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Service Manual

Fuller Heavy Duty Transmissions TRSM0250

October 2007

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FOREWORD

This manual is designed to provide detailed information necessary to service and repair the Fuller Transmissions listed on the cover.

As outlined in the Table of Contents, the manual is divided into 3 main sections:

a. Technical information and reference
b. Removal, disassembly, reassembly and installation
c. Options

The format of the manual is designed to be followed in its entirety if complete disassembly and reassembly of the transmission is necessary. But if only one component of the transmission needs to be repaired, refer to the Table of Contents for the page numbers showing that component. For example, if you need to work on the Shift Bar Housing, you will find instructions for removal, disassembly and reassembly on page 21. Instructions for installation are on page 76. Service Manuals, Illustrated Parts Lists, Drivers Instructions, Driver Training Programs and other forms of product service information for these and other Fuller Transmissions are available upon request. A Technical Literature Order Form may be found in the back of this manual*. You may also obtain Service Bulletins, detailing information on product improvements, repair procedures and other service-related subjects by writing to the following address:

EATON CORPORATION
TRANSMISSION DIVISION
Technical Service Department
P.O. Box 4013
Kalamazoo, Michigan 49003
(61 6) 342-3344

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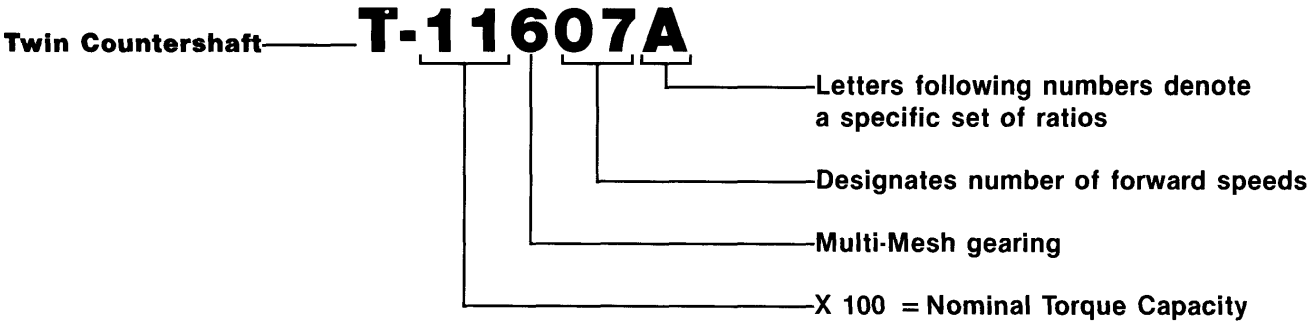
MODEL DESIGNATIONS AND SPECIFICATIONS

Nomenclature:



IMPORTANT: All Fuller Transmissions are identified by model and serial number. This information is stamped on the transmission identification tag and affixed to the case.
DO NOT REMOVE OR DESTROY THE TRANSMISSION IDENTIFICATION TAG.

7 Speed Series Transmissions

Models	No. Spds.	Gear Ratios 1st	2nd	3rd	4th	5th	6th	7th	Reverse	(Note 1) Relative Speed PTO Gear To Input R.P.M. Right	Bottom	(Note 2) Length In. *mm*	(Note 3) Weight Lbs. *kg*	(Note 4) Oil Cap. Pints *Liters*
T-11607A	7	10.50	6.13	3.71	2.51	1.83	1.34	1.00	10.20	.513	.513	28.9 *734*	576 *261*	30 *14*
T-11607B	7	12.35	7.15	4.31	2.72	1.83	1.34	1.00	12.03	.513	.513	28.9 *734*	576 *261*	30 *14*

See Chart Notes.

CHART NOTES:

1 Lengths measured from face of clutch housing to front bottoming surface of companion flange or yoke.

2 Weights include SAE No. 1 cast iron clutch housing and standard controls (gear shift lever and housing assembly), less clutch release parts. For information on available clutch housings, refer to Publication FUL-140 - "Clutch Housing Chart." All weights are approximate.

3 Oil Capacities are approximate, depending on inclination of engine and transmission. Always fill transmission with proper grade and type of lubricant to level of filler opening. See LUBRICATION.

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Proper Lubrication . . . the Key to long transmission life

Proper lubrication procedures are the key to a good all-around maintenance program. If the oil is not doing its job, or if the oil level is ignored, all the maintenance procedures in the world are not going to keep the transmission running or assure long transmission life.

Eaton® Fuller® Transmissions are designed so that the internal parts operate in a bath of oil circulated by the motion of gears and shafts.

Thus, ail parts will be amply lubricated if these procedures are closely followed:

1. **Maintain oil level. Inspect regularly.**
2. **Change oil regularly.**
3. **Use the correct grade and type of oil.**
4. **Buy from a reputable dealer.**

Lubrication Change and Inspection

Eaton® Roadranger® CD50 Transmission Fluid	
HIGHWAY USE—Heavy Duty and Mid-Range	
First 3,000 to 5,000 miles (4827 to 8045 Km)	Factory fill Inltlal drain
Every 10,000 miles (16090 Km)	Check fluid level Check for leaks
Heavy Duty Highway Change Interval	
Every 250,000 miles (402336 Km)	Change transmission fluid,
Mid-Range Highway Change Interval	
Every 100,000 miles (160,000 Km) or every 3 years whichever occurs first	Change transmission fluid.
OFF-HIGHWAY USE	
First 30 hours	Factory fill Initial drain,
Every 40 hours	Inspect fluid level Check for leaks
Every 500 hours	Change transmission fluid where severe dirt conditions exist.
Every 1,000 hours	Change transmission fluid (Normal off-highway use),
Heavy Duty Engine Lubricant or Mineral Gear Lubricant	
HIGHWAY USE	
First 3,000 to 5,000 miles (4827 to 8045 Km)	Factory fill Initial drain.
Every 10,000 miles (16090 Km)	Inspect lubricant level, Check for leaks,
Every 50,000 miles (80450 Km)	Change transmission lubricant,
OFF-HIGHWAY USE	
First 30 hours	Change transmission lubricant on new units
Every 40 hours	Inspect lubricant level Check for leaks
Every 500 hours	Change transmission lubricant where severe dirt conditions exist.
Every 1,000 hours	Change transmission lubricant (Normal off-highway use),

Change the oil filter when fluid or lubricant is changed.

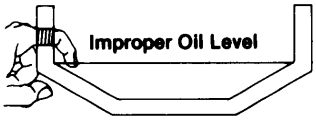
Recommended Lubricants

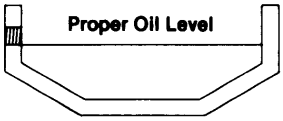
Type	Grade (SAE)	Fahrenheit (Celsius) Ambient Temperature
Eaton® Roadranger® CD50 Transmission Fluid	**50**	**All**
Heavy Duty Engine 011 MI L-L-2104B C or D or API-SF or API-CD (Previous API designations acceptable)	50 40 30	Above 10°F(-12°C.) Above 10°F(-12°C.) Below 10°F(-12°C.)
Mineral Gear 011 with rust and oxidation Inhibitor API-GL-1	90 80W	Above 10°F(-12°C.) Below 10°F(-12°C.)

The use of mild EP gear oil or multi-purpose gear oil is not recommended, but if these gear oils are used, be sure to adhere to the following limitations:

Do not use mild EP gear oil or multi-purpose gear oil when operating temperatures are above 230°F (110°C). Many of these gear oils, particularly 85W140, break down above 230°F and coat seals, bearings and gears with deposits that may cause premature failures. If these deposits are observed (especially a coating on seal areas causing oil leakage), change to Eaton Roadranger CD50 transmission fluid, heavy duty engine oil or mineral gear oil to assure maximum component life and to maintain your warranty with Eaton. (Also see "Operating Temperatures".)

Additives and friction modifiers are not recommended for use in Eaton Fuller transmissions.





Proper Oil Level

Make sure oil is level with filler opening. Because you can reach oil with your finger does not mean oil is at proper level. One inch of oil level is about one gallon of oil.

Draining Oil

Drain transmission while oil is warm. To drain oil remove the drain plug at bottom of case. Clean the drain plug before re-installing.

Refilling

Clean case around filler plug and remove plug from side of case. Fill transmission to the level of the filler opening. If transmission has two filler openings, fill to level of both openings.

The exact amount of oil will depend on the transmission inclination and model. Do not over fill—this will cause oil to be forced out of the transmission.

When adding oil, types and brands of oil should not be mixed because of possible incompatibility.

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LUBRICATION

Operating Temperatures —With Eaton® Roadranger® CD50 Transmission Fluid Heavy Duty Engine Oil and Mineral Oil

The transmission should not be operated consistently at temperatures above 250°F (120°C). However, intermittent operating temperatures to 300°F (149°C) will not harm the transmission. Operating temperatures above 250°F increase the lubricant's rate of oxidation and shorten its effective life. When the average operating temperature is above 250°F, the transmission may require more frequent oil changes or external cooling.

The following conditions in any combination can cause operating temperatures of over 250°F: (1) operating consistently at slow speeds, (2) high ambient temperatures, (3) restricted air flow around transmission, (4) exhaust system too close to transmission, (5) high horsepower, overdrive operation.

External oil coolers are available to reduce operating temperatures when the above conditions are encountered.

Transmission Oil Coolers are:

Recommended

— With engines of 350 H.P. and above with overdrive transmissions

Required

— With engines 399 H.P. and above with overdrive transmissions and GCW'S over 90,000 lbs.

— With engines 399 H.P. and above and 1400 Lbs.-Ft. or greater torque

— With engines 450 H.P. and above

— With EP or Multipurpose Gear Oil

Mild EP gear oil and multipurpose gear oil are not recommended when lubricant operating temperatures are above 230°F (110). In addition, transmission oil coolers are not recommended with these gear oils since the oil cooler materials may be attacked by these gear oils. The lower temperature limit and oil cooler restriction with these gear oils generally limit their success to milder applications.

Proper Lubrication Levels as Related to Transmission Installation Angles

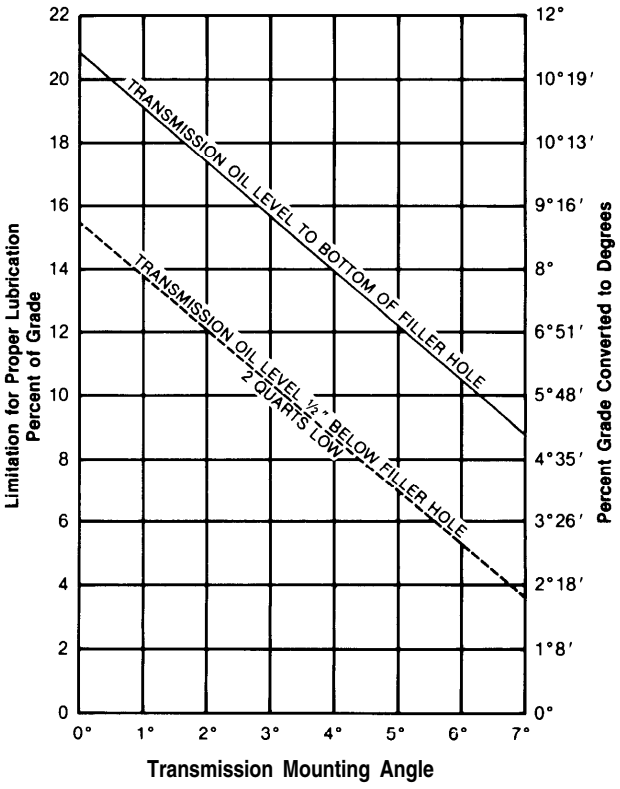
If the transmission operating angle is more than 12 degrees, improper lubrication can occur. The operating angle is the transmission mounting angle in the chassis plus the percent of upgrade (expressed in degrees).

The chart below illustrates the safe percent of upgrade on which the transmission can be used with various chassis mounting angles. For example: if you have a 4 degree transmission mounting angle, then 8 degrees (or 14 percent of grade) is equal to the limit of 12 degrees. If you have a O degree mounting angle, the transmission can be operated on a 12 degree (21 percent) grade.

Anytime the transmission operating angle of 12 degrees is exceeded for an extended period of time the transmission should be equipped with an oil pump or cooler kit to insure proper lubrication.

Note on the chart the effect low oil levels can have on safe operating angles. Allowing the oil level to fall 1/2" below the filler plug hole reduces the degree of grade by approximately 3 degrees (5.5 percent).

Proper Lubrication Levels are Essential!



Dotted line showing "2 Quarts Low" is for reference only. Not recommended.

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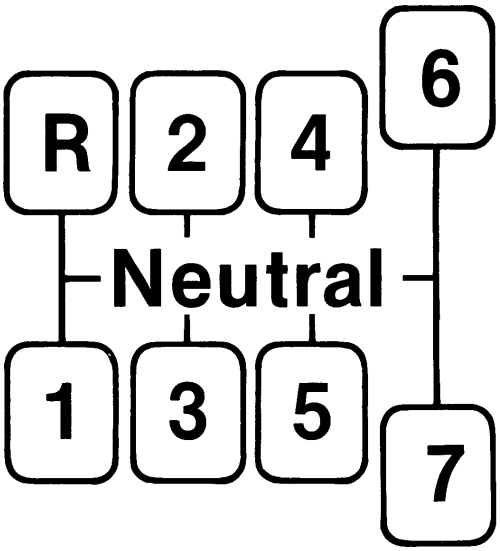
OPERATION



Shift Lever Patterns

The T-11607 transmissions have seven forward speeds and one reverse. All models are shifted as you would shift any non-synchronized manual transmission, following the simple 7-speed shift pattern. Always double-clutch when making lever shifts.

The longer lever throw in 6th and 7th gear positions provide greater clutching tooth contact.

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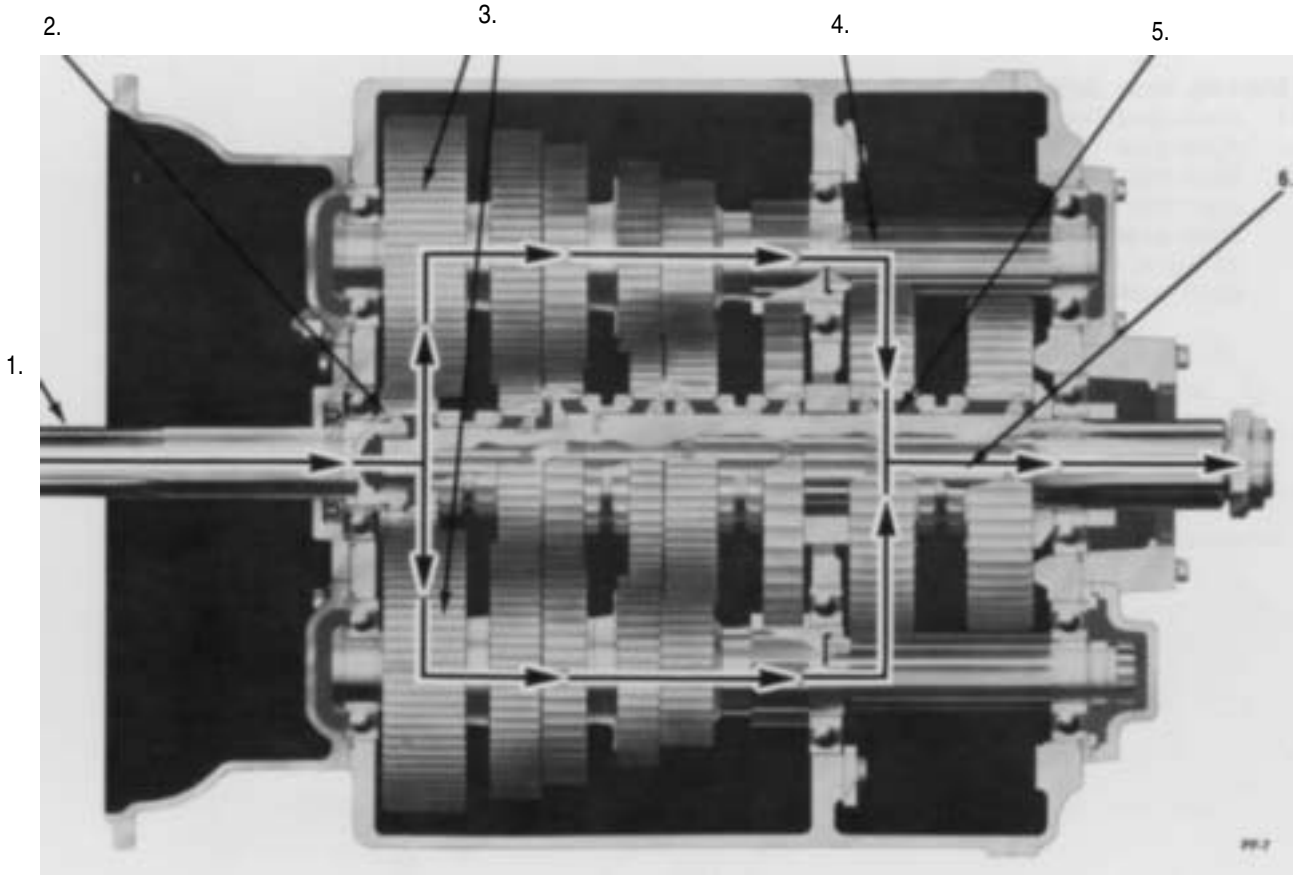
POWER FLOW

The transmission must transfer the engine's power in terms of torque to the vehicle's rear wheels. Knowledge of what takes place in the transmission during torque transfer is essential when trouble-shooting and making repairs become necessary.

1. Torque from the engine is transferred to the transmission's input shaft.
2. Splines of input shaft engage internal splines in hub of main drive gear.
3. Torque is split between the two countershaft drive gears.
4. Torque is delivered along both countershaft to countershaft gears of "engaged" mainshaft gear. The cross section view illustrates 1st speed gear engagement.
5. Internal clutching teeth in hub of engaged mainshaft gear transfers torque to mainshaft through sliding clutch.
6. Mainshaft transfers torque directly to output shaft.



1st SPEED POWER FLOW

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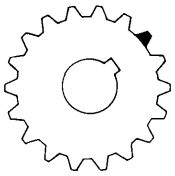
TIMING

All Fuller Twin countershaft transmissions are "timed" at assembly. It is important that proper timing procedures are followed when reassembling the transmission. Timing assures that the countershaft gears will contact the mating mainshaft gears at exactly the same time, allowing mainshaft gears to center on the mainshaft and equally divide the load.

Timing is a simple procedure of making the appropriate teeth of a gear set prior to installation and placing them in proper mesh while in the transmission.

A. Marking Countershaft Drive Gear Teeth

1. Prior to placing each countershaft assembly into case, mark the tooth located directly over the keyway of drive gear as shown. This tooth is stamped with an "O" to aid identification.

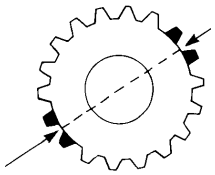


A. TOOTH MARKED ON EACH COUNTERSHAFT DRIVE GEAR FOR TIMING PURPOSES

Cut 7300/7-84

B. Marking Main Drive Gear Teeth.

1. Mark any two adjacent teeth on the main drive gear.
2. Mark the two adjacent teeth located directly opposite the first set marked on the main drive gear. As shown below, there should be an equal number of unmarked gear teeth on each side between the marked sets.

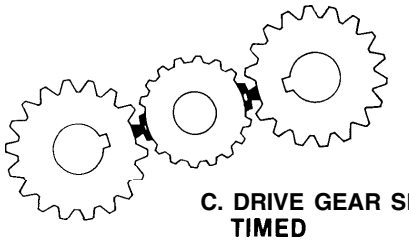


B. TEETH MARKED ON MAIN DRIVE GEAR FOR TIMING PURPOSES

Cut 7300A/7-84

C. Meshing Marked Countershaft Drive Gear Teeth with Marked Main Drive Gear Teeth.

1. When installing the bearings on left countershaft, mesh the marked tooth of countershaft drive gear with either set or two marked teeth on the main drive gear.
2. Repeat the procedure when installing the bearings on right countershaft (after installing mainshaft assembly), using the remaining set of two marked teeth on the main drive gear to time assembly.



C. DRIVE GEAR SET PROPERLY TIMED

Cut 7300B/7-84

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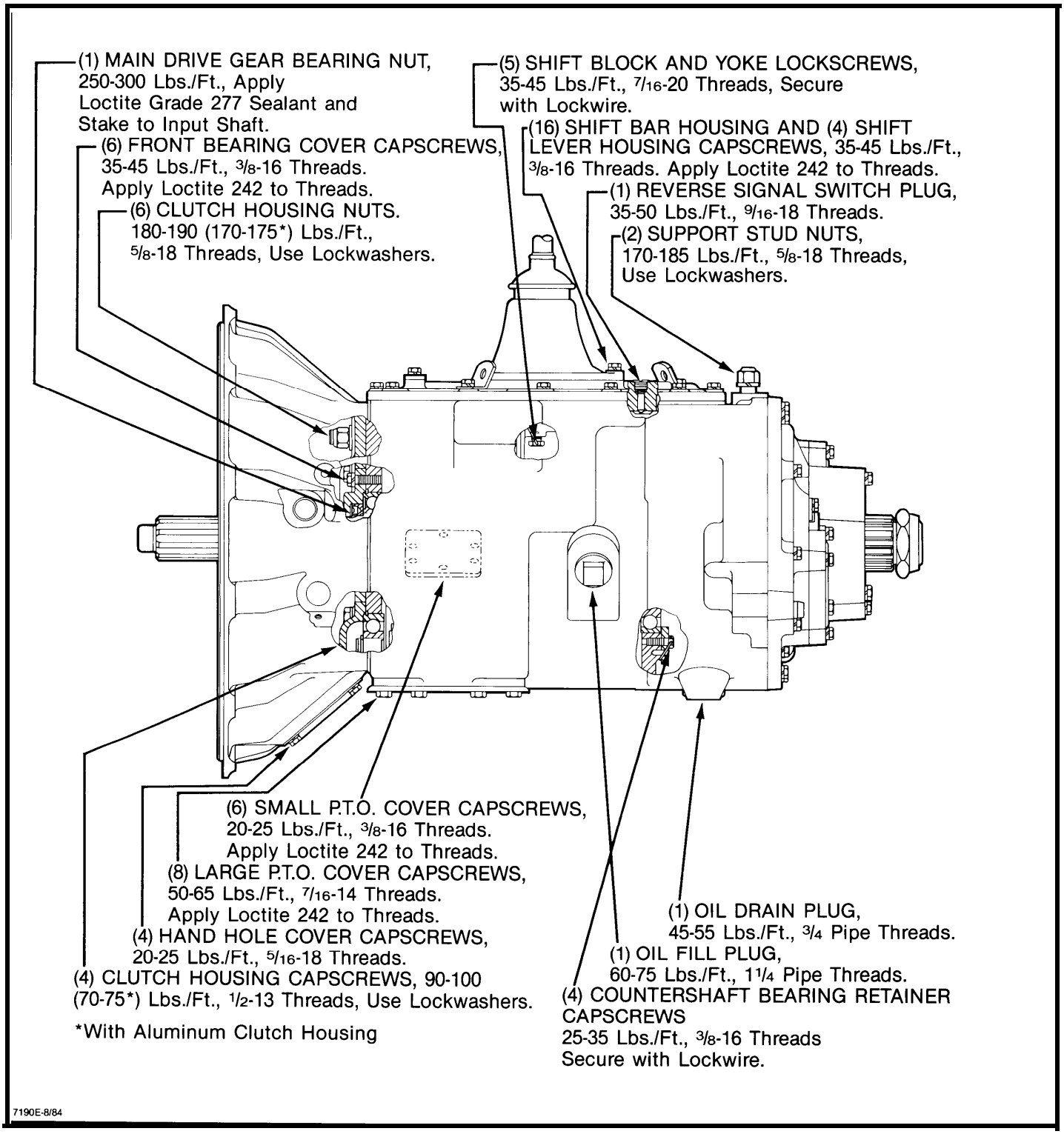
TORQUE RECOMMENDATIONS

Correct torque application is extremely important to assure long transmission life and dependable performance. Over-tightening or under-tightening can result in a loose installation and, in many instances, eventually cause damage to transmission gears, shafts, and/or bearings. Use a torque wrench whenever possible to attain recommended lbs./ft. ratings. Do not torque capscrews dry.



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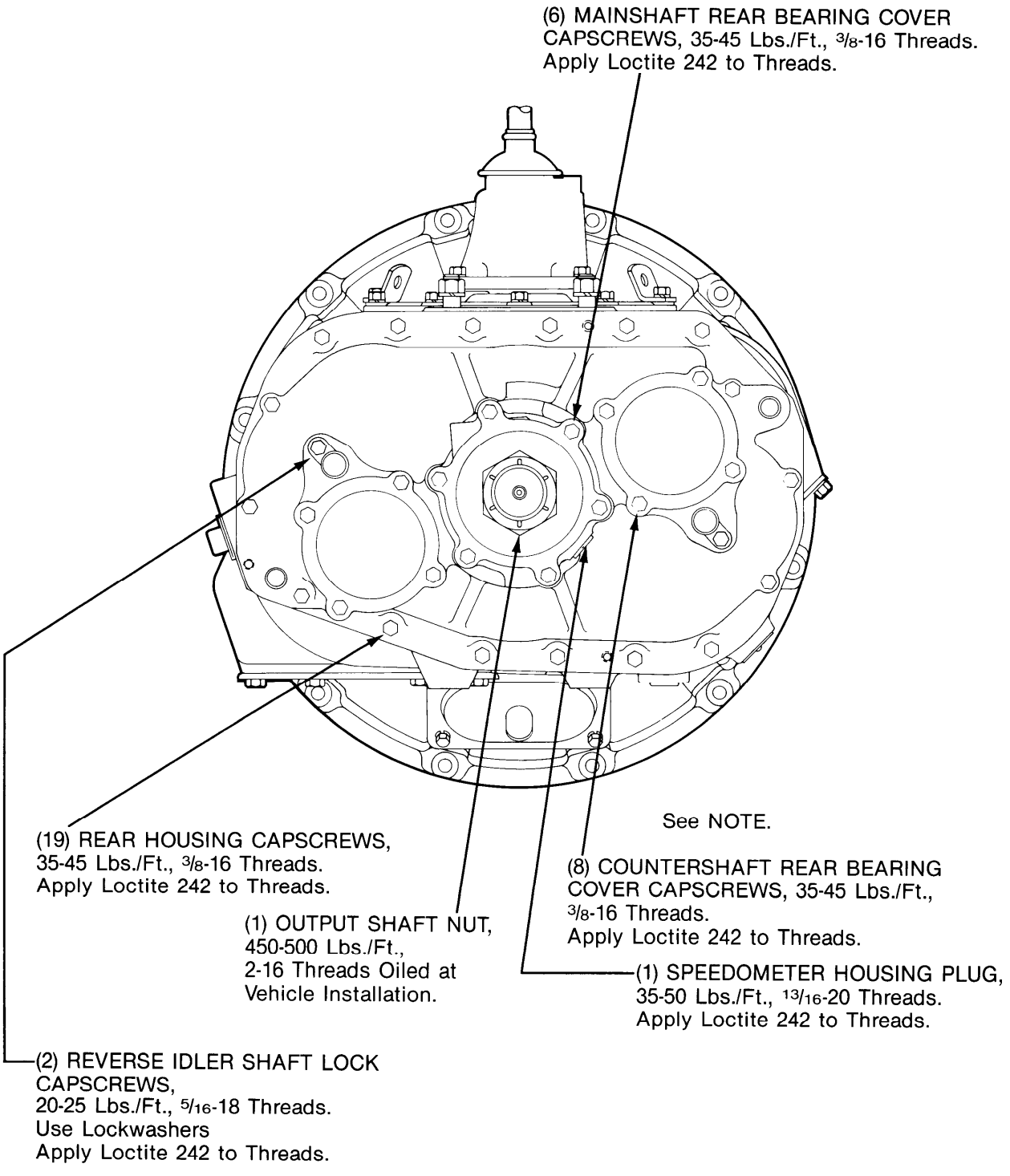
TORQUE RECOMMENDATIONS



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TOOL REFERENCE

Some repair procedures pictured in this manual show the use of specialized tools. Their actual use is recommended as they make transmission repair easier, faster, and prevent costly damage to critical parts.

But for the most part, ordinary mechanic's tools such as socket wrenches, screwdrivers, etc., and other standard shop items such as a press, mauls and soft bars are all that is needed to successfully disassemble and reassemble any Fuller Transmission.

The specialized tools listed below can be obtained from a tool supplier or made from dimensions as required by the individual user. Detailed Fuller Transmission Tool Prints are availabe upon request by writing.

Eaton Corporation
Transmission Division
Technical Service Dept.
P.O. Box 4013
Kalamazoo, Michigan 49003

PAGE	TOOL	HOW OBTAINED
25	Snap Ring Pliers	Tool Supplier
39	Mainshaft Hook	Tool Supplier
20	Tension Spring Driver	Made from Fuller Transmission Print T-11938
49	Snap Ring Pliers	Tool Supplier
38	Bearing Puller w/Set Screw	Made from Fuller Transmission Print T-10325
50	Bearing Drivers (Flanged-End)	Made from Fuller Transmission Print Series T-10842*
50	Countershaft Support Tool	Tool Supplier
52	Input Shaft Nut Installer	Made from Fuller Transmission Print T-22553-A
74	Torque Wrench, 1000 Lbs./Ft. Capacity	Tool Supplier
51	Input Shaft Bearing Driver	Tool Supplier

***Dimensions necessary to determine specific tool number required.**

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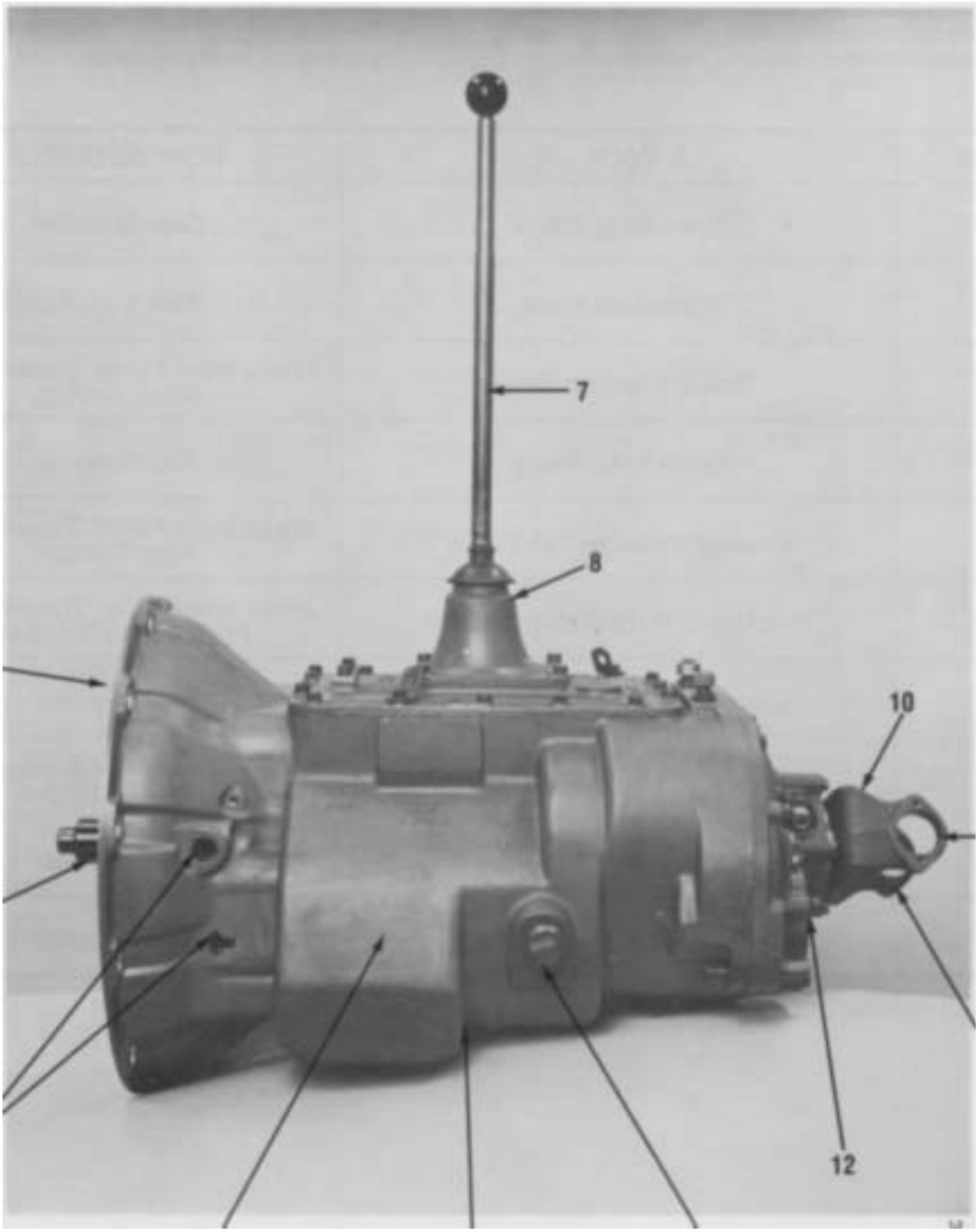
PREVENTIVE MAINTENANCE



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PREVENTIVE MAINTENANCE

PREVENTIVE MAINTENANCE CHECK CHART

CHECKS WITHOUT PARTIAL DISASSEMBLY OF CHASSIS OR CAB

1. Clutch Housing Mounting

a. Check all capscrews in bolt circle of clutch housing for looseness.

2. Clutch Release Bearing (Not Shown)

a. Remove hand hole cover and check radial and axial clearance in release bearing.

b. Check relative position of thrust surface of release bearing with thrust sleeve on push-type clutches.

3. Clutch Pedal Shaft and Bores

a. Pry upward on shafts to check wear.

b. If excessive movement is found, remove clutch release mechanism and check bushings in bores and wear on shafts.

4. Lubricant

a. Change at specified service intervals.

b. Use only the types and grades as recommended. See LUBRICATION.

5. Filler and Drain Plugs

a. Remove filler plugs and check level of lubricant at specified intervals. Tighten filler and drain plugs securely.

6. Capscrews and Gaskets

a. Check all capscrews, especially those on PTO covers and rear bearing covers for looseness which would cause oil leakage. See TORQUE RECOMMENDATIONS.

b. Check PTO opening and rear bearing covers for oil leakage due to faulty gasket.

7. Gear Shift Lever

a. Check for looseness and free play in housing. If lever is loose in housing, proceed with Check No. 9.

8. Gear Shift Lever Housing Assembly

a. Remove the gear shift lever housing assembly from transmission.

b. Check tension spring and washer for set and wear.

c. Check the gear shift lever spade pin and spade in slot for wear.

d. Check bottom end of gear shift lever for wear and check slot of yokes and blocks in shift bar housing for wear at contact points with shift lever.

CHECKS WITH DRIVE LINE DROPPED

9. Universal Joint Companion Flange or Yoke Nut

a. Check for tightness. Tighten to recommended torque.

10. Output Shaft (Not Shown)

a. Pry upward against output shaft to check radial clearance in mainshaft rear bearing.

CHECKS WITH UNIVERSAL JOINT COMPANION FLANGE OR YOKE REMOVED

NOTE: If necessary, use solvent and shop rag to clean sealing surface of companion flange or yoke. DO NOT USE CROCUS CLOTH, EMERY PAPER OR OTHER ABRASIVE MATERIALS THAT WILL MAR SURFACE FINISH.

11. Splines on Output Shaft (Not Shown)

a. Check for wear from movement and chucking action of the universal joint companion flange or yoke.

12. Mainshaft Rear Bearing Cover

a. Check oil seal for wear.

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PRECAUTIONS

Disassembly

It is assumed in the detailed disassembly instructions that the lubricant has been drained from transmission, the necessary linkage and air lines disconnected and the transmission has been removed from vehicle chassis. Removal of the gear shift lever housing assembly (or remote control assembly) is included in the detailed instructions (Disassembly and Reassembly—Shifting Controls); however, this assembly MUST be detached from shift bar housing before transmission can be removed.

FOLLOW CLOSELY EACH PROCEDURE IN THE DETAILED INSTRUCTIONS. MAKING USE OF THE TEXT. ILLUSTRATIONS AND PHOTOGRAPHS PROVIDED.

1 **BEARINGS** — Carefully wash and relubricate all reusable bearings as removed and protectively wrap until ready for use. Remove bearings planned to be reused with pullers designed for this purpose.

2. **ASSEMBLIES** — When disassembling the various assemblies, such as the mainshaft, countershaft, and shift bar housing, lay all parts on a clean bench in the same sequence as removed. This procedure will simplify reassembly and reduce the possibility of losing parts.

3. **SNAP RINGS** — Remove snap rings with Pliers designed for this purpose. Snap rings removed in this manner can be reused, if they are not sprung or loose.

4 **INPUT SHAFT** — The input shaft can be removed from transmission without removing the countershafts, mainshaft, or main drive gear. Special procedures are required and provided in this manual.

5. **CLEANLINESS** — Provide a clean place to work. It is important that no dirt or foreign material enters the unit during repairs, Dirt is an abrasive and can damage bearings. It is always good practice to clean the outside of the unit before starting the planned disassembly.

6. **WHEN USING TOOLS TO MOVE PARTS** — Always apply force to shafts, housings, etc, with restraint. Movement of some parts is restricted. Never apply force to the part being driven after it stops solidly. The use of soft hammers, bars and mauls for all disassembly work is recommended.

Inspection

Before reassembling the transmission, check each part carefully for abnormal or excessive wear and damage to determine reuse or replacement. When replacement is necessary, use only genuine Fuller Transmission parts to assure continued performance and extended life from your unit.

Since the cost of a new part is generally a small fraction of the total cost of downtime and labor, avoid reusing a questionable part which could lead to additional repairs and expense soon after initial reassembly. To aid in determining the reuse or replacement of any transmission part, consideration should also be given to the unit's history, mileage, application, etc.

Recommended inspection procedures are provided in the following checklist.

A. BEARINGS

1. Wash all bearings in clean solvent. Check balls, rollers and raceways for pitting, discoloration, and spalled areas. Replace bearings that are pitted, discolored, or spalled.
2. Lubricate bearings that are not pitted, discolored, or spalled and check for axial and radial clearances.
3. Replace bearings with excessive clearances.
4. Check bearing fits. Bearing inner races should be tight to shaft; outer races slightly tight to slightly loose in case bore. If bearing spins freely in bore, however, case should be replaced.

B. GEARS

1. Check gear teeth for frosting and pitting. Frosting of gear tooth faces present no threat of transmission failure. Often in continued operation of the unit, frosted gears will "heal" and not progress to the pitting stage. And in most cases, gears with light to moderate pitted teeth have considerable gear life remaining and can be reused. But gears with advanced stage pitting should be replaced.
2. Check for gears with clutching teeth abnormally worn, tapered, or reduced in length from clashing in shifting. Replace gears found in any of these conditions.

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PRECAUTIONS

Inspection (cont'd.)

