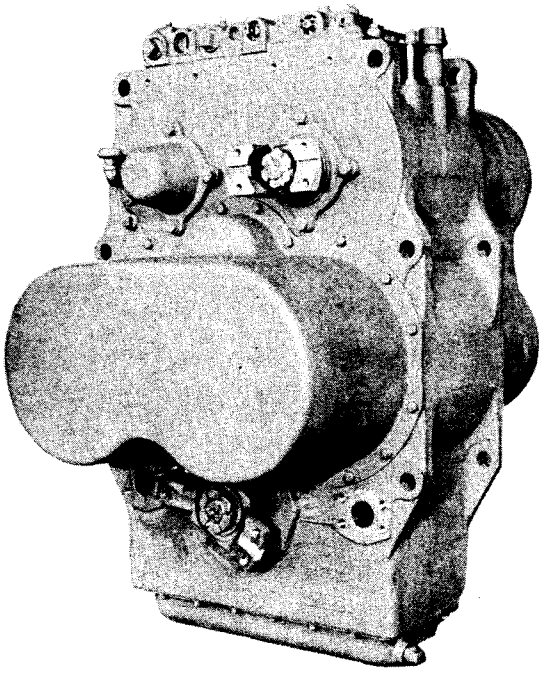
CLARK®

TRANSMISSION

MAINTENANCE
&
SERVICE MANUAL



5420 **SERIES**

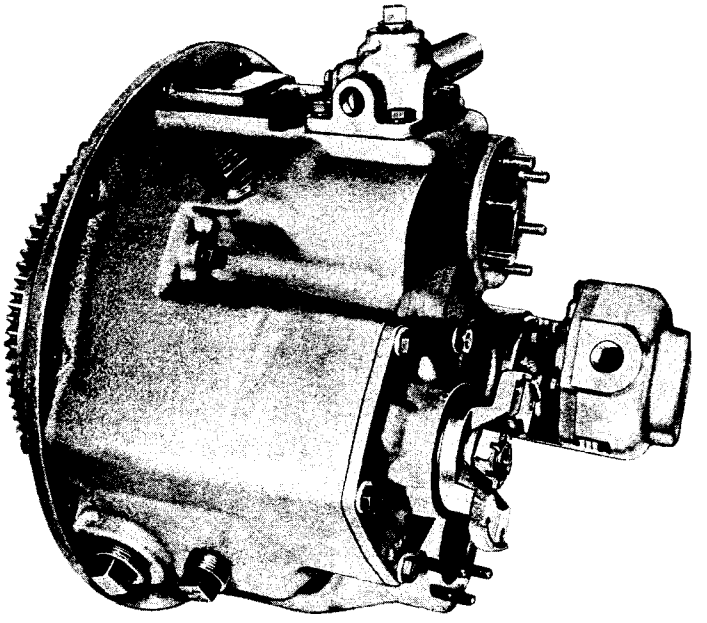
CLARK EQUIPMENT COMPANY

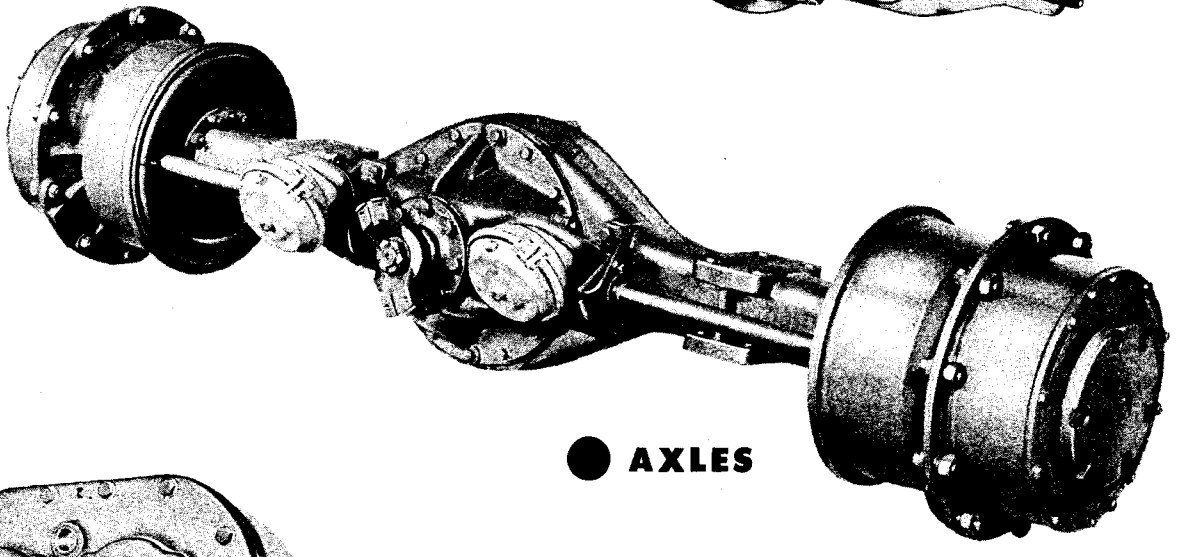
CUSTOMER SERVICE DIVISION

PUBLICATION DEPT. — JACKSON, MICHIGAN

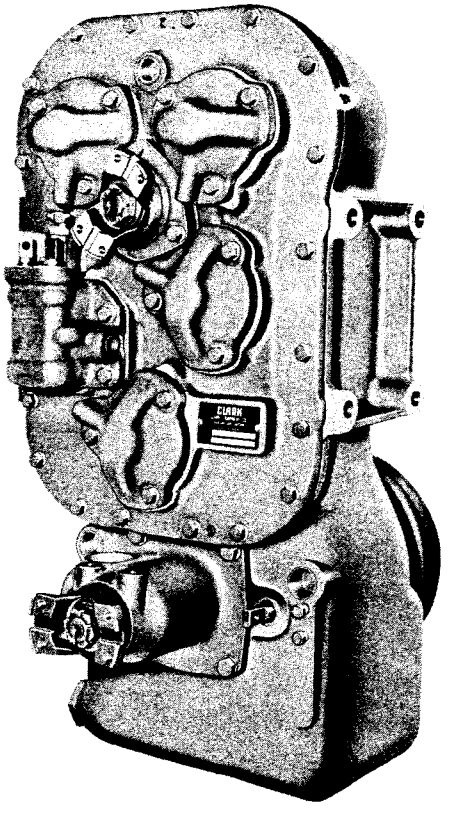
SM-54 REV. 12-65

● **TORQUE CONVERTERS**
UP TO 1000 HORSEPOWER





● **AXLES**



● **TRANSMISSIONS**
UP TO 1000 HORSEPOWER

FOREWORD

This manual has been prepared to provide the customer and the maintenance personnel with information and instructions on the maintenance and repair of the **CLARK** Power Shift Transmission.

Extreme care has been exercised in the design, selection of materials and manufacturing of these units. The slight outlay in personal attention and cost required to provide regular and proper lubrication, inspection at stated intervals, and such adjustments as may be indicated will be reimbursed many times in low cost operation and trouble free service.

In order to become familiar with the various parts of the transmission, its principal of operation, trouble shooting and adjustments, it is urged that the mechanic study the instructions in this manual carefully and use it as a reference when performing maintenance and repair operations.

Whenever repair or replacement of component parts is required, only Clark-approved parts as listed in the applicable parts manual should be used. Use of "will-fit" or non-approved parts may endanger proper operation and performance of the equipment. The Clark Equipment Company does not warrant repair or replacement parts, nor failures resulting from the use thereof, which are not supplied by or approved by the Clark Equipment Company. IMPORTANT: **Always furnish the Distributor with the transmission serial and model number when ordering parts.**

TABLE OF CONTENTS

The transmission portion of the power train enacts an important role in delivering engine power to the driving wheels. In order to properly maintain and service these units it is important to first understand their function and how they operate.

The transmission and torque converter function together and operate through a common hydraulic system. To obtain maximum serviceability they have been designed and built as separate units. It is necessary, however, to consider both units in the study of their function and operation.

To supplement the text below, and for references use therewith, the following illustrations are provided:

Fig. A — Front and Rear View, Shaft Identification
Fig. B — Transmission Case and Internal Tubing
Fig. C — Control Cover Assembly
Fig. D — Output Shaft Group — "O"
Fig. E — Idler Shaft Group — "I"
Fig F — Input and Forward Drive Shaft Group—"F"
Fig. G — Reverse Drive Shaft Group — "R"
Fig. H — 2nd and 4th Drive Shaft Group — "A"
Fig. I — 1st and 3rd Drive Shaft Group — "B"
Fig. J — External Oil Flow—Converter and Transmission.

HOW THE UNITS OPERATE —

With the engine running, the converter charging pump draws oil from the transmission sump and directs it through oil filters to the regulating valve located on top of the transmission. From the regulating valve it is then directed through the control cover on the transmission to the converter and to the transmission clutches.

The pressure regulating valve mounted on the top of the transmission remains closed until required pressure is delivered to the transmission for actuating the direction and speed clutches. This regulator valve consists of a hardened valve spool operating in a closely fitted bore. The valve spool is backed up by a spring to hold the valve spool against its seat until the oil pressure builds up to the specified pressure. The valve spool then moves toward the spring until a port is exposed along the side of the bore. The oil can then flow through this port into a distributor which directs the oil into the converter inlet port.

After entering the converter, the oil is directed through the stator support to the converter cavity and exits between the turbine shaft and converter support. The oil then passes through an oil distributor which directs the oil out of the converter by way of a down stream regulator valve and then to the oil cooler. After leaving the cooler the oil is directed through a hose to the lubricating oil inlet on the transmission, then through a series of tubes to the transmission, bearings, and clutches. The oil then returns to the transmission sump.

A safety valve is built in the transmission control cover and will open to bypass oil only if an excessive pressure is built up due to a blocked passage.

The rear compartment of the converter unit also houses the converter output shaft. A flexible hose provides an overflow to the transmission sump.

The three members of the torque converter are composed of a series of blades. The blades are curved in such a manner as to force the oil to circulate from the impeller to the turbine, through the reaction member again into the impeller. This circulation causes the turbine to turn in the same direction as the impeller. Oil enters the inner side of the impeller and exits from the outer side into the outer side of the turbine. It then exits from the inner side of the turbine and after passing through the reaction member, again enters the inner side of the impeller.

Converter "Stall" is achieved whenever the turbine and impeller shaft are stationary and the engine is operating at full power or wide open throttle. CAUTION: Do not maintain "Stall" for more than 30 seconds at a time. Excessive heat will be generated and may cause converter or transmission seal damage.

In converters equipped with Lock-up clutches, a hydraulic clutch, similar to the transmission clutches is used to "lock" the engine mechanically to the output shaft. This is accomplished by hydraulic pressure actuating the lock-up clutch which in turn locks the impeller cover to the turbine hub. During lock-up the converter turns at 1 to 1 speed ratio.

The down stream regulator valve on the converter consists of a valve body and regulator spool. The spool is backed up by a spring to hold the valve until converter oil pressure builds up to specified pressure. The valve is used to maintain a given converter pressure to insure proper performance under all conditions.

The control valve assembly on the transmission consists of a valve body with selector valve spools connected to the steering column by exterior linkage. A detent ball and spring in the selector spool provides four positions, one position for each speed range. A detent ball and spring in the direction spool provides three positions, one each for forward, neutral, and reverse.

On certain models, this valve also contains a shut-off valve spool operated by an air or hydraulic cylinder located on the control cover. This valve is connected to the brake system by a hose line. When the wheel brakes are applied, air or hydraulic fluid enters the valve and overcomes a spring force. This forces the spool to shift over and block pressure from entering the directional clutches. In this manner a "neutral" is established without moving the control levers.

With the engine running and the directional control lever in neutral position, oil pressure is blocked at the control valve, and the transmission is in neutral. Movement of the forward and reverse spool will direct oil, under pressure, to either the forward or reverse direction clutch as desired, and the opposite one is open to relieve pressure.

