



Mack Transmission T2060A Service Manual

Pro Gear Mack Transmission T2060A Service Manual to assist in identifying the parts for your Mack Transmission unit.

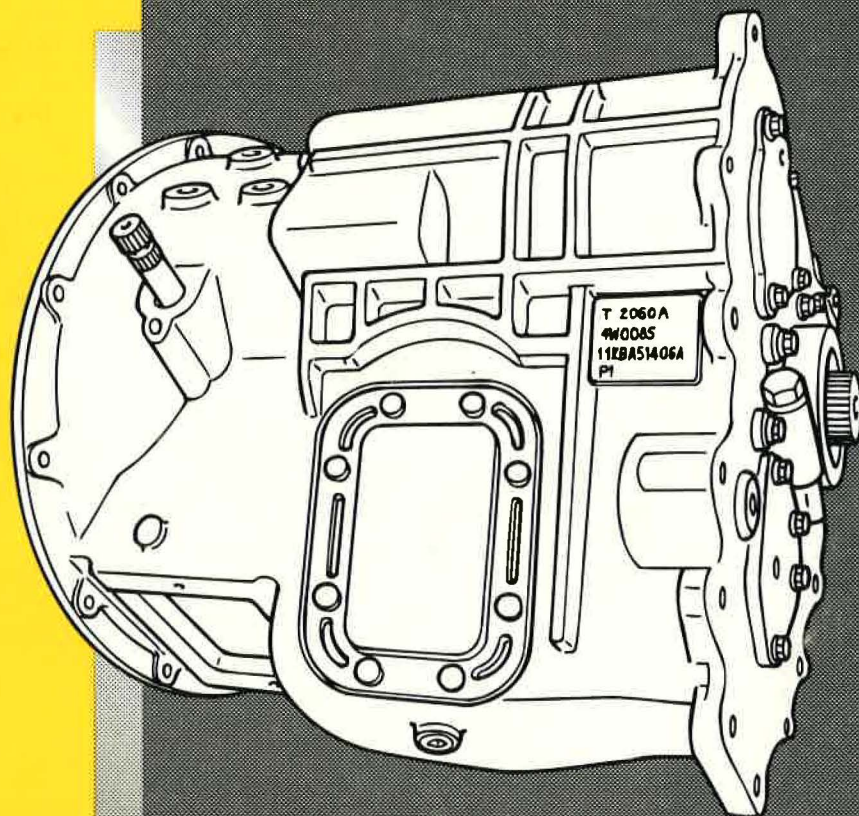
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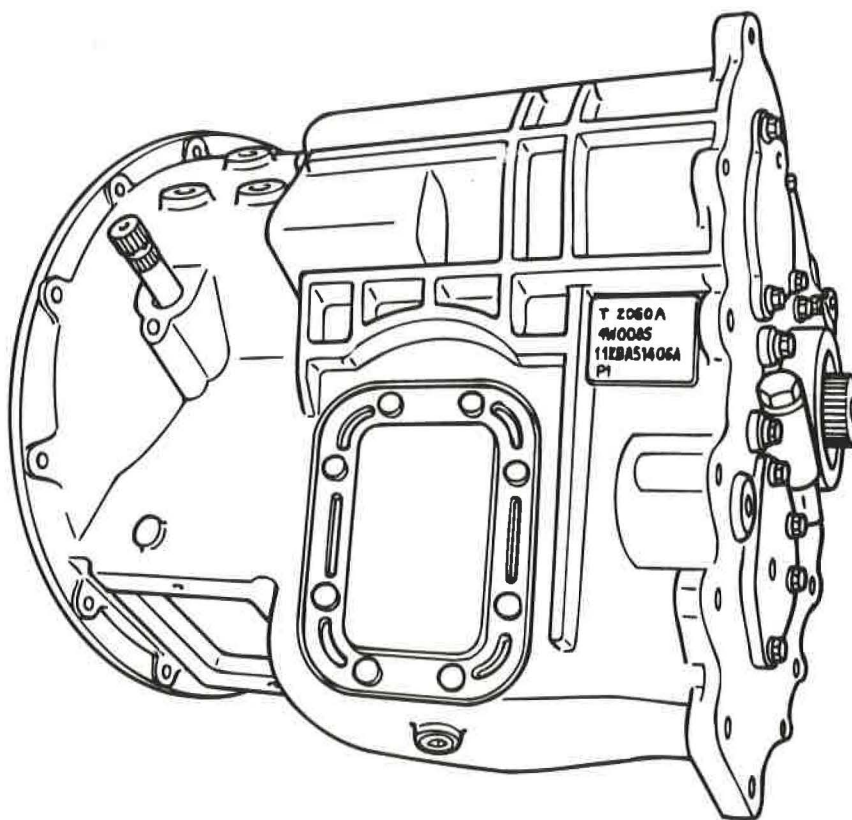
TRANSMISSION T2060A SERVICE MANUAL



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TRANSMISSION **T2060A** SERVICE MANUAL



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(NEW ISSUE) 5M

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ATTENTION

The information in this manual is not all inclusive and cannot take into account all unique situations. Note that some illustrations are typical and may not reflect the exact arrangement of every component installed on a specific chassis.

The information, specifications, and illustrations in this publication are based on information that was current at the time of publication.

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SAFETY INFORMATION

SAFETY INFORMATION



SAFETY INFORMATION

Advisory Labels

Cautionary *signal words* (Danger-Warning-Caution) may appear in various locations throughout this manual. Information accented by one of these signal words must be observed to minimize the risk of personal injury to service personnel, or the possibility of improper service methods which may damage the vehicle or render it unsafe. Additional Notes and Service Hints are utilized to emphasize areas of procedural importance and provide suggestions for ease of repair. The following definitions indicate the use of these advisory labels as they appear throughout the manual:

CAUTION

Directs attention to unsafe practices which could result in damage to equipment and possible subsequent personal injury or death if proper precautions are not taken.

WARNING

Directs attention to unsafe practices which could result in personal injury or death if proper precautions are not taken.

DANGER

Directs attention to unsafe practices and/or existing hazards which will result in personal injury or death if proper precautions are not taken.

NOTE

An operating procedure, practice, condition, etc., which is essential to emphasize.

SERVICE HINT

A helpful suggestion which will make it quicker and/or easier to perform a certain procedure, while possibly reducing overhaul cost.



SAFETY INFORMATION

Service Procedures and Tool Usage

Anyone using a service procedure or tool not recommended in this manual must first satisfy himself thoroughly that neither his safety nor vehicle safety will be jeopardized by the service method he selects. Individuals deviating in any manner from the instructions provided assume all risks of consequential personal injury or damage to equipment involved.

Also note that particular service procedures may require the use of a special tool(s) designed for a specific purpose. These special tools must be used in the manner described, whenever specified in the instructions.

WARNING

1. Before starting a vehicle, always be seated in the driver's seat, place the transmission in neutral, be sure that parking brakes are set, and disengage the clutch.
2. Before working on a vehicle, place the transmission in neutral, set the parking brakes, and block the wheels.
3. Before towing the vehicle, place the transmission in neutral and lift the rear wheels off the ground, or disconnect the driveline to avoid damage to the transmission during towing.

**REMEMBER,
SAFETY ... IS NO ACCIDENT!**



NOTES



EXPLANATION OF NUMERICAL CODE

EXPLANATION OF NUMERICAL CODE



EXPLANATION OF NUMERICAL CODE

EXPLANATION OF 3-DIGIT NUMERICAL CODE

The organization of MACK service manuals has been upgraded to standardize manual content according to a reference system based on component identification. The new reference system will help to link the information contained in this publication with related information included in other MACK service-warranty publications, such as associated service bulletins, warranty manuals, and the TS477 Labor Time Standards Manual.

The system is based on a numerical code, the first **digit** of which identifies the general component grouping as listed here:

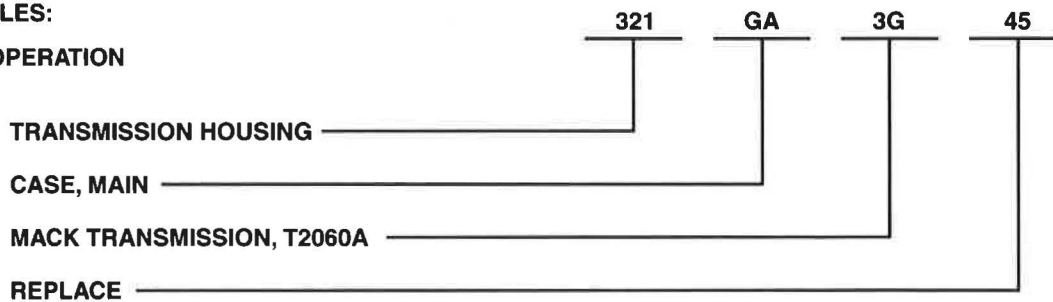
- GROUP 000 — INSPECTIONS
- GROUP 100 — CHASSIS
- GROUP 200 — ENGINE

- GROUP 300 — CLUTCH, TRANSMISSION, TRANSFER CASE AND PTO
- GROUP 400 — STEERING, AXLES, WHEELS & TIRES, DRIVELINE
- GROUP 500 — BRAKES, AUXILIARY SYSTEMS
- GROUP 600 — CAB, TRUCK BODY
- GROUP 700 — ELECTRICAL

The second two digits of the 3-digit code are used to identify the **system, assembly** or **subassembly**, as appropriate, within each of the groupings. The codes applicable to this publication are shown at the TOP OF EACH PAGE and at SECTION HEADINGS as necessary, and may also appear in the TABLE OF CONTENTS, to guide you to specific component information.

EXAMPLES:

BASE OPERATION



301255a



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300 TRANSMISSION IDENTIFICATION

TRANSMISSION IDENTIFICATION



300 TRANSMISSION IDENTIFICATION

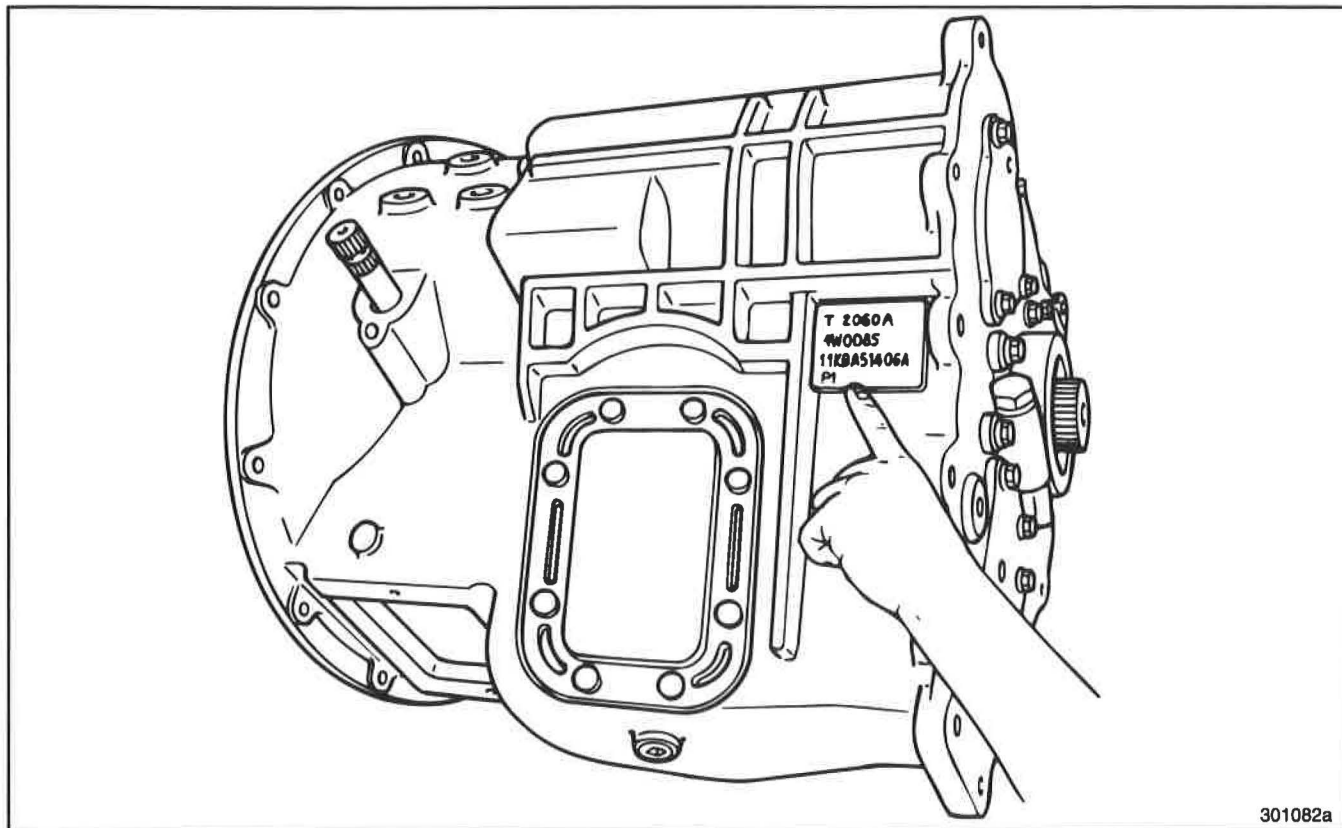


Figure 1 — Location of Identification Stamping on Left Side of Case

UNIT IDENTIFICATION STAMPING

The following model code information represents the identification stamping on the left side of the transmission case, toward the rear.

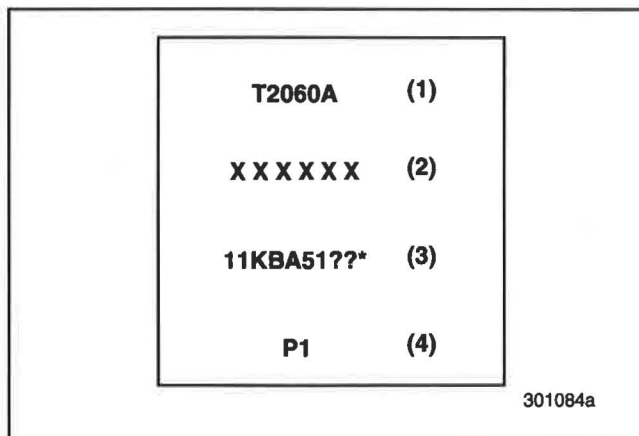


Figure 2 — Identification Stamping

The illustration numbers in parentheses are explained as follows:

(1) Unit Symbol Identification

T = Transmission

2 = 200 Series

06 = Usable forward speeds

0 = Overdrive

A = Designed with gathered ratio steps

(2) Transmission Serial Number

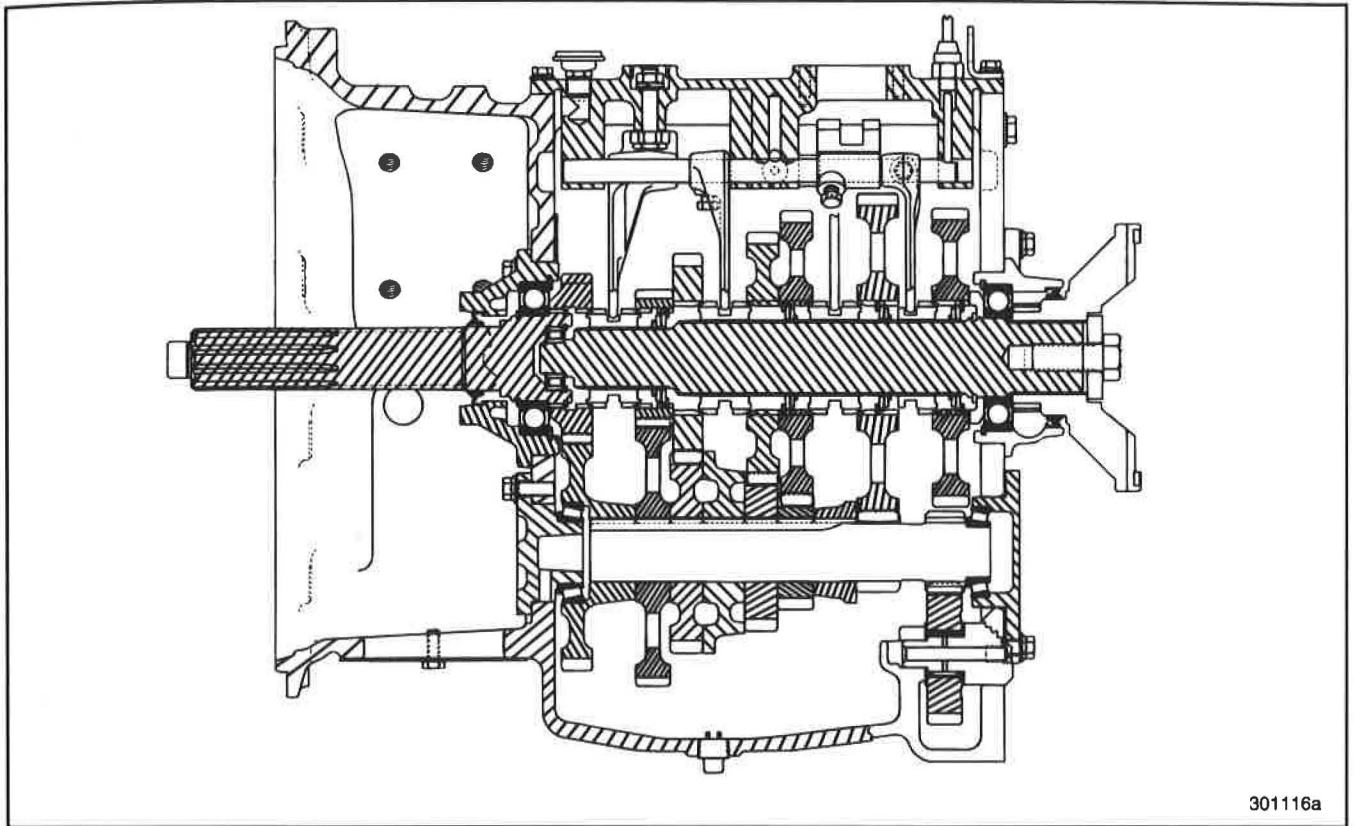
(3) Transmission Assembly (Part) Number

* = digits may vary

(4) Assembly Number Revision Level



300 TRANSMISSION IDENTIFICATION



301116a

Figure 3 — Cutaway View of T2060A Transmission



NOTES



300 DESCRIPTION AND OPERATION

DESCRIPTION AND OPERATION



300 DESCRIPTION AND OPERATION

T2060A TRANSMISSION

Description

The T2060A transmission is a triple-countershaft, non-synchronized unit. It consists of a compact transmission case, which houses the six forward-speed gear sets of a gathered ratio design (steps between ratios become smaller with faster ratios), plus a reverse gear set. Thus, the T2060A has six forward speeds and one reverse speed.

The transmission case and bell housing are a one-piece casting, made of aluminum and heat-treated for strength.

The bearings are housed in cast-iron bearing retainers (covers). Tapered roller bearings are used at each end of the three countershafts.

All gears are of the spur type design and are in constant mesh with mating gears. All shifting is done by forks and sliding clutches. The shift rails and forks are integral with the shift cover.

A single gear shift lever is used to shift through a standard "H" plus pattern.

This transmission is compatible with the MaxiCruise™ E7 and the EM7 Maxidyne™ engines. It is not compatible with conventional torque-rise engines unless an auxiliary transmission is used.

A four-rail shifter cover is used. A non-standard SAE Power Take-Off (PTO) gear set is available for the six- and eight-bolt case openings. Only a PTO compatible with this transmission is acceptable. A MACK rear-mounted countershaft PTO is also available.

The three countershafts of the T2060A are equally spaced around the mainshaft. This design distributes the load evenly among the three countershafts, thus keeping normal deflection and gear tooth loading to a minimum. The design also allows a shorter transmission length, which improves driveline angularity.

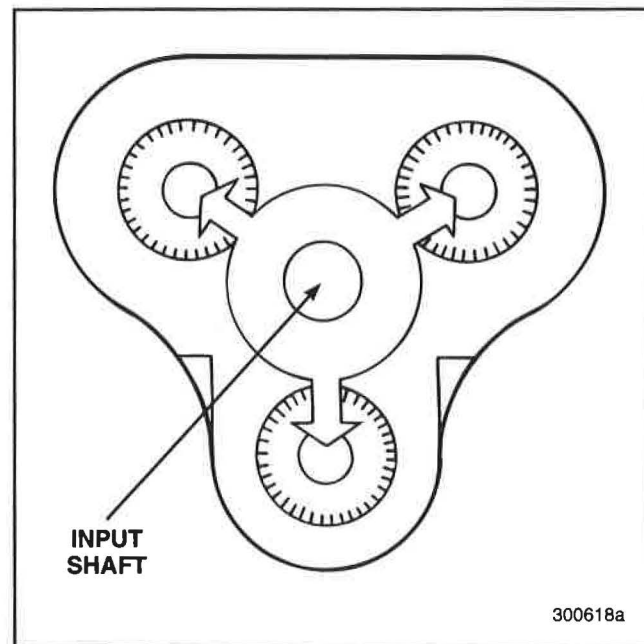


Figure 4 — Equal Torque Distribution



300 DESCRIPTION AND OPERATION

TRANSMISSION SPECIFICATIONS AND CAPACITIES

Make	Mack Trucks, Inc.
Type	Overdrive, Triple Countershaft
Controls: T2060A	Selective, One Lever Manual
Speeds	T2060A: Six Forward, One Reverse
Bell Housing	SAE No. 1, Integral with Main Case
Case	Cast Aluminum, Heat Treated
Gears	Spur Type
Shaft Splines	Fine Pitch Rolled Involute
Lubrication	Splash Lubrication
Oil Filter	Integral, Magnetic
Drain Plug	Magnetic
PTO Openings: Left Side	Standard SAE 8-Hole — Non-Standard Gear
Right Side	Standard SAE 6-Hole — Non-Standard Gear
PTO Non-Standard Gear	Fourth Speed Countershaft Gear (40-Tooth Gear with 17.5 Degree Pressure Angle, 6.56 Diametrical Pitch)
Oil Capacity: T2060A	Approx. 20 Pints (depends on angle of installation in chassis)

Recommended SAE Grade Gear Oil For All Temperature Operations: T2060A

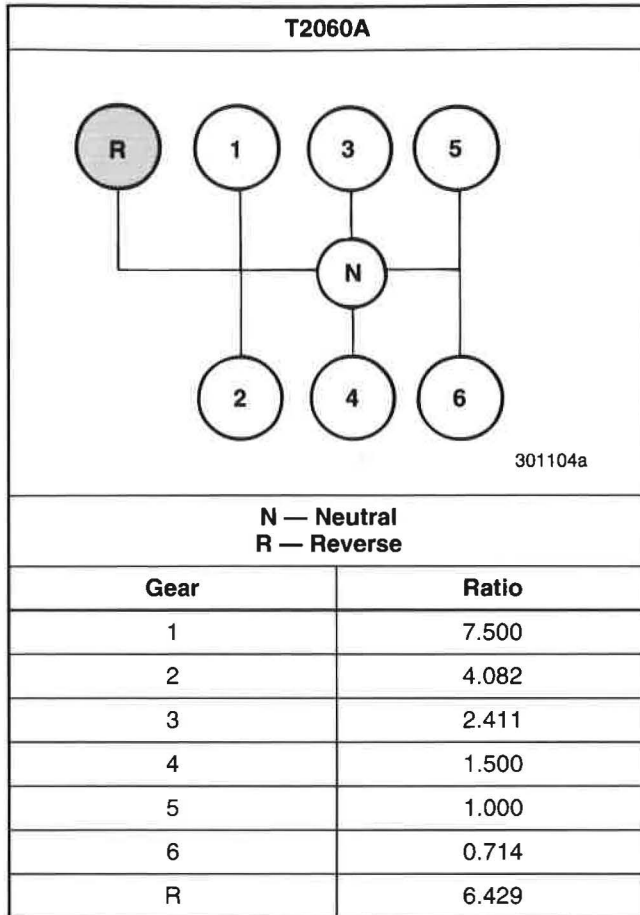
- Mack® GO-J Specification 90, 140, 80W-90, 80W-140, 85W-140 for Mineral Base
- Mack® GO-J Plus* Specification 75W-90, 75W-140, 80W-140 for Synthetic base

*GO-J Plus is required for MACK geared component extended service drain intervals.



300 DESCRIPTION AND OPERATION

GEAR RATIOS AND SHIFT PATTERN



T2060A SHIFTING INSTRUCTIONS

The T2060A is a six-speed, overdrive transmission designed for general highway use. It is a non-synchronized model that shifts using a single shift lever in the traditional "H" plus pattern, with reverse to the left and forward. Start out in first gear and shift up to second, third, fourth, fifth and sixth, double clutching from one gear to the next.

Downshift in reverse order, double clutching through each gear.

CAUTION

Be careful not to overspeed the engine during downshifting. Damage to powertrain components may result.

The shift marker plate is a decal that can be found in various cab locations.

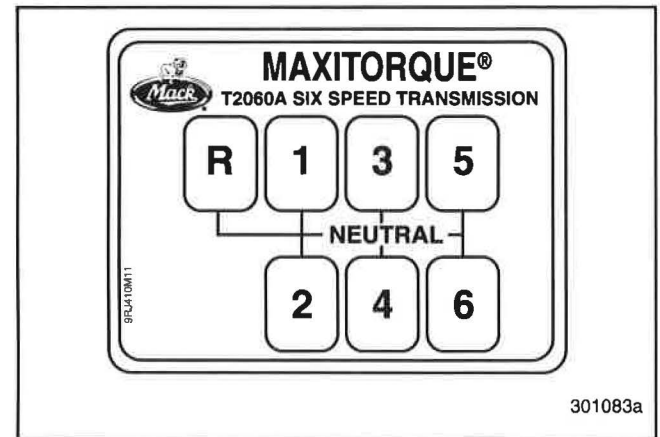


Figure 5 — Shift Marker Plate Decal



300 DESCRIPTION AND OPERATION

T2060A POWER FLOW DIAGRAMS

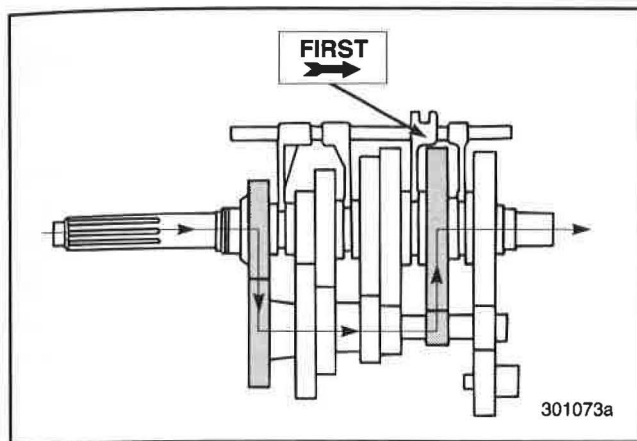


Figure 6 — First Speed

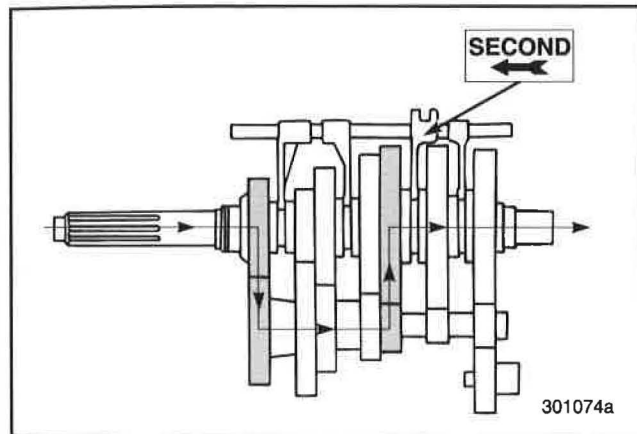


Figure 7 — Second Speed

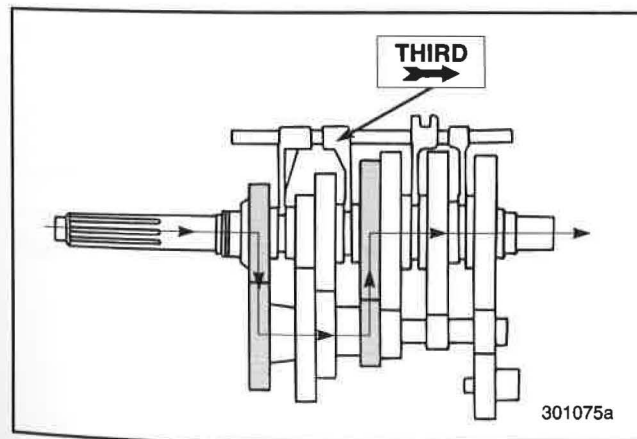


Figure 8 — Third Speed

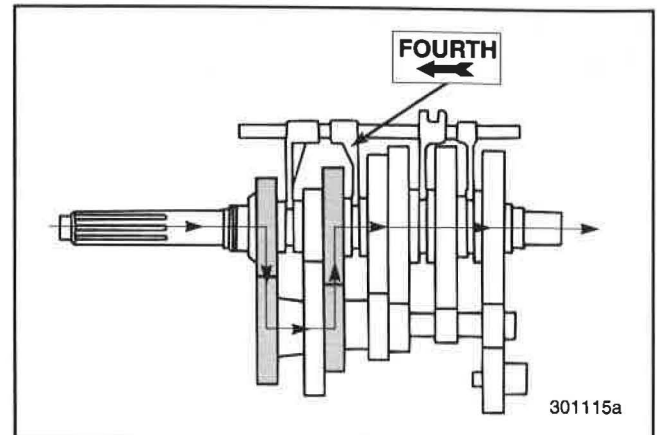


Figure 9 — Fourth Speed

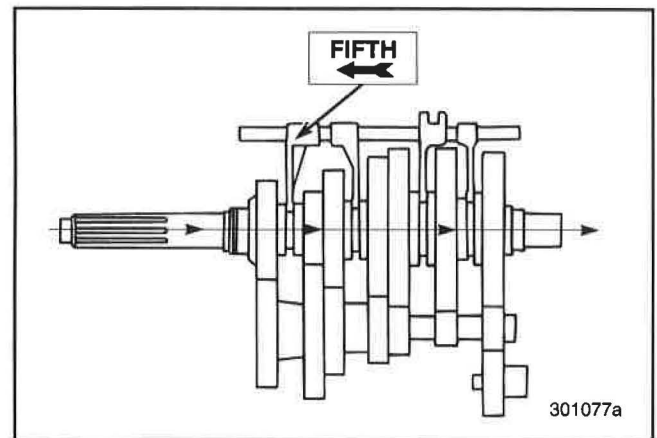


Figure 10 — Fifth Speed



300 DESCRIPTION AND OPERATION

T2060A POWER FLOW DIAGRAMS (CONT.)

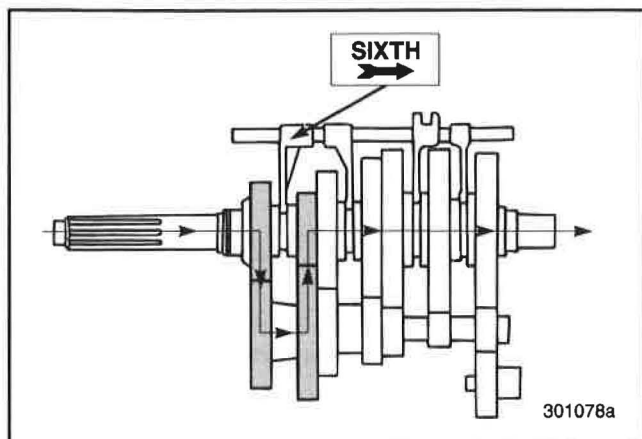


Figure 11 — Sixth Speed

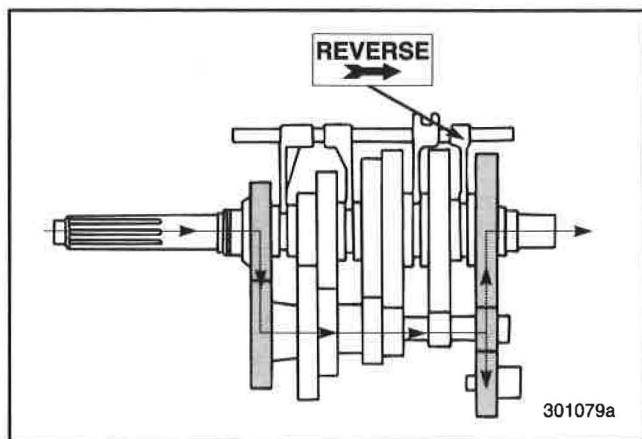


Figure 12 — Reverse Speed

LUBRICATION

Splash Lubrication

All parts inside the transmission are lubricated by a splash-and-gravity system. Only the lower countershaft dips into the lubrication oil to minimize churning. As the gears on that countershaft spin, a constant spray of oil is directed to all internal parts of the transmission. The oil cools as it circulates over the aluminum case. Troughs and passages, cast into the inside of the case, capture and direct oil to the bearings.

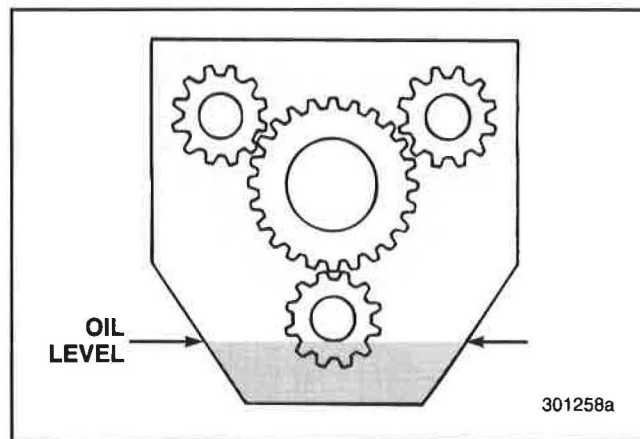


Figure 13 — Splash Lubrication



300 DESCRIPTION AND OPERATION

Magnetic Oil Filter

A magnetic oil filter assembly is built into the right side of the transmission case. It consists of a trough arrangement cast into the inside wall of the case and a removable cover plate (1). The trough is open at the top to collect oil. The oil is then channelled past a magnetic plug (2), which removes ferrous metallic particles from the passing oil. After passing the magnetic plug, the oil is channelled upward to an outlet, where it returns by gravity down into the transmission case sump. The magnetic plug is removable from the outside of the transmission. The drain plug at the bottom of the case is also magnetic.

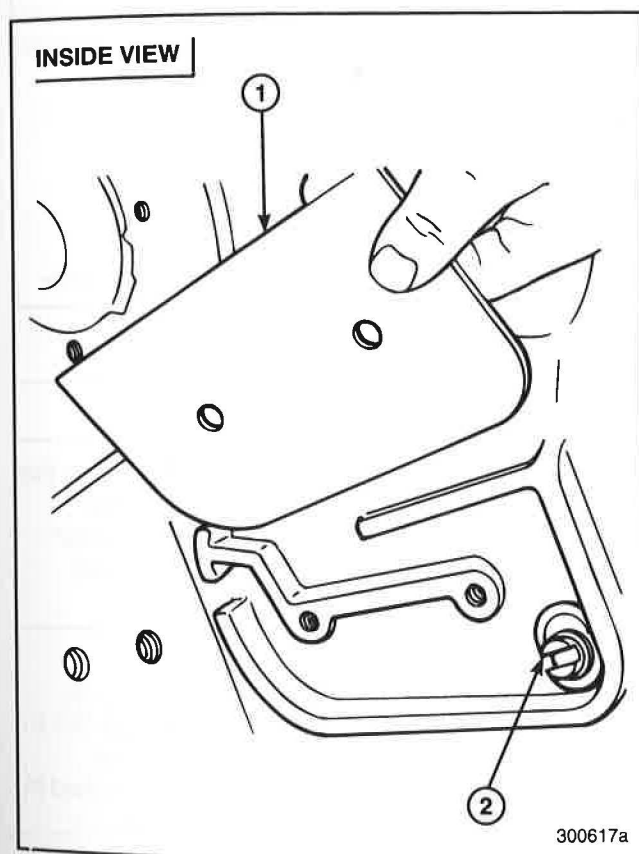


Figure 14 — Magnetic Oil Filter Viewed from Inside Case

MAINTENANCE

Checking Oil

WARNING

Be careful not to burn your finger in hot gear oil when checking oil level in transmission.

To check the transmission oil, remove the filler plug on the right-hand side of the case. The oil should be level with the bottom of the filler plug hole (Figure 15).

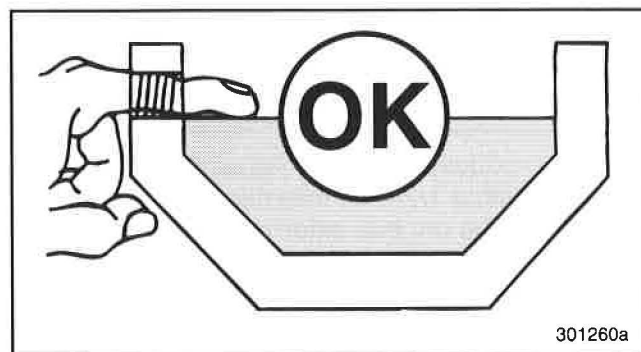


Figure 15 — Correct Oil Level

If oil can only be felt by reaching your finger down into the unit, the oil level is too low (Figure 16).

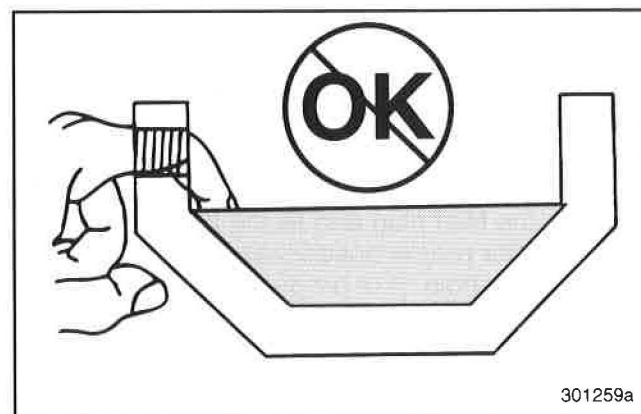


Figure 16 — Incorrect Oil Level



300 DESCRIPTION AND OPERATION

NOTE

Check the oil when it is at normal operating temperature. The vehicle should be in a level position, both front-to-rear and side-to-side.

Check the level of the oil at the intervals specified in the Maintenance and Lubrication Manual (TS494). Add oil, if needed, until the oil begins to run out of the filler plug hole. Use oil of the proper specification (refer to Transmission Specifications and Capacities found in the Description and Operation section of this manual).

Changing Oil

NOTE

Current production T2060A transmissions are now built with a 1/2-inch internal square-drive drain plug. The original external square-drive drain plug is completely interchangeable with the new internal drive plug. Tightening torque range for both remains the same at 25-30 lb-ft (34-41 N·m).

When changing the oil in the transmission, the oil should be at normal operating temperature. Remove the magnetic drain plug from the bottom of the transmission case, and drain the hot oil from the unit into an industry-approved recovery container. Clean and reinstall the magnetic drain plug, then tighten plug to 25-30 lb-ft (34-41 N·m) torque.

Remove the filler plug and fill the transmission with oil of the proper specification to the level of the filler plug hole. (For proper oil specification, refer to Transmission Specifications and Capacities found in this section.)

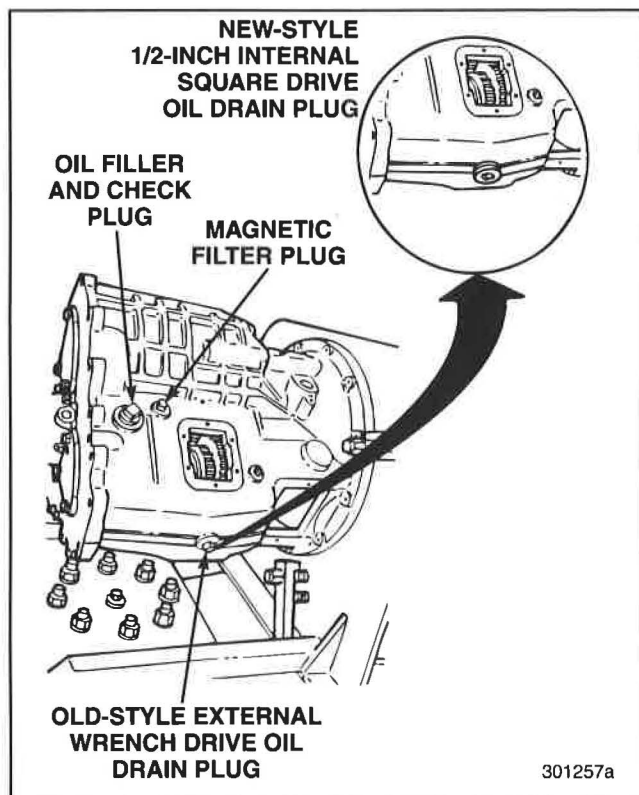


Figure 17 — Plug Locations

CAUTION

Be sure to add oil to the transmission through the filler hole, NOT the magnetic filter plug hole. Severe damage due to low oil level may occur because the baffles of the magnetic filter will prevent proper filling.

Reinstall and snug the filler plug by hand only. Then wrench tighten the plug an additional 3/4 to one turn, not exceeding 55 lb-ft (75 N·m) of torque. Change the oil at the intervals specified in the Maintenance and Lubrication Manual (TS494).



300 DESCRIPTION AND OPERATION

Magnetic Oil Filter

Remove the magnetic oil filter plug and clean the magnet in the plug every time the oil is changed. Also clean the trough inside and then reinstall the magnetic plug. Tighten the plug to 25–30 lb-ft (34–41 N·m) torque.

Air Breathers

The T2060A has one air breather located on the case top cover. The air breather should be removed every time the oil is changed and cleaned with a suitable solvent. Also check to be sure that airflow through the breather is unobstructed. Reinstall breather into case top cover and tighten until snug.



NOTES



300 DISASSEMBLY

DISASSEMBLY



300 DISASSEMBLY

[320] TRANSMISSION DISASSEMBLY PROCEDURES

NOTE

Unless a complete overhaul is necessary, remove only those parts required to gain access to faulty parts. Do not disturb parts with a heavy press fit (interference fit) unless replacement is necessary. When replacement is necessary, use proper press setups and pullers to prevent damage to usable parts.

1. Clean the transmission externally and mount it in an overhaul stand. Drain the lubricant.
2. Remove the clutch release bearing assembly, shafts, yoke and clutch brake.
3. Remove the transmission case shift cover capscrews.

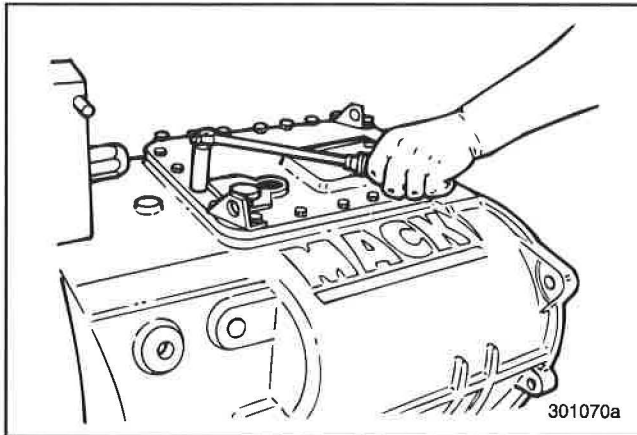


Figure 18 — Removing Case Cover Capscrews

4. Remove the transmission case shift cover assembly.

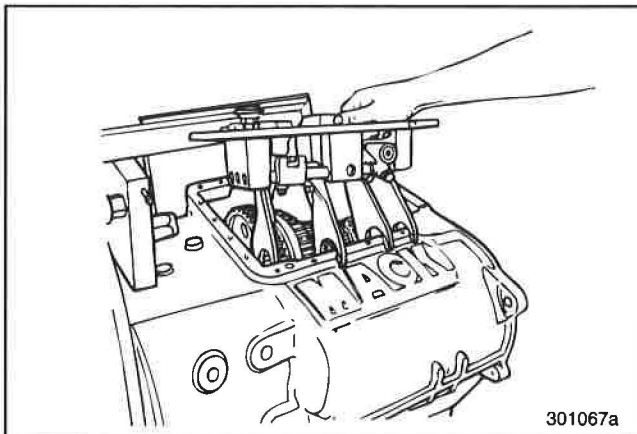


Figure 19 — Removing Case Shift Cover

5. Remove the drive yoke or drive flange by first separating the capscrew and clamp plate.

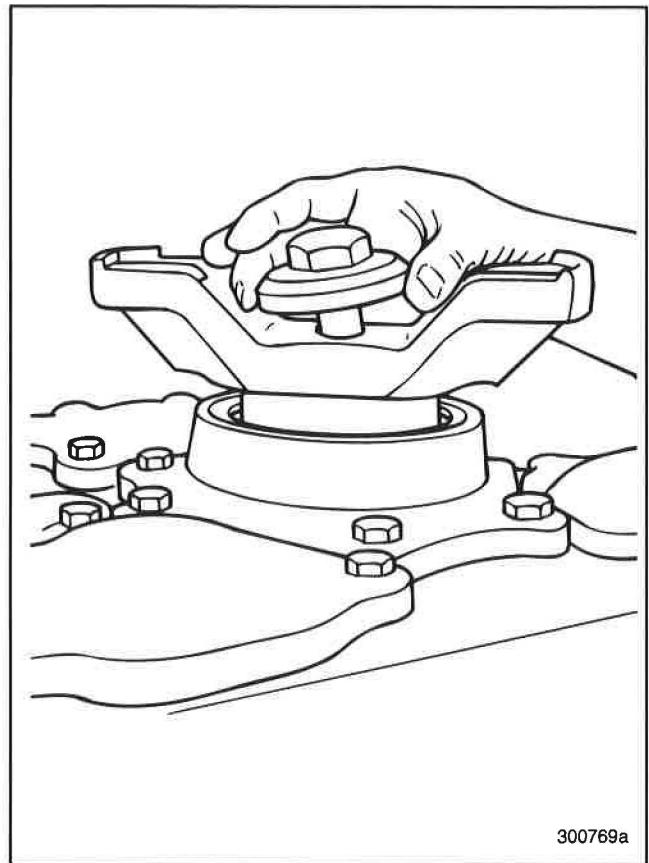


Figure 20 — Removing Clamp Plate and Capscrew

6. Remove the output yoke from the rear of the transmission, using a suitable puller, such as bar-type puller J 39477-1 or equivalent.

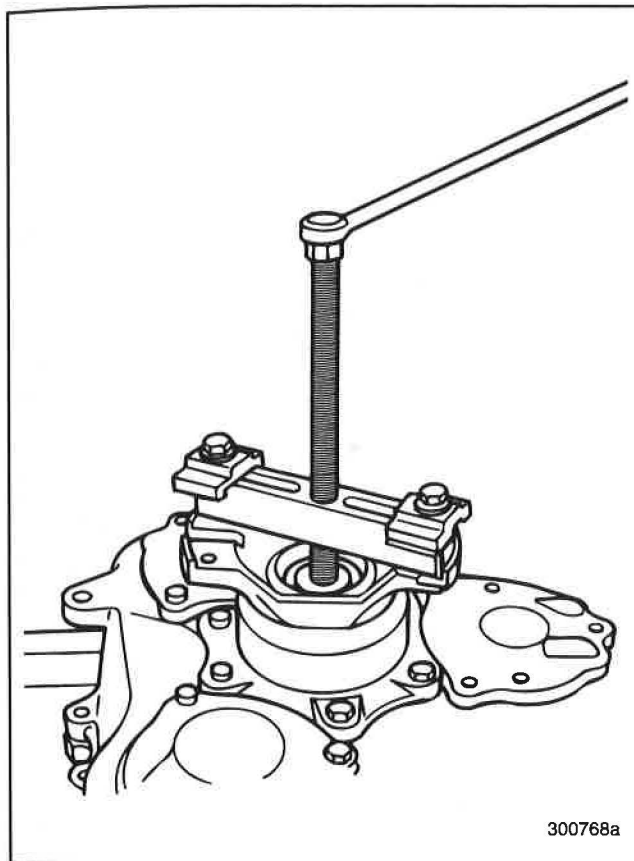


Figure 21 — Removing Drive Yoke (Drive Flange)

7. Using a large screwdriver or pry bar, shift the transmission gears into neutral by centering the sliding clutches. This may require tapping the gears with a soft-faced hammer. (Verify that the transmission is in neutral.)
8. Number the countershaft front and rear bearing covers, using a grease pencil. Write number one (1) on the upper right front cover (viewed from front), number two (2) on the upper left front cover (viewed from front), and number three (3) on the lower front cover. Write number one (1) on the upper left rear cover (viewed from rear), number two (2) on the upper right rear cover (viewed from rear), and number three (3) on the lower rear cover.