3. Check axial clearance of gears. Where excessive clearance is found, check gear snap ring, washer, spacer, and gear hub for excessive wear. Maintain .005" to .012" axial clearance between mainshaft gears.

C. SPLINES

1. Check splines on all shafts for abnormal wear. If sliding clutch gears, companion flange, or clutch hub have worn into the sides of the splines, replace the specific shaft affected.

D. TOLERANCE/LIMIT WASHERS

1. Check surfaces of all limit washers. Washers scored or reduced in thickness should be replaced.

E. REVERSE IDLER GEAR ASSEMBLIES

1. Check for excessive wear from action of roller bearings.

F. GRAY IRON PARTS

1. Check all gray iron parts for cracks and breaks. Replace or repair parts found to be damaged. Heavy castings may be welded or brazed provided the cracks do not extend into bearing bores or bolting surfaces. When welding, however, never place the ground so as to allow current to pass through the transmission.

G. CLUTCH RELEASE PARTS

1. Check clutch release parts. Replace yokes worn at cam surfaces and bearing carrier worn at contact pads.
2. Check pedal shafts. Replace those worn at bearing surfaces.

H. SHIFT BAR HOUSING ASSEMBLY

1. Check for wear on shift yokes and blocks at pads and lever slot. Replace excessively worn parts.
2. Check yokes for correct alignment. Replace sprung yokes.
3. Check lockscrews in yokes and blocks. Tighten and rewire those found loose.
4. If housing has been disassembled, check neutral notches of shift bars for wear from interlock balls.

I. GEAR SHIFT LEVER HOUSING ASSEMBLY

1. Check spring tension on shift lever. Replace tension spring and washer if lever moves too freely.
2. If housing is disassembled, check spade pin and corresponding slot in lever for wear. Replace both parts if excessively worn.

J. BEARING COVERS

1. Check covers for wear from thrust of adjacent bearing. Replace covers damaged from thrust of bearing outer race.
2. Check bores of covers for wear. Replace those worn oversize.

K. OIL RETURN THREADS AND SEALS

1. Check oil return threads in front bearing cover. If sealing action of threads has been destroyed by contact with input shaft, replace bearing cover.
2. Check oil seal in mainshaft rear bearing cover. If sealing action of lip has been destroyed, replace seal.

L. SLIDING CLUTCHES

1. Check all shift yokes and yoke slots in sliding clutches for extreme wear or discoloration from heat.
2. Check engaging teeth of sliding clutches for partial engagement pattern.

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PRECAUTIONS

Reassembly

Make sure that interiors of case and housings are clean. It is important that dirt and other foreign materials be kept out of the transmission during reassembly. Dirt is an abrasive and can damage polished surfaces of bearings and washers. Use certain precautions, as listed below, during reassembly,

1. **GASKETS -** Use new gaskets throughout the transmission as it is being rebuilt. Make sure all gaskets are installed. An omission of any gasket can result in oil leakage or misalignment of bearing covers.
2. **CAPSCREWS** - To prevent oil leakage, use Loctite 242 thread sealant on all capscrews. For torque ratings, see TORQUE RECOMMENDATIONS.
3. **O-RINGS** - Lubricate all O-rings with silicon lubricant.
4. **ASSEMBLY** - Refer to the illustrations provided in the detailed disassembly instructions as a guide to reassembly.
5. **INITIAL LUBRICATION** - Coat all limit washers and splines of shafts with Lubriplate during reassembly to prevent scoring and galling of such parts.
6. **AXIAL CLEARANCES -** Maintain original axial clearances of .005” to .012” for mainshaft gears.
7. **BEARINGS -** Use of flanged-end bearing drivers is recommended for the installation of bearings. These special drivers apply equal force to both bearing races, preventing damage to balls/rollers and races while maintaining correct bearing alignment with bore and shaft. Avoid using a tubular or sleeve-type driver, whenever possible, as force is applied to only one of the bearing races. See TOOL REFERENCE.
8. **UNIVERSAL JOINT COMPANION FLANGE OR YOKE** - Pull the companion flange or yoke tightly into place with the output shaft nut, using 450-500 foot-pounds of torque. Make sure the speedometer drive gear or a replacement spacer of the same width has been installed. Failure to pull the companion flange or yoke tightly into place will permit the output shaft to move axially with resultant damage to the rear bearing.

IMPORTANT: REFER TO THE APPROPRIATE ILLUSTRATED PARTS LIST (SPECIFIED BY MODEL SERIES) TO ENSURE THAT PROPER PARTS ARE USED DURING REASSEMBLY OF THE TRANSMISSION.

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CHANGING INPUT SHAFT

Special Procedure

In some cases, it may become necessary to remove only the input shaft due to clutch wear on the splines. In these cases the input shaft can be removed without disassembling the transmission other than removing the shift bar housing. Removal of the clutch housing is optional.

Disassembly

1. Remove the gear shift lever housing and shift bar housing.
2. Remove the front bearing cover capscrews.
3. Engage two of the mainshaft sliding clutches so that the mainshaft is locked up.
4. Use paint to mark one tooth on each side of the drive gear where it meshes with the countershaft gears. Mark the countershaft tooth on each side of the marked drive gear tooth. It is advisable to use different colored paint on each countershaft to avoid the possibility of re-installing the drive gear incorrectly.
5. Drive against the back face of the drive gear to move the assembly forward and from the case bore.

CAUTION:

DO NOT allow the mainshaft gearing to turn while the drive gear is removed.

6. Proceed with normal disassembly of the drive gear assembly.

Reassembly

1. Insert the reassembled drive gear assembly into the case bore, returning the marked tooth on each side of the drive gear to its original position between the two marked teeth on each countershaft. It may be necessary to lift the front of the mainshaft slightly so that the mainshaft pilot enters the pocket in the input shaft. Drive against the front of the input shaft to fully seat the bearing in the case bore.
2. Re-install the front bearing cover, shift bar housing and gear shift lever housing.

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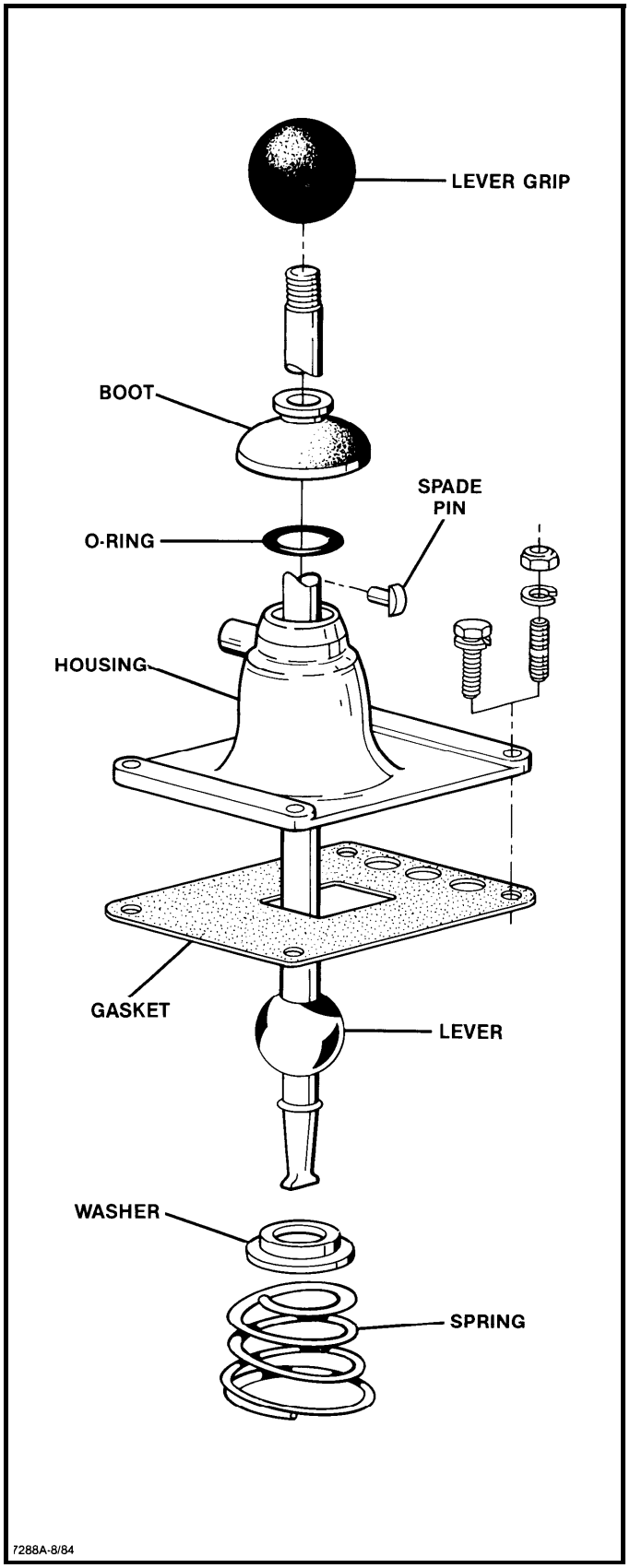
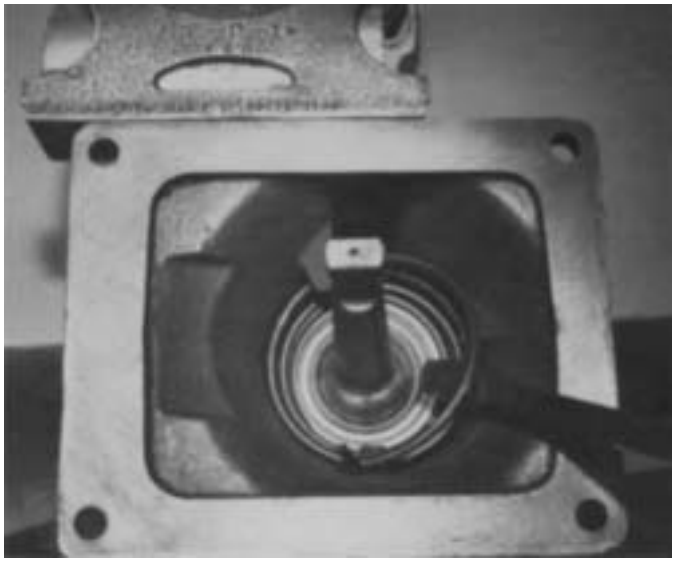
DISASSEMBLY AND REASSEMBLY SHIFTING CONTROLS

GEAR SHIFT LEVER HOUSING ASSEMBLY



A. Removal and Disassembly

1. Turn out retaining capscrews, jar lightly to break gasket seal and remove gear shift lever housing and gasket from shift bar housing.
NOTE: Remote control housings are removed from shift bar housing in the same manner. For disassembly and reassembly of LRC Assemblies, see Illustrated Parts List No. P-541. For disassembly and reassembly of SRC Assemblies, see Illustrated Parts List No. P-515.



2. Remove boot from gear shift lever and secure assembly in vise with bottom of housing up. Use a large screwdriver to twist between the spring and housing, forcing spring from under lugs in housing. Do one coil at a time.

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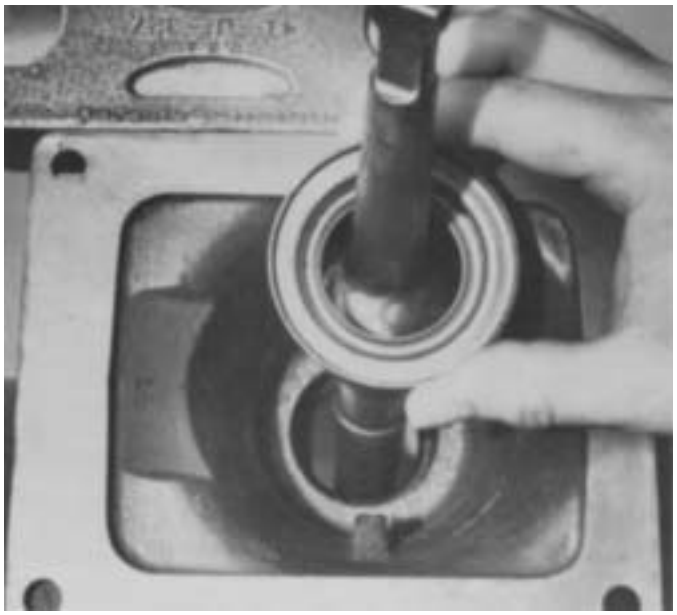
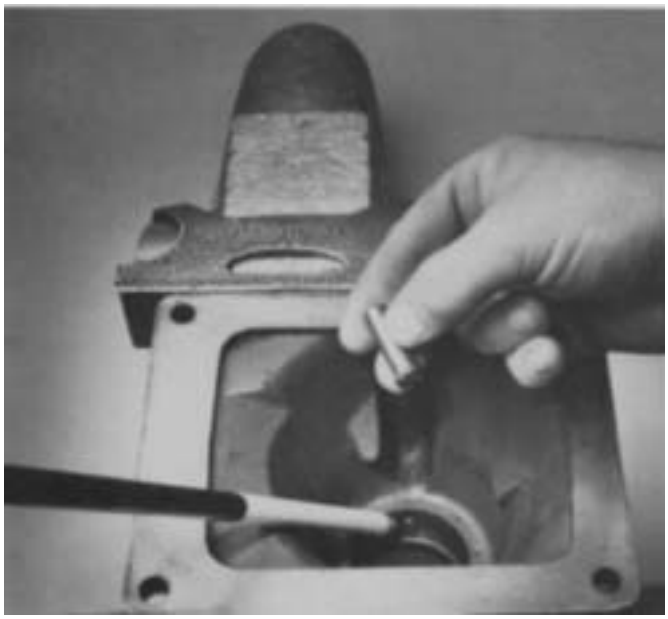
DISASSEMBLY AND REASSEMBLY SHIFTING CONTROLS

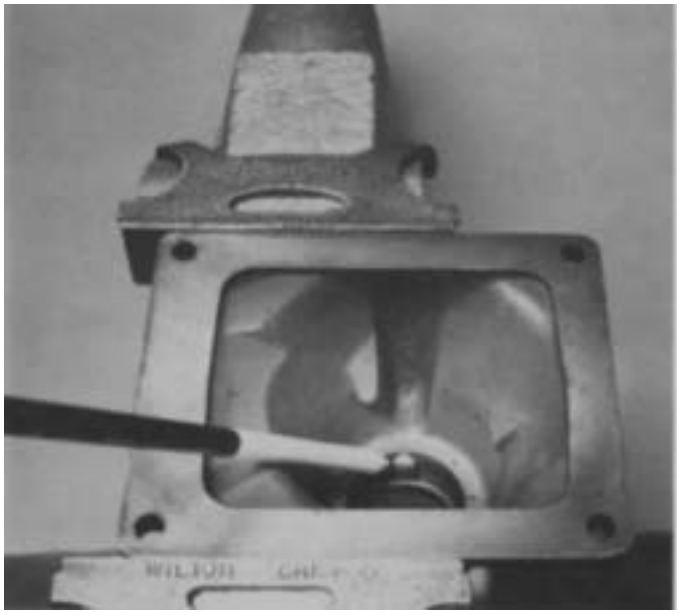


3. Remove tension spring, washer and gear shift lever from housing.

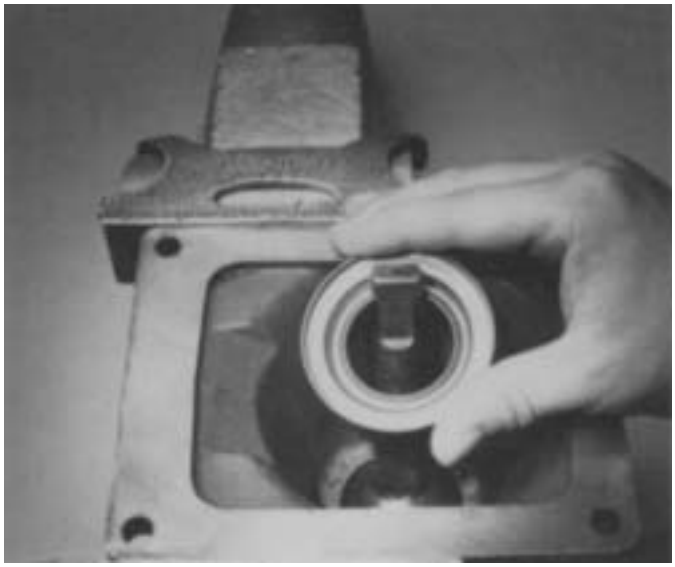


4. Remove spade pin from bore in housing tower. If necessary, remove the O-ring from groove inside tower.

B. Reassembly of Gear Shift Lever



1. With gear shift lever housing secured in vise as during disassembly, install spade pin in bore of housing tower. If previously removed, install O-ring in tower groove.



2. Position the gear shift lever in housing with spade pin in lever ball slot and install the tension spring washer over ball, dished-side up.

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DISASSEMBLY AND REASSEMBLY SHIFTING CONTROLS

3. Install tension spring under lugs in housing, seating one coil at a time. Use of a spring driving tool is recommended.

4. Remove assembly from vise and install rubber boot over gear shift lever and against housing.

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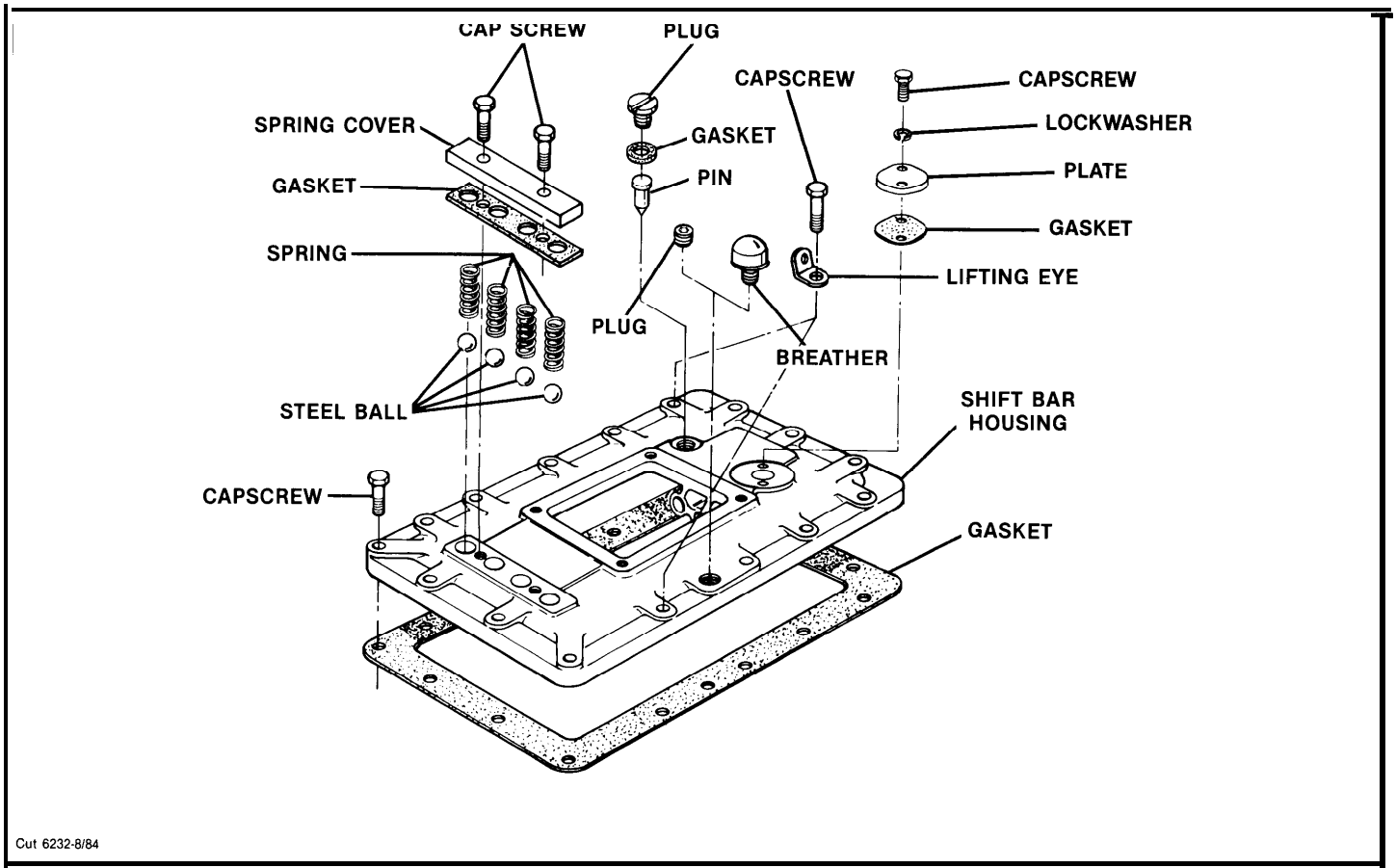
DISASSEMBLY AND REASSEMBLY SHIFTING CONTROLS

SHIFT BAR HOUSING ASSEMBLY



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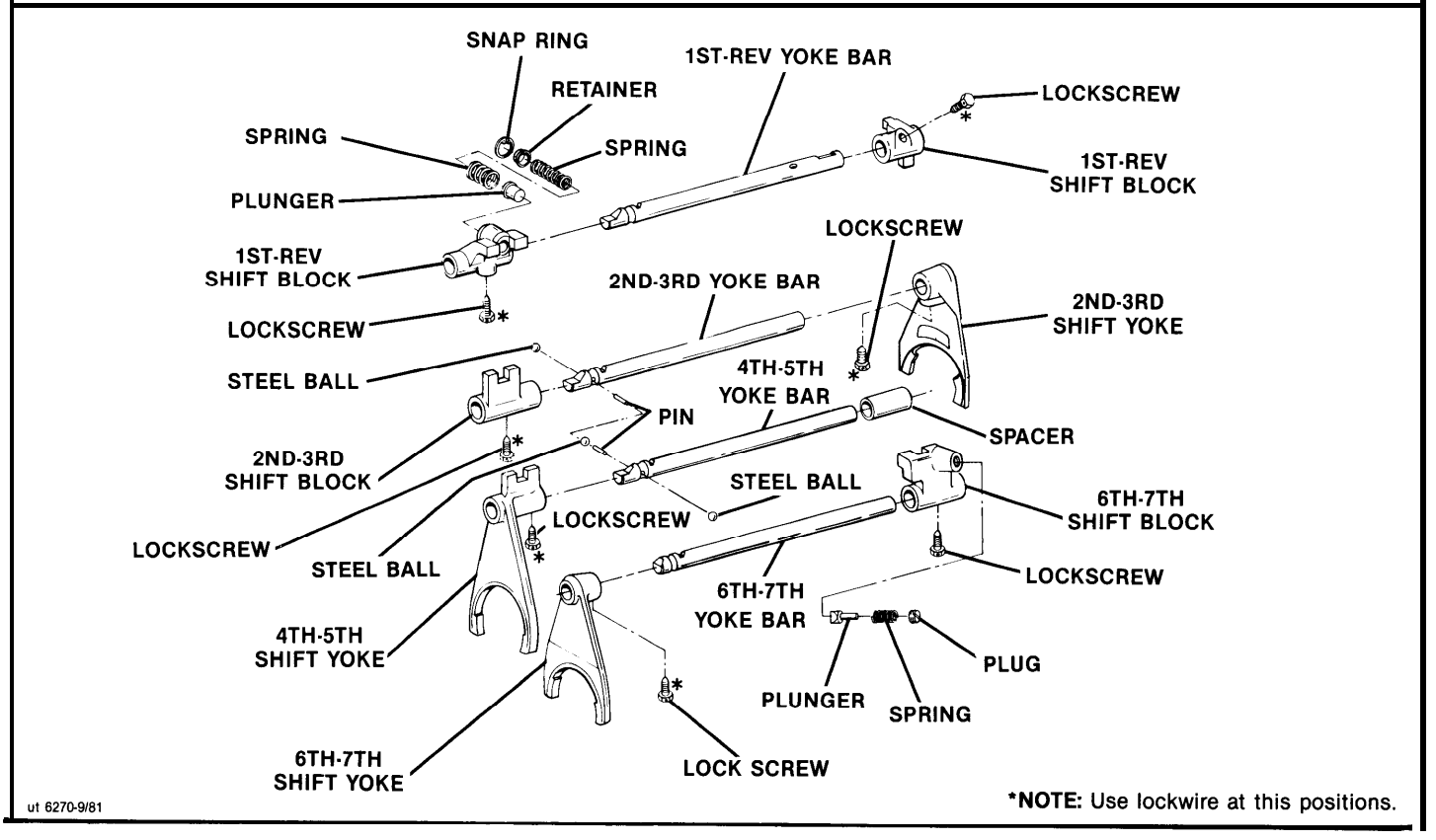

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***NOTE:** Use lockwire at this positions.

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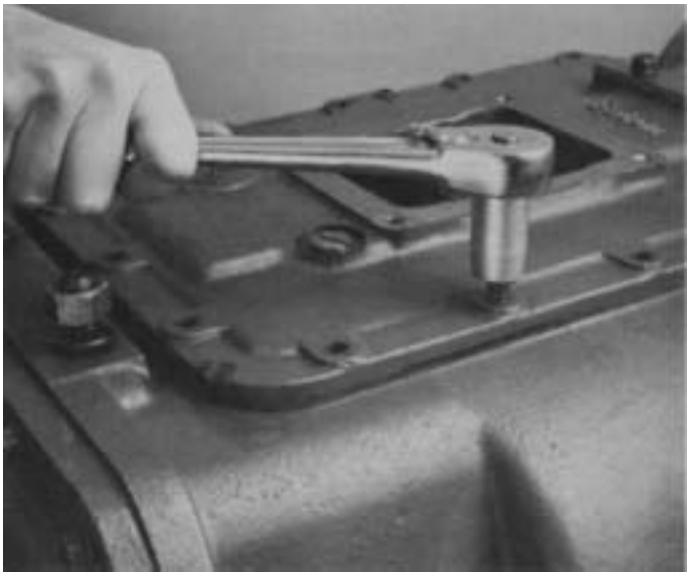
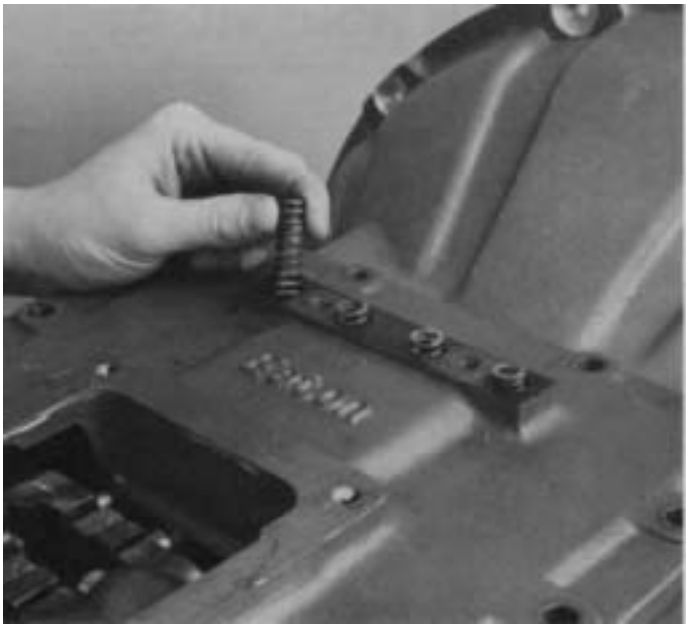
DISASSEMBLY AND REASSEMBLY SHIFTING CONTROLS

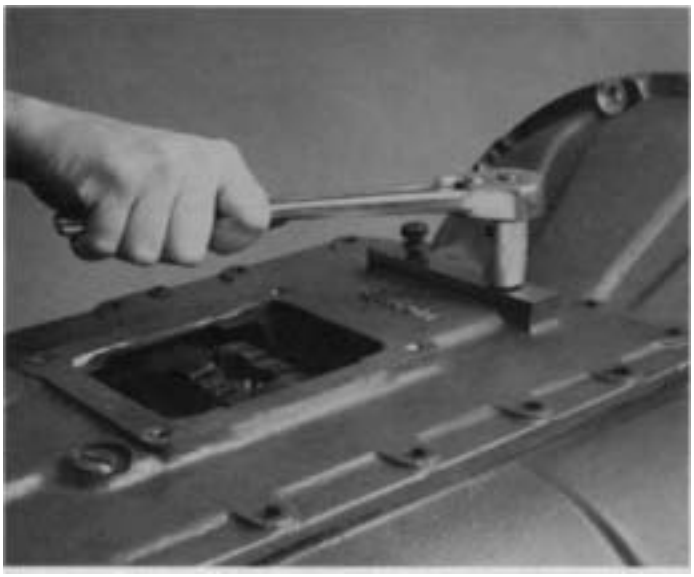
A. Removal and Disassembly



1. Turn out the retaining capscrews.



3. Remove four tension springs.



2. Turn out two capscrews and remove tension spring cover.

4. Jar housing lightly to break gasket seal and lift housing from transmission. Tip housing over to remove four balls in tension spring bores (inset).

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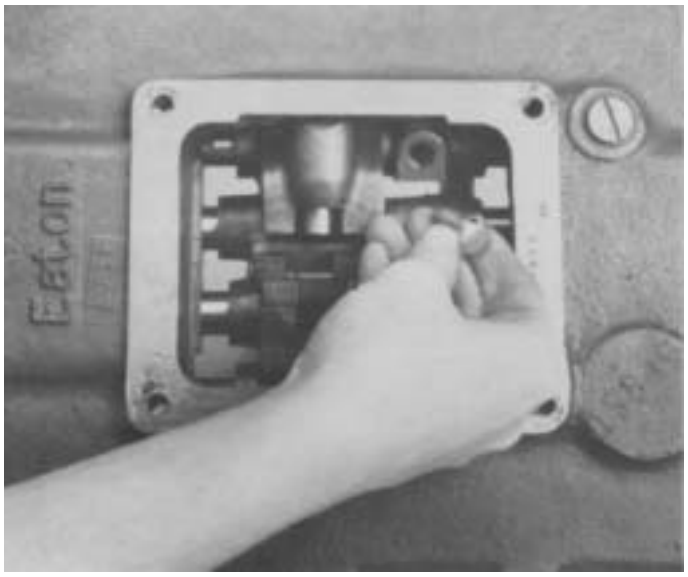
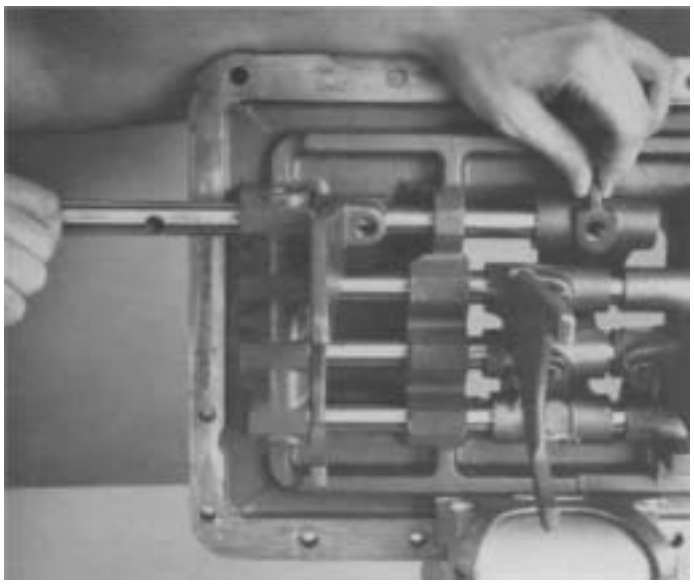
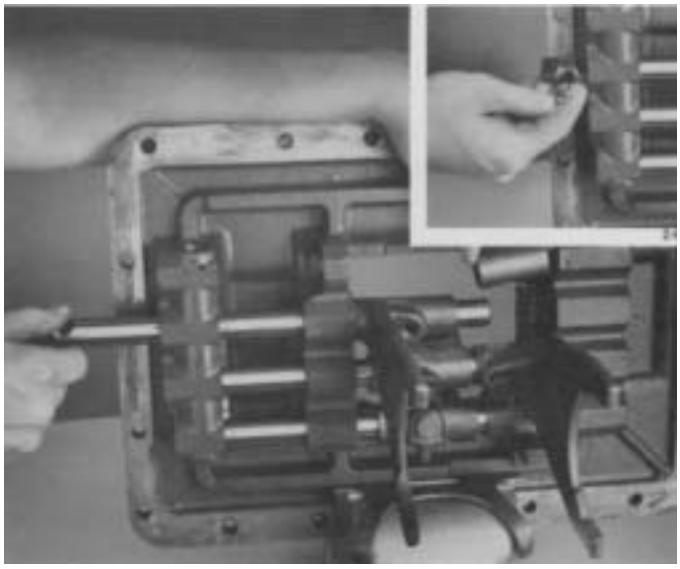
DISASSEMBLY AND REASSEMBLY
SHIFTING CONTROLS



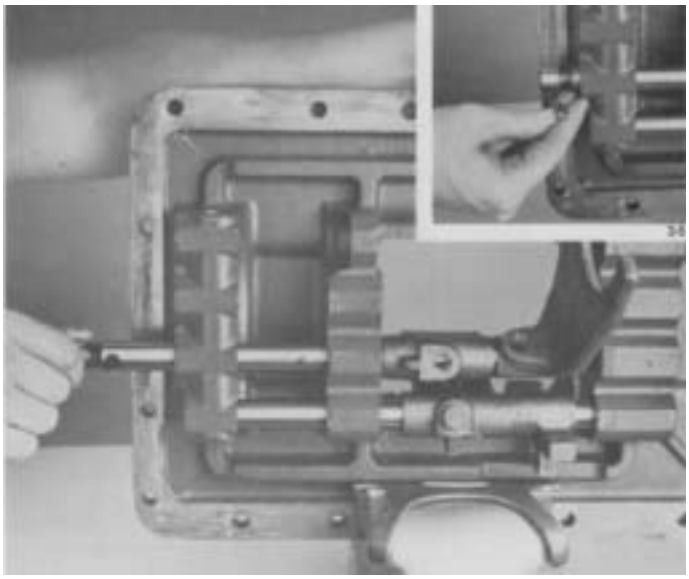
5. Cut lockwire and remove machined capscrew from 1st and reverse shift block.



6. Mount housing in a vise as indicated using caution to avoid marring machined surface. Cut lockwire, turn out lockscrews and remove direct yoke, bar, and block from housing.
NOTE: When removing bars, remaining bars must be kept in neutral position or interlock parts will prevent removal.



7. Cut lockwire, turn out lockscrew and remove the 4-5th speed yoke, bar, and spacer. As the bar is pulled out of housing, remove interlock pin from the bar (inset).



8. Cut lockwires, turn out lockscrews and remove 2nd & 3rd speed yoke and block. Remove interlock pin from bar as it clears housing boss (inset).

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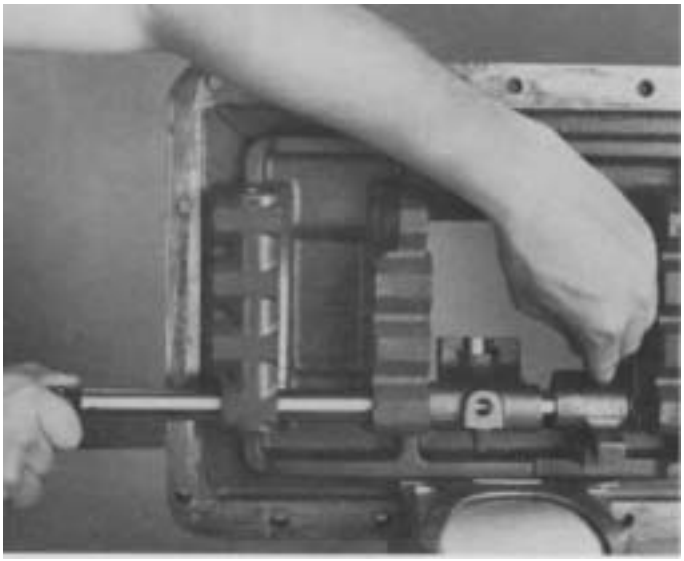
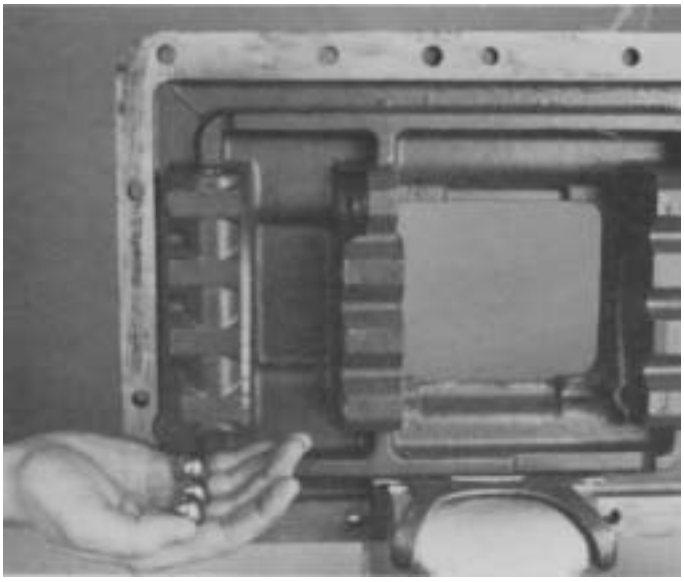
DISASSEMBLY AND REASSEMBLY SHIFTING CONTROLS

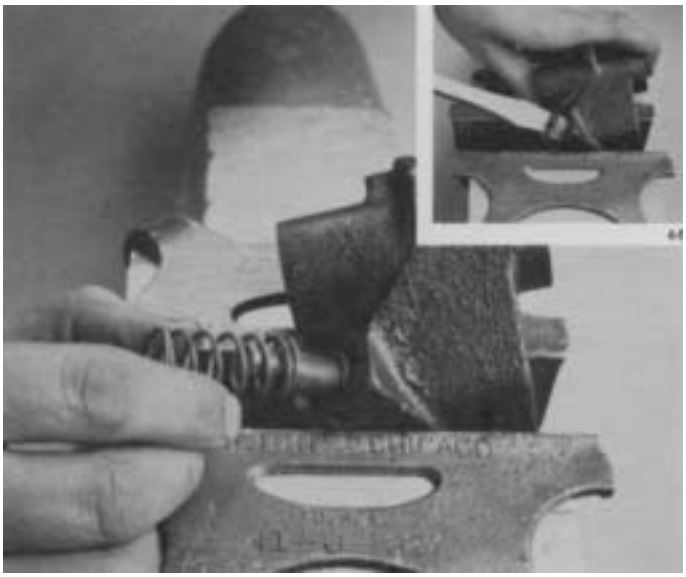


9. Cut lockwires, turn out lockscrews and remove the 1st-reverse finger, bar, and block from housing.

11. If necessary, remove snap ring, retainer, spring, and plunger from 1st and reverse block (inset). Use caution as the plug is spring loaded.