The direction or speed clutch assembly consists of a drum with internal gear teeth and a bore to receive a hydraulically actuated piston. A piston is inserted into the bore of the drum. The piston is "oil tight" by the use of sealing rings. A bronze disc with internal teeth is inserted into the drum and rests against the piston. Next, a disc with splines at the outer diameter is inserted. Discs are alternated until the required total is achieved. After inserting the last disc, a series of springs and pins are assembled in such a manner that these springs rest on teeth of the piston. A heavy back-up plate is then inserted and secured by a snap ring. A hub with I.D. and O.D. splines is inserted into the splines of discs with teeth on the inner diameter and a splined shaft extending through the clutch support. This hub is retained by a snap ring. The discs and inner shaft are free to increase in speed or rotated in the opposite direction as long as no pressure is present in the direction or speed clutch.

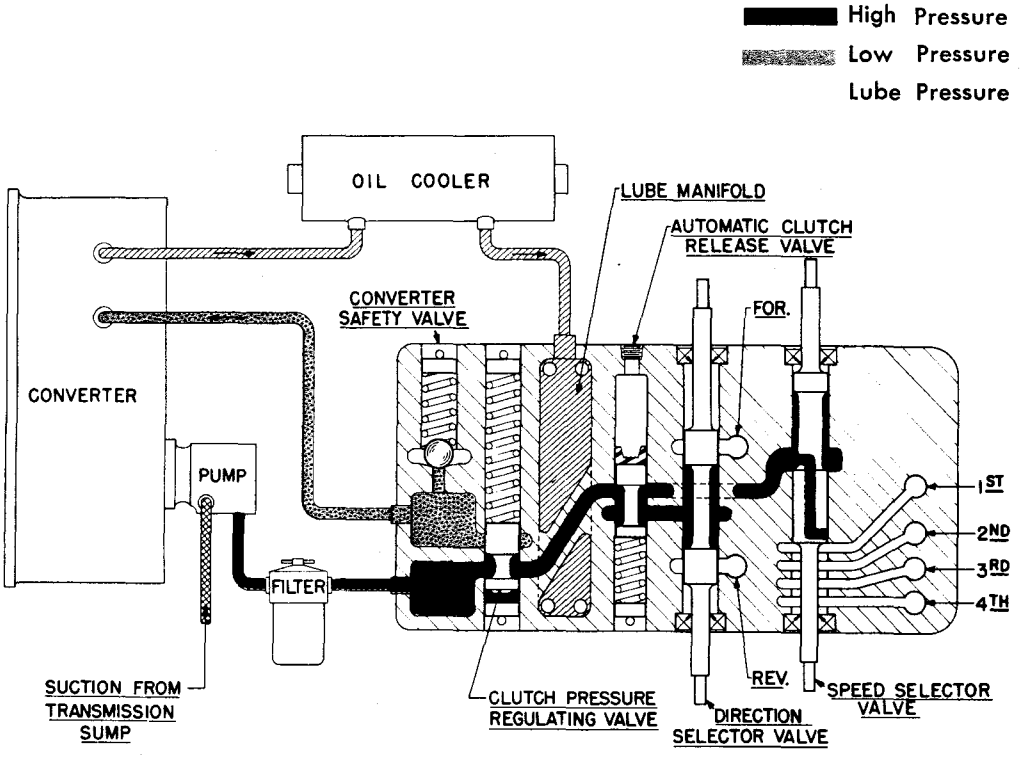
To engage the clutch, as previously stated, the control valve is placed in the desired position. This allows oil under pressure to flow from the control cover valve, through a tube in the transmission case, to a chosen clutch. Once into the drum, oil is directed through a drilled hole into the rear side of the piston bore. Pressure of the oil forces the piston and discs over against the heavy back-up plate. The discs, with teeth on the outer diameter, clamping against discs, with teeth on inner diameter, enables the clutch drum and drive shaft to be locked together and allows them to turn as a unit.

There are bleed balls in the clutch drums which allow quick escape for oil when the pressure to the piston is released.

The transmission gear train consists of six shafts: (1) Input Shaft, (2) Reverse Shaft, (3) Idler Shaft, (4) First and Third Shaft, (5) Second and Fourth Shaft, (6) Output Shaft.

A screen mounted in a frame is positioned on the bottom of the transmission case, to screen out any foreign material. This screen is covered by the sump pan. This pan is provided with magnets to catch any metallic particles.

Some transmissions may have an axle declutching unit as optional equipment, this unit consists of a split output shaft with a sliding splined sleeve to engage or disengage the axle. This is accomplished by manually shifting a lever in the operator's compartment which is mechanically connected to the shift fork on the clutching unit sliding sleeve. This unit, of course, is only used on the four wheel drive machine. On the front drive only or the rear wheel drive only, the output shaft is a one piece type and an output flange assembled only on the required end.



TRANSMISSION CONTROL COVER INTERNAL OILFLOW

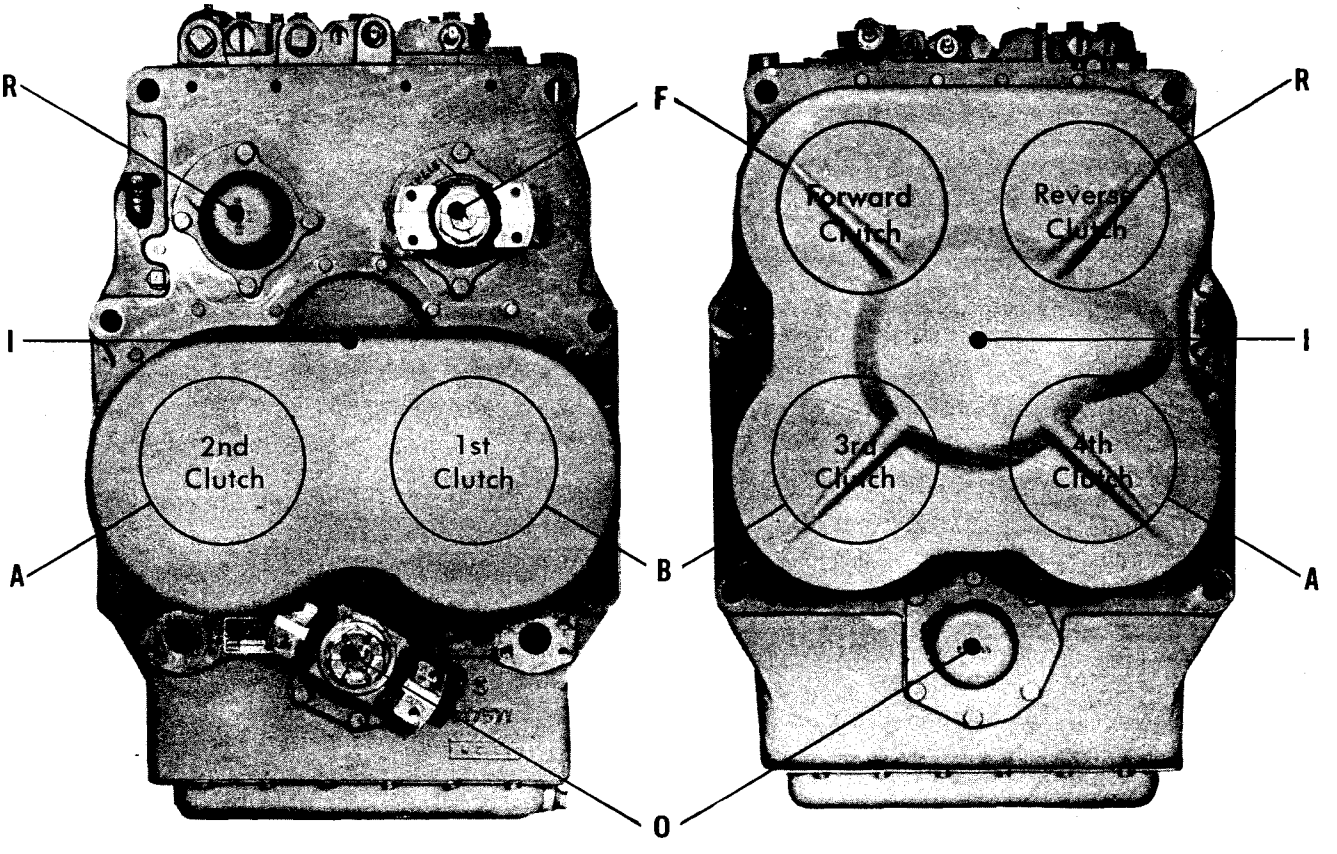


FIG. A—TRANSMISSION ASSEMBLY SHAFT IDENTIFICATION

For purpose of identification, illustration above indicates by alphabetical designation the individual shaft group location in transmisson. Code to alphabetical designation is given below. Alphabetical designation also appears in heading of each shaft group covered in parts listings herein.