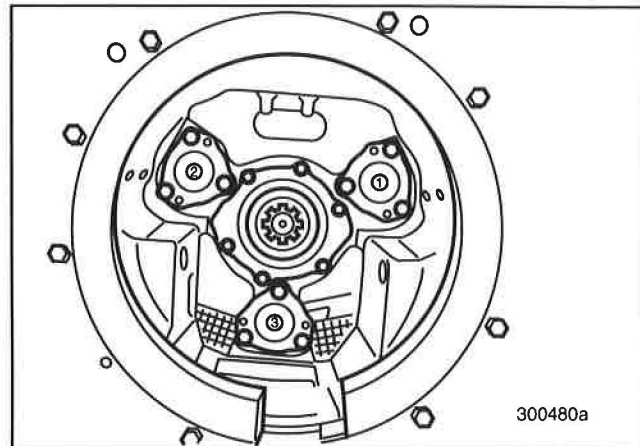


Figure 22 — Mark Countershaft Front Bearing Covers for Placement

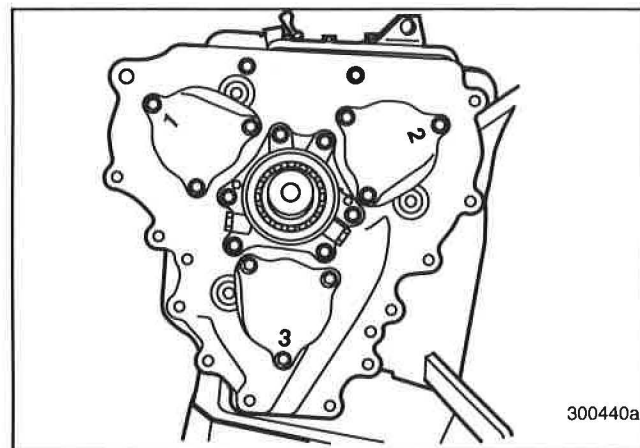


Figure 23 — Mark Countershaft Rear Bearing Covers for Placement

9. Position the transmission case horizontally. Remove the main drive pinion bearing cover capscrews.

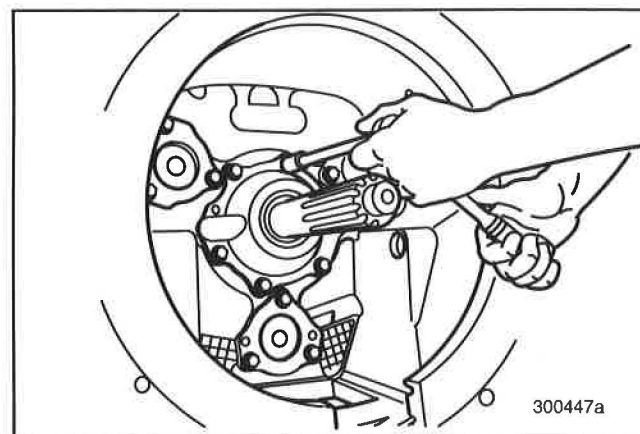


Figure 24 — Removing Main Drive Pinion Bearing Cover Capscrews



300 DISASSEMBLY

10. Remove the main drive pinion bearing assembly. Jackscrew holes (see arrows) are provided to assist the removal.

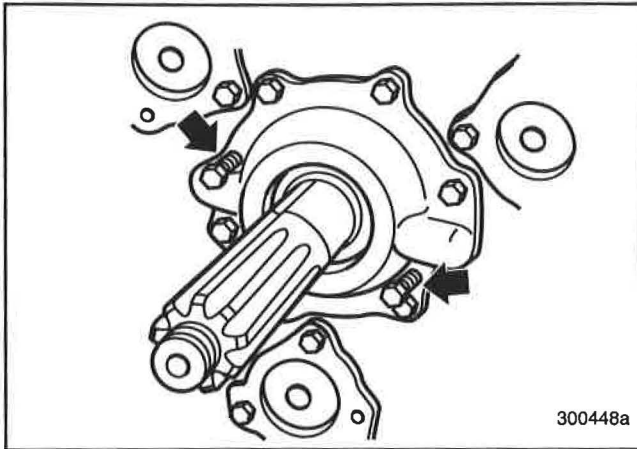


Figure 25 — Using Jackscrews to Remove Main Drive Pinion Assembly

11. Remove main drive pinion bearing assembly from the case.

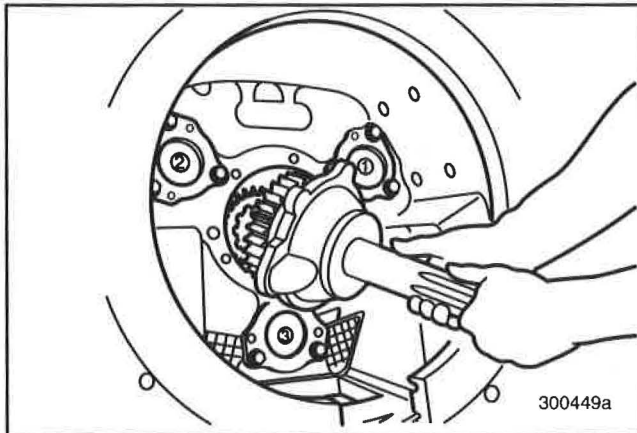


Figure 26 — Removing Main Drive Pinion Assembly from Case

12. Remove the fifth/sixth sliding clutch.

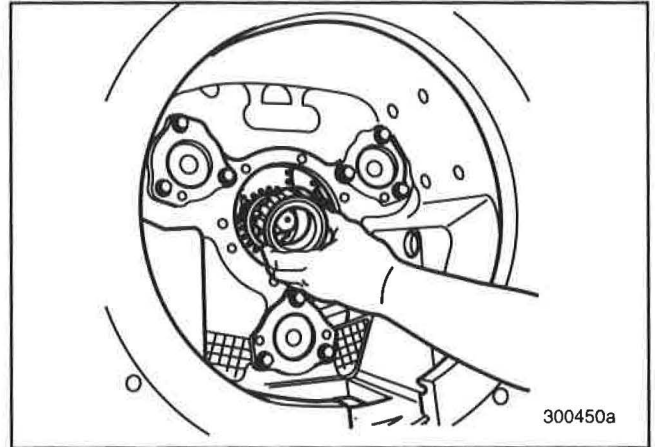


Figure 27 — Removing Fifth/Sixth Sliding Clutch

13. Remove the No. 2 (upper left, as viewed from the front) countershaft front bearing cover capscrews.

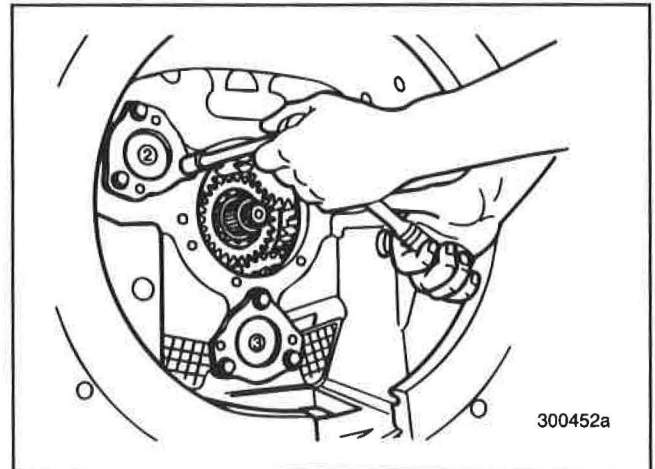


Figure 28 — Removing No. 2 (Upper Left) Countershaft Front Bearing Cover Capscrews

14. Remove the No. 2 (upper left, as viewed from the front) countershaft front bearing cover, using jackscrews.

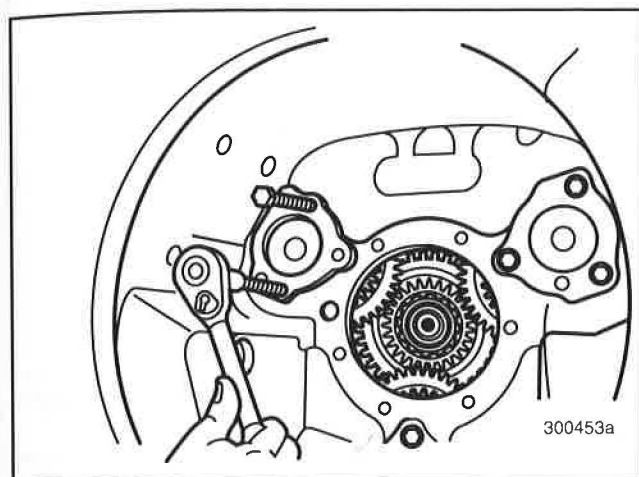


Figure 29 — Removing No. 2 (Upper Left) Countershaft Front Bearing Cover, Using Jackscrews

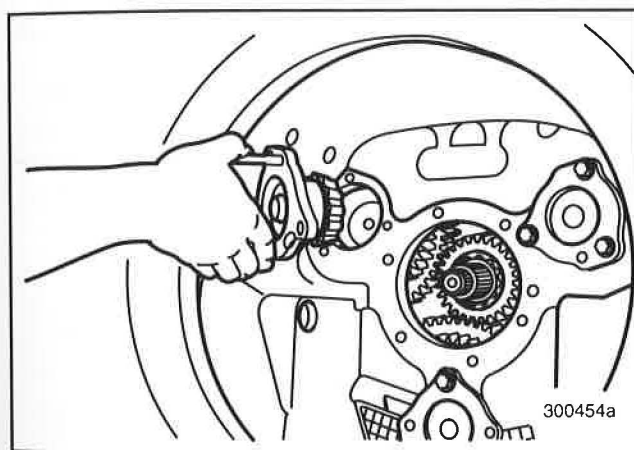


Figure 30 — No. 2 (Upper Left) Countershaft Front Bearing Cover Removed

15. Remove the No. 2 (upper right, as viewed from the rear) countershaft rear bearing cover capscrews.

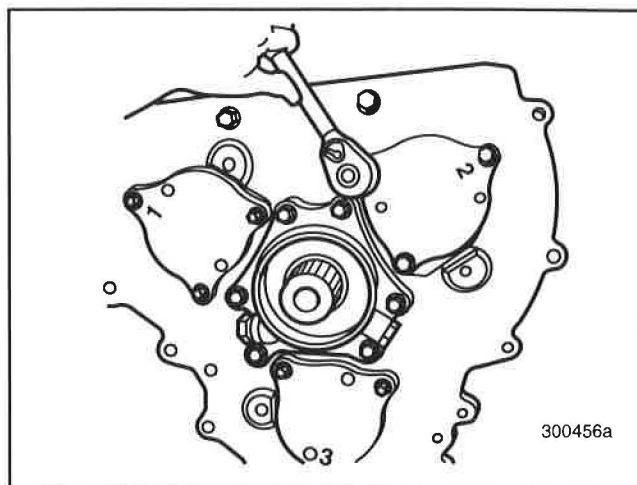


Figure 31 — Removing No. 2 (Upper Right) Countershaft Rear Bearing Cover Capscrews

16. Remove the jackscrew plugs from all three countershaft rear bearing covers.

NOTE

Pry the plugs loose using a thin knife-edge or similar tool. Do not cut through plugs during removal. Save for reuse or replace if necessary.

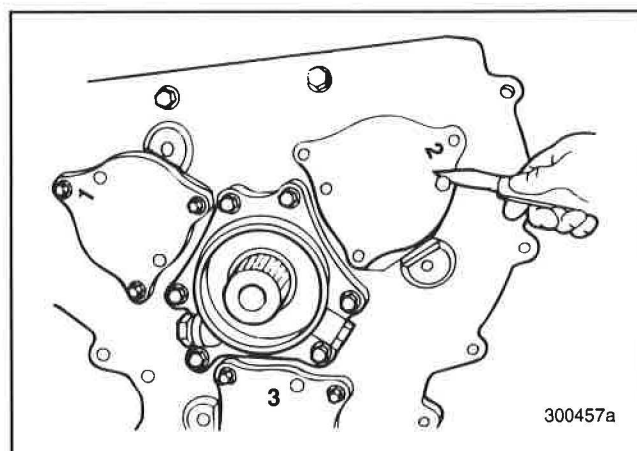


Figure 32 — Removing Jackscrew Plugs from Countershaft Rear Bearing Covers

17. Remove the No. 2 (upper right, as viewed from the rear) countershaft rear bearing cover, using jackscrews.

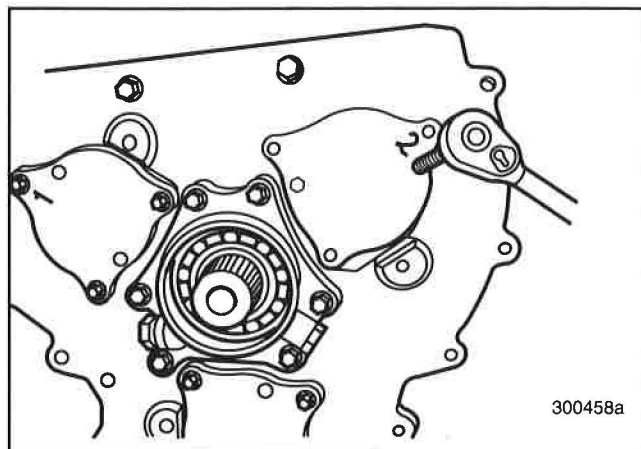


Figure 33 — Using Jackscrews to Remove No. 2 (Upper Right) Countershaft Rear Bearing Cover

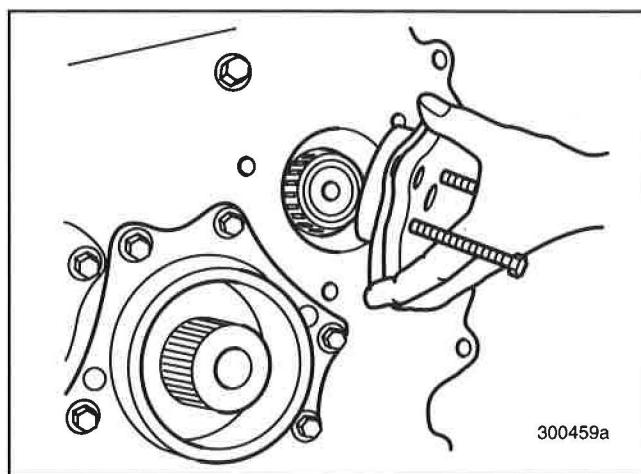


Figure 34 — No. 2 (Upper Right) Countershaft Rear Bearing Cover Removed

18. Remove the mainshaft rear bearing cover capscrews.

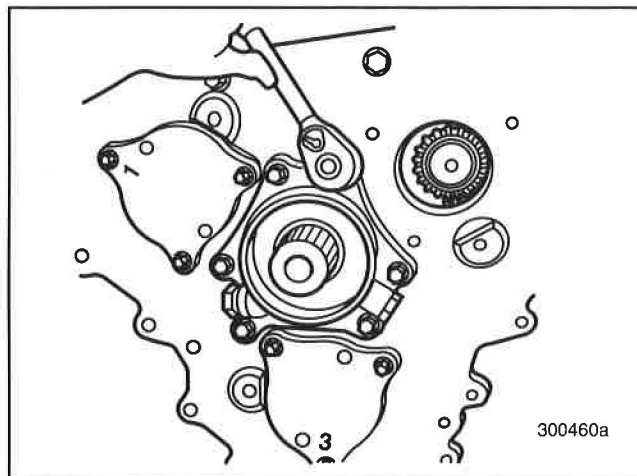


Figure 35 — Removing Mainshaft Rear Bearing Cover Capscrews

19. Remove the mainshaft rear bearing cover jack screw plugs.
20. Remove the mainshaft rear bearing cover, using jackscrews.

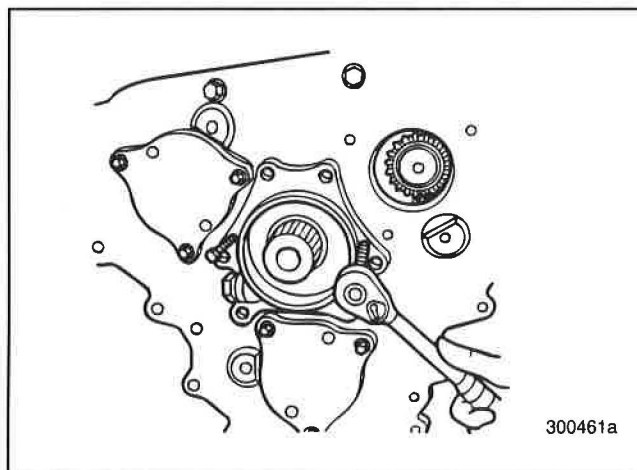


Figure 36 — Removing Mainshaft Rear Bearing Cover, Using Jackscrews

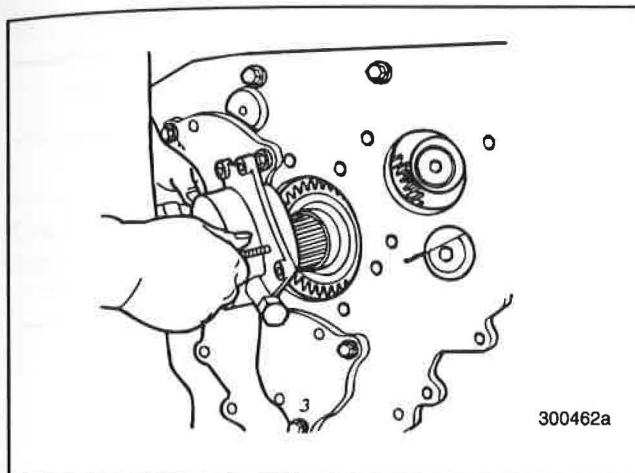


Figure 37 — Mainshaft Rear Bearing Cover Removed

21. Drive the mainshaft rearward in the case. To protect the end of the shaft, use a soft mallet or a wood block cushion.
22. Remove the No. 2 (upper right, as viewed from the rear) countershaft from the transmission case, front end first, as shown.

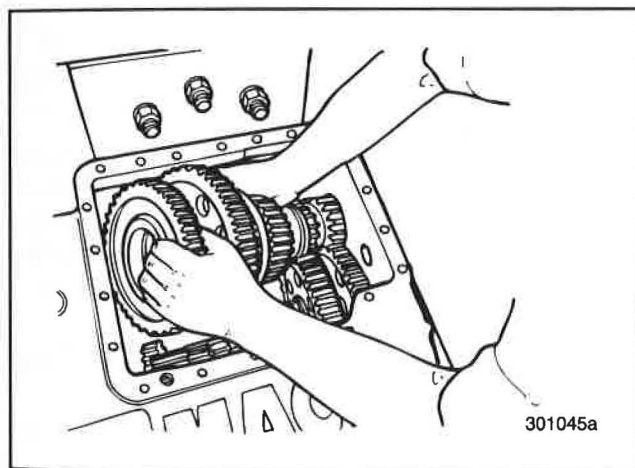


Figure 38 — Removing No. 2 (Upper Right) Countershaft from Transmission Case

23. Remove the upper right reverse idler shaft expansion (welsh) plug (next to No. 2 countershaft location), using a hammer and sharp punch.

CAUTION

This action destroys the expansion plug. Make sure replacement expansion plugs are available.

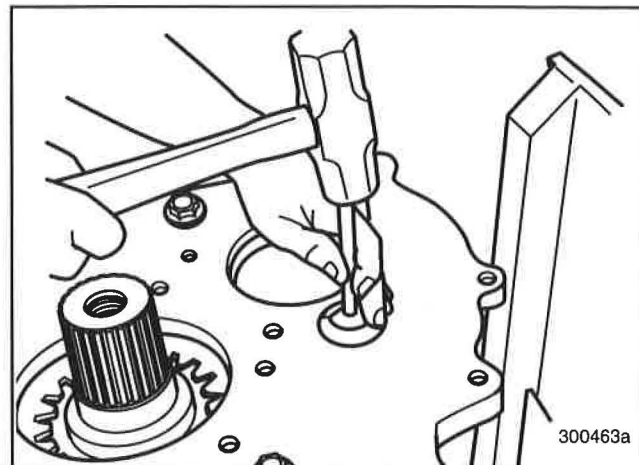


Figure 39 — Removing Upper Right Reverse Idler Shaft Expansion Plug

24. Using tool J 34630 or slide hammer, remove the upper right reverse idler shaft. To prevent damage to the reverse idler gear, catch the gear as it separates from the shaft. Also, catch the thrust washers and save for reassembly.

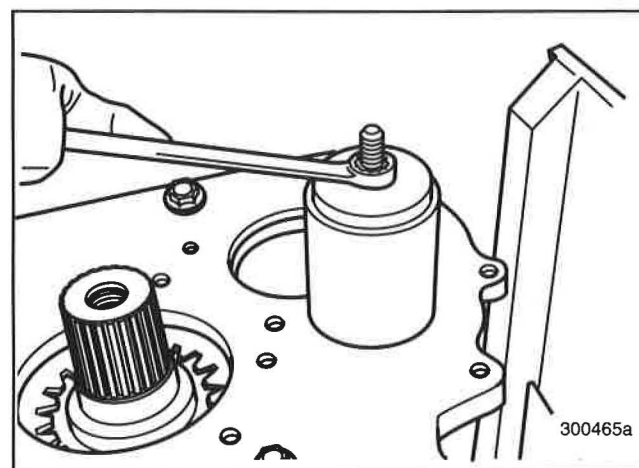


Figure 40 — Using Tool J 34630 to Remove Reverse Idler Shaft

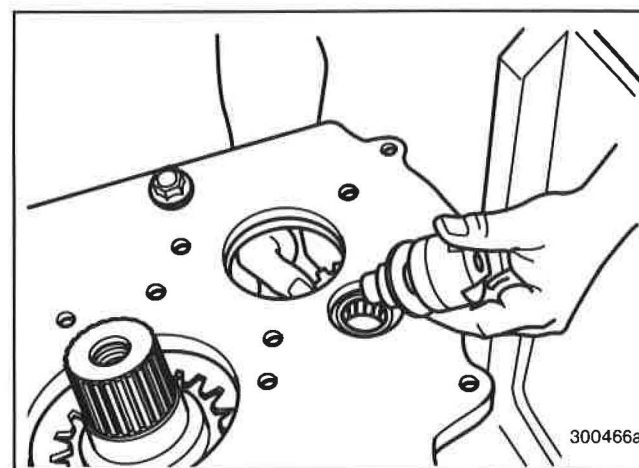


Figure 41 — Removing Reverse Idler Gear and Shaft

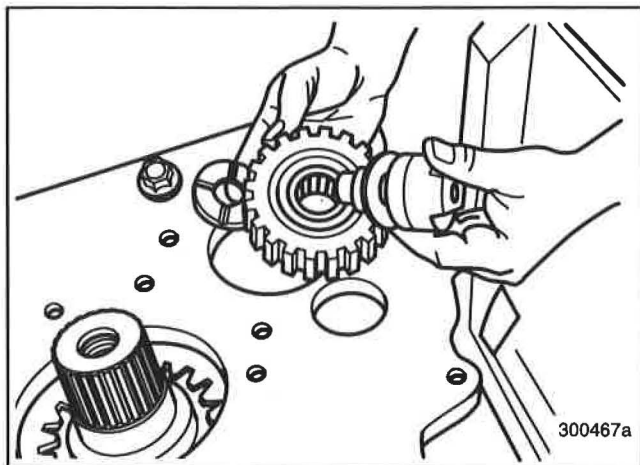


Figure 42 — Reverse Idler Gear and Shaft Removed

25. Remove the No. 1 (upper left) countershaft rear bearing cover capscrews as performed previously for the No. 2 (upper right) countershaft. Refer to Step 15.

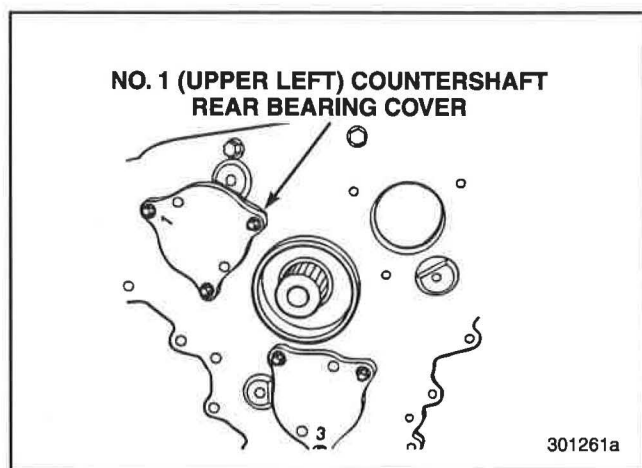


Figure 43 — Remove Cover Capscrews

26. Remove the No. 1 (upper left) countershaft rear bearing cover, using jackscrews as performed previously for the No. 2 (upper right) countershaft. Refer to Step 17.

27. Remove the upper left through bolt.

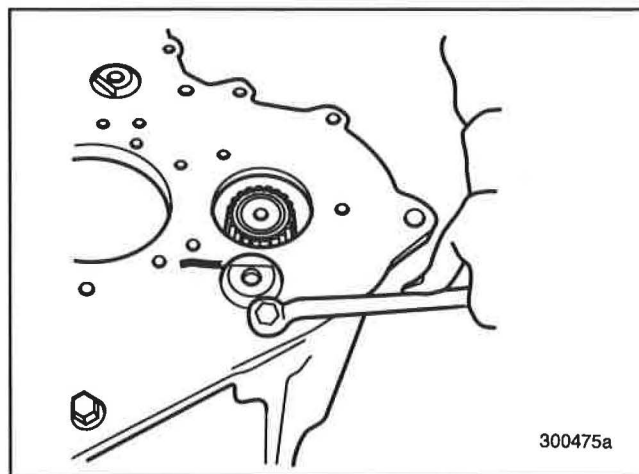


Figure 44 — Removing Upper Left Through Bolt

28. Remove the upper left reverse idler shaft expansion (welsh) plug (next to No. 1 countershaft), using a hammer and sharp punch as done in Step 23.

CAUTION

This action destroys the expansion plug. Make sure replacement expansion plugs are available.

29. Using tool J 34630 or slide hammer, remove the upper left reverse idler shaft. To prevent damage to the reverse idler gear, catch the gear as it separates from the shaft as done in Step 24. Also, catch the thrust washers and save for reassembly.
30. Remove the thrust washer (spacer) from the rear of the mainshaft. See arrow.

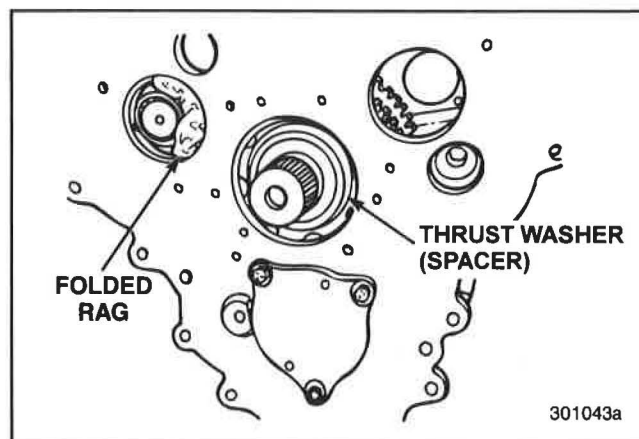


Figure 45 — Removing Thrust Washer (Spacer) from Mainshaft

31. Remove the rear snap ring from the mainshaft, using suitable metric snap ring pliers.

SERVICE HINT

The rear snap ring on the mainshaft requires metric snap ring pliers for removal.

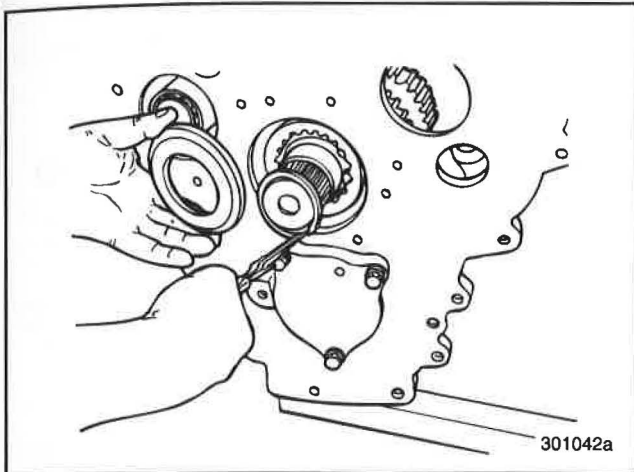


Figure 46 — Removing Rear Snap Ring from Mainshaft

32. Remove the snap ring from inside the reverse gear.

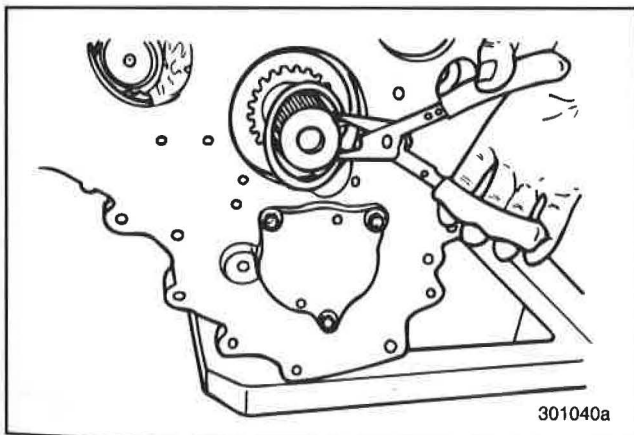


Figure 47 — Removing Reverse Gear Snap Ring

33. From the case top opening, slide the reverse gear over the reverse clutch.

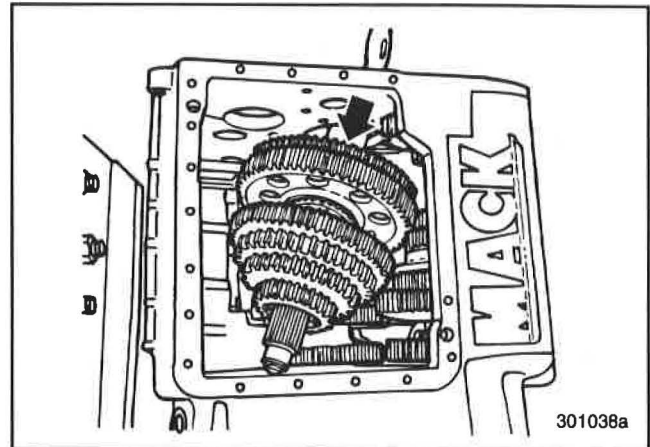


Figure 48 — Sliding Reverse Gear Over Reverse Clutch

34. Using a pry bar, move the rear end of the upper left (No. 1) countershaft away from the mainshaft as far as possible without damage. Block the countershaft in this position using wadding made from rags.

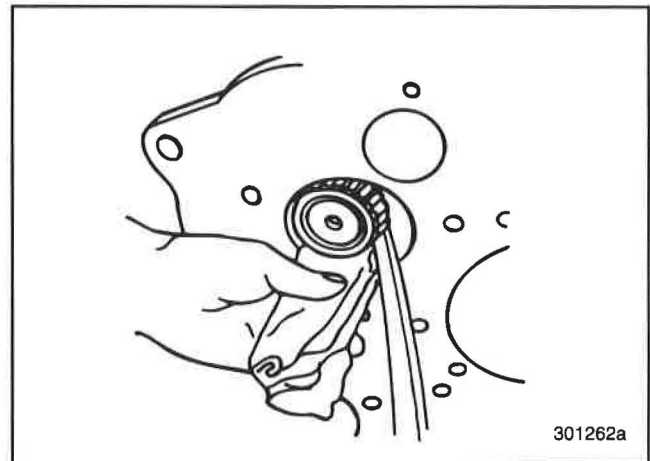


Figure 49 — Moving and Blocking No. 1 Countershaft Away from Mainshaft

35. Tip the front end of the mainshaft upward and remove it from the case.

CAUTION

The reverse gear is free on the mainshaft and can fall off when removing the mainshaft. To prevent it from falling off, slide it back as the mainshaft is removed and leave it in the case or remove it along with the mainshaft, making sure to retain it by hand.

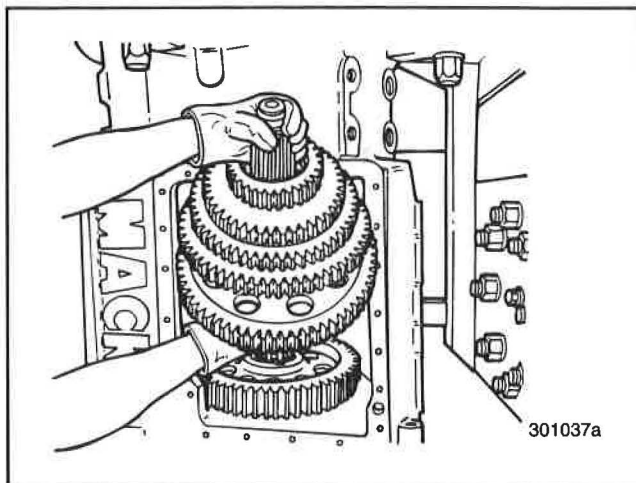


Figure 50 — Removing Mainshaft

36. Remove the No. 3 (lower) countershaft rear bearing cover capscrews, as performed previously in Step 15 for the No. 2 (upper right) countershaft.
37. Remove the No. 3 (lower) countershaft rear bearing cover using jackscrews, as performed previously in Step 17 for the No. 2 (upper right) countershaft.
38. Remove the lower reverse idler shaft expansion (welsh) plug (next to No. 3 countershaft), using a hammer and sharp punch, as performed previously in Step 23.

NOTE

This action destroys the expansion plug. Make sure replacement expansion plugs are available.

39. Using tool J 34630 or slide hammer, remove the lower reverse idler shaft. To prevent damage to the reverse idler gear, catch the gear as it separates from the shaft, as done before — refer to Step 24. Also, catch the thrust washers and save for reassembly.
40. Remove the No. 1 (upper left) countershaft by pulling and tilting the front end upward.

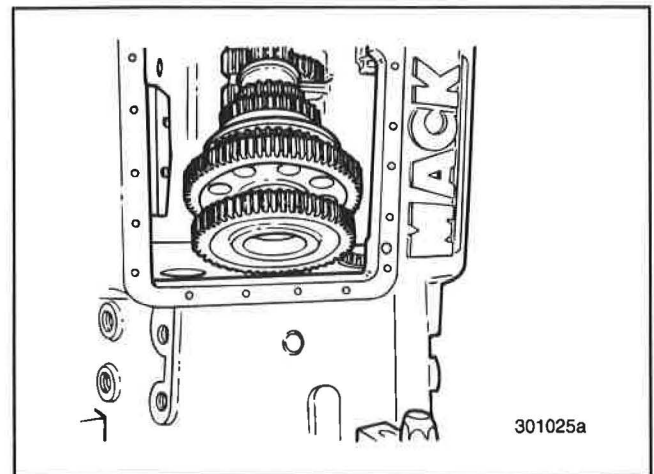


Figure 51 — Removing No. 1 Countershaft

41. Remove the No. 3 (lower) countershaft by pulling and tilting the front end upward.

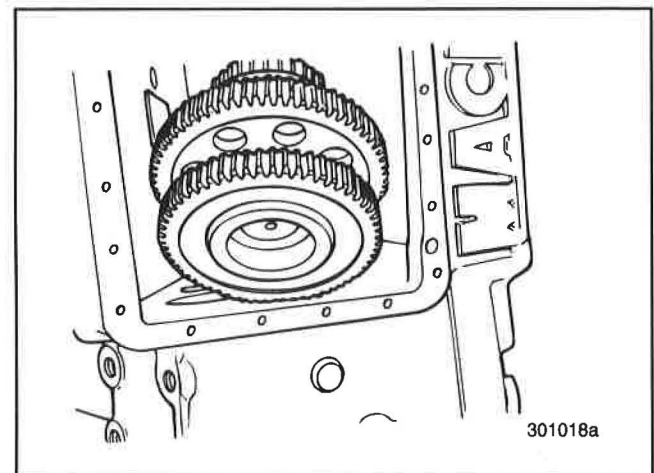


Figure 52 — Removing No. 3 Lower Countershaft

42. Remove the remaining No. 1 (upper right, as viewed from front) and No. 3 (lower) countershaft front bearing cover capscrews as performed previously in Step 13 for the No. 2 (upper left) countershaft.
43. Remove the remaining No. 1 (upper right) and No. 3 (lower) countershaft front bearing covers, using jackscrews, as performed previously in Step 14 for the No. 2 (upper left) countershaft.

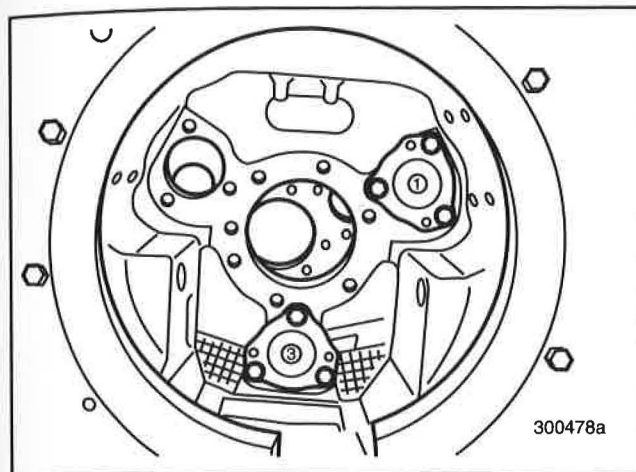


Figure 53 — Remaining No. 1 and No. 3 Countershaft Front Bearing Covers

44. Inspect the six- and eight-bolt Power Take-Off (PTO) covers on the sides of the case for damage or oil leaks. Replace the cover(s) if damaged, or remove and reseal if leaking.



NOTES



300 BENCH PROCEDURES

BENCH PROCEDURES



300 BENCH PROCEDURES

[320] TRANSMISSION COMPONENT DISASSEMBLY

NOTE

Unless a complete overhaul is necessary, remove only the parts required to repair the assembly. Do not disturb parts that have a heavy press fit (interference fit) unless replacement of the part is necessary. When replacement is necessary, use proper pullers and press setups to prevent damage to usable parts.

[323] Main Case Shift Cover Disassembly

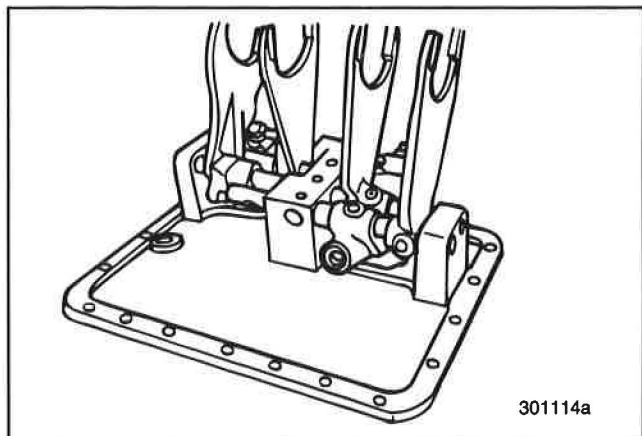
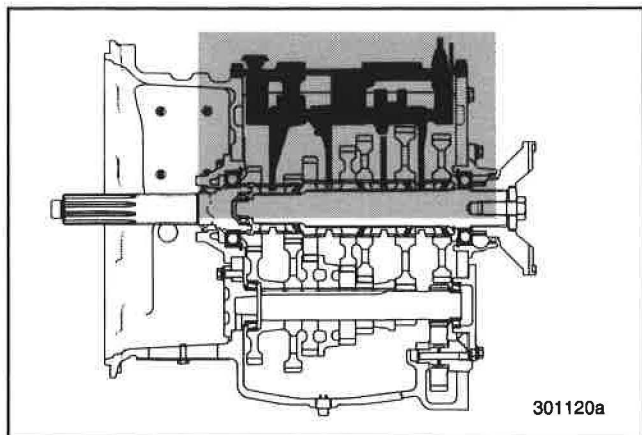


Figure 54 — Shift Cover Assembly

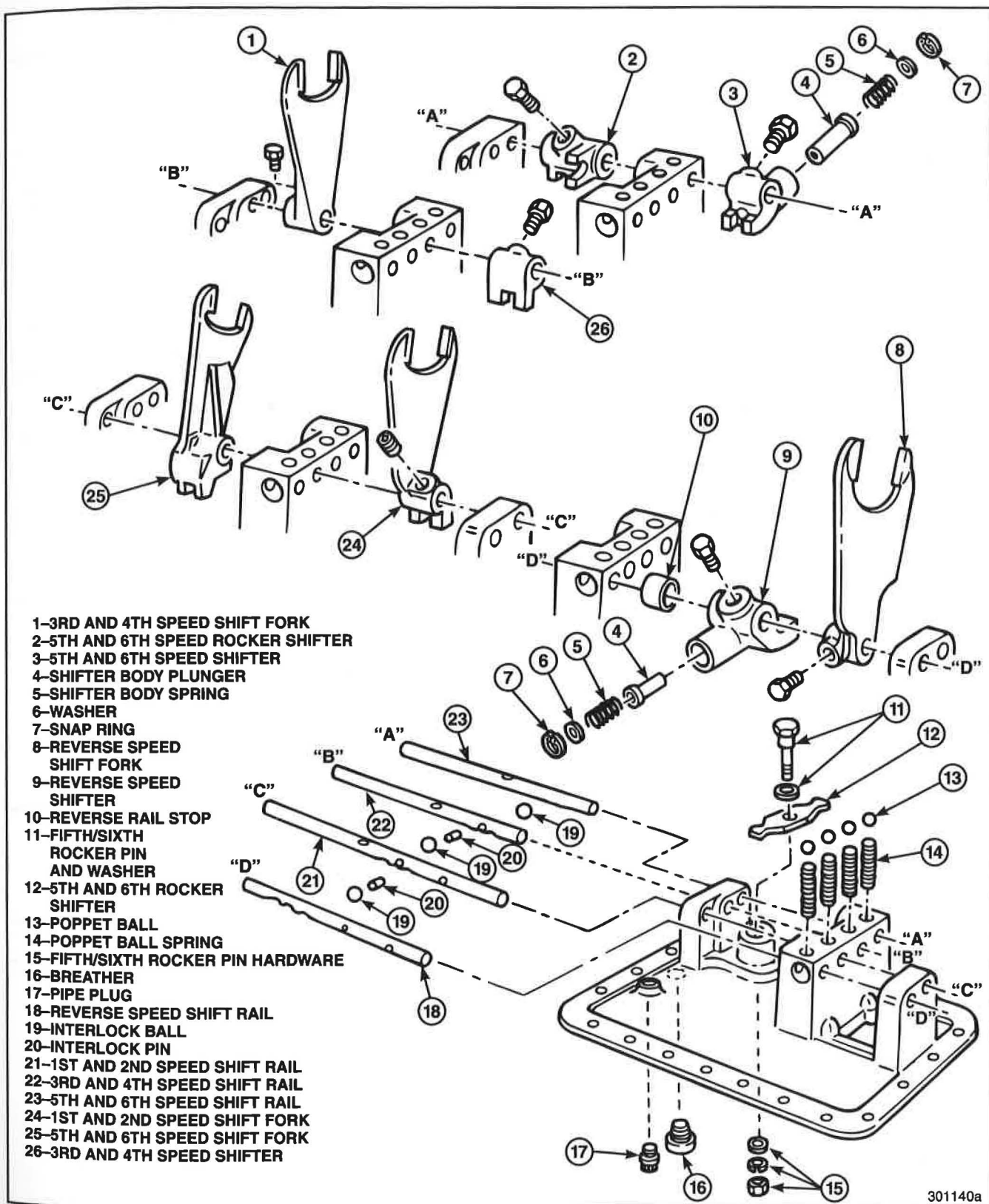


Figure 55 — Exploded View of Main Case Shift Cover



300 BENCH PROCEDURES

1. Remove the reverse light switch and actuator rod from the shift cover.

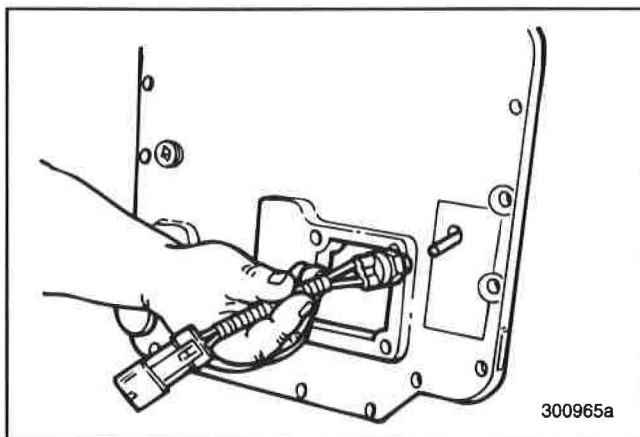


Figure 56 — Removing Reverse Light Switch and Actuator Rod

2. Remove the setscrews from the reverse shifter and fork.

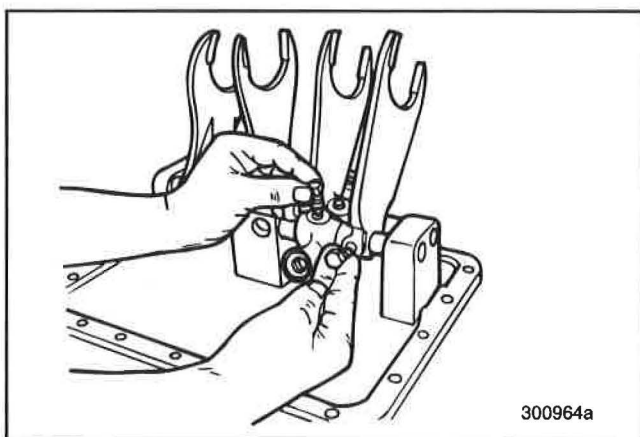


Figure 57 — Removing Setscrews from Reverse Shifter and Fork

3. To release the reverse shift fork, slide the reverse shift rail toward the front of the cover as shown.

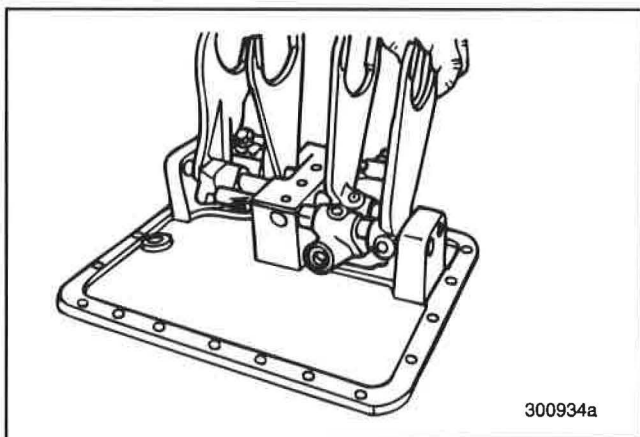


Figure 58 — Sliding Reverse Shift Rail

4. Remove the reverse shift fork from the end of the shift rail.

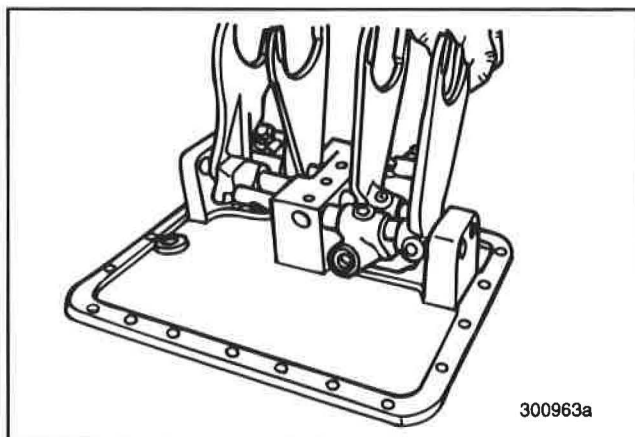


Figure 59 — Removing Reverse Shift Fork

5. Remove the reverse shifter from the end of the shift rail.

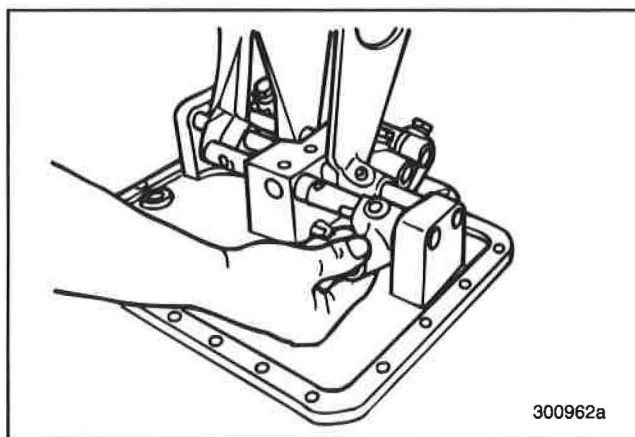


Figure 60 — Removing Reverse Shifter

6. Disassemble the reverse shifter body. Place the shifter body in a soft-jaw vise. Compress the spring of the shifter body, using a suitable drift or transmission dowel bolt. As the spring is compressed, remove the snap ring, using suitable snap ring pliers.

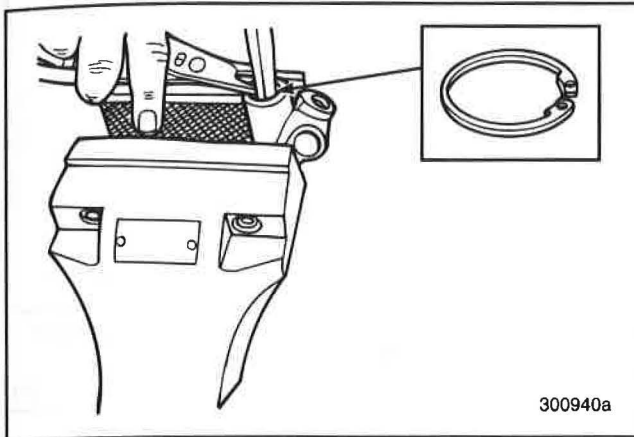


Figure 61 — Removing Shifter Snap Ring

7. Carefully release spring pressure and remove the washer, spring and plunger from the reverse shifter body.

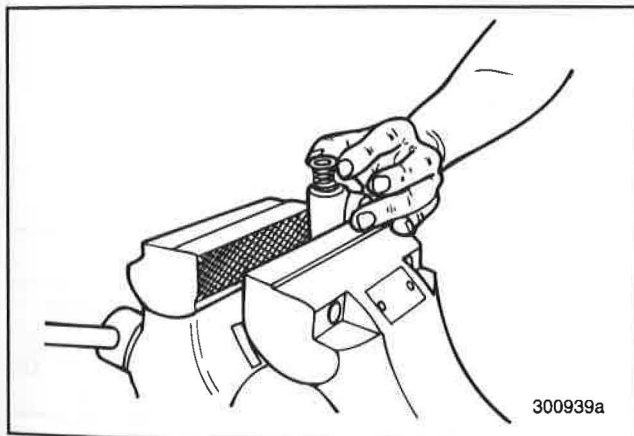


Figure 62 — Removing Washer and Spring

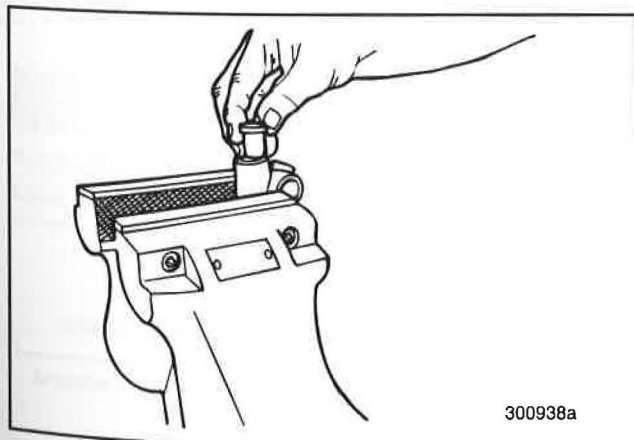


Figure 63 — Removing Plunger

NOTE

The plungers for the reverse and fifth/sixth shifters are similar. However, the plunger for the reverse shifter is long and the fifth/sixth plunger is short.

8. Remove the reverse rail stop from the rail.

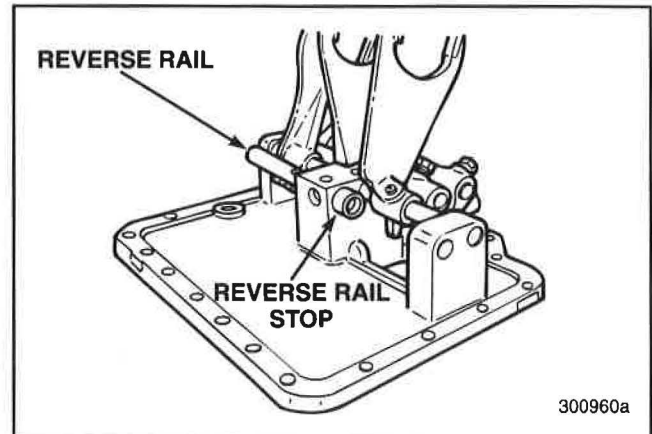


Figure 64 — Removing Rail Stop

9. Push the reverse shift rail forward, using a metal bar or large screwdriver to remove it. Hold a shop towel over the top opening. The shop towel prevents the spring and ball under the rail from popping out and becoming lost.

WARNING

Poppet balls are spring loaded and may cause injury when released.

10. Remove the poppet ball and spring (located in line with the rail) from the reverse shift rail vertical pocket.

SERVICE HINT

A magnet is helpful in removing the poppet ball and spring.

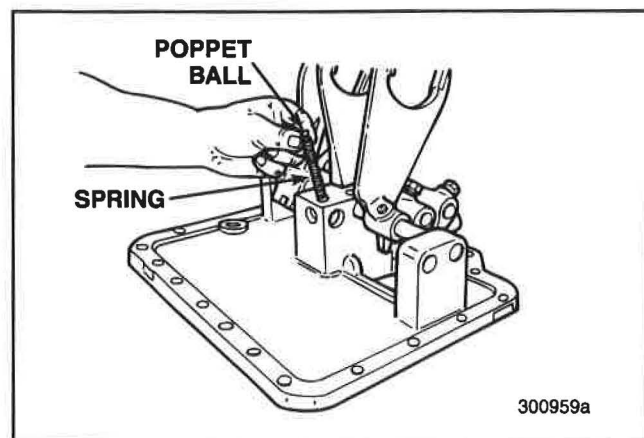


Figure 65 — Removing Poppet Ball and Spring

11. Remove the interlock ball from the horizontal pocket between the reverse shift rail and the first/second shift rail.

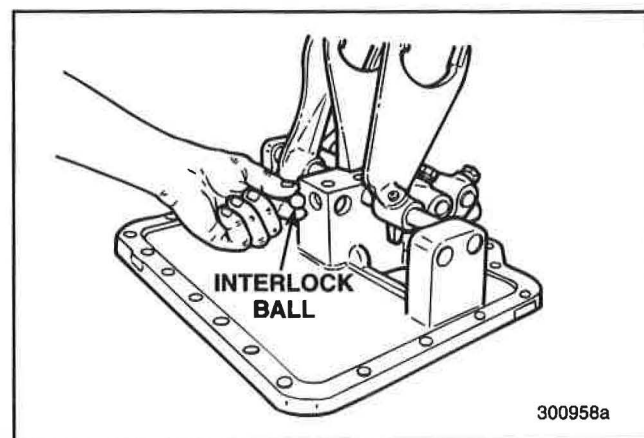


Figure 66 — Removing Interlock Ball

12. Remove the setscrew from the first/second shift fork.

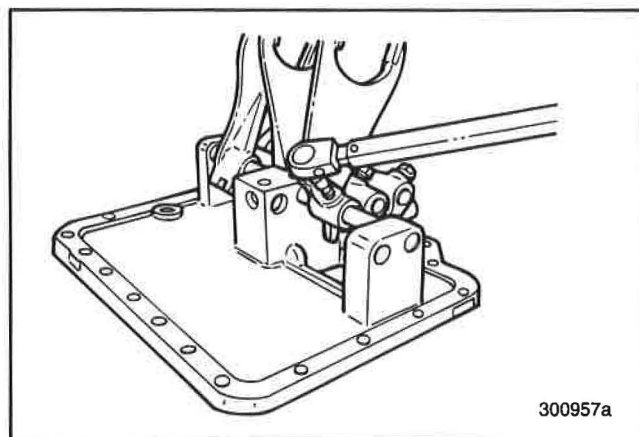


Figure 67 — Removing Setscrew from First/Second Shift Fork

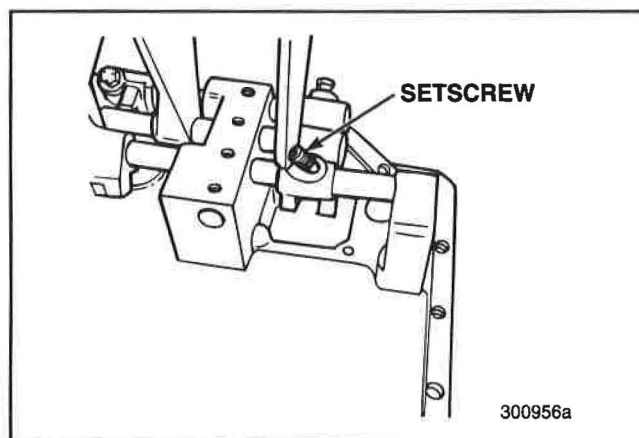


Figure 68 — Setscrew Removed

13. To release the first/second shift fork, slide the first/second shift rail toward the front of the cover, as shown.

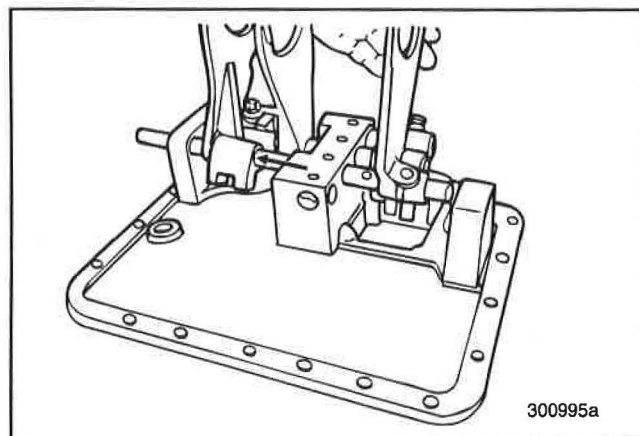


Figure 69 — Sliding First/Second Shift Rail Forward



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14. Remove the first/second shift fork from the rail.