10. Remove three interlock balls from housing.



12. If necessary, turn out plug from 6th & 7th block (inset). Remove spring and plunger.

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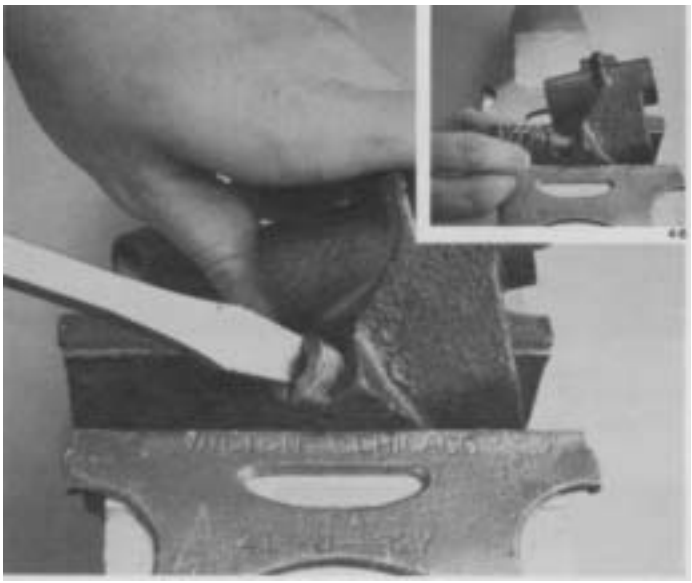
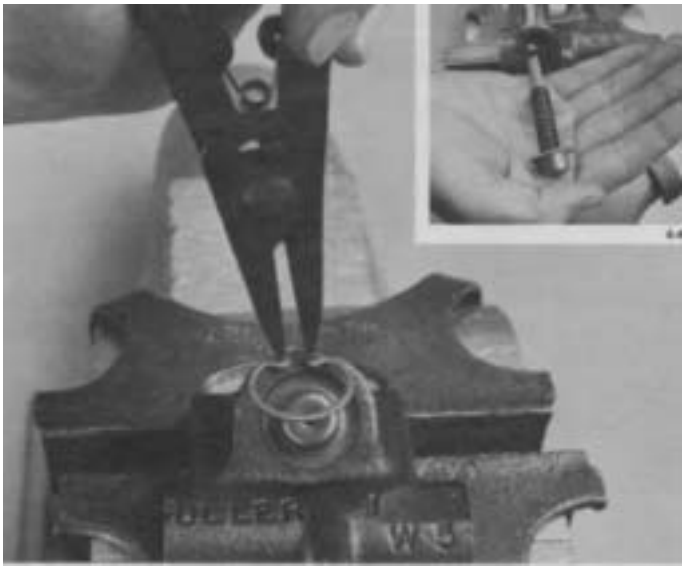
DISASSEMBLY AND REASSEMBLY SHIFTING CONTROLS

B. Reassembly of Shift Bar Housing Assembly

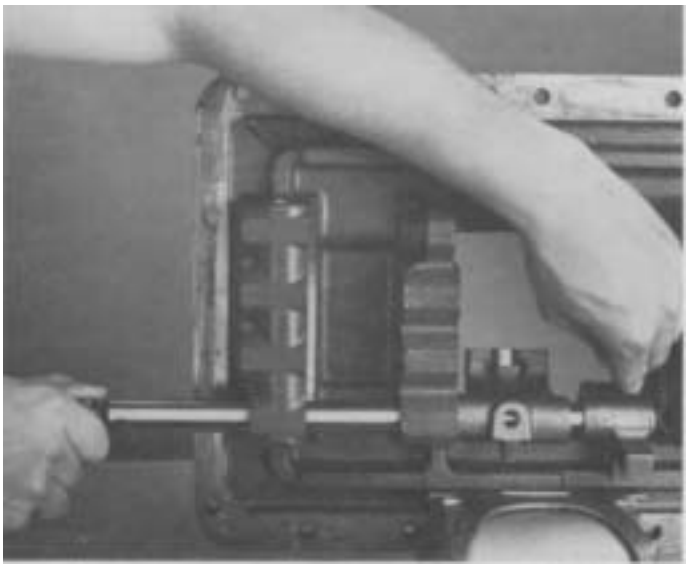
NOTE: When installing lockscrews, make sure that the end of the lockscrew seats in the bore in the bar. Torque lockscrews to 35-45 lbs/ft. Excessive torque can result in distortion of the bars. Use lockwire on all lockscrews.



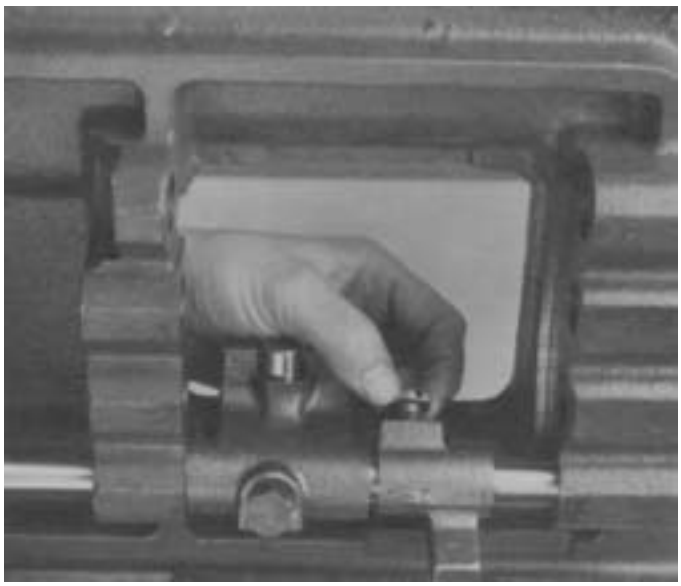
1. If previously removed, install plunger and spring in block (insert), and secure with plug. Apply pressure against plug to compress spring fully. Tighten plug and then back off 1/4 - 1/2 turns. Stake the threads in hole on side of block.



2. If previously removed, install plunger, springs, retainer (inset), and snap ring, in direct block making sure snap ring is seated in groove in block.



3. Secure housing in vise as shown. Install 1st-reverse finger, bar, and block.



4. Install capscrews and wire securely.
NOTE: make sure the short capscrew is used in 1st-reverse finger.

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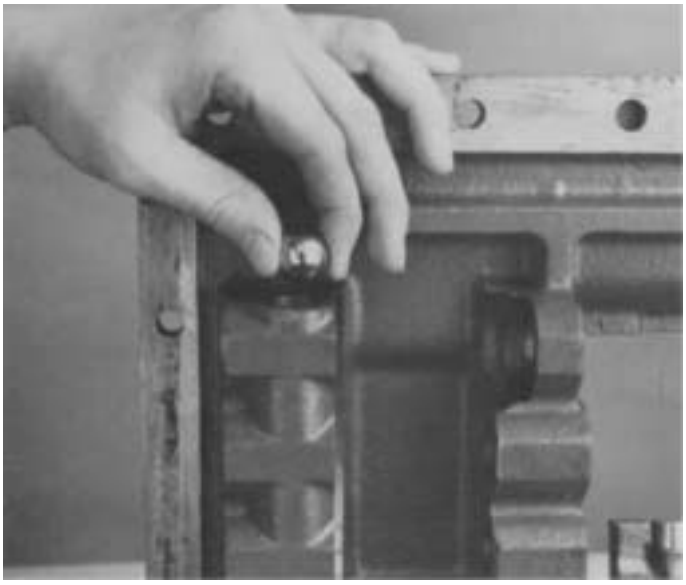
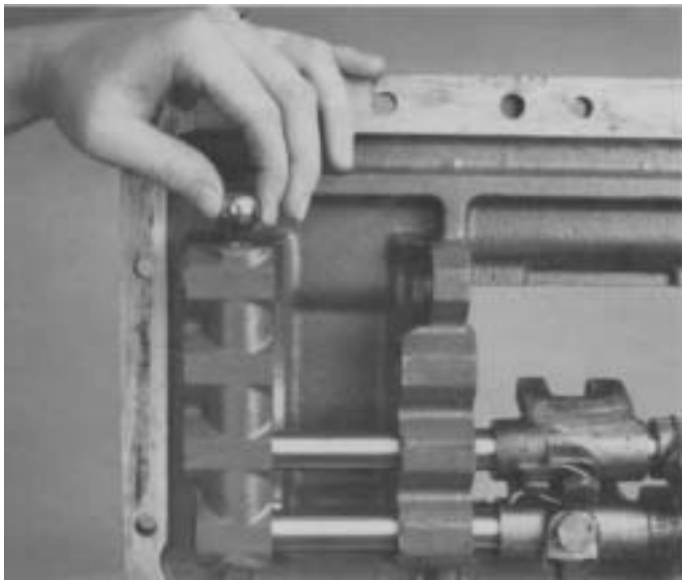
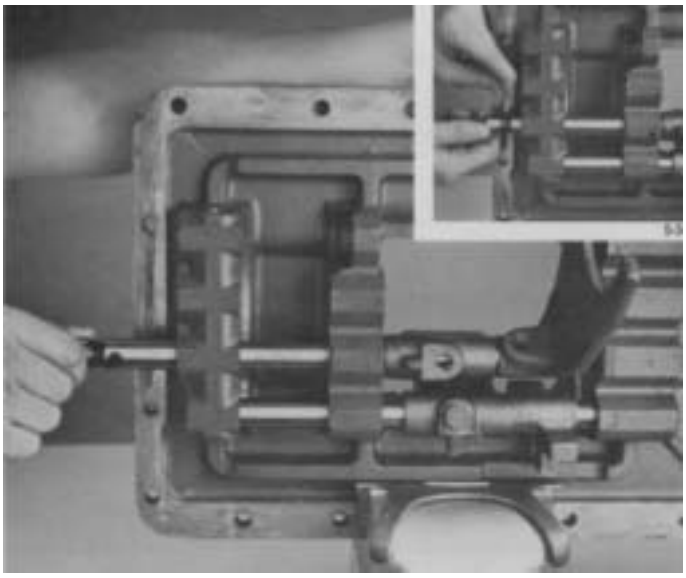
DISASSEMBLY AND REASSEMBLY SHIFTING CONTROLS



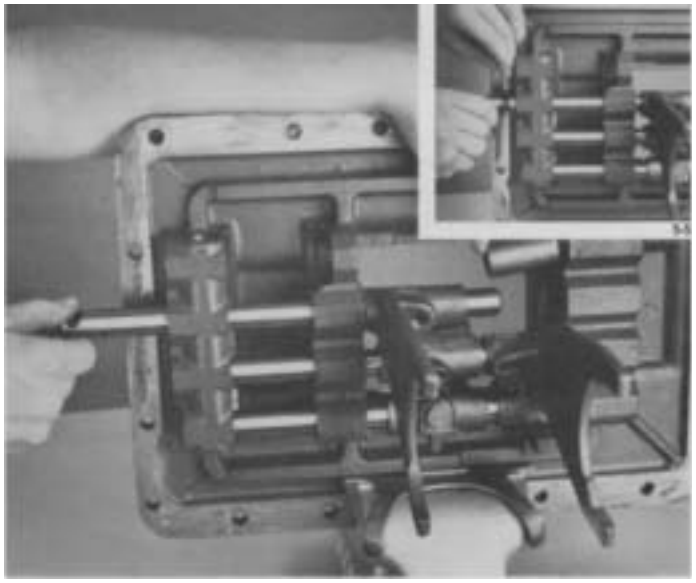
5. Install an interlock ball in housing bore against the bar.



7. Install an interlock ball in housing bore against the bar.



6. Install 2nd & 3rd speed block, and yoke on bar. install interlock pin in bar as it enters housing (inset).



8. Install 4th & 5th speed yoke, spacer, and bar. Install interlock pin in bar as it enters the housing (inset).

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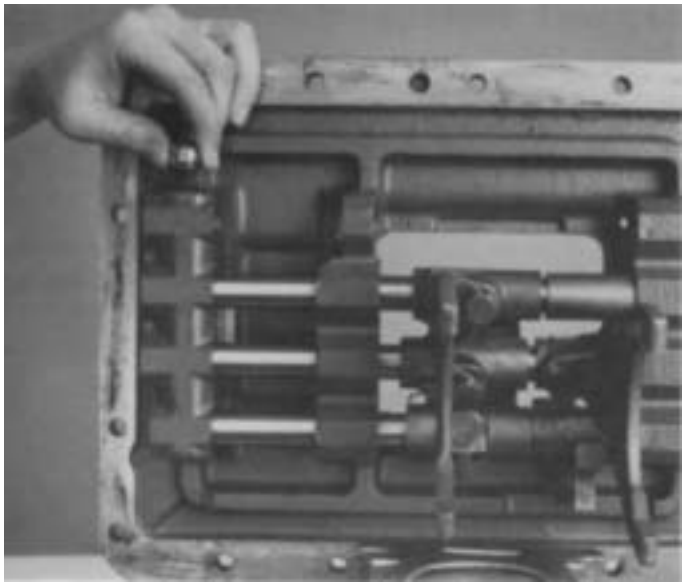
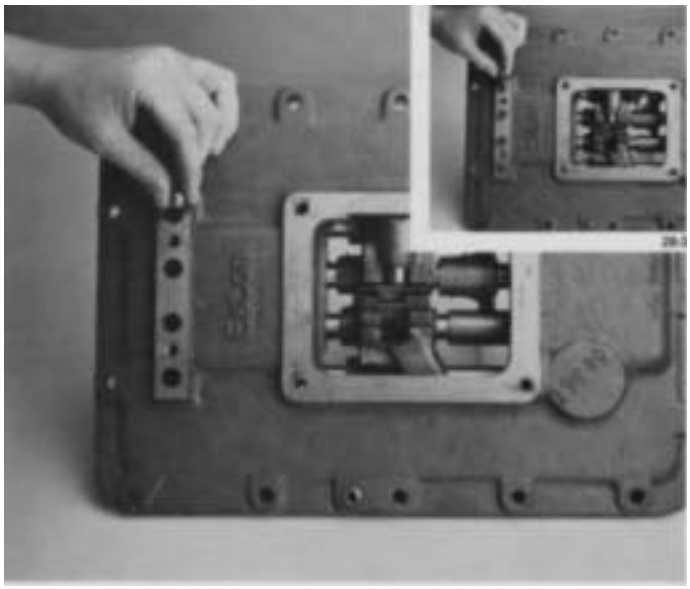
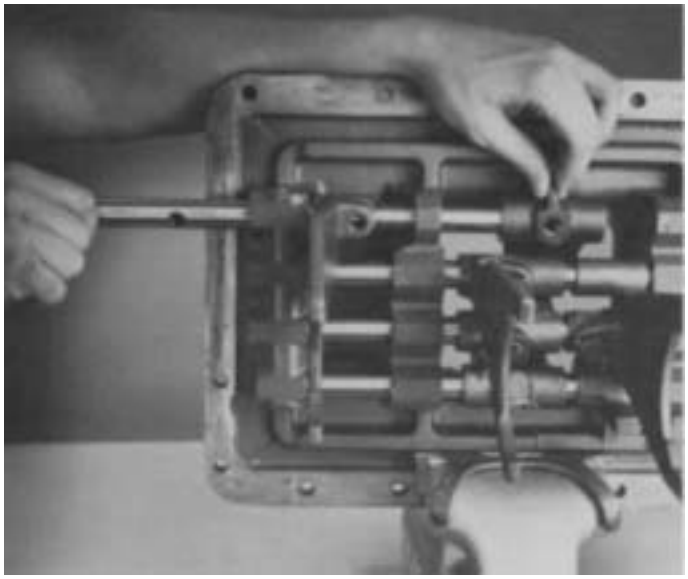
DISASSEMBLY AND REASSEMBLY
SHIFTING CONTROLS



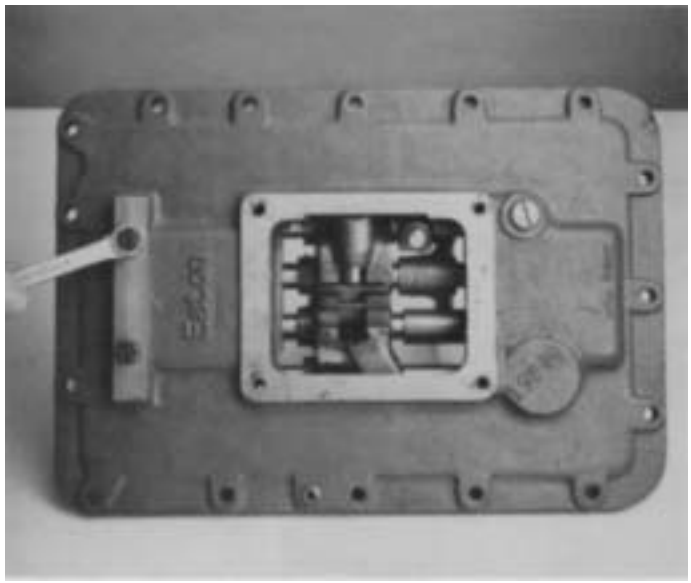
9. Install the remaining interlock ball in the housing bore against the bar.



11. Install four balls in tension spring bores and install four tension springs (inset).



10. Install direct yoke, block and bar in housing. Torque capscrews and wire securely.



12. Install gasket and tension spring cover.

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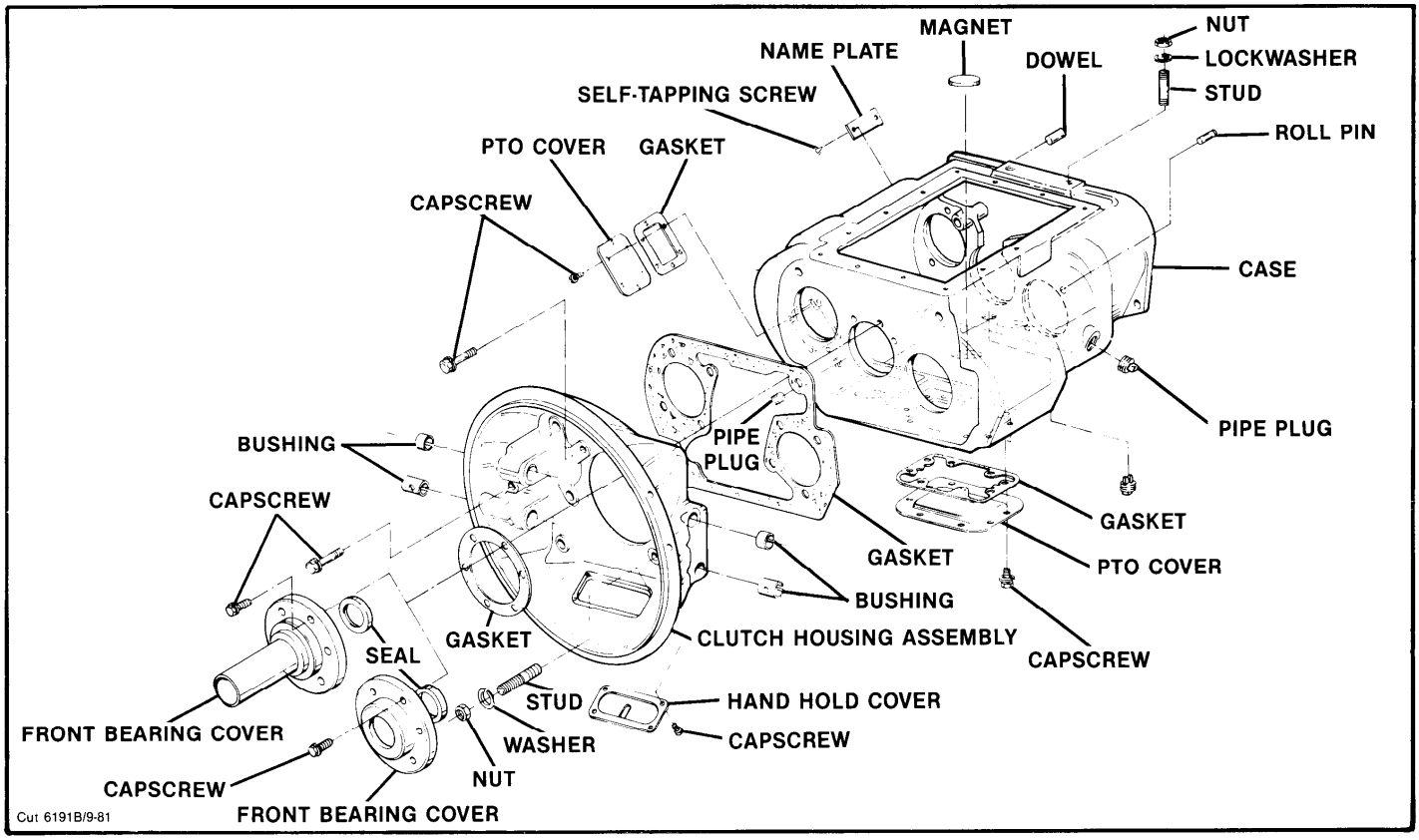
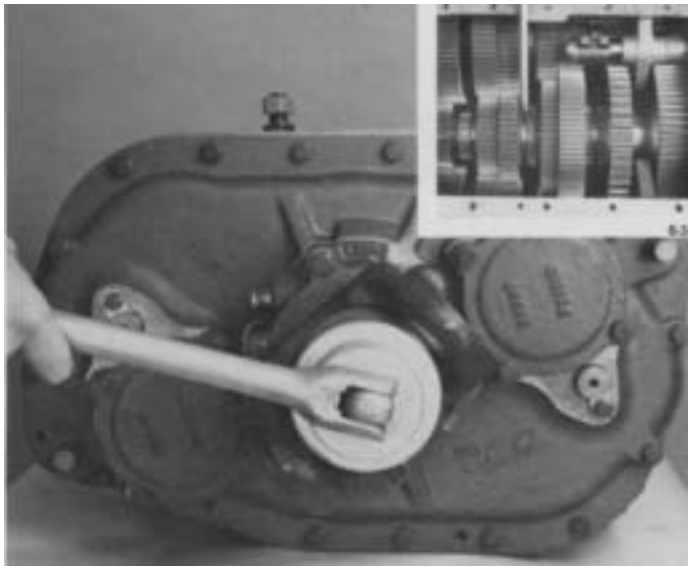
REMOVAL - COMPANION FLANGE AND CLUTCH HOUSING

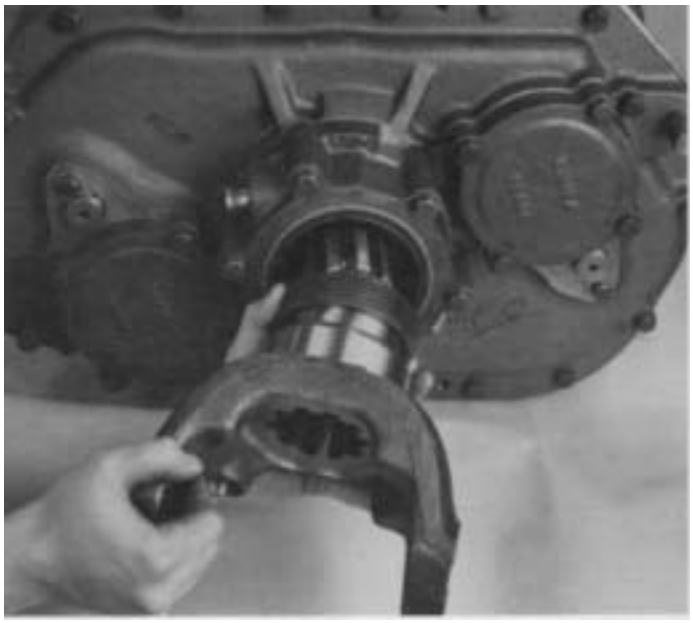
COMPANION FLANGE AND CLUTCH HOUSING



A. Removal of Companion Flange or Yoke



1. Lock the transmission by engaging two main-shaft gears with sliding clutches (inset). Use a large braker bar to turn the nut from output shaft.



2. Pull yoke and speedo gear or spacer from output shaft.

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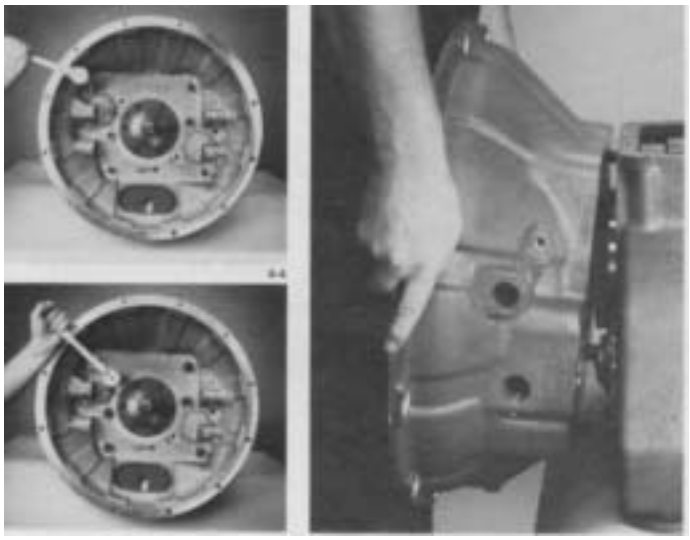
REMOVAL - COMPANION FLANGE AND CLUTCH HOUSING

B. Removal of Clutch Housing

1. For models so equipped, remove clutch release mechanism and/or clutch brake assembly. See OPTIONS.



2. Remove four capscrews and six nuts from studs (left). Jar clutch housing with a rubber mallet to break gasket seal and pull from transmission case (right).

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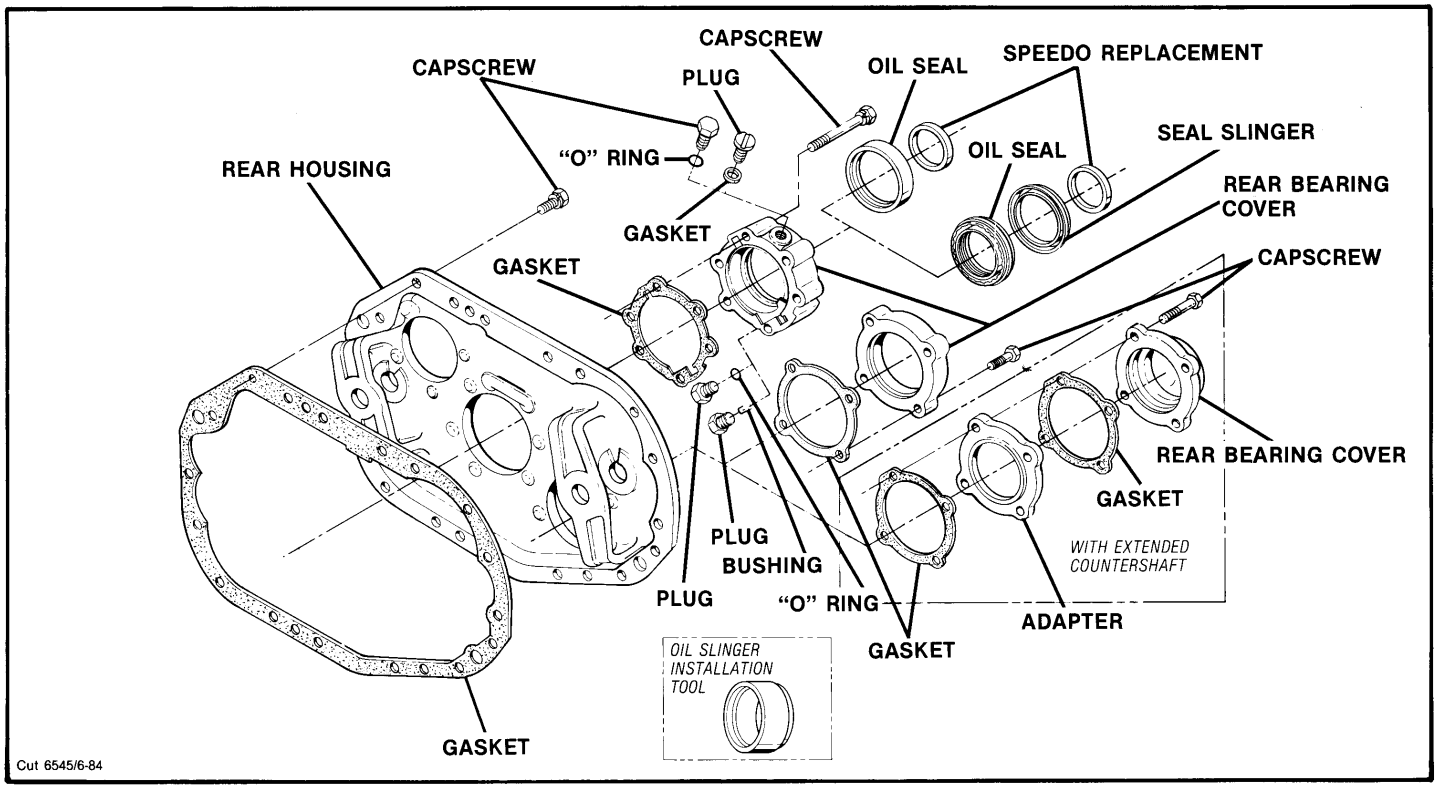
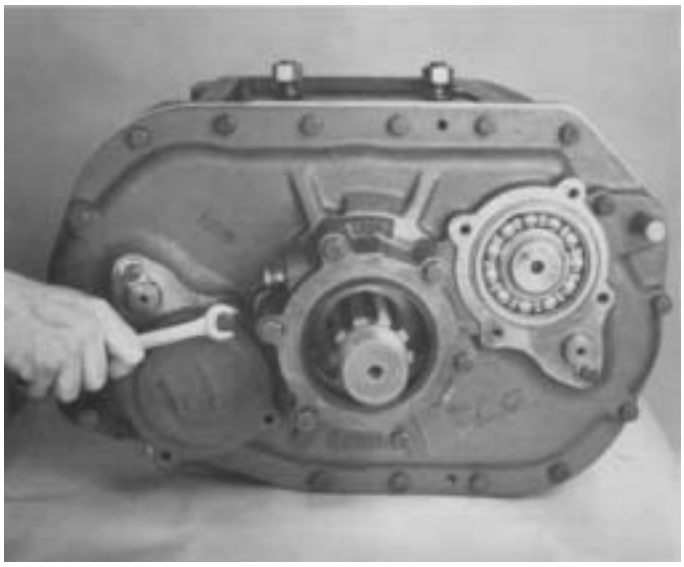
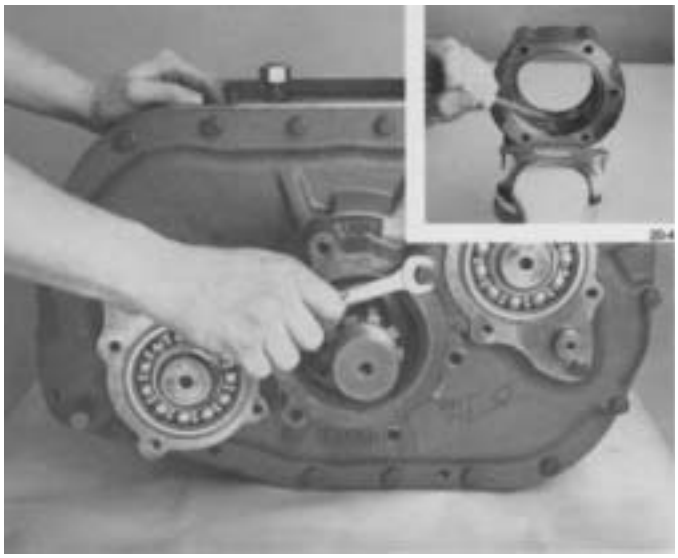
REMOVAL AND DISASSEMBLY OF REAR HOUSING



A. Removal of Rear Housing



1. Turn out capscrews and remove both countershaft rear bearing covers.



2. Turn out capscrews and remove output shaft rear bearing cover. If necessary, remove the oil seal from cover (inset).

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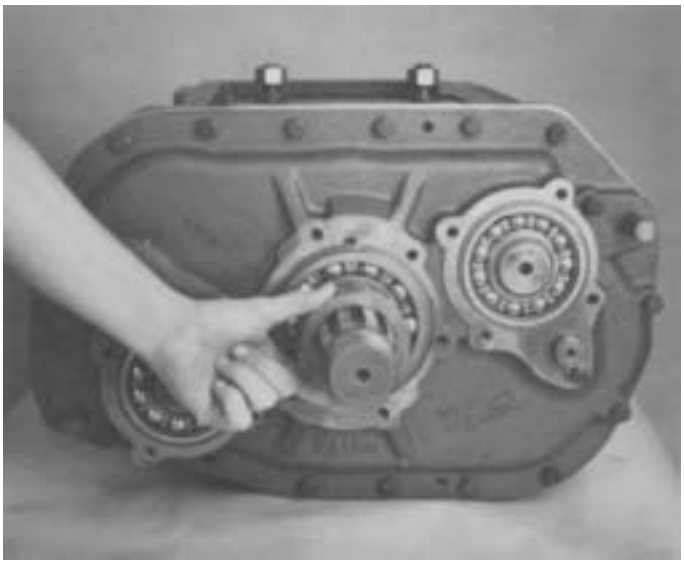
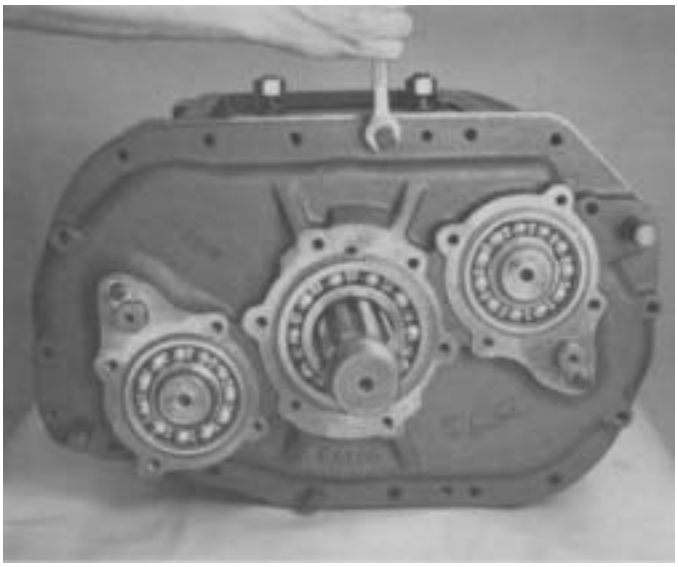
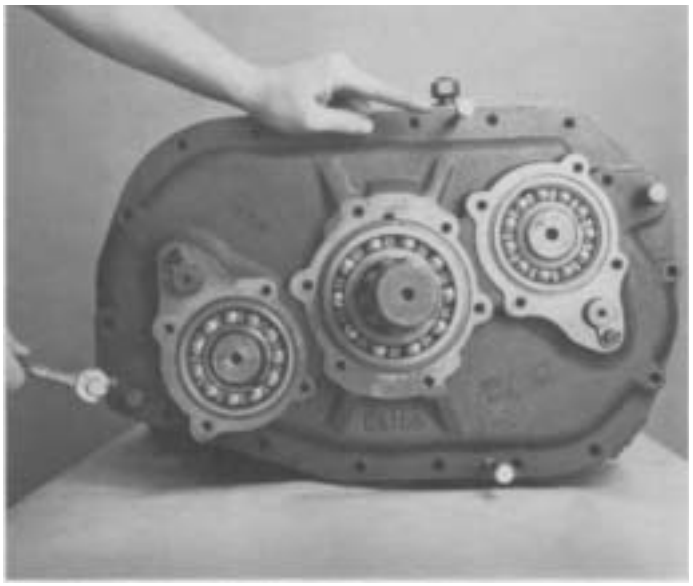
REMOVAL AND DISASSEMBLY OF REAR HOUSING



3. Remove spacer from output shaft.



4. Turn out rear plate retaining capscrews.



5. Install three 4-inch capscrews in the three tapped holes in rear plate and tighten evenly to move plate to the rear. Remove capscrews.