A—Second & Fourth Drive Shaft Group

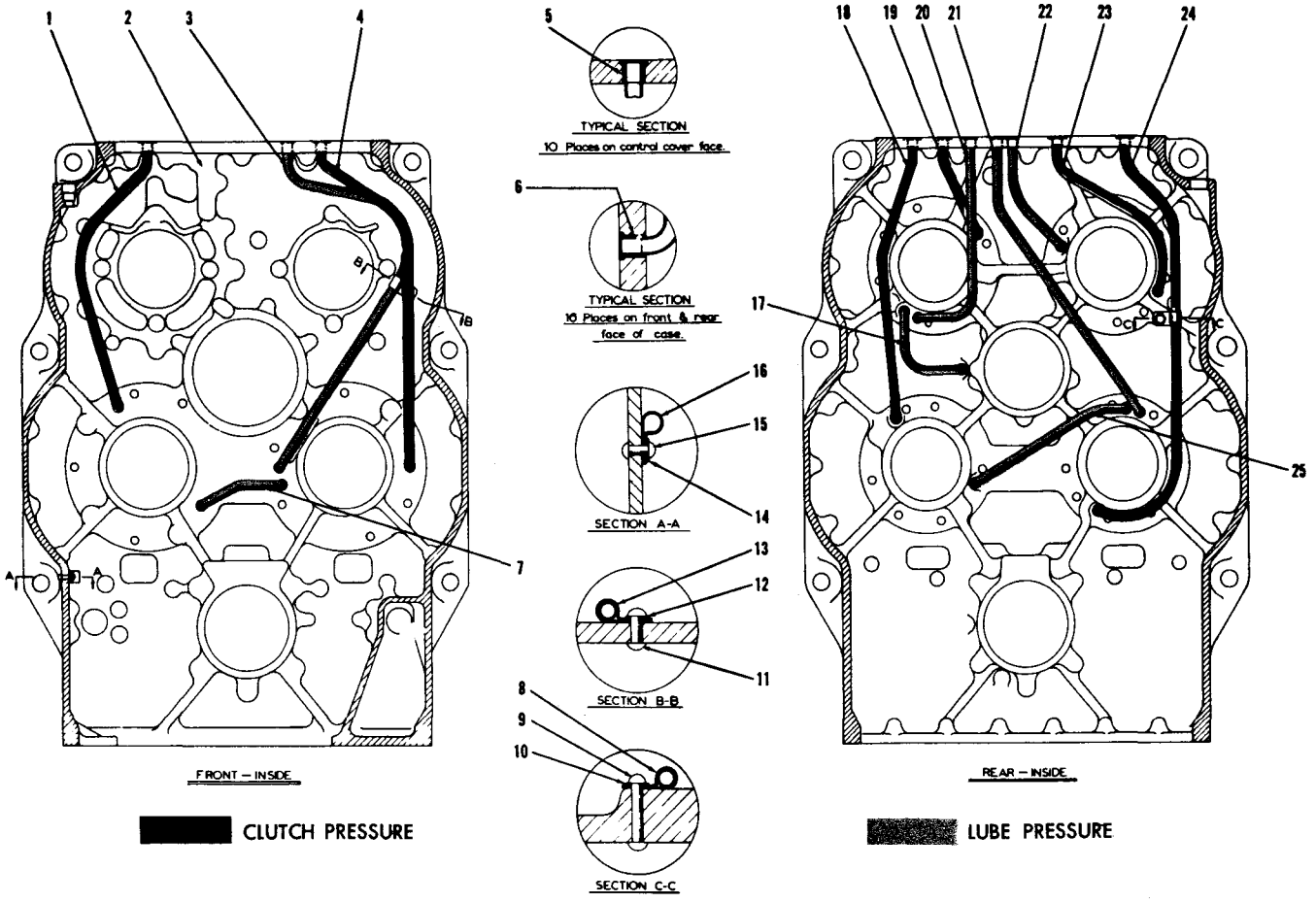
B—First & Third Drive Shaft Group

F—Input Drive Shaft & Forward Clutch Group

I—Idler Shaft Group

O— Output Shaft & Disconnect Assembly Group

R—Reverse Drive Shaft Group



5000 SERIES CASE ASSEMBLY

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	1st Clutch Pressure Tube	1	14	Washer	1
2	Transmission Case	1	15	Rivet	1
3	2nd Clutch Lube Tube	1	16	Dip Stick Tube Clip	1
4	2nd Clutch Pressure Tube	1	17	Reverse to Idler Crossover Lube Tube	1
5	Tube Sleeve	8	18	4th Clutch Pressure Tube	1
6	Tube Sleeve	18	19	Reverse Clutch Pressure Tube	1
7	2nd and 1st Cross Over Lube Tube	1	20	Reverse Clutch Lube Tube	1
8	Tube Clip	1	21	3rd Clutch Lube Tube	1
9	Rivet	1	22	Input Lube Tube	1
10	Washer	1	23	Input Clutch Pressure Tube	1
11	Rivet	1	24	3rd Clutch Pressure Tube	1
12	Washer	1	25	3rd to 4th Crossover Lube Tube	1
13	Tube Clip	1			

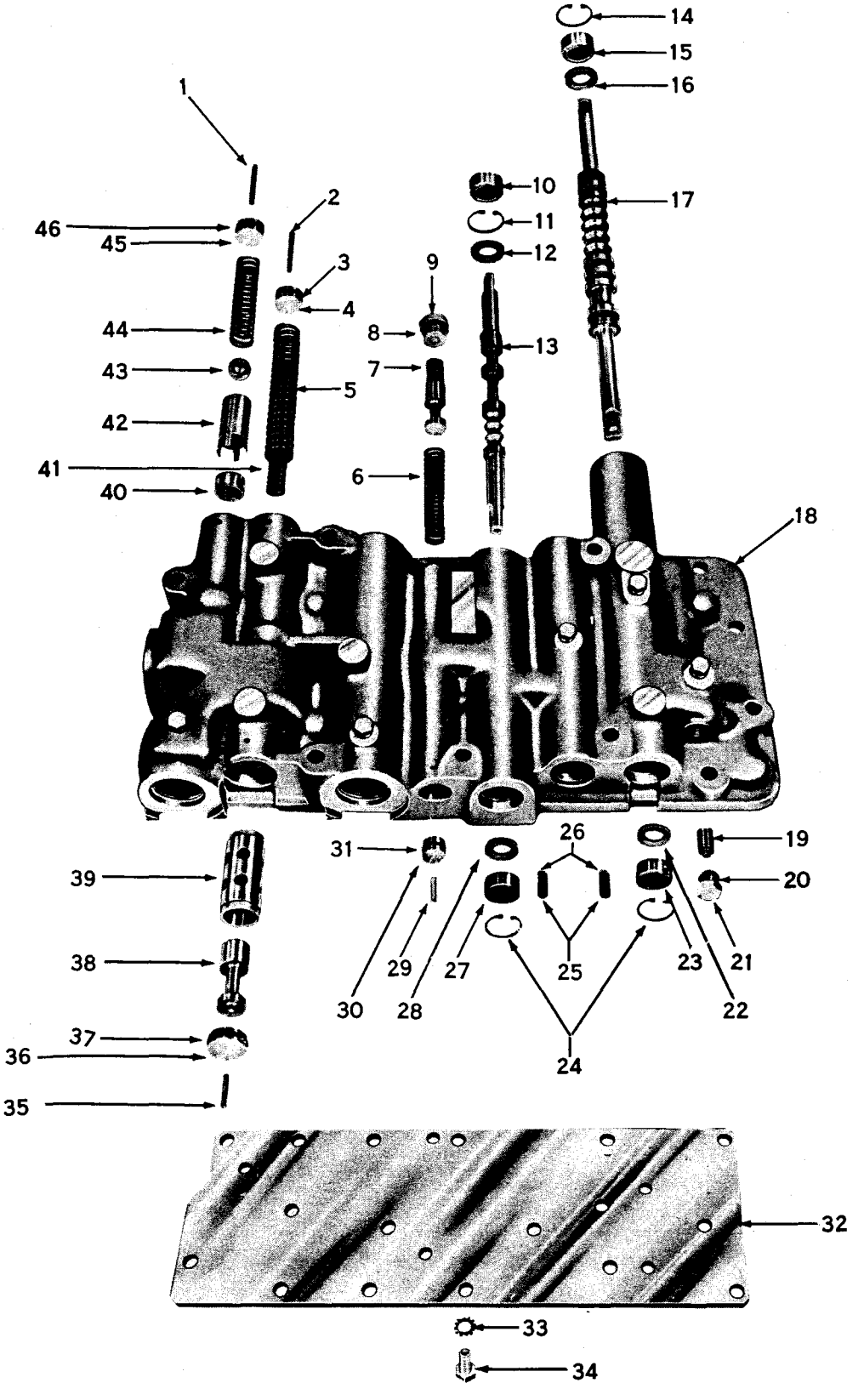

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FIG. C — CONTROL COVER GROUP

ITEM	DESCRIPTION	QTY.
1	Spring Stop Roll Pin	1
2	Spring Stop Roll Pin	1
3	Spring Stop "O" Ring	1
4	Spring Stop	1
5	Regulator Valve Spring (Outer)	1
6	Shut-off Valve Spool Spring	1
7	Shut-off Valve Spool	1
8	Shut-off Valve Hole Plug "O" Ring	1
9	Shut-off Valve Hole Plug	1
10	Valve Oil Seal	1
11	Valve Stop Snap Ring	1
12	Valve Stop Washer	1
13	Forward and Reverse Selector Valve	1
14	Valve Stop Snap Ring	1
15	Valve Oil Seal	1
16	Valve Stop Washer	1
17	Speed Selector Valve Assembly	1
18	Control Cover	1
19	Shuttle Valve	1
20	Shuttle Valve "O" Ring	1
21	Shuttle Valve Plug	1
22	Valve Stop Washer	1
23	Valve Oil Seal	1
24	Valve Stop Snap Ring	1
25	Poppet Spring	2
26	Poppet Ball	2
27	Valve Oil Seal	1
28	Valve Stop Washer	1
29	Spring Stop Roll Pin	1
30	Spring Stop	1
31	Spring Stop "O" Ring	1
32	Control Cover Plate	1
33	Control Cover Plate Screw Lockwasher	17
34	Control Cover Plate Screw	17
35	Spring Stop Roll Pin	1
36	Valve Stop	1
37	Valve Stop "O" Ring	1
38	Regulator Valve Spool	1
39	Regulator Valve Spool Sleeve	1
40	Safety Valve Seat	1
41	Regulator Valve Spring (Inner)	1
42	Safety Valve Spacer	1
43	Safety Valve Ball	1
44	Safety Valve Spring	1
45	Spring Stop	1
46	Spring Stop "O" Ring	1

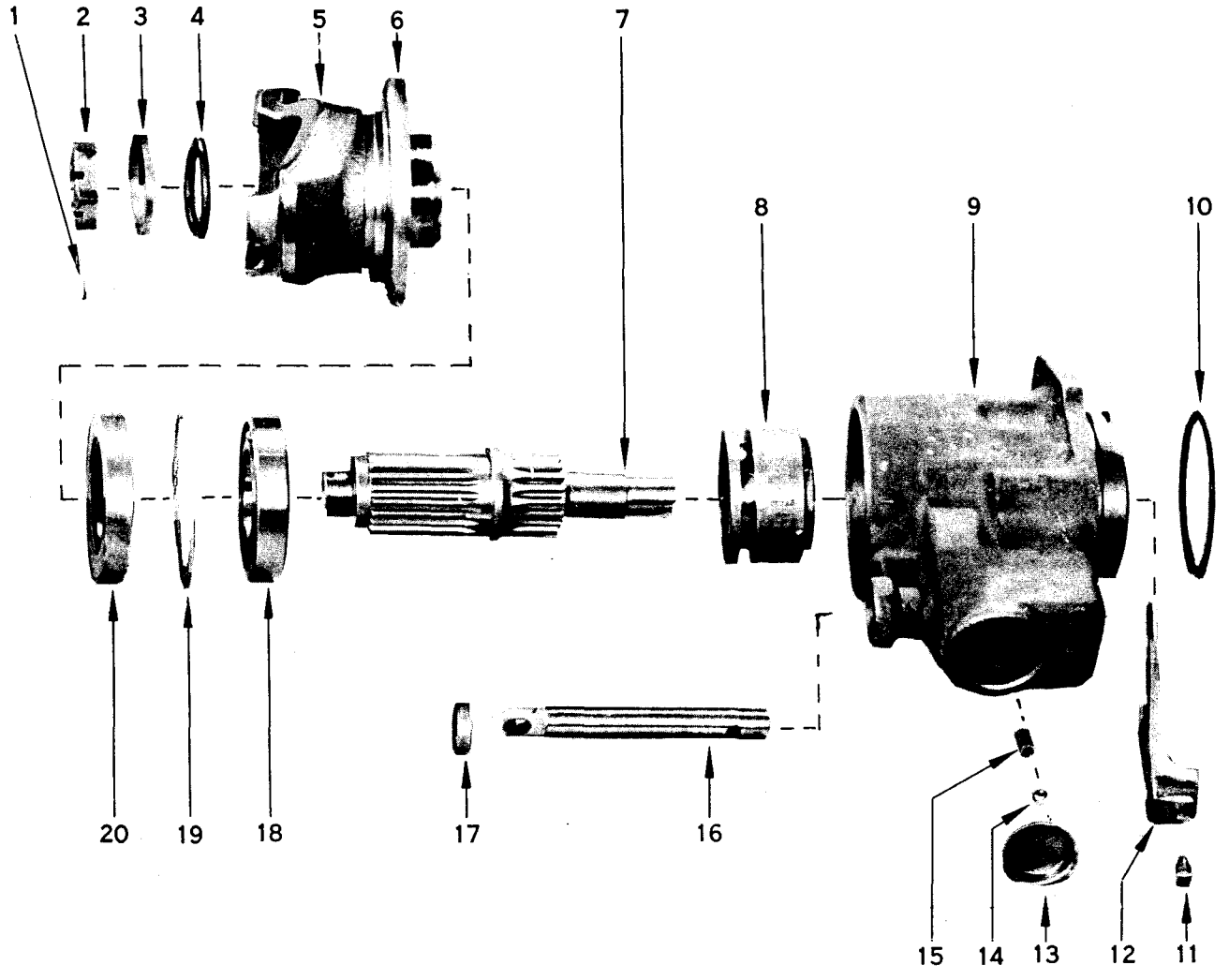


FIG. D DISCONNECT ASSEMBLY "O"

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	Flange Nut Cotter	1	11	Shift Fork Lock Screw	1
2	Flange Nut	1	12	Shift Fork	1
3	Flange Washer	1	13	Housing Plug	1
4	Flange "O" Ring	1	14	Detent Ball	1
5	Companion Flange	1	15	Detent Spring	1
6	Companion Flange Deflector	1	16	Shift Rail	1
7	Disconnect Shaft	1	17	Shift Rail Oil Seal	1
8	Disconnect Shift Hub	1	18	Shaft Bearing	1
9	Disconnect Housing	1	19	Shaft Bearing Retainer Ring	1
10	Disconnect Housing "O" Ring	1	20	Companion Flange Oil Seal	1