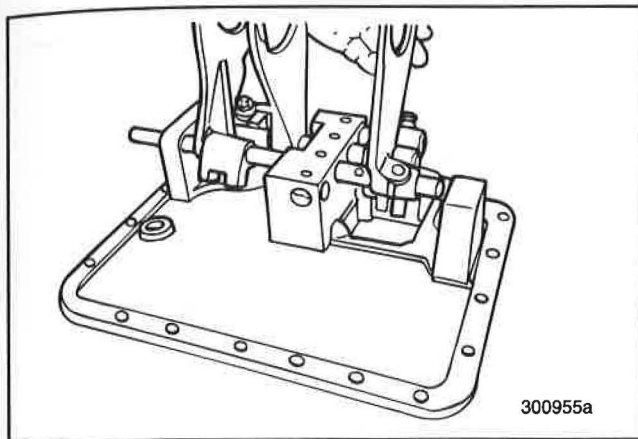


Figure 70 — Removing First/Second Shift Fork

15. Remove the interlock pin from the first/second shift rail.

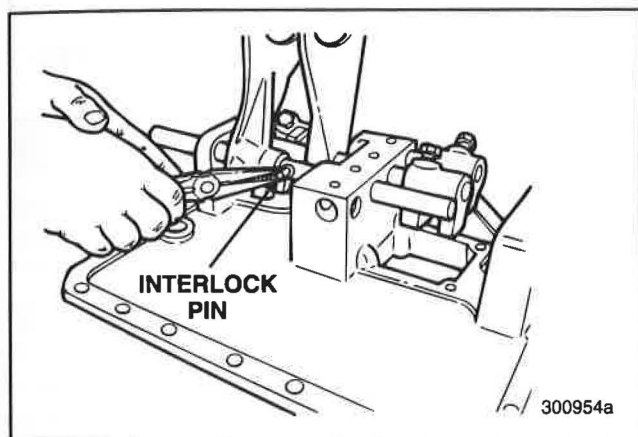


Figure 71 — Removing Pin from First/Second Rail

16. Push the first/second shift rail forward, using a metal bar or large screwdriver. Hold a shop towel over the top opening. The shop towel prevents the spring and ball under the rail from popping out and becoming lost.

WARNING

Poppet balls are spring loaded and can cause injury when they are released.

17. Remove the poppet ball and spring (located in line with the rail) from the first/second shift rail vertical pocket.

SERVICE HINT

A magnet is helpful in removing the poppet ball and spring.

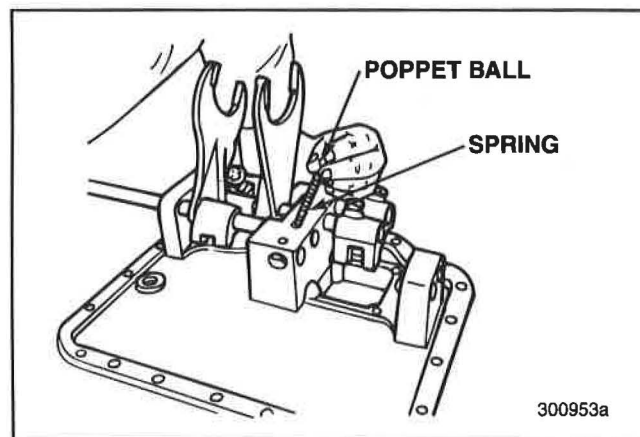


Figure 72 — Removing Poppet Ball and Spring

18. Remove the interlock ball from the horizontal pocket between the first/second shift rail and the third/fourth shift rail.

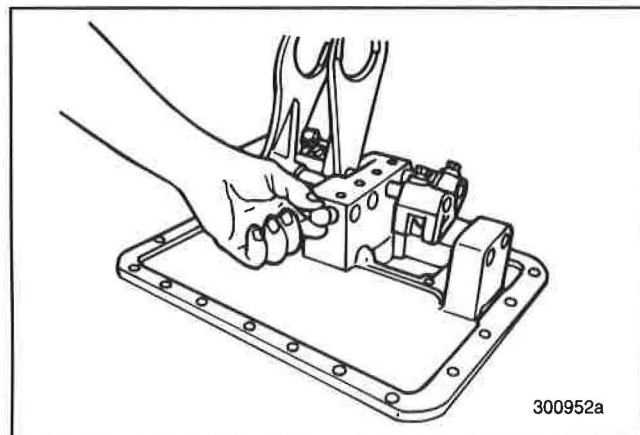


Figure 73 — Removing Interlock Ball



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19. Slide the first/second shift rail farther forward, out of the cover. At the same time, remove the fifth/sixth shift fork.

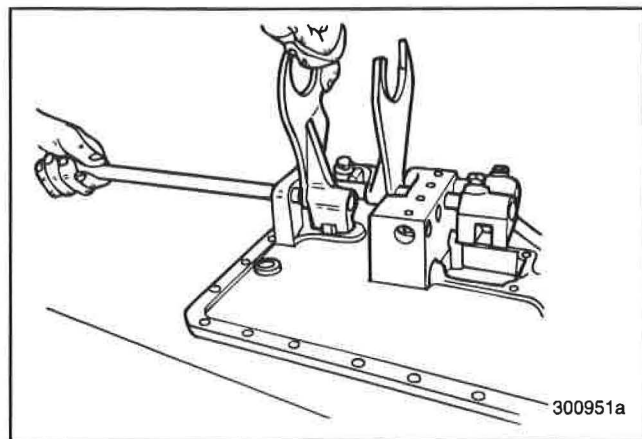


Figure 74 — Removing Fifth/Sixth Shift Fork

20. Working from the fifth/sixth shift rail side of the cover, loosen the setscrew on the third/fourth shifter.

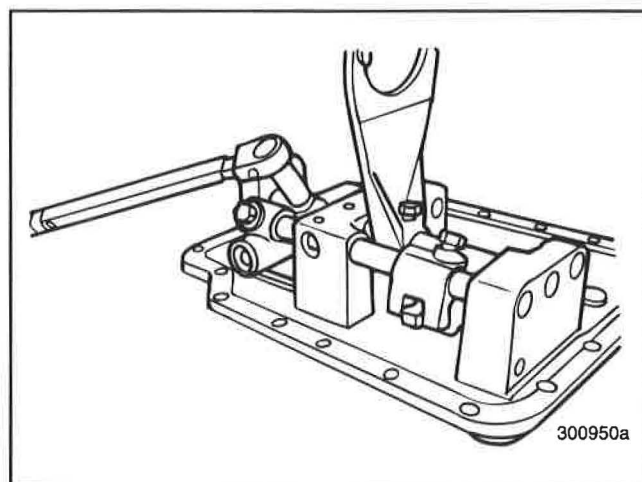


Figure 75 — Loosening Setscrew on Third/Fourth Shifter

21. Slide the third/fourth shift rail forward, and at the same time, remove the third/fourth shifter.

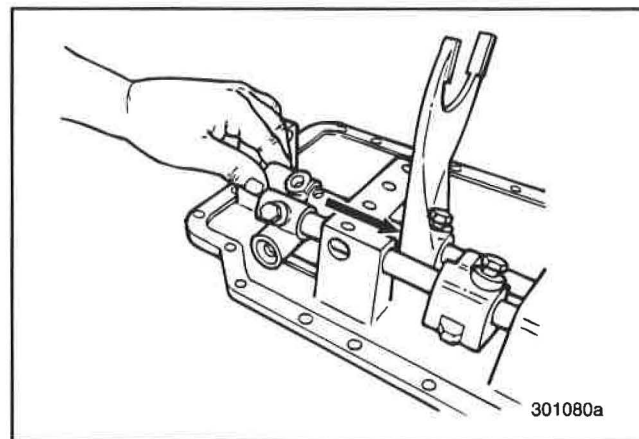


Figure 76 — Sliding Third/Fourth Shift Rail and Removing Third/Fourth Shifter

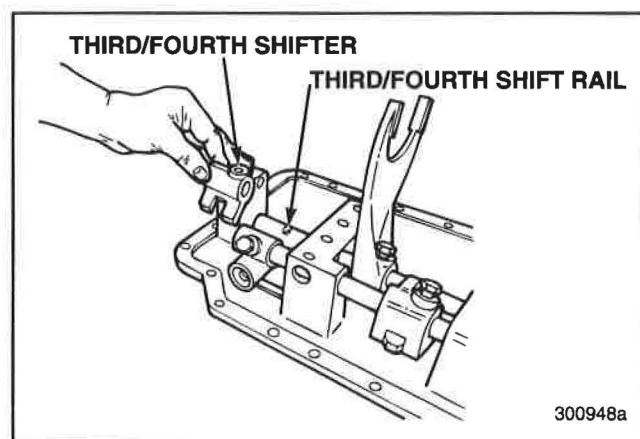


Figure 77 — Third/Fourth Shifter Removed

22. Loosen the setscrew on the third/fourth shift fork.

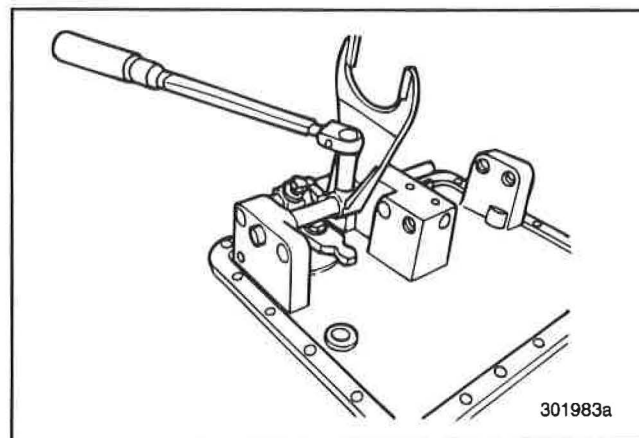


Figure 78 — Loosening Setscrew on Third/Fourth Shift Fork

23. Remove the interlock pin from the third/fourth shift rail.

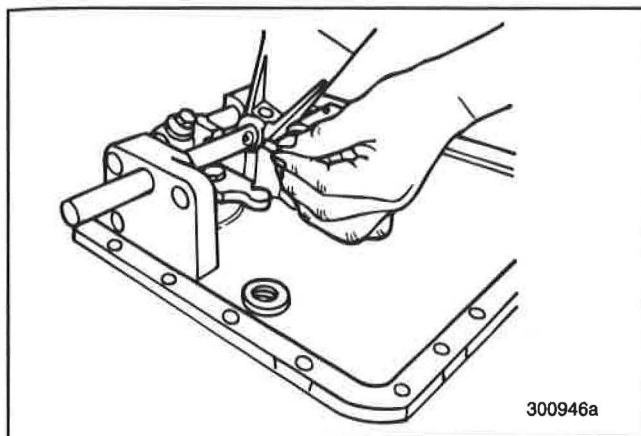


Figure 79 — Removing Pin from Third/Fourth Shift Rail

24. Push the third/fourth shift rail forward, using a metal bar or large screwdriver. Hold a shop towel over the top opening. The shop towel prevents the spring and ball under the rail from popping out and becoming lost.

WARNING

Poppet balls are spring loaded and can cause injury when they are released.

25. Remove the poppet ball and spring (located in line with the rail) from the third/fourth shift rail vertical pocket.

SERVICE HINT

A magnet is helpful in removing the poppet ball and spring.

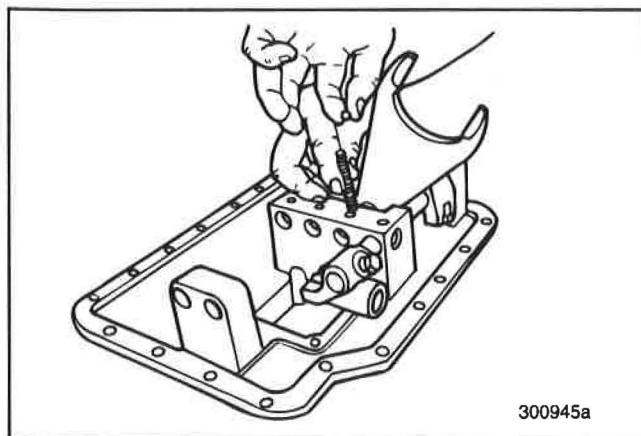


Figure 80 — Removing Third/Fourth Shift Rail Poppet Ball and Spring

26. Continue sliding the third/fourth shift rail forward out of the shift cover. At the same time, remove the third/fourth shift fork.

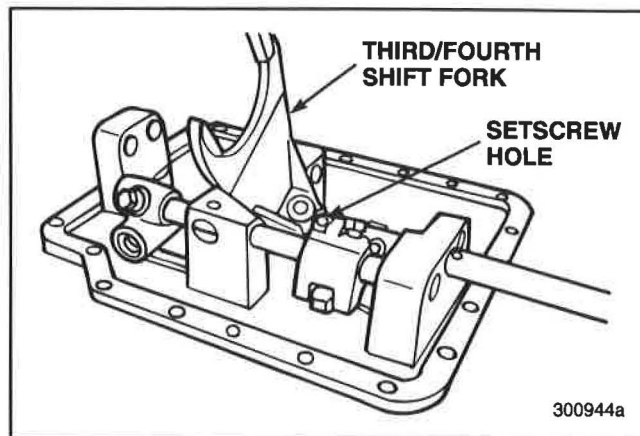


Figure 81 — Removing Third/Fourth Shift Fork and Rail

27. Remove the interlock ball from the horizontal pocket between the third/fourth shift rail and the fifth/sixth shift rail.

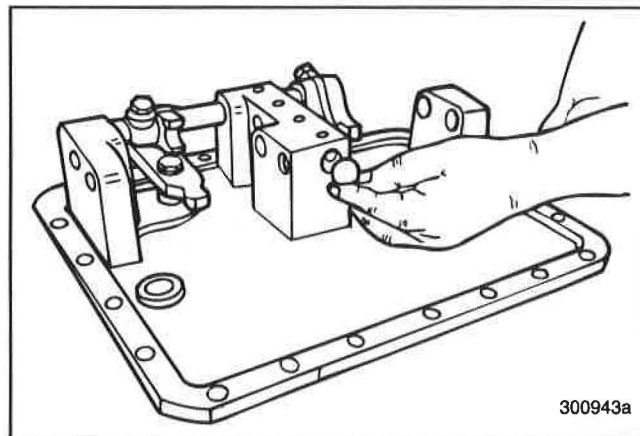


Figure 82 — Removing Interlock Ball

28. Loosen the setscrew on the fifth/sixth shifter.

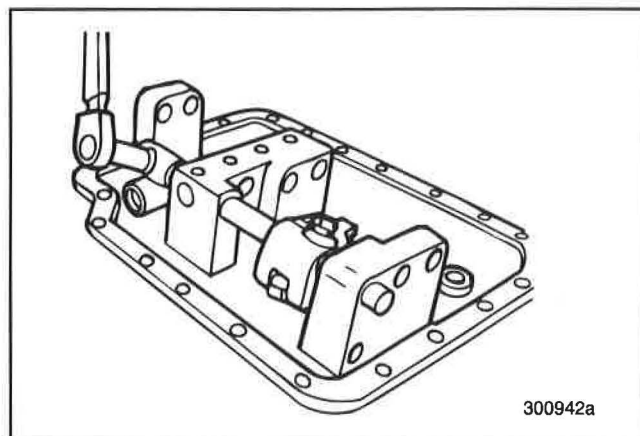


Figure 83 — Loosening Setscrew on Fifth/Sixth Shifter



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29. Remove the fifth/sixth shifter from the fifth/sixth shift rail.

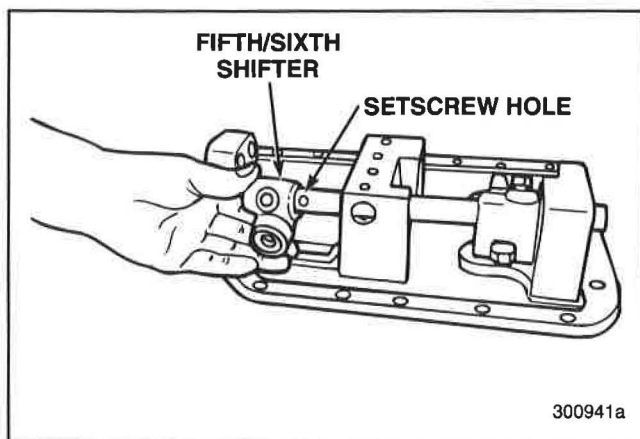


Figure 84 — Removing Fifth/Sixth Shifter from Fifth/Sixth Shift Rail

30. Disassemble the fifth/sixth shifter body. Place the shifter body in a soft-jaw vise. Compress the spring of the shifter body, using a suitable drift or transmission dowel bolt. As the spring is compressed, remove the snap ring, using suitable snap ring pliers.

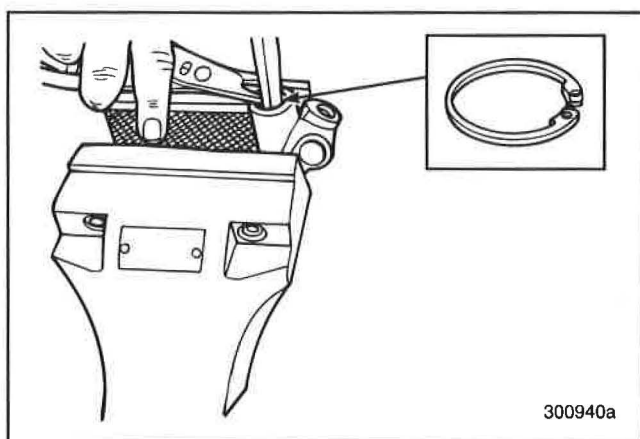


Figure 85 — Removing Shifter Snap Ring

31. Carefully release spring pressure and remove the washer, spring and plunger from the fifth/sixth shifter body.

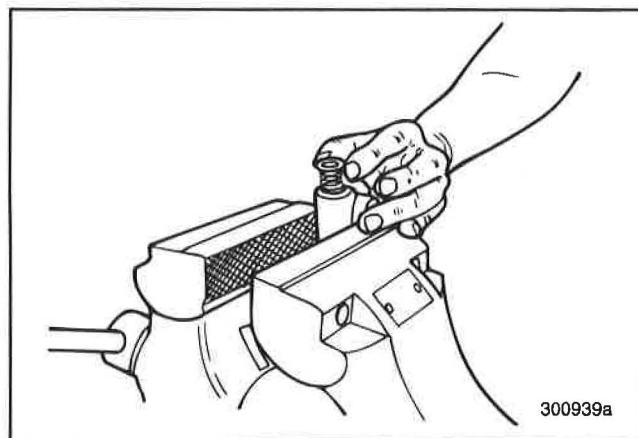


Figure 86 — Removing Washer and Spring

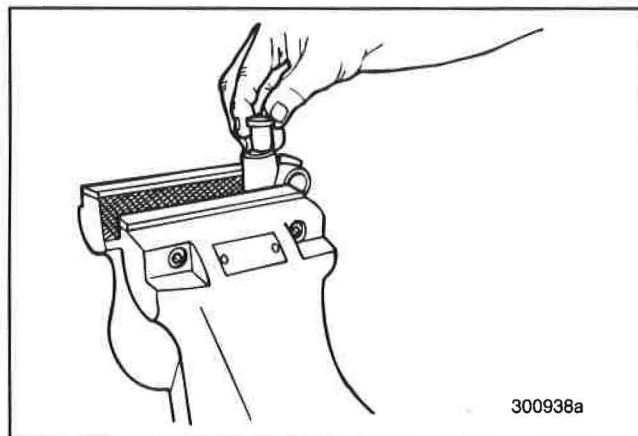


Figure 87 — Removing Plunger

NOTE

The plungers for the reverse and fifth/sixth shifters are similar. However, the plunger for the fifth/sixth shifter is short and the reverse plunger is long.

32. Loosen the setscrew on the fifth/sixth rocker shifter.

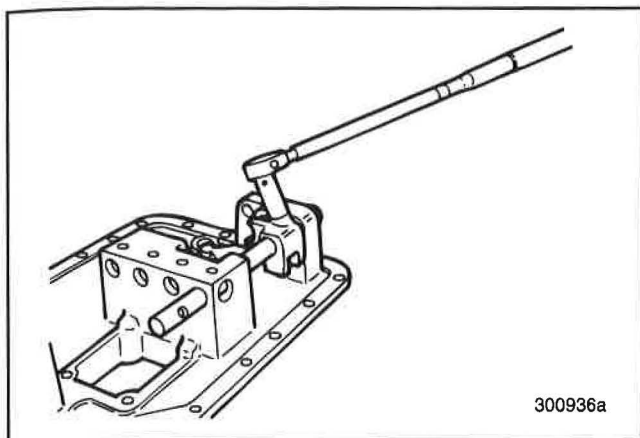


Figure 88 — Loosening Setscrew on Fifth/Sixth Rocker Shifter

33. Push the fifth/sixth shift rail forward, using a metal bar or large screwdriver. Hold a shop towel over the top opening. The shop towel prevents the spring and ball under the rail from popping out and becoming lost.

WARNING

Poppet balls are spring loaded and can cause injury when they are released.

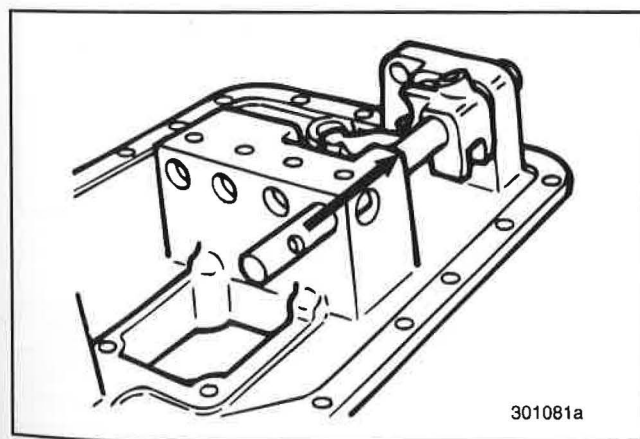


Figure 89 — Pushing Fifth/Sixth Shift Rail Forward

34. Remove the poppet ball and spring from under the fifth/sixth shift rail.

SERVICE HINT

A magnet is helpful in removing the poppet ball and spring.

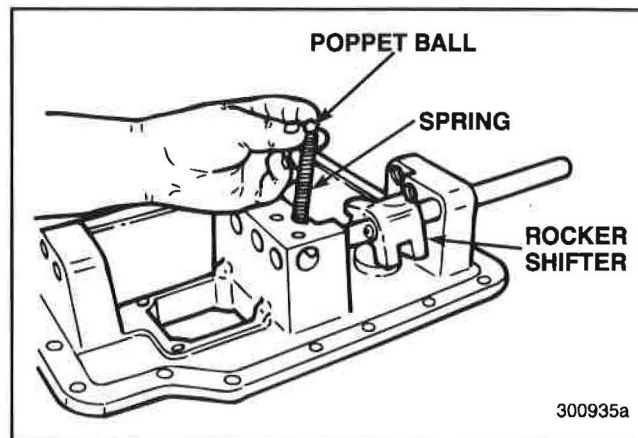


Figure 90 — Removing Poppet Ball and Spring

35. Continue sliding the fifth/sixth shift rail forward and out of the cover. At the same time, remove the fifth/sixth rocker shifter.
36. Remove the rocker pin cap, shift cover breather vent and pipe plug.

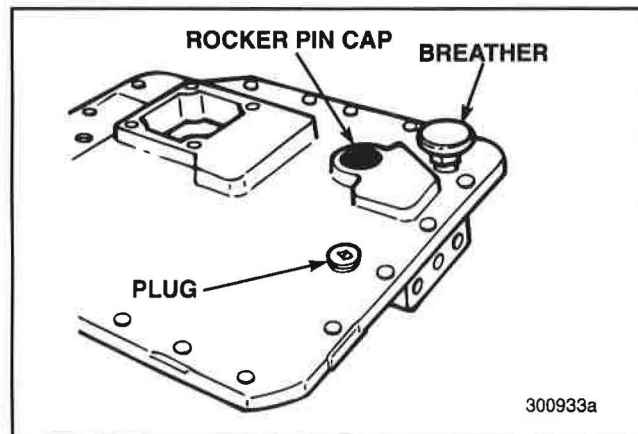


Figure 91 — Removing Pin Cap, Breather Vent and Pipe Plug

37. Remove the nut and washers from the fifth/sixth rocker pin.

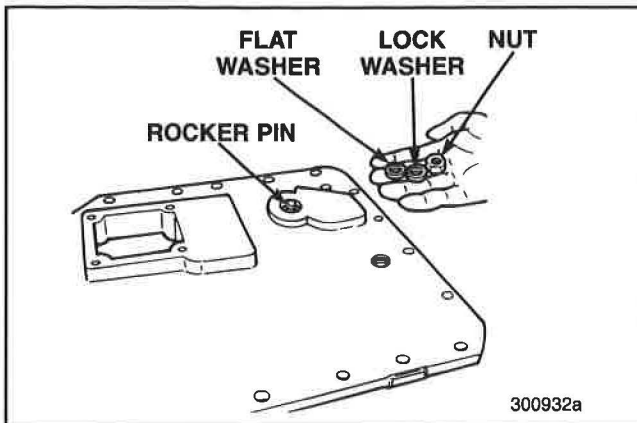


Figure 92 — Fifth/Sixth Pin Nut and Washers Removed

38. Remove the fifth/sixth rocker pivot pin, washer and rocker arm.

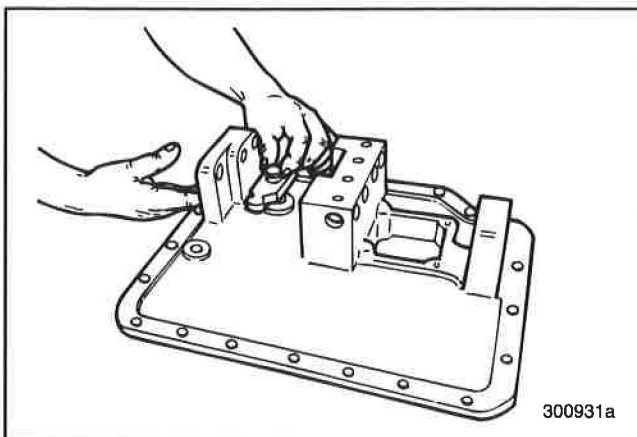
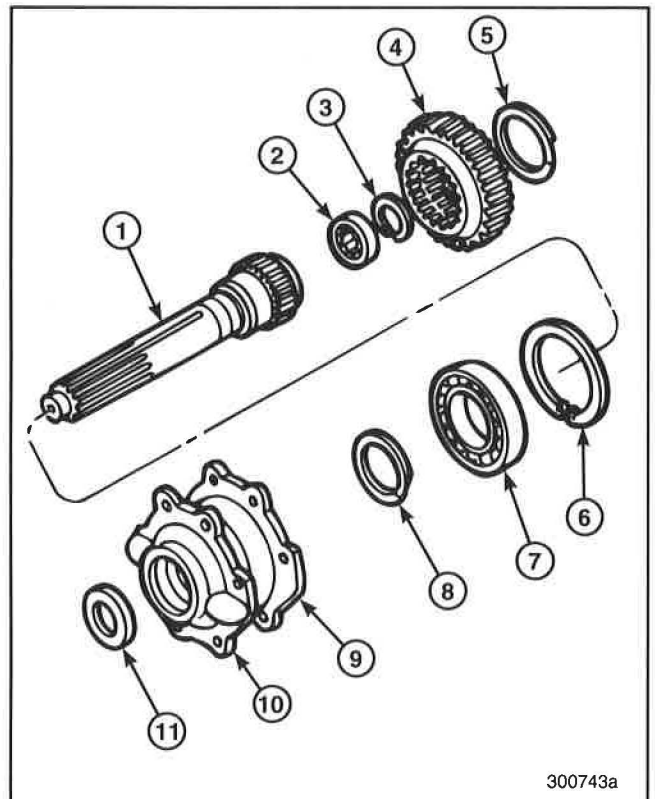
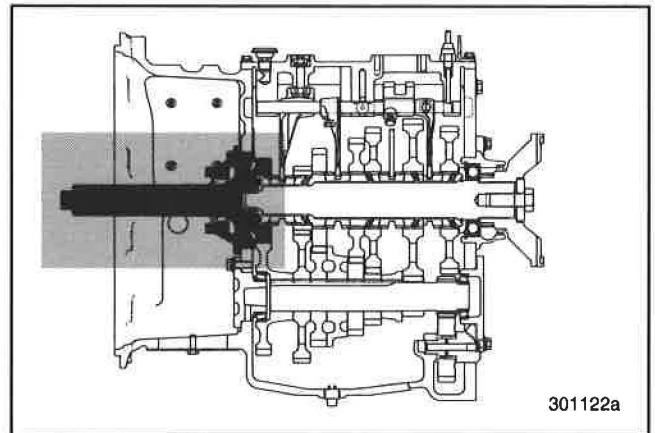


Figure 93 — Removing Fifth/Sixth Rocker Pivot Pin, Washer and Rocker Arm

[322] Main Drive Pinion Disassembly



- | | |
|----------------------------|--------------------------|
| 1. Main Drive Pinion Shaft | 7. Bearing |
| 2. Spigot Bearing | 8. Spiral Snap Ring |
| 3. Snap Ring | 9. Gasket |
| 4. Main Drive Pinion Gear | 10. Pinion Bearing Cover |
| 5. Spiral Snap Ring | 11. Oil Seal |
| 6. Snap Ring | |

Figure 94 — Exploded View of Main Drive Pinion



300 BENCH PROCEDURES

1. Remove the main drive pinion bearing cover gasket.

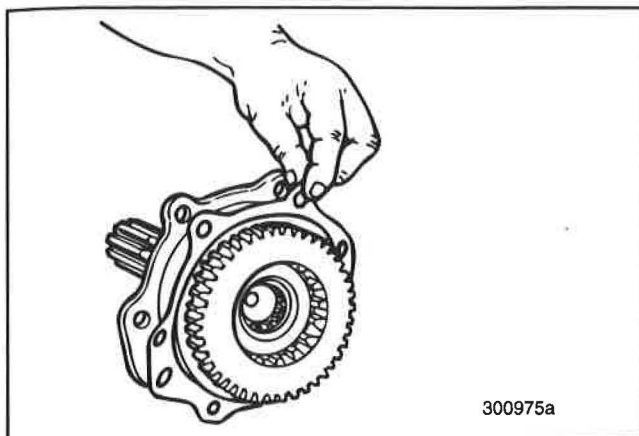


Figure 95 — Removing Cover Gasket

2. Remove the spiral snap ring from the end of the main drive pinion shaft inside the main drive pinion gear. Roll the snap ring out of the groove and over the shoulder of the main drive pinion, using a flat-blade screwdriver.

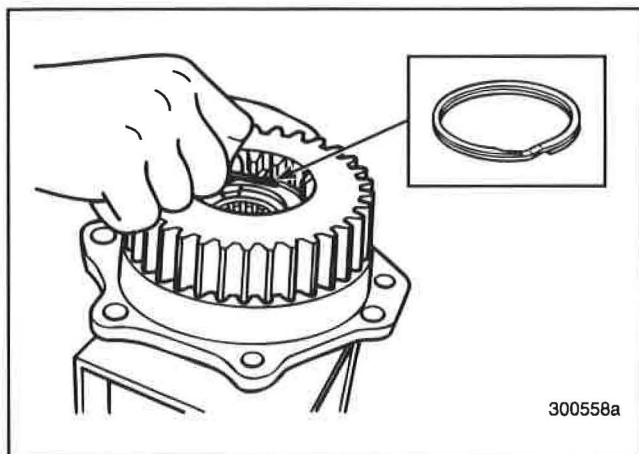


Figure 96 — Removing Snap Ring from Main Drive Pinion Gear

CAUTION

The action of removing the spiral snap ring may destroy the snap ring. Make sure a replacement snap ring is available.

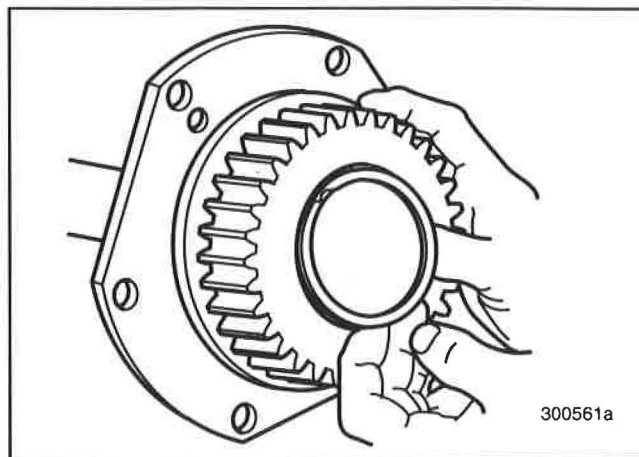


Figure 97 — Spiral Snap Ring Removed

3. Remove the main drive pinion gear from the shaft.

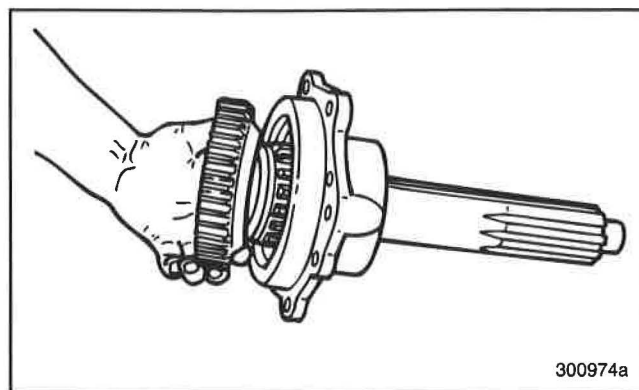


Figure 98 — Removing Main Drive Pinion Gear from Shaft

4. Remove the main drive pinion bearing cover snap ring, using suitable snap ring pliers.

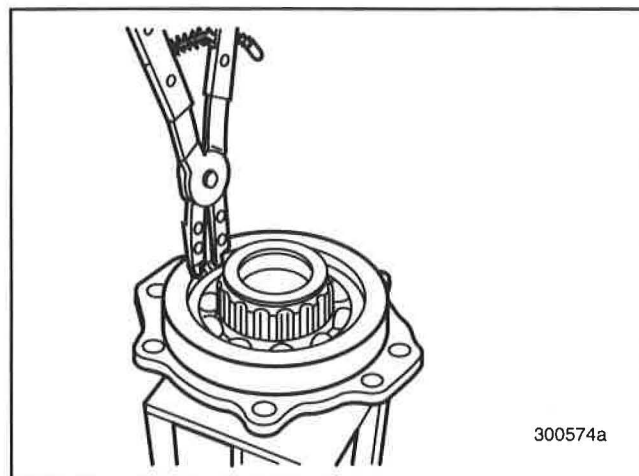


Figure 99 — Removing Main Drive Pinion Bearing Cover Snap Ring



300 BENCH PROCEDURES

5. Separate the main drive pinion shaft and bearing assembly from the main drive pinion bearing cover.

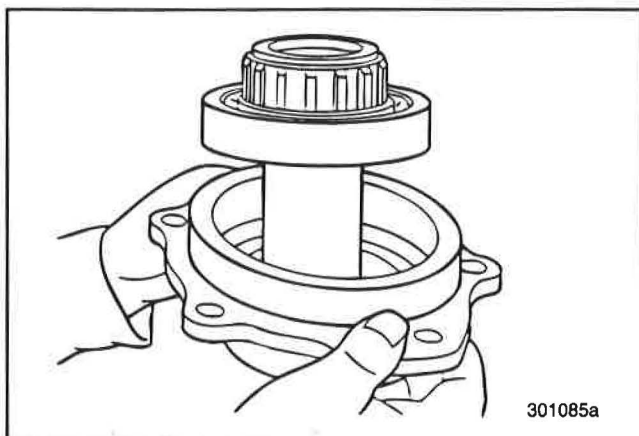


Figure 100 — Removing Main Drive Pinion Assembly from Main Drive Pinion Cover

6. Remove the main drive pinion bearing spiral snap ring, using a small flat-blade screwdriver. Roll the spiral snap ring out of the groove to release.

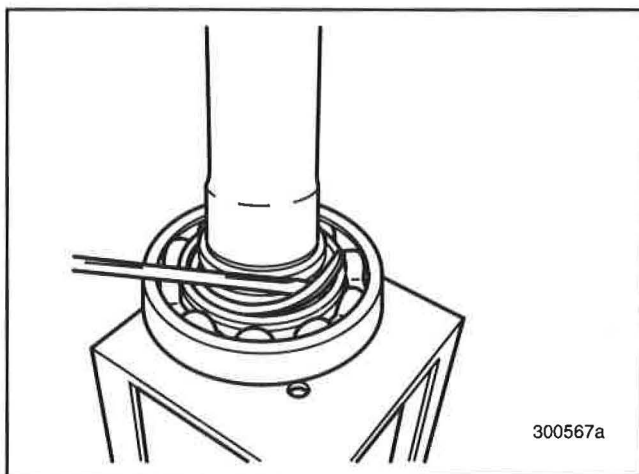


Figure 101 — Removing Spiral Snap Ring from Main Drive Pinion Bearing

CAUTION

The action of removing the spiral snap ring may destroy the snap ring. Make sure a replacement snap ring is available.

7. Place the main drive pinion shaft and bearing into a suitable press and remove the bearing.

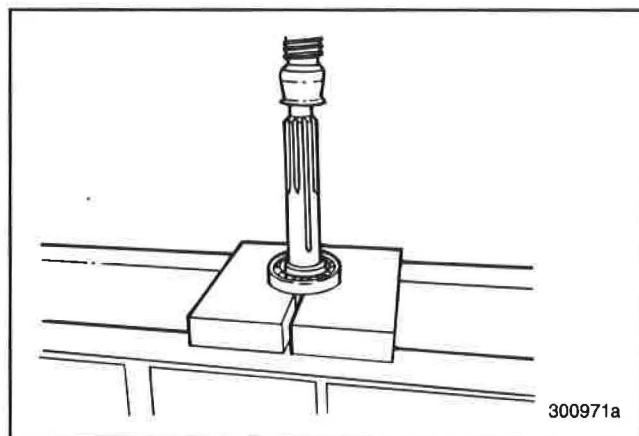


Figure 102 — Pressing Bearing Off Main Drive Pinion Shaft

8. Remove the oil seal from the main drive pinion bearing cover, using a hammer and a blunt punch.

CAUTION

Removing the oil seal destroys the seal. Make sure a replacement oil seal is available.

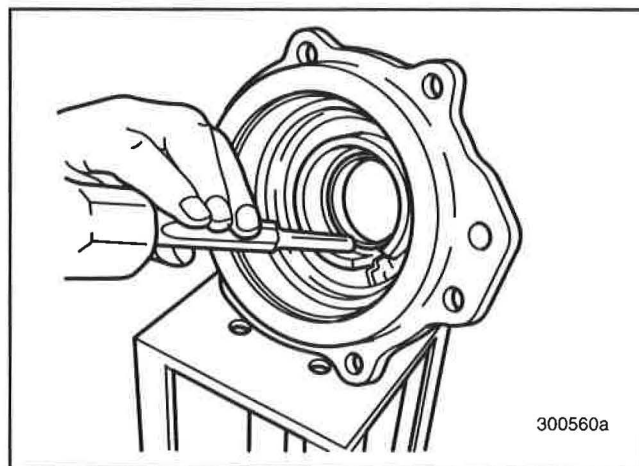


Figure 103 — Removing Main Drive Pinion Bearing Cover Oil Seal

9. Remove the spigot bearing snap ring from the main drive pinion, using suitable snap ring pliers.

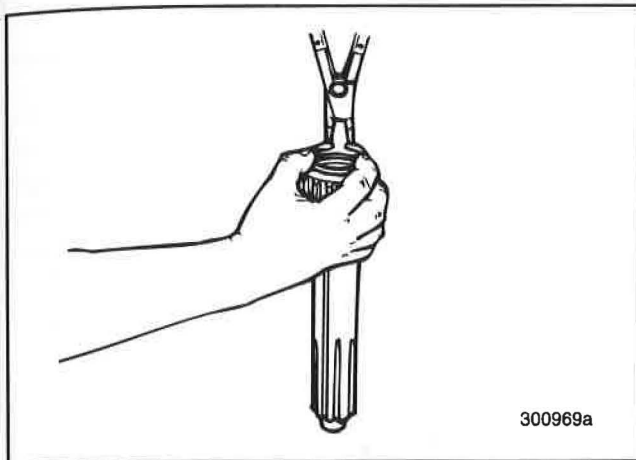


Figure 104 — Removing Spigot Bearing Snap Ring

10. Remove spigot bearing from inside the end of the main drive pinion shaft.

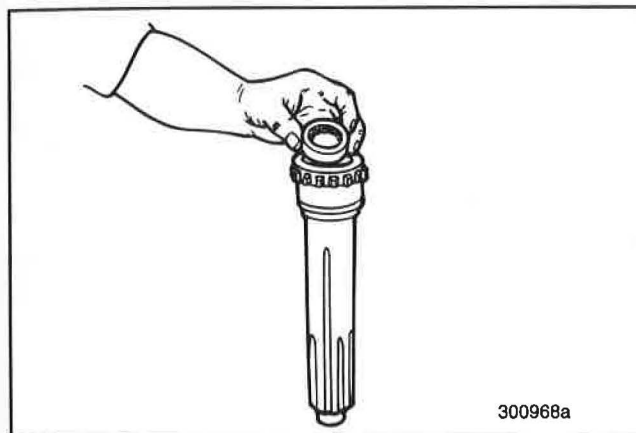
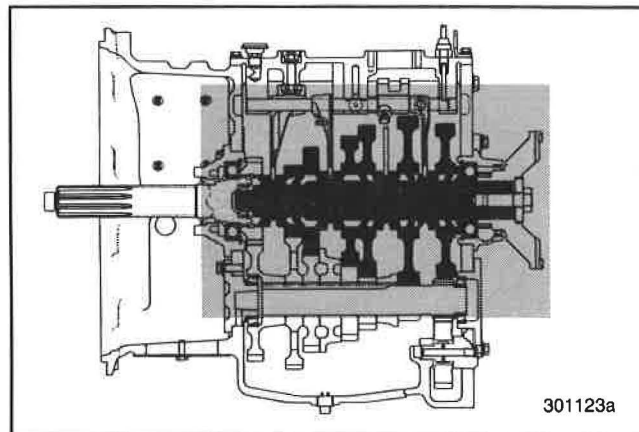


Figure 105 — Spigot Bearing Removed from Main Drive Pinion Shaft

[322] Mainshaft Disassembly



1. Slide the reverse gear from the mainshaft splines, if not already done.

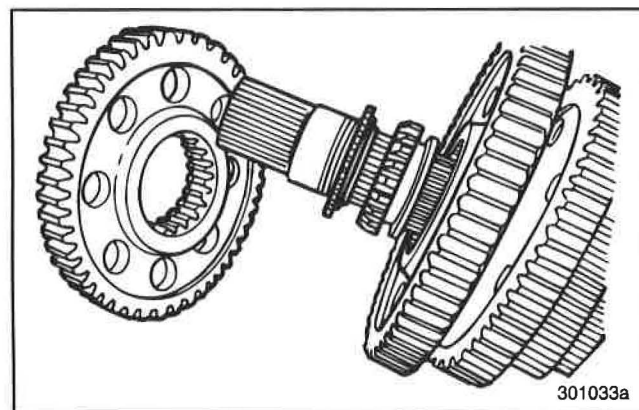
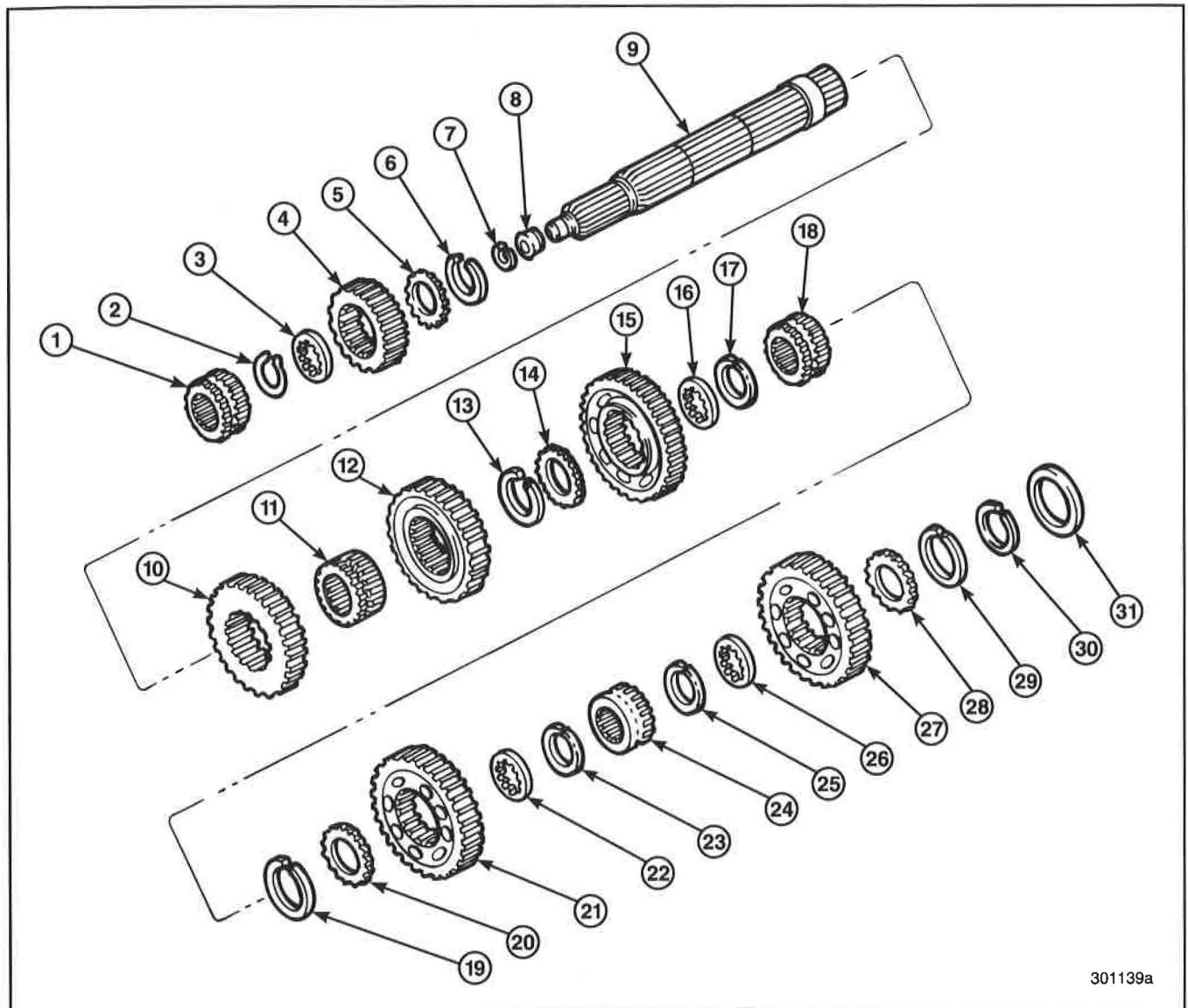


Figure 106 — Removing Reverse Gear from Mainshaft



1. Sliding Clutch — 5th/6th	12. Third Speed Gear	22. Thrust Washer — Internal Tooth
2. Snap Ring	13. Snap Ring	23. Snap Ring
3. Thrust washer — Internal Tooth	14. Thrust Washer — External Tooth	24. Sliding Clutch — Reverse
4. Sixth Speed Gear	15. Second Speed Gear	25. Snap Ring
5. Thrust Washer — External Tooth	16. Thrust Washer — Internal Tooth	26. Thrust Washer — Internal Tooth
6. Snap Ring	17. Snap Ring	27. Reverse Speed Gear
7. Snap Ring	18. Sliding Clutch — 1st/2nd	28. Thrust Washer — External Tooth
8. Bearing Inner Race	19. Snap Ring	29. Snap Ring
9. Mainshaft	20. Thrust Washer — External Tooth	30. Snap Ring
10. Fourth Speed Gear	21. First Speed Gear	31. Thrust Washer (Spacer)
11. Sliding Clutch — 3rd/4th		

Figure 107 — Exploded View of Mainshaft

2. Working at the front of the mainshaft, remove the snap ring that retains the sixth speed gear on the mainshaft. Use suitable metric snap ring pliers.

SERVICE HINT

The sixth speed gear snap ring on the mainshaft requires metric snap ring pliers.