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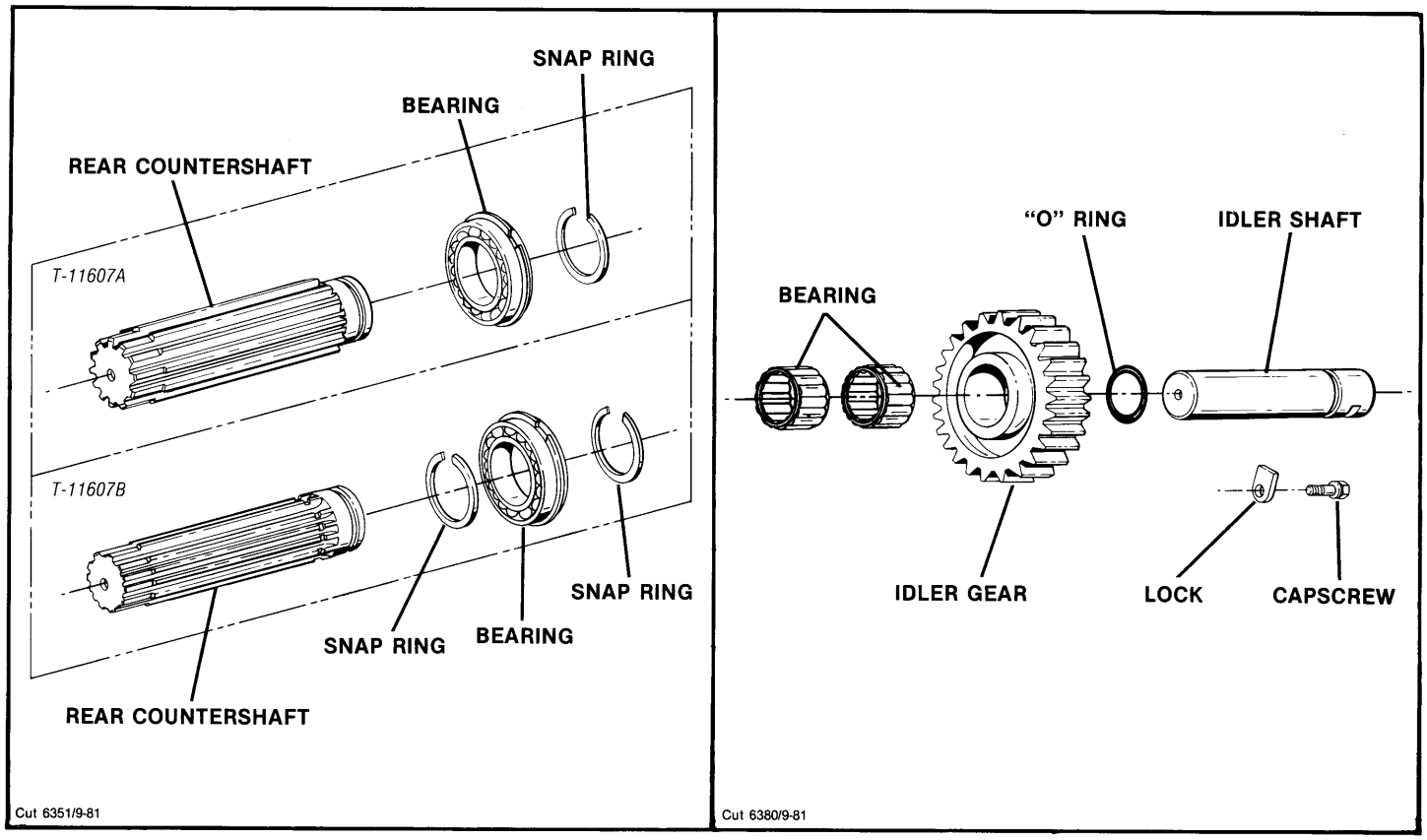
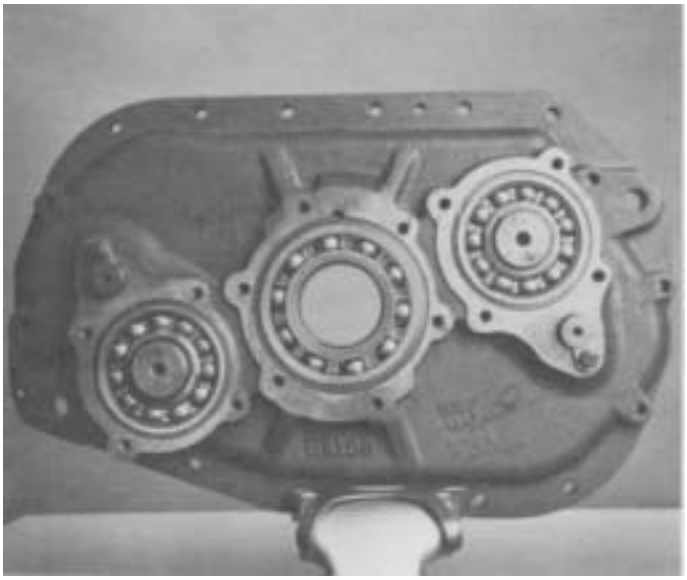
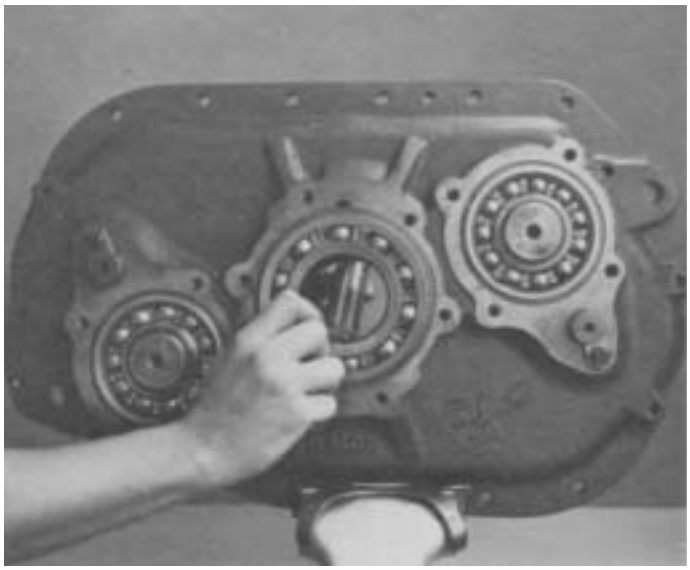
REMOVAL AND DISASSEMBLY OF REAR HOUSING



B. Disassembly of Rear Housing



1. Position rear plate in vise as shown.



2. Use a soft bar to drive output shaft bearing from bore.

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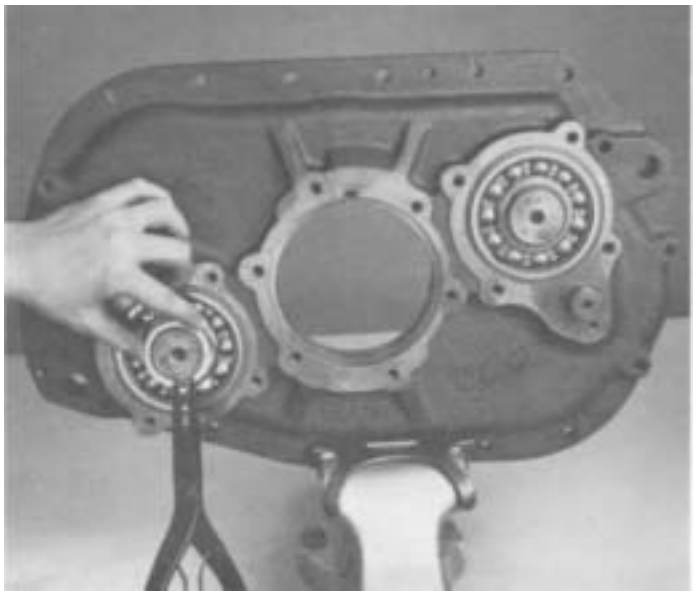
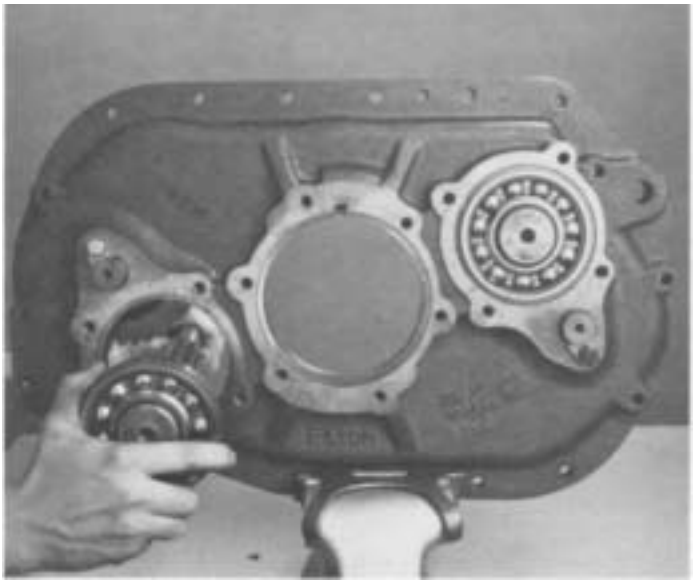
REMOVAL AND DISASSEMBLY OF REAR HOUSING

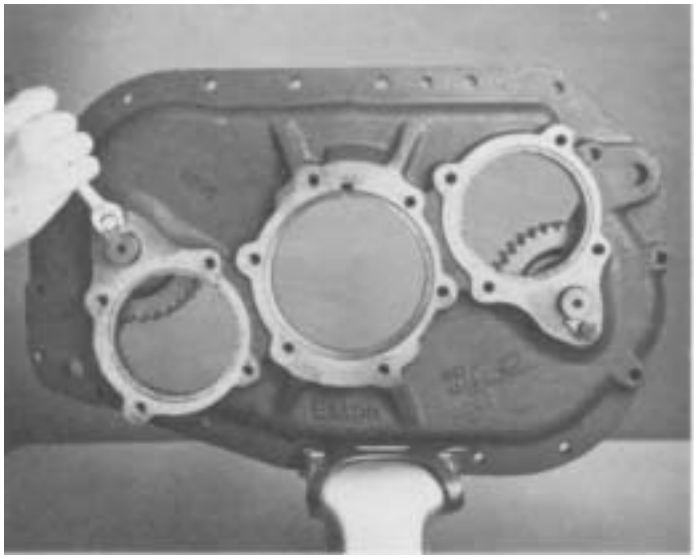


3. Remove snap rings from rear countershafts.

5. Block the countershaft bearings and press them from shaft, remove inner snap ring (inset) if so equipped.



4. Remove rear countershaft and bearings from rear plate by driving shafts to the rear.



6. Remove capscrews and retainer plates from idler shafts.

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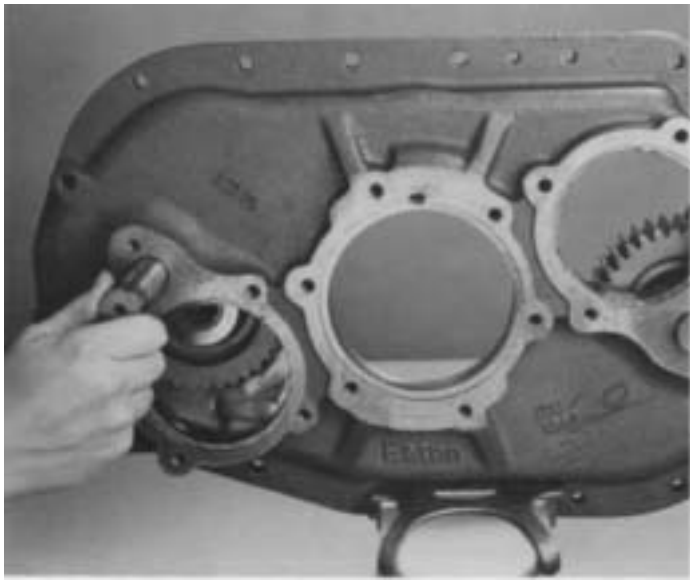
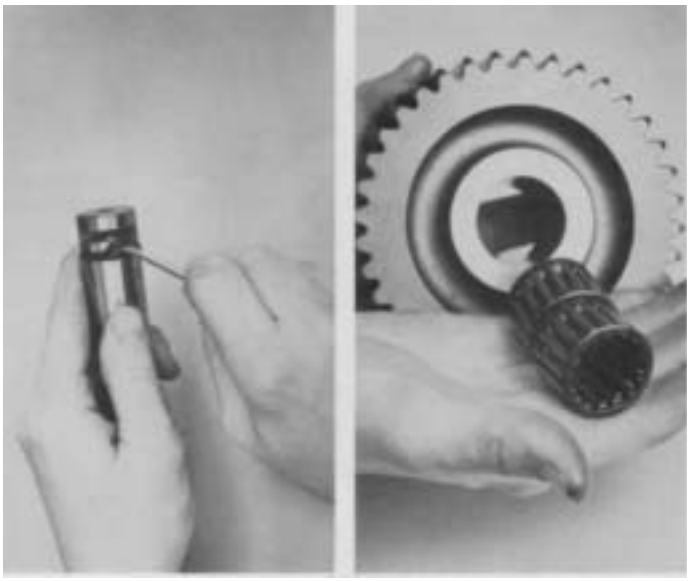
REMOVAL AND DISASSEMBLY OF REAR HOUSING



7. Remove idler shafts and reverse idler gears from rear housing.



8. If necessary, remove O-rings from idler shafts (left) and two sets of roller bearings from idler gears (right).

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DISASSEMBLY - FRONT SECTION

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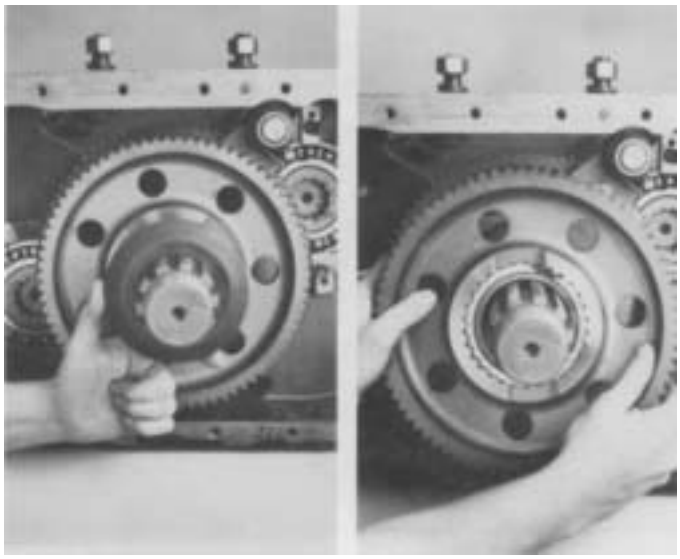
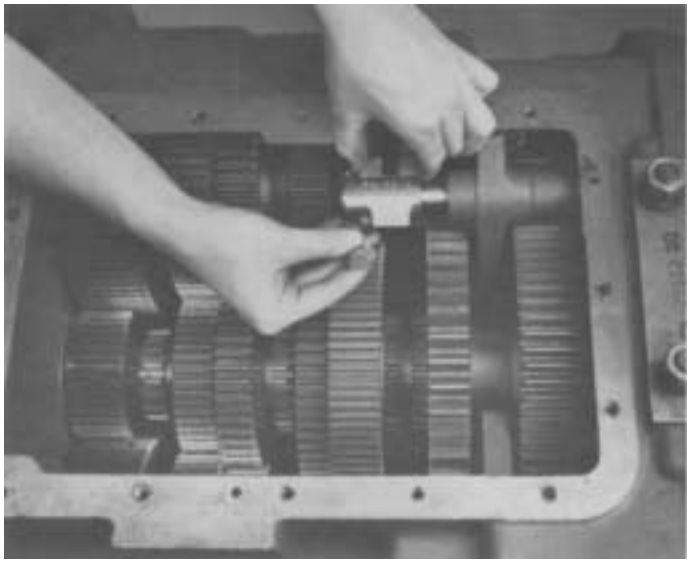
A. Mainshaft Removal

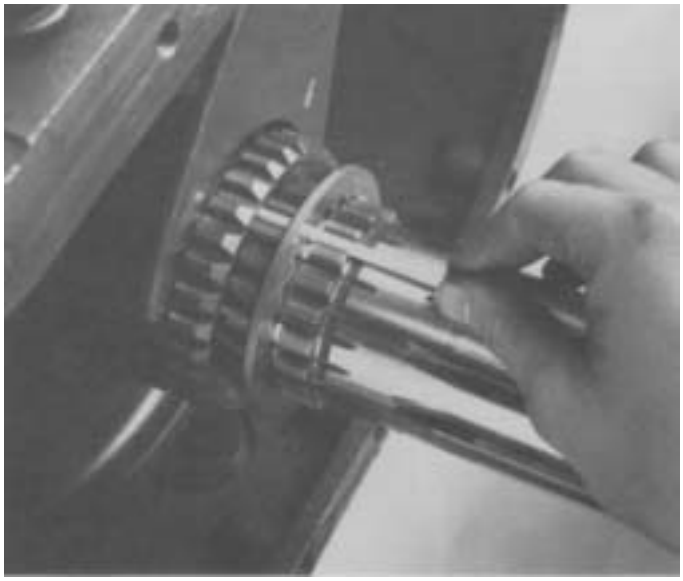


1. Remove spacer (left) and reverse gear from mainshaft (right).

2. Remove washer from hub of reverse gear and snap ring from reverse gear if necessary (inset).



3. Cut lockwire, remove capscrew and 1st/reverse block.



4. Remove rear mainshaft key.

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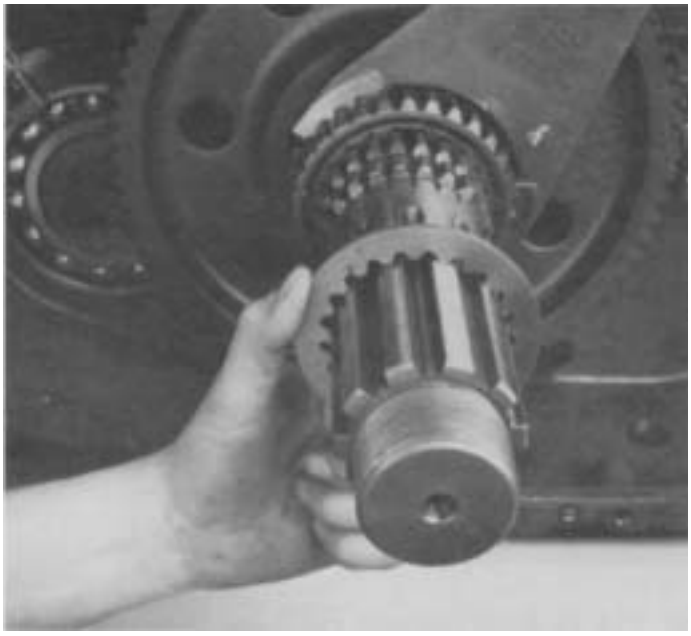
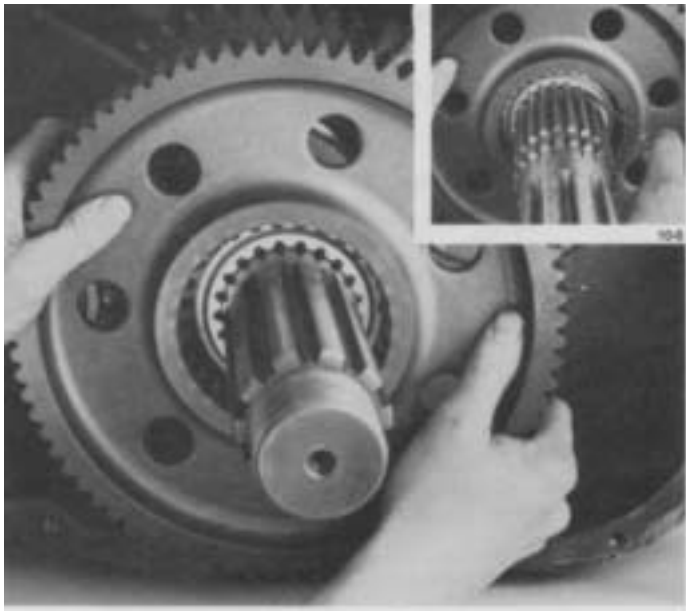
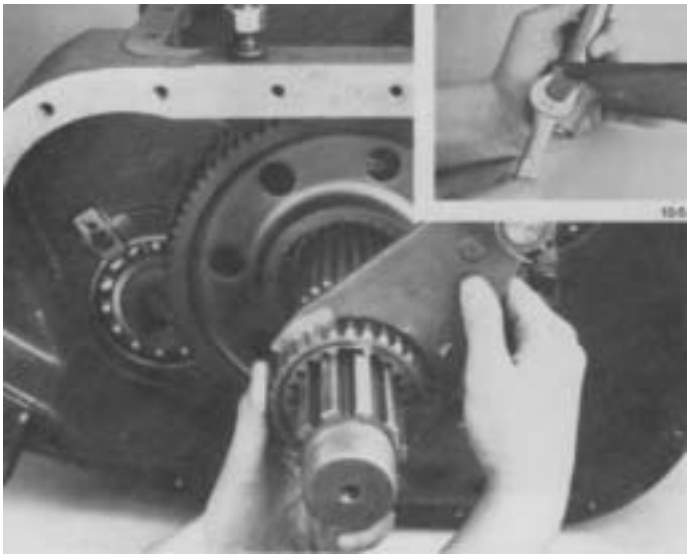
DISASSEMBLY - FRONT SECTION



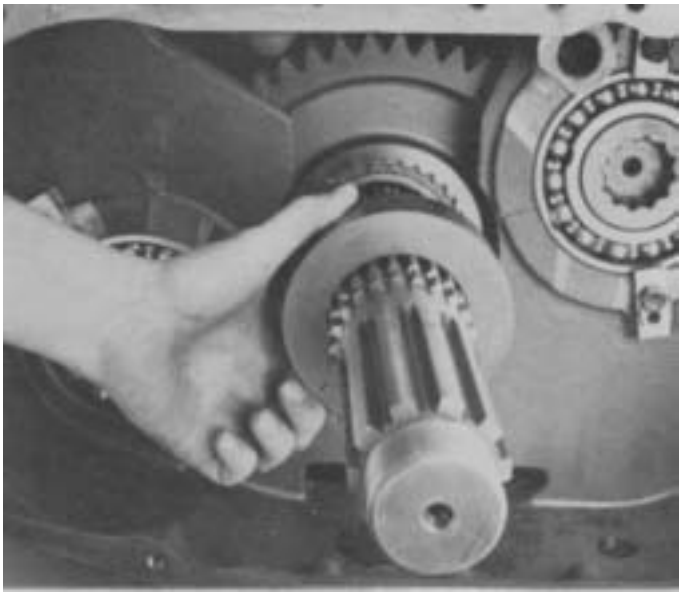
5. Turn tolerance washer to align splines and remove from mainshaft.



7. Rotate tolerance washer inside 1st speed gear (inset), remove gear, washer, and spacer.



6. Remove shift fork, clutch, and shift bar. Cut lockwire and remove capscrew and shift fork if necessary (inset).



8. Remove 1st & 2nd gear spacer from mainshaft.

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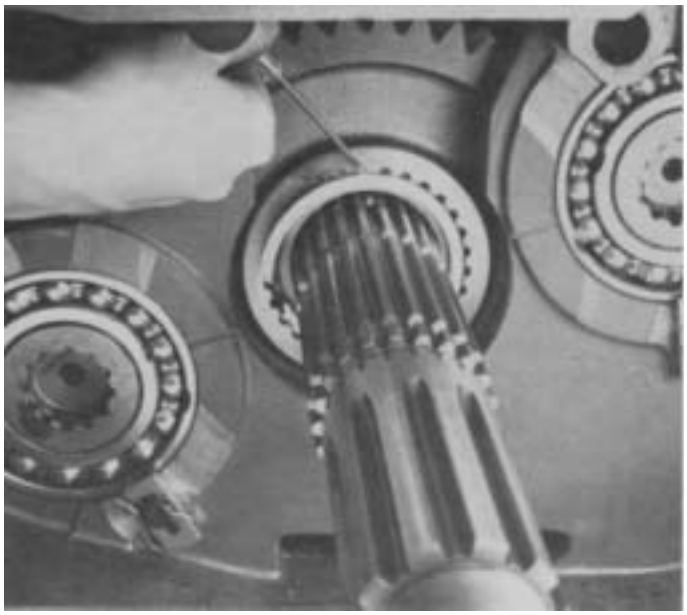
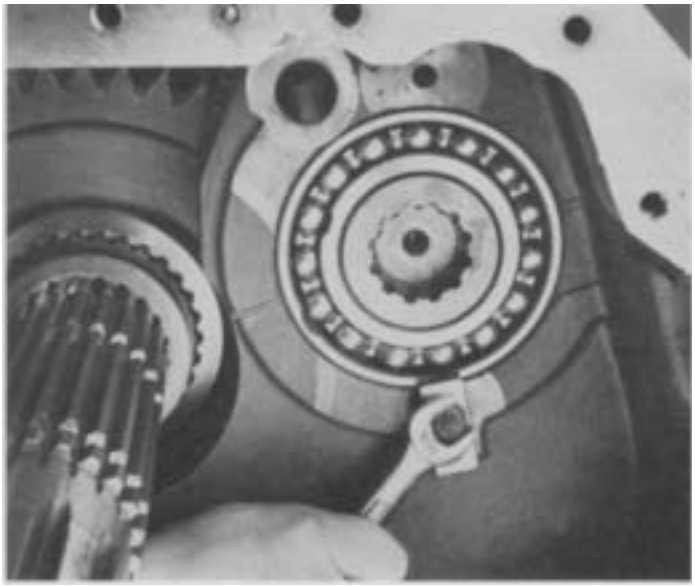
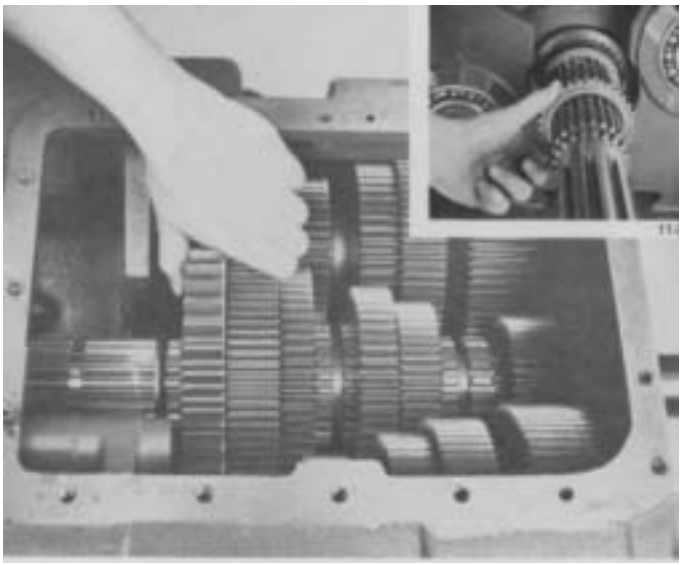
DISASSEMBLY - FRONT SECTION



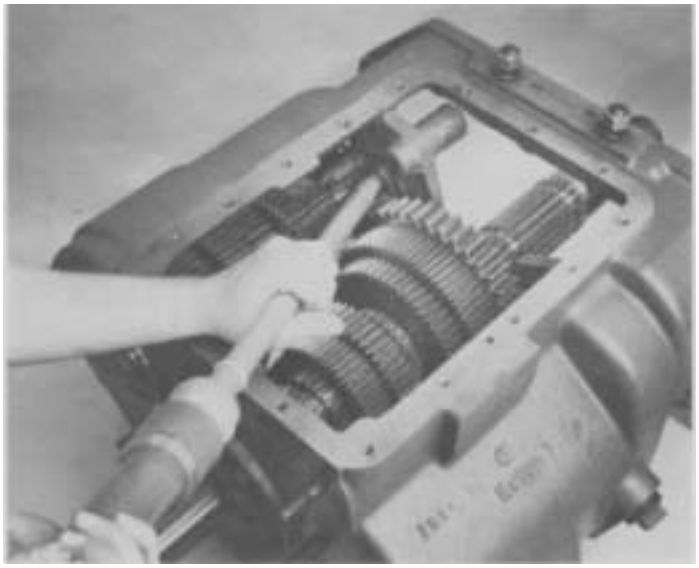
9. Using a small screwdriver, remove snap ring from inside 2nd speed gear.



11. Cut lockwire, remove bearing retainer capscrews and retainers from rear of countershaft.



10. Move 2nd speed gear forward engaging it into its clutch and against 3rd speed gear. Remove external splined spacer (inset).



12. From inside case, use a long punch and maul to drive right countershaft rear bearing to the rear and from case bore. Use caution to avoid marring case bore.

NOTE: Remove procedures will damage bearing. Removal should not be attempted unless replacement of bearing is planned.

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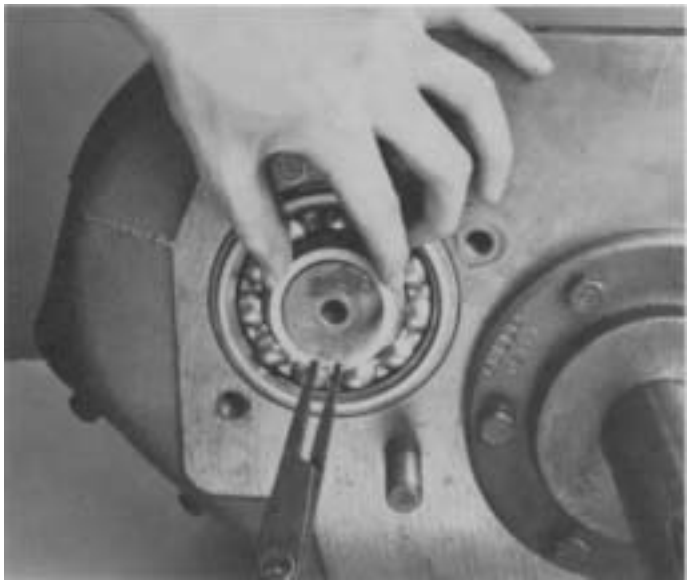
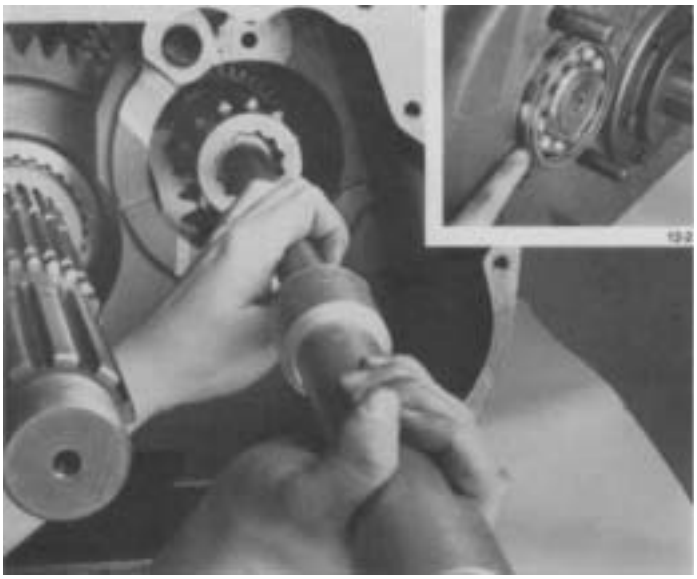
DISASSEMBLY - FRONT SECTION

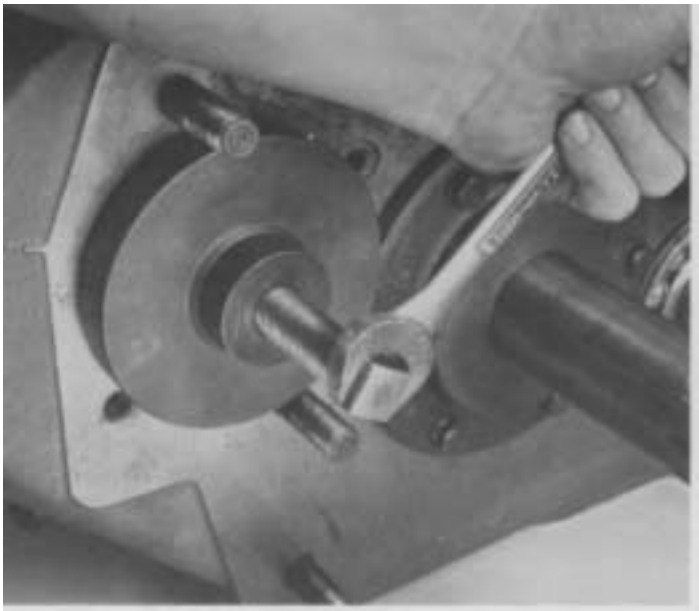


13. Remove snap rings from the front of both countershaft.

14. With soft bar and maul drive right countershaft to rear until front of countershaft is even with front of bearing.



15. Drive against rear of right countershaft to move it as far forward as possible. This will expose front bearing snap ring (inset).



16. Use a bearing puller to remove front countershaft bearing.

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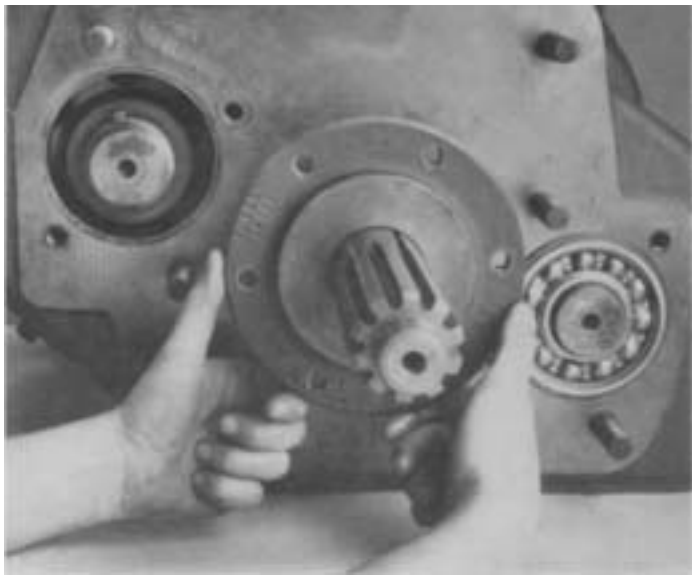
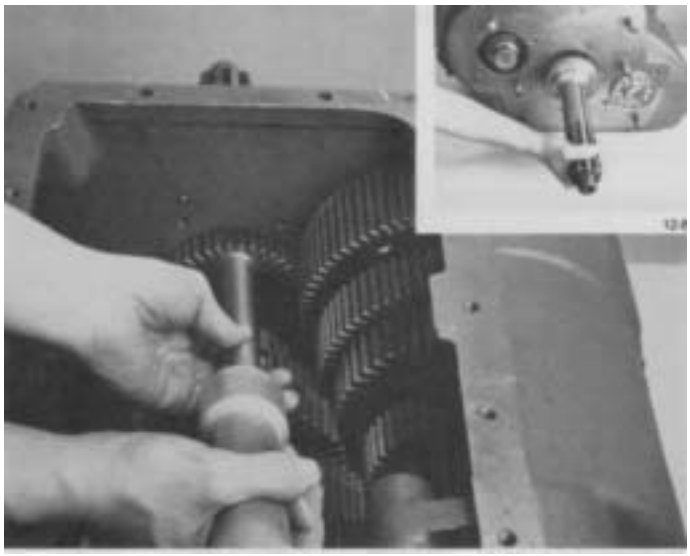
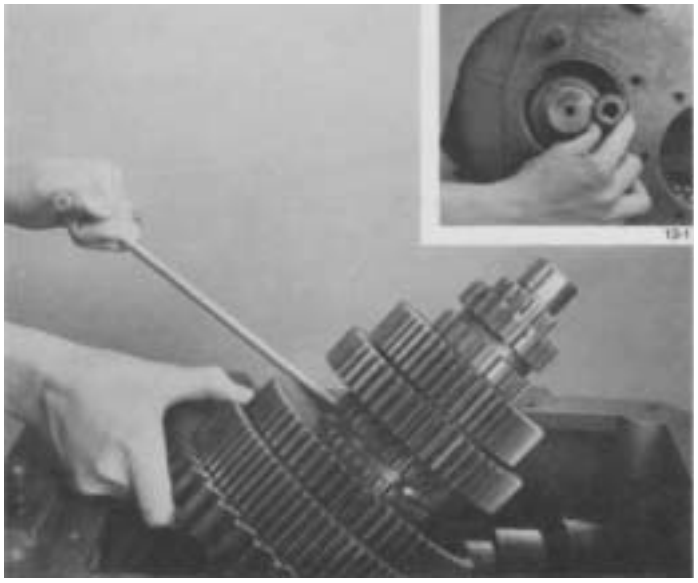
DISASSEMBLY - FRONT SECTION



17. Turn out retaining capscrews, jar to break gasket seal and remove front bearing cover.



18. From inside case, tap lightly against back face of drive gear until input shaft assembly can be pulled by hand from case (inset).



19. Block right countershaft against the wall of the case (inset). Hold 2nd speed gear against 3rd speed gear, using a mainshaft hook on front of shaft. Tilt assembly up and lift it from case. Use caution as 2nd speed gear is free to fall off main shaft.

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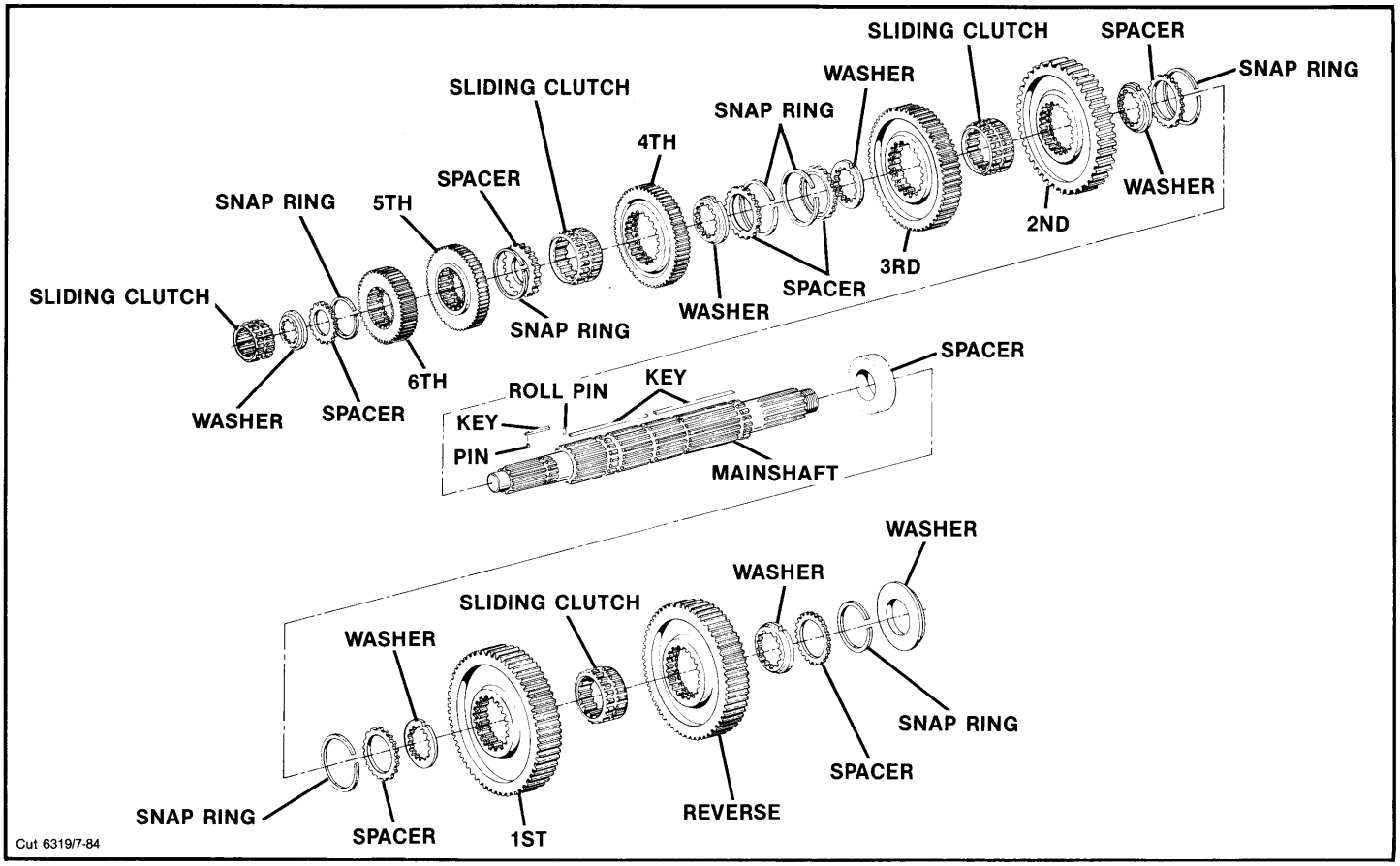
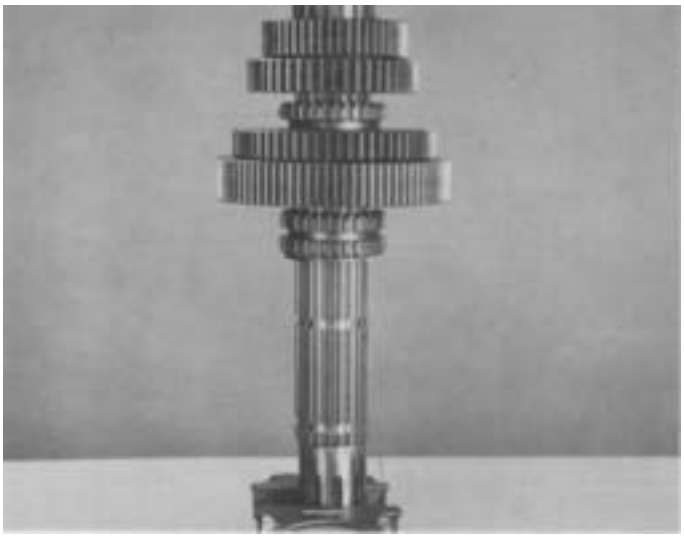
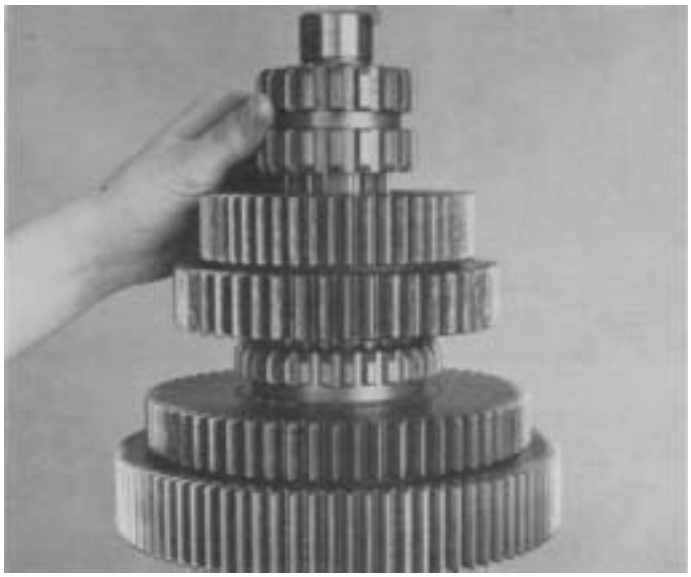
DISASSEMBLY - FRONT SECTION



B. Mainshaft Disassembly



1. Remove 2nd speed gear from rear of mainshaft and place mainshaft assembly in vise, pilot end up. Use brass jaws or wood blocks in vise to protect mainshaft.