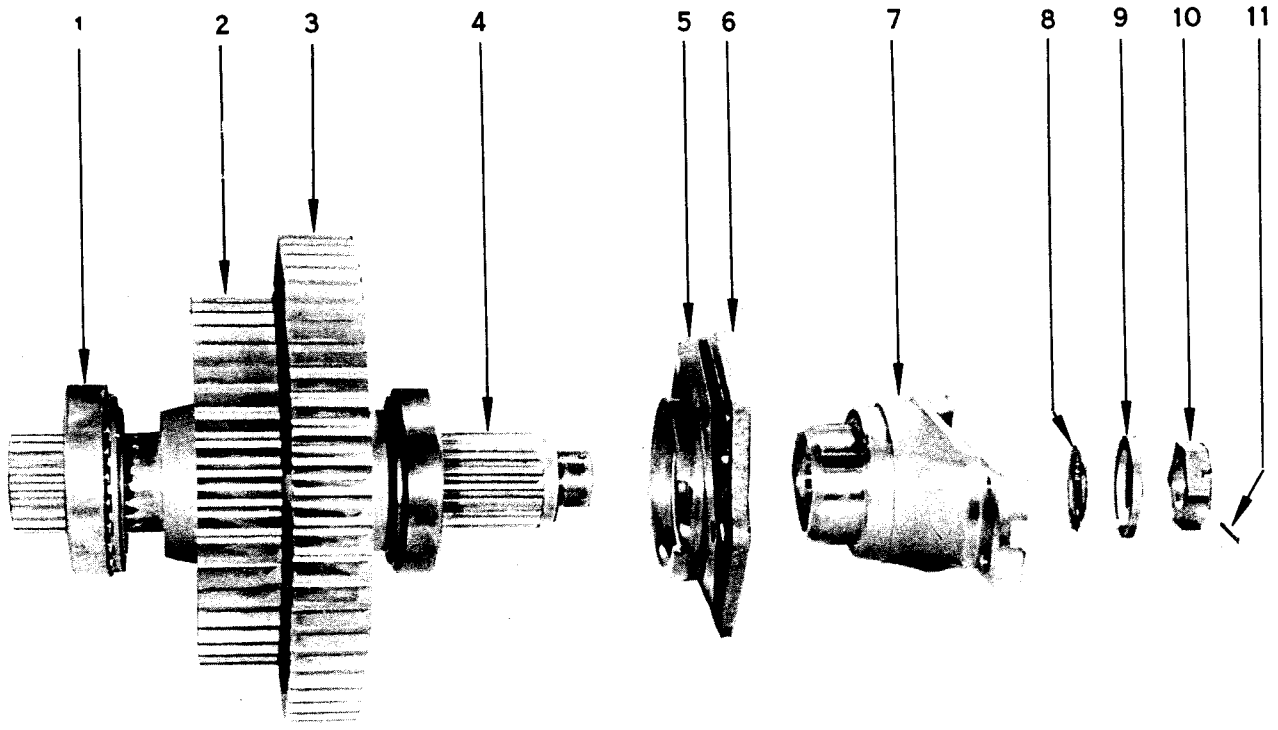
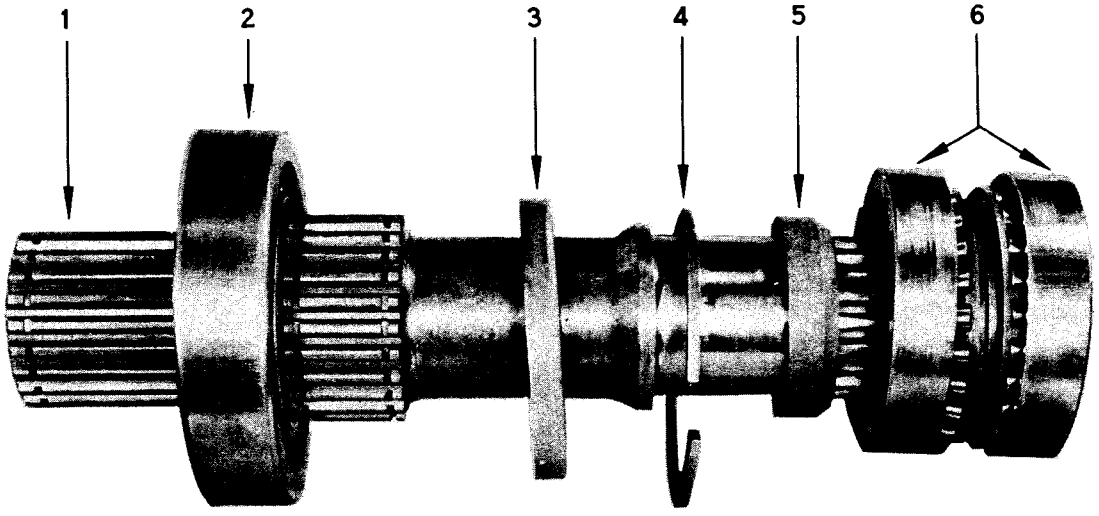


FIG. D OUTPUT SHAFT GROUP "O"

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	Output Shaft Taper Bearing	2	7	Companion Flange	1
2	Output Shaft Gear	1	8	Flange "O" Ring	1
3	Output Shaft Gear	1	9	Flange Washer	1
4	Output Shaft	1	10	Flange Nut	1
5	Bearing Cap Shims		11	Flange Nut Cotter	1
6	Bearing Cap	1			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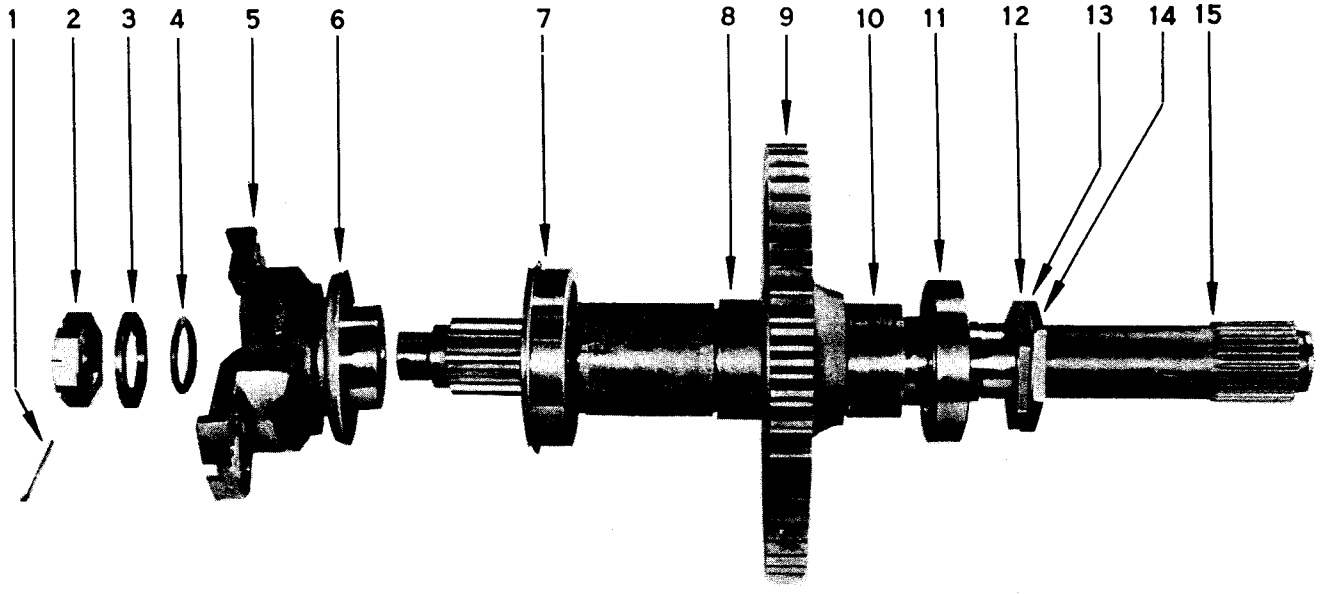
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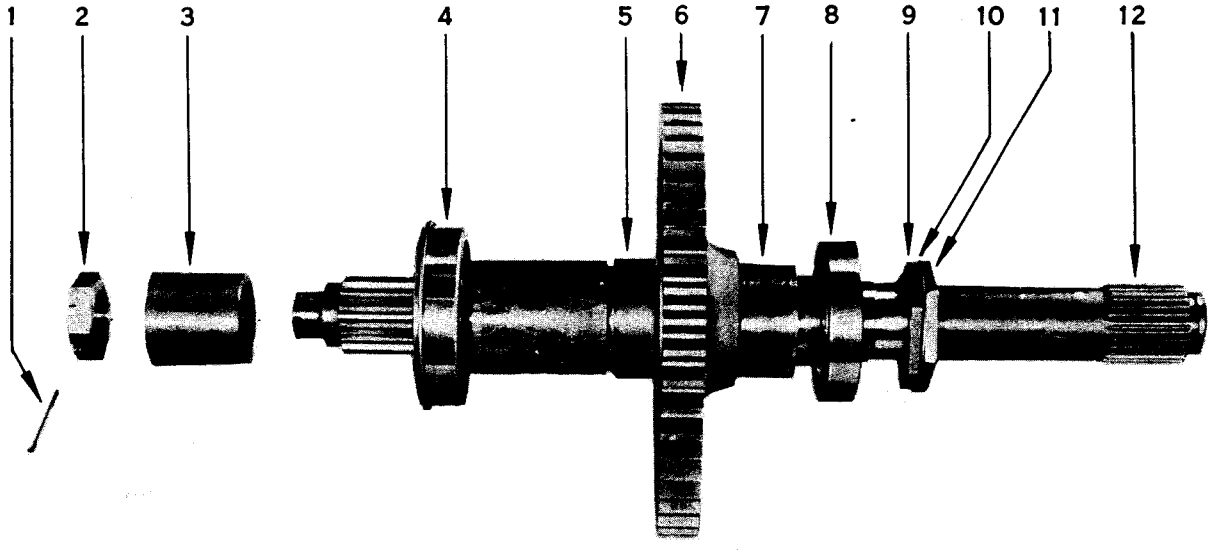
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FIG. E IDLER SHAFT GROUP "I"

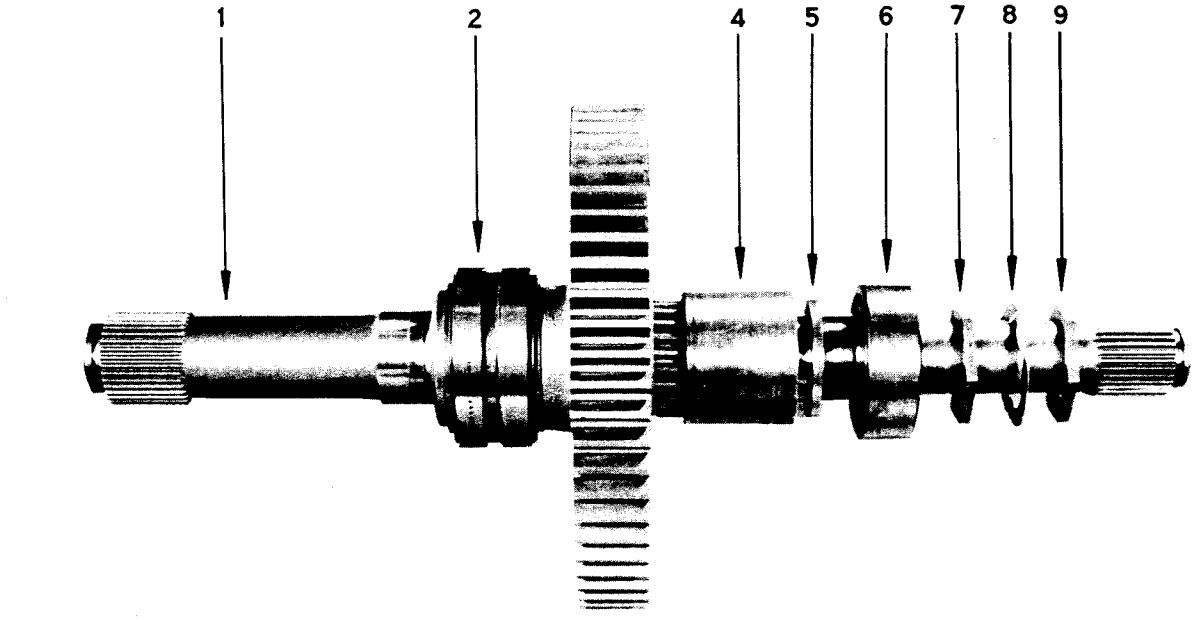
ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	Idler Shaft	1	4	Inner Bearing Cup Locating Ring	1
2	Idler Shaft Roller Bearing	1	5	Tapered Bearing Spacer	1
3	Oil Baffle	1	6	Tapered Bearing	2