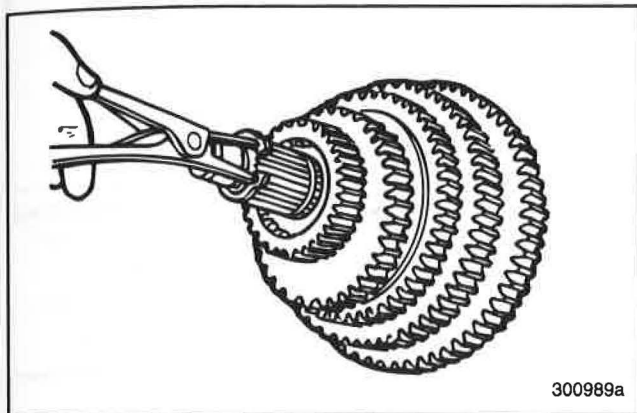


Figure 108 — Removing Sixth Speed Gear Snap Ring

3. Remove the sixth speed gear internal and external tooth thrust washers from the mainshaft.

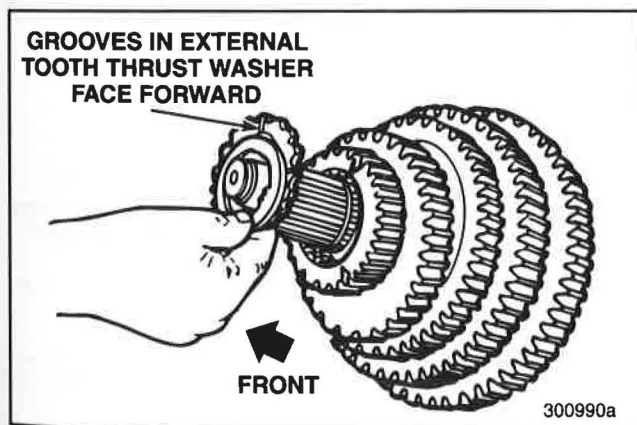


Figure 109 — Removing Internal and External Tooth Thrust Washers

4. Remove the sixth speed gear from the mainshaft.

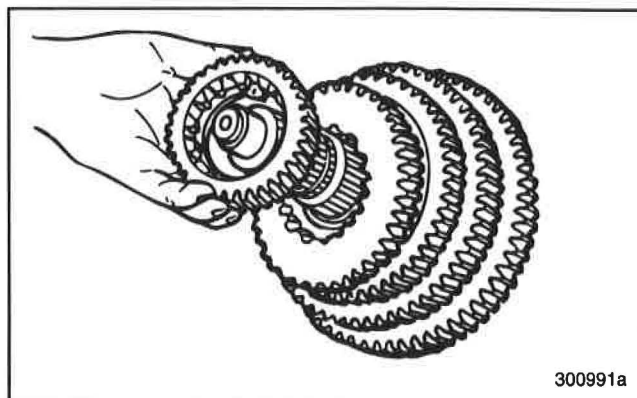


Figure 110 — Removing Sixth Speed Gear

5. Remove the snap ring from inside the sixth speed gear.

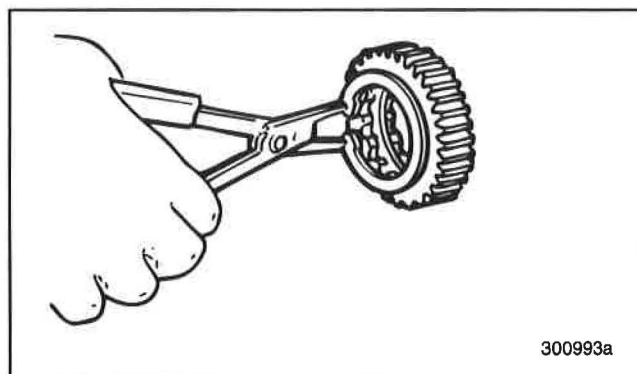


Figure 111 — Removing Sixth Speed Gear Snap Ring

6. Remove the fourth speed gear from the mainshaft.

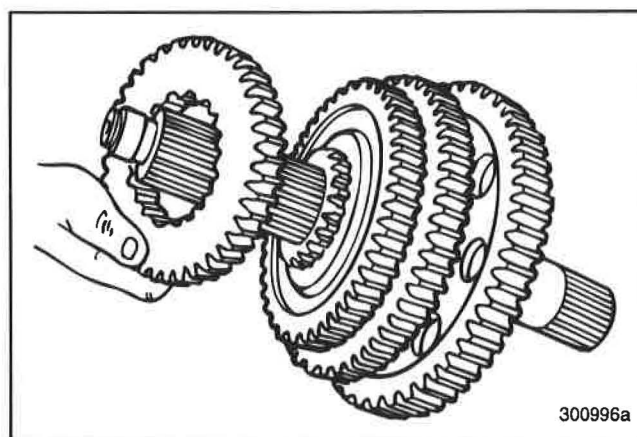


Figure 112 — Removing Fourth Speed Gear

7. Remove the third/fourth sliding clutch from the mainshaft.

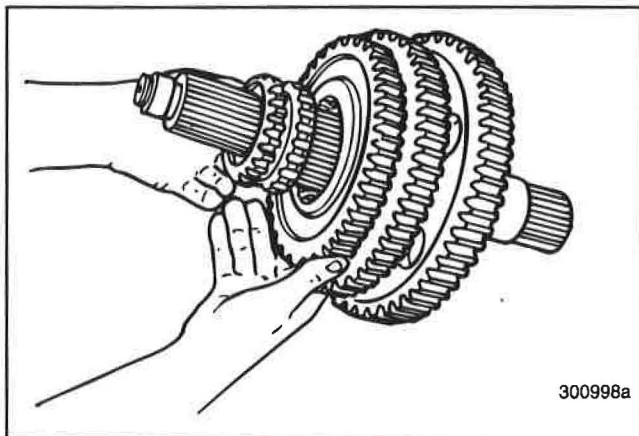


Figure 113 — Removing Third/Fourth Sliding Clutch from Mainshaft

8. Remove the third speed gear from the mainshaft.

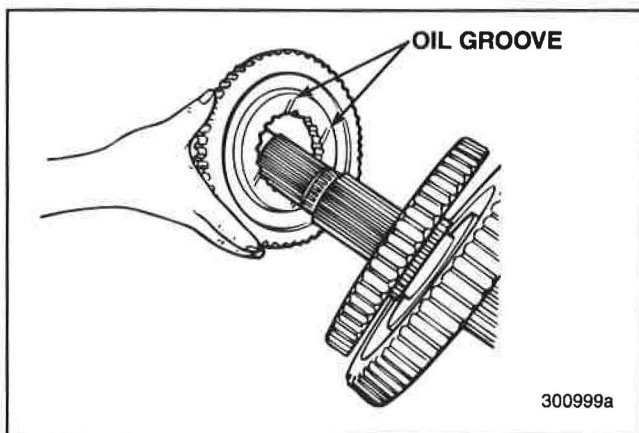


Figure 114 — Removing Third Speed Gear

9. Remove the second speed gear from the mainshaft.

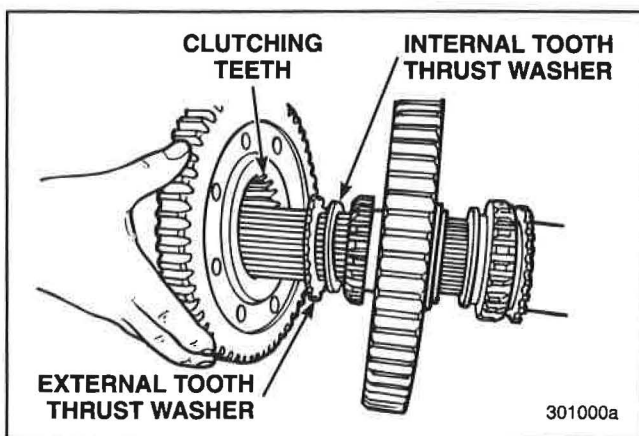


Figure 115 — Removing Second Speed Gear

10. Remove the snap ring inside the second speed gear, using suitable snap ring pliers.

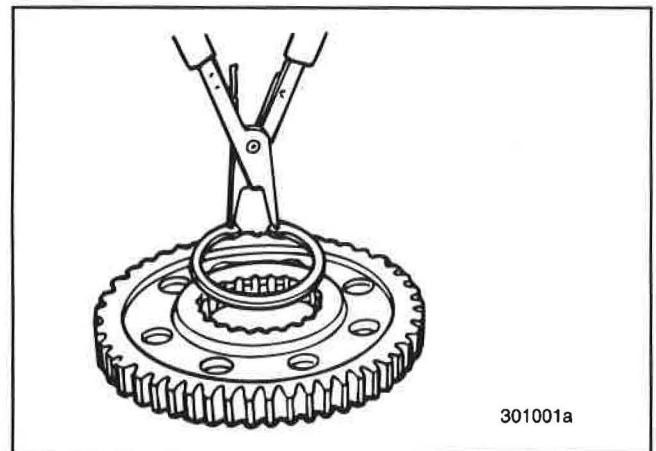


Figure 116 — Removing Second Speed Gear Snap Ring

11. Remove the second speed gear external and internal tooth thrust washers from the mainshaft.

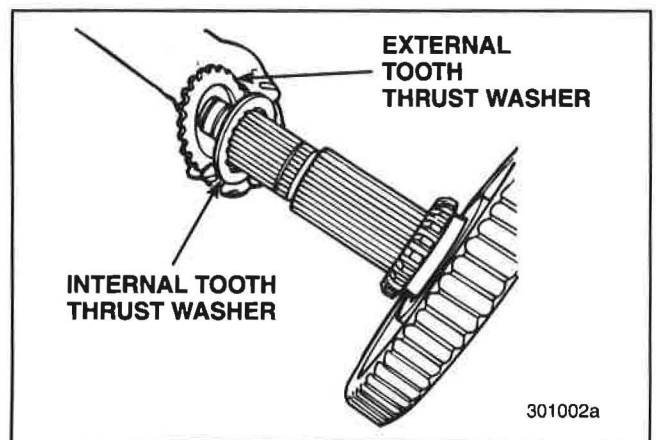


Figure 117 — Removing External and Internal Tooth Thrust Washers



300 BENCH PROCEDURES

12. Remove the snap ring on the mainshaft next to the first/second sliding clutch, using suitable snap ring pliers.

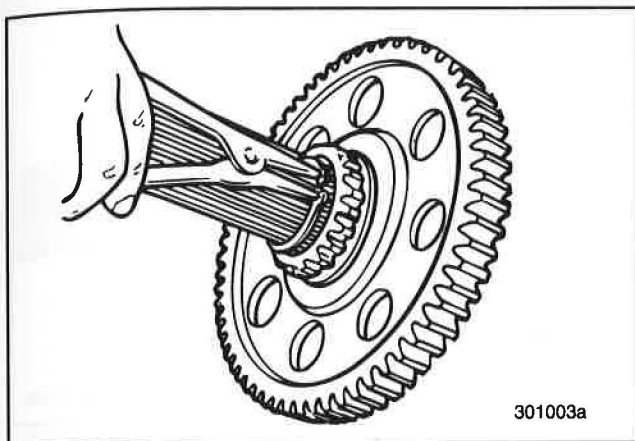


Figure 118 — Removing First/Second Sliding Clutch Snap Ring

13. Remove the first/second sliding clutch from the mainshaft.

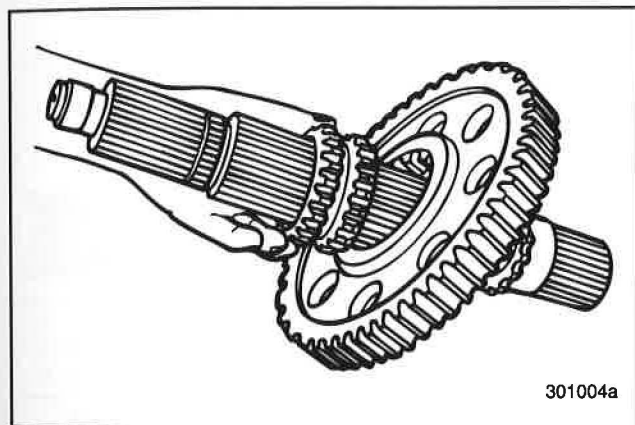


Figure 119 — Removing First/Second Sliding Clutch

14. Remove the first speed gear from the mainshaft.

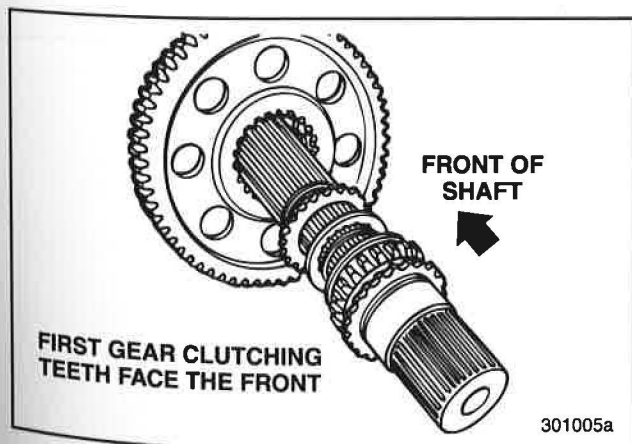


Figure 120 — Removing First Speed Gear

15. Remove the snap ring inside the first speed gear, using suitable snap ring pliers.

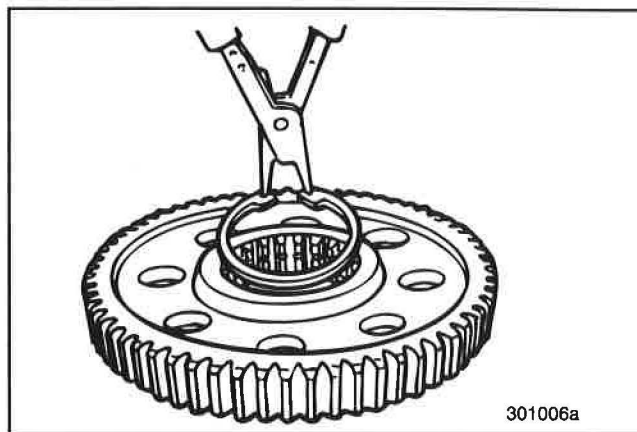


Figure 121 — Removing Snap Ring from First Speed Gear

16. Remove the first speed gear external and internal tooth thrust washers and snap ring from the mainshaft.

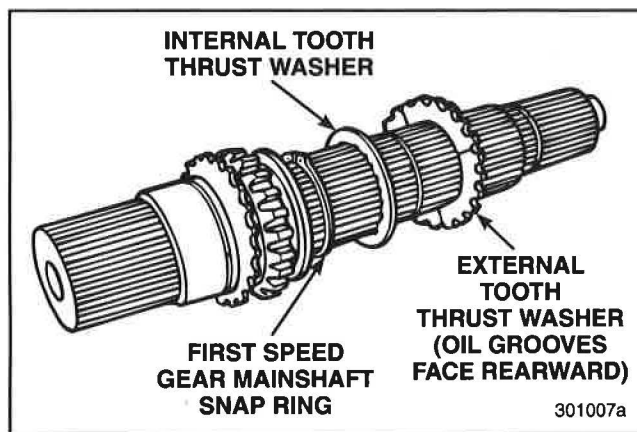


Figure 122 — Removing First Speed Gear External and Internal Tooth Thrust Washers and Snap Ring

17. Remove the reverse speed gear sliding clutch from the mainshaft.

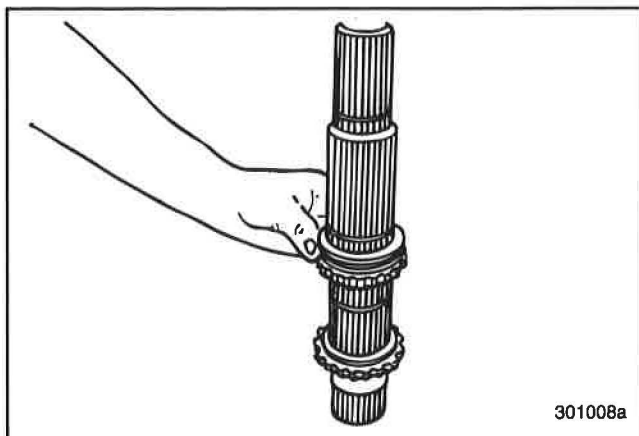


Figure 123 — Removing Reverse Speed Gear Sliding Clutch

18. Remove the snap ring plus internal and external tooth thrust washers from the mainshaft, for the reverse speed gear.

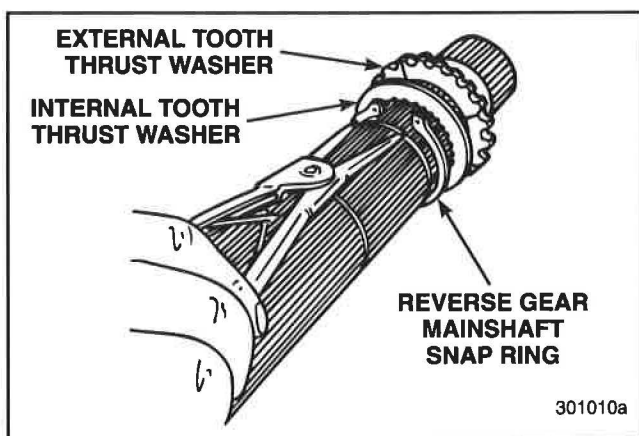


Figure 124 — Removing Snap Ring Plus Internal and External Tooth Thrust Washers

19. Remove the snap ring that retains the spigot bearing inner race to the mainshaft, using suitable snap ring pliers.

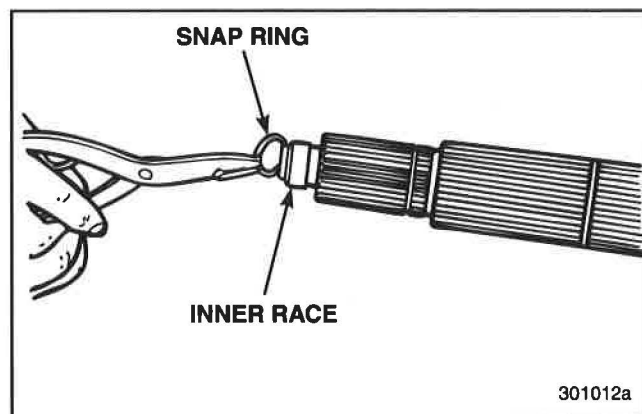


Figure 125 — Removing Spigot Bearing Inner Race Snap Ring

20. Remove the spigot bearing inner race, using a suitable puller arrangement, such as bar-type puller J 39477-1 used with bearing separator J 22912-01 or equivalent.

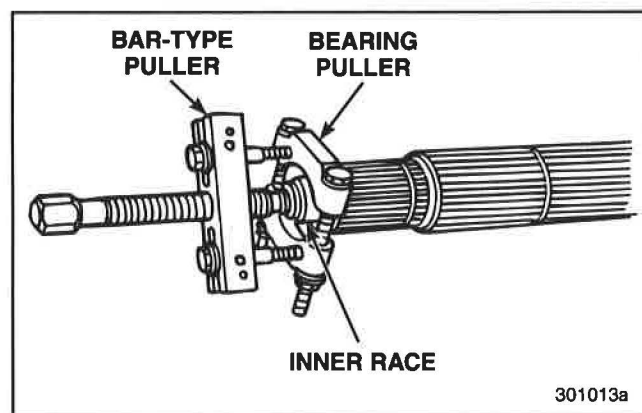
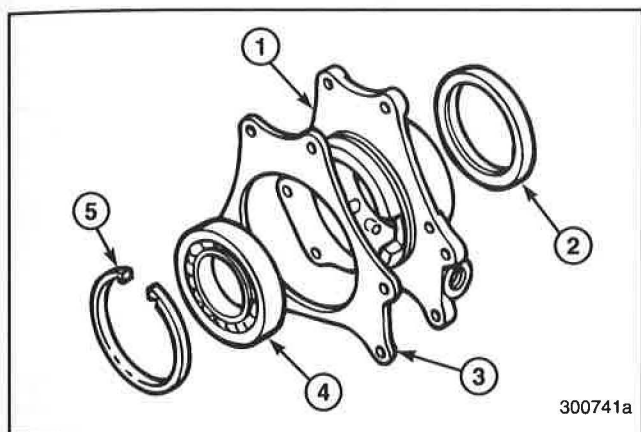
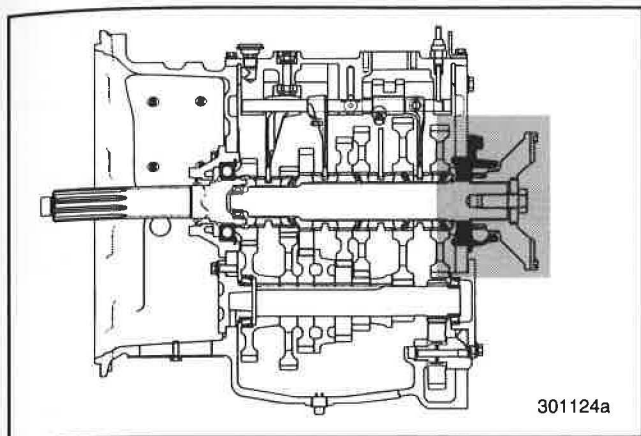


Figure 126 — Removing Spigot Bearing Inner Race



300 BENCH PROCEDURES

[322] Mainshaft Rear Bearing Cover Disassembly



- 1. Rear Bearing Cover
- 2. Oil Seal
- 3. Gasket

- 4. Bearing
- 5. Snap Ring

Figure 127 — Exploded View of Mainshaft Rear Bearing Cover

1. Remove the bearing snap ring from the rear bearing cover, using suitable snap ring pliers.

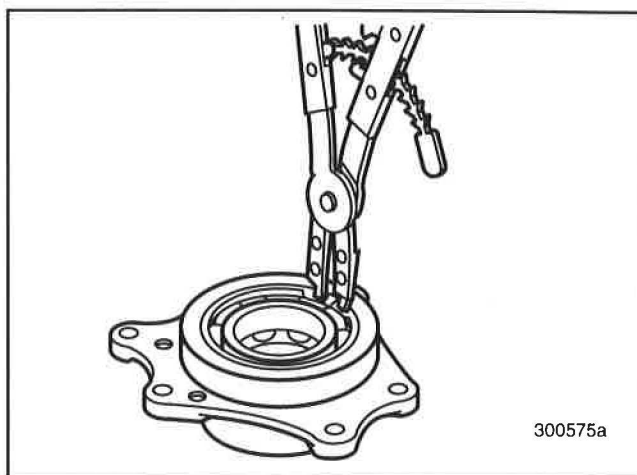


Figure 128 — Removing Rear Cover Snap Ring

2. Remove the mainshaft rear bearing from the bearing cover, using an internal puller such as OEM 4052 or equivalent.

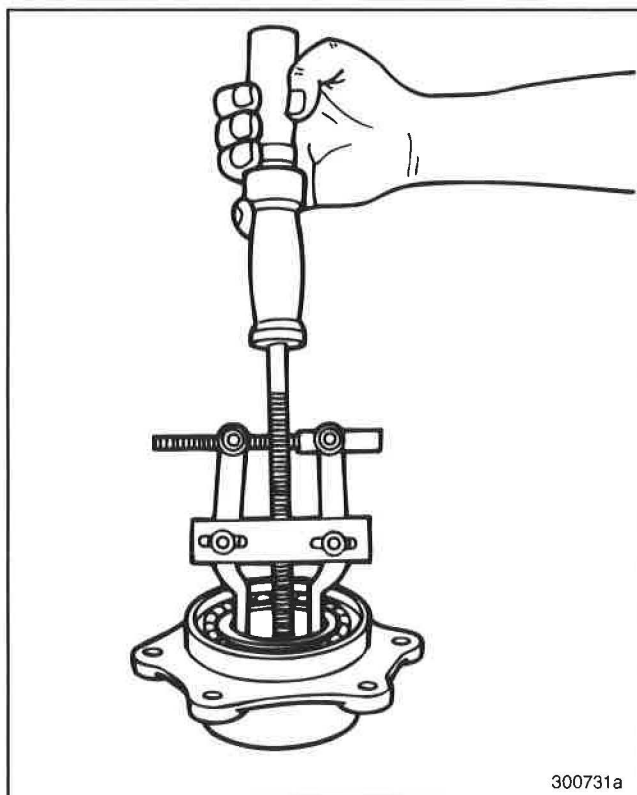


Figure 129 — Removing Bearing from Mainshaft Rear Bearing Cover



300 BENCH PROCEDURES

3. Remove the oil seal from the mainshaft rear bearing cover, using a hammer and blunt punch. Drive the seal out from the opposite side. Discard the cover gasket.

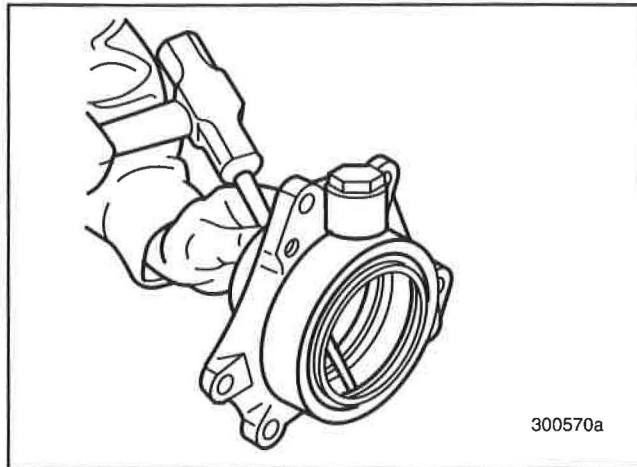


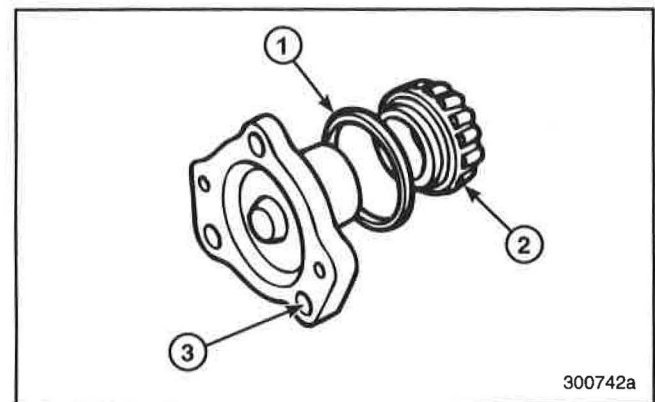
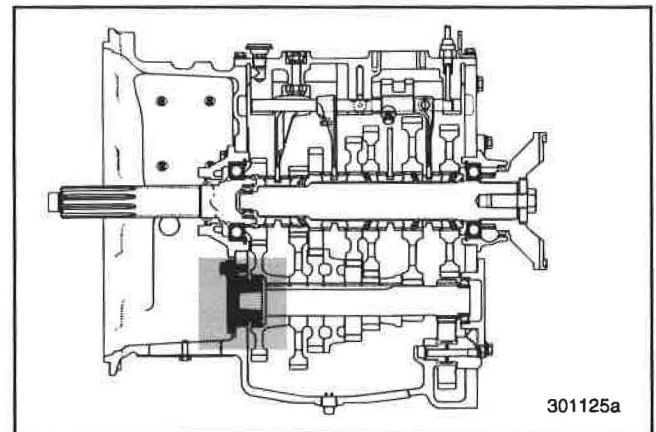
Figure 130 — Using Hammer and Blunt Punch to Remove Oil Seal

CAUTION

This action destroys the oil seal. Make sure a replacement oil seal is readily available.

4. Thoroughly clean the mainshaft rear bearing cover and bearing and inspect for damage.

[322] Countershaft Front Bearing Cover Disassembly



1. O-Ring
2. Bearing

3. Front Bearing Cover

Figure 131 — Exploded View of Countershaft Front Bearing Cover



300 BENCH PROCEDURES

The following countershaft front bearing cover disassembly procedure applies to all three countershaft front bearing covers.

1. Remove the O-ring from the shoulder of the countershaft front bearing cover.

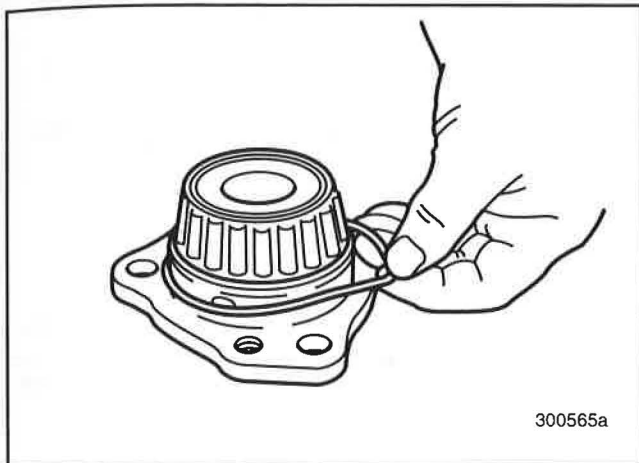


Figure 132 — Removing O-Ring from Shoulder of Countershaft Front Bearing Cover

2. Remove the bearing cone from the countershaft front bearing cover, using a suitable puller arrangement, such as bar-type puller J 39477-1 used with bearing separator J 8176 or equivalent.

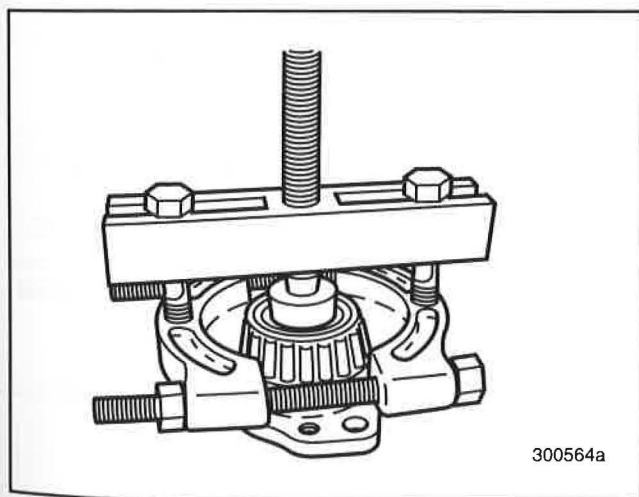
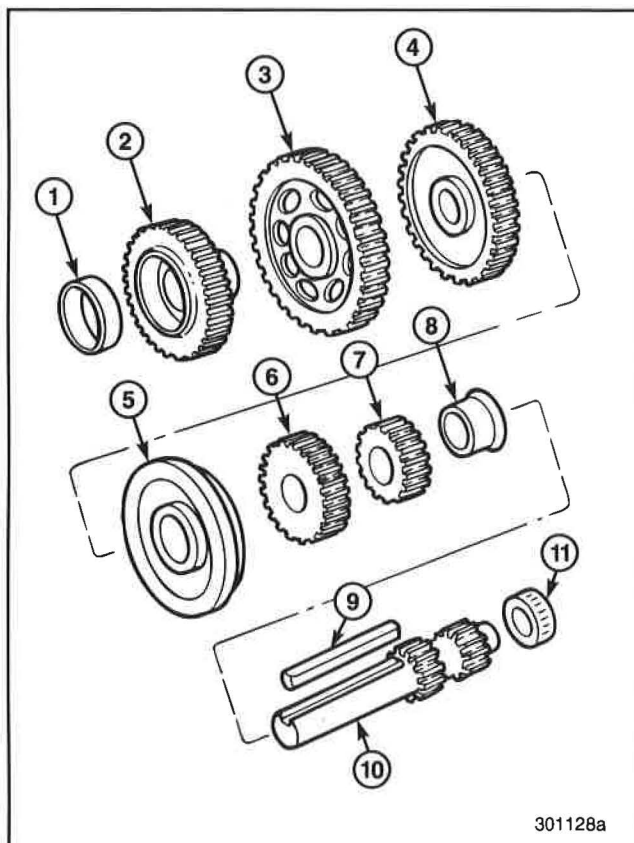
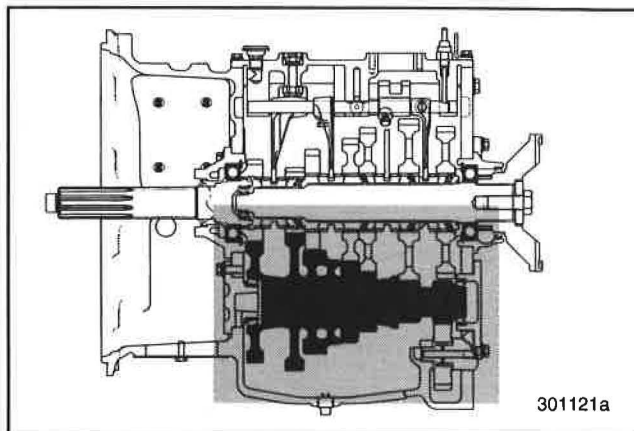


Figure 133 — Removing Bearing Cone from Countershaft Front Bearing Cover

3. Thoroughly clean the bearing cover and inspect for damage.

[322] Countershaft Disassembly



- | | |
|-------------------------|--|
| 1. Bearing Cup | 8. Thrust Washer/Spacer |
| 2. Main Drive Gear | 9. Key |
| 3. Sixth Speed Gear | 10. Countershaft (1st and reverse gearing integral with shaft) |
| 4. Fourth Speed Gear | 11. Bearing |
| 5. Thrust Washer/Spacer | |
| 6. Third Speed Gear | |
| 7. Second Speed Gear | |

Figure 134 — Exploded View of Countershaft



300 BENCH PROCEDURES

The following countershaft disassembly procedure applies to all three countershafts.

1. Press the countershaft main drive gear off the countershaft, using a suitable bearing separator such as J-8176 and press setup.

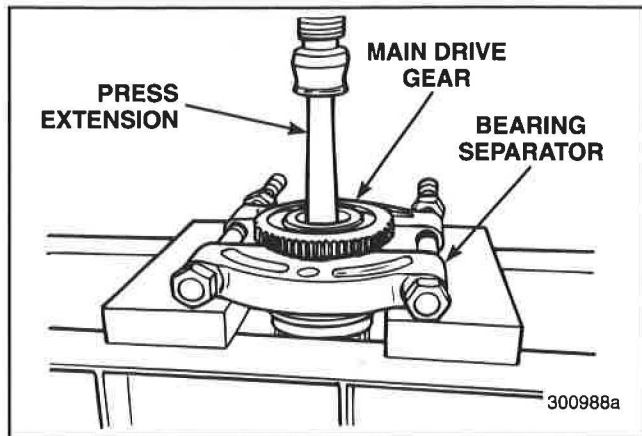


Figure 135 — Pressing Main Drive Gear Off Countershaft

2. Press the sixth speed gear off the countershaft.

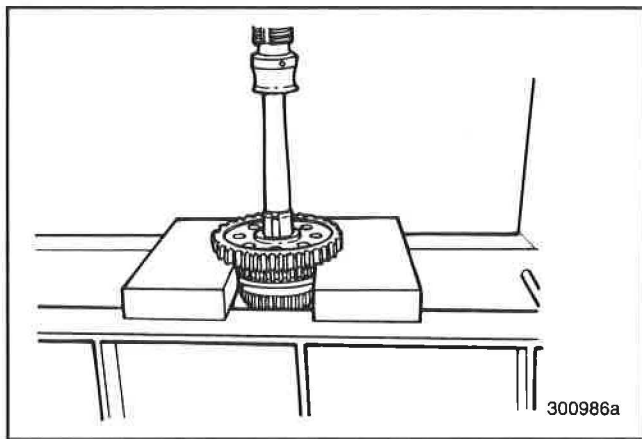


Figure 136 — Pressing Sixth Speed Gear Off Countershaft

3. Press the fourth speed gear, thrust washer/spacer and third speed gear off the countershaft as an assembly.

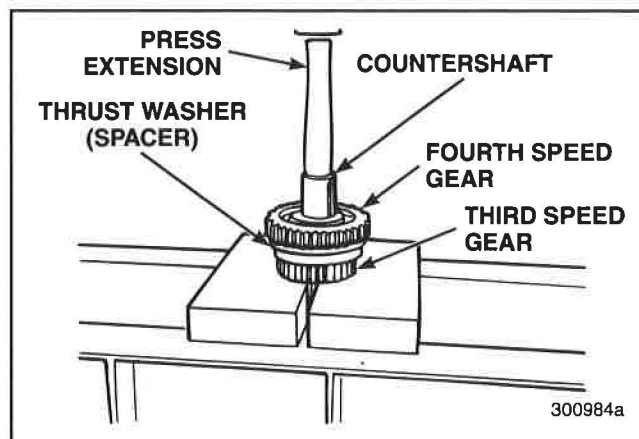


Figure 137 — Pressing Off Fourth Speed Gear, Thrust Washer/Spacer and Third Speed Gear

4. Press the second speed gear, thrust washer/spacer and key from the countershaft, as an assembly.

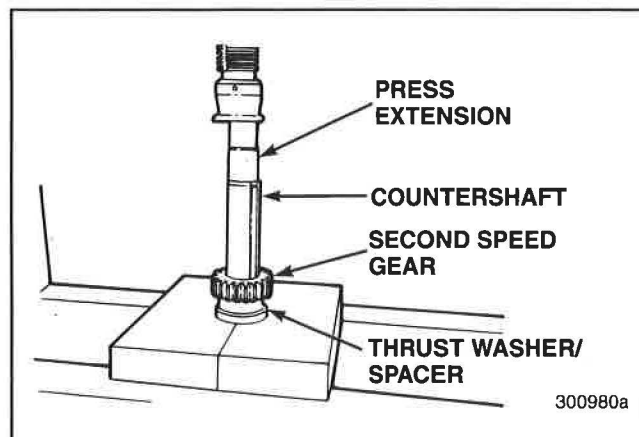


Figure 138 — Pressing Off Second Speed Gear, Thrust Washer/Spacer and Key

5. Press the rear bearing off the rear of the countershaft, using suitable press tools such as bearing separator J 8176 or equivalent.

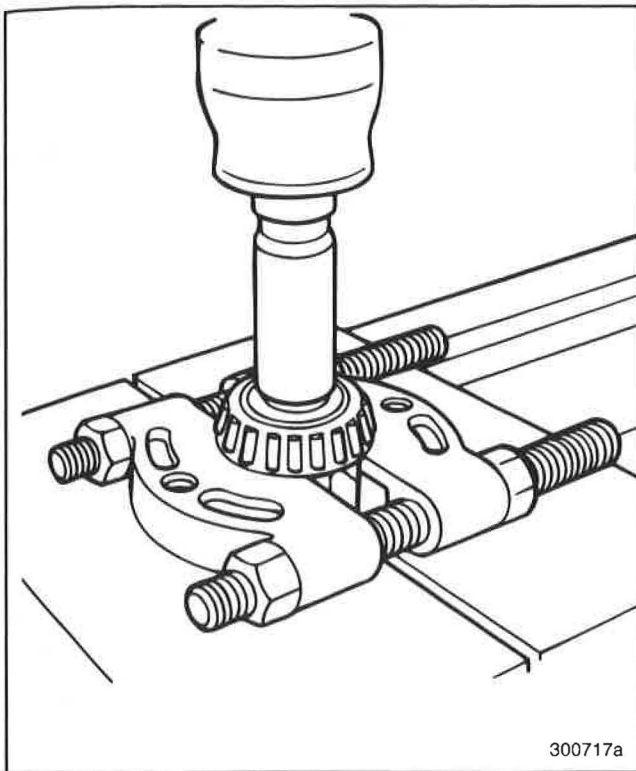


Figure 139 — Pressing Off Rear Bearing

6. Remove the bearing cup from the countershaft main drive gear, using a suitable puller such as OEM-4052 or equivalent.

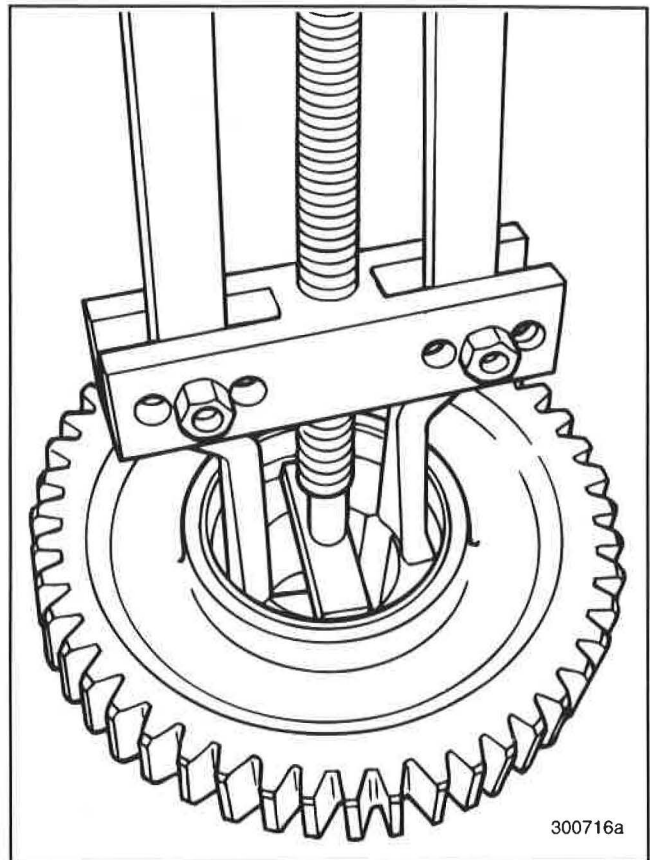
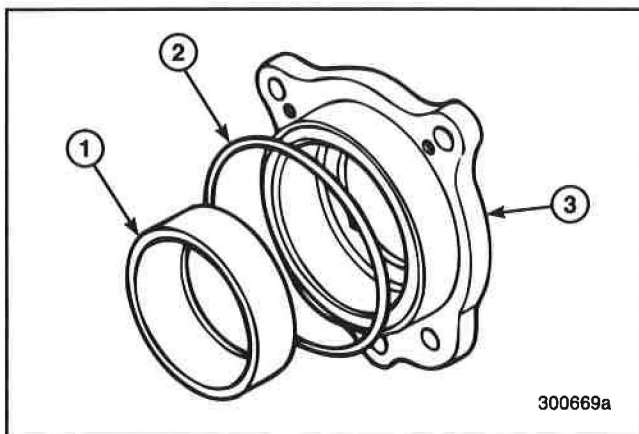
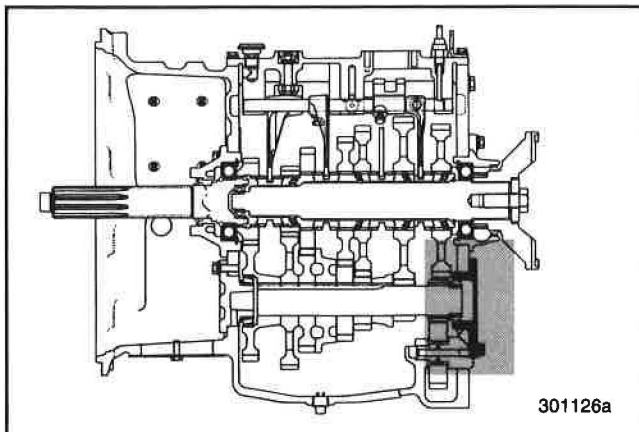


Figure 140 — Removing Bearing Race from Main Drive Gear



300 BENCH PROCEDURES

[322] Countershaft Rear Bearing Cover Disassembly



1. Bearing Cup
2. O-Ring

3. Bearing Cover

Figure 141 — Exploded View of Countershaft Rear Bearing Cover

The following countershaft rear bearing cover disassembly procedure applies to all three countershaft rear bearing covers.

1. Remove the shims and O-ring from the shoulder of the countershaft rear bearing cover. Tag and record the shim pack thickness for use during assembly.

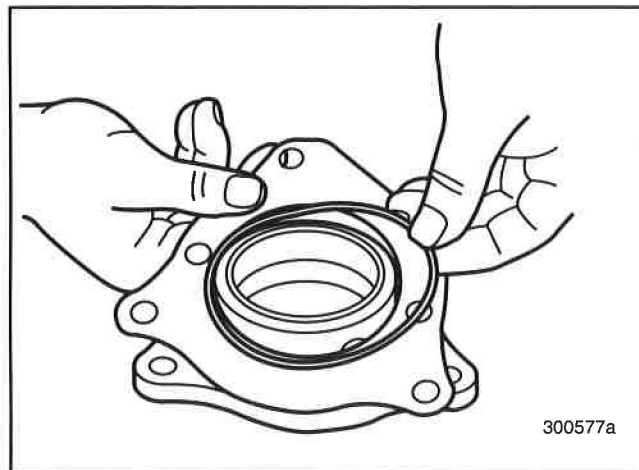


Figure 142 — Removing Cover Shims and O-Ring

2. Remove the bearing cup from the bearing cover, using a suitable puller such as internal puller OEM 4052 or equivalent.

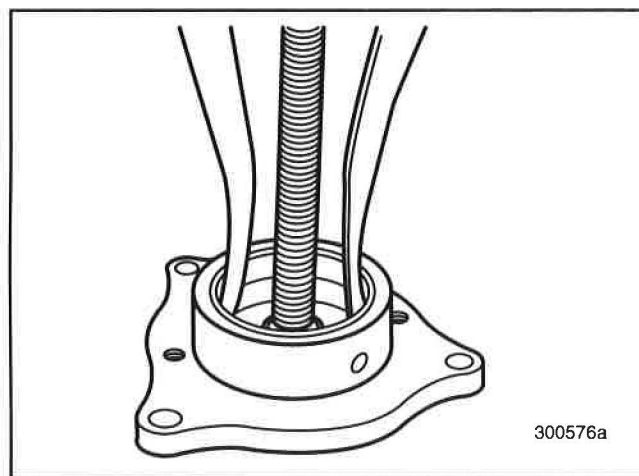


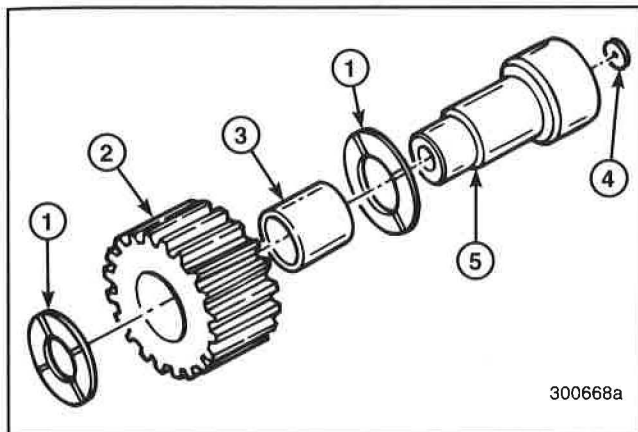
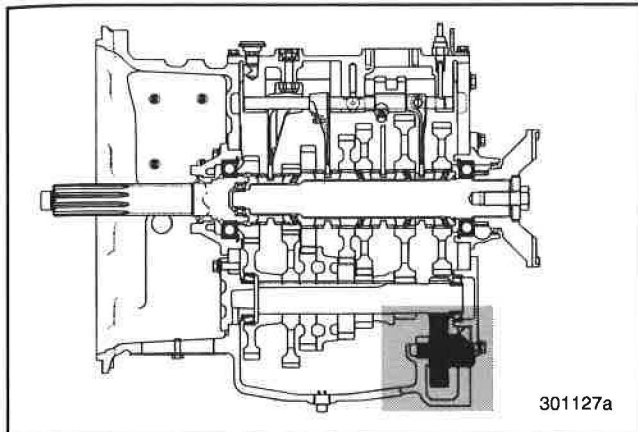
Figure 143 — Removing Bearing Cup from Cover

3. Thoroughly clean the bearing cover and inspect for damage.



300 BENCH PROCEDURES

[322] Reverse Idler Gear Disassembly



- | | |
|-----------------------|------------------------|
| 1. Thrust Washer | 4. Expansion Plug |
| 2. Reverse Idler Gear | 5. Reverse Idler Shaft |
| 3. Bearing | |

Figure 144 — Exploded View of Reverse Idler Shaft

Reverse idler gear disassembly applies to all three reverse idler gears.

1. Press the reverse idler bearing out of the reverse idler gear, using a suitable driver.

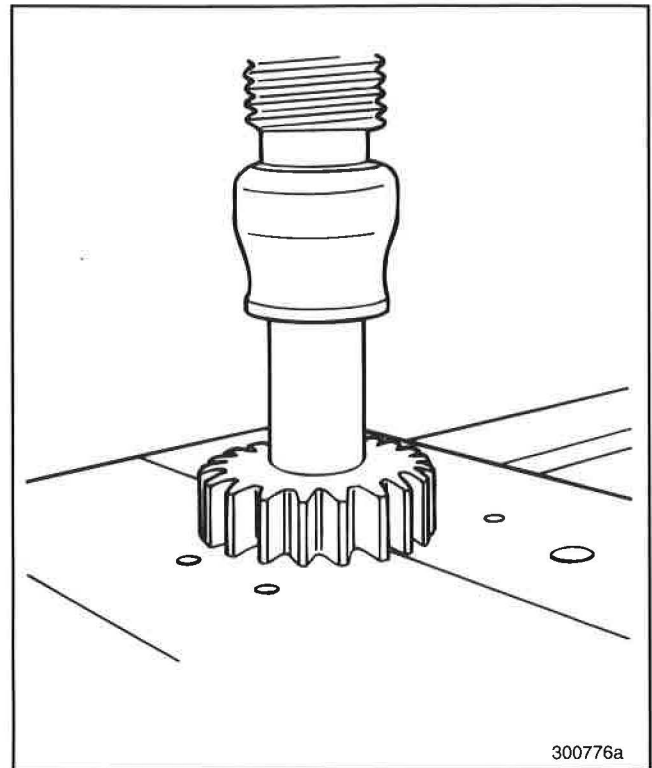


Figure 145 — Pressing Out Reverse Idler Gear Bearing

2. Thoroughly clean the bearing and gear and inspect for damage.



NOTES



300 INSPECTION OF PARTS

INSPECTION OF PARTS



300 INSPECTION OF PARTS

[300] Inspection and Cleaning

Thoroughly clean the case, cover and all other parts of the transmission. Remove all grease, oil and foreign matter, using a suitable safety solvent. Dry the parts with moisture-free compressed air.

[322] Bearings

Soak bearings in fresh clean solvent to loosen all hardened grease and foreign matter until the bearings are clean. Blow them dry with filtered, moisture-free compressed air.

CAUTION

Do not spin the bearings with compressed air. Doing so can damage the bearings.

Inspect each bearing for flaking, cracks, fractures, cavities, indentations, measurable wear, brinelling, fretting, corrosion, nicking, cage wear or deformation and other damage. If any of these conditions are present, the bearing should be replaced.

Apply a light coat of fresh, clean, specified gear oil to the bearings. (Refer to Recommended SAE Grade Gear Oil in Transmission Specifications and Capacities.) Turn the races and bearings slowly by hand to be sure they move freely and are smooth. If there is resistance to movement, or the bearings or races feel rough, replace the bearing.

CAUTION

If a bearing cone or cup needs replacement, a complete new assembly, including cup and mating cone, is required.

Do not remove a new bearing from its packing before time of installation. Never clean protective grease from new bearings.

Do not handle bearings with dirty hands. Rags must be clean and lint free.

Clean bearings which are satisfactory for installation. Wrap the bearings in clean, lint-free cloth and store for assembly.

[322] Gears

Replace all gears with teeth that show signs of abrasive wear, scratching (except normal manufacturing tool marks), ridging, scoring, surface fatigue, pitting, spalling, corrosive wear, digging in or cracking. Gears should always be inspected by magnaflux (or a similar system) for cracks which would not otherwise be detected.

[323] Shifter Forks, Sliding Clutches and Shift Rails

Replace forks and/or sliding clutches when the side clearance between the fork and sliding clutch groove exceeds the specified limit found in the Tolerance Specification table.

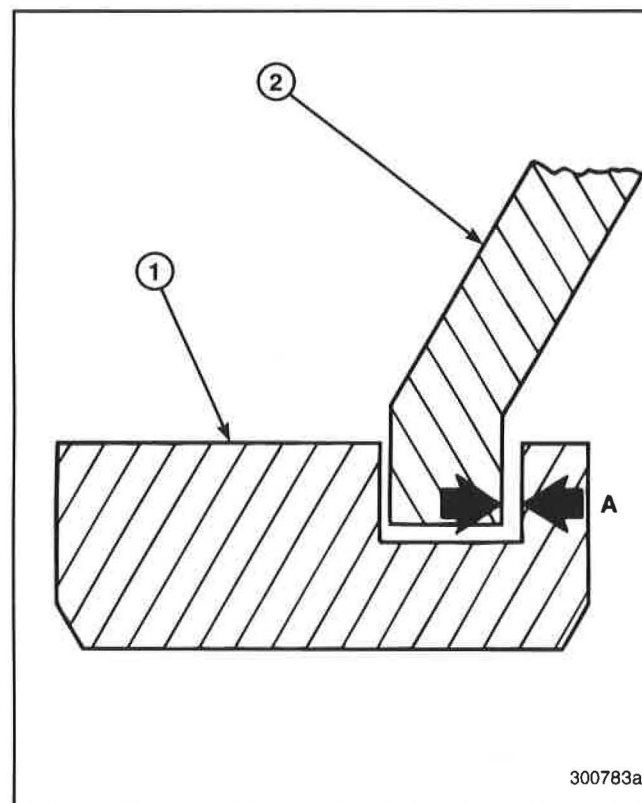


Figure 146 — Fork and Clutch Detail

Replace shift rails if they are cracked in either the poppet or setscrew holes. If the clearance between the shift rail and housing (cover) bore exceeds 0.010 inch maximum, determine which part is worn before replacing. Shaft wear can be checked by measuring the shaft at an unworn location. Then measure the shaft at the worn area and compare measurements. When measuring a shift rail, the reading should be an average of diameter measurements taken at four locations. Compare one side of the shaft to the other, AB-CD as shown in Figure 147.

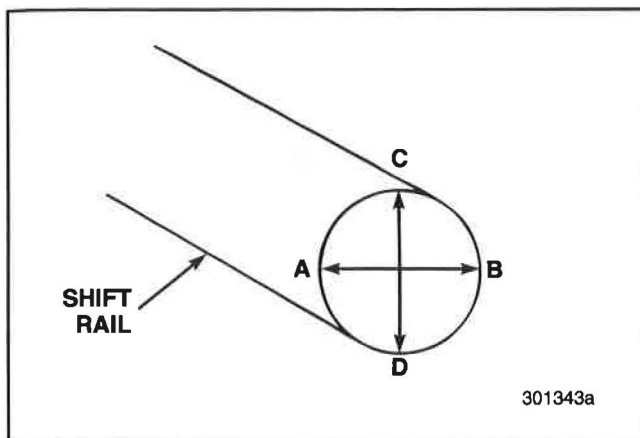


Figure 147 — Measuring Shift Rail

[321] Oil Seals

When an overhaul is required, replace all oil seals. Be careful to ensure that the sealing surface of any seal is not damaged, turned back or cut. A nick on a shaft sealing surface can cut the seal. Remove sharp edges that can damage the seal (chamfer edges if possible).

CAUTION

Be careful when using any abrasive polishing methods such as emery or crocus cloth on a sealing surface. It is possible to leave micro-grooves on the sealing surface. This can cause oil to leak past the sealing lip(s) of the oil seal. With this condition, a new seal will not stop the oil leak.

Be careful when installing a shaft through a new seal (or seal over shaft). Lubricate the shaft before inserting it through the seal. Splines, keyways and holes in a shaft can damage seals unless care is taken. Lubricate the seal to prevent damage during the initial start-up period, before normal lubrication begins. Keep anti-seize and sealing compounds away from oil seals.

If an oil seal does not have a preapplied sealant on its outer diameter, apply an appropriate sealer around the outside diameter to prevent leaks.

Lip-type oil seals are precision made and require close attention and care during installation. The quality of the installation method and the tools used directly affect the life of the seal. Do not use a block of wood or discarded bearing as a substitute for the proper seal driver.

For the seal to function properly, install it squarely with respect to the shaft centerline. The seal should be kept square within 0.010 inch total indicated runout (TIR). Squareness of the seal to the shaft is controlled by using the proper seal installation tools as shown in the next two illustrations.