2. Remove 6th and 7th speed clutch from mainshaft.

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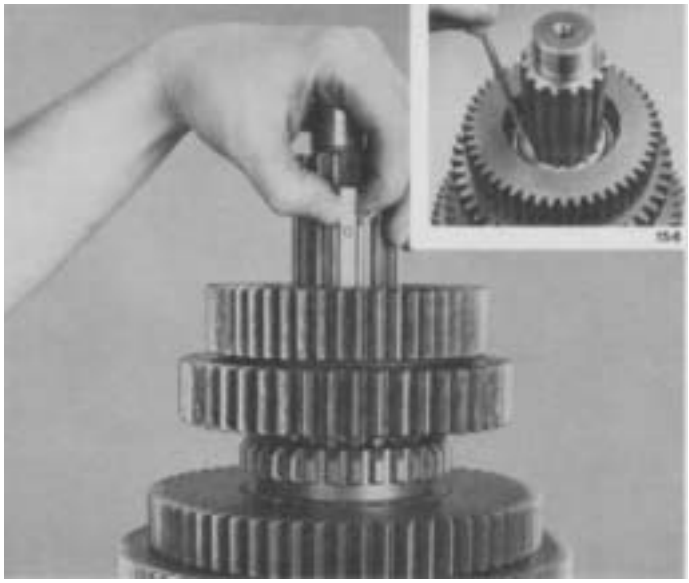
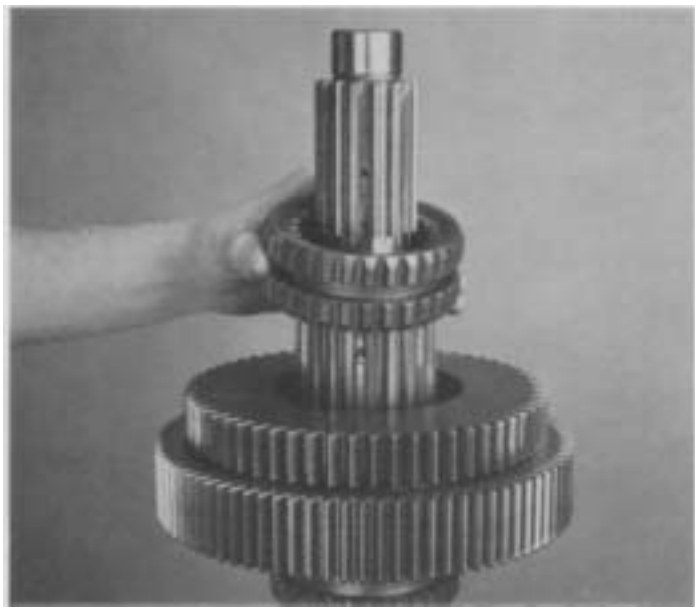
DISASSEMBLY - FRONT SECTION



3. Remove short key and rotate tolerance washer with screwdriver to align splines with those of mainshaft (inset).

4. Remove 6th speed gear, tolerance washer, and spacer from mainshaft.

5. Remove 5th speed gear and spacer from mainshaft.



6. Remove 4th and 5th speed clutch from mainshaft.

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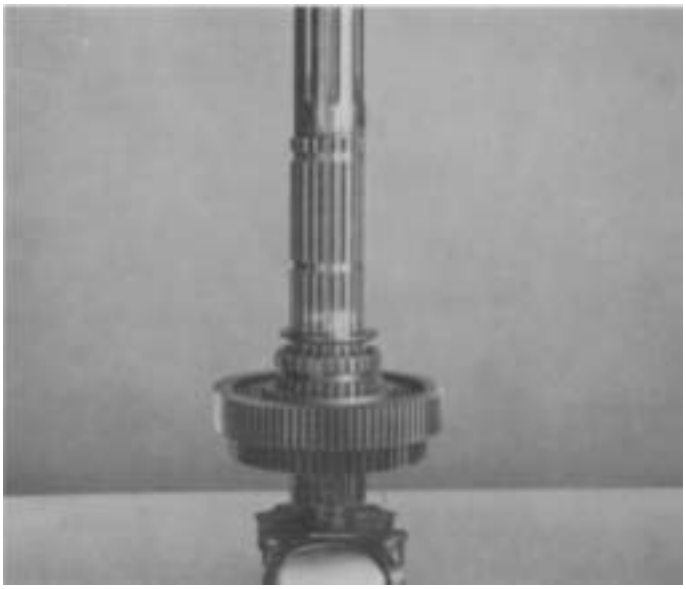
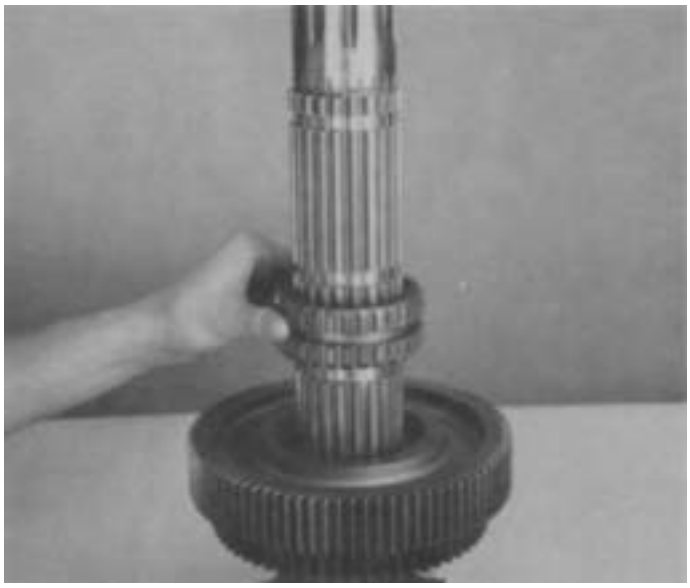
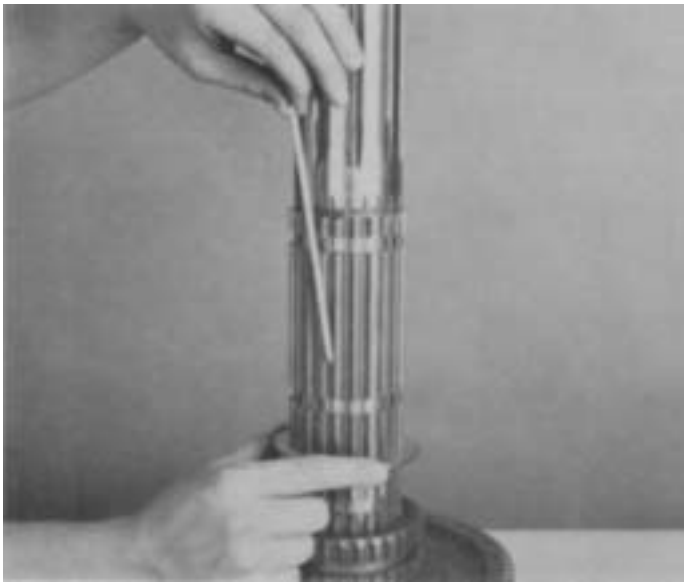
DISASSEMBLY - FRONT SECTION



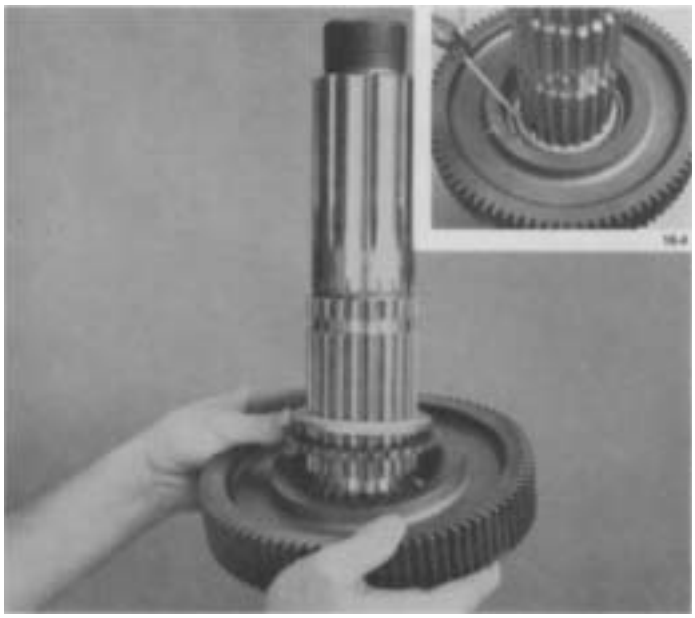
7. Remove mainshaft assembly from vise. Reinstall mainshaft in vise with pilot of mainshaft facing down.



9. Remove 2nd and 3rd speed clutch from rear of mainshaft.



8. Remove key from rear of mainshaft, rotate tolerance washer and remove washer.



10. Rotate 3rd speed gear tolerance washer with small screwdriver (inset) and remove gear, spacer, and tolerance washer.

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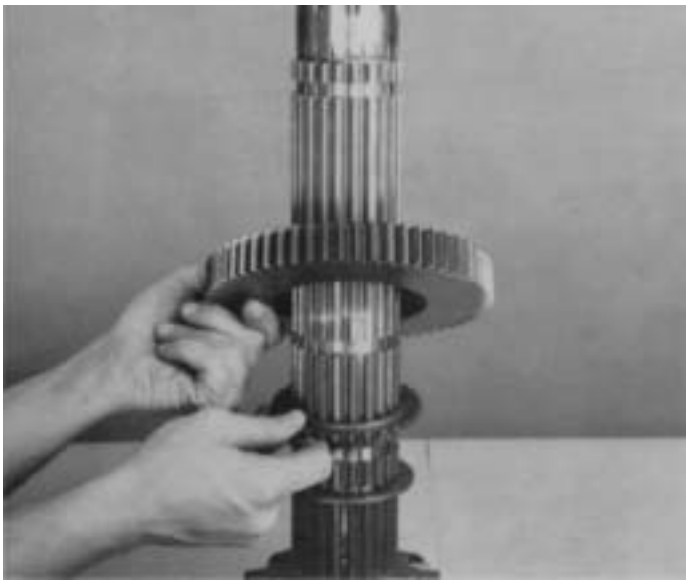
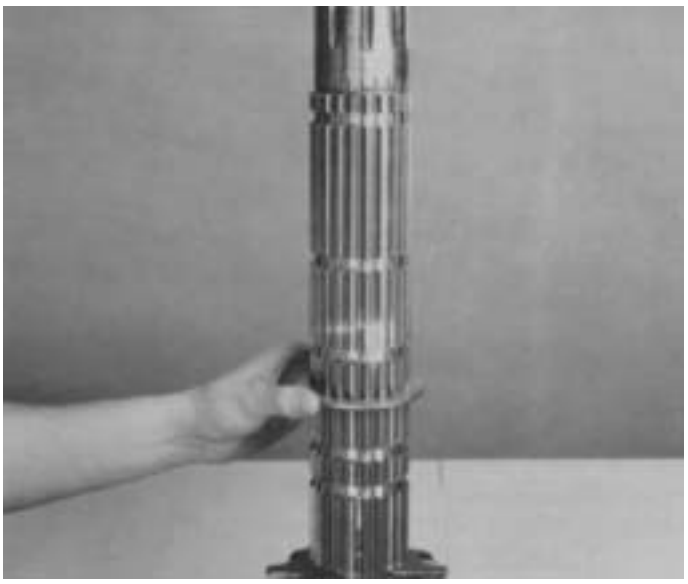
DISASSEMBLY - FRONT SECTION



11. Remove 4th speed gear and spacer from mainshaft.



12. Rotate tolerance washer and remove from mainshaft.

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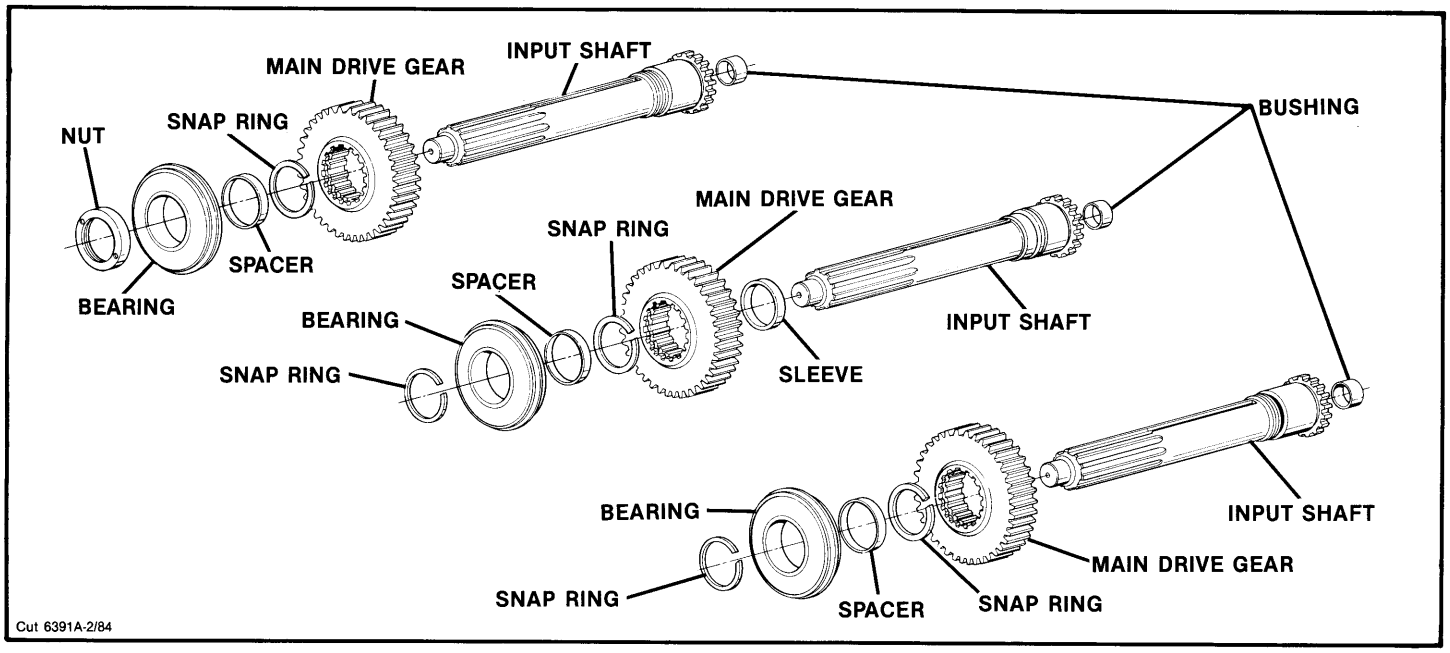
DISASSEMBLY - FRONT SECTION



C. Drive Gear Assembly-Disassembly

1. Mount assembly in a vise, pilot-end up, and recure on drive gear O.D. Vise used should be equipped with brass jaws or wood blocks to prevent damage to the gear teeth.

2. Use a punch and maul to relieve drive gear bearing nut from input shaft. For models equipped with a snap ring to retain bearing, remove snap ring from groove of input shaft.
NOTE: A wear sleeve is pressed on input shaft of models equipped with an oil seal in drive gear bearing cover. DO NOT DAMAGE OR ATTEMPT TO REMOVE WEAR SLEEVE FROM INPUT SHAFT.

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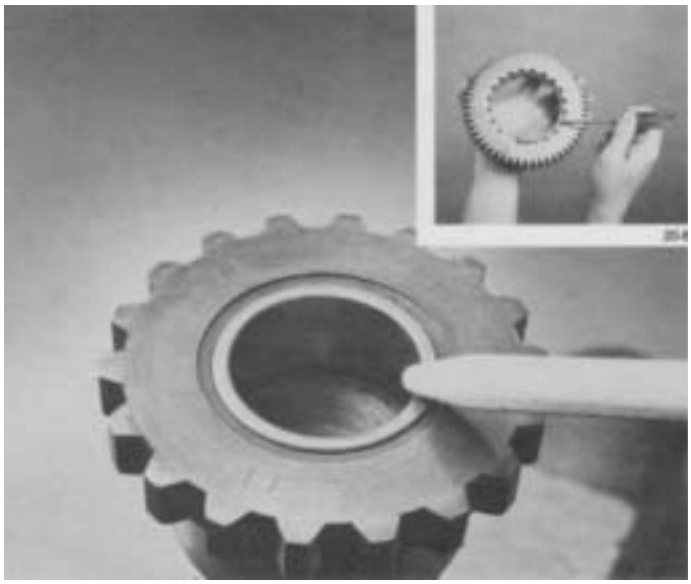
DISASSEMBLY - FRONT SECTION

3. Use a drive gear bearing nut remover to turn nut from shaft, left-hand threads.

4. Remove assembly from vise. Using rear face of drive gear as a base, press input shaft through the bearing, spacer, and gear.



5. If necessary, remove snap ring from drive gear (inset). Check bushing in pocket of input shaft and replace if worn or damaged.

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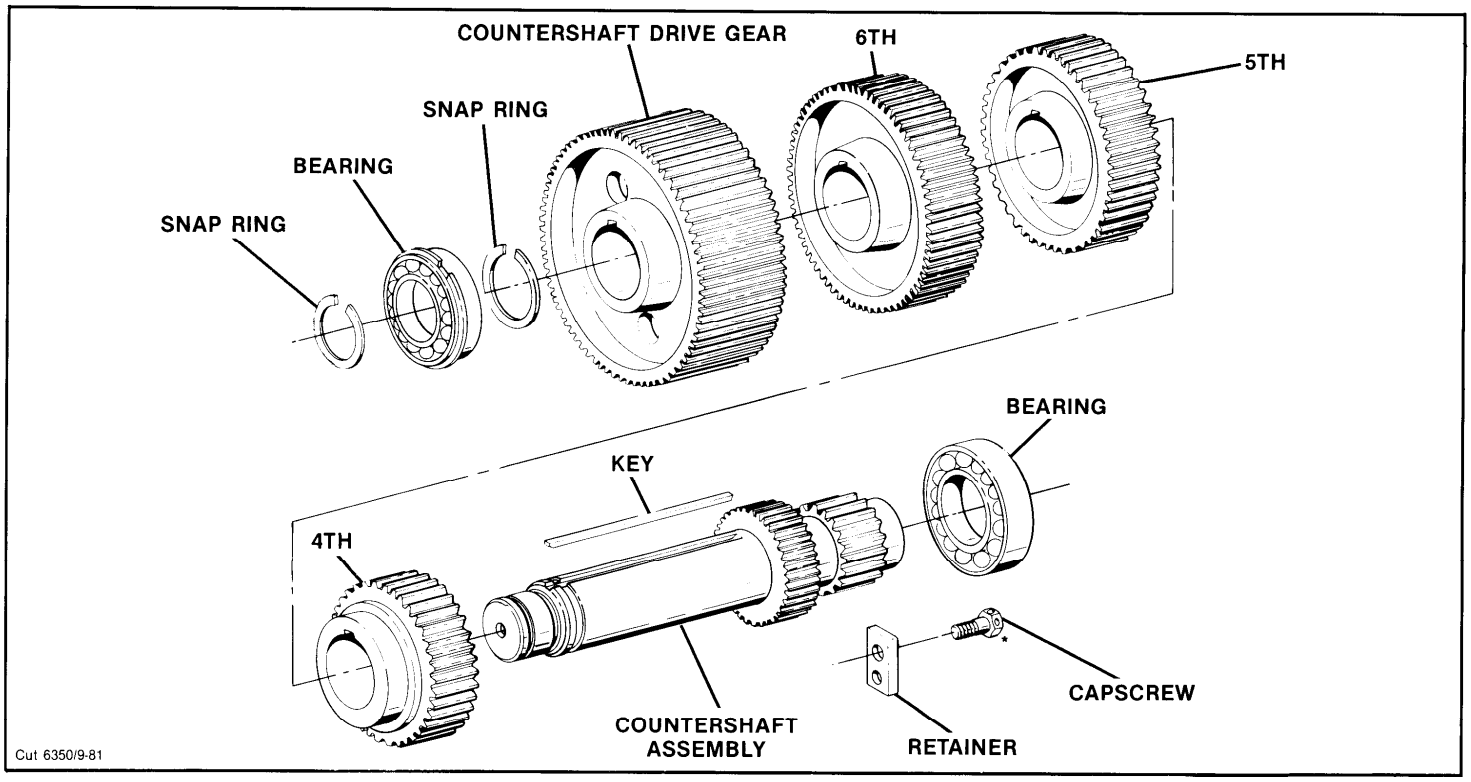
DISASSEMBLY - FRONT SECTION



D. Countershaft Removal and Disassembly

NOTE: If not previously done, remove front and rear bearings from lower countershaft using same procedure as was used for upper countershaft bearing removal.

1. Move upper countershaft to rear, move front of shaft to center of case and remove through top of case. Repeat same procedure to remove lower countershaft assembly.
NOTE: Left and right countershaft assemblies are identical. Disassembly if each is performed in the same manner.

2. Remove snap ring from front of countershaft.

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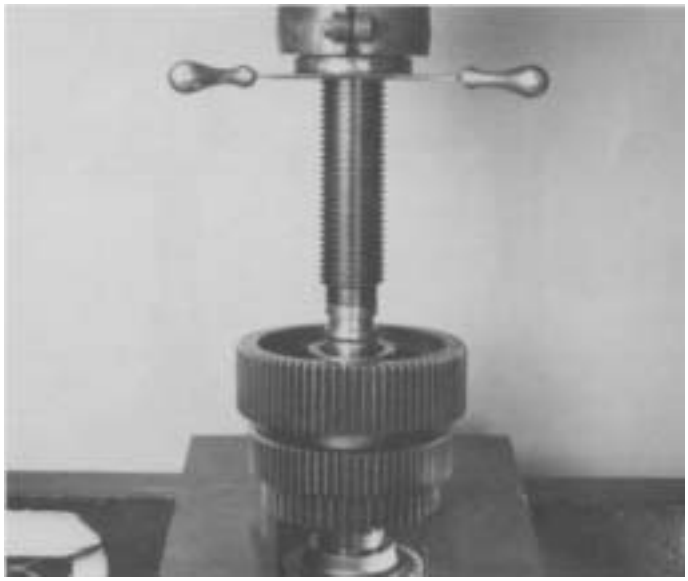
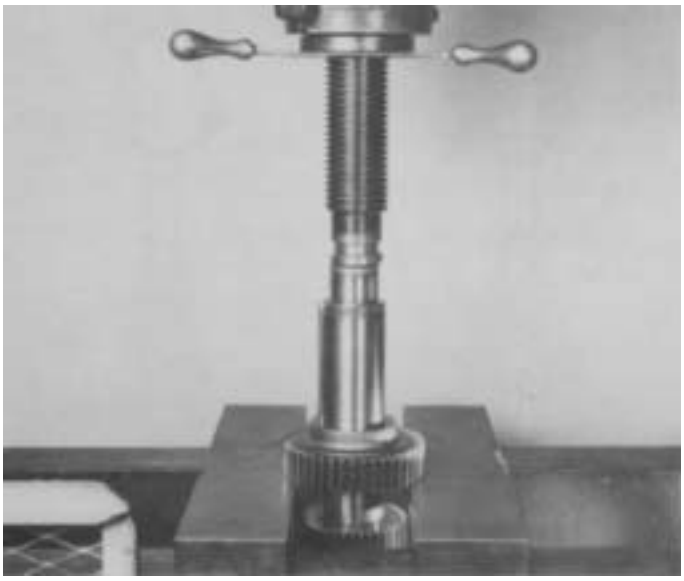
DISASSEMBLY - FRONT SECTION



3. Press drive gear, 6th speed gear and 5th speed gear from countershaft.

5. If necessary, remove key from countershaft.



4. Press 4th speed gear from countershaft.

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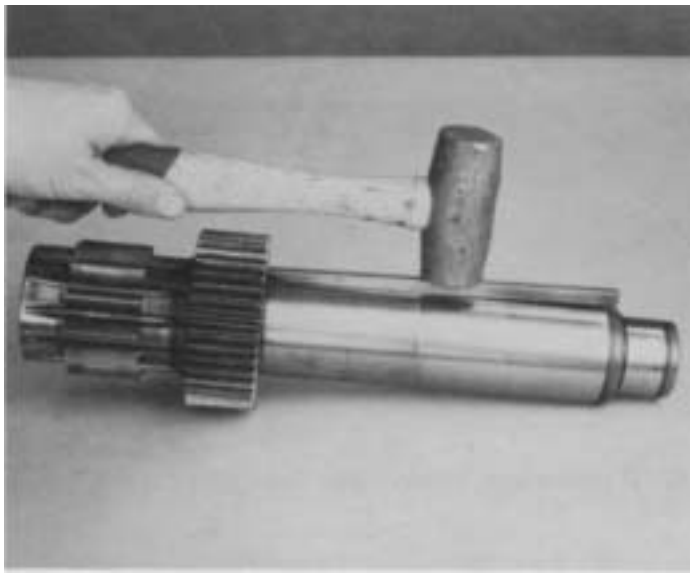
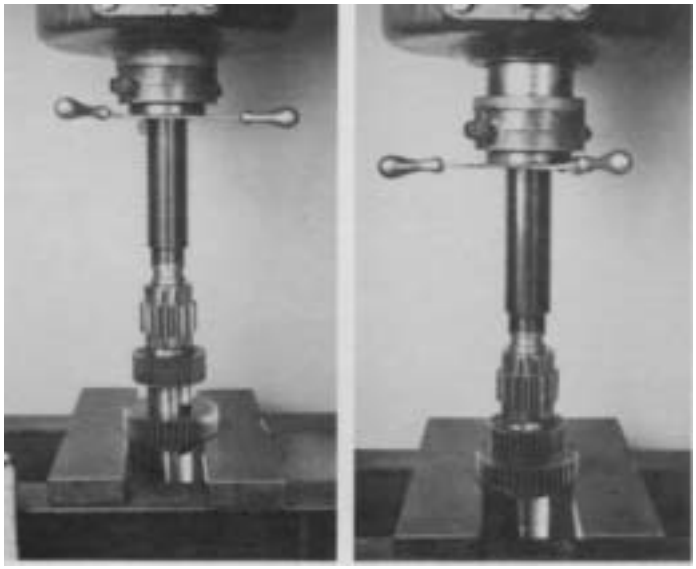
REASSEMBLY - FRONT SECTION

A. Countershaft Reassembly

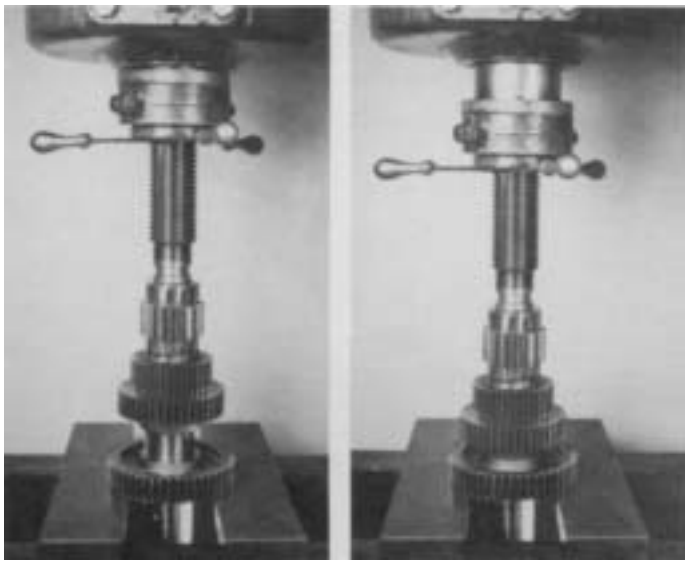
NOTE: Since left and right countershaft assemblies are identical, reassembly of each is performed in the same manner.



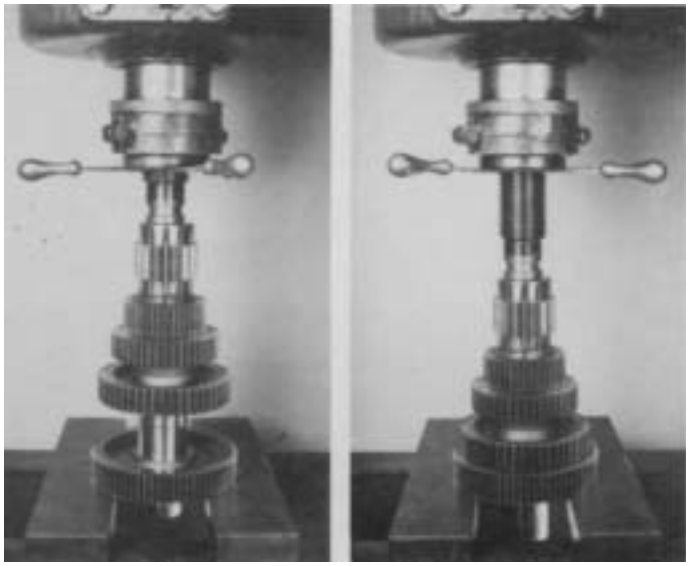
1. If previously removed, install key in keyway of



2. Align keyway of gear with key in countershaft and press the 4th speed gear into position on shaft, long hub of gear toward the front of countershaft.



3. Press the 5th speed gear on countershaft against 4th speed gear.



4. Press the 6th speed gear on countershaft, long hub of gear toward front of countershaft.

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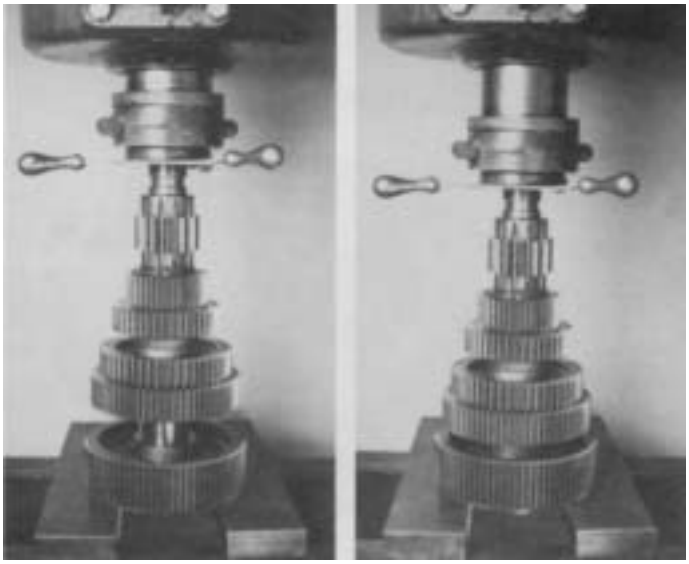
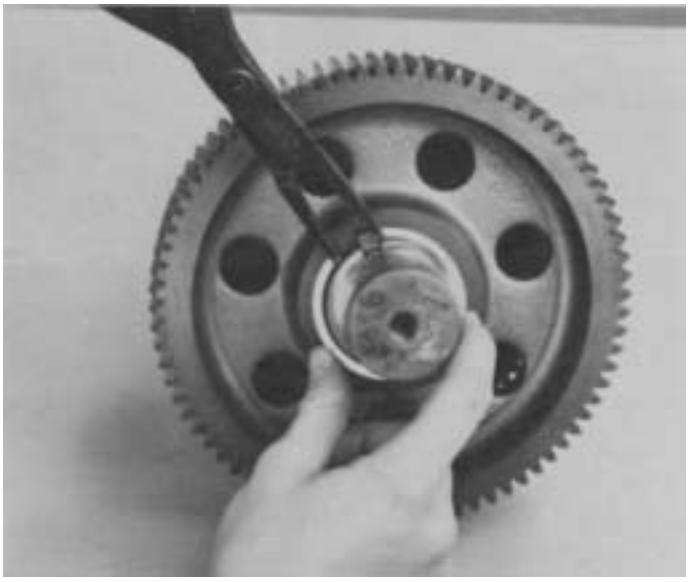
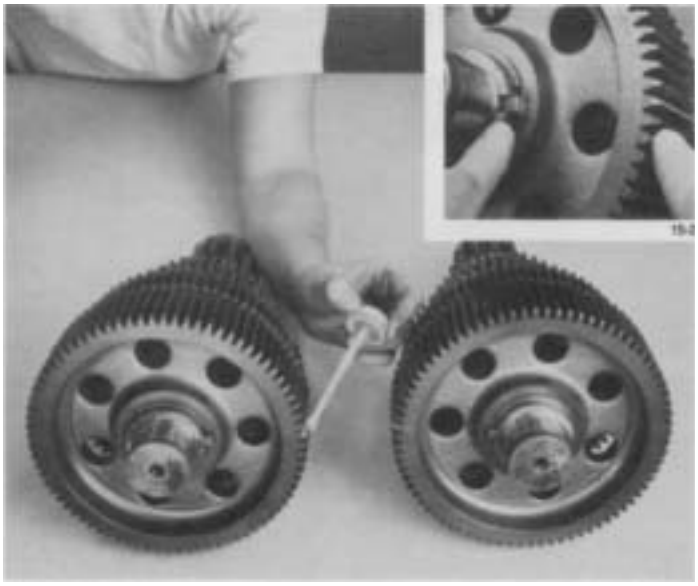
REASSEMBLY - FRONT SECTION



5. Press drive gear on countershaft, long hub of gear toward 6th speed gear.



6. Install snap ring in groove nearest drive gear.



7. Mark countershaft drive gear for timing. On the drive gear of each countershaft assembly, mark

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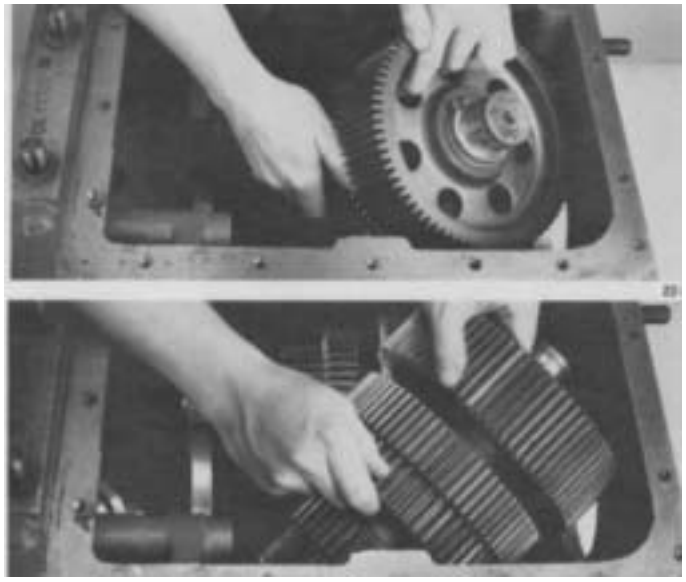
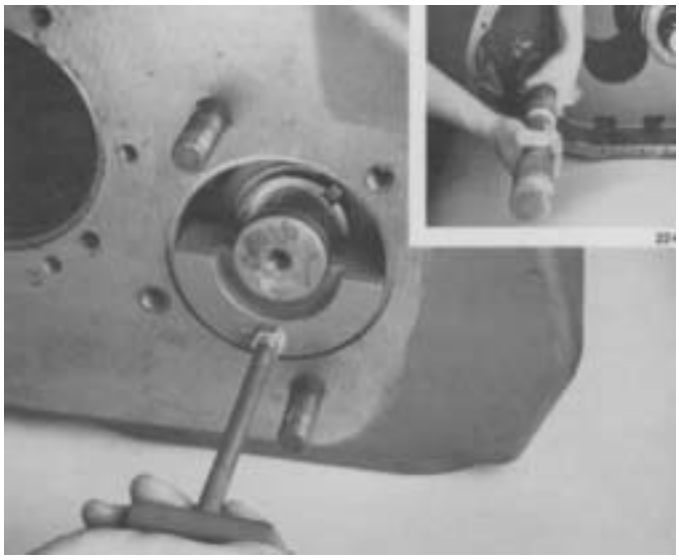
REASSEMBLY - FRONT SECTION

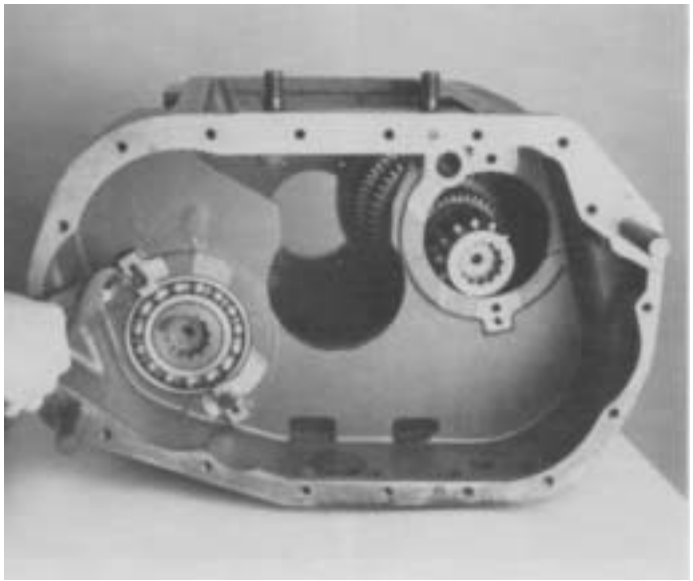
B. Countershaft Installation



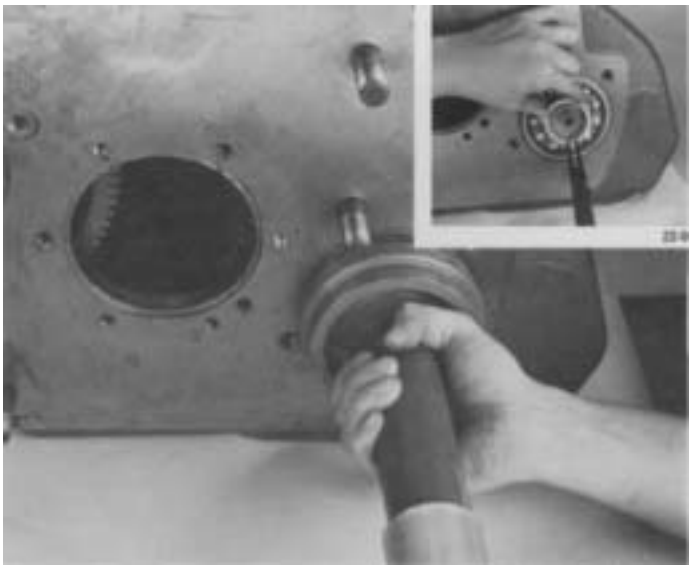
1. Install both countershaft assemblies back into maincase.
NOTE: Both assemblies are identical.