FIG F INPUT SHAFT GROUP "F"

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	Flange Nut Cotter	1	9	Input Gear	1
2	Flange Nut	1	10	Gear Spacer (Long)	1
3	Flange Nut Washer	1	11	Input Shaft Rear Bearing	1
4	Flange Nut "O" Ring	1	12	Bearing Lock Nut (Inner)	1
5	Companion Flange	1	13	Bearing Nut Lock	1
6	Companion Flange Deflector	1	14	Bearing Lock Nut (Outer)	1
7	Input Shaft Front Bearing	1	15	Input Shaft	1
8	Gear Spacer (Short)	1			

FIG. G REVERSE SHAFT GROUP "R"

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	Nut Cotter	1	7	Gear Spacer (Long)	1
2	Nut	1	8	Reverse Shaft Rear Bearing	1
3	Bearing Spacer	1	9	Bearing Lock Nut (Inner)	1
4	Reverse Shaft Front Bearing	1	10	Bearing Nut Lock	1
5	Gear Spacer (Short)	1	11	Bearing Lock Nut (Outer)	1
6	Reverse Gear	1	12	Reverse Shaft	1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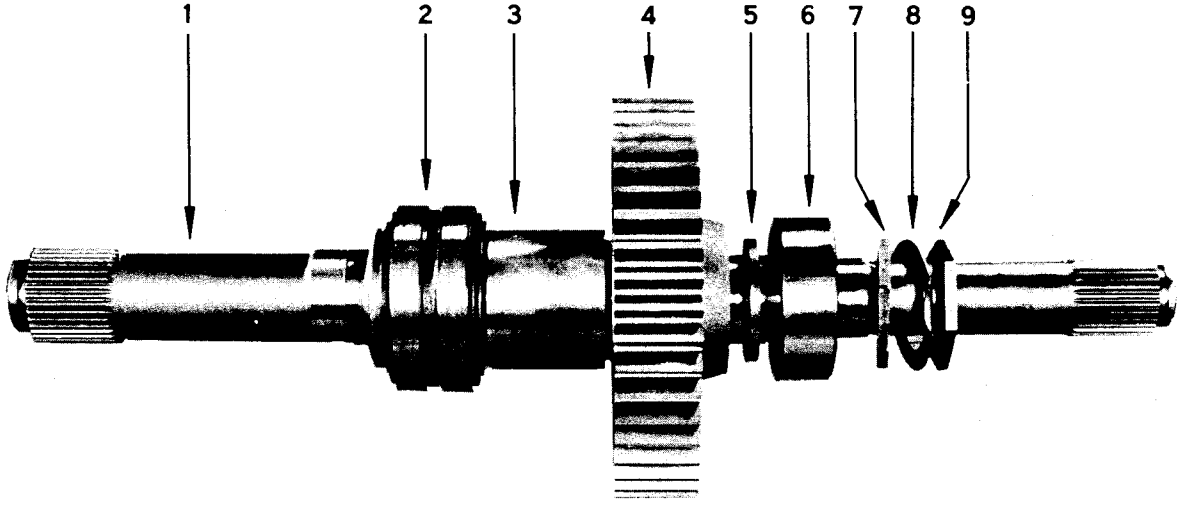
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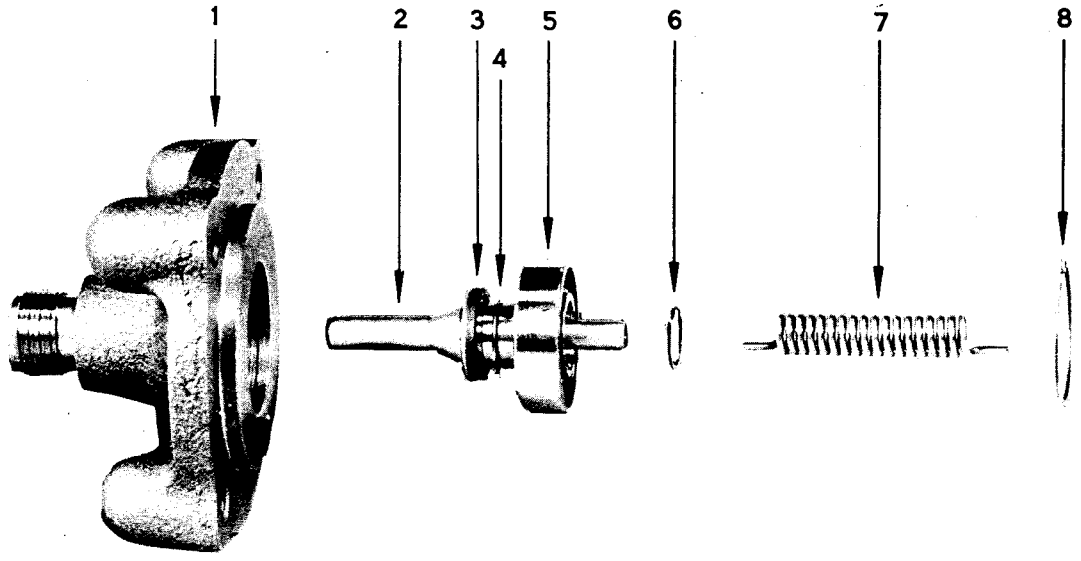
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FIG. H 2nd and 4th SHAFT GROUP "A"

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	2nd and 4th Shaft	1	6	Roller Bearing (Rear)	1
2	Tapered Bearing Assembly (Front)	1	7	Bearing Lock Nut (Inner)	1
3	2nd and 4th Shaft Gear	1	8	Bearing Nut Lock	1
4	Gear Spacer (Long)	1	9	Bearing Lock Nut (Outer)	1
5	Gear Spacer (Short)	1			

FIG. I 1st and 3rd SHAFT GROUP "B"

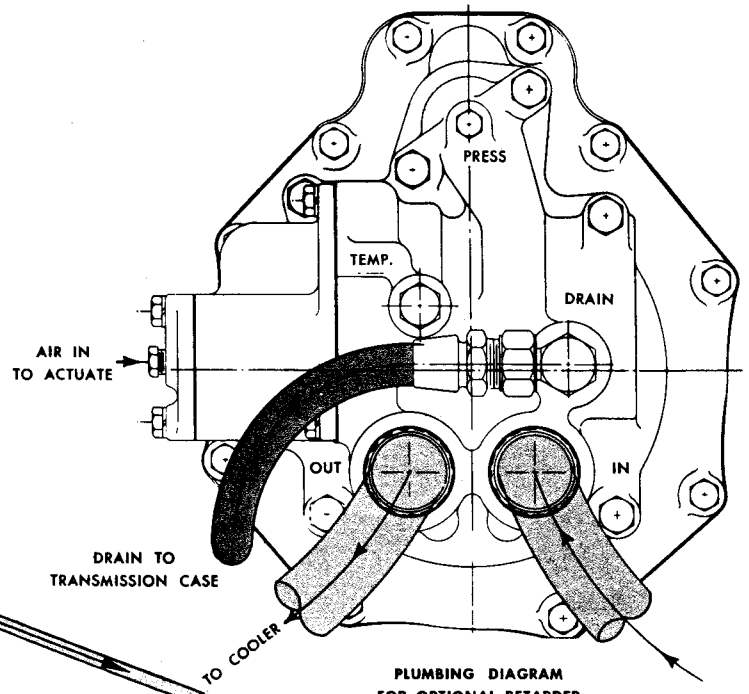
ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	1st and 3rd Shaft	1	6	Roller Bearing (Rear)	1
2	Tapered Bearing Assembly (Front)	1	7	Bearing Lock Nut (Inner)	1
3	Gear Spacer (Long)	1	8	Bearing Nut Lock	1
4	1st and 3rd Shaft Gear	1	9	Bearing Lock Nut (Outer)	1
5	Gear Spacer (Short)	1			

SPEEDOMETER DRIVE GROUP

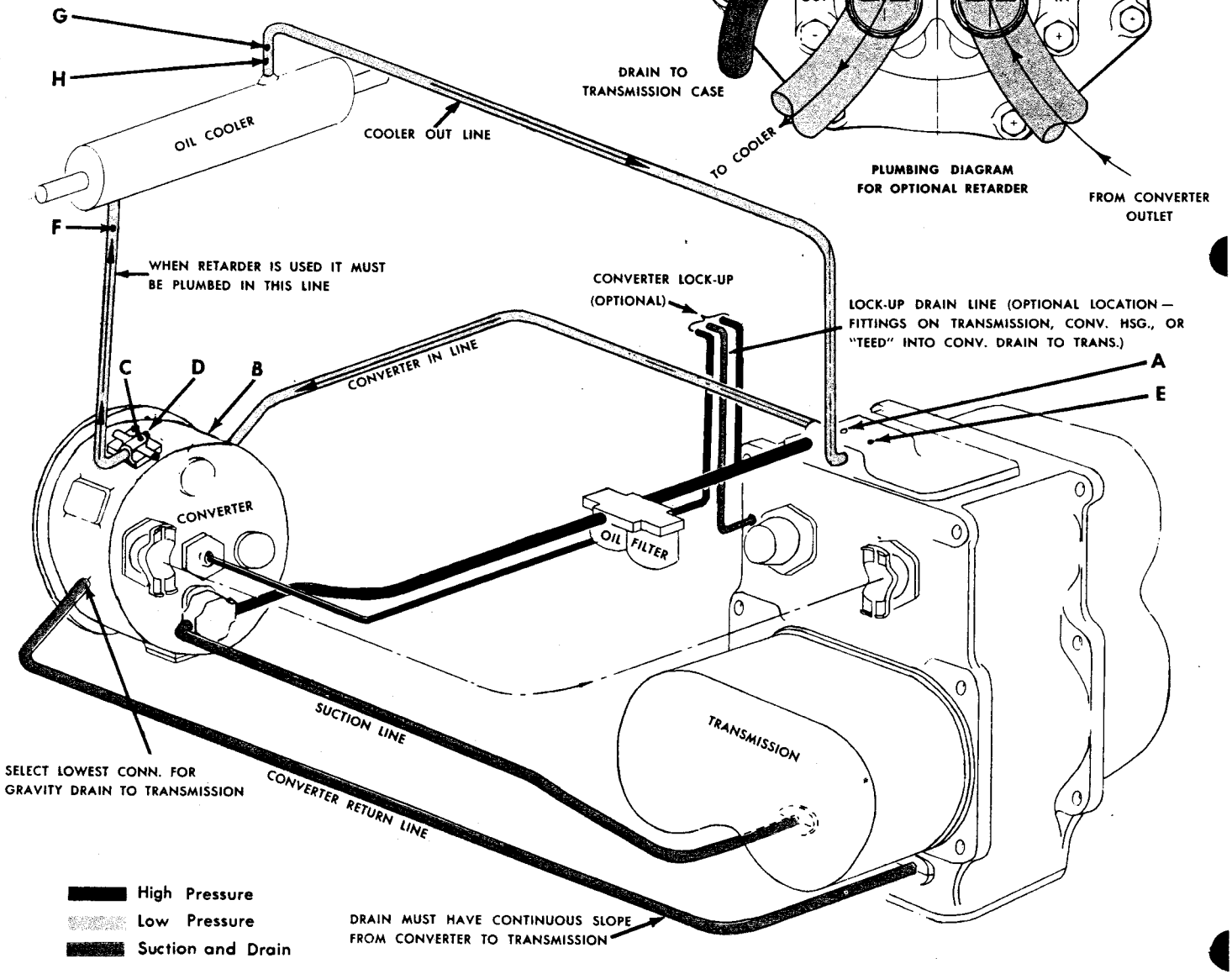
ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	Speedometer Drive Housing	1	5	Speedometer Drive Bearing	1
2	Speedometer Drive Shaft	1	6	Bearing Snap Ring	1
3	Drive Shaft Oil Seal	1	7	Speedometer Drive Spring	1
4	Bearing Snap Ring	1	8	Bearing Snap Ring	1