Press seals into housings with smooth, even pressure to prevent cocking or distorting the seal. Gently press the seal into place. Correct installation depth is achieved as the driver tool bottoms against the positioning tool as shown.

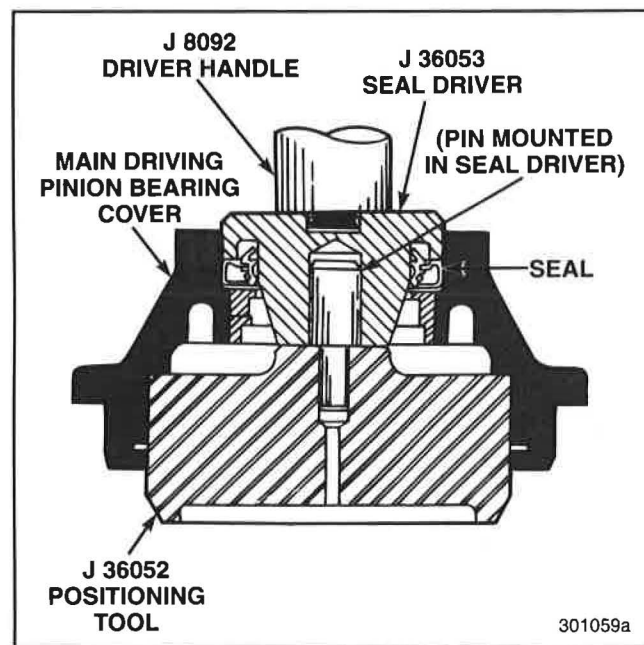


Figure 148 — Main Drive Pinion Oil Seal Tools



300 INSPECTION OF PARTS

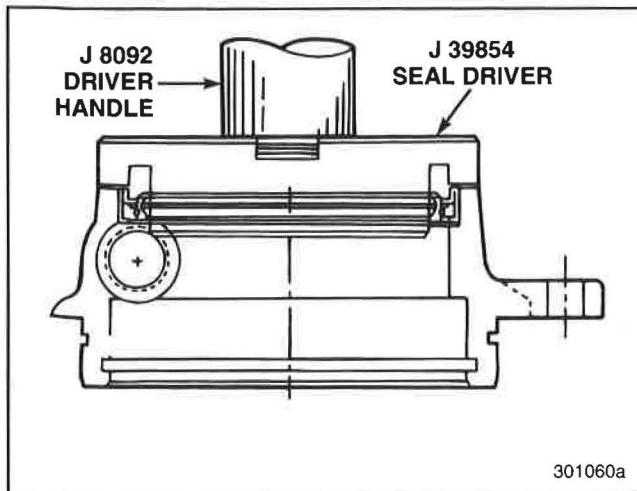


Figure 149 — Mainshaft Rear Bearing Cover Oil Seal Tools

General Inspection

A cracked transmission case should be replaced. Check all components for wear or damage. Replace all parts as required. Replace all gaskets, O-rings and any part that shows mutilation or damage. Repair all stripped threads using a thread repair insert that is compatible with patch-lock type capscrews.

General Reassembly Instructions

Refer to the Torque and Tolerance Specification tables for fits and limits.

All working metal parts, especially the bearings, should be coated with fresh, clean, specified gear oil while the transmission is being reassembled. This ensures immediate lubrication and helps prevent parts seizure during initial start-up. (Refer to Recommended SAE Grade Gear Oil in Transmission Specifications and Capacities.)

When installing bearings, use proper bearing drivers. When pressing a bearing onto a shaft, apply force only to the inner race of the bearing. When pressing a bearing into a housing (bearing cover), apply force only to the outer race. Do not apply force that is transmitted through the bearing rollers, balls or cage. Damage and premature bearing failure can result. Always apply even pressure to the bearing to prevent it from cocking or distorting during installation.

As moving parts are installed, check the parts frequently to see that they are moving freely.



300 BENCH PROCEDURES

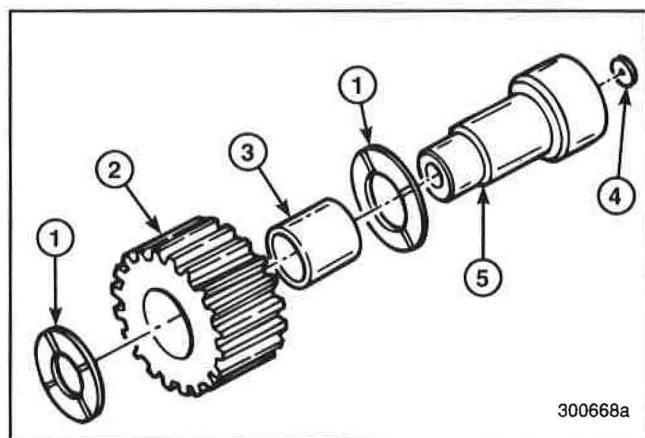
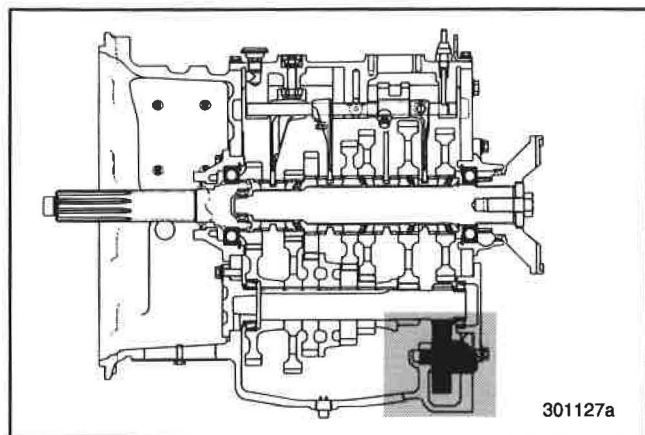
BENCH PROCEDURES



300 BENCH PROCEDURES

[320] TRANSMISSION COMPONENT REASSEMBLY

[322] Reverse Idler Gear Reassembly



- | | |
|-----------------------|------------------------|
| 1. Thrust Washer | 4. Expansion Plug |
| 2. Reverse Idler Gear | 5. Reverse Idler Shaft |
| 3. Bearing | |

Figure 150 — Exploded View of Reverse Idler Gear

1. Install the expansion plug into the reverse idler shaft, rounded side up. Seat it by driving the plug in with a driver. The driver should be solid, rather than hollow, and cylindrical, with an end diameter equal to that of the expansion plug. The end of the driver should be flat, not rounded.

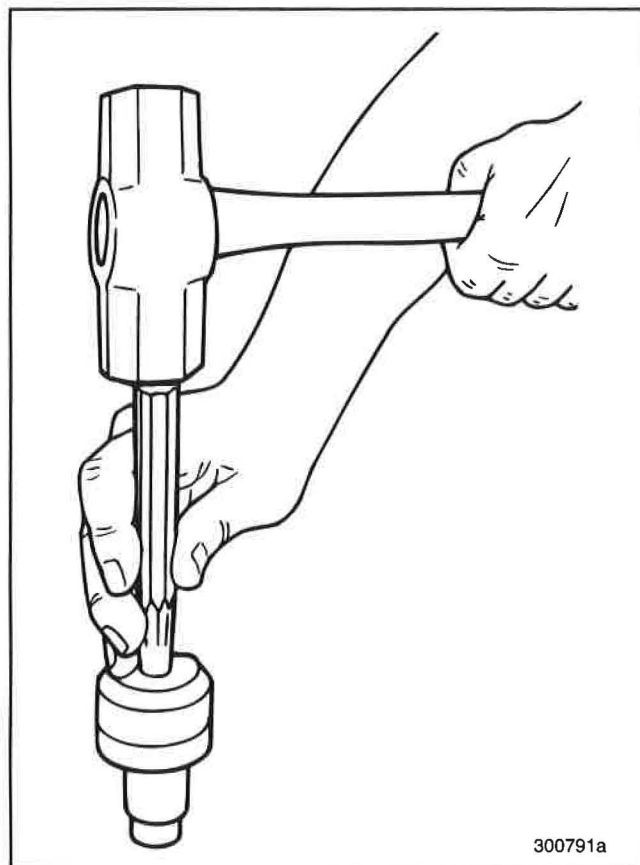


Figure 151 — Seating Expansion Plug

2. Install a new bearing into the reverse idler gear. Press it in until flush with the gear surface. The bearing must not protrude on either side of the gear surface.

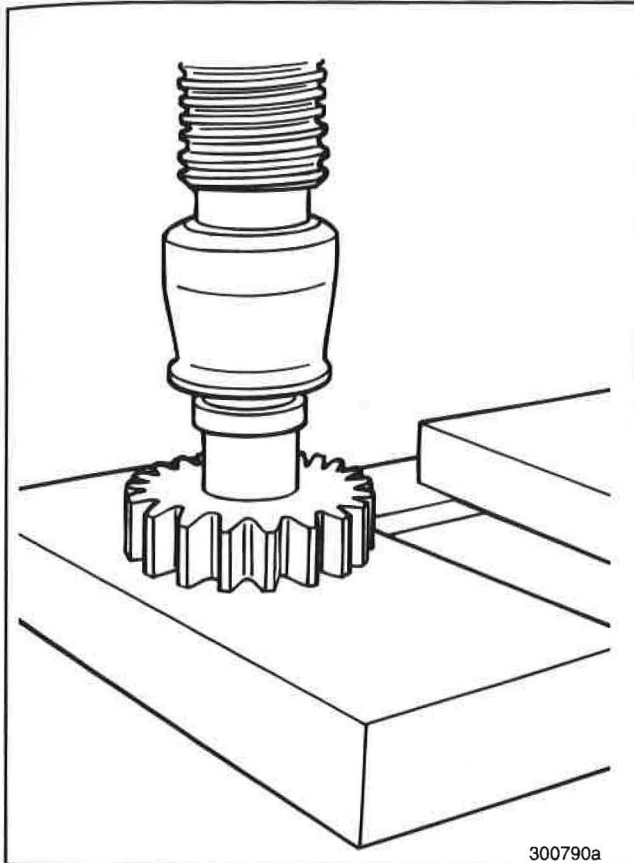
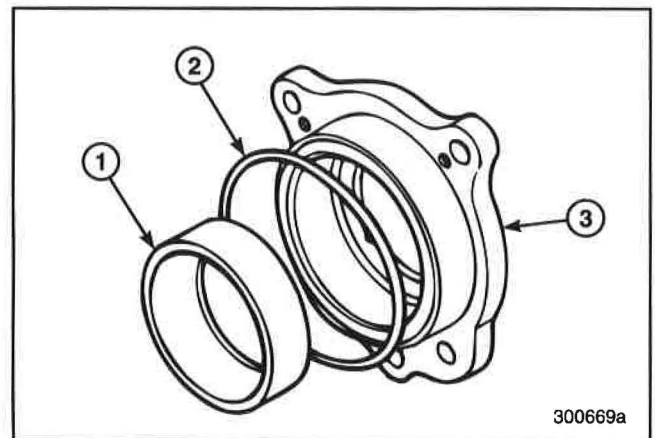
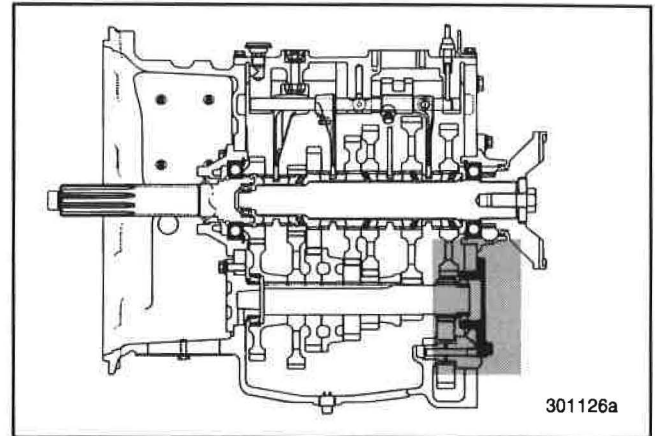


Figure 152 — Pressing Bearing into Gear

[322] Countershaft Rear Bearing Cover Reassembly



1. Bearing Cup
2. O-Ring

3. Bearing Cover

Figure 153 — Exploded View of Countershaft Rear Bearing Cover

1. Press the bearing cup into the cover, using a suitable driver.

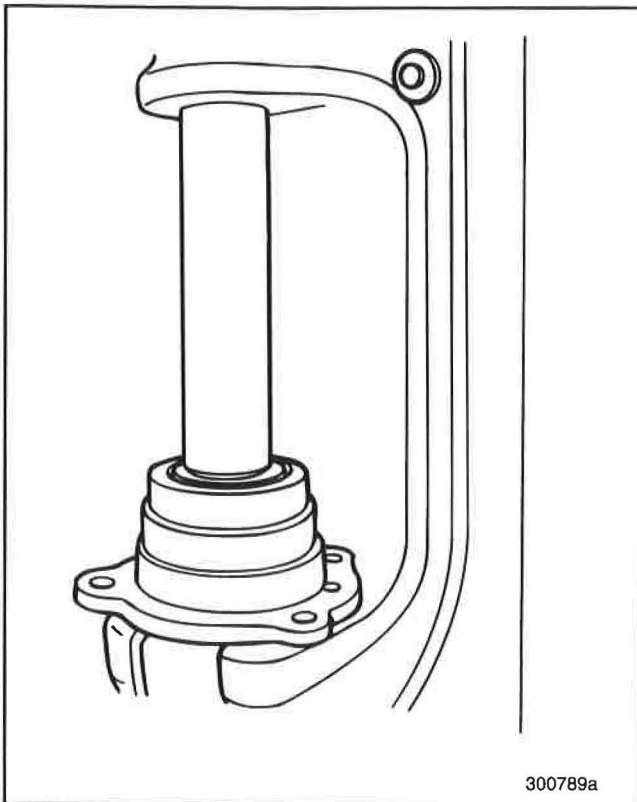


Figure 154 — Pressing Bearing Outer Race into Cover

2. Install the large O-ring and original shim pack onto the shoulder of the countershaft rear bearing cover.

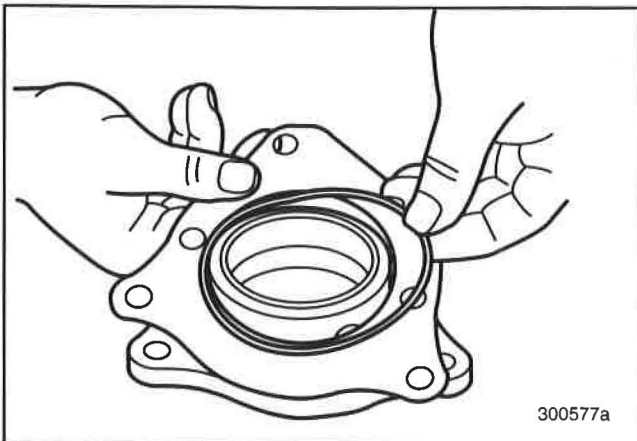
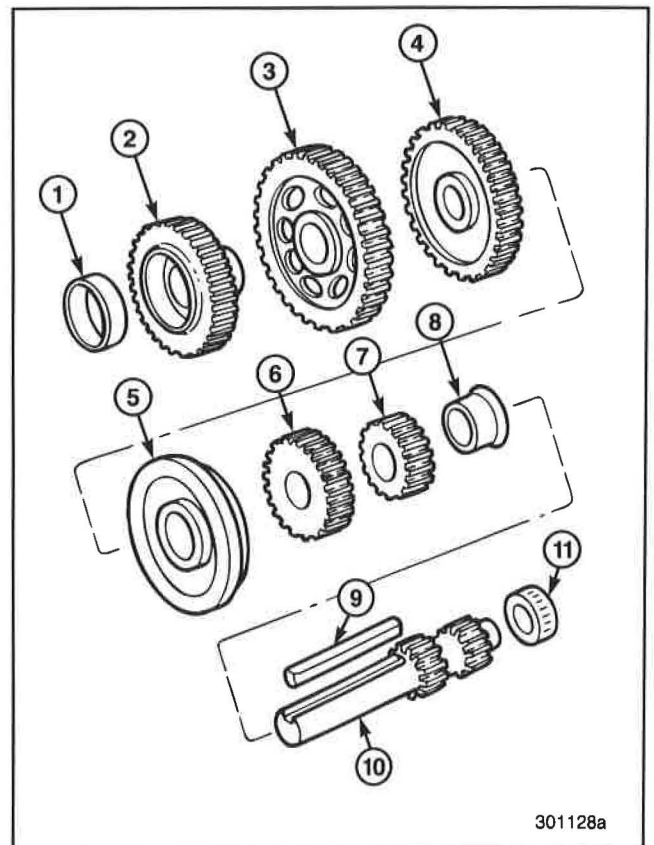
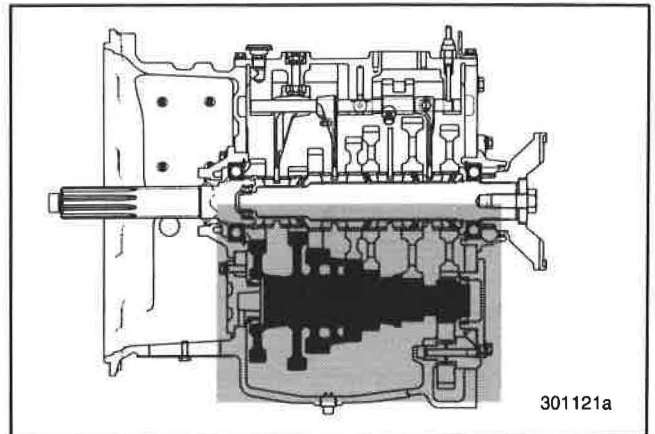


Figure 155 — Install Cover Shims and O-Ring

3. Set the bearing cover aside for later installation.

[322] Countershaft Reassembly



- | | |
|-------------------------|--|
| 1. Bearing Cup | 8. Thrust Washer/Spacer |
| 2. Main Drive Gear | 9. Key |
| 3. Sixth Speed Gear | 10. Countershaft (1st and reverse gearing integral with shaft) |
| 4. Fourth Speed Gear | 11. Bearing |
| 5. Thrust Washer/Spacer | |
| 6. Third Speed Gear | |
| 7. Second Speed Gear | |

Figure 156 — Exploded View of Countershaft



300 BENCH PROCEDURES

The following countershaft reassembly procedure applies to all three countershafts.

1. Press the bearing cup into the countershaft main drive gear, using a suitable driver.

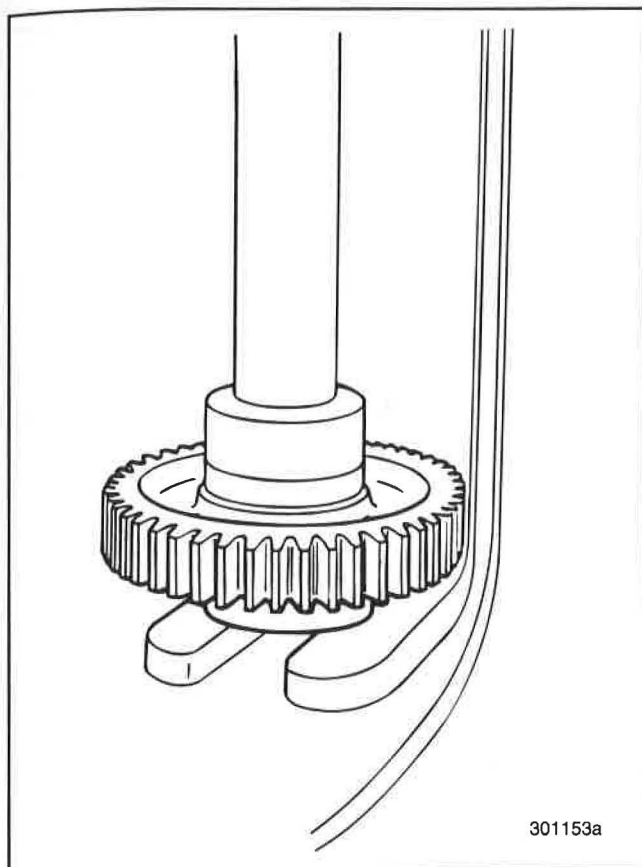


Figure 157 — Pressing Bearing Cup into Gear

2. Install the first and second speed gear thrust washer/spacer onto the countershaft, wide end next to first speed gear.

NOTE

The thrust washer/spacer must be installed before the key. The thrust washer/spacer acts as a stop.

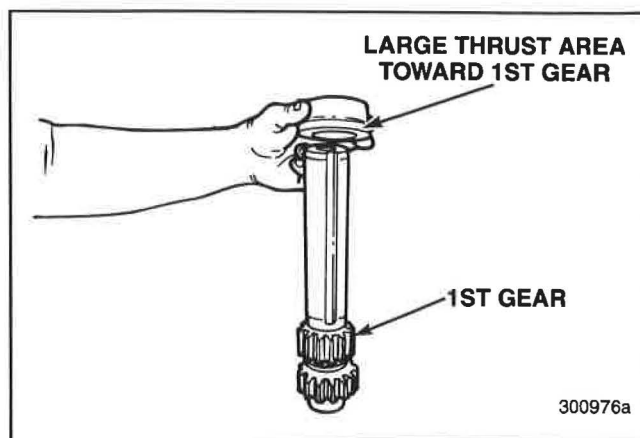


Figure 158 — Installing Thrust Washer/Spacer

3. Install the key into the keyway of the countershaft.

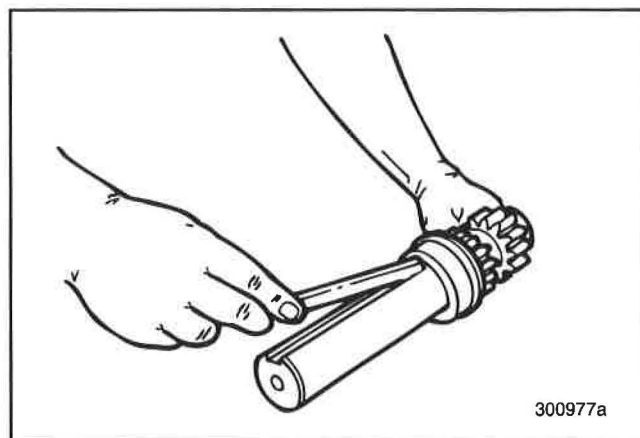


Figure 159 — Installing Key

4. Drive the key into position, using a brass hammer.

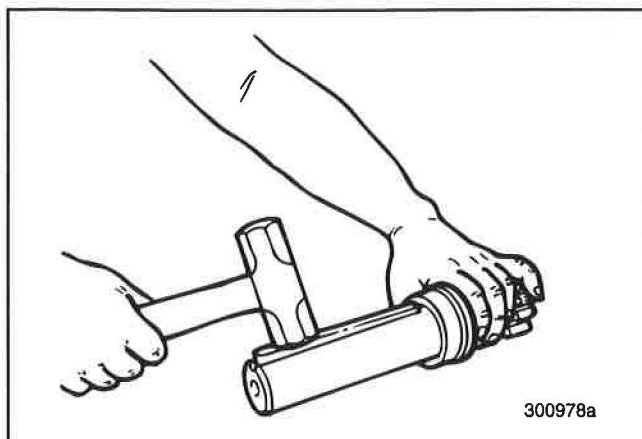


Figure 160 — Seating Key into Countershaft

5. Lubricate the countershaft, using the specified gear lubricant. (Refer to Recommended SAE Grade Gear Oil in Transmission Specifications and Capacities.) Align the key on the countershaft with the second speed gear keyway. Install the second speed gear onto the countershaft, using a suitable press arrangement.

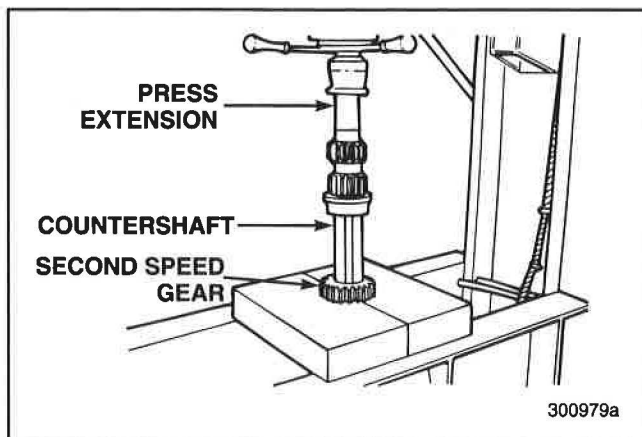


Figure 161 — Pressing on Second Speed Gear

6. Install the third speed gear onto the countershaft by aligning the key on the shaft with the keyway in the gear. Press the gear onto the shaft, using a suitable press arrangement.

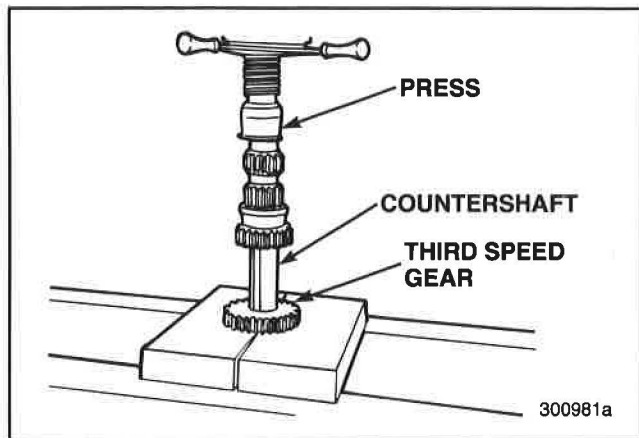


Figure 162 — Pressing Third Speed Gear onto Countershaft

7. Install the third and fourth gear thrust washer/spacer onto the countershaft with the large end toward the front. Align the keyway to install.

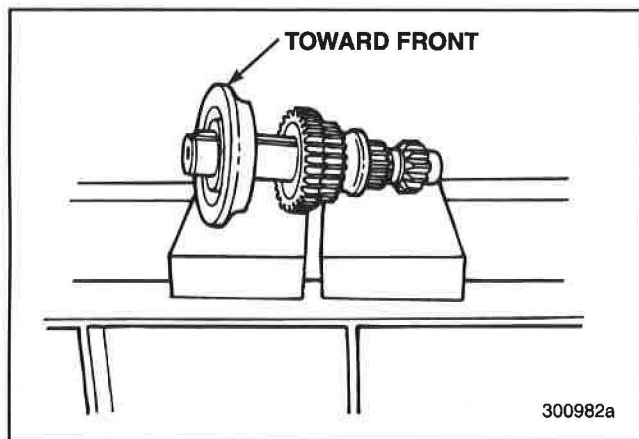


Figure 163 — Installing Third and Fourth Gear Thrust Washer/Spacer

8. Align the keyway of the fourth speed gear with the countershaft key and press the gear into place.

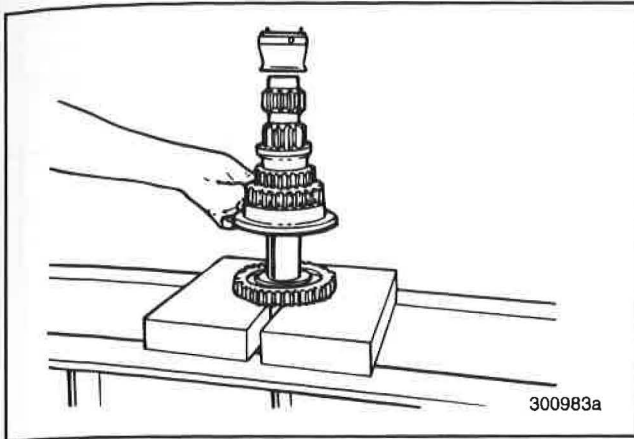


Figure 164 — Pressing Fourth Speed Gear onto Shaft

9. Install the sixth speed gear onto the countershaft by aligning the key on the shaft with the keyway in the gear. Press the gear onto the shaft, using a suitable press arrangement.

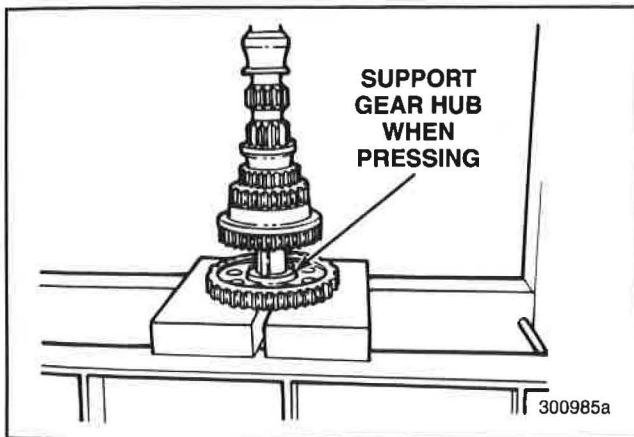


Figure 165 — Pressing Sixth Speed Gear onto Shaft

CAUTION

The sixth speed gear center hub must be fully supported during the pressing operation. Pressure applied to the outer gear web will overstress the gear and cause it to crack.

10. Install the countershaft main drive gear with the gear hub (offset) facing the rear. Align the key and press into place.

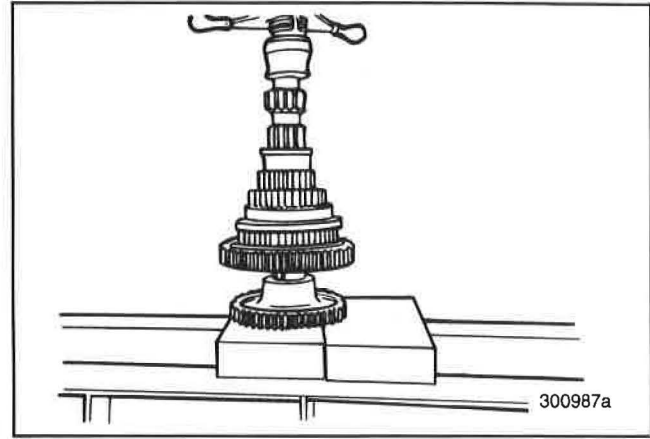


Figure 166 — Pressing Main Drive Gear onto Shaft

11. Press a new bearing onto the rear end of the countershaft, using a suitable driver. Apply force to the inner race of the bearing only.

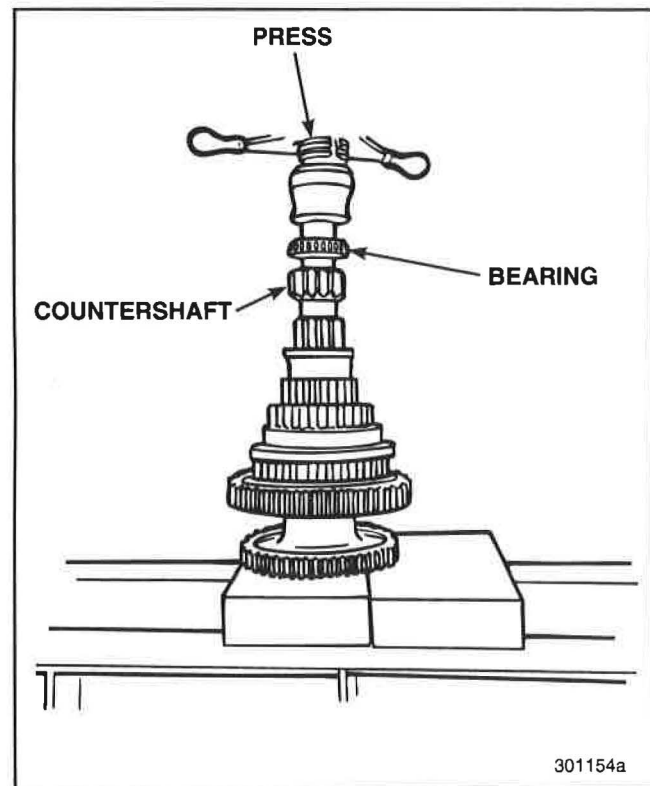
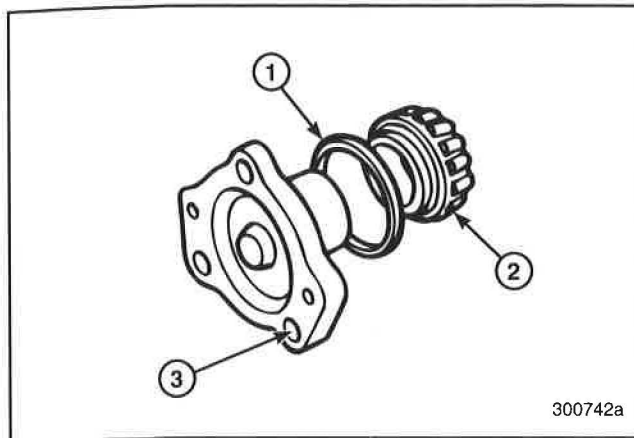
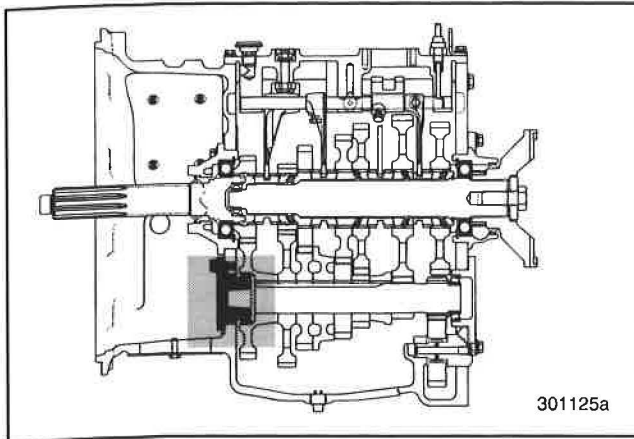


Figure 167 — Pressing Rear Bearing onto Countershaft

[322] Countershaft Front Bearing Cover Reassembly



1. O-Ring
2. Bearing

3. Front Bearing Cover

Figure 168 — Exploded View of Front Countershaft Front Bearing Cover

The following countershaft front bearing cover reassembly procedure applies to all countershaft front bearing covers.

1. Press a new bearing onto the countershaft front bearing cover, using a suitable driver. Apply force to the inner race of the bearing only.

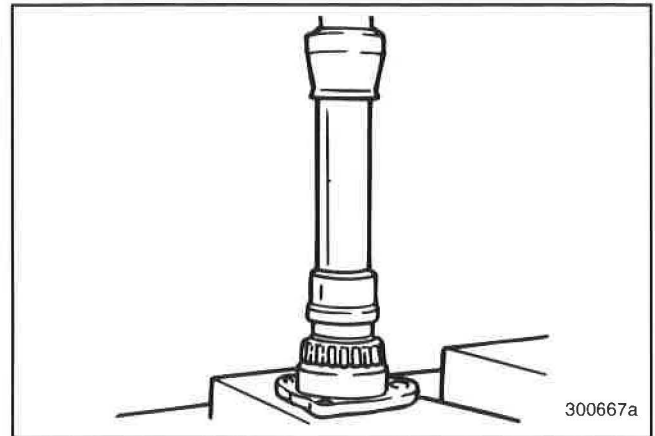


Figure 169 — Pressing Bearing onto Cover

2. Install the large O-ring onto the shoulder of the front bearing cover.

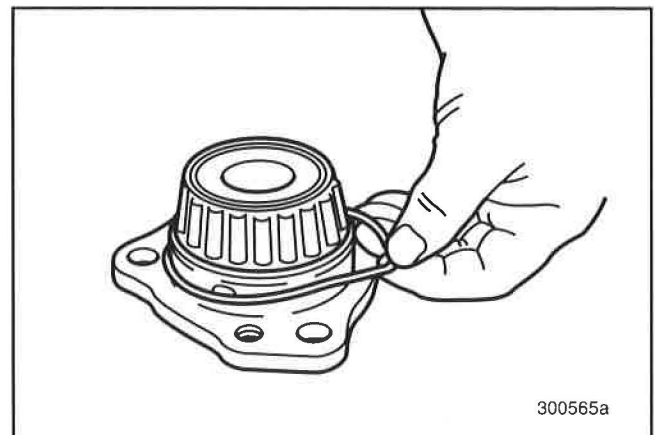
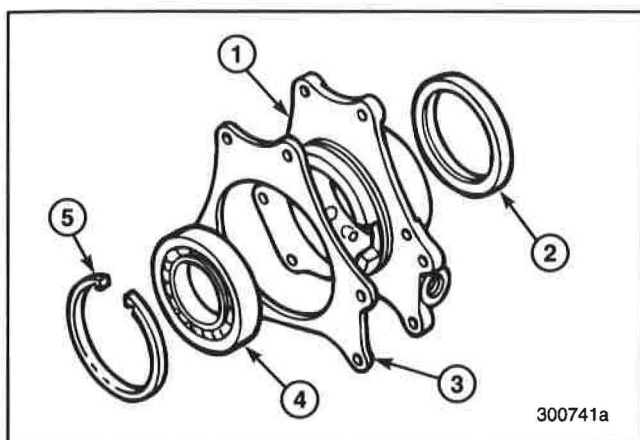
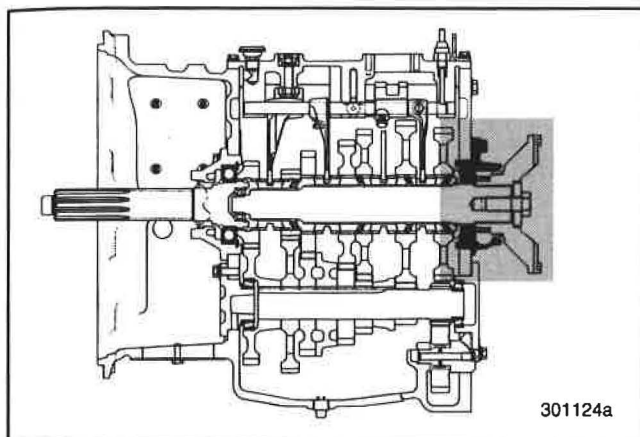


Figure 170 — Installing O-Ring onto Front Cover

[322] Mainshaft Rear Bearing Cover Reassembly



1. Rear Bearing Cover
2. Oil Seal
3. Gasket

4. Bearing
5. Snap Ring

Figure 171 — Exploded View of Mainshaft Rear Bearing Cover

1. Gently press a new oil seal into the mainshaft rear bearing cover using the tool arrangement depicted in Figure 172. Correct seal installation depth is achieved as the driver tool contacts the cover.

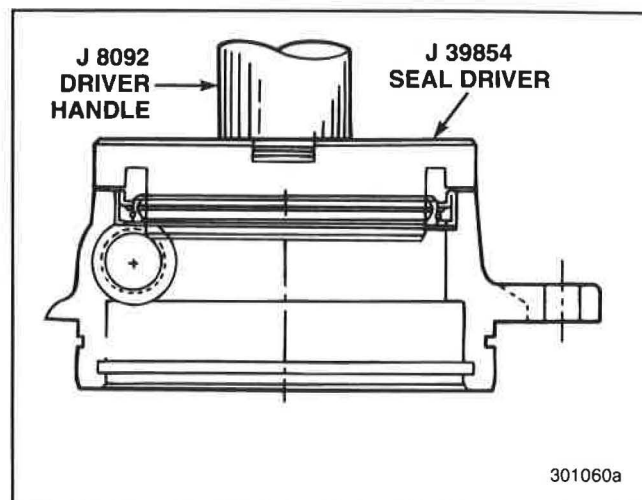


Figure 172 — Pressing Oil Seal into Mainshaft Rear Bearing Cover

2. Install a new bearing into the cover, using a suitable driver. Apply force to the outer race only.



Figure 173 — Pressing Bearing into Rear Bearing Cover

3. Install the snap ring (that retains the bearing) into the rear bearing cover.

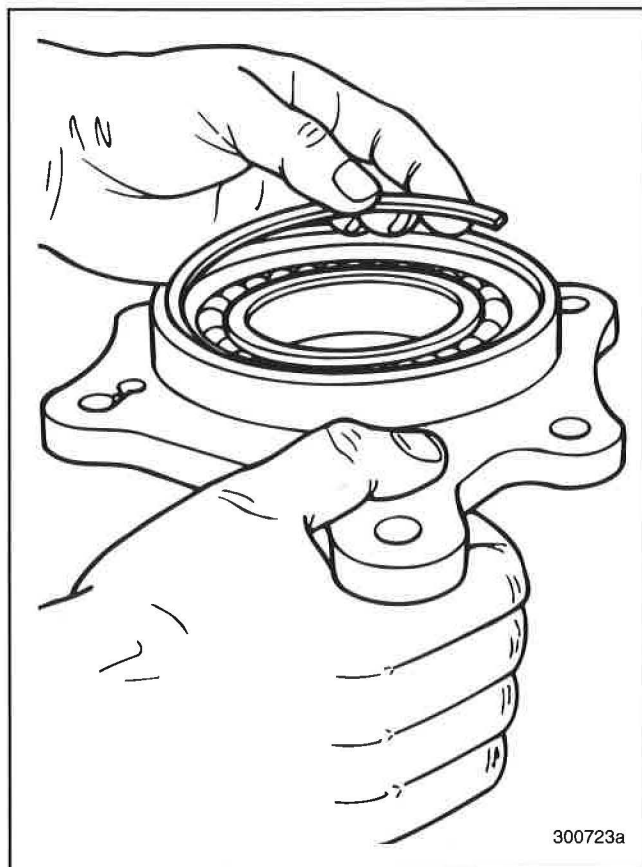


Figure 174 — Installing Snap Ring

4. Install the mainshaft rear bearing cover gasket, using sealant between the cover and the gasket. Make sure to align the oil passage holes in the gasket with the oil passage holes in the cover.

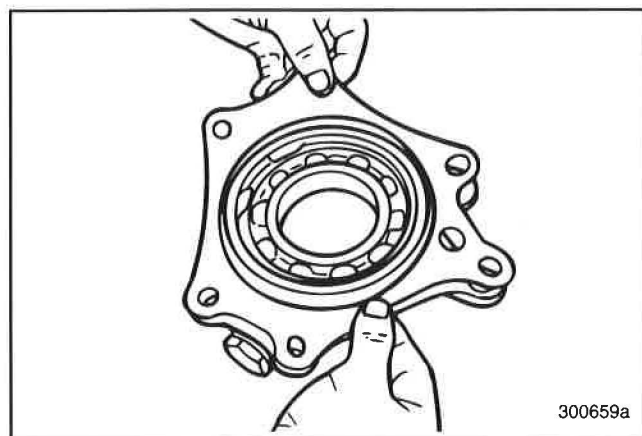
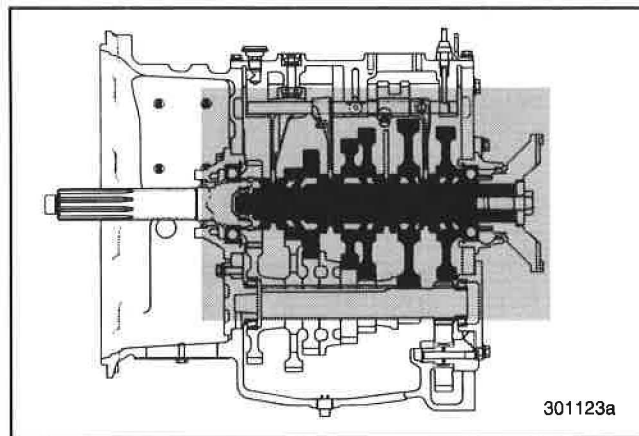


Figure 175 — Installing Cover Gasket

[322] Mainshaft Reassembly



1. Install the inner race of the spigot bearing onto the front of the mainshaft, using a suitable driver and hammer.

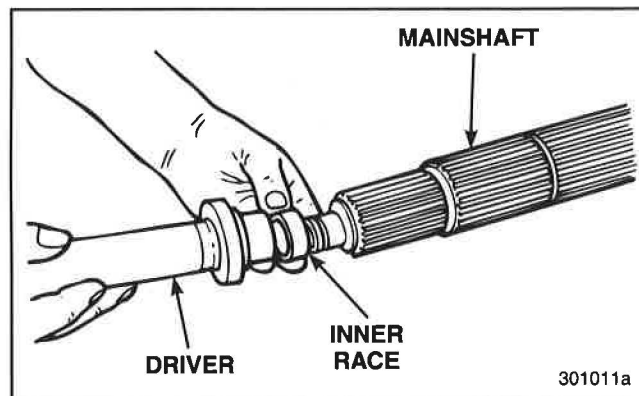


Figure 176 — Installing Spigot Bearing Inner Race

2. Install the spigot bearing inner race snap ring, using suitable snap ring pliers.

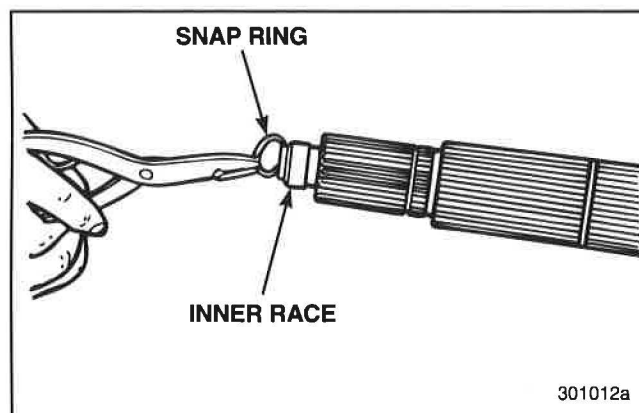
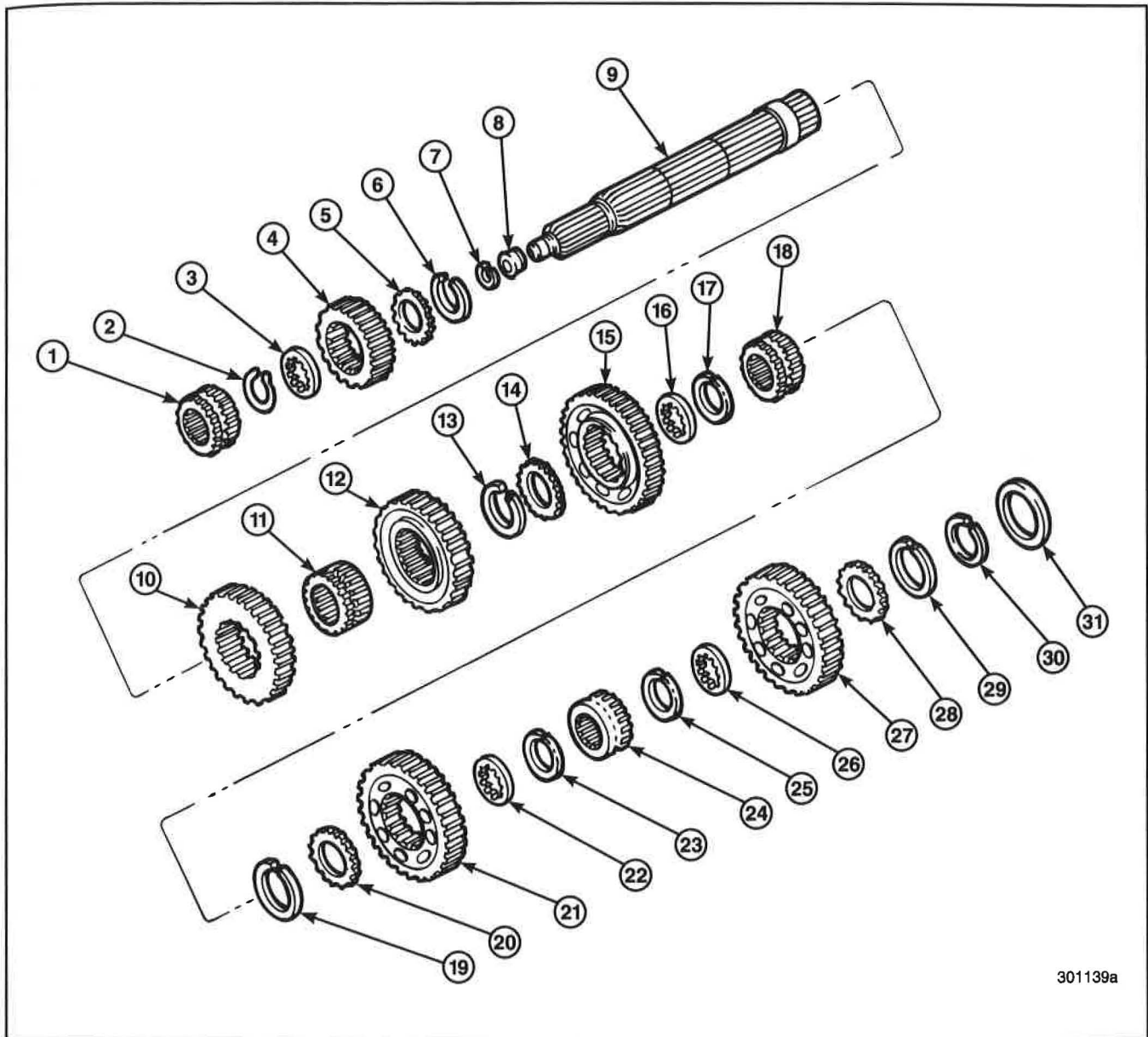


Figure 177 — Installing Inner Race Snap Ring



1. Sliding Clutch — 5th/6th
2. Snap Ring
3. Thrust Washer — Internal Tooth
4. Sixth Speed Gear
5. Thrust Washer — External Tooth
6. Snap Ring
7. Snap Ring
8. Bearing Inner Race
9. Mainshaft
10. Fourth Speed Gear
11. Sliding Clutch — 3rd/4th

12. Third Speed Gear
13. Snap Ring
14. Thrust Washer — External Tooth
15. Second Speed Gear
16. Thrust Washer — Internal Tooth
17. Snap Ring
18. Sliding Clutch — 1st/2nd
19. Snap Ring
20. Thrust Washer — External Tooth
21. First Speed Gear
22. Thrust Washer — Internal Tooth

23. Snap Ring
24. Sliding Clutch — Reverse
25. Snap Ring
26. Thrust Washer — Internal Tooth
27. Reverse Speed Gear
28. Thrust Washer — External Tooth
29. Snap Ring
30. Snap Ring
31. Thrust Washer (Spacer)

Figure 178 — Exploded View of Mainshaft

3. Working from the front of the mainshaft, install the reverse speed gear internal tooth and external tooth thrust washers. Grooves in external tooth thrust washer face forward, toward internal tooth thrust washer. Install the external tooth thrust washer first. Also, install the reverse speed gear mainshaft snap ring in the second groove, using suitable snap ring pliers.

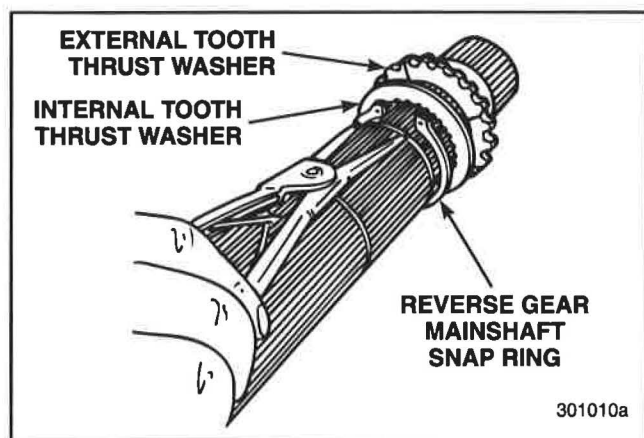


Figure 179 — Installing Snap Ring and Internal and External Tooth Thrust Washers

4. Continuing to work from the front of the mainshaft, install the reverse speed gear sliding clutch, with clutch teeth facing rearward.

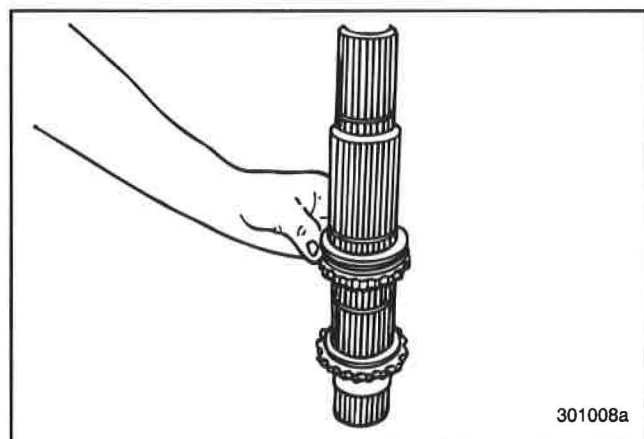


Figure 180 — Installing Reverse Speed Gear Sliding Clutch

5. Install the first speed gear mainshaft snap ring, and the internal tooth and external tooth thrust washers.

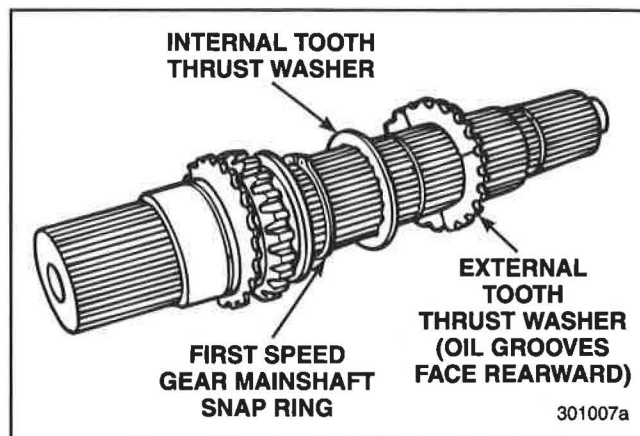


Figure 181 — Installing Snap Ring and Thrust Washers

6. Install the first speed gear snap ring into the groove located in the center of the gear, using suitable snap ring pliers.