2. Use a centering tool in front bearing bore and install lower rear countershaft bearing with a flanged bearing driver (inset).



3. Install rear countershaft capscrews and retainers and wire securely.



4. Remove centering tool and install front countershaft bearing with a flanged bearing driver. Install retaining snap ring (inset).
NOTE: Do not install upper countershaft bearings at this time.

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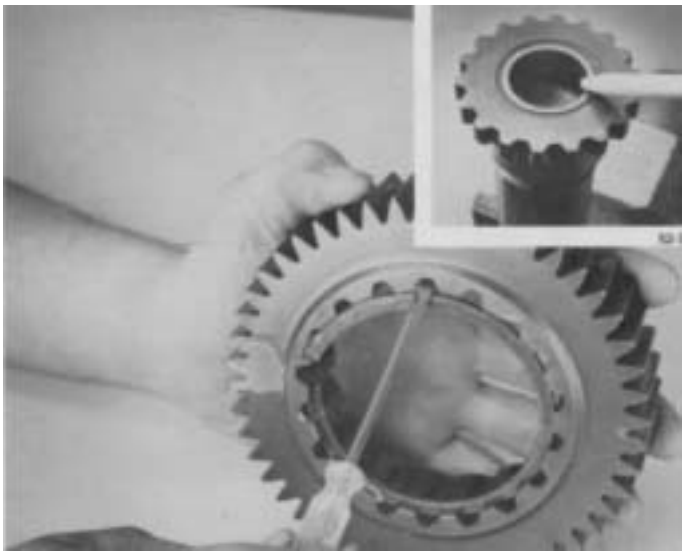
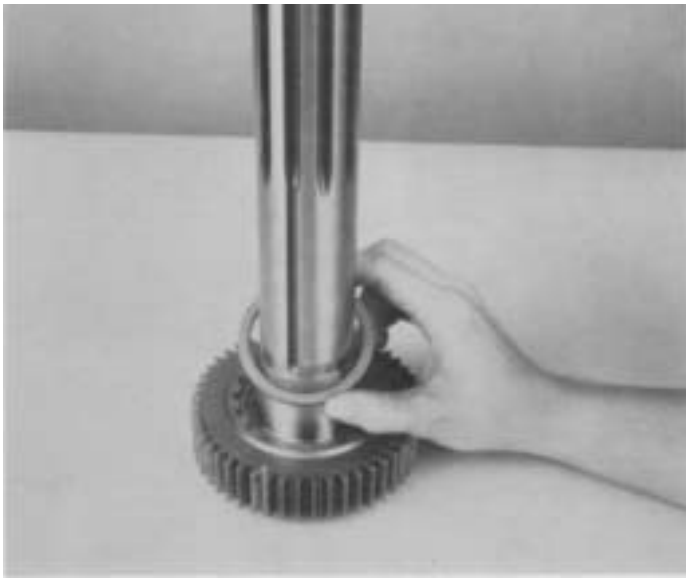
REASSEMBLY - FRONT SECTION

C. Reassembly, Installation, and Timing of Main Drive Gear Assembly

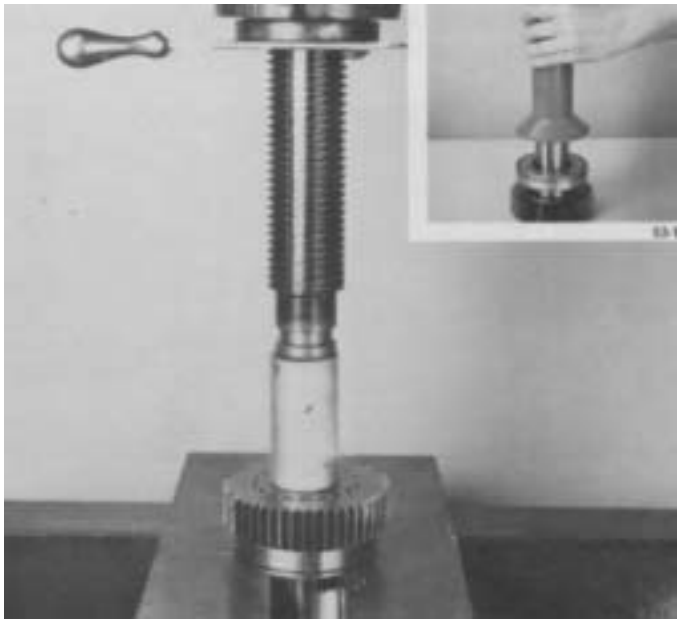


1. If previously removed, install snap ring in I.D. of main drive gear and bushing in pocket of input shaft (inset).

2. Install drive gear on input shaft, engaging internal splines of gear with teeth on shaft, snap ring of gear to front of shaft.



3. Install drive gear spacer on input shaft and against gear.



4. Press drive gear bearing on input shaft, bearing shield to front of shaft, or use a flanged bearing driver (inset).

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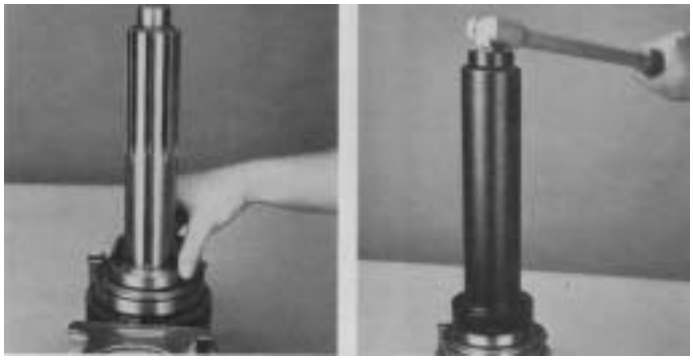
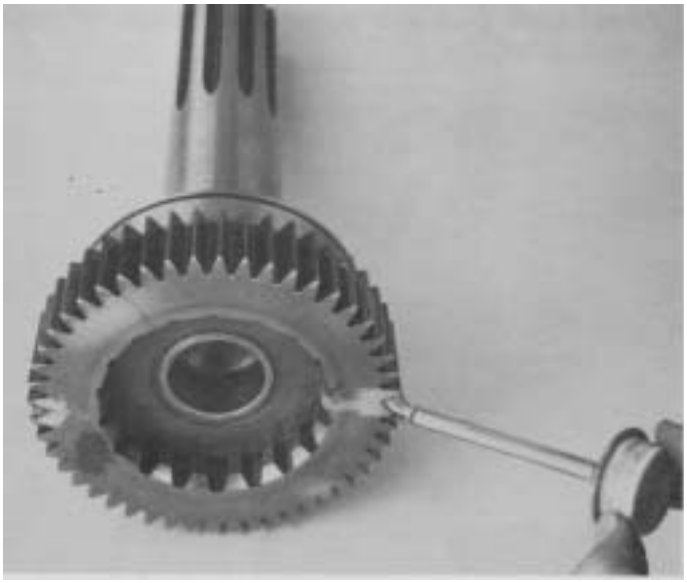
REASSEMBLY - FRONT SECTION

5. Apply Loctite grade 277 sealant to cleaned threads of new drive gear bearing nut. DO NOT REUSE OLD NUT.
NOTE: Models otherwise equipped with a snap ring to retain bearing, install snap ring in groove of input shaft and proceed to No. 8.



6. Mount assembly in a vise, pilot-end up, and secure on drive gear O.D. Vise used should be equipped with brass jaws or wood blocks to prevent damage to gear teeth. Clean threads of input shaft and install drive gear bearing nut on shaft (left). Using a drive gear bearing nut installer, tighten nut on input shaft, lefthand threads, with 250-300 lbs./ft. of torque (right).

7. Use a punch and maul to peen nut into the two milled slots of input shaft.



8. IMPORTANT: Remove assembly from vise to mark main drive gear for timing purposes. Mark any two adjacent teeth on drive gear and repeat procedure for the two adjacent teeth directly opposite first set marked. A highly visible color of toolmakers' dye is recommended for making timing marks.

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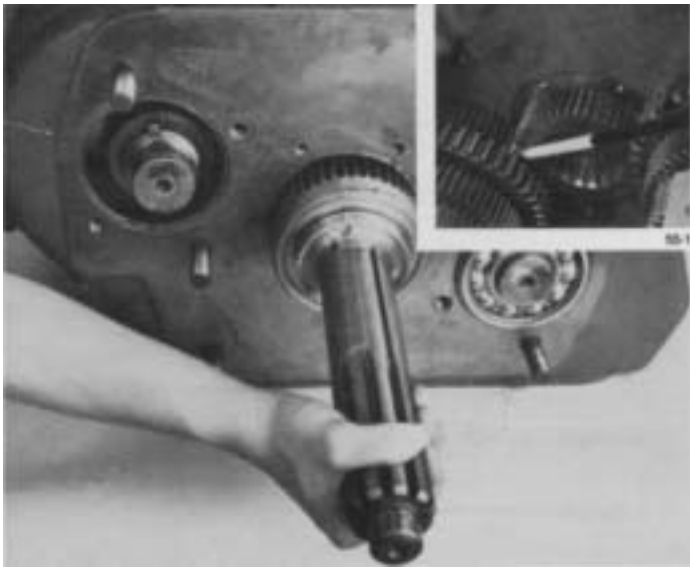
REASSEMBLY - FRONT SECTION



9. Install main drive gear assembly approximately1/2 inch into maincase aligning either two marked timing teeth of drive gear with marked tooth of left countershaft (inset).

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REASSEMBLY—FRONT SECTION

SETTING CORRECT AXIAL CLEARANCES FOR MAINSHAFT GEARS

Axial Clearance (End-Play) Limits Are:
.005''-,012" for all mainshaft gears

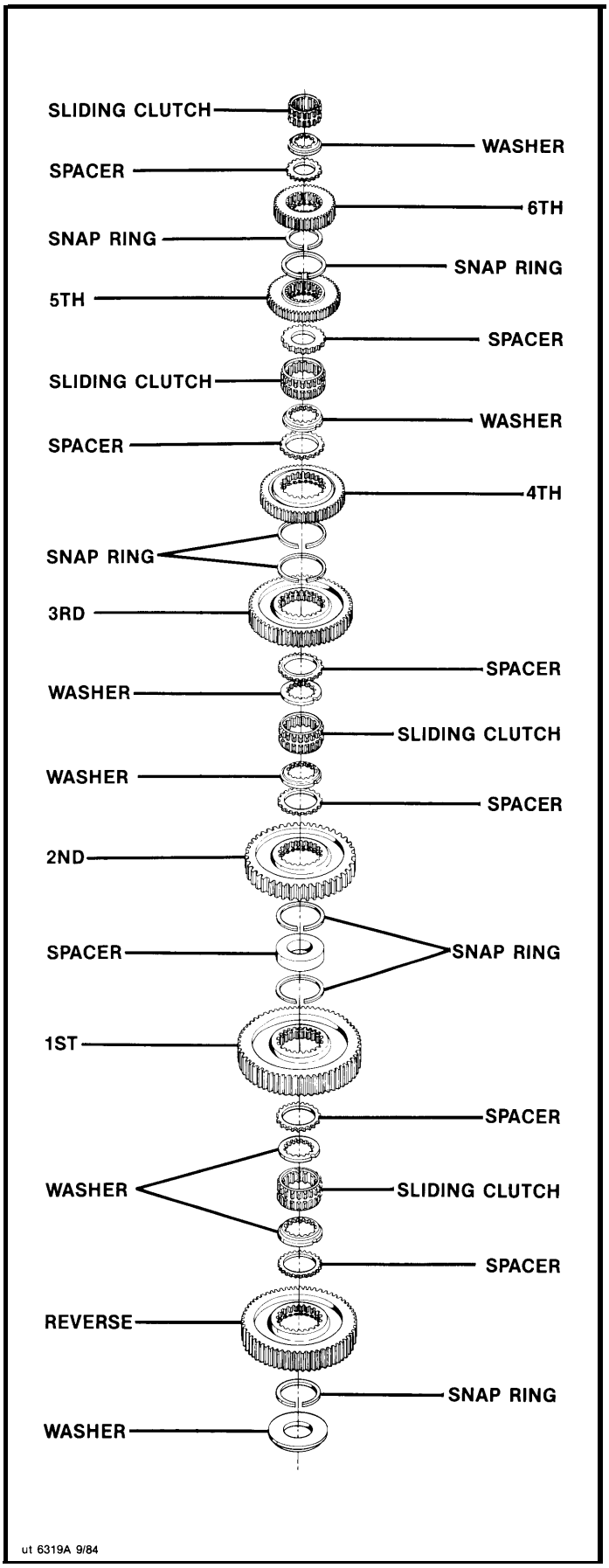
Washers are used to obtain the correct limits; six thicknesses are available as follows:

LIMITS (INCH)	COLOR CODE
.248-.250	WHITE
.253 -.255	GREEN
.258-.260	ORANGE
.263-.265	PURPLE
.268-.270	YELLOW
.273 -.275	BLACK
*	"PLUS RED"

***NOTE:** New style limit washers come in a full range of tolerances as corresponding colors listed above "plus red." (Example: "Orange plus red" limit washer has an inch limit thickness of .258 -.260.)

Refer to Illustrated Parts Lists for washer part numbers.

Always use the .248-.250" low limit washer ("White" or "white plus red") in the 4th and 2nd speed gear positions as shown at right.



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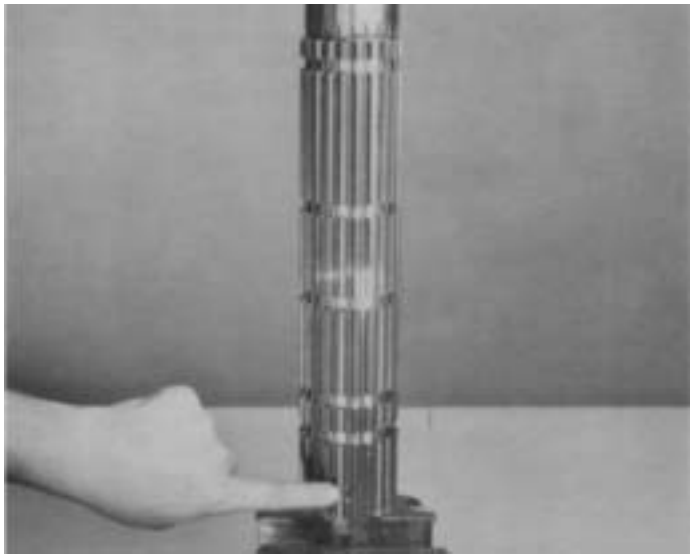
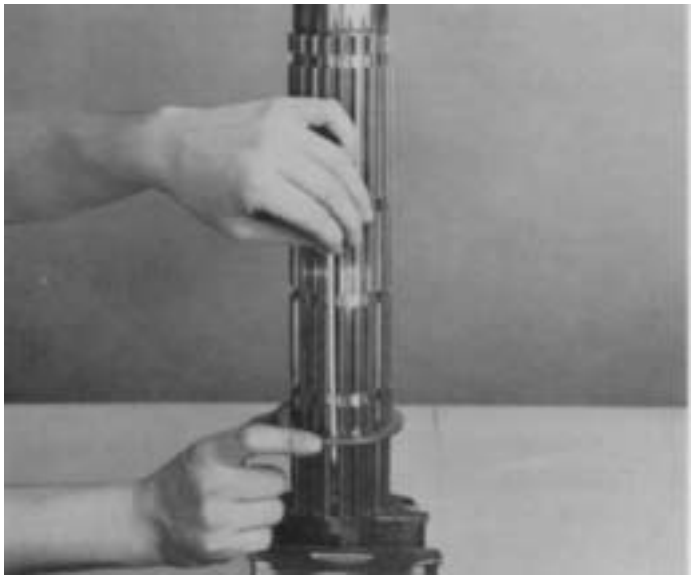
REASSEMBLY - FRONT SECTION

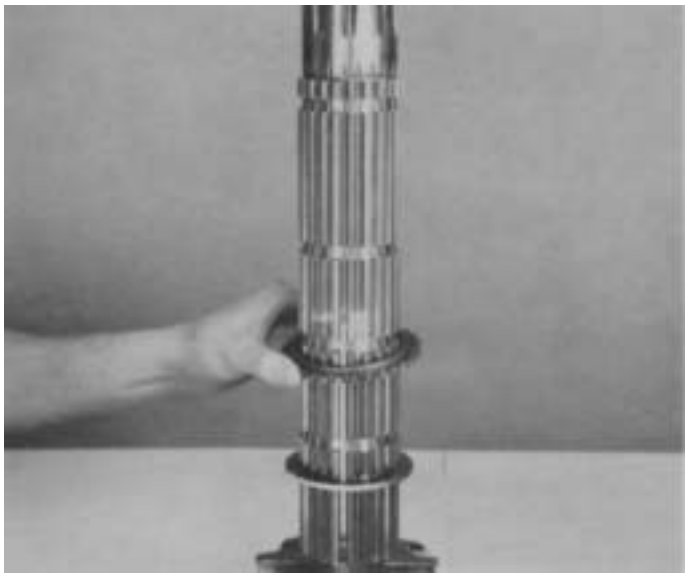
D. Mainshaft Reassembly and Installation



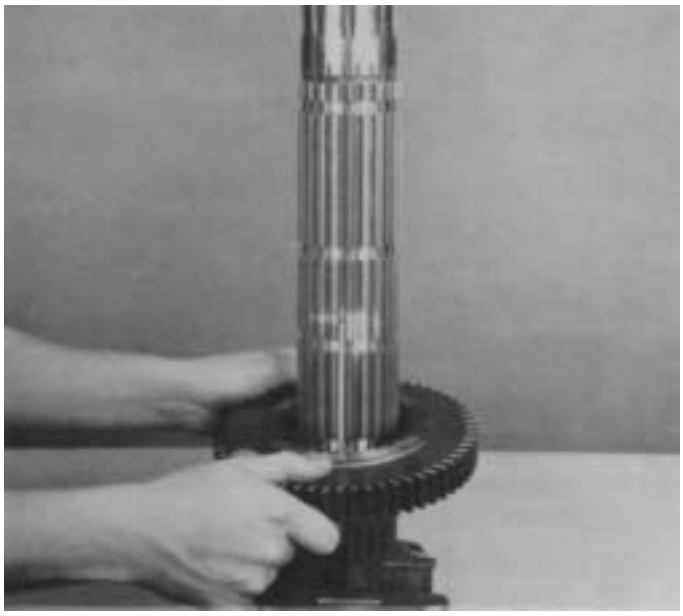
1. Install mainshaft in vise, front of shaft down. Use brass jaws or wood blocks in vise to protect mainshaft. Make sure that roll pin is in place. If previously removed, install snap rings in hubs of mainshaft gears.



2. Install white color coded tolerance washer on mainshaft in 4th speed position, flat side of washer facing up. Rotate washer to align splines and install key to lock washer in position.
NOTE: Key must be installed in keyway with roll pin. Roll pin acts as forward slot) for key.



3. Install spacer, with shoulder of spacer facing up, against tolerance washer.



4. Install 4th speed gear on spacer with clutching teeth facing down.

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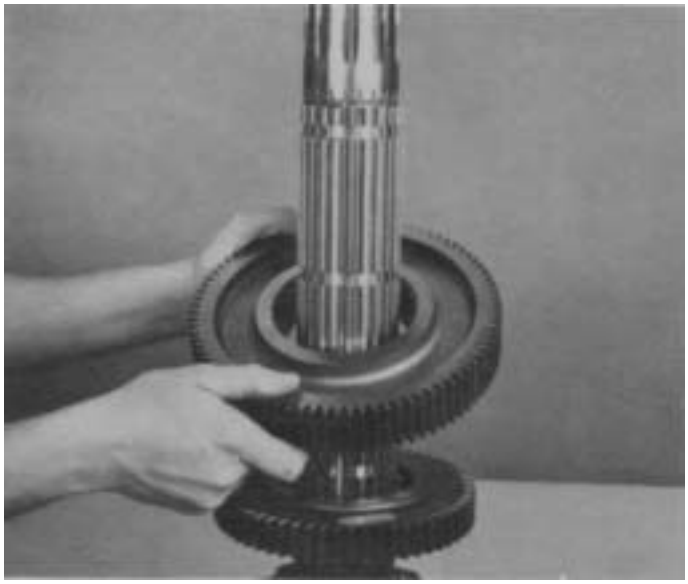
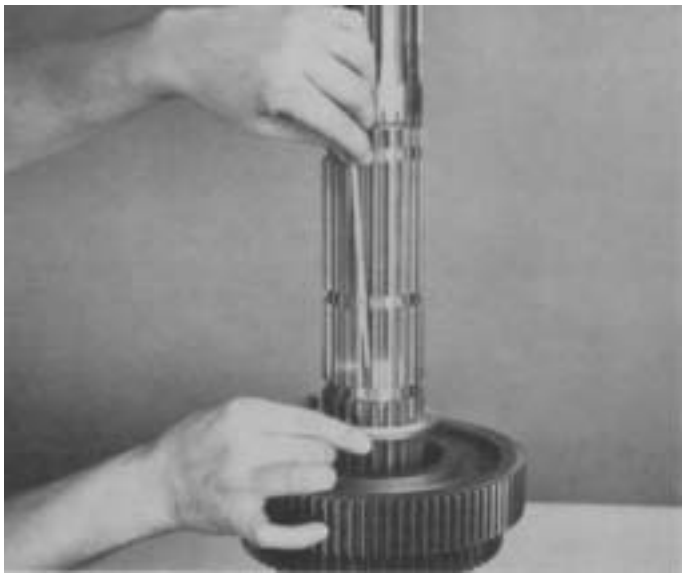
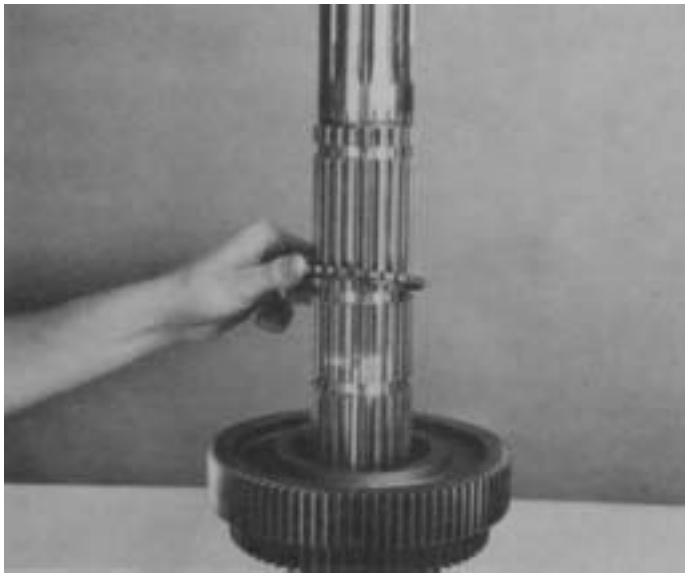
REASSEMBLY - FRONT SECTION



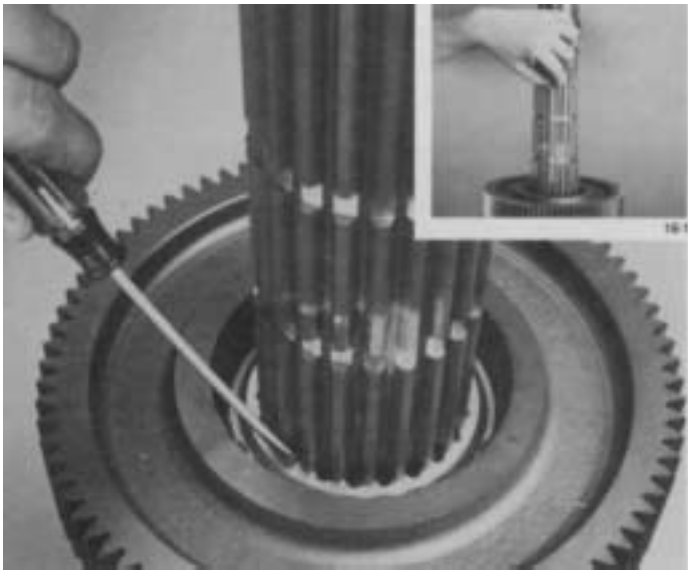
5. install 3rd speed gear on 4th speed gear with clutching teeth facing up.



7. Remove, key. Install tolerance washer with flat side against spacer.



6. Install spacer, shoulder facing down, into 3rd speed gear.



8. Rotate tolerance washer 1/2 spline and reinstall key (inset).

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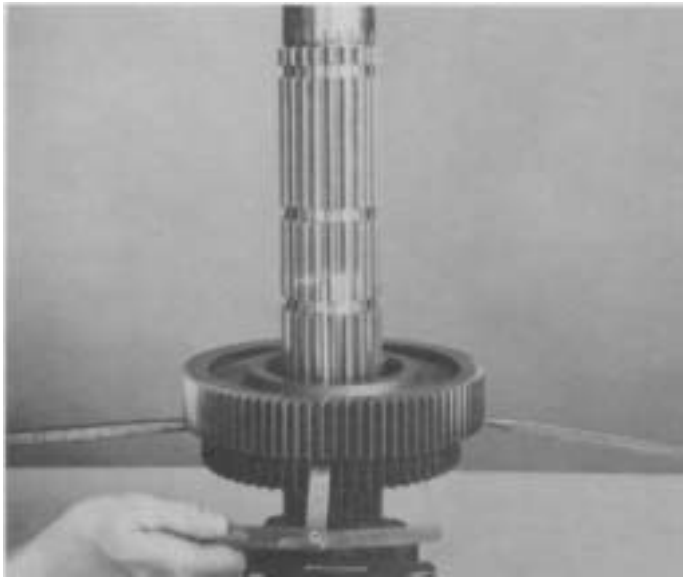
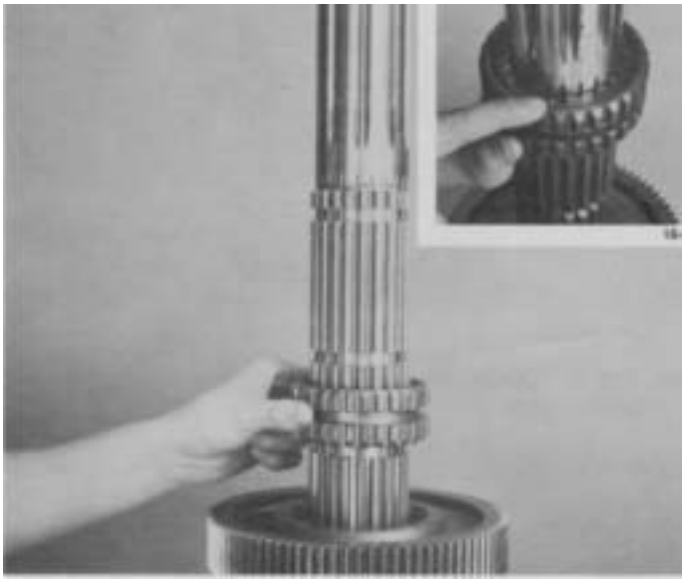
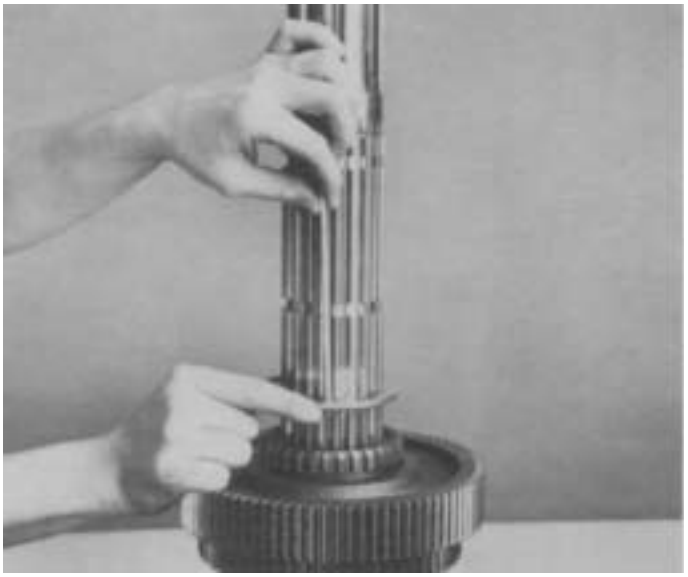
REASSEMBLY-FRONT SECTION



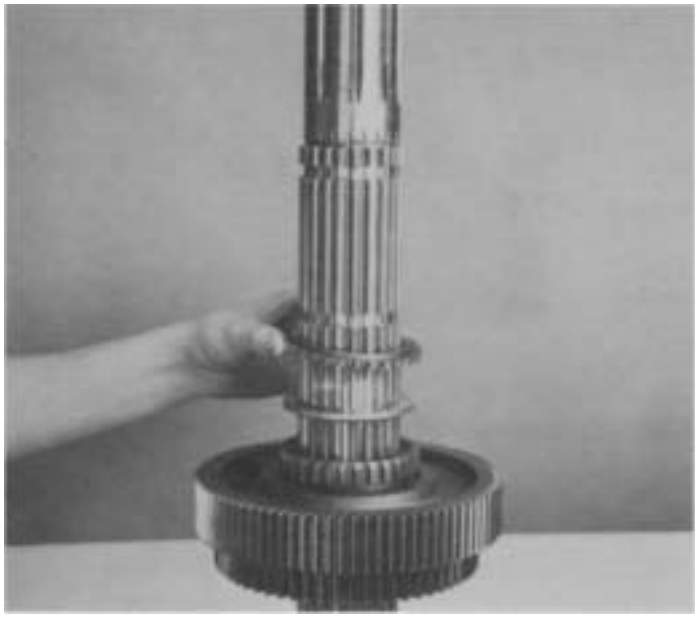
9. Insert two large screwdrivers between 3rd and 4th speed gears. Apply slight downward pressure on screwdriver handles to spread gears evenly. Making certain gear hubs are parallel, insert feeler gage between gear hubs. Correct axial clearance is .005" to .012". If clearance is less than the minimum .005" tolerance, the tolerance washer in 3rd speed gear should be replaced by a thinner washer. If clearance checked is larger than the maximum .012" tolerance, a thicker tolerance washer should be installed in 3rd speed gear.



10. Install 2nd and 3rd speed sliding clutch, aligning missing internal spline of sliding clutch with key (inset).



11. Remove key and install white color coded tolerance washer in 2nd speed position with flat side of washer facing up. Rotate washer 1/2 spline and reinstall key.



12. Install spacer with shoulder side up, against tolerante washer.

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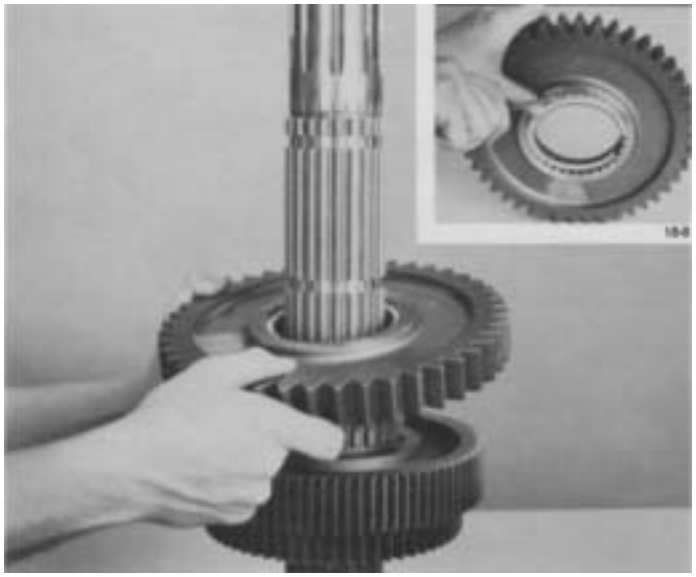
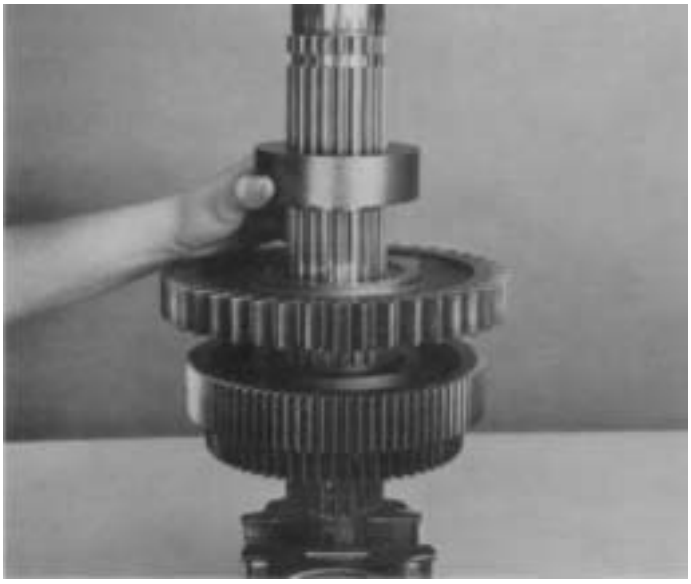
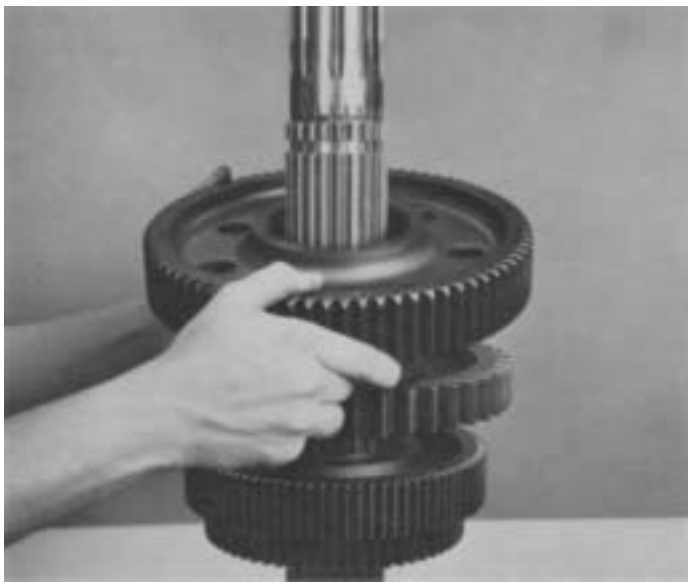
REASSEMBLY-FRONT SECTION



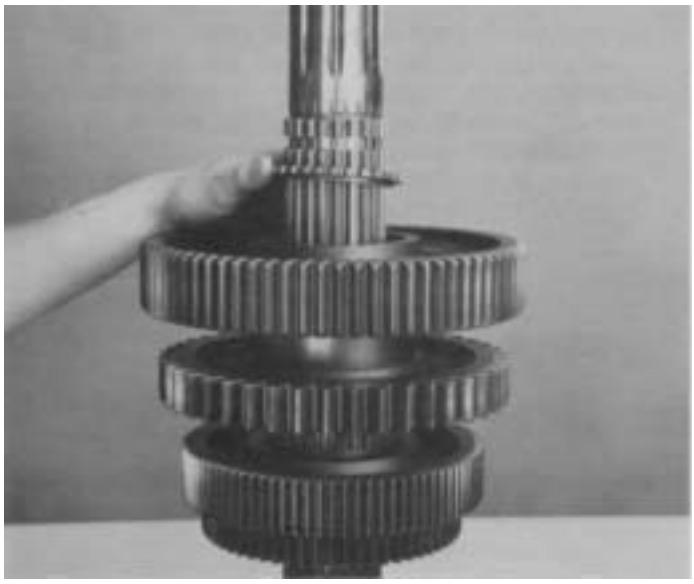
13. Temporarily install snap ring in 2nd speed of gear (inset). Install gear, clutching teeth facing down. Engage clutching teeth of gear with external splines of spacer.



14. Install spacer against back of 2nd speed gear.



15. Install 1st speed gear with clutching teeth facing



16. Install spacer, shoulder side facing down into 1st speed gear.

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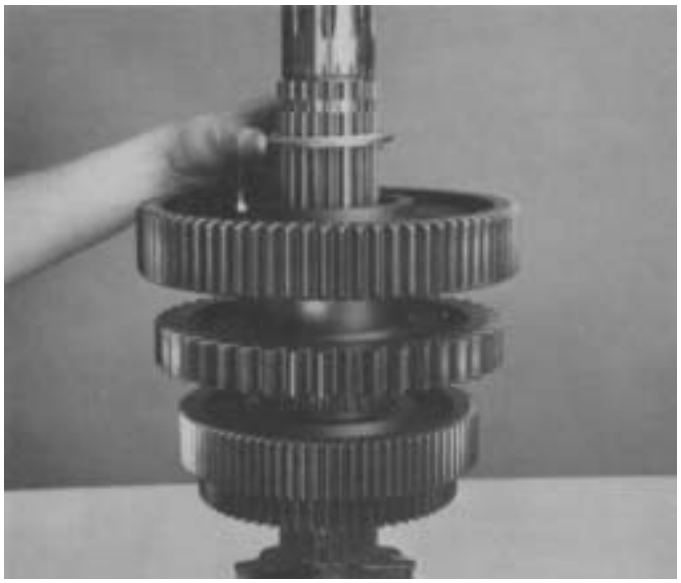
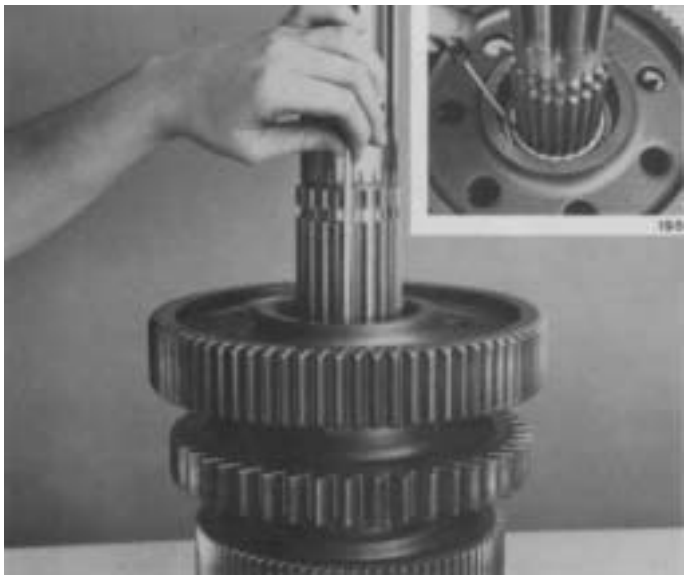
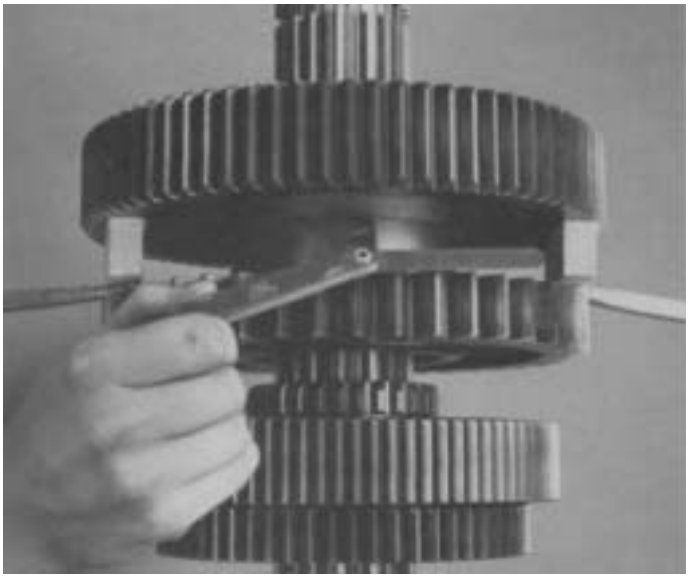
REASSEMBLY-FRONT SECTION



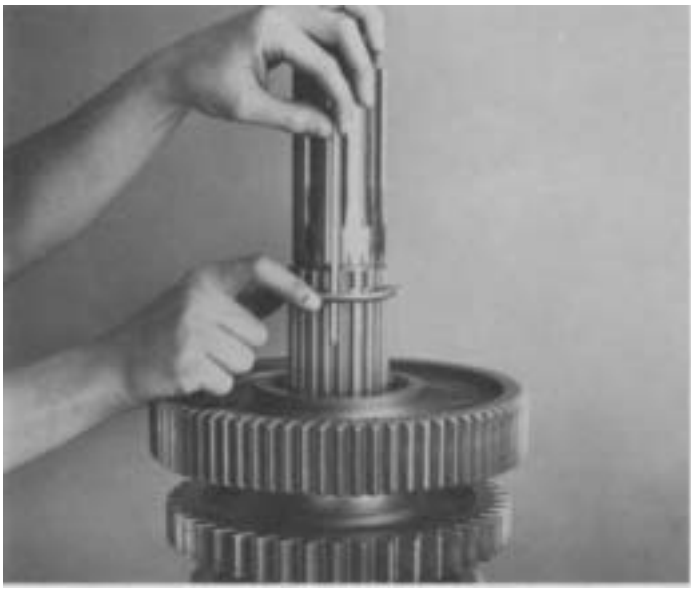
17. Install tolerance washer with flat side toward spacer.