FIG J CHECK POINTS

A. CLUTCH PRESSURE
B. CONVERTER INLET
C. CONVERTER OUTLET
D. CONVERTER TEMPERATURE CONNECTION
E. LUBE PRESSURE
F. COOLER INLET PRESSURE
G. COOLER OUTLET PRESSURE
H. COOLER OUTLET TEMPERATURE



PLUMBING DIAGRAM FOR OPTIONAL RETARDER



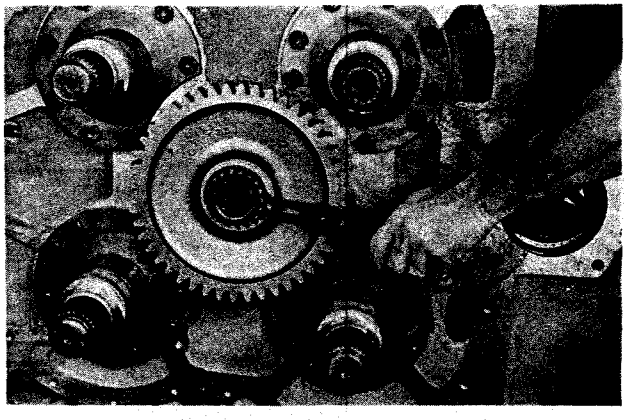


Figure 22

Remove idler gear retainer ring.

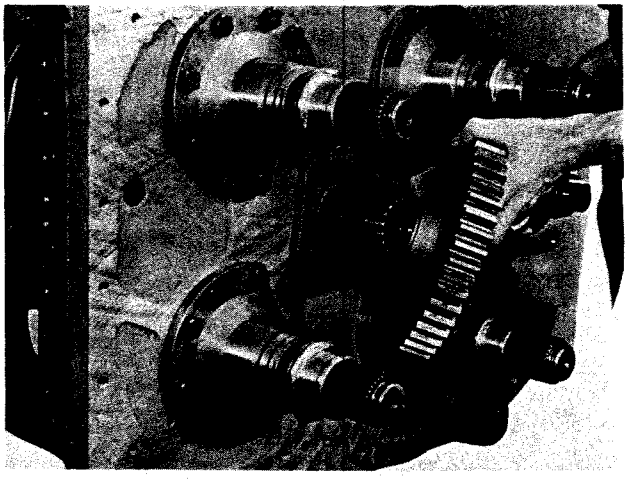


Figure 23

Remove idler gear.

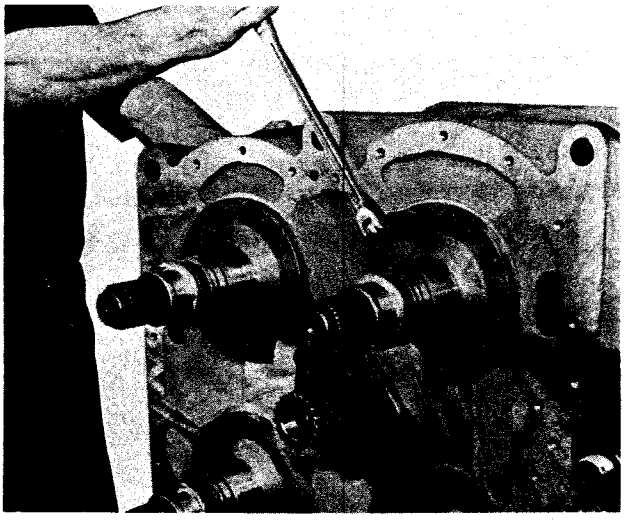


Figure 24

Remove clutch support bolt.

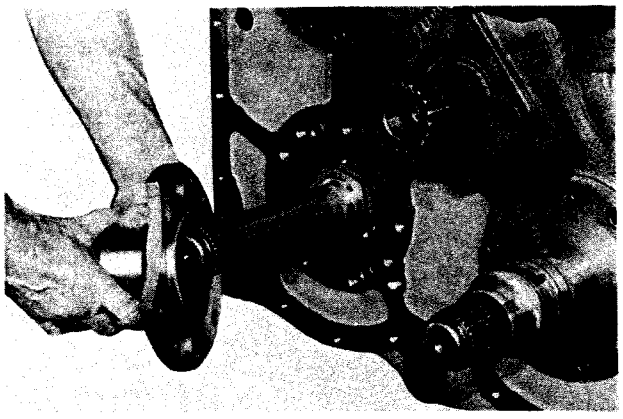


Figure 25

Remove clutch support.

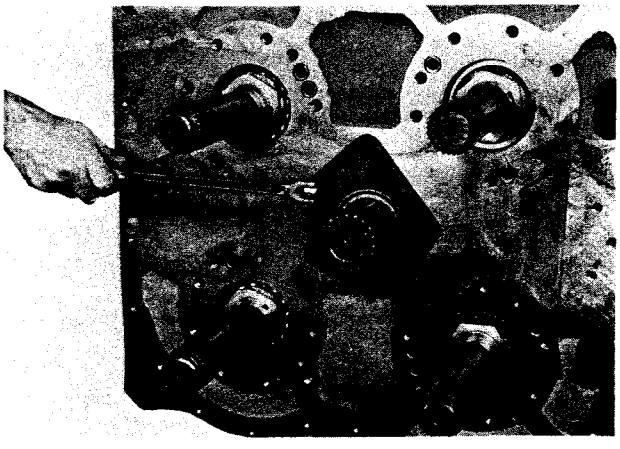


Figure 26

Remove idler shaft bearing cap bolts.

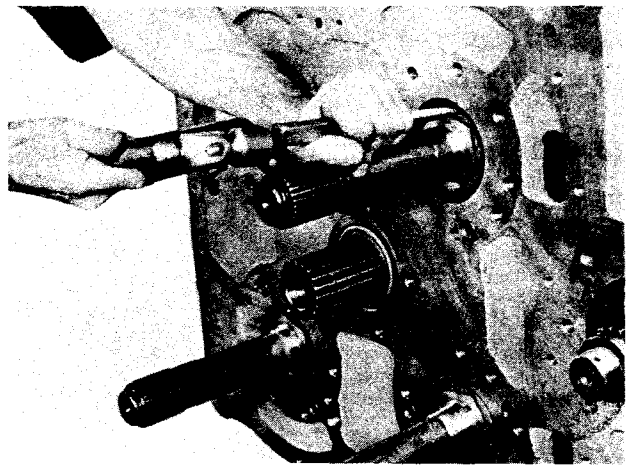


Figure 28

Straighten tangs on bearing nut lock.

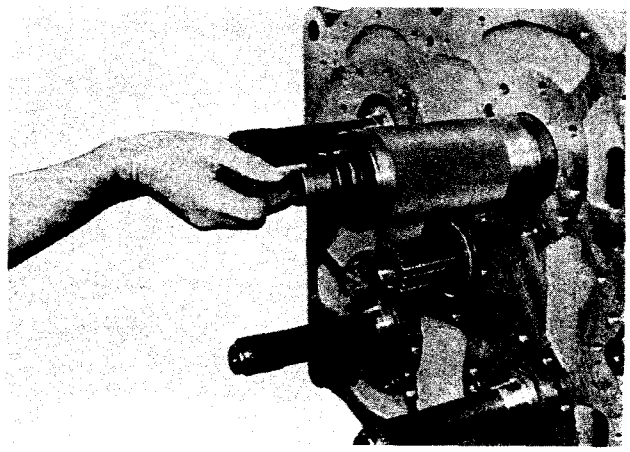


Figure 29

Lock transmission gears with a soft bar and remove the outer lock nut, nut lock, and inner lock nut.

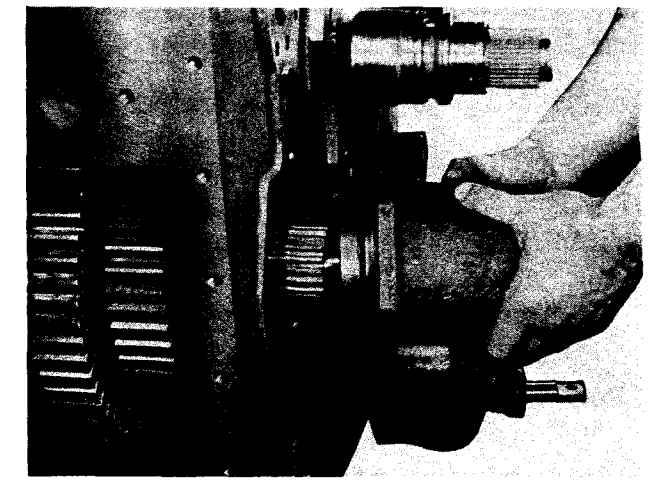


Figure 31

Remove disconnect housing bolts and housing assembly.

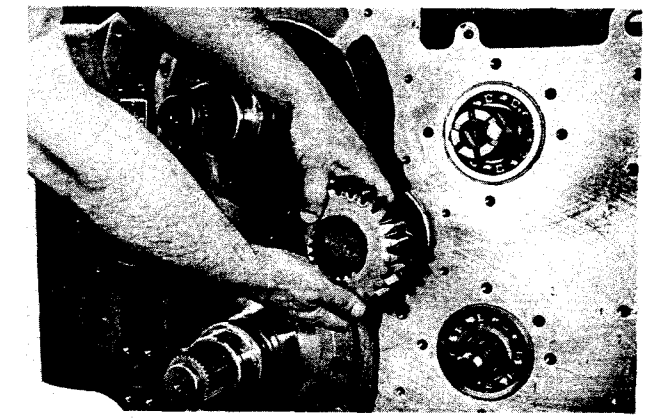


Figure 32

Remove idler gear retainer rings and idler gear.

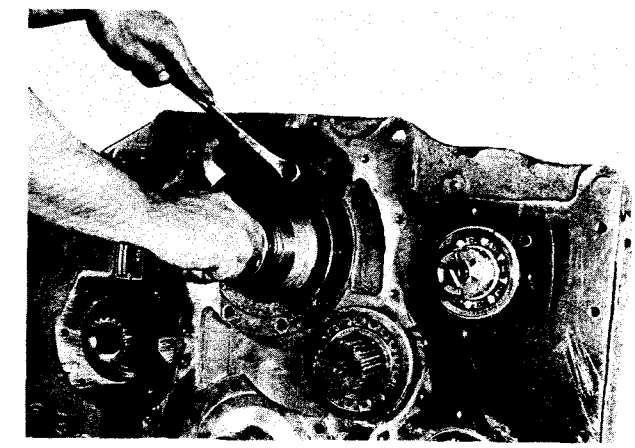


Figure 33

Remove 1st and 2nd clutch support bolts and clutch supports.