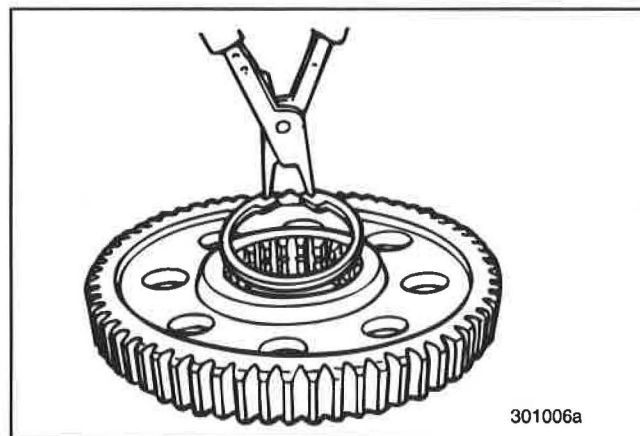


Figure 182 — Installing First Speed Gear Snap Ring

7. Install the first speed gear onto the mainshaft with clutch teeth facing forward. Slide the gear onto the shaft until the external and internal tooth thrust washers are fully engaged.

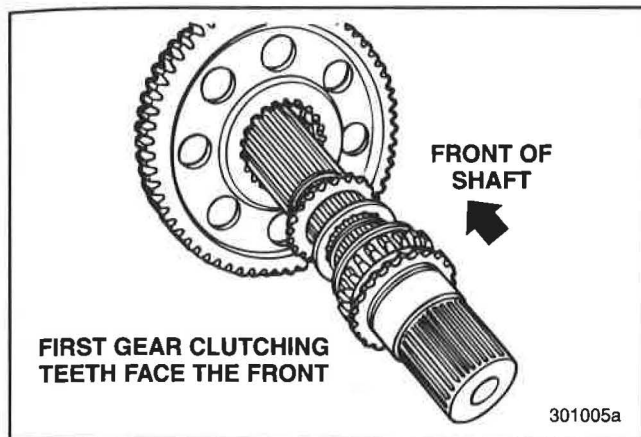


Figure 183 — Installing First Speed Gear

8. Install the first/second sliding clutch.

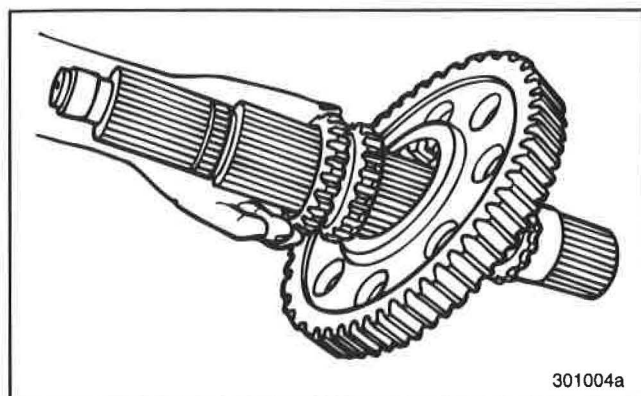


Figure 184 — Installing First/Second Sliding Clutch

9. Install the second speed gear mainshaft snap ring, using suitable snap ring pliers.

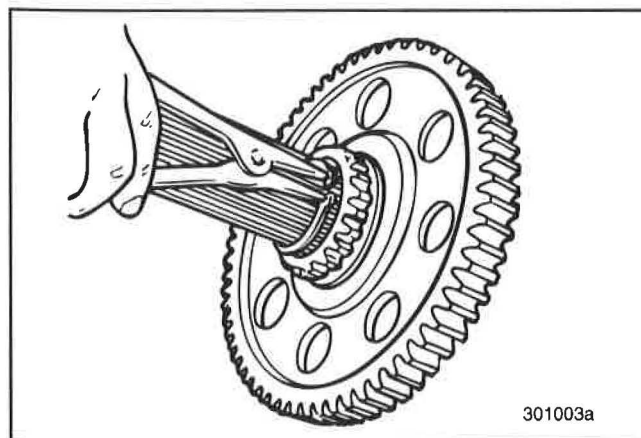


Figure 185 — Installing Second Speed Gear Mainshaft Snap Ring

10. Install the internal tooth and external tooth thrust washers until they contact the snap ring. Be sure that the oil grooves on the external tooth thrust washer face the internal tooth thrust washer.

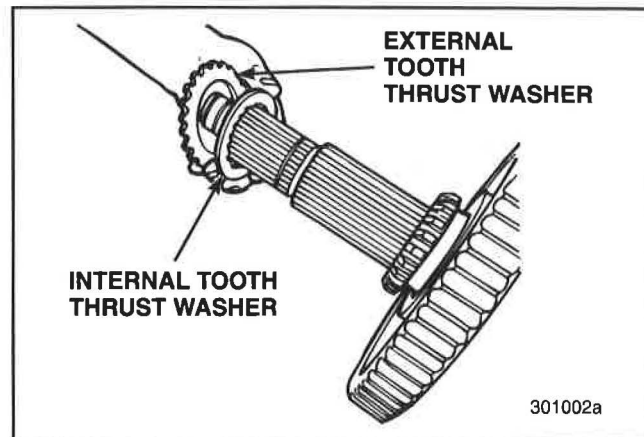


Figure 186 — Installing Internal and External Tooth Thrust Washers

11. Install the snap ring into the snap ring groove of the second speed gear, using suitable snap ring pliers.

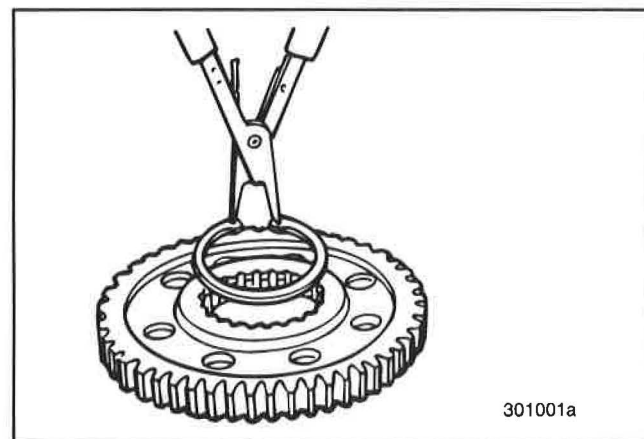


Figure 187 — Installing Snap Ring into Second Speed Gear

12. Install the second speed gear onto the mainshaft with clutch teeth facing rearward (toward sliding clutch) and thrust washers fully engaged.

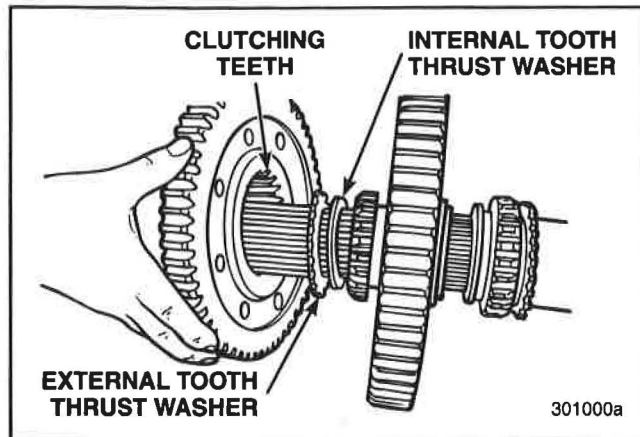


Figure 188 — Installing Second Speed Gear

13. Install the third speed gear onto the mainshaft with the oil grooves of the gear facing rearward (toward second speed gear).

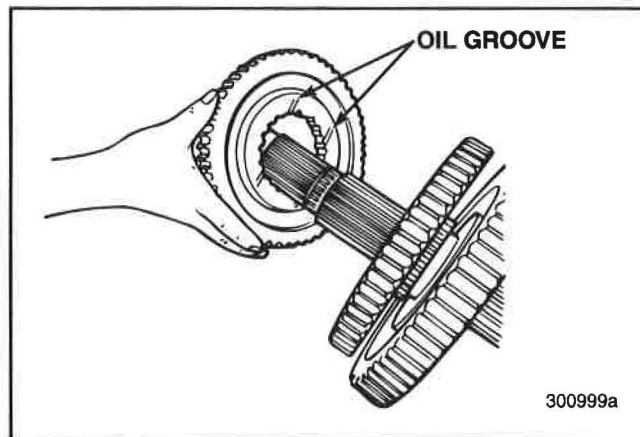


Figure 189 — Installing Third Speed Gear

14. Install the third/fourth sliding clutch onto the mainshaft.

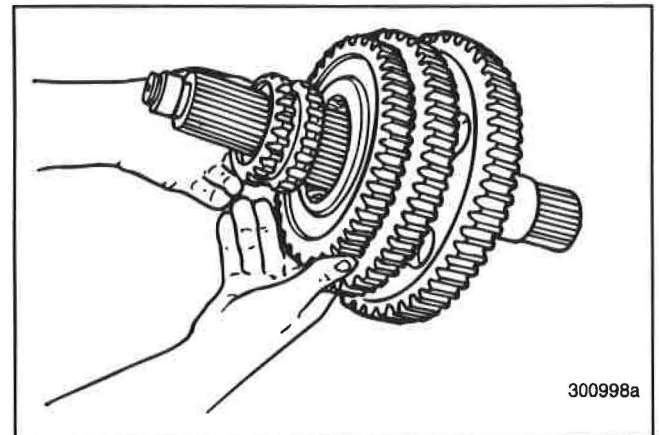


Figure 190 — Installing Third/Fourth Sliding Clutch

15. Install the fourth speed gear onto the mainshaft with clutch teeth facing rearward (toward sliding clutch).

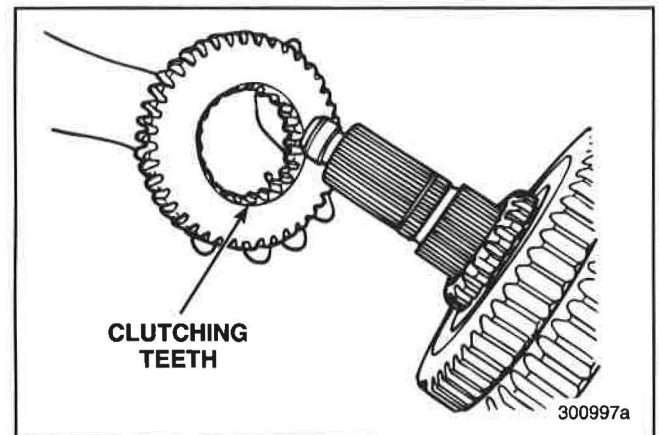


Figure 191 — Installing Fourth Speed Gear

16. Install the snap ring into the sixth speed gear outside groove.

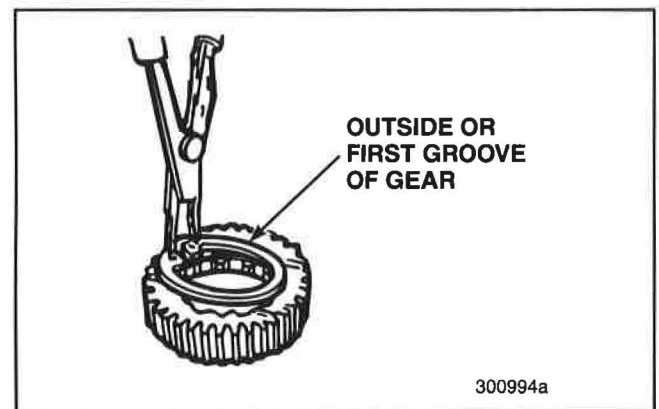


Figure 192 — Installing Sixth Speed Gear Snap Ring



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17. Install the sixth speed gear onto the mainshaft with oil grooves facing the fourth speed gear.

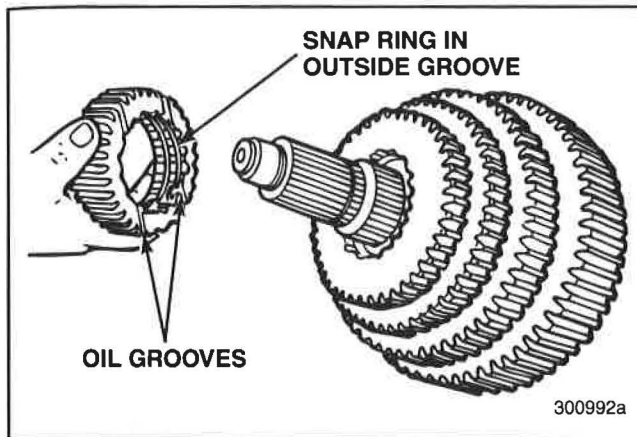


Figure 193 — Installing Sixth Speed Gear

18. Install the external tooth and internal tooth thrust washers onto the mainshaft for the sixth speed gear. Be sure that oil grooves on the external tooth thrust washer face the internal tooth thrust washer.

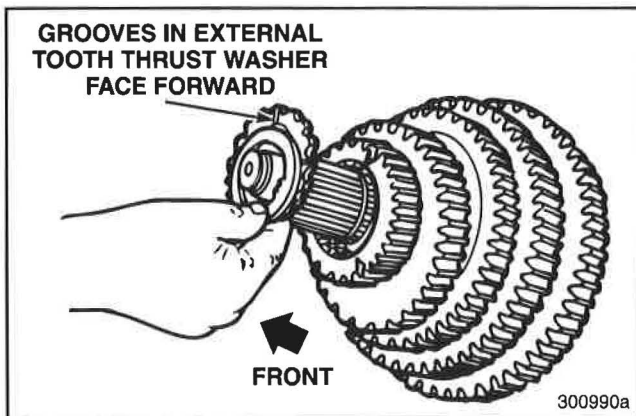


Figure 194 — Installing External and Internal Tooth Thrust Washers

19. Install the sixth speed gear mainshaft snap ring, using suitable snap ring pliers.

NOTE

The snap ring on the mainshaft for the sixth speed gear requires the use of metric snap ring pliers.

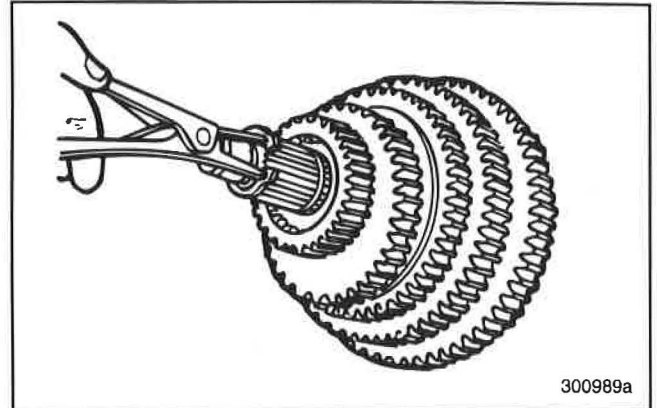
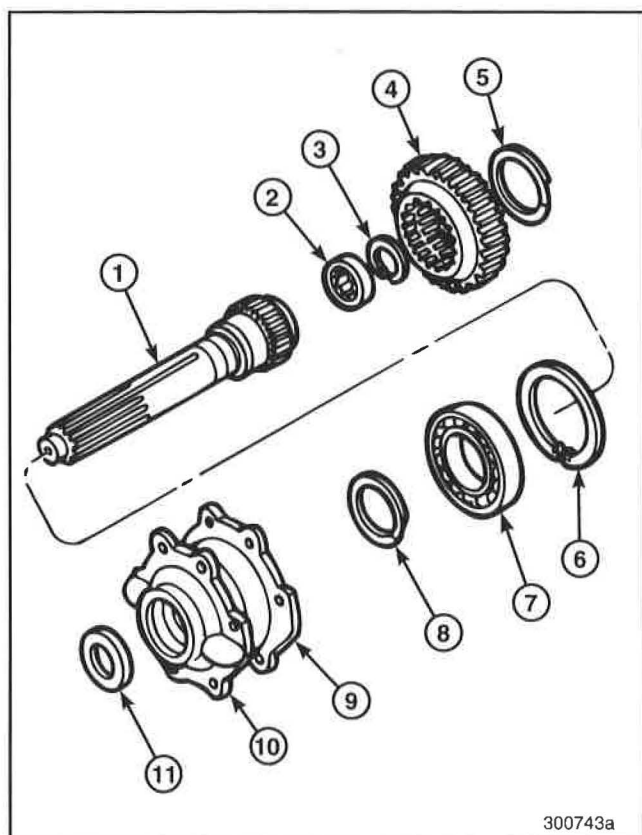
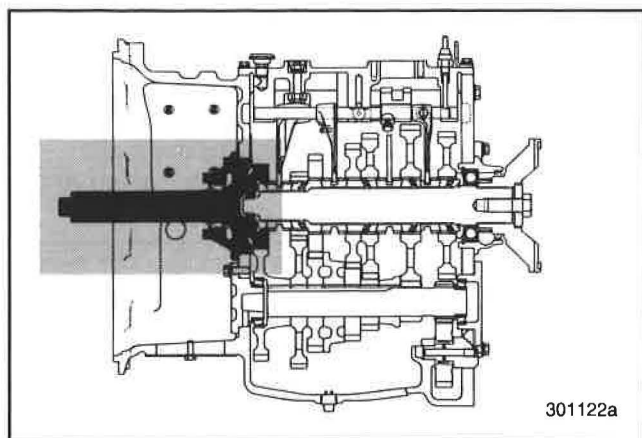


Figure 195 — Installing Sixth Speed Gear Mainshaft Snap Ring

[322] Main Drive Pinion Reassembly



- | | |
|----------------------------|--------------------------|
| 1. Main Drive Pinion Shaft | 7. Bearing |
| 2. Spigot Bearing | 8. Spiral Snap Ring |
| 3. Snap Ring | 9. Gasket |
| 4. Main Drive Pinion Gear | 10. Pinion Bearing Cover |
| 5. Spiral Snap Ring | 11. Oil Seal |
| 6. Snap Ring | |

Figure 196 — Exploded View of Main Drive Pinion

1. Install the spigot bearing into the end of the main drive pinion shaft by hand.

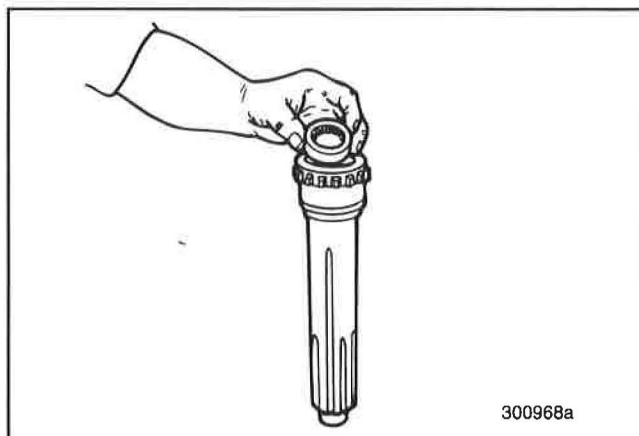


Figure 197 — Installing Spigot Bearing

2. Install the snap ring to retain the spigot bearing.

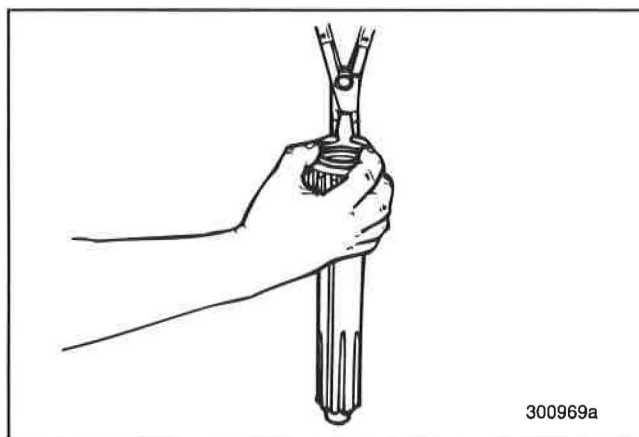
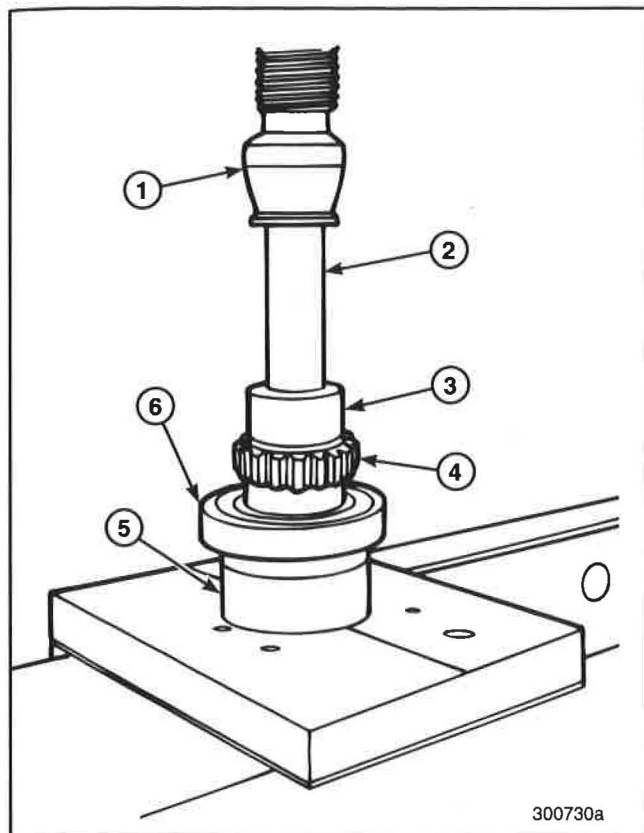


Figure 198 — Installing Snap Ring

- Press the ball bearing onto the main drive pinion shaft. Support the inner race of the bearing while pressing.



- | | |
|----------------|----------------------------|
| 1. Press | 4. Main Drive Pinion Shaft |
| 2. Spacer Tube | 5. Sleeve |
| 3. Driver | 6. Bearing |

Figure 199 — Installing Main Drive Pinion Bearing

- Install the spiral snap ring to retain the bearing, using a circular motion while pressing the snap ring into the groove on the shaft.

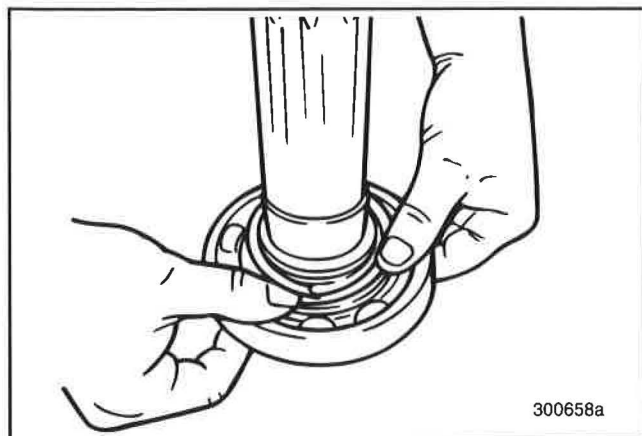


Figure 200 — Installing Spiral Snap Ring

- Position a new oil seal in the main drive pinion bearing cover.

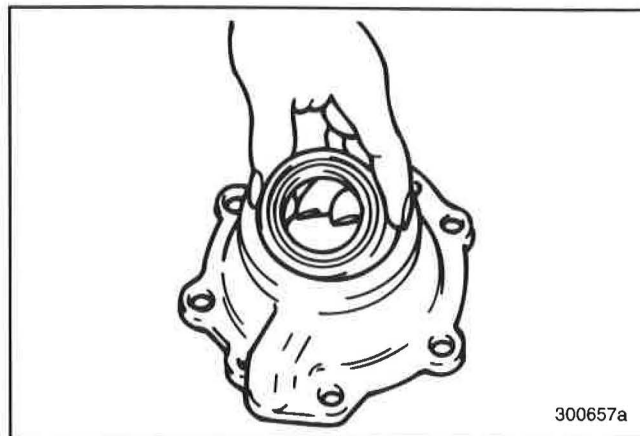


Figure 201 — Positioning Bearing Cover Oil Seal

- Install the main drive pinion bearing cover oil seal, using the tool arrangement depicted in Figure 202. Correct seal installation depth is achieved as the driver tool bottoms against the positioning tool.

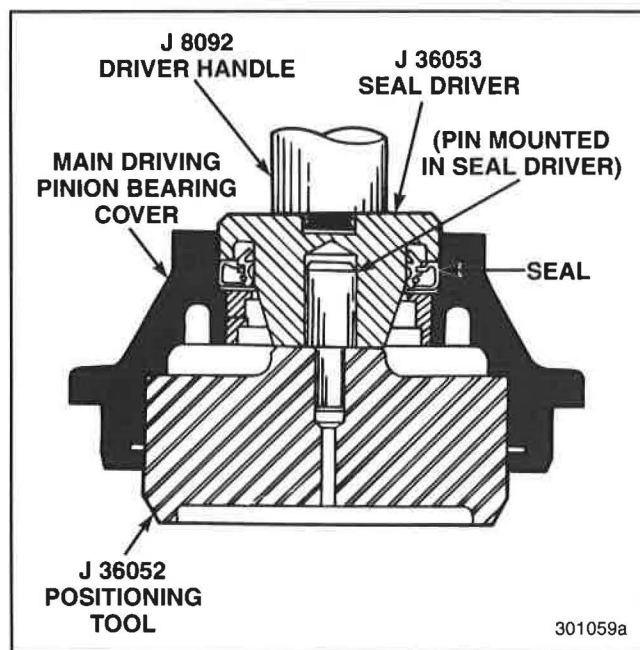


Figure 202 — Installing Bearing Cover Oil Seal

- After bearing cover oil seal installation, check that the seal is squarely installed with respect to the shaft center line. The seal should be kept square within 0.010 inch TIR. Refer to Oil Seals in the INSPECTION OF PARTS section of this manual for more information.



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8. Press the main drive pinion shaft and bearing assembly into the main drive pinion bearing cover.

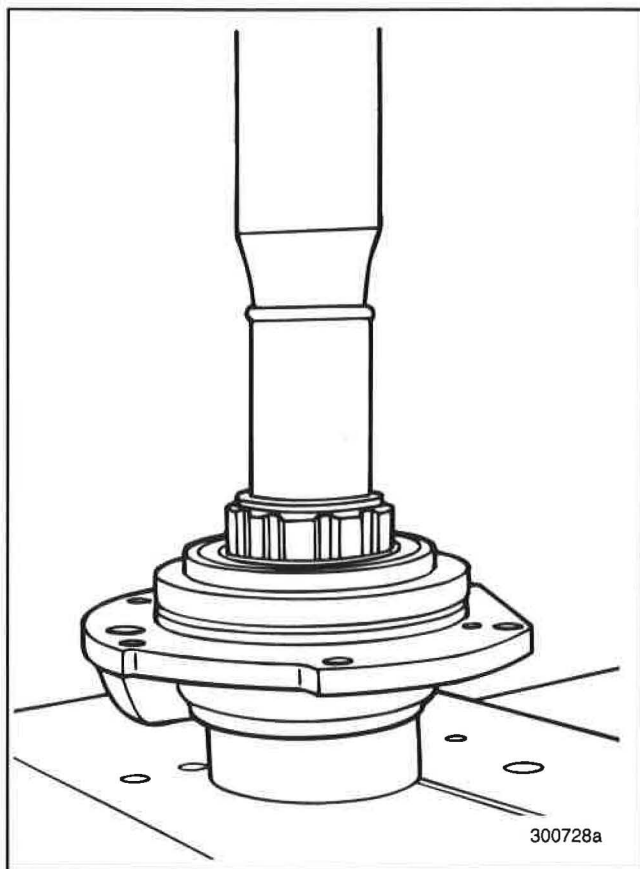


Figure 203 — Installing Main Drive Pinion Assembly into Pinion Bearing Cover

9. Install the main drive pinion bearing snap ring, using suitable snap ring pliers.

WARNING

The large snap ring is very difficult to compress and install and may fly off the snap ring pliers, causing injury.

NOTE

One side of the snap ring is beveled and faces outward. The flat side of the snap ring goes against the bearing.

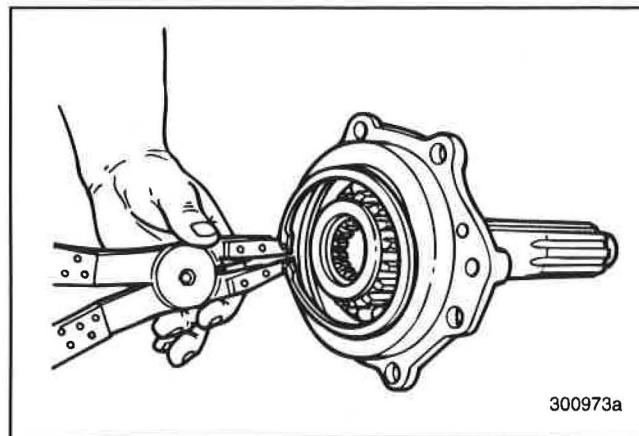


Figure 204 — Installing Snap Ring into Main Drive Pinion Bearing Cover

10. Install the main drive pinion gear onto the pinion shaft and install the spiral snap ring, using a circular motion while pressing the snap ring tightly into the groove.

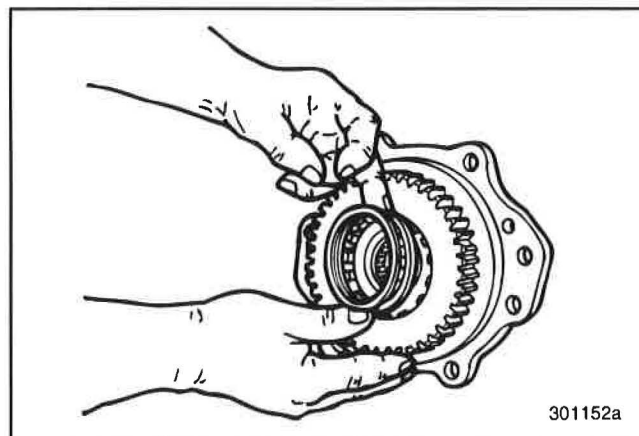


Figure 205 — Installing Main Drive Pinion Gear and Spiral Snap Ring



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11. Install a new bearing cover gasket, using sealant between the gasket and cover. Make sure the oil passage hole and capscrew holes in the gasket align with the cover holes.

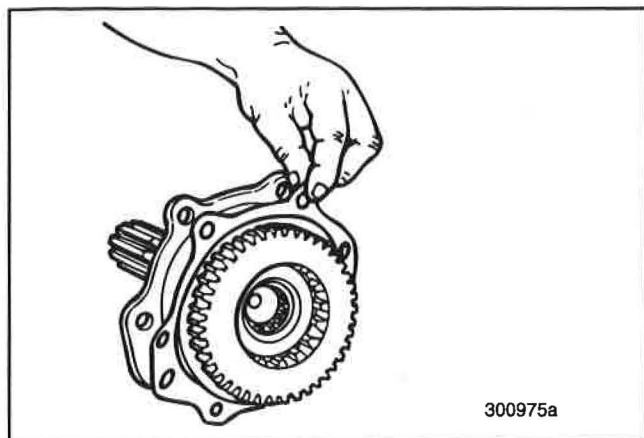
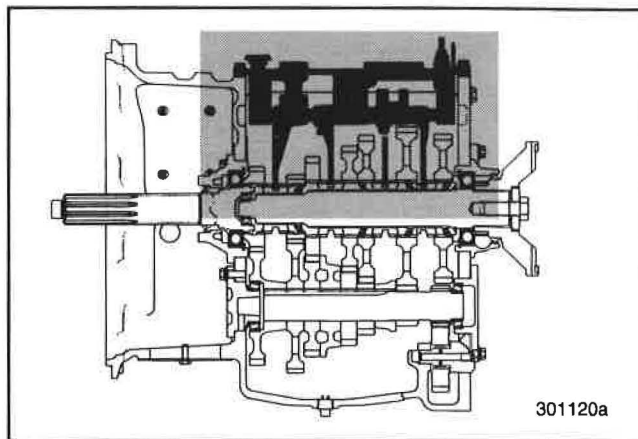


Figure 206 — Installing Main Drive Pinion Bearing Cover Gasket

[323] Main Case Shift Cover Reassembly



1. Install the fifth/sixth pivot pin, washer and rocker arm.

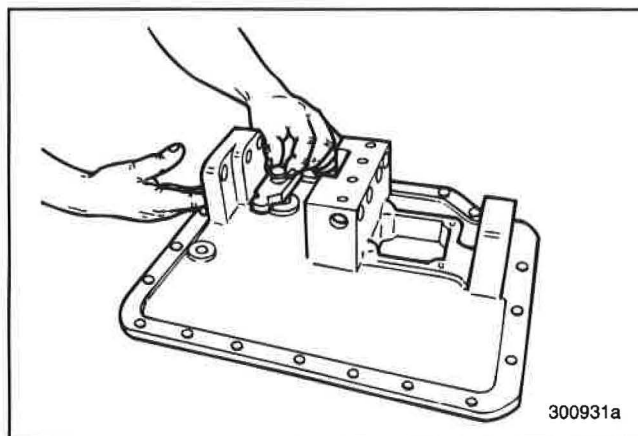


Figure 207 — Installing Fifth/Sixth Pivot Pin, Washer and Rocker Arm

2. Install the fifth/sixth pivot pin lock washer, flat washer and nut. Tighten nut to 50–60 lb-ft (68–81 N·m) torque, using torque wrench J 24407 or equivalent.

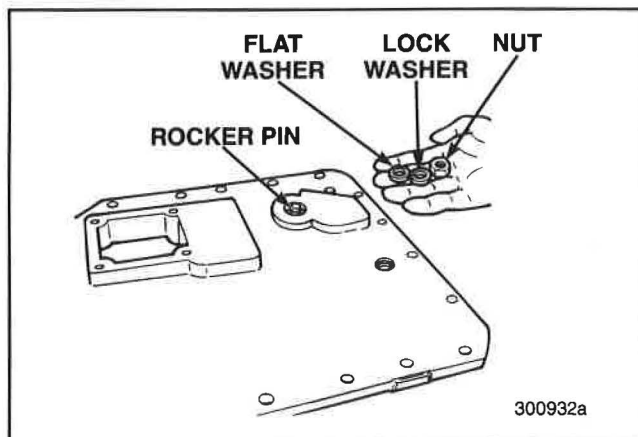


Figure 208 — Installing Pivot Pin Washers and Nut



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3. Install the rocker pin cap, shift cover breather vent and pipe plug into the shift cover.

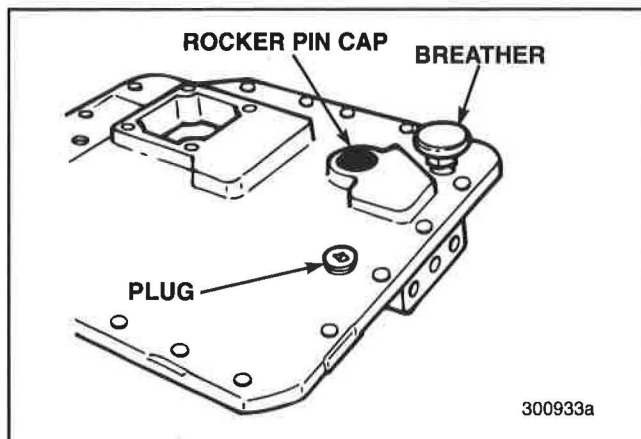


Figure 209 — Installing Pin Cap, Breather Vent and Pipe Plug

4. Slide the fifth/sixth shift rail into the cover. At the same time, install the fifth/sixth shifter onto the shift rail. Also, install the poppet ball and spring for the fifth/sixth shift rail.

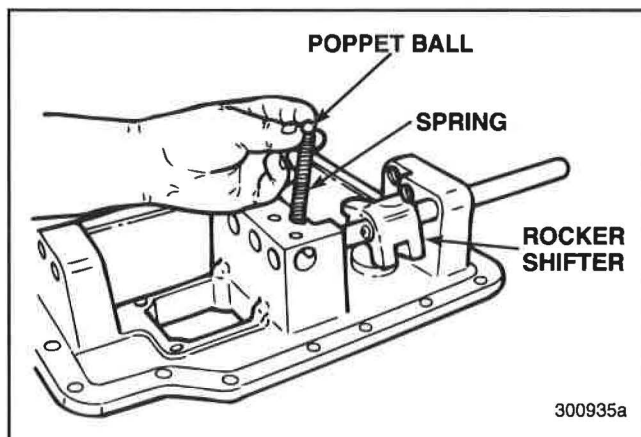


Figure 210 — Installing Shift Rail, Shifter, Poppet Ball and Spring

5. Press the poppet ball down while sliding the fifth/sixth shift rail over the ball. A hollow tube works well to press down the ball.

6. Finish sliding the rail to align the setscrew in the fifth/sixth shifter with the notch in the shift rail. Tighten the setscrew to 35–45 lb-ft (48–61 N·m) torque, using torque wrench J 1313-B or equivalent.

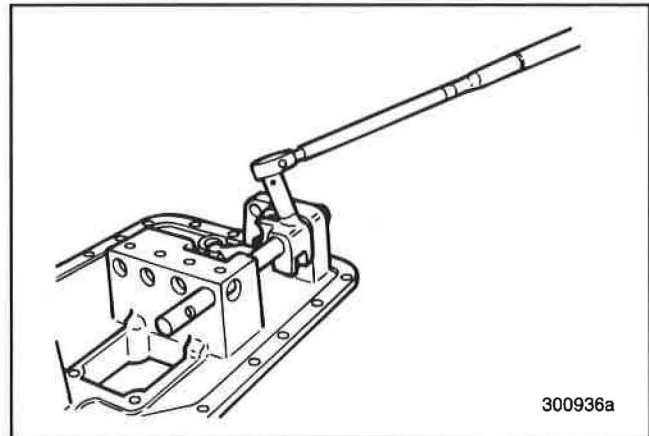


Figure 211 — Tightening Setscrew

7. Assemble the fifth/sixth shifter body with the parts in the order shown below.

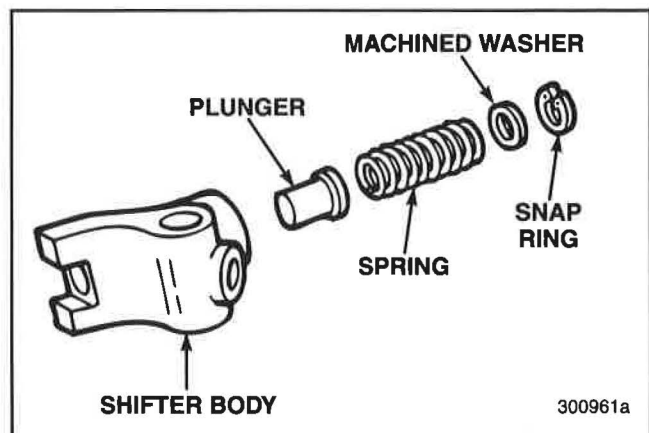


Figure 212 — Assembling Fifth/Sixth Shifter

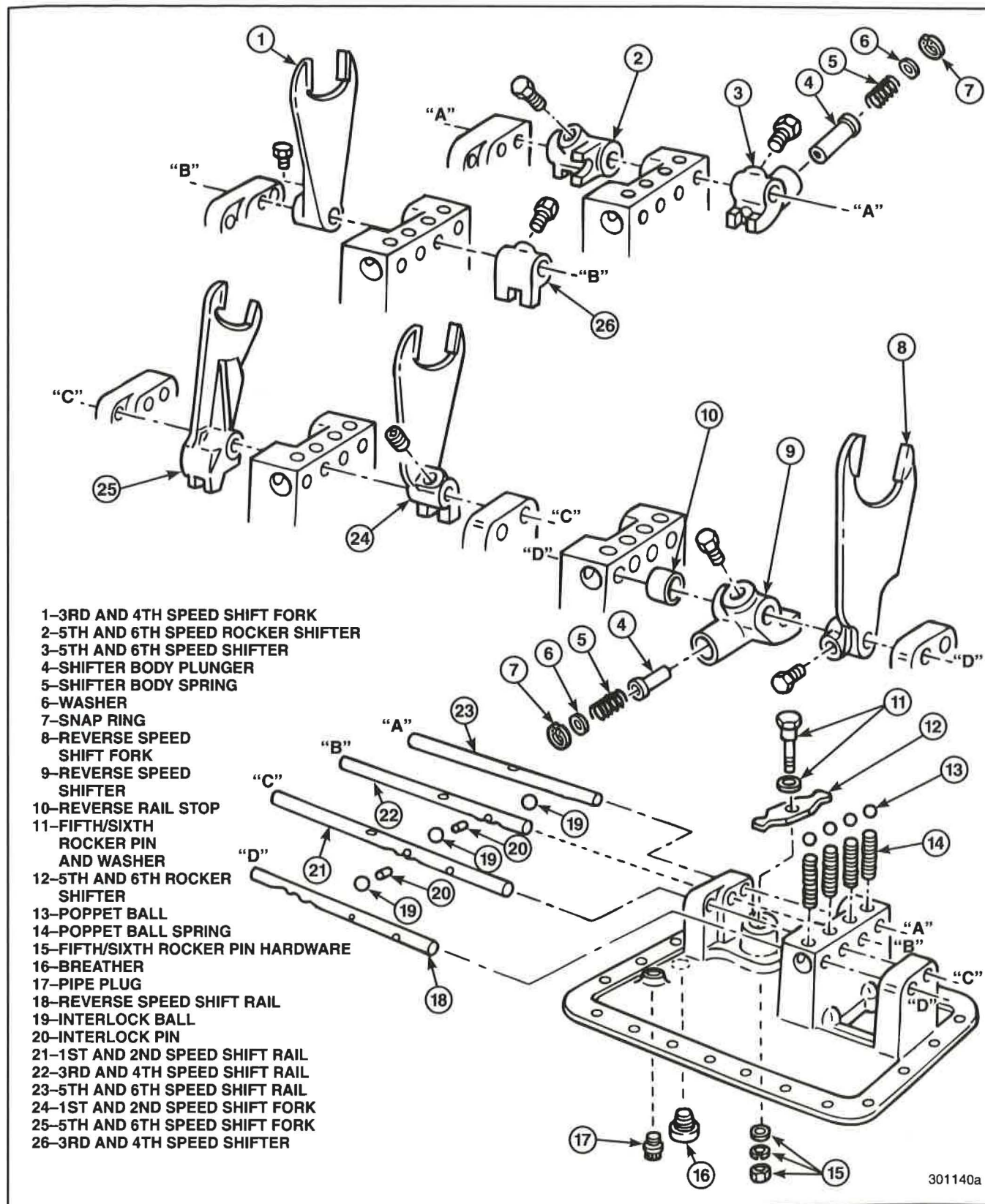


Figure 213 — Exploded View of Main Case Shift Cover

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8. Place the fifth/sixth shifter body into a soft-jaw vise. Install the short plunger into the shifter body.

NOTE

The plungers for the reverse and fifth/sixth shifters are similar. However, the plunger for the fifth/sixth shifter is short and the reverse plunger is long.

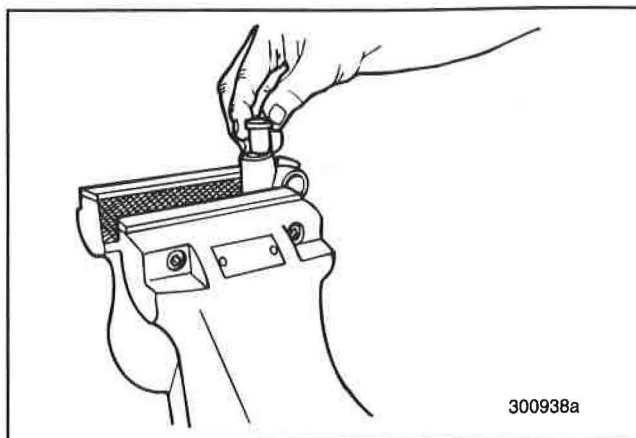


Figure 214 — Installing Plunger into Fifth/Sixth Shifter Body

9. Position the spring and washer over the plunger in the fifth/sixth shifter body.

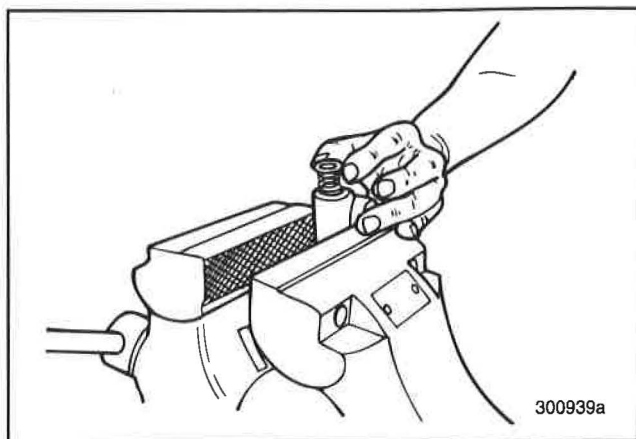


Figure 215 — Positioning Spring and Washer

10. Compress the spring into the fifth/sixth shifter body, using a suitable drift or transmission dowel bolt. As the spring is compressed, install the snap ring, using suitable snap ring pliers.

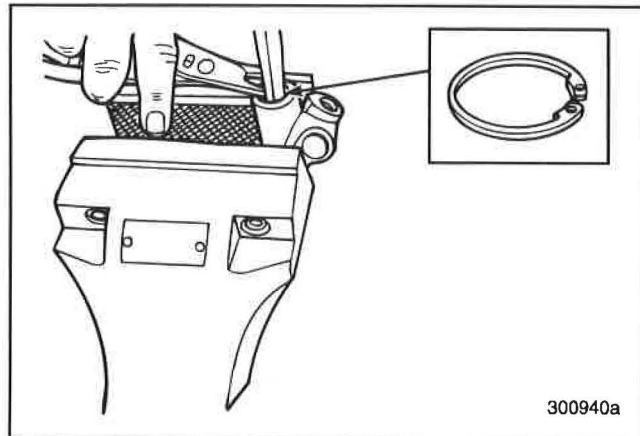


Figure 216 — Installing Snap Ring into Fifth/Sixth Shifter Body

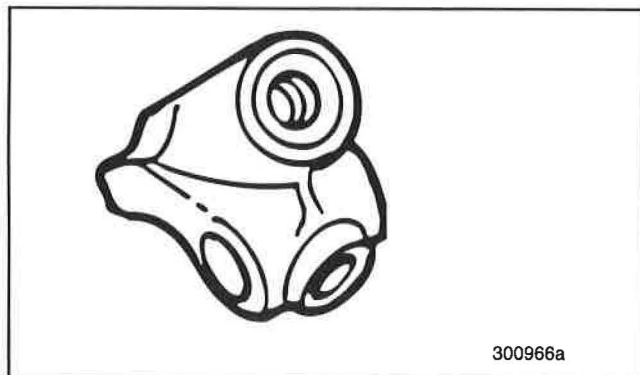


Figure 217 — Fifth/Sixth Shifter Body Assembled

11. Install the fifth/sixth shifter body onto the end of the fifth/sixth shift rail. Align the shifter body with the hole in the rail and install the setscrew.

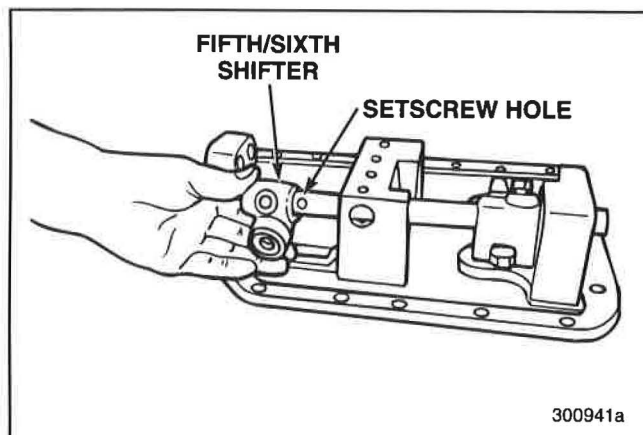


Figure 218 — Installing and Aligning Fifth/Sixth Shifter Body

12. Tighten the fifth/sixth shifter body setscrew to 35–45 lb-ft (48–61 N·m) torque, using torque wrench J 1313-B or equivalent.

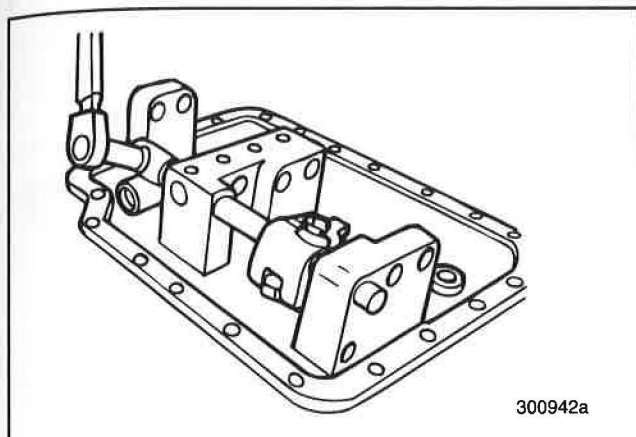


Figure 219 — Tightening Setscrew

13. Install the interlock ball located between the fifth/sixth shift rail and the third/fourth shift rail.

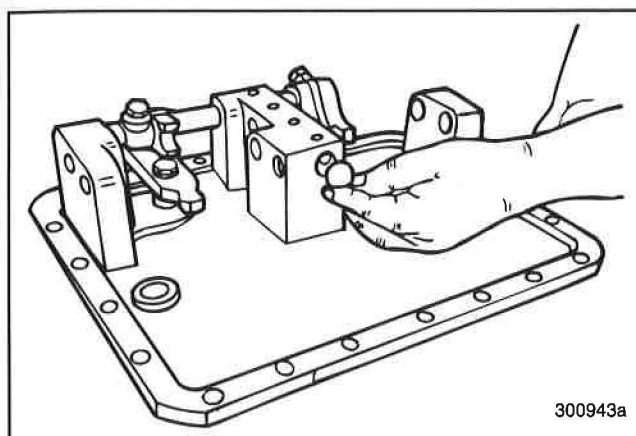


Figure 220 — Installing Interlock Ball

14. Install the third/fourth shift rail. Begin by inserting the shift rail into the shift cover. At the same time, slide the third/fourth shift fork onto the rail and orient the fork and rail setscrew holes.

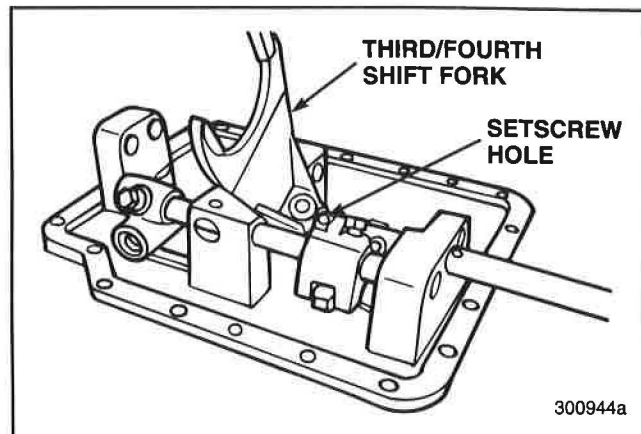


Figure 221 — Installing Third/Forth Shift Rail and Fork

15. Install the poppet ball and spring for the third/fourth shift rail.

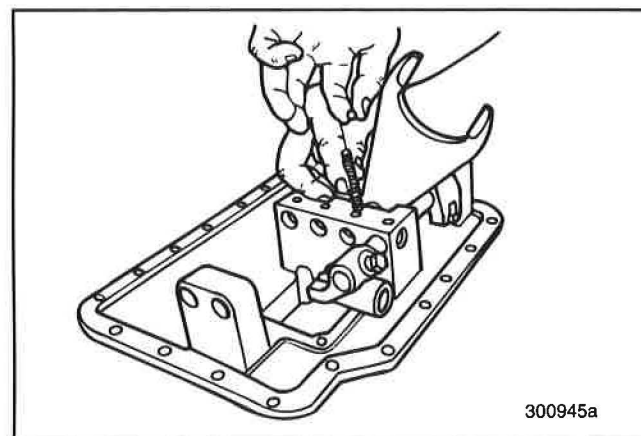


Figure 222 — Installing Poppet Ball and Spring

16. Press the poppet ball down while sliding the third/fourth shift rail over the ball. A hollow tube works well to press down the ball.
17. Install the interlock pin into its location in the third/fourth shift rail.