18. Rotate washer 1/2 spline, and reinstall key (inset).



19. Using two wood blocks and two large screwdrivers to evenly spread 1st and 2nd speed gear check clearance with feeler gage between spacer and 1st speed gear. Correct clearance is .005" to .012". If it is necessary to adjust clearance, change tolerance washer in 1st gear.



20. Remove key and install white color coded tolerance washer, flat side facing up, in reverse speed position. Reinstall key.

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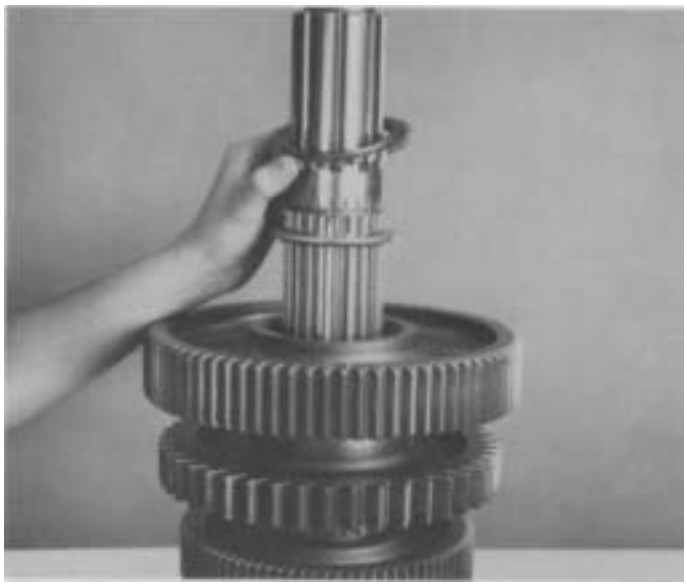
REASSEMBLY - FRONT SECTION



21. Install spacer, shoulder side facing up, against tolerance washer.

23. Install washer, with tapered side facing up, against reverse gear.

22. Install reverse gear, clutching teeth facing down. Engage clutching teeth of gear with external splines of spacer.

24. Apply downward pressure against spacer and check clearance between spacer and reverse gear with feeler gage. Correct clearance is .005" to .012". If it is necessary to adjust clearance, change tolerance washer in reverse gear.

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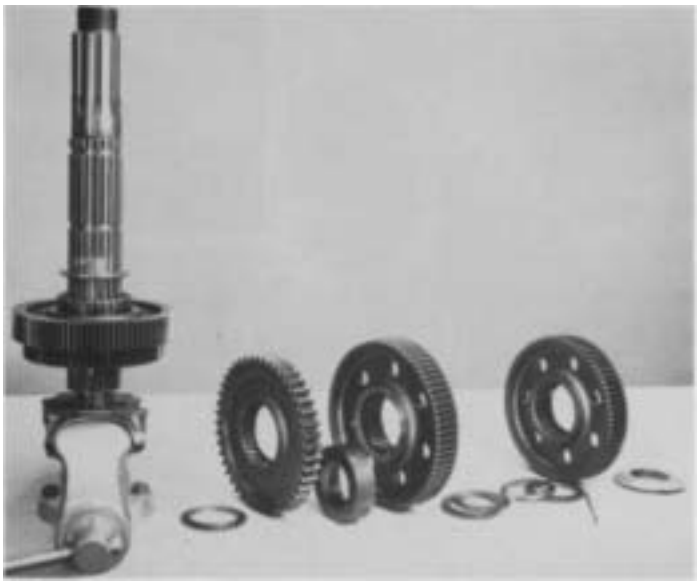
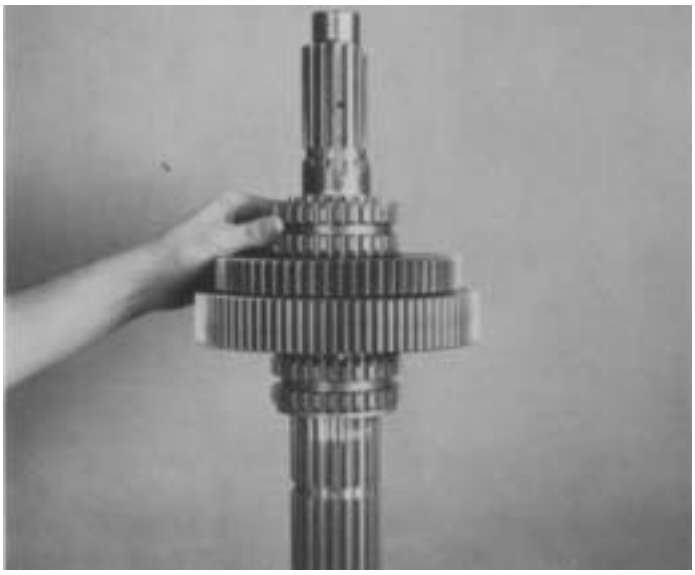
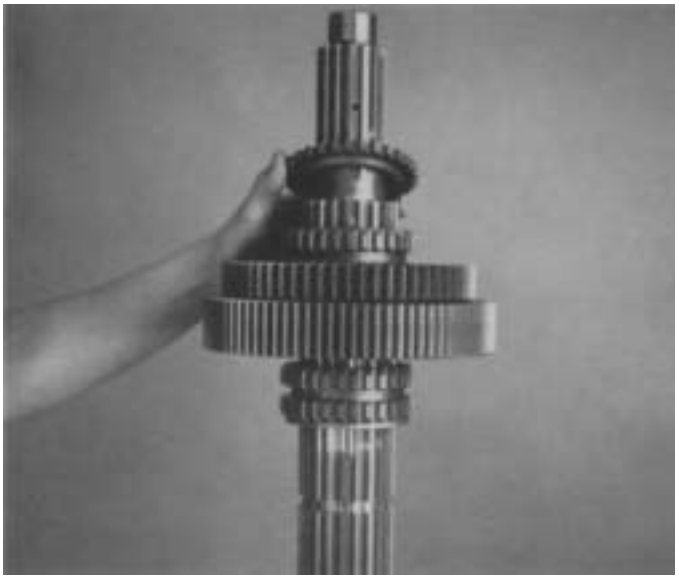
REASSEMBLY - FRONT SECTION



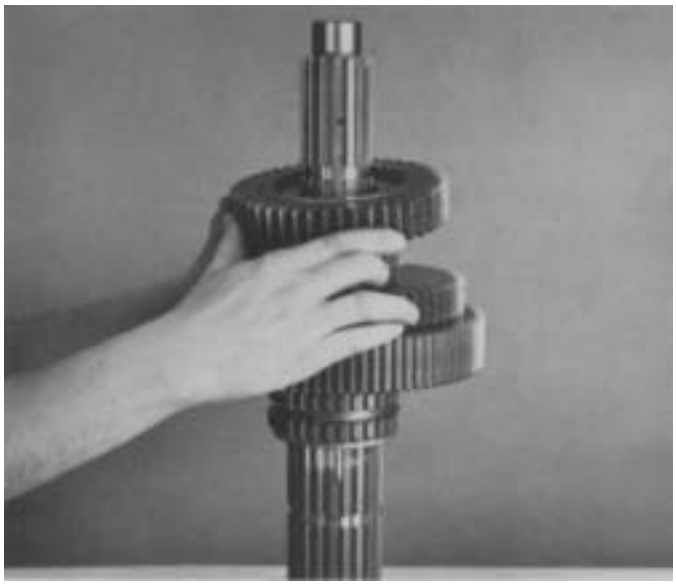
25. Remove spacer, reverse gear externally splined spacer, key, tolerance washer, 1st speed gear tolerance washer, 1st speed gear spacer, 1st speed gear, 1st and 2nd gear spacer, 2nd speed gear and its externally splined spacer from mainshaft. Keep related spacers and tolerance washers with gears. Do not mix these parts after you have set axial clearance between the gears.



26. Remove mainshaft assembly from vise. Reinstall in vise with front of mainshaft facing up. Install 4th-5th speed sliding clutch, aligning missing internal spline of sliding clutch with key in mainshaft.



27. Install 5th gear spacer, flat side facing up.



28. Install 5th speed gear with clutching teeth facing down. Engage clutching teeth of gear with external splines of spacer.

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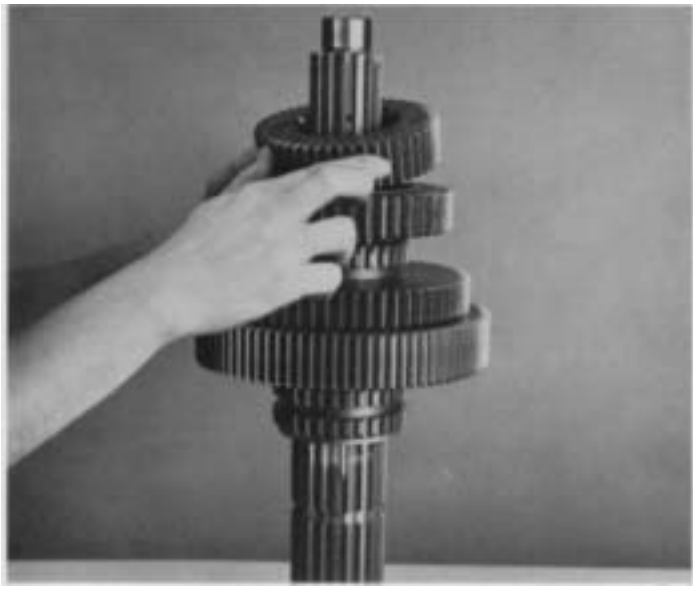
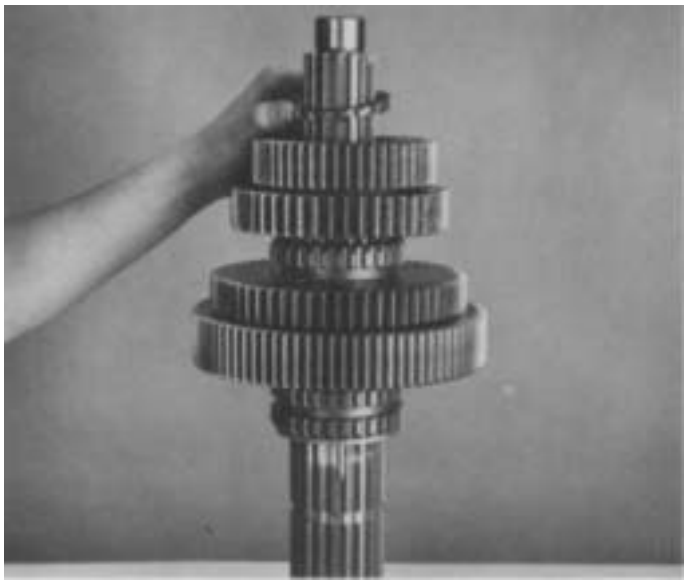
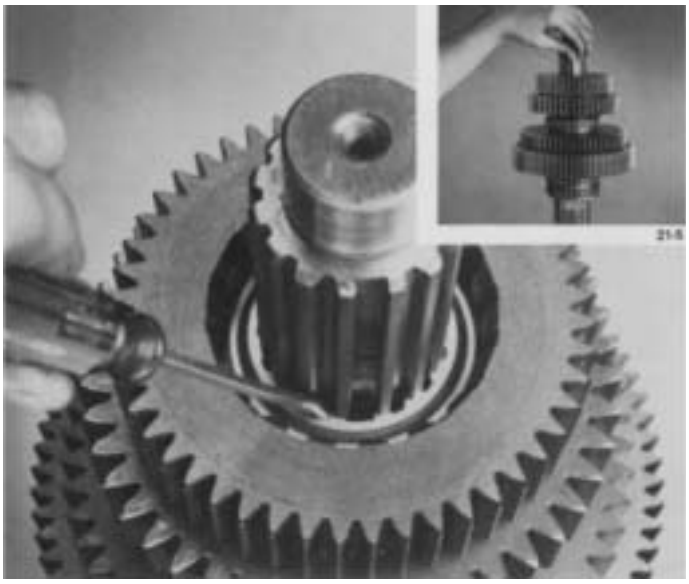
REASSEMBLY-FRONT SECTION



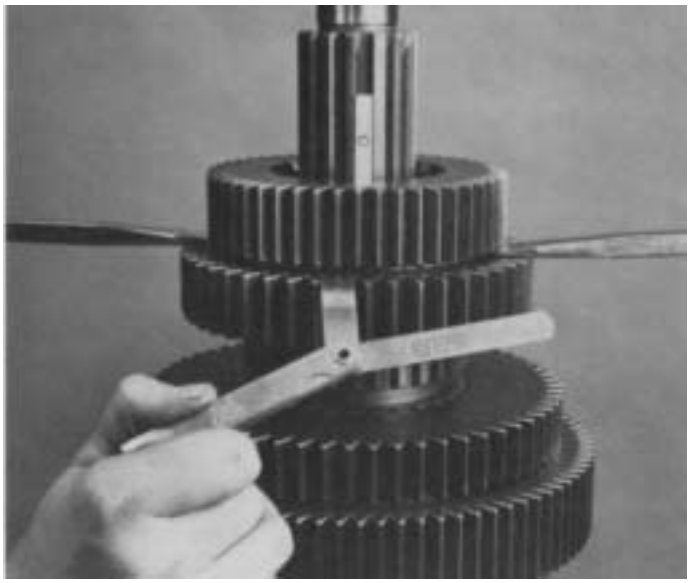
29. Install 6th speed gear with clutching teeth facing up, against 5th speed gear.



30. Install spacer in 6th speed gear.



31. Install tolerance washer with flat side facing down, against spacer. Rotate washer to align square notch in washer with keyway in mainshaft and install short key (inset).



32. Check clearance and make adjustments if necessary, between 5th and 6th speed gears. (In the same manner as performed in step #9).

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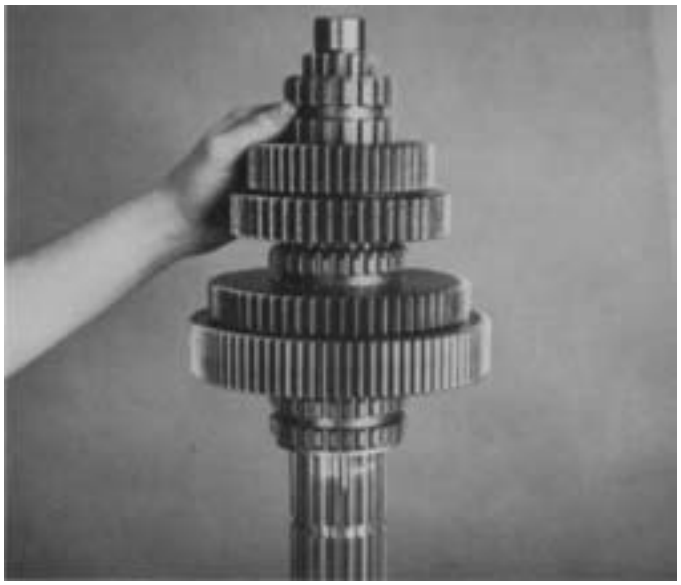
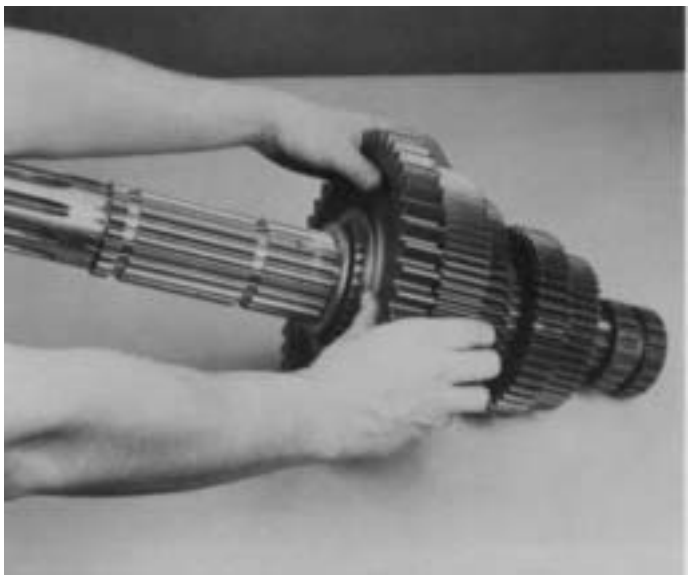
REASSEMBLY - FRONT SECTION

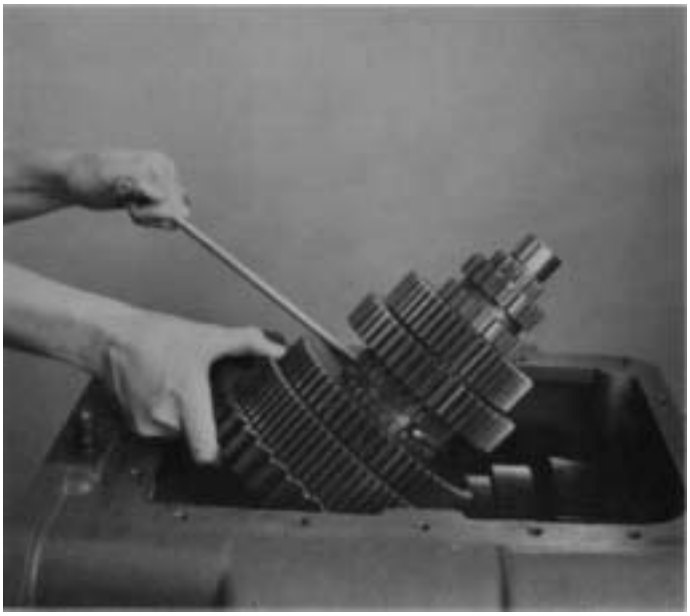


33. Install 6th and 7th speed sliding clutch, aligning missing internal spline of clutch with key in mainshaft.

23. Install washer, with tapered side facing up, against reverse gear.



34. Place mainshaft assembly on bench. Remove snap ring from rear of 2nd speed gear. Install 2nd speed gear on rear of mainshaft engaging 2nd and 3rd speed clutch.



36. Lower mainshaft assembly into position with 2nd gear next to 3rd gear. Use a mainshaft hook if available to ease assembly.

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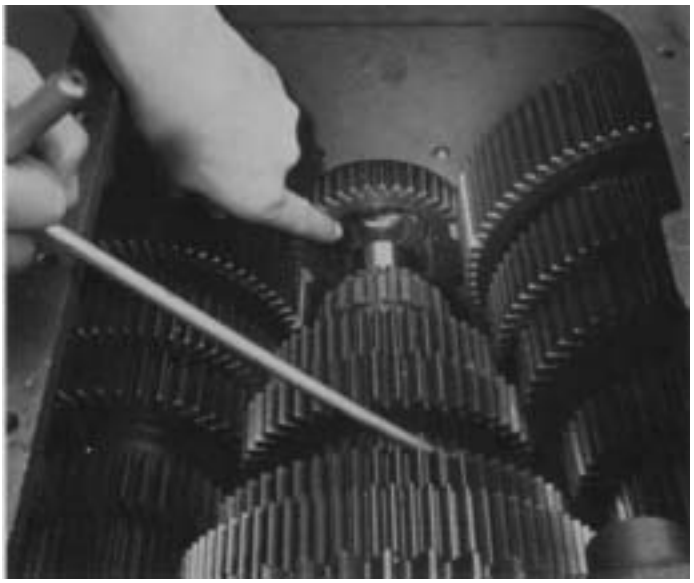
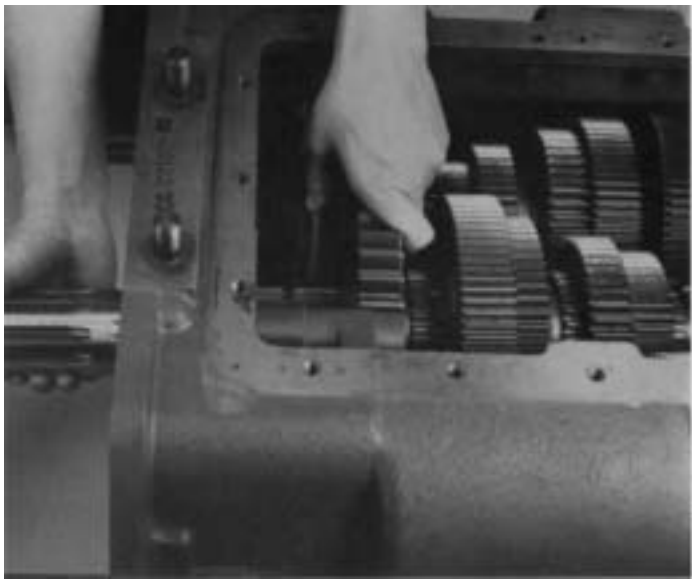
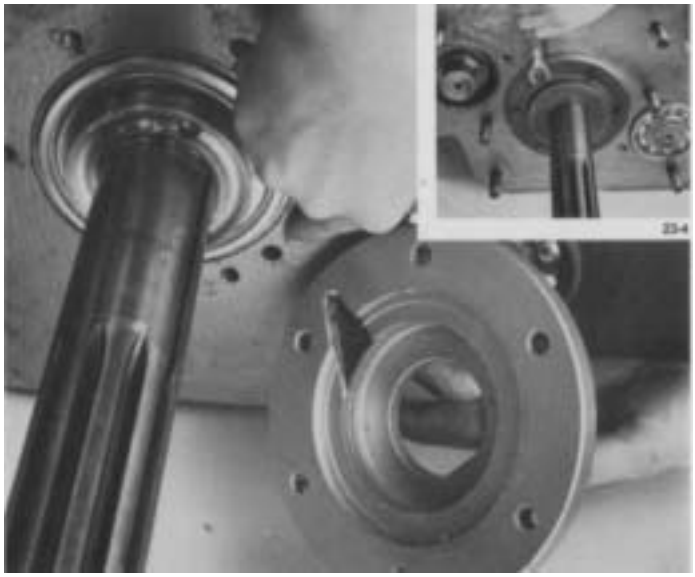
REASSEMBLY - FRONT SECTION



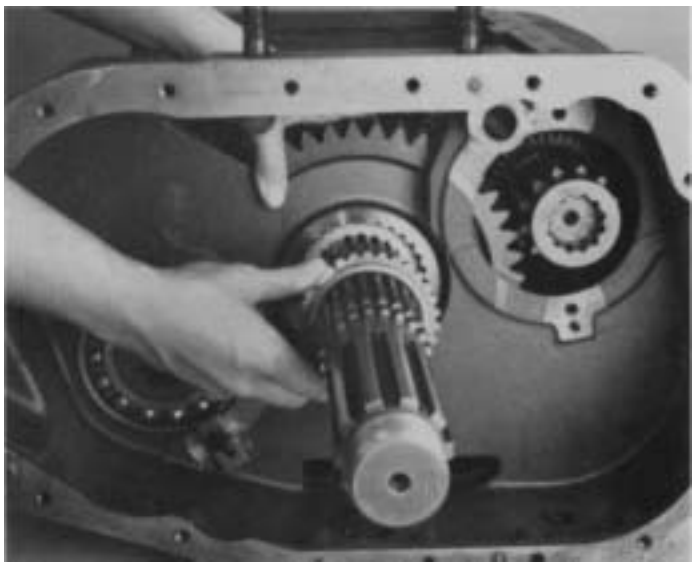
37. Lower pilot end of mainshaft into position with pocket bushing of input shaft.



39. Move 2nd speed gear to the rear.
NOTE: Pick up on mainshaft to aid in centering 2nd gear.



38. Drive input shaft assembly into case. Install a gasket, bearing cover, capscrews, making sure oil return holes are aligned (inset).



40. Install spacer into 2nd speed gear, step to the rear.

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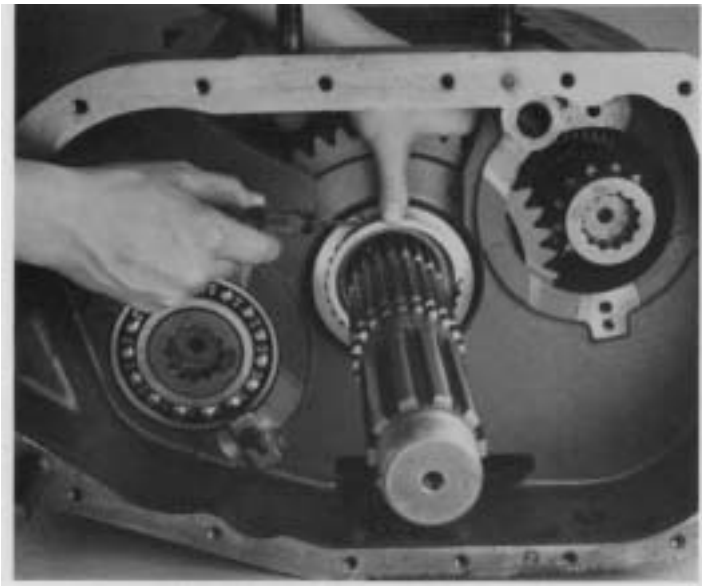
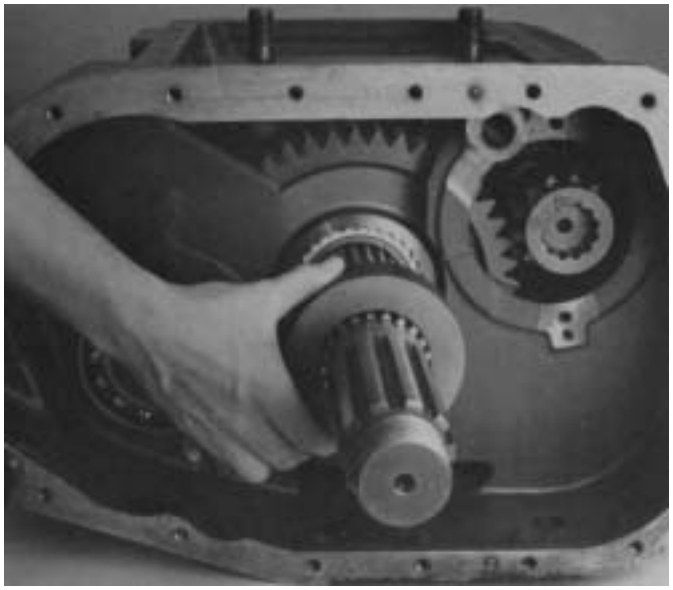
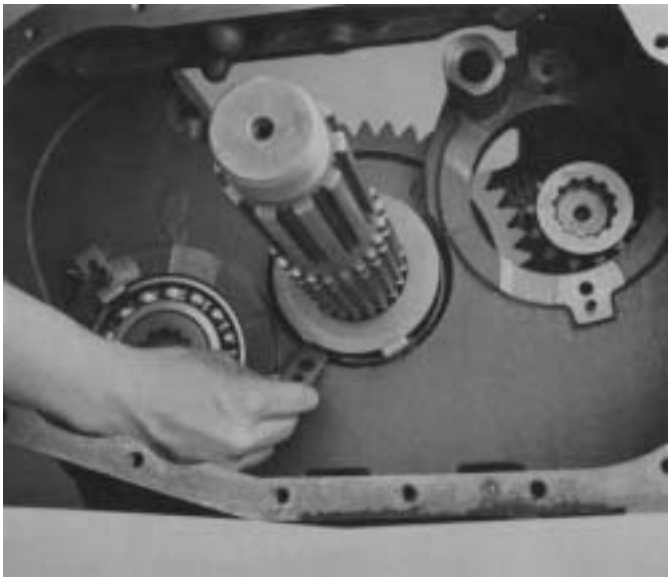
REASSEMBLY - FRONT SECTION



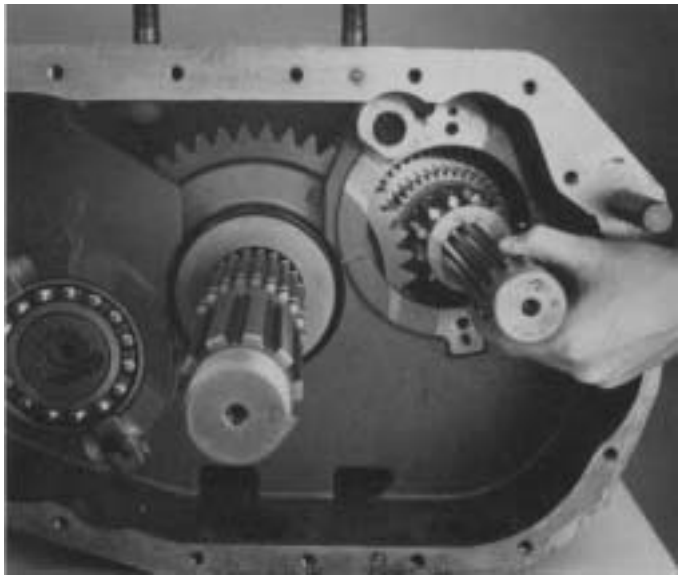
41. Using a small screwdriver, install snap ring into 2nd speed gear.



42. Install large spacer on mainshaft and against rear of 2nd speed gear.



43. NOTE: To center rear of mainshaft, place the two rear countershaft bearing retainer tabs between bore in case wall and 1st-2nd gear spacer.



44. Temporarily install rear countershaft into maincase countershaft to aid in centering maincase countershaft in bearing bore.

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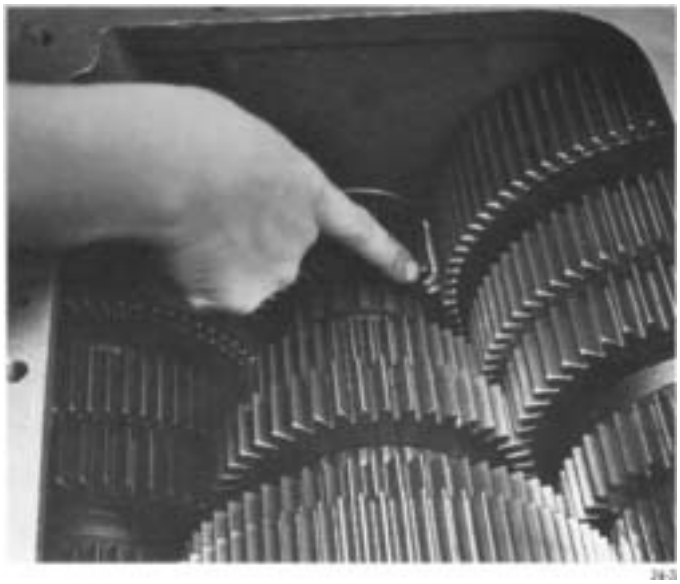
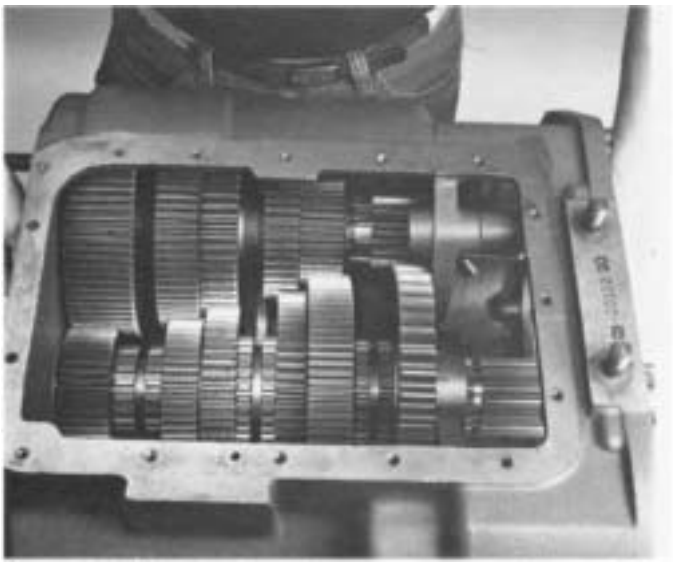
REASSEMBLY - FRONT SECTION

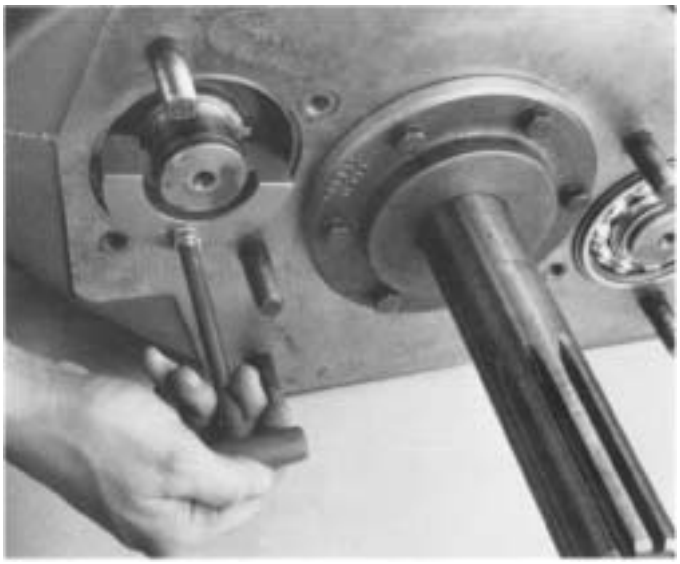
45. Check to make sure that the timing tooth on left countershaft drive gear remained in mesh with marked timing teeth of main drive gear.



47. Mesh the marked tooth of right countershaft drive gear with remaining set of two marked teeth on main drive gear.



46. Remove blocking from front of right countershaft assembly and place it parallel to mainshaft assembly.



48. Install countershaft support tool in front bearing bore.

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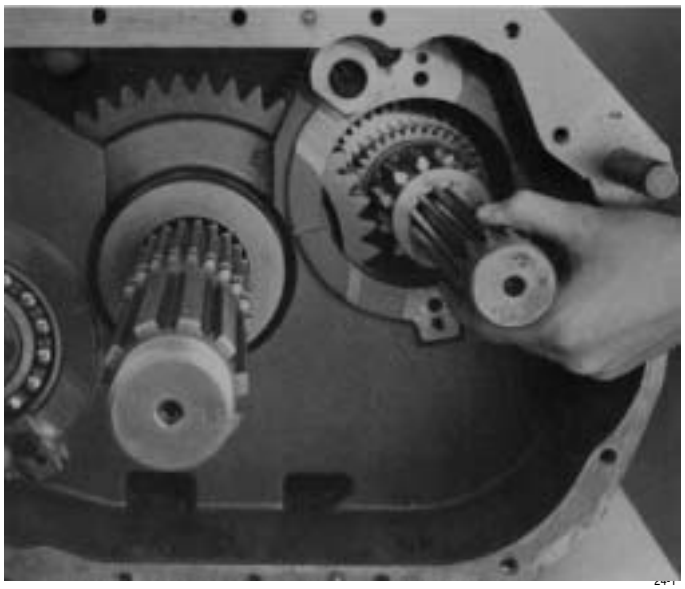
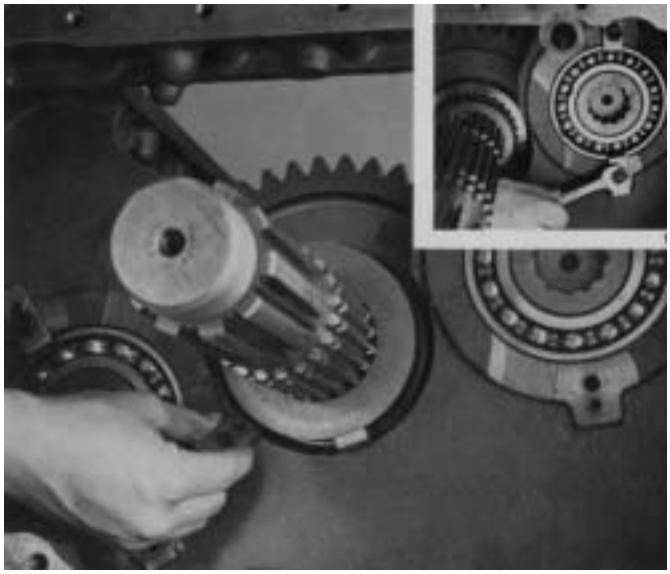
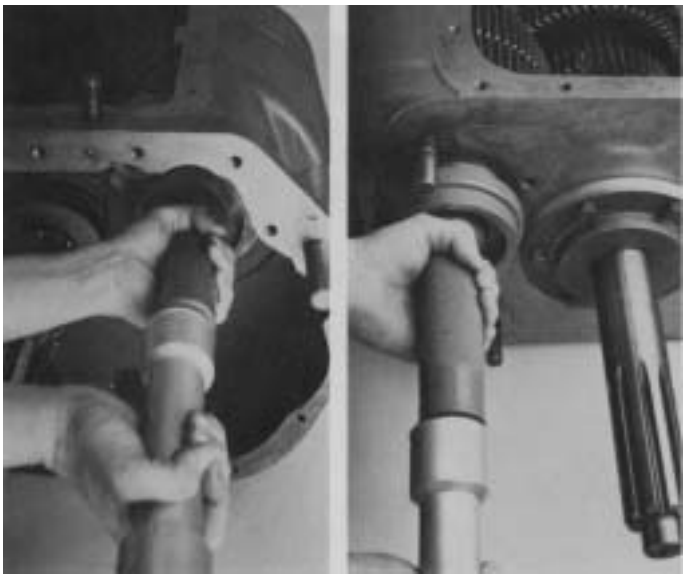
REASSEMBLY - FRONT SECTION



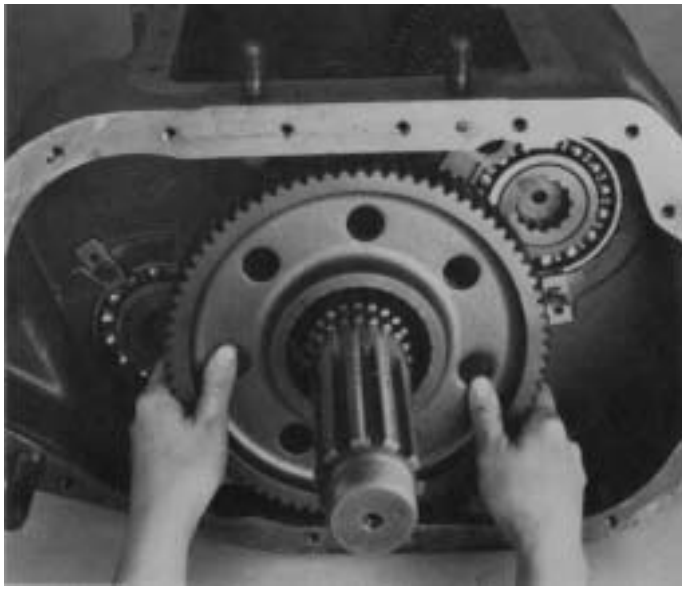
49. Remove rear countershaft.