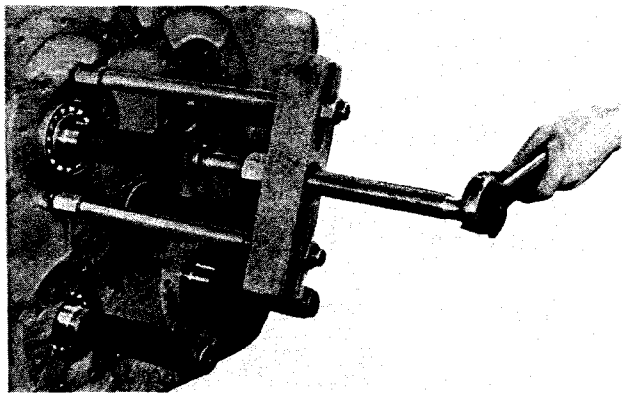


Figure 34

Using a suitable pusher tool, remove the reverse shaft, pushing from the lock nut side. Remove gears and spacers from inside case.

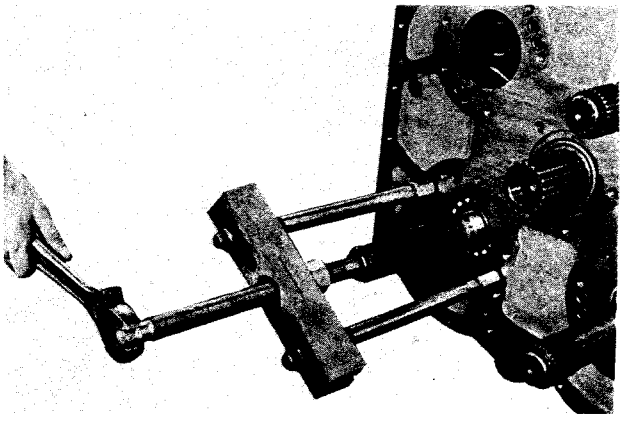


Figure 35

Using a suitable pusher tool, remove the input shaft, pushing from the lock nut side. Remove gears and spacers from inside case.

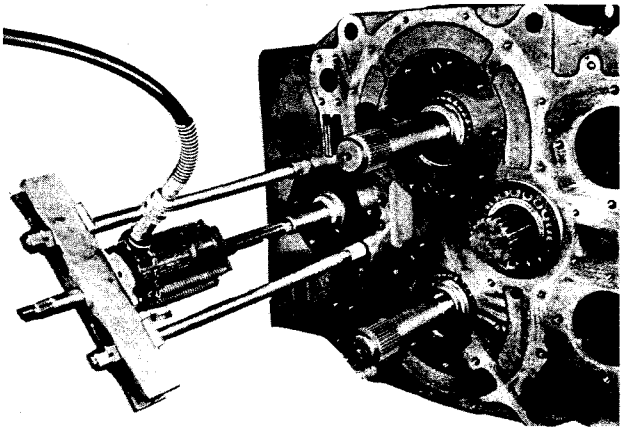


Figure 36

Press output shaft from case. Output shaft may be removed from either side.

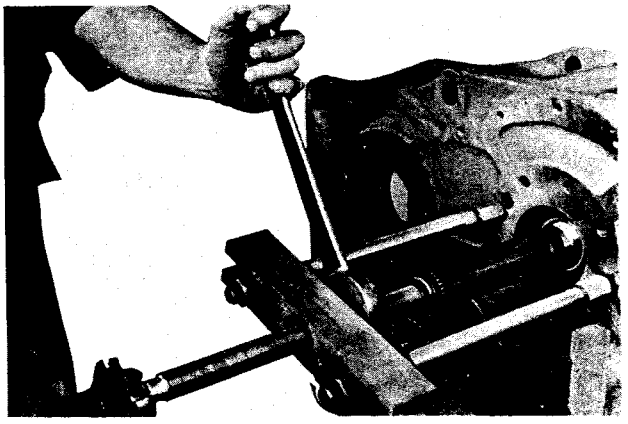


Figure 37

Using a suitable pusher tool, remove the 2nd and 4th shaft, pushing from the lock nut side. Remove gears and spacers from inside case.

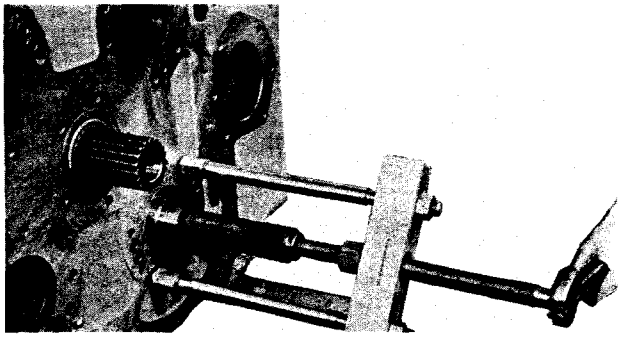


Figure 38

Using a suitable pusher tool, remove the 1st and 3rd shaft, pushing from the lock nut side. Remove gears and spacers from inside case.

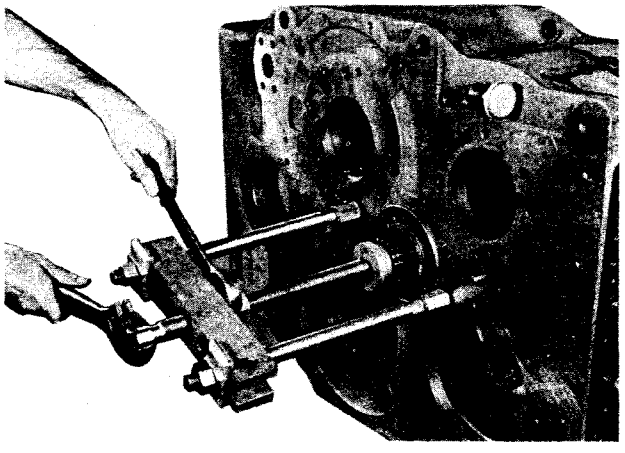


Figure 39

Remove idler shaft by pushing shaft out until double cone bearing and outer bearing race are exposed on opposite side.

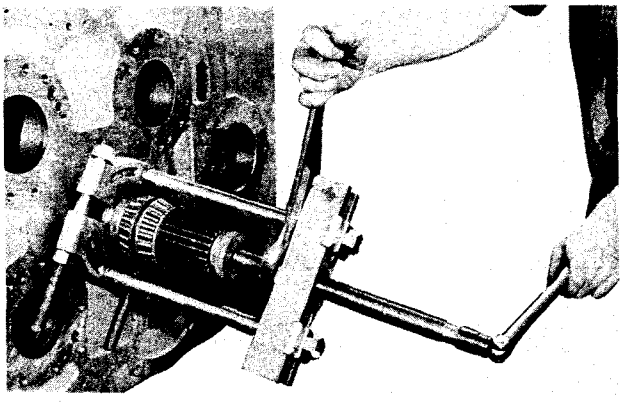


Figure 40

Using a suitable puller, remove double cone bearing from idler shaft. From cone bearing side push idler shaft and roller bearing from case.

DISASSEMBLY OF CONTROL COVER

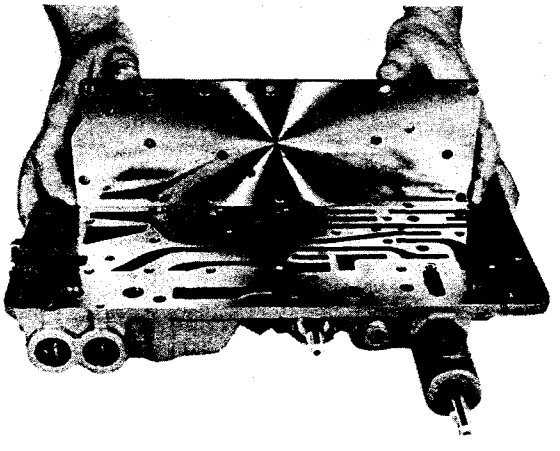


Figure 41

Remove bolts from oil circuit plate. Remove oil circuit plate. **CAUTION:** Do not lose detent springs.

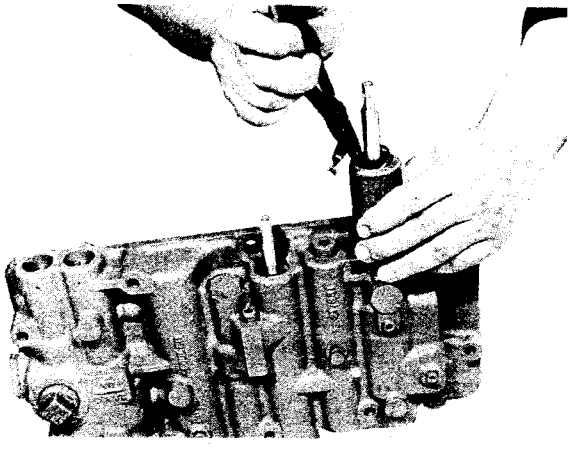


Figure 42

Remove speed selector valve assembly retainer ring.

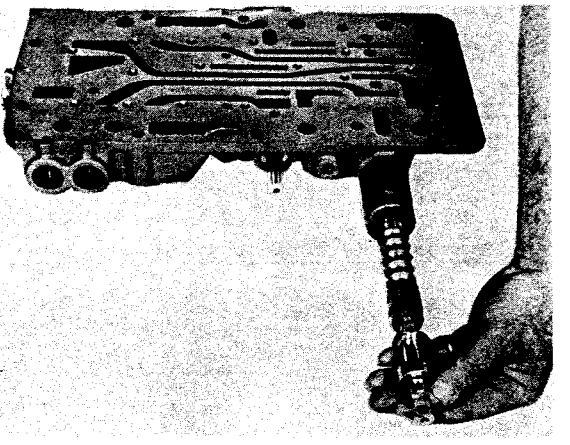


Figure 43

Tap lightly on opposite end of speed selector valve. Valve and valve oil seal will come out together.

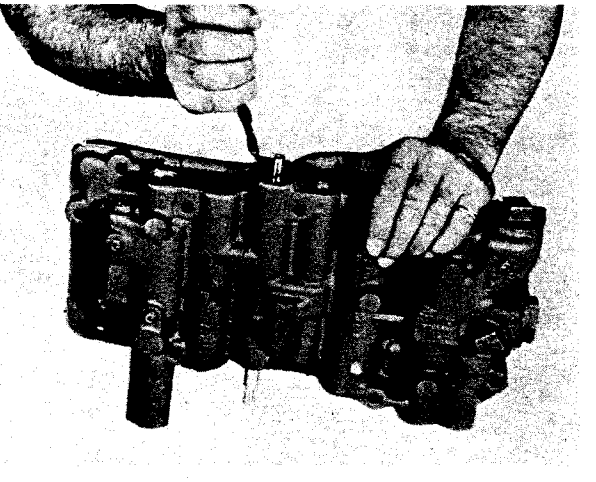


Figure 44

Remove forward and reverse selector valve retainer ring.

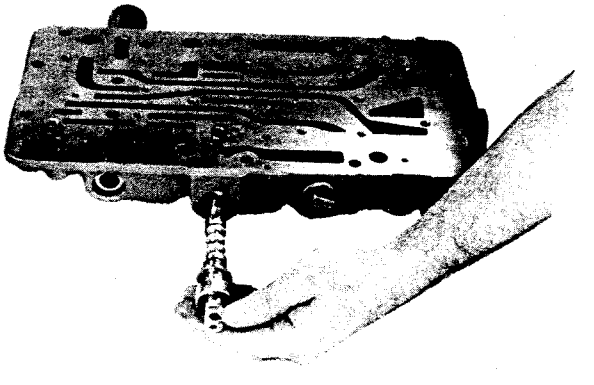


Figure 45

Tap lightly on opposite end of forward and reverse selector valve. Valve and valve oil seal will some out together.