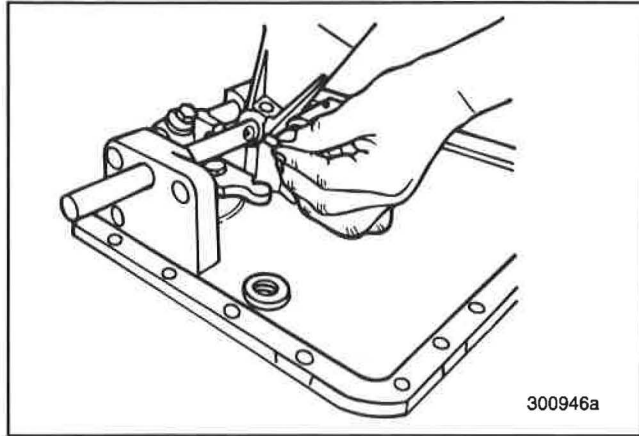


Figure 223 — Installing Interlock Pin

18. Align the setscrew holes in the third/fourth shift fork and rail. Install the setscrew and tighten to 35–45 lb-ft (48–61 N•m) torque, using torque wrench J 1313-B or equivalent.

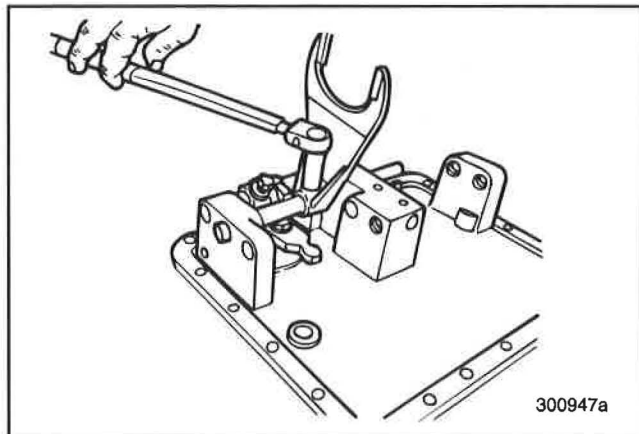


Figure 224 — Tighten Shift Fork Setscrew

19. Align the third/fourth shifter with the rail.

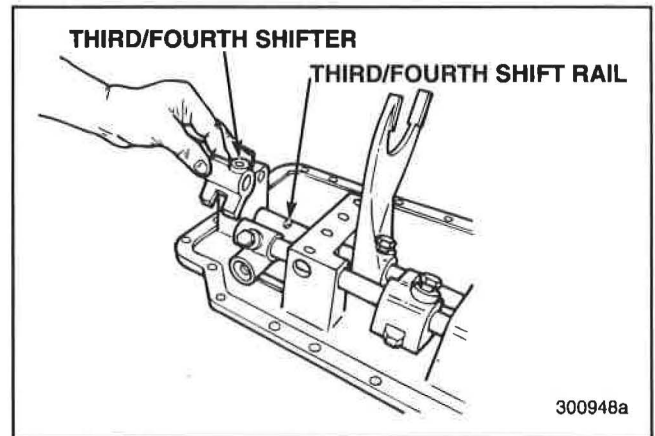


Figure 225 — Aligning Shifter and Rail

20. Install the third/fourth shifter onto the third/fourth shift rail and align the setscrew hole with the hole in the rail.

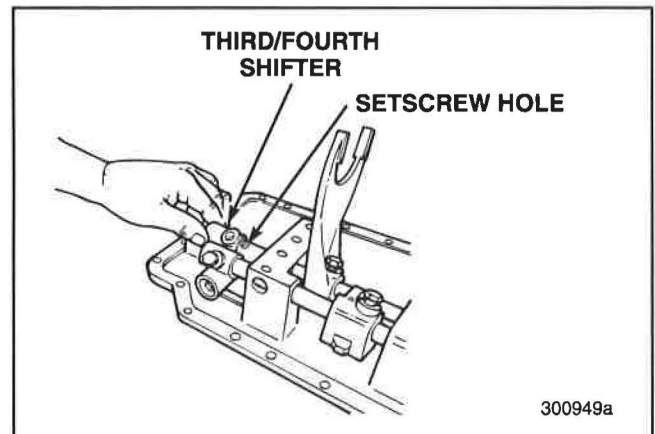


Figure 226 — Installing Third/Fourth Shifter

21. Install and then tighten the setscrew of the third/fourth shifter to 35–45 lb-ft (48–61 N•m) torque, using torque wrench J 1313-B or equivalent.

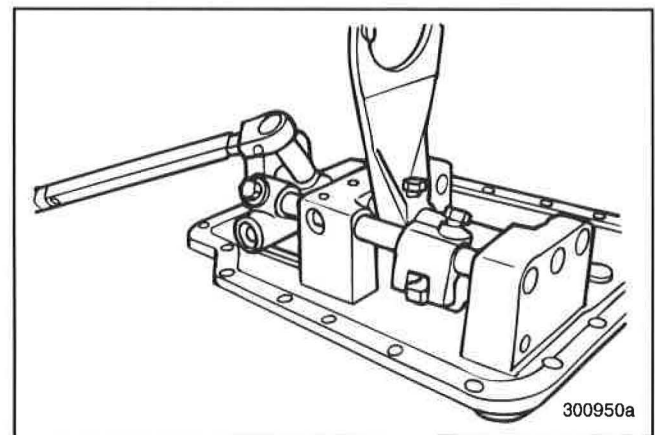


Figure 227 — Tightening Third/Fourth Shifter Setscrew



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22. Slide the first/second shift rail into the shift cover. Engage rocker arm into the fifth/sixth shift fork. At the same time, install the fifth/sixth shift fork onto the shift rail.

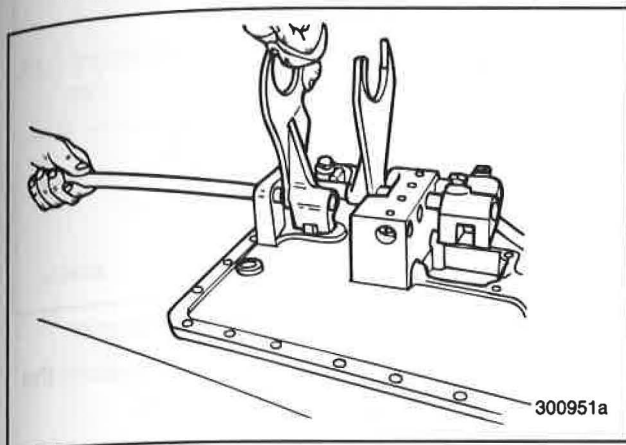


Figure 228 — Installing Rail and Shift Fork

23. Install the interlock ball located between the first/second and third/fourth shift rails.

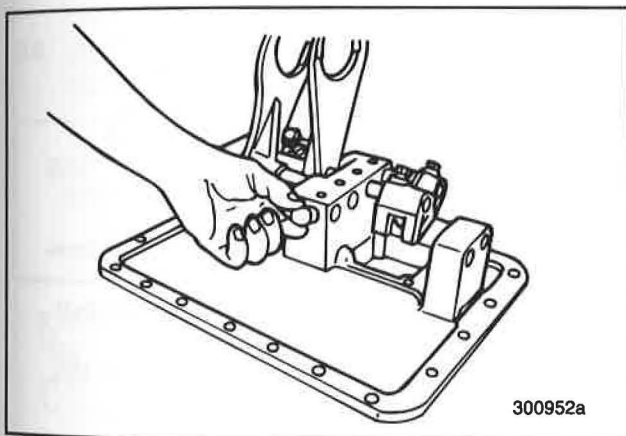


Figure 229 — Installing Interlock Ball

24. Install the poppet ball and spring for the first/second shift rail.

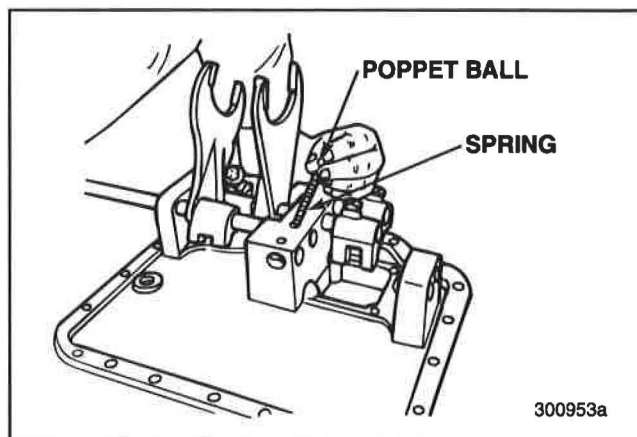


Figure 230 — Installing Poppet Ball and Spring

25. Press the poppet ball down while sliding the first/second shift rail over the ball. A hollow tube works well to press down the ball.
26. Install the interlock pin into the first/second shift rail.

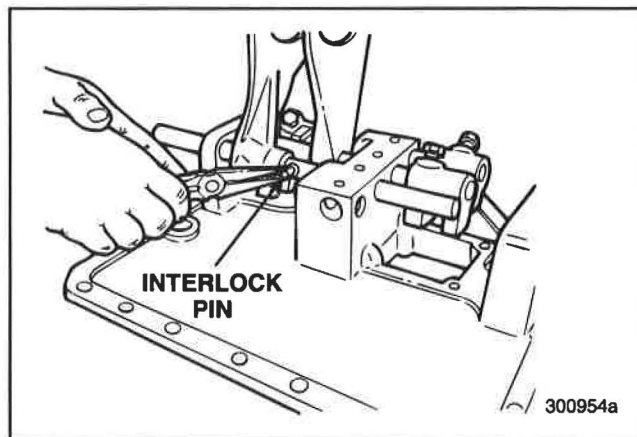


Figure 231 — Installing Interlock Pin



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27. Install the first/second shift fork onto the first/second shift rail. Align the first/second shift fork and rail setscrew holes. Slide the fork toward the setscrew hole.

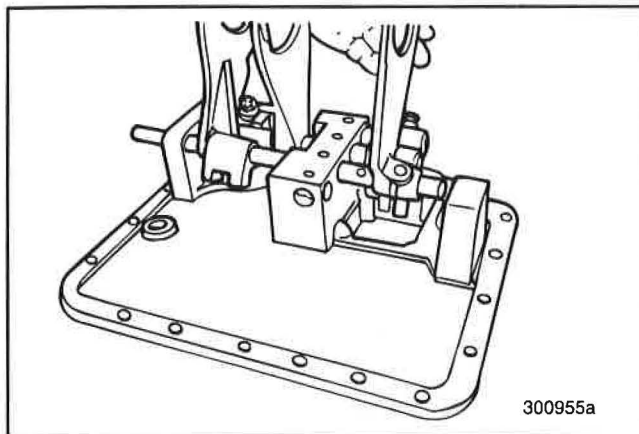


Figure 232 — Installing and Aligning Shift Fork and Rail

28. Install the setscrew (Allen head) into the first/second shift fork.

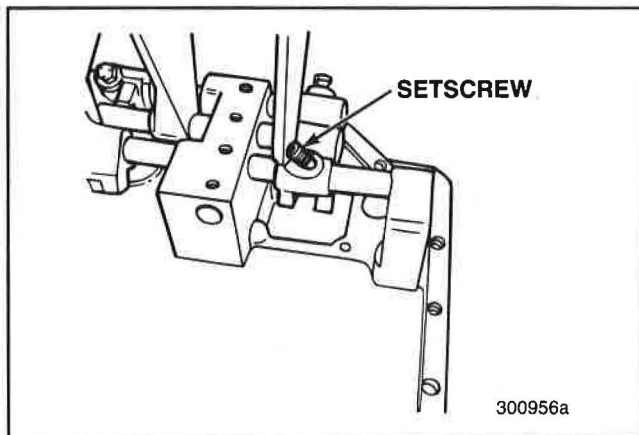


Figure 233 — Installing Shift Fork Setscrew

29. Tighten the setscrew to 35–45 lb-ft (48–61 N·m) torque, using the appropriate Allen wrench socket and torque wrench J 1313-B or equivalent.

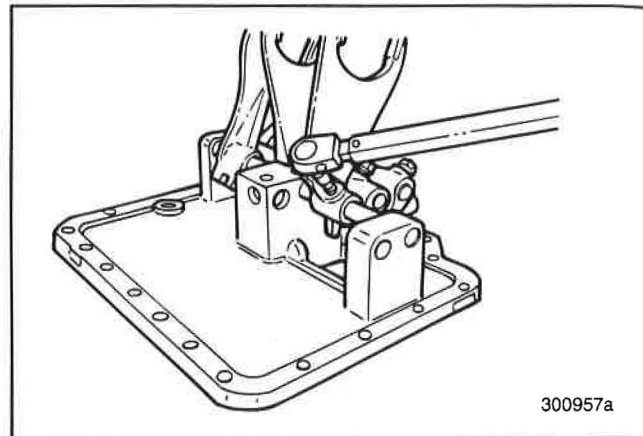


Figure 234 — Tightening Shift Fork Setscrew

30. Install the interlock ball located between the first/second and reverse shift rails.

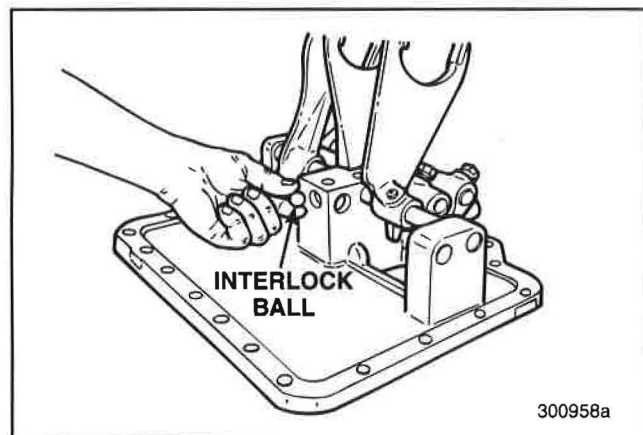


Figure 235 — Installing Shift Rail Interlock Ball

31. Install the poppet ball and spring into the reverse shift rail tower.

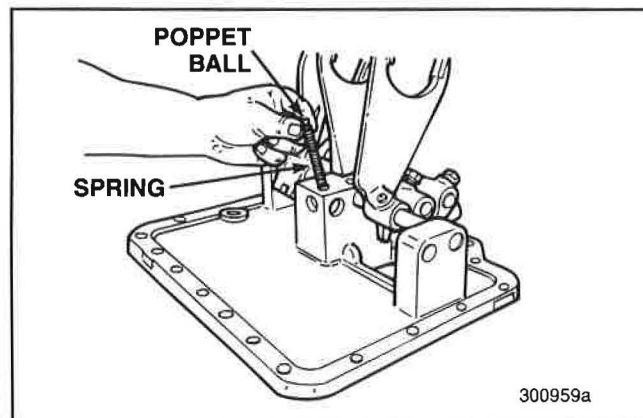


Figure 236 — Installing Reverse Rail Poppet Ball and Spring

32. Slide the reverse shift rail into the cover and at the same time, press the poppet ball down while sliding the reverse shift rail over the ball. A hollow tube works well to press down the ball.
33. Install the reverse rail stop onto the reverse rail.

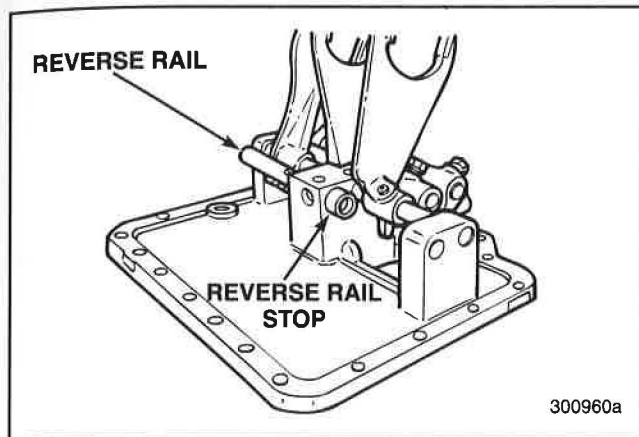


Figure 237 — Installing Reverse Rail Stop

34. Assemble the reverse shifter body with the parts in the order shown below.

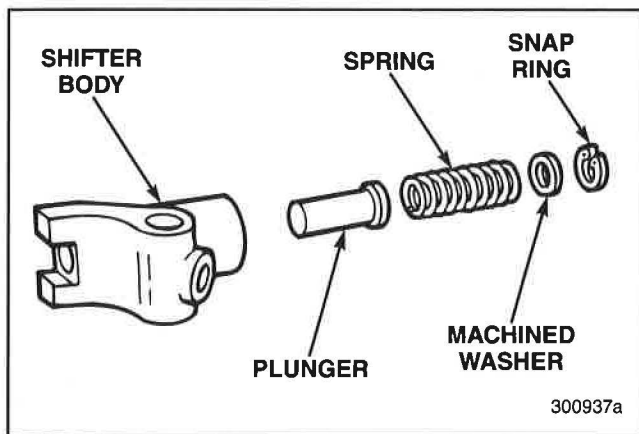


Figure 238 — Assembling Reverse Shifter

35. Place the reverse shifter body into a soft-jaw vise. Install the long plunger into the shifter body.

NOTE

The plungers for the reverse and fifth/sixth shifters are similar. However, the plunger for the reverse shifter is long and the fifth/sixth plunger is short.

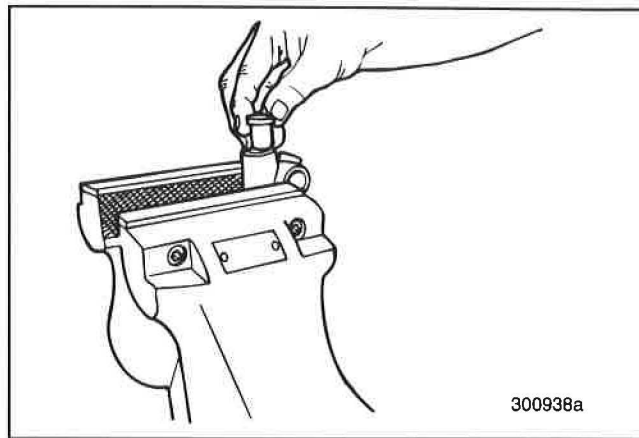


Figure 239 — Installing Plunger into Reverse Shifter Body

36. Position the spring and washer over the plunger in the reverse shifter body.

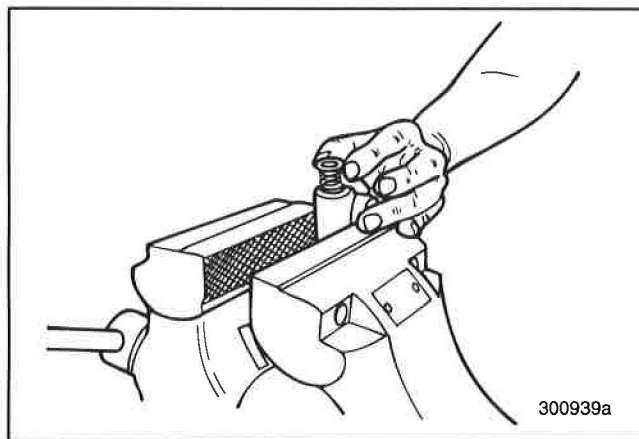


Figure 240 — Positioning Spring and Washer

37. Compress the spring into the reverse shifter body, using a suitable drift or transmission dowel bolt. As the spring is compressed, install the snap ring, using suitable snap ring pliers.

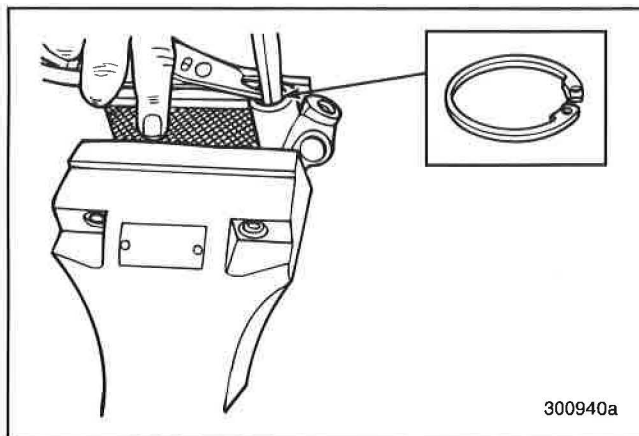


Figure 241 — Installing Snap Ring into Reverse Shifter



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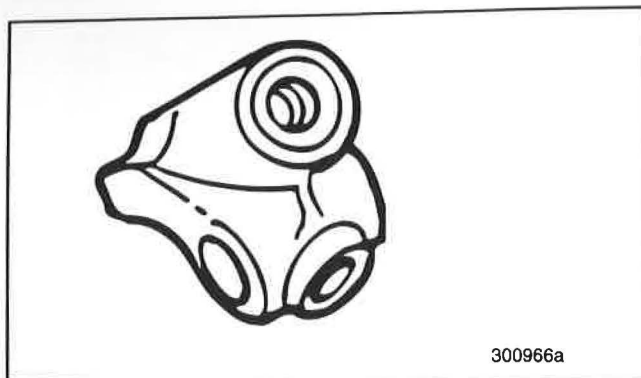


Figure 242 — Reverse Shifter Body Assembled

38. Install the reverse shifter body onto the end of the reverse shift rail. Align the shifter body with the hole in the rail.

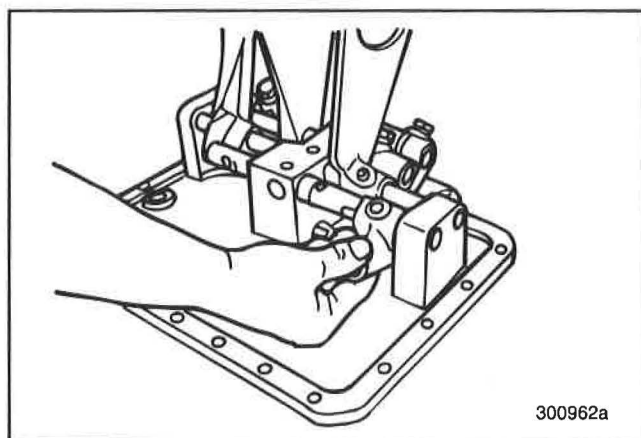


Figure 243 — Installing and Aligning Reverse Shifter Body

39. Install the reverse shift fork onto the end of the reverse shift rail. Continue sliding reverse shifter body and shift fork until shifter body and shift fork setscrew holes align with the shift rail.

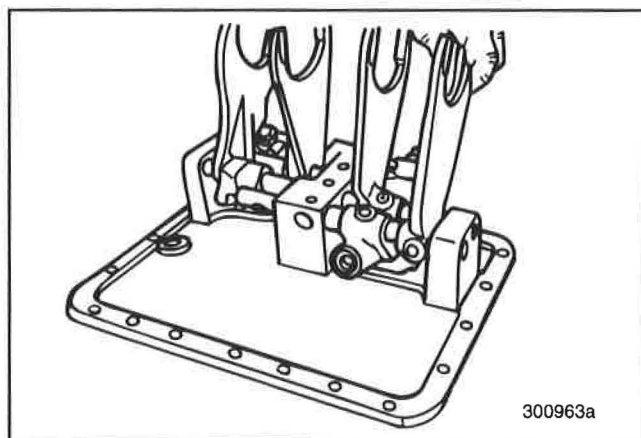


Figure 244 — Installing Shift Fork and Aligning Setscrew Holes

40. Install the reverse shifter body and shift fork setscrews.

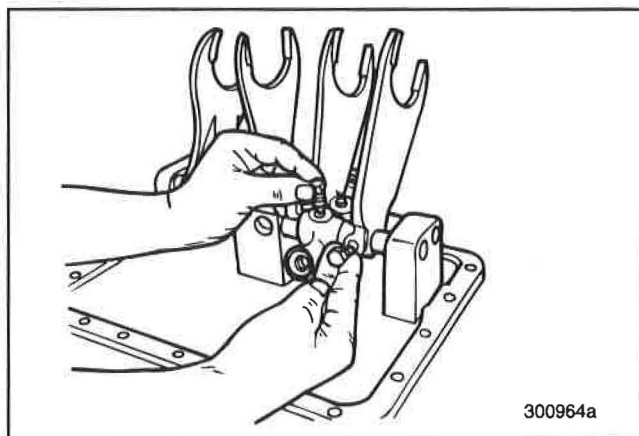


Figure 245 — Installing Setscrews

41. Tighten the reverse shifter body and shift fork setscrews to 35–45 lb-ft (48–61 N•m) torque, using torque wrench J 1313-B or equivalent.
42. Install the reverse light switch rod and the reverse light switch into the shift cover.

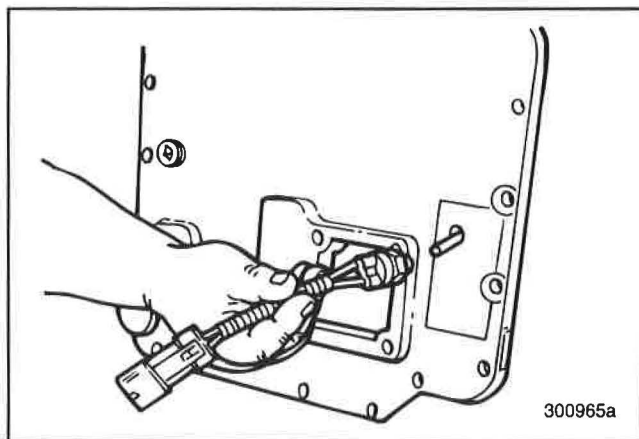


Figure 246 — Installing Reverse Light Switch Rod and Switch



300 REASSEMBLY

REASSEMBLY

[320] TRANSMISSION REASSEMBLY PROCEDURES

1. Locate the stamped letter "O" on the top of each countershaft sixth speed gear. Paint the corresponding gear tooth on the top and back with white paint. If there is no stamped letter, mark the gear tooth that is directly in line with the key between the gear and the countershaft.

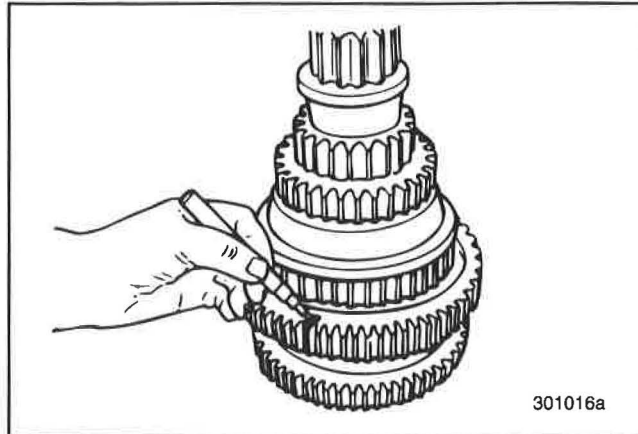


Figure 247 — Marking Gear Tooth for Timing

2. Locate the three stamped letters on the front face of the mainshaft sixth speed gear. Paint the gear teeth on each side of the marked tooth space. If there are no stamped letters, count the number of gear teeth (result should be divisible by three). Paint three white marks, each 120 degrees apart, on the gear face on the tooth spaces between the teeth.

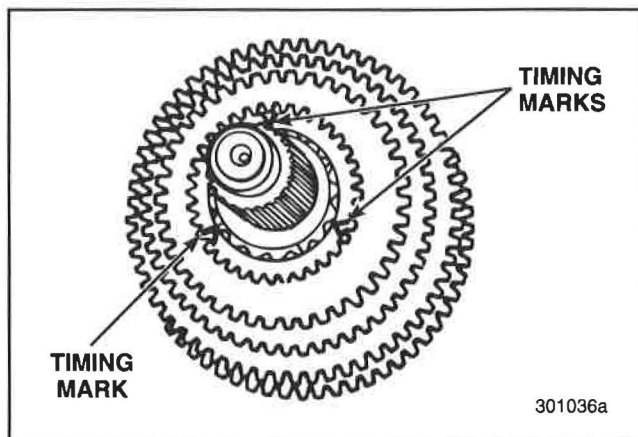


Figure 248 — Mainshaft Sixth Speed Gear Tooth Spaces Marked

3. Viewed from the front install the No. 1 (upper right) and No. 3 (lower center) countershaft front bearing covers and capscrews (make sure O-rings are in place). Tighten the capscrews to 40–50 lb-ft (54–68 N·m) torque, using torque wrench J 1313-B or equivalent.

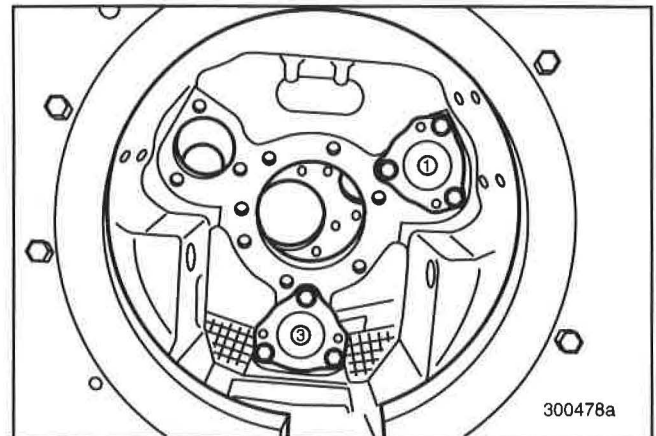


Figure 249 — No. 1 and No. 3 Countershaft Front Bearing Covers Installed

4. Install the lower No. 3 (lower center) countershaft into the transmission case by tipping into position, rear end downward.

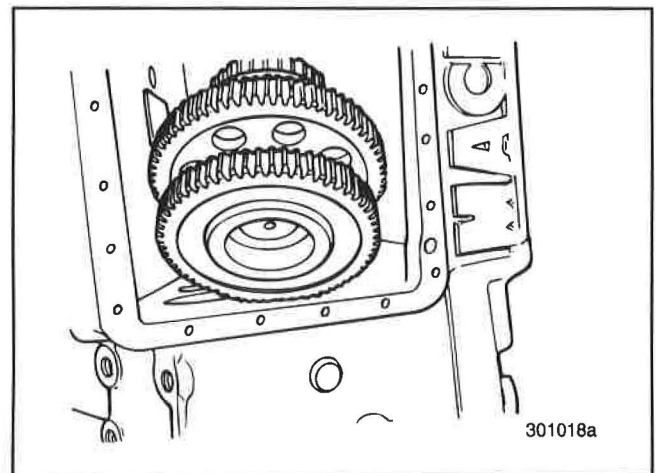


Figure 250 — Installing No. 3 (Lower Center) Countershaft

5. Place the transmission in the vertical position to center the countershaft over the front bearing.

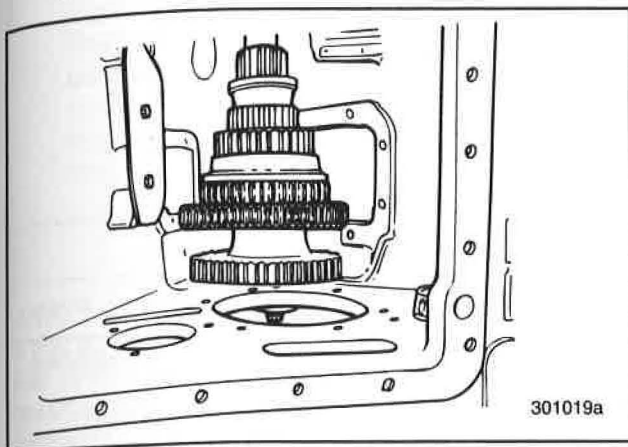


Figure 251 — Positioning No. 3 (Lower Center) Countershaft

6. Temporarily position a shim pack over the No. 3 (lower center) countershaft rear bearing cover opening, and mark the overhang of the shim. This prevents interference with the flat on the reverse idler shaft. Perform this step for all three countershaft rear bearing cover openings.

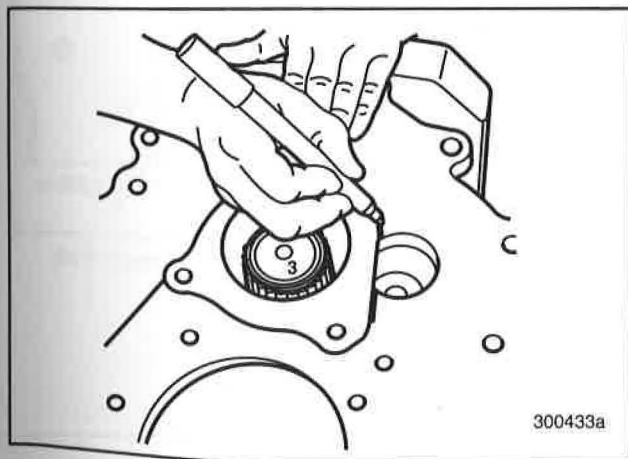


Figure 252 — Marking Shim Pack Overhang

7. Install the reverse idler shaft into the opening provided, next to the installed No. 3 (lower center) countershaft. As the reverse idler shaft is inserted into the case, install (in order) the large bore thrust washer, reverse idler gear and small bore thrust washer onto the shaft.

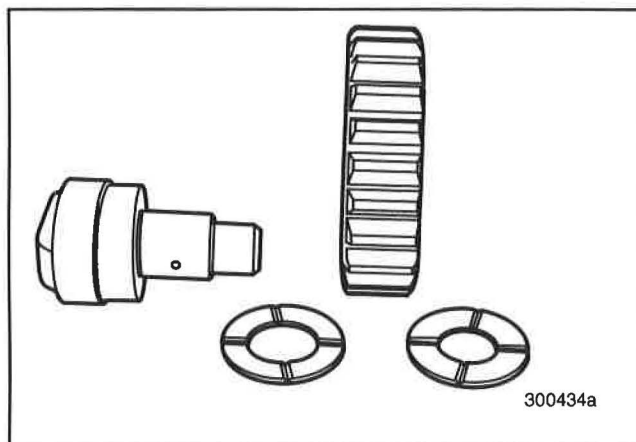


Figure 253 — Order of Reverse Idler Shaft and Components

8. Align the flat on the end of the reverse idler shaft with the mark previously made along the edge of the shim pack.

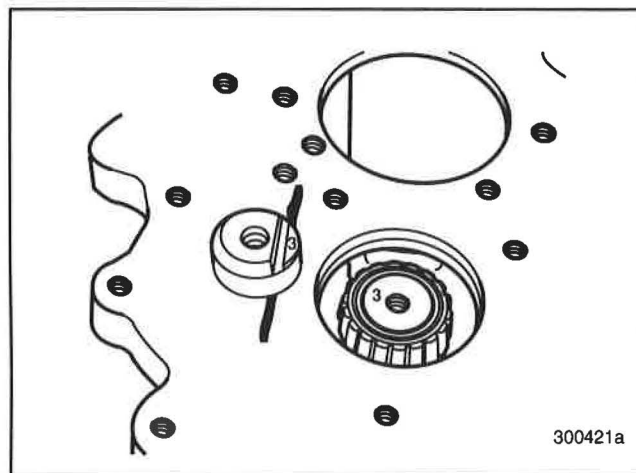


Figure 254 — Aligning Reverse Idler Shaft with Marks

9. Maintaining mark alignment, tap the reverse idler shaft into the case until it bottoms, using a brass hammer.

NOTE

Make sure that the small bore thrust washer is aligned correctly with the idler shaft, while tapping the idler shaft into place. If not aligned, damage to the thrust washer may result.

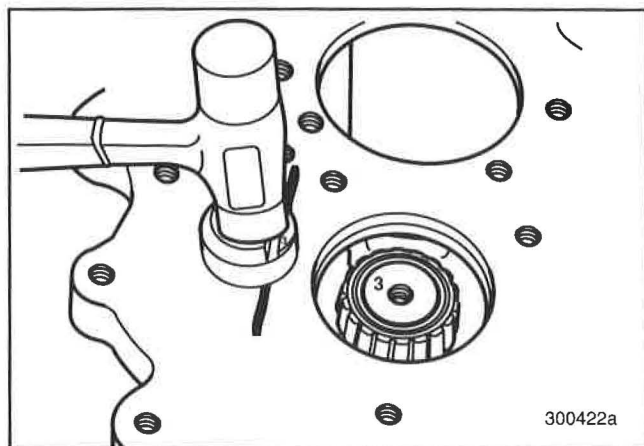


Figure 255 — Tapping Reverse Idler Shaft into Place

10. Install a new welch (expansion) plug into the reverse idler shaft using a blunt punch and hammer, if not already done.

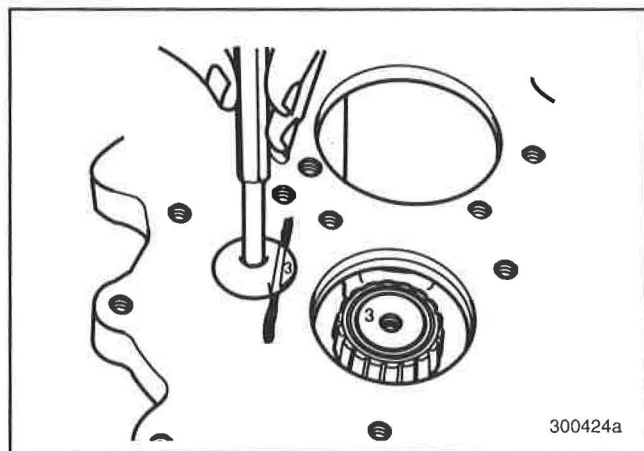


Figure 256 — Installing Welch Plug

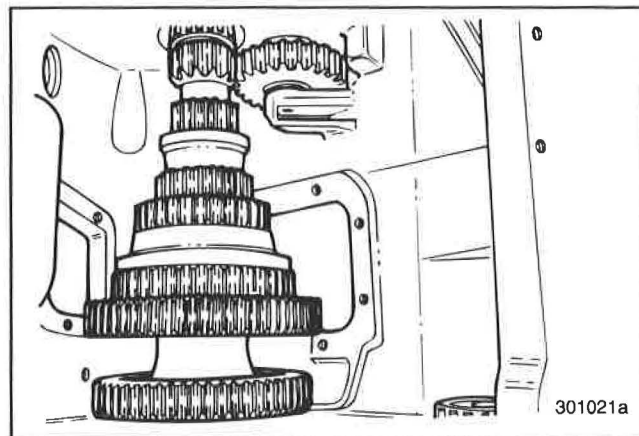


Figure 257 — Reverse Idler Gear and Shaft Installed

11. Install the upper left through bolt using silicone sealer on the threads. Tighten the through bolt to 40–50 lb-ft (54–68 N•m) torque, using torque wrench J 1313-B or equivalent.

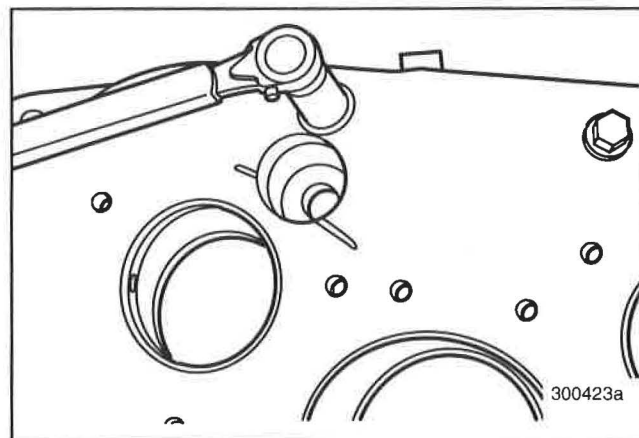


Figure 258 — Installing Upper Left Through Bolt

12. Working at the rear of the lower countershaft, temporarily install the countershaft rear bearing cover, leaving the capscrews loose. **Do not use shims or O-rings at this time.** Measure the space between the cover and the transmission case, using two tapered feeler gauges. Take two or more measurements and average the results.

NOTE

A more accurate measurement can be obtained if the transmission is in a vertical position and the covers are hand-held firmly against the countershaft rear bearings.

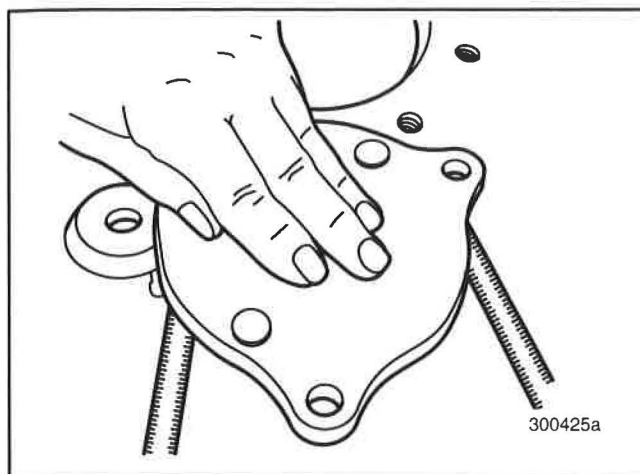


Figure 259 — Measuring Space Between Cover and Case

13. Remove the cover and add enough shims to bring the space under the bearing to zero. Then remove enough shim thickness to obtain the required 0.003–0.007 inch preload.

Example:

- Begin the procedure with no shims under the cover.
- Measure space under the cover. For this example the space is 0.100 inch.
- A 0.100 inch shim pack is needed to fill the measured space.
- Remove (subtract) 0.003–0.007 inch shims from the pack to obtain the specified preload on the bearings.
- Final shim pack thickness, to obtain the required 0.003–0.007 inch preload, must be 0.093–0.097 inch.

NOTE

Preload is negative end play or “crush.” It cannot be measured directly. It must be done carefully, as described, to obtain the correct preload.

14. After determining the correct shim thickness, install the O-ring and shim pack onto the countershaft rear cover.

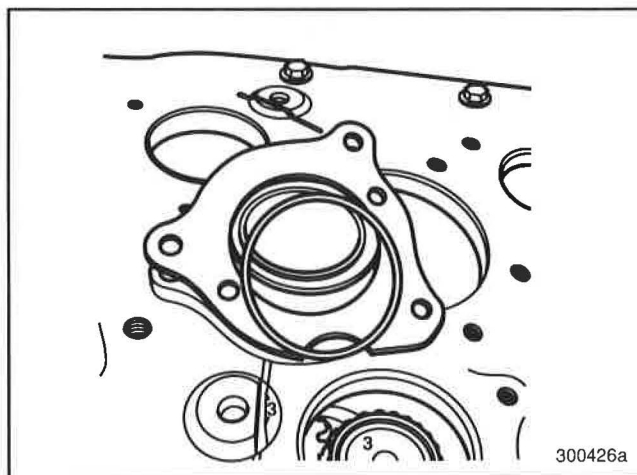


Figure 260 — Installing Shim Pack and O-Ring



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15. Install the No. 3 (lower) countershaft rear cover by aligning and lightly tapping the cover into place. Tighten the bolts to 40–50 lb-ft (54–68 N·m) torque, using torque wrench J 1313-B or equivalent.

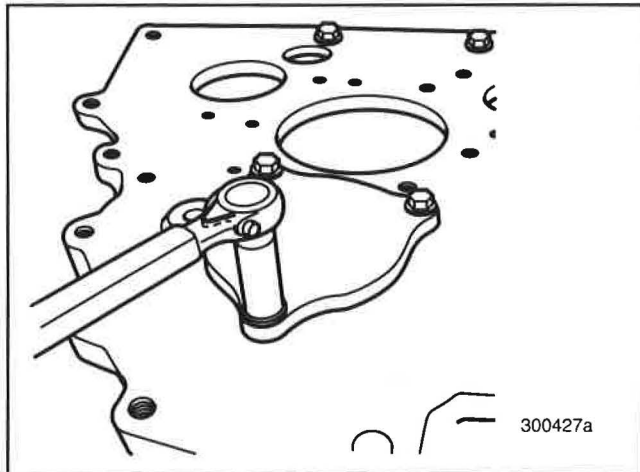


Figure 261 — Installing Countershaft Rear Bearing Cover

16. Install the reverse idler shaft into the opening provided, next to the location for the No. 1 (upper left, as viewed from the rear) countershaft (not yet installed). As the reverse idler shaft is inserted into the case, install (in order) the large bore thrust washer, reverse idler gear and small bore thrust washer onto the shaft.

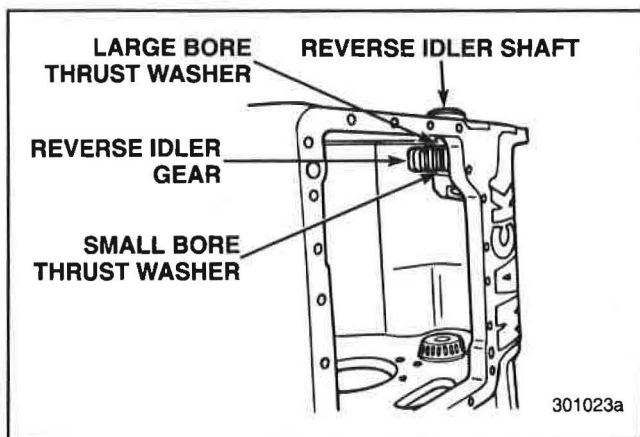


Figure 262 — Assembling No. 1 (Upper Left) Reverse Idler Gear

17. Tap the reverse idler shaft into the case until it bottoms, using a brass hammer. Make sure the flat on the reverse idler shaft is aligned with the mark on the case.

NOTE

Make sure that the small bore thrust washer is aligned correctly with the idler shaft, while tapping the idler shaft into place. If not aligned, damage to the thrust washer may result.

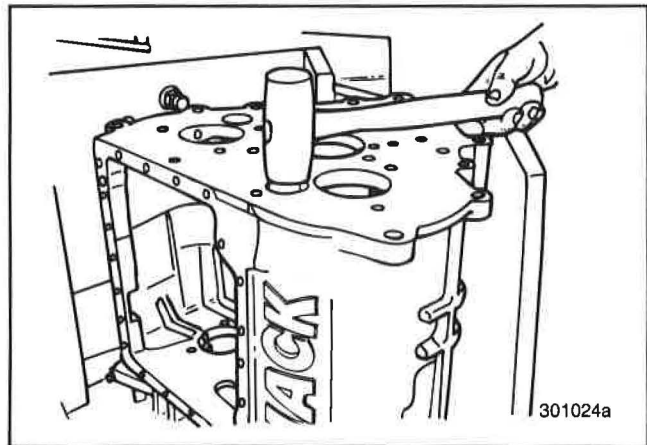


Figure 263 — Tapping Reverse Idler Shaft into Place

18. Install a new welch (expansion) plug into the reverse idler shaft using a blunt punch and hammer, if not already done.



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19. Tip into position the No. 1 (upper left, as viewed from the rear) countershaft, rear end first.

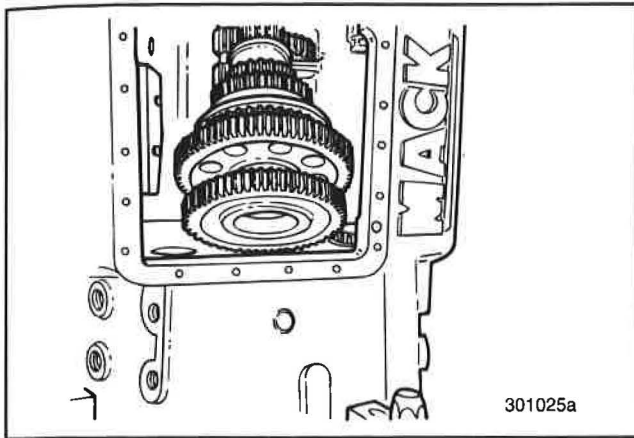


Figure 264 — Installing No. 1 (Upper Left) Countershaft

20. Position the No. 1 (upper left) countershaft over the front bearing and bring the reverse idler gear and countershaft into mesh.

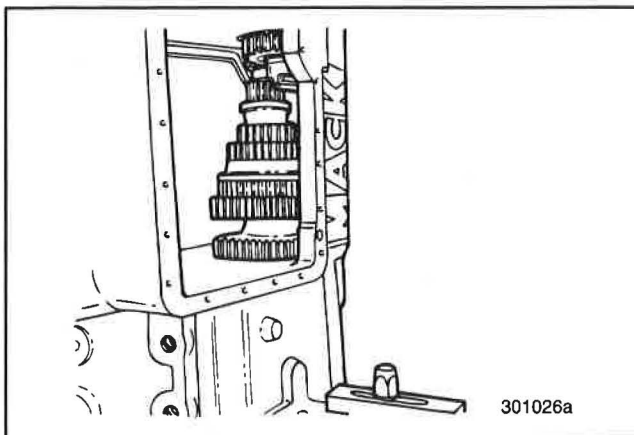


Figure 265 — Reverse Idler Gear and Shaft Installed

21. Pry the rear of the No. 1 (upper left) countershaft to the position illustrated, using a suitable pry bar. Block the rear end of the countershaft off-center, using a folded rag.

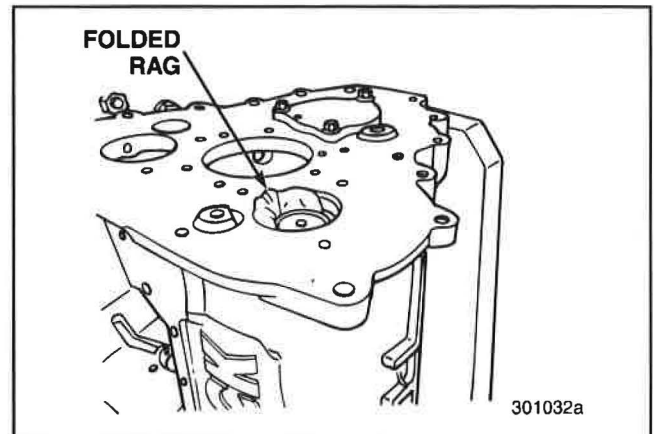


Figure 266 — Blocking No. 1 Left Upper Countershaft

22. Place the transmission in the vertical position, front end up. Temporarily place the mainshaft reverse gear into the case, positioned to receive the mainshaft. The mainshaft snap ring for reverse gear and internal and external tooth thrust washers have been previously installed during mainshaft reassembly bench procedures.

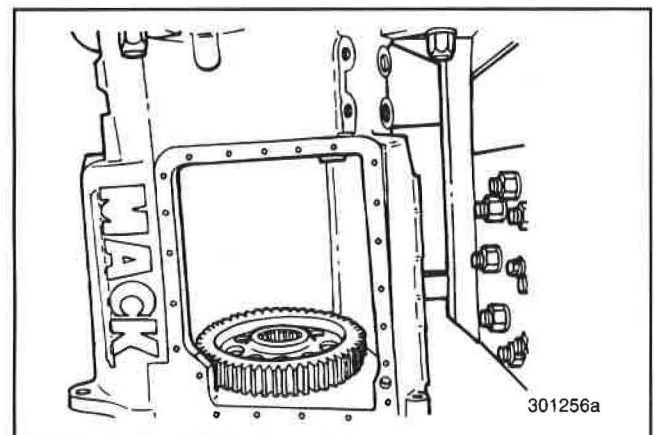


Figure 267 — Installing Reverse Gear onto Mainshaft



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23. Install a lifting eye to ease installation and handling of the mainshaft.

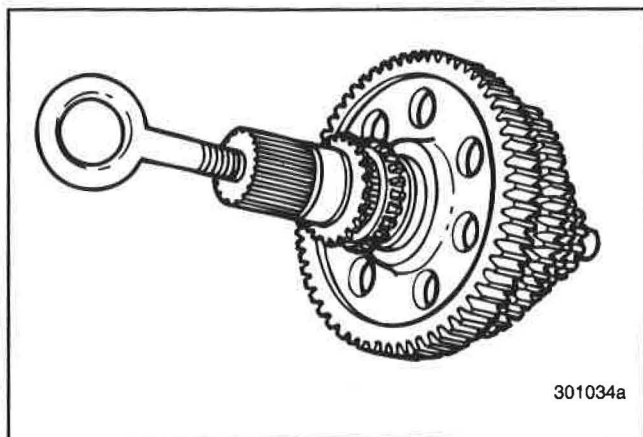


Figure 268 — Installing Lifting Eye

24. To prepare for mainshaft installation, position the No. 1 (upper left, as viewed from the rear) and No. 3 (lower center) countershafts so that the timing marks (on sixth speed gears) face toward the location of the mainshaft sixth speed gear timing marks.

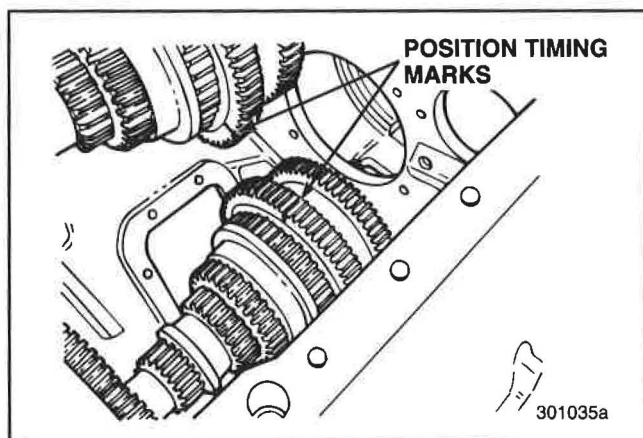


Figure 269 — Positioning Upper Left and Lower Countershafts

25. Install the mainshaft into the case by lowering the rear end of the mainshaft in first. Insert the rear end of the mainshaft into the reverse gear that was previously installed loose in the case.