51. Remove retainer tabls from under 1st and 2nd gear



50. Install rear and front countershaft bearings with flanged bearing driver.



52. Install 1st gear on mainshaft, clutching teeth of gear to the rear.

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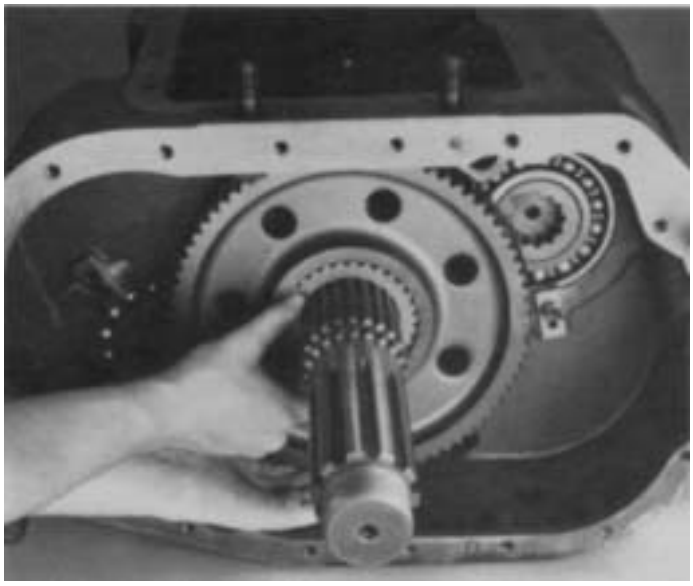
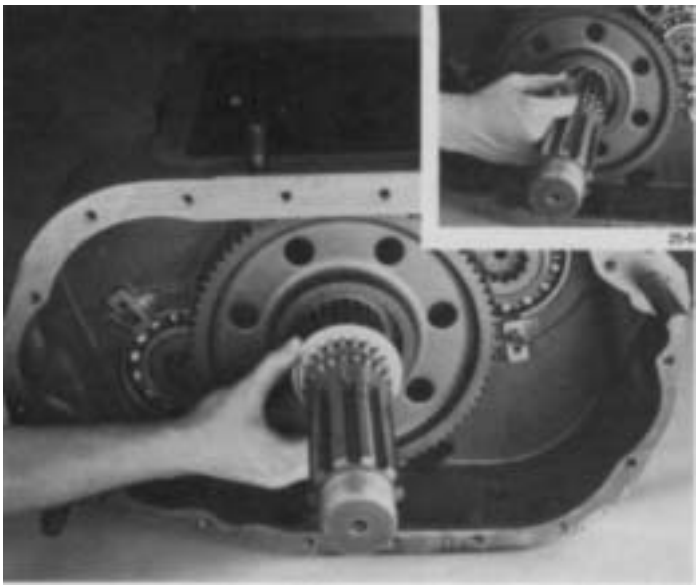
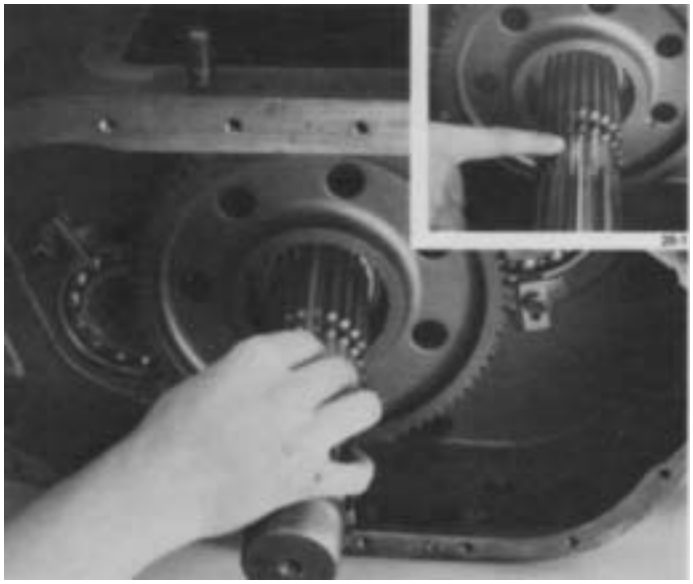
REASSEMBLY-FRONT SECTION



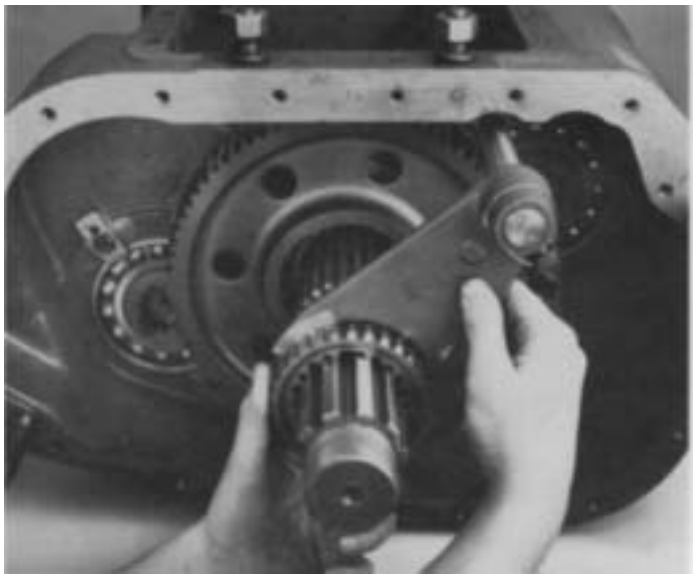
53. Pick up on 1st gear and install spacer, step towards front of the transmission.
NOTE: Make sure you install all mainshaft spacers and washers in same position that was used previously in setting mainshaft tolerances.



54. Install tolerance washer, flat side towards spacer. Rotate washer to align splines with screwdriver (inset).



55. Install mainshaft key in keyway of mainshaft marked with "O" (inset).



56. Install 1st/reverse clutch, shift fork, and rail.
NOTE: Missing tooth in clutch must be aligned with key.

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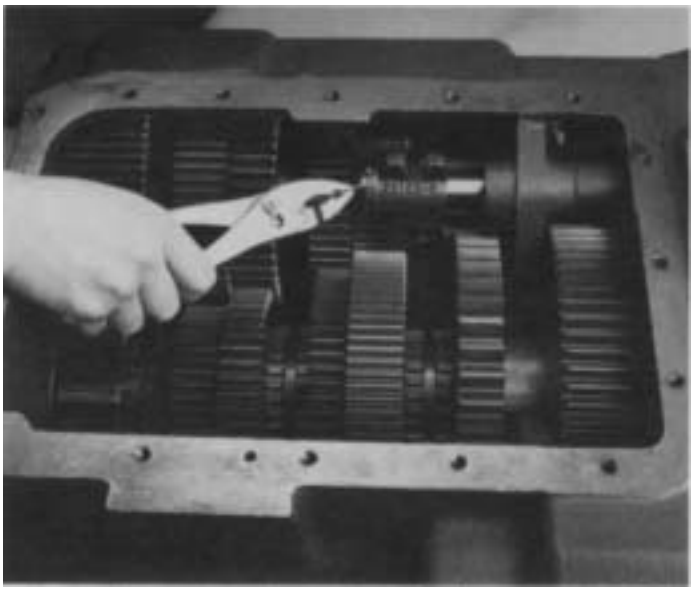
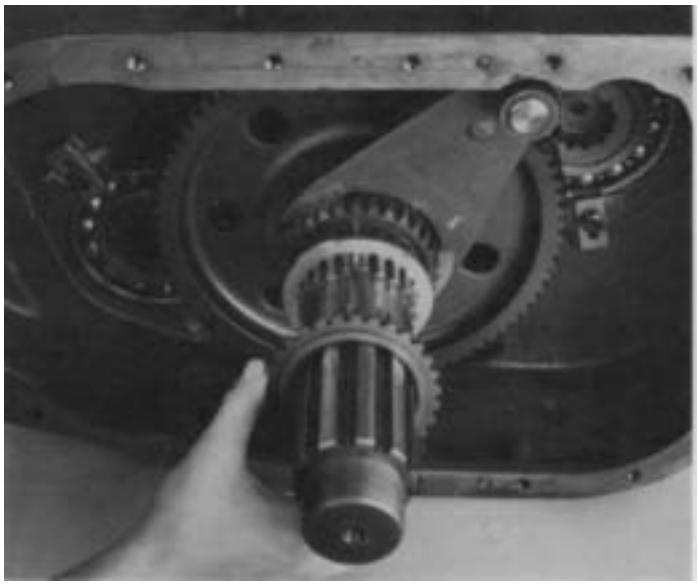
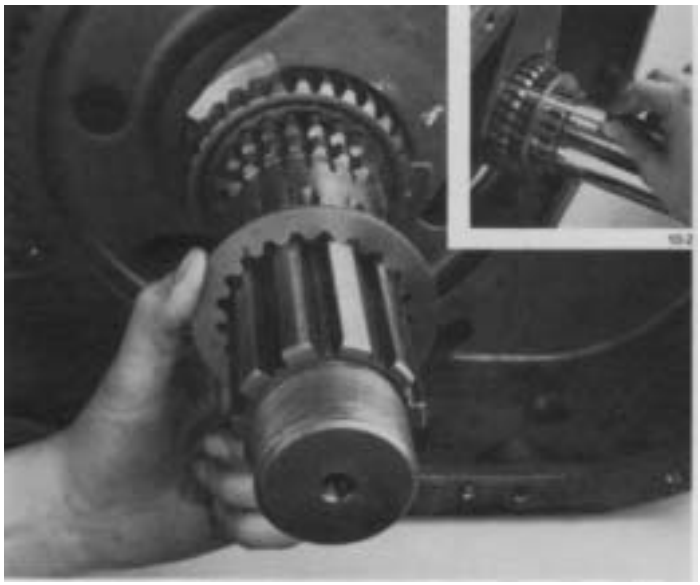
REASSEMBLY - FRONT SECTION



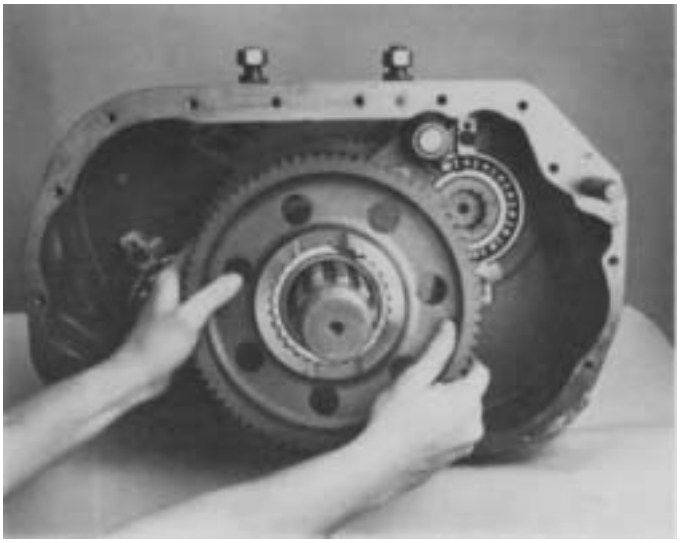
57. Install 1st reverse shift blosk and capscrew, lock wire securely.
NOTE: Machined surface of shift block should be installed towards mainshaft.



59. Install spacer, stepped side to the rear of transmission.



58. Remove mainshaft key and install reverse gear tolerance washer, flat side to rear of transmission. Reinstall key (inset).



60. Install reverse gear, clutching teeth toward the clutch.

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REASSEMBLY - FRONT SECTION

61. Install chamfer spacer, flat side toward reverse gear.

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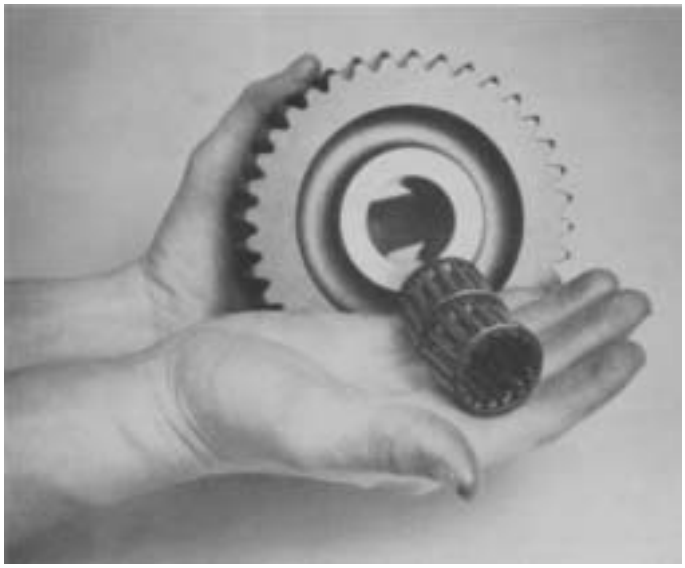
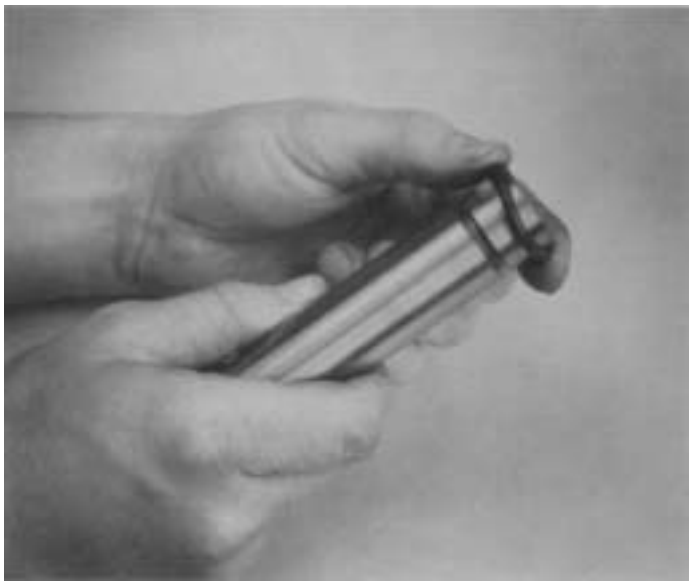
REASSEMBLY AND INSTALLATION - REAR HOUSING

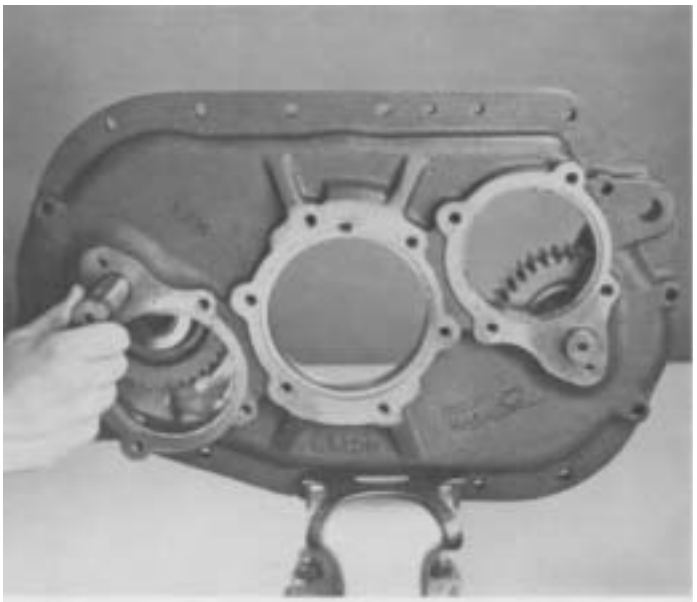
A. Reassembly - Rear Housing



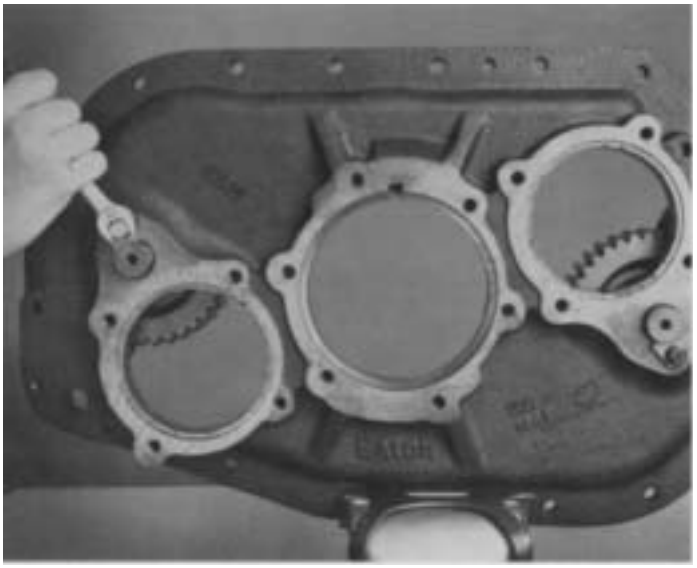
1. Install bearings into reverse idler gears.



2. If previously removed, install O-ring on reverse idler shafts.



3. Position reverse idler gears in rear housing and install reverse idler shafts aligning slot in shafts with retainer capscrew holes.



4. Place reverse idler retainers in slot of idler shafts and install capscrews.

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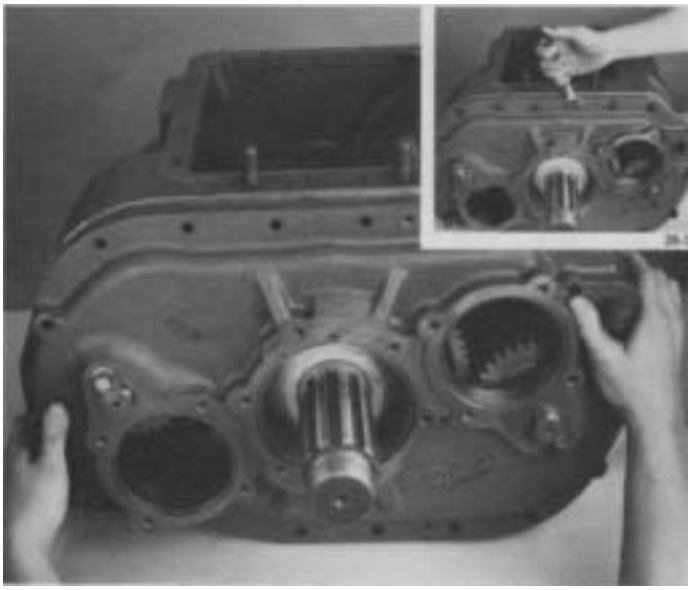
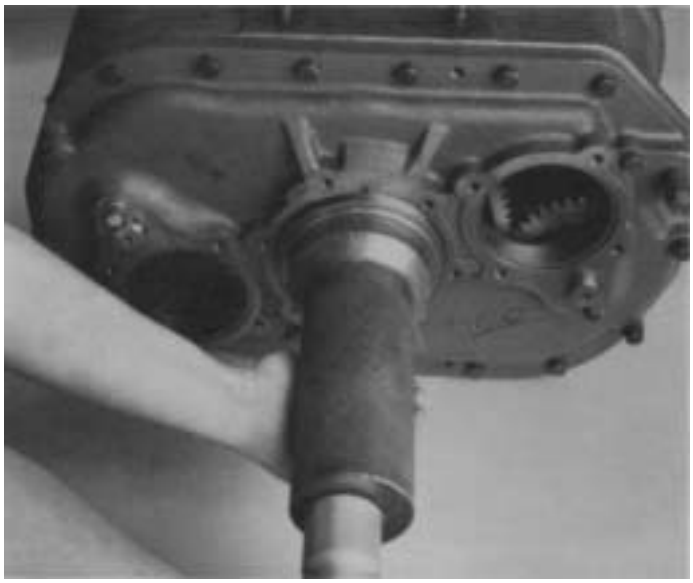
REASSEMBLY AND INSTALLATION - REAR HOUSING

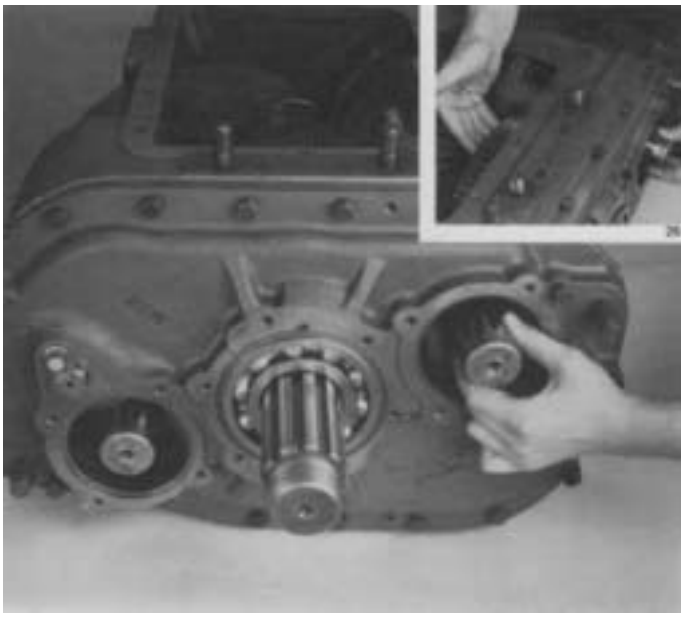
B. Installation - Rear Housing



1. Position rear housing on dowel pins and install capscrews (inset).



2. Using a flanged driver, install output shaft bearing.
NOTE: Pick up on output shaft to help start rear bearing into bore.



3. Install rear countershaft.
NOTE: When installing upper countershaft, pick up on first speed gear. This will aid in aligning the shaft (inset).

4. In models so equipped, install snap rings in groove of rear countershaft.

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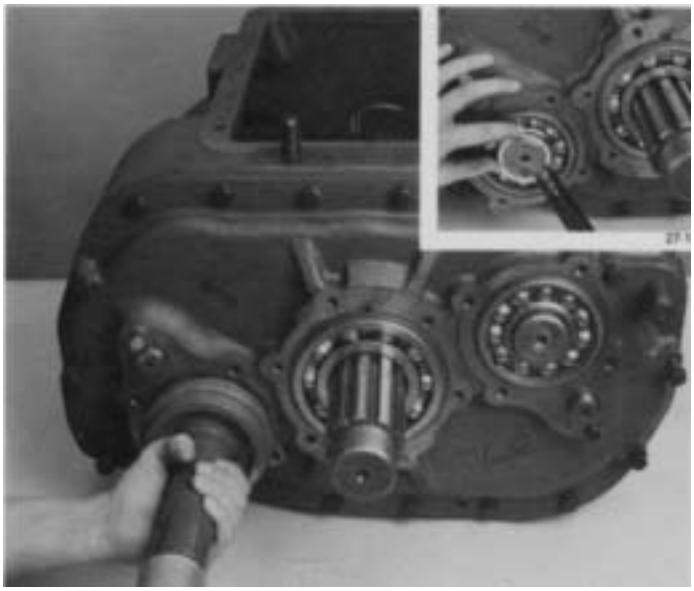
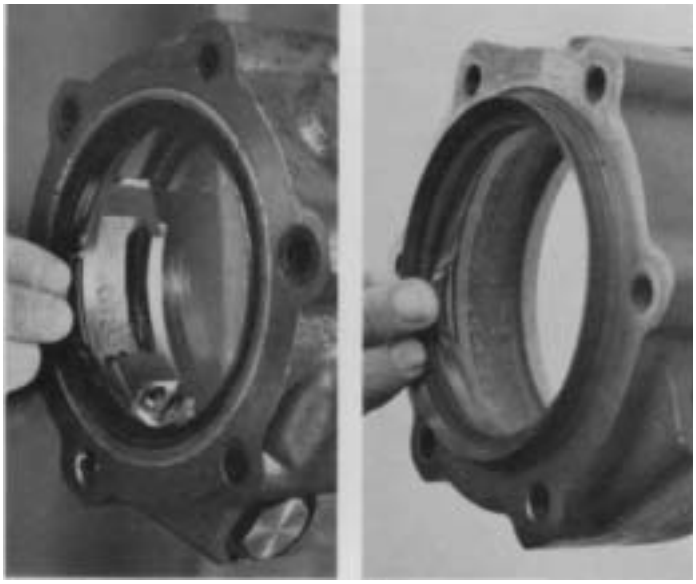
REASSEMBLY AND INSTALLATION - REAR HOUSING

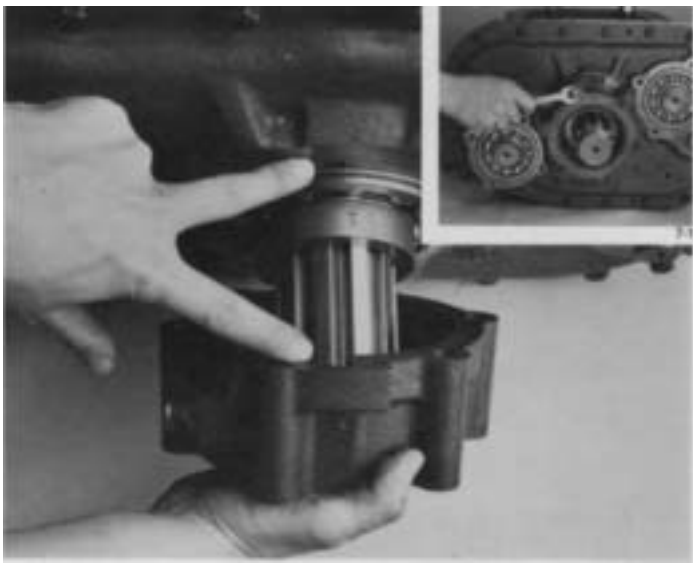


5. Using a flanged driver, install rear countershaft bearings and retaining snap rings (inset).

6. Install output shaft spacer.



7. If previously removed, instll the oil seal in rear bearing cover. Seal should be installed so the spring is to the front of the cover.



8. Align rear bearing cover oil return hole with the hole in rear housing. Install rear cover capscrews (inset).

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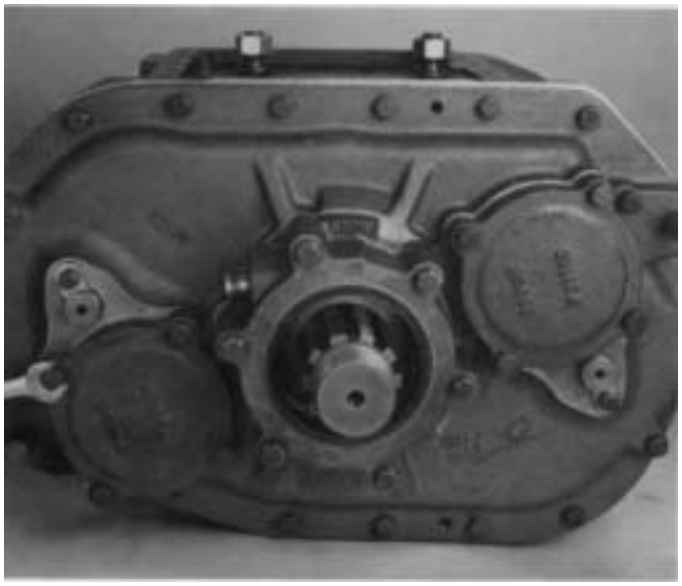
REASSEMBLY AND INSTALLATION - REAR HOUSING



9. Install countershaft rear bearing covers.

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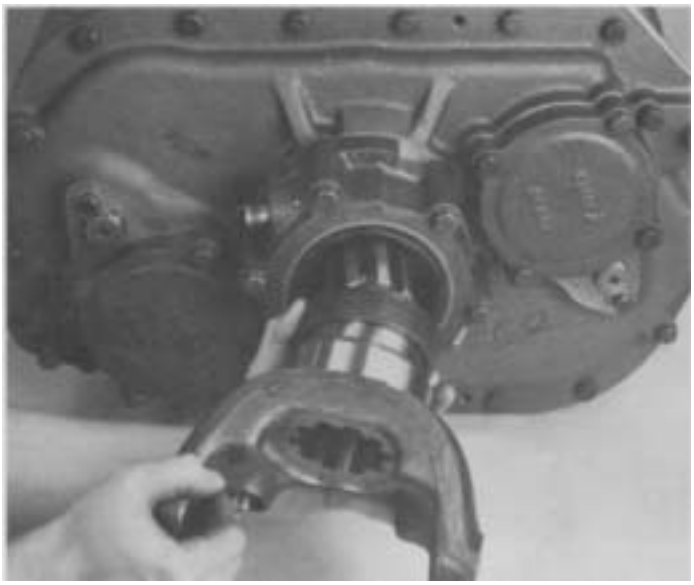
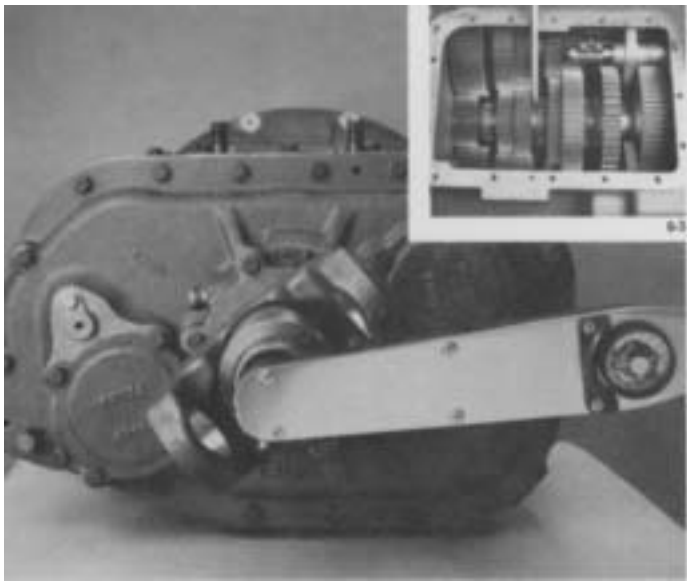
INSTALLATION - COMPANION FLANGE AND CLUTCH HOUSING

A. Installation - Companion Flange

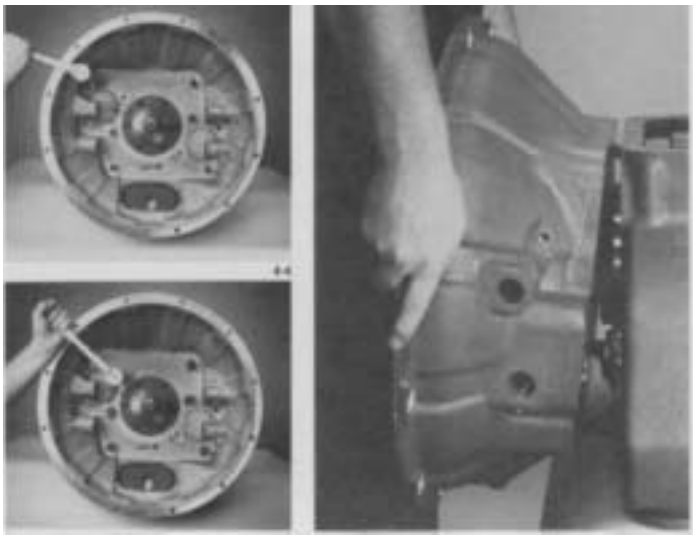


1. Install the speedometer drive gear or spacer and yoke.



2. Lock the transmission by engaging two main-shaft gears with sliding clutches (inset). Install output shaft stop nut and torque to 450-500 lbs./ft.

B. Installation - Clutch Housing



1. Position housing on the six studs and drive gear bearing cover (right). Install six nuts and lock-washers and four capscrews to recommended torque.

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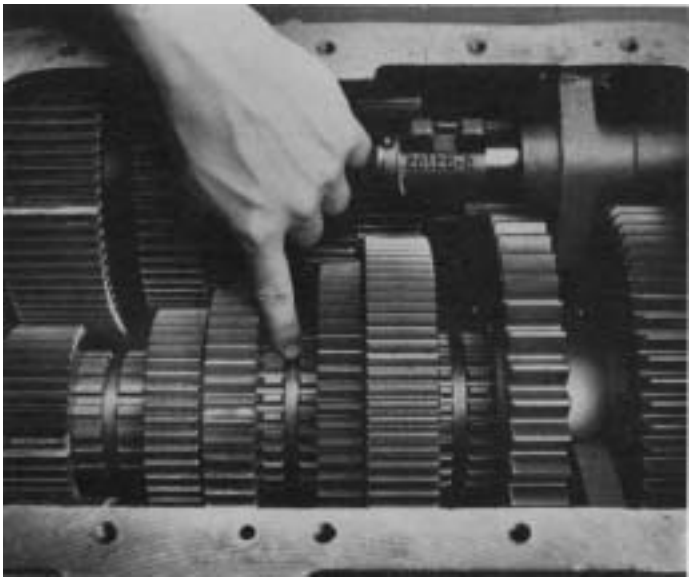
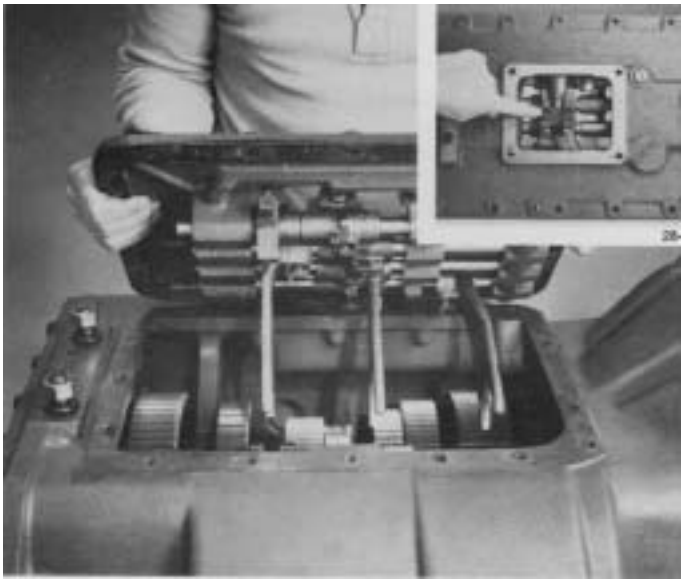
INSTALLATION - SHIFTING CONTROLS

A. Installation - Shaft Bar Housing

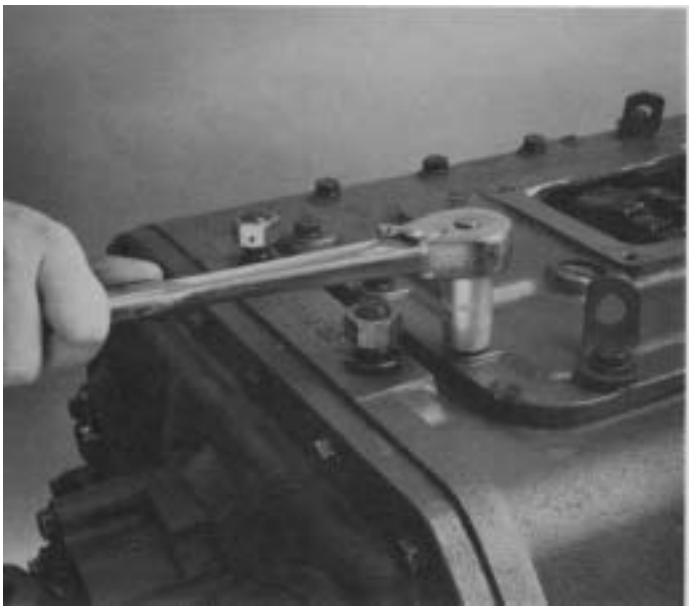


1. Place mainshaft sliding clutches in neutral.



29.1

2. With shift bars in neutral position (inset), install shift bar housing on case, fitting shift yokes into slots of sliding clutches.



3. Install retaining capscrews to recommended torque. Use the two longer capscrews at lifting eye locations.

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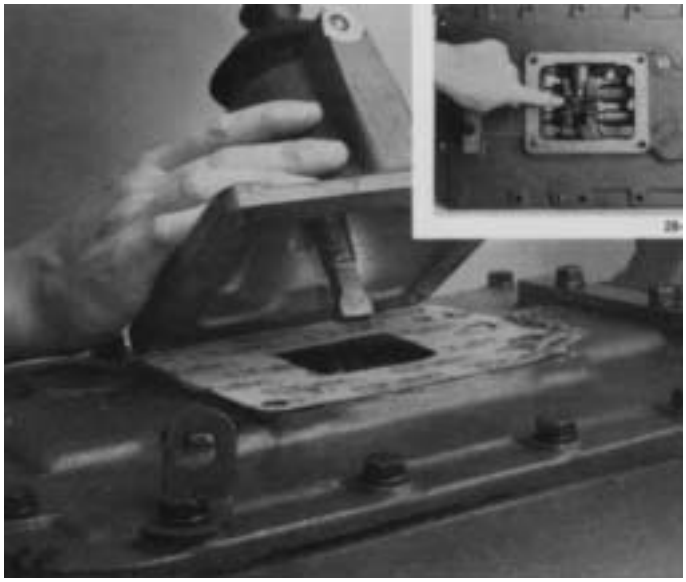
INSTALLATION - SHIFTING CONTROLS

B. Installation - Gear Shift Lever Housing



1. Check the shift bar housing assembly to make sure shift block notches are in the neutral position (inset). Install gear shift lever housing on shift bar housing fitting the lever tip into shift block notches.

2. Install retaining capscrews in housing flange.

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