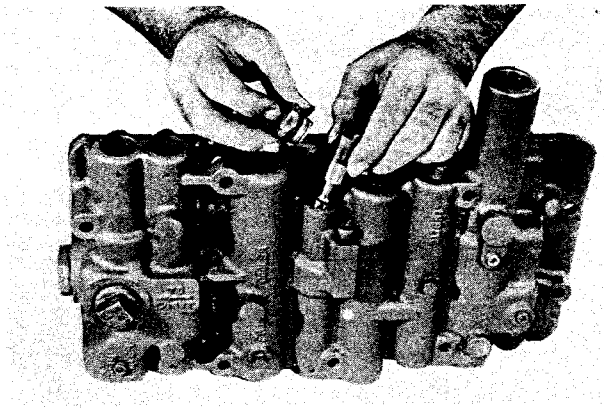


Figure 46

Remove shut-off valve plug and "O" ring. Remove shut-off valve.

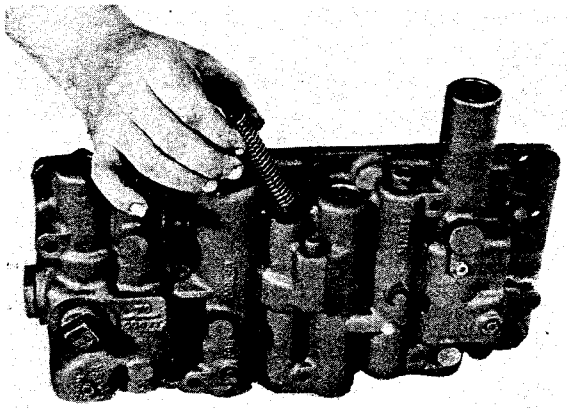


Figure 47

Remove shut-off valve spring.

CAUTION: When removing roll pins, it is recommended a press be used to depress valve stop, valve and spool springs.

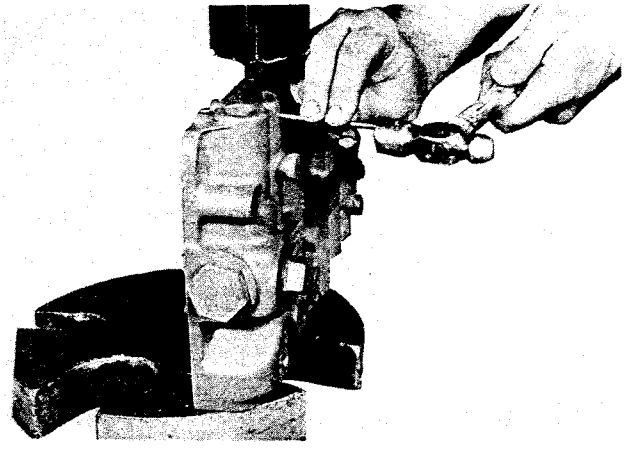


Figure 48

Depress regulating valve spring stop and spring. Remove roll pin.

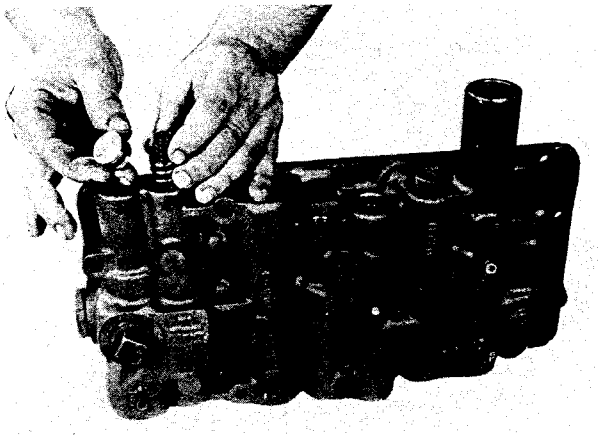


Figure 49

Release press slowly. Springs will push spring stop from control housing. Remove spring stop and inner and outer spring.

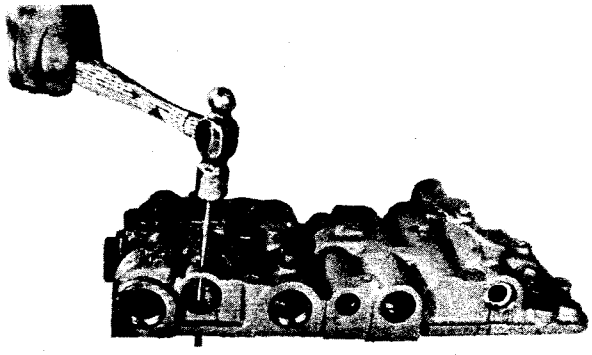


Figure 50

Remove roll pin on opposite end. Depressing valve stop is not necessary as the springs were removed in Figure **49**

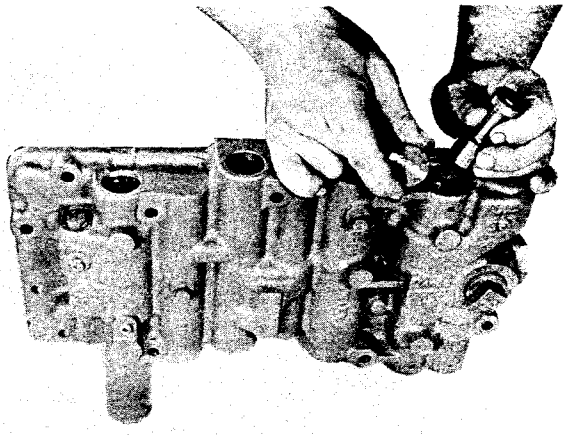


Figure 51

Remove regulating valve stop and valve from control housing.

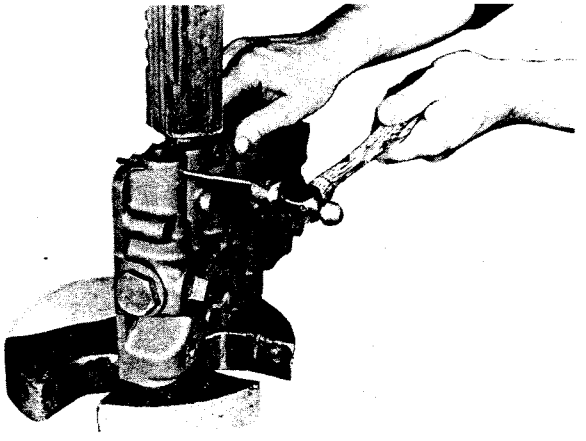


Figure 52

Depress safety valve spring and spring stop.

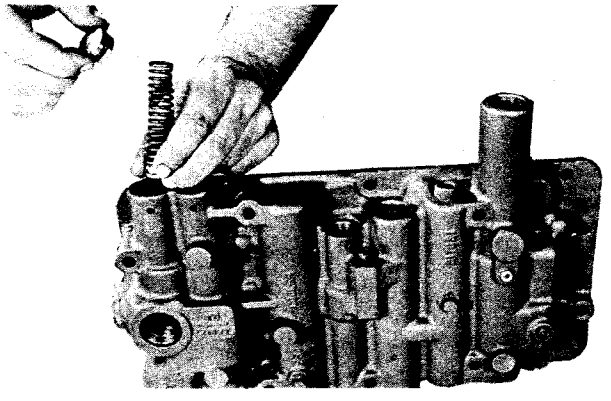


Figure 53

Remove safety valve spring stop, valve spring, and safety ball valve.

TRANSMISSION INTERNAL TUBING

These tubes are not to be removed unless damaged. They should, however, be cleaned and checked for leaks when transmission is disassembled. The tubes are divided into two groups. The high pressure or clutch pressure lines and the low or lubricating pressure lines.

When necessary to replace any tubes, tool 943374 is required. The procedure for using tool is as follows:

1. Install tubing in housing with end flush with case.
2. Slide collar over end of tube and press into bore of case.

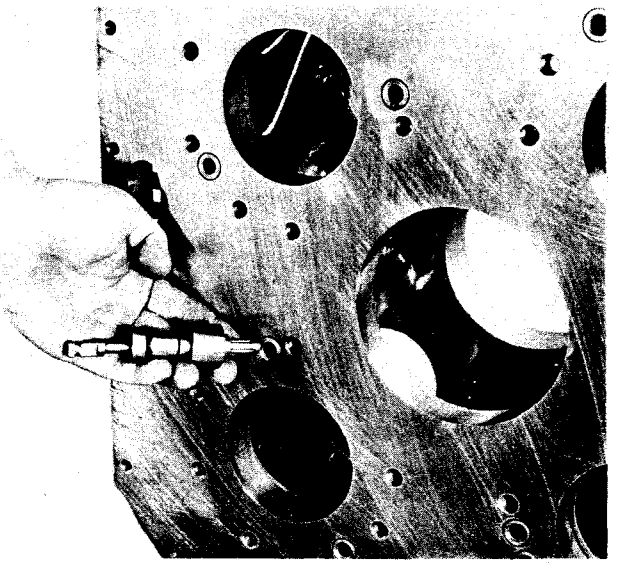


Figure 54

Pull mandrel on tool all the way back and insert tool in tube.

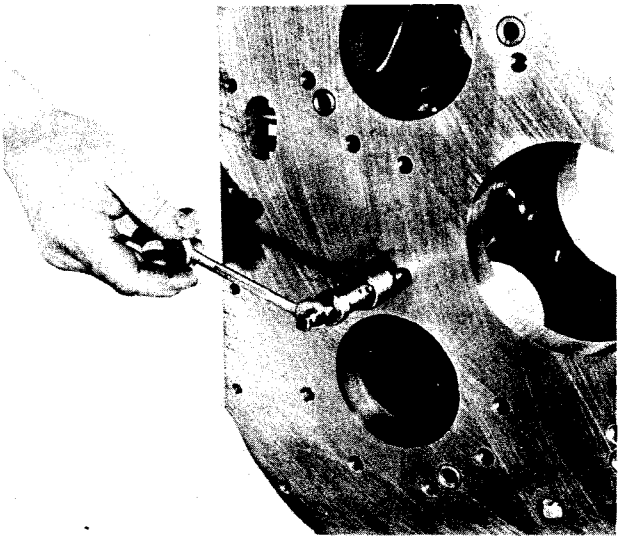


Figure 55

Turn mandrel with hand until tool is firmly seated in tube. Using a 3/8" wrench, turn mandrel as far as possible.

Use this procedure to install all tubes in housing.

Principle of Tool

Tool has roller which expands when mandrel is inserted. As mandrel is turned, the rollers expand against the internal bore of tubing. This forces tube to expand against collar which has a groove on inside diameter: When tube is expanded into this groove it is locked into position.

Cleaning and Repair of Tool

This tool is a precision instrument and must be treated as such. After each use, remove mandrel and rollers and flush tool with cleaning solvent. Inspect rollers and mandrel for chips and flaking. If rollers or mandrel need to be replaced, they may be purchased from CENTRAL PARTS DIVISION, 7300 SOUTH CICERO AVE., CHICAGO 29, ILLINOIS.

CLEANING AND INSPECTION

CLEANING

Clean all parts thoroughly using solvent type cleaning fluid. It is recommended that parts be immersed in cleaning fluid and slushed up and down slowly until all old lubricant and foreign material is dissolved and parts are thoroughly cleaned.

CAUTION: Care should be exercised to avoid skin rashes, fire hazards and inhalation of vapors when using solvent type cleaners.

Bearings

Remove bearings from cleaning fluid and strike larger side of cone flat against a block of wood to dislodge solidified particles of lubricant. Immerse again in cleaning fluid to flush out particles. Repeat above operation until bearings are thoroughly clean. Dry bearings using moisture-free compressed air. Be careful to direct air stream across bearing to avoid spinning. Do not spin bearings when drying. Bearings may be rotated slowly by hand to facilitate drying process.

Housings

Clean interior and exterior of housings, bearing caps, etc., thoroughly. Cast parts may be cleaned in hot solution tanks with mild alkali solutions providing these parts do not have ground or polished surfaces. Parts should remain in solution long enough to be thoroughly