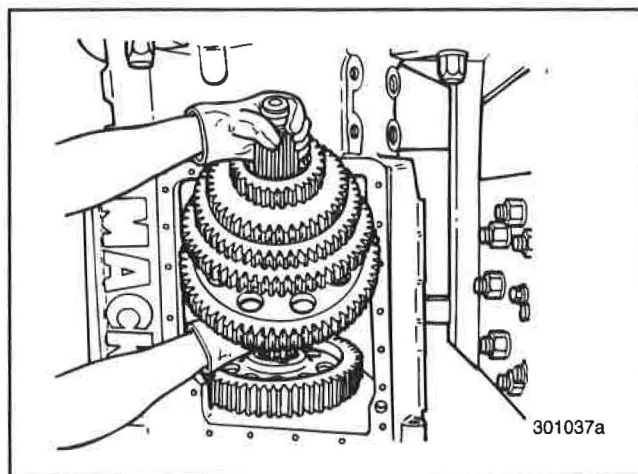


Figure 270 — Installing Mainshaft into Case

CAUTION

When installing the mainshaft, wear gloves to prevent injury to hands.

26. Position the mainshaft so that its sixth speed gear timing marks are aligned with the timing marks on the No. 3 (lower center) countershaft and No. 1 (upper left) countershaft sixth speed gears. Roll the mainshaft into place.

SERVICE HINT

Installing and timing the mainshaft and countershaft gears is easier if the transmission is horizontal and rotated 15 degrees counterclockwise, as viewed from the rear.

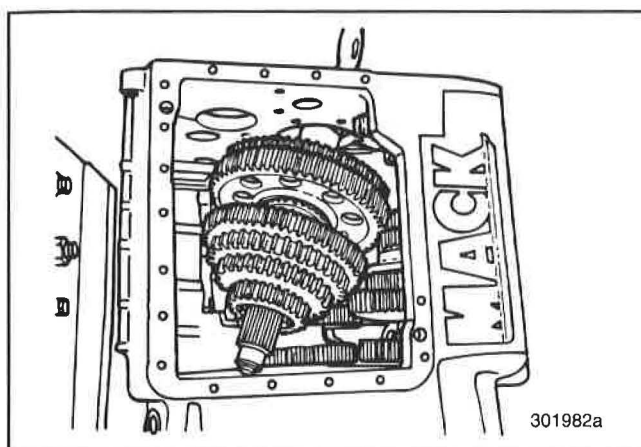


Figure 271 — Timing Gears with Mainshaft in Place

27. Verify correct mainshaft-to-countershaft gear timing by viewing timing marks through the main drive pinion opening. Remove the lifting eye.

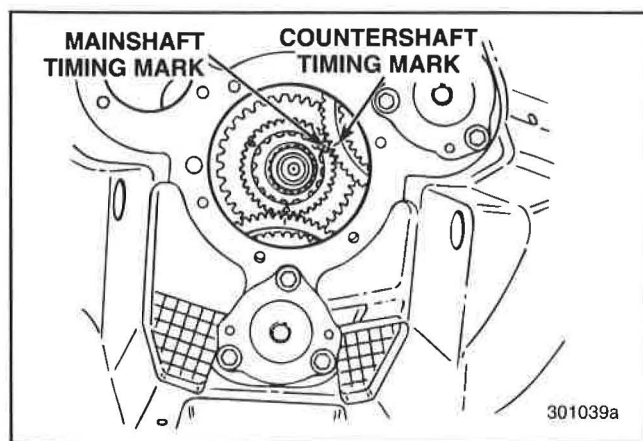


Figure 272 — Verifying Mainshaft-to-Countershaft Gear Timing

28. Install the remaining No. 2 (upper right, as viewed from the rear) reverse idler shaft into the opening provided, next to the position for the No. 2 (upper right) countershaft. Move the reverse speed gear on the mainshaft as far forward as possible. As the reverse idler shaft is inserted into the case, install (in order) the large bore thrust washer, reverse idler gear and small bore thrust washer onto the shaft.
29. Align the flat on the end of the reverse idler shaft with the mark previously made along the edge of the shim pack on the case.
30. Tap the reverse idler shaft into the case until it bottoms, using a brass hammer. Make sure the flat on the reverse idler shaft is aligned with the mark on the case.

NOTE

Make sure that the small bore thrust washer is aligned correctly with the idler shaft, while tapping the idler shaft into place. If not aligned, damage to the thrust washer may result.

31. Install a new welch (expansion) plug into the reverse idler shaft using a blunt punch and hammer, if not already done.



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32. Move the mainshaft reverse gear and sliding clutch toward the rear, until both are in the neutral position. Engage the reverse speed gear with the reverse idler gears. Install a folded rag between the first and reverse speed gears, to hold the reverse gear in place.

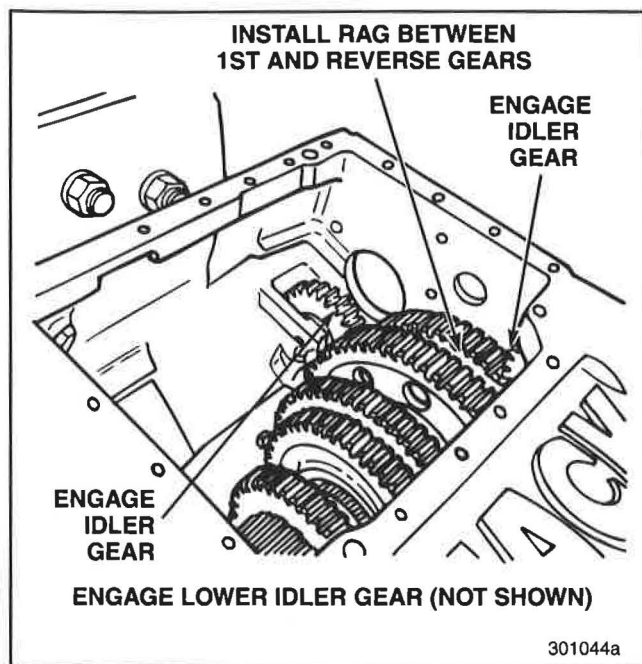


Figure 273 — Reverse Idler Gear and Shaft Shown Installed

33. Install the snap ring into the reverse speed gear. Remove the folded rag placed between the first and reverse speed gears in Step 32.

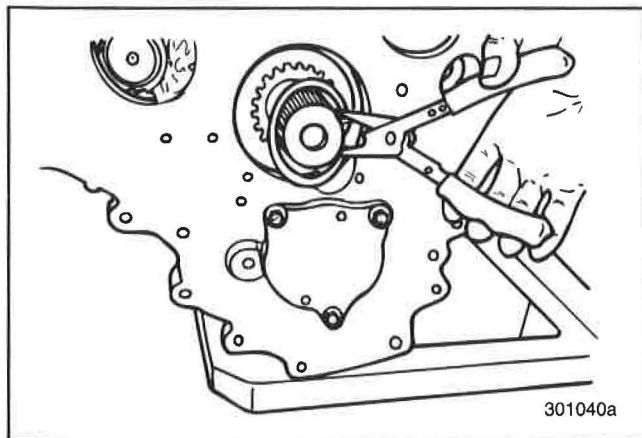


Figure 274 — Installing Snap Ring into Reverse Speed Gear

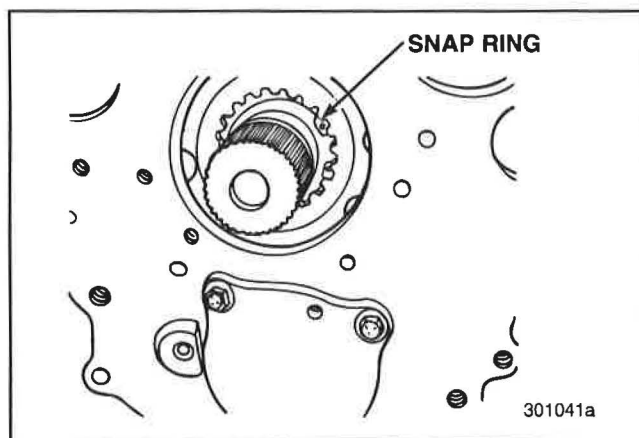


Figure 275 — Reverse Gear Snap Ring Installed

34. Install the last mainshaft snap ring into the groove on the mainshaft, using suitable metric snap ring pliers. Then, install the thrust washer (spacer) onto the mainshaft against the snap ring just installed.

SERVICE HINT

The last mainshaft snap ring requires metric snap ring pliers.

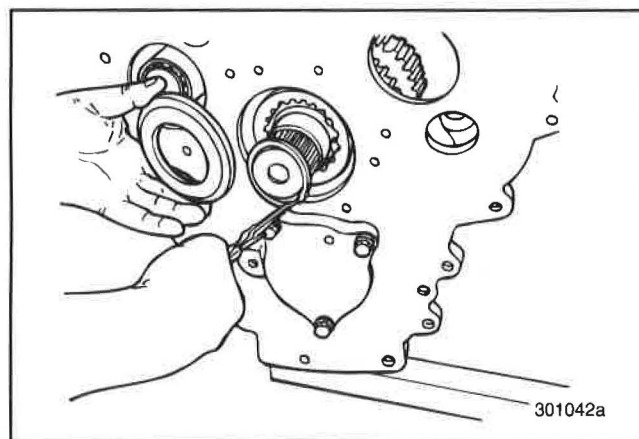


Figure 276 — Installing Last Snap Ring and Thrust Washer (Spacer) onto Mainshaft

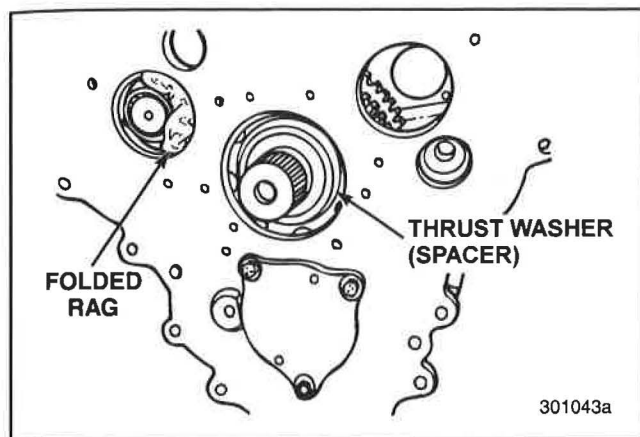


Figure 277 — Thrust Washer (Spacer) Installed

35. Begin to install the No. 2 (upper right) countershaft, rear end first.

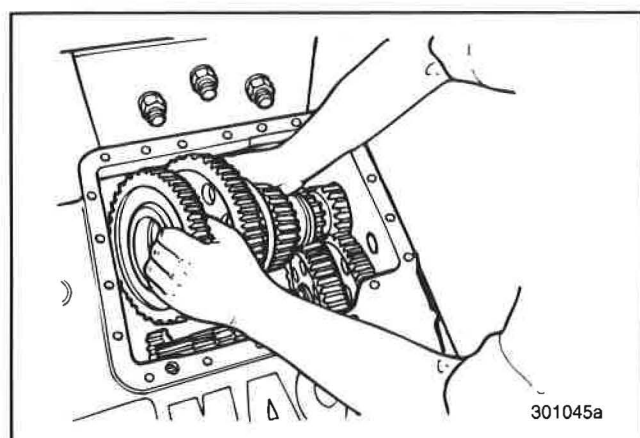


Figure 278 — Installing No. 2 (Upper Right) Countershaft

36. Align the timing mark on the No. 2 (upper right) countershaft sixth speed gear with the mark on the mainshaft sixth speed gear. This needs to be done before countershaft gears make final engagement with mating gears. All countershaft and mainshaft gear timing marks should be aligned at this point. Verify gear timing through the main drive pinion opening.

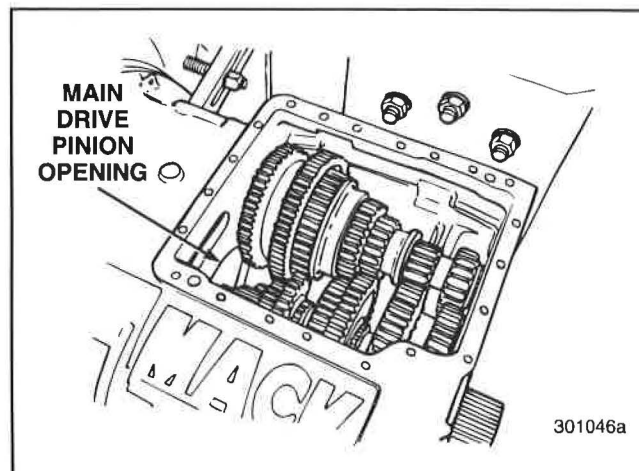


Figure 279 — Aligning Gear Timing Marks

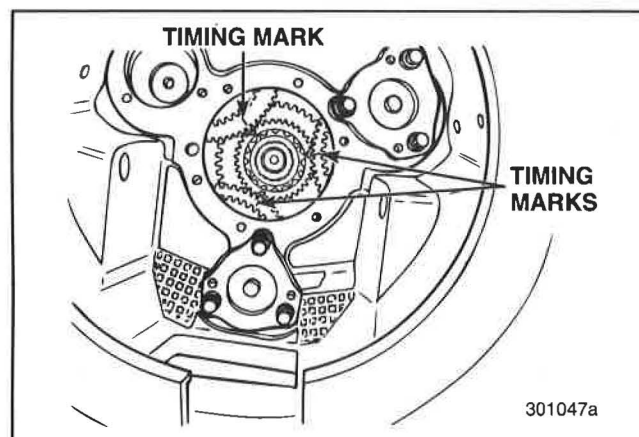


Figure 280 — Verifying Gear Timing

37. Install the No. 1 (upper left) and No. 2 (upper right) countershaft rear bearing covers without O-rings or shims. Determine shim pack thickness for proper bearing preload adjustment, as described earlier. Refer to Steps 12 and 13 in this section.
38. After determining the correct shim thickness, install the O-ring and shim pack onto the countershaft rear cover.

39. Install the No. 1 (upper left) and No. 2 (upper right) countershaft rear cover by aligning and lightly tapping the cover into place.

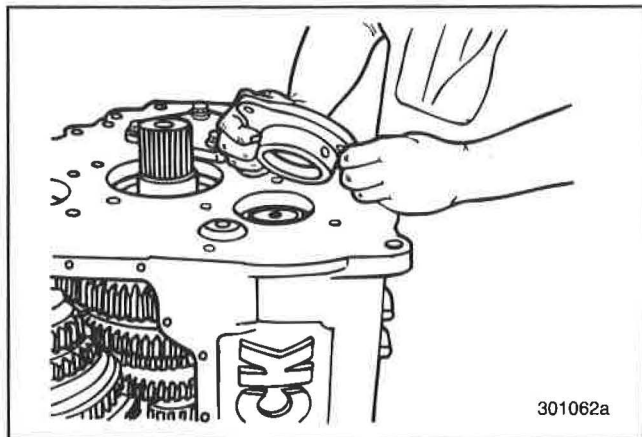


Figure 281 — Installing No. 1 (Upper Left) Countershaft Rear Bearing Cover

40. Tighten the rear cover capscrews to 40–50 lb-ft (54–68 N·m) torque, using torque wrench J 1313-B or equivalent.

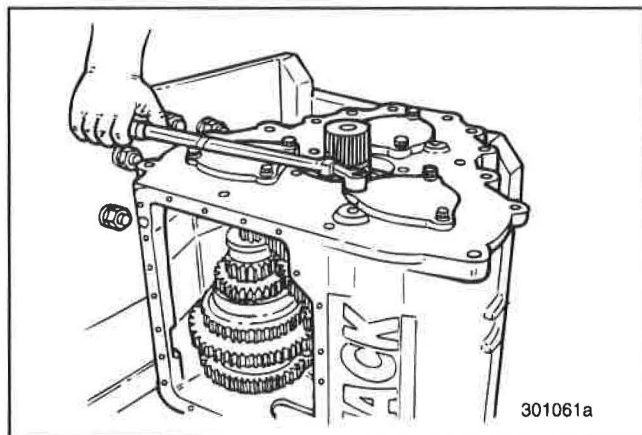


Figure 282 — Tightening Countershaft Rear Bearing Cover Capscrews

41. Install the mainshaft rear bearing cover and gasket.

CAUTION

Make sure the oil passage holes in the rear bearing cover and bearing cover gasket are aligned correctly during installation.

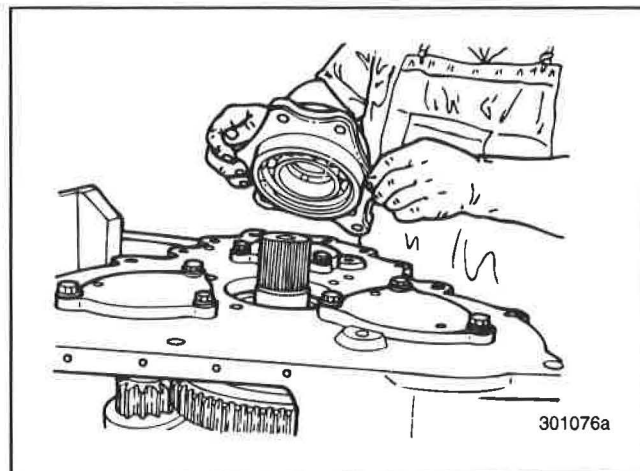


Figure 283 — Installing Mainshaft Rear Bearing Cover

42. Install and tighten the mainshaft rear bearing cover capscrews to 40–50 lb-ft (54–68 N·m) torque, using torque wrench J 1313-B or equivalent.

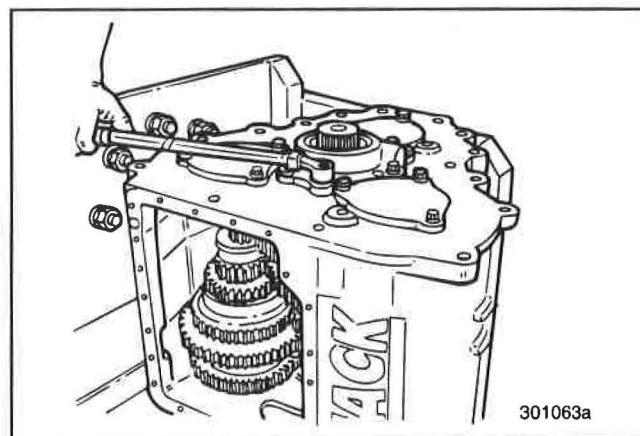


Figure 284 — Tightening Mainshaft Rear Bearing Cover Capscrews



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43. Install the No. 2 (upper left, as viewed from the front) countershaft front bearing cover and capscrews (make sure O-ring is in place). Pull up on the countershaft with one hand and wiggle the cover into place. A slight tap may be required to seat the cover.

CAUTION

Do not attempt to pull cover into place using the cover capscrews. Damage to the cover or bearing can result.

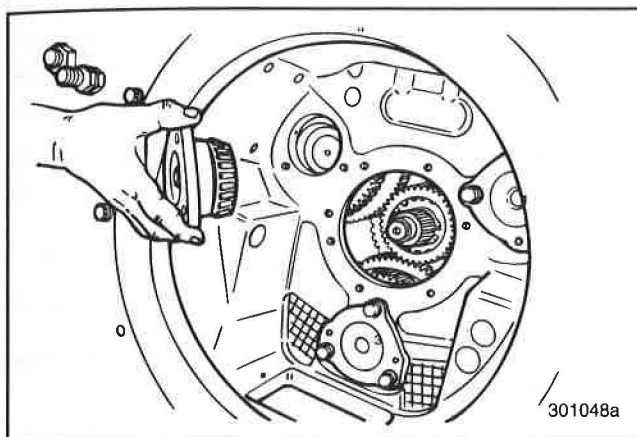


Figure 285 — Installing No. 2 Countershaft Front Bearing Cover

44. Tighten the No. 2 (upper left) countershaft front bearing cover capscrews to 40–50 lb-ft (54–68 N·m) torque, using torque wrench J 1313-B or equivalent.

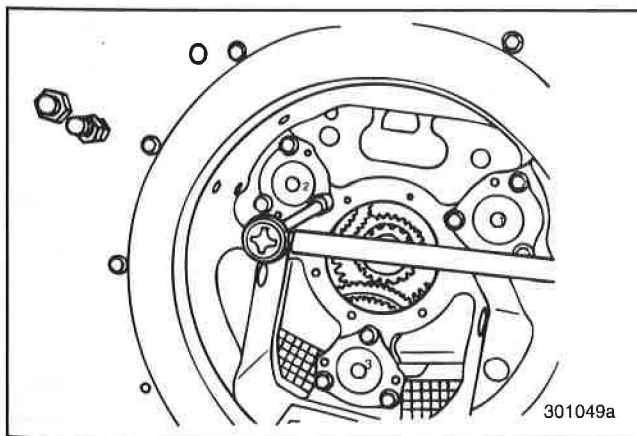


Figure 286 — Tightening Countershaft Front Bearing Cover Capscrews

45. Working at the front of the mainshaft, install the fifth/sixth sliding clutch.

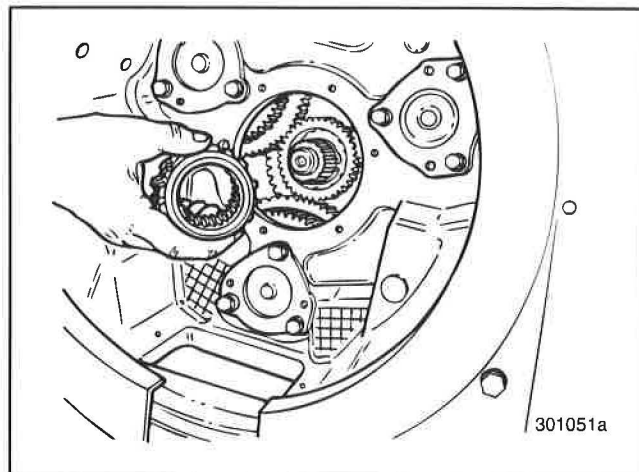


Figure 287 — Installing Fifth/Sixth Sliding Clutch onto Mainshaft

46. Install the main drive pinion bearing cover gasket. Make sure the rubber sealing material on the gasket is facing the bearing cover.

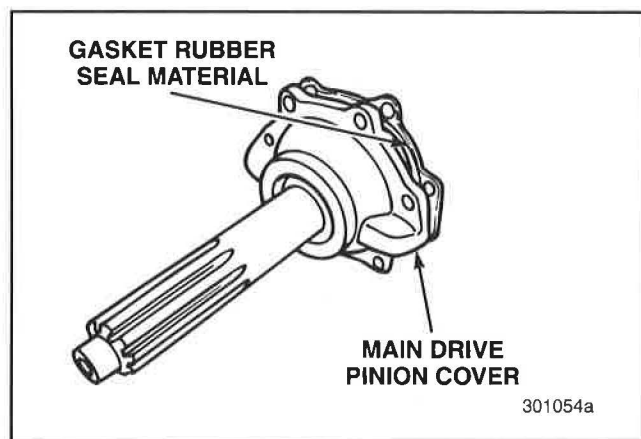


Figure 288 — Installing Cover Gasket with Sealing Material Facing Cover

47. Align the main drive pinion bearing cover gasket. Make sure the hole in the cover gasket aligns with the oil passageway in the bearing cover.

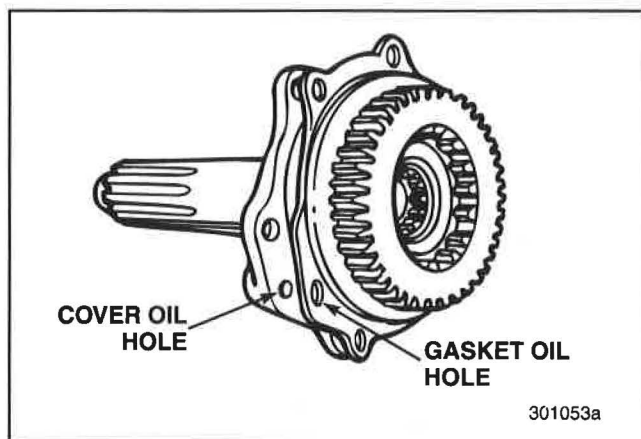


Figure 289 — Aligning Cover and Gasket Oil Holes

48. Before installing the main drive pinion assembly, make sure to align the oil passage hole in the cover with the oil passage hole in the case.

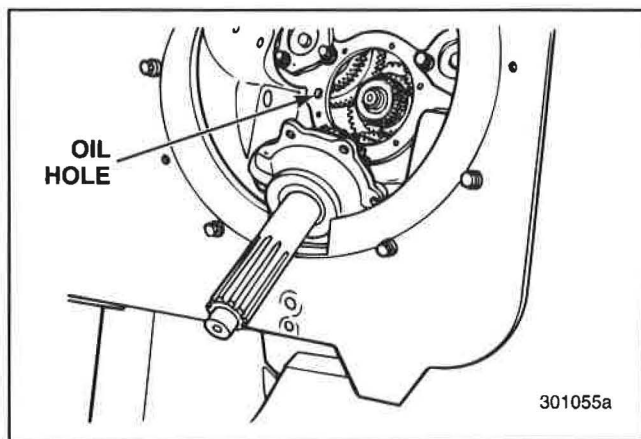


Figure 290 — Aligning Pinion Cover Oil Hole with Hole in Case

CAUTION

Make sure the oil passageways in the gasket, cover and case are aligned.

49. Install the main drive pinion assembly onto the front of the case.

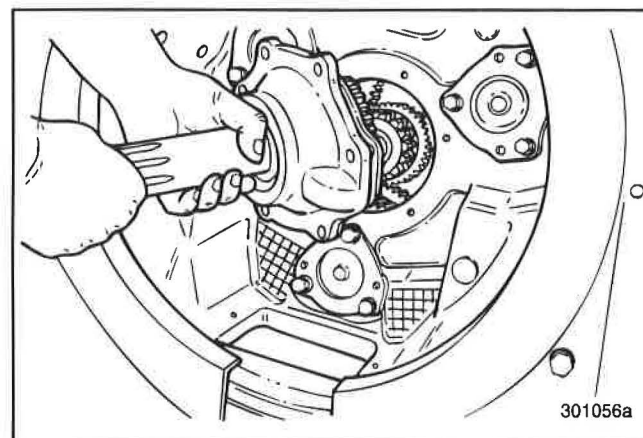


Figure 291 — Installing Main Drive Pinion

50. Install and then tighten the main drive pinion bearing cover capscrews to 40–50 lb-ft (54–68 N·m) torque, using torque wrench J 1313-B or equivalent.

NOTE

Main drive pinions for these transmissions are designed with 0.069–0.071 inch (three degrees) backlash between the shaft splines and the mating splines of the main drive pinion gear. This amount of backlash was designed to eliminate a rattling noise that can occur when the engine is idling with the clutch engaged.

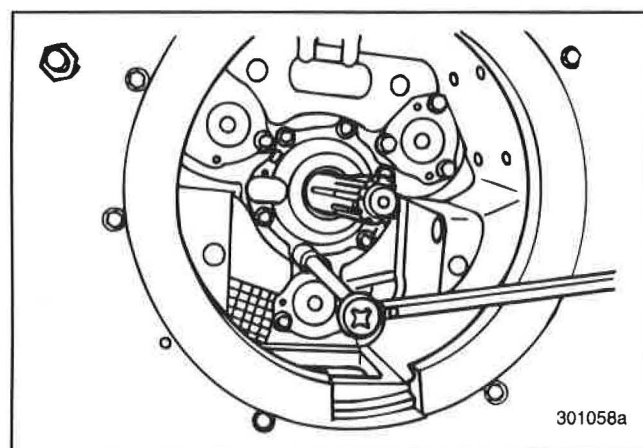


Figure 292 — Tightening Main Drive Pinion Bearing Cover Capscrews



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51. Install a new transmission case top cover gasket. Use a small amount of adhesive or grease to hold it in place.

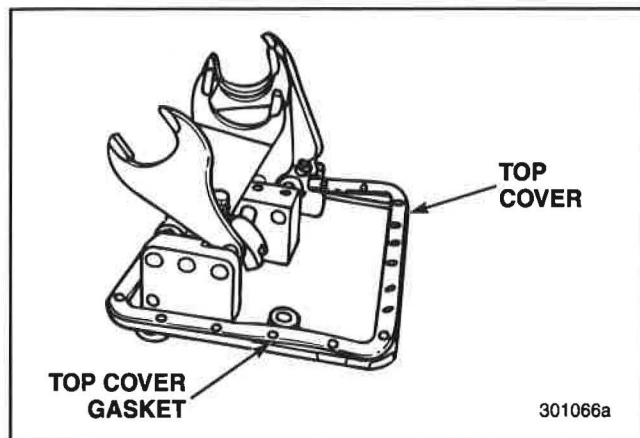


Figure 293 — Installing Top Cover Gasket

52. Make sure the shifters on the top cover and the sliding clutches on the mainshaft are in the neutral position for shift fork alignment.
53. Align the shift forks with the sliding clutches and install the transmission case top cover.

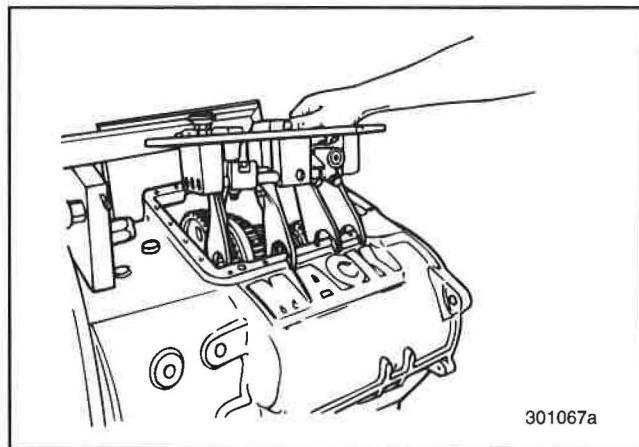


Figure 294 — Installing Case Top Cover

54. Install the lifting brackets at the front and rear of the transmission case top cover as shown (opposite corners).

NOTE

The lift bracket capscrews are slightly longer than the remainder of the top cover capscrews. Make sure the longer capscrews are used to secure the lift brackets.

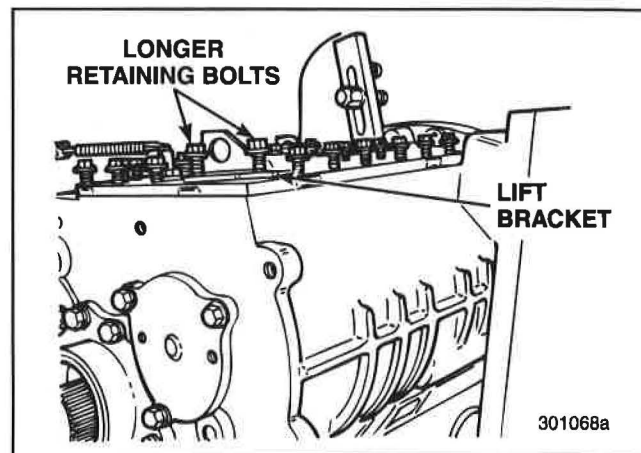


Figure 295 — Installing Top Cover Capscrews

55. Tighten the top cover capscrews to 27–33 lb-ft (37–45 N·m) torque, using torque wrench J 1313-B or equivalent.

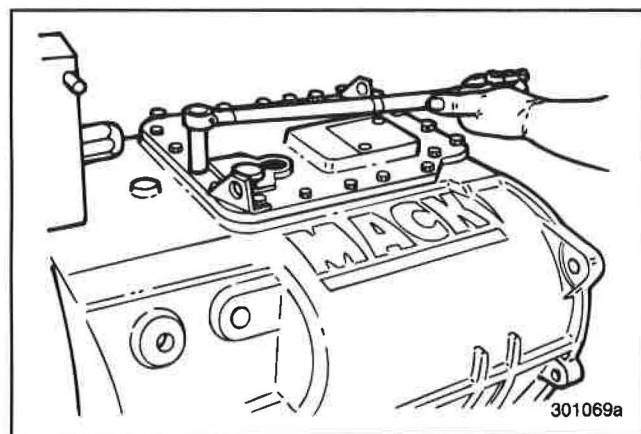


Figure 296 — Tightening Top Cover and Lift Bracket Capscrews



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- 56.** Install the rear drive yoke, clamp plate and capscrew, and tighten to 494–600 lb-ft (670–813 N·m) torque, using torque wrench J 23775-01 or equivalent.
- 57.** If removed, install the eight-bolt (left side) or six-bolt (right side) standard PTO covers or a non-standard PTO. (Refer to PTO Non-Standard Gear in Transmission Specifications and Capacities.)

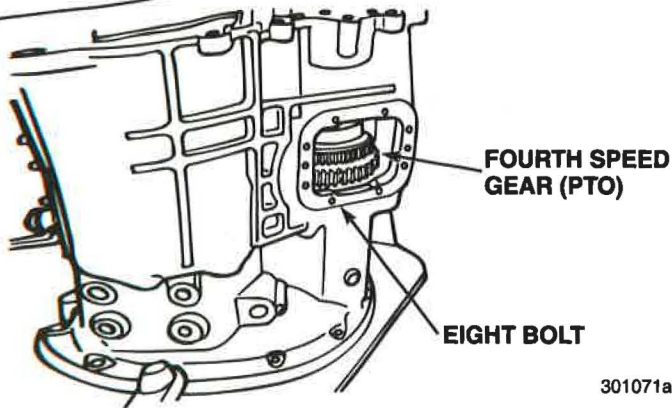


Figure 297 — Left Side Eight-Bolt PTO Location

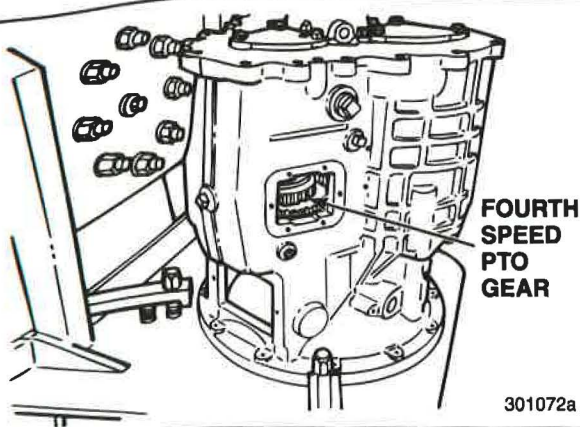


Figure 298 — Right Side Six-Bolt PTO Location

- 58.** Install drain plug and tighten to 25–30 lb-ft (34–41 N·m) torque, using torque wrench J 1313-B or equivalent.

- 59.** Install the clutch release bearing assembly, shafts, yoke and clutch brake.
- 60.** Install the transmission into the vehicle.
- 61.** Fill the transmission with the required lubricant (MACK GO-J or GO-J Plus), to the proper level. Refer to Transmission Specifications and Capacities found in the DESCRIPTION AND OPERATION section.
- 62.** Tighten the filler plug to finger tight, then wrench-tighten plug an additional 3/4 to one turn, not exceeding 55 lb-ft (75 N·m) torque.



300 DIAGNOSIS

DIAGNOSIS



300 DIAGNOSIS

TROUBLESHOOTING CHART

Symptom	Probable Cause	Remedy
NOISY	a. Low oil level b. Wrong oil used c. Side-mounted PTO installed too tight or too loose d. Loose bell housing-to-flywheel housing capscrews e. Incorrect clutch-driven discs used f. Gears worn, chipped, rough, cracked g. Bearings worn, cracked, corroded, galled, etc. h. Mismatched carrier ratios i. Resonating (ringing) driveshaft	a. Fill to correct level b. Drain and refill with correct oil c. Reinstall PTO correctly d. Install new capscrews using Loctite e. Install correct clutch-driven discs f. Replace gears g. Replace bearings h. Install correct matched gearing i. Install suitable dampening material, then high-speed balance the driveshaft
HARD SHIFTING	a. Incorrect driving practices b. Low oil level c. Improperly adjusted clutch, clutch linkage, clutch brake or shift linkage d. Incorrect oil used e. Remote shift linkage not lubricated f. Shift lever binding or has interference g. Poppet balls binding in holes h. Loose setscrews in shifters or shift forks i. Improperly adjusted fifth/sixth eccentric pin (when applicable) j. Worn spigot bearing k. Clutch brake ears broken l. Clutch discs worn into main drive pinion m. Mainshaft snap ring or thrust washer failure	a. Educate driver b. Fill to correct level c. Adjust properly d. Drain and refill with correct oil e. Clean and lubricate f. Relieve binding or interference g. Clean holes and balls h. Tighten to correct torque i. Adjust properly j. Replace bearing k. Replace clutch brake l. Replace clutch discs and main drive pinion m. Replace snap rings or thrust washers. Inspect shaft for damage



300 DIAGNOSIS

Symptom	Probable Cause	Remedy
GEAR DISENGAGEMENT (JUMPING OUT OF GEAR)	a. Excessive length and/or weight of gear shift lever and/or knob b. Shift lever interference c. Worn or loose mounting insulators d. Loose, broken or missing capscrews between clutch housing and flywheel housing e. Weak or broken shifter rail poppet springs f. Bent or worn shifter forks g. Broken snap rings h. Shift rail bent or poppet notches worn i. Worn taper or chipped teeth on sliding clutch teeth j. Worn or damaged spigot bearing k. Engine flywheel housing misalignment	a. Replace with standard lever and/or knob b. Remove interference c. Replace insulators d. Replace capscrews, check threads in case e. Replace springs f. Replace forks g. Replace snap rings h. Replace shift rail i. Replace sliding clutch; replace mating gear if clutch teeth are damaged j. Replace bearing k. Realign properly
OIL LEAKS	a. Oil level too high b. Drain plug, fill plug or magnetic plug loose c. Loose or missing capscrews d. Improper lubricant used e. Clogged breather f. Gaskets or O-rings broken, shifted or squeezed out of position g. Worn oil seals	a. Drain to correct level b. Tighten plug c. Tighten or replace d. Drain and refill with correct oil e. Clean or replace f. Replace gaskets or O-rings g. Replace seals
BEARING FAILURE	a. Dirt in system b. Wrong grade of oil, or contaminated oil c. Excessive vibrations d. Binding or seized propeller shaft slip yoke e. Improper bearing clamping f. Improper bearing installation (preloads, etc.)	a. Clean and replace bearings as necessary b. Drain and refill with correct oil, replace bearings c. Eliminate vibrations, replace bearings d. Clean and replace as needed e. Reclamp, using correct procedures; replace bearings f. Replace, using correct procedures



NOTES



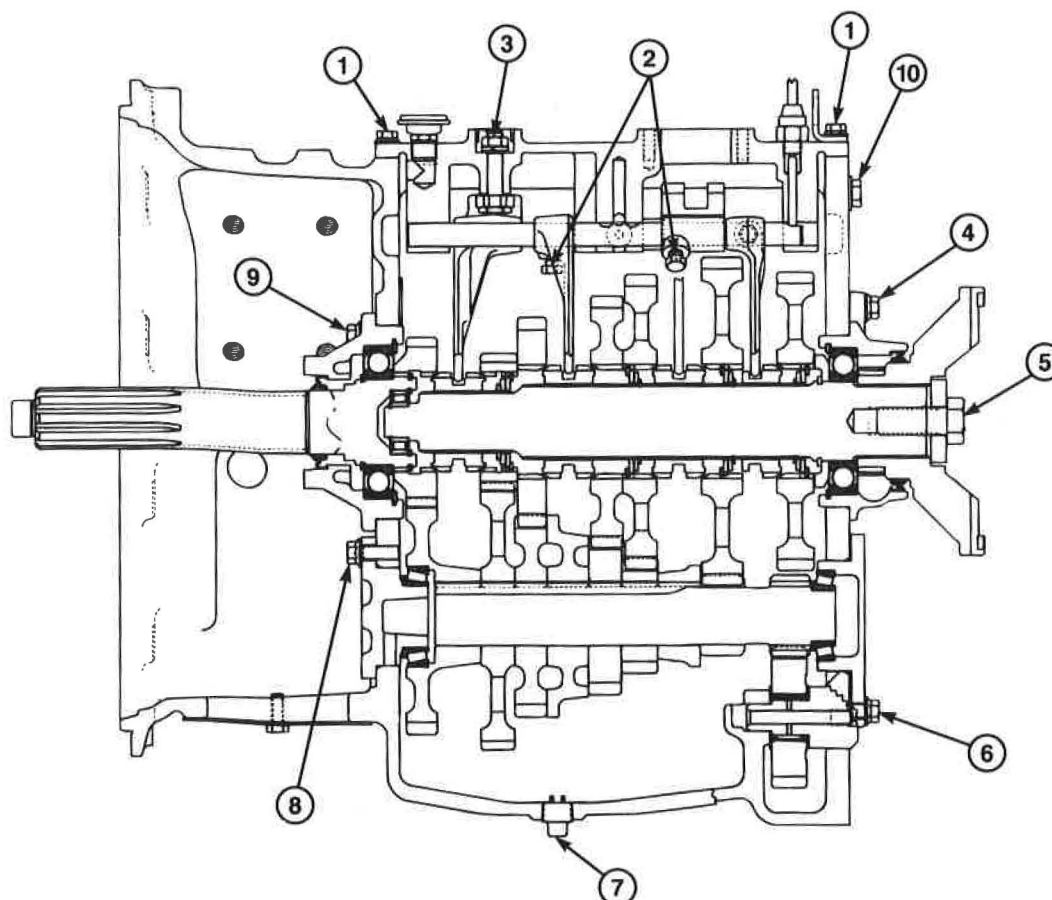
300 SPECIFICATIONS

SPECIFICATIONS



300 SPECIFICATIONS

T2060A CUTAWAY VIEW



301117a

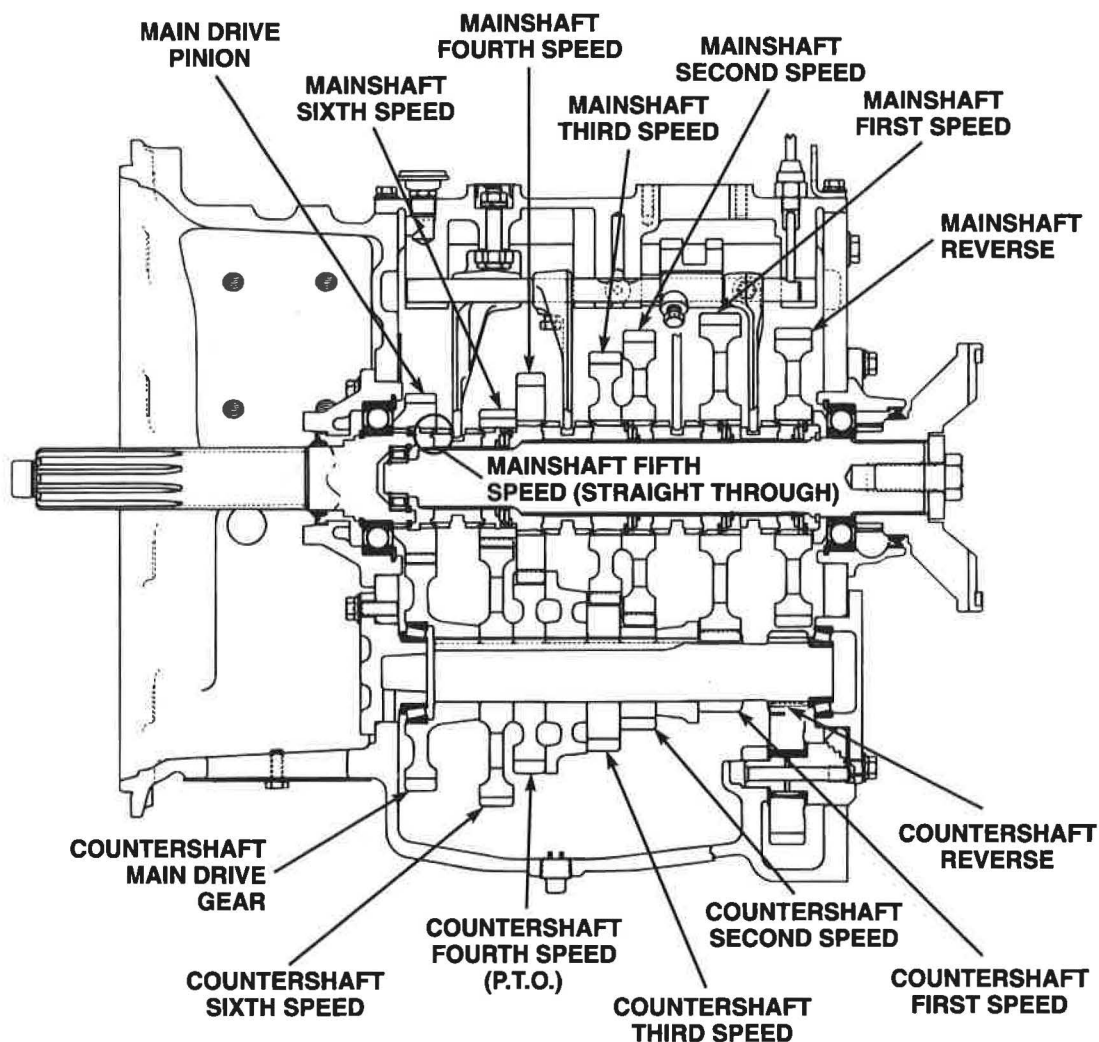
T2060A TORQUE SPECIFICATIONS

Item	Location	Torque	
		Lb-Ft	(N•m)
1	Top Cover Capscrews	27-33	(37-45)
2	Shifter and Shift Fork Setscrews	35-45	(48-61)
3	Fifth/Sixth Rocker Pin Nut	50-60	(68-81)
4	Mainshaft Rear Bearing Cover Capscrews	40-50	(54-68)
5	Drive Flange (or Yoke) Clamp Plate Capscrew	494-600	(670-813)
6	Countershaft Rear Bearing Cover Capscrews	40-50	(54-68)
7	Drain Plug	25-30	(34-41)
8	Countershaft Front Bearing Cover Capscrews	40-50	(54-68)
9	Main Drive Pinion Bearing Cover Capscrews	40-50	(54-68)
10	Through Bolt	48-72	(65-98)
—	Filler Plug (Finger Tight, Then Wrench Tighten 3/4 to One Turn)	55 Max.	(75) Max.
—	Magnetic Filter Plug	25-30	(27-31)



300 SPECIFICATIONS

T2060A TRANSMISSION



301118a

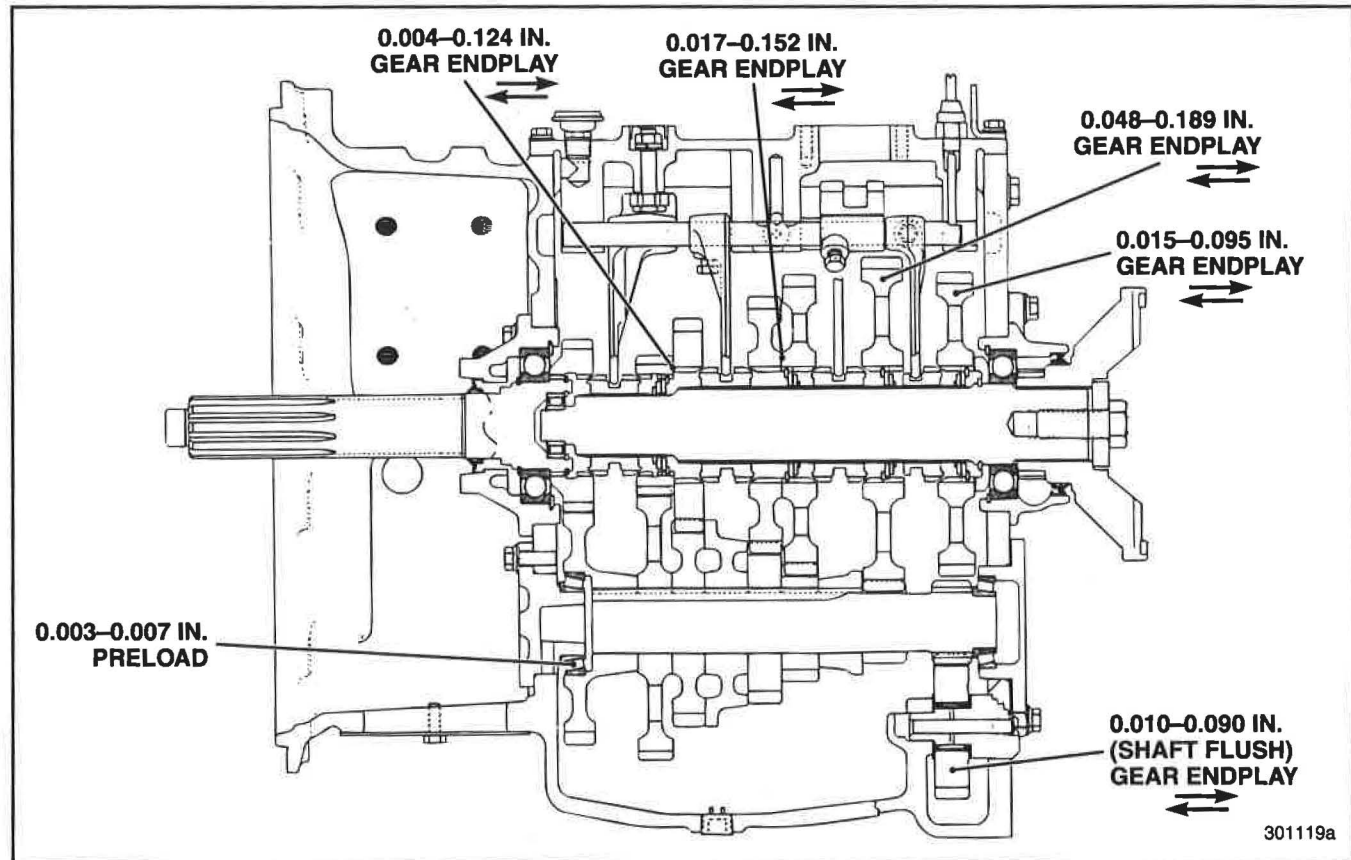
GEAR IDENTIFICATION CHART

T2060A		
	Number of Teeth	Outside Diameter (In Inches)
Mainshaft Gears		
Main Drive Pinion (Straight Through)	42	5.455
Sixth	36	4.417
Fourth	42	6.742
Third	54	8.116
Second	60	9.488
First	63	10.650
Reverse	54	9.601
Countershaft and Reverse Idler Gears		
Main Drive Gear	60	7.593
Sixth	72	8.583
Fourth (PTO)	40	6.478
Third	32	5.064
Second	21	3.697
First	12	2.520
Reverse	12	2.625
Reverse Idler	24	4.520



300 SPECIFICATIONS

T2060A TOLERANCES



ALL FORKS AND SLIDING CLUTCHES

	Minimum New	Maximum New	Maximum Wear
Clearance between fork pad and clutch groove	0.005 inch	0.020 inch	0.050* inch

*If unit has experienced disengagement, clearance must not exceed 0.030 inch maximum.

Springs	Free Length	Load	Length Under Load
Reverse Shifter Plunger Spring	2.30 in. Approximately	43 ± 3 lbs.	1.100 in.
Fifth/Sixth Shifter Plunger Spring	2.30 in. Approximately	43 ± 3 lbs.	1.100 in.
Shift Rail Poppet Ball Springs (4)	2.50 in. Approximately	31.4 ± 3 lbs.	1.674 in.

Shift rails to mating shift cover bore clearance:

Countershaft Bearing Preload:

Floating Gear Endplay (Mainshaft):

Reverse Idler Gear:

Reverse Gear:

First Gear:

2nd Speed Gear to 3rd Speed Gear:

4th Speed Gear to 6th Speed Gear:

0.010 inch maximum

0.003-0.007 inch

0.010-0.090 inch (shaft flush)

0.015-0.095 inch

0.048-0.189 inch

0.017-0.152 inch

0.004-0.124 inch



300 SPECIFICATIONS

SPECIAL TOOLS

TOOLS

J 1313-B	0-150 lb-ft Torque Wrench
J 23775-01	100-600 lb-ft Torque Wrench
J 24407	30-250 lb-ft Torque Wrench
J 2619-01	Slide Hammer
J 29048	Tapered Feeler Gauge
J 29369-1	Bearing Puller
J 29369-2	Bearing Puller
OEM 4052	Internal Puller
J 34629	Snap Ring Pliers Set
J 34630	Reverse Idler Shaft Removal Tool
J 36052	Positioning Tool
J 36053	Seal Driver
J 39477-1	Bar-Type Puller
J 39854	Seal Driver
J 8092	Driver Handle
J 8176	Bearing Separator

Above tools are available from:

KENT-MOORE
O.E. TOOL AND EQUIPMENT GROUP
SPX CORPORATION
28635 Mound Road
Warren, Michigan 48092
Phone: 1-800-328-6657
Fax: 1-800-578-7375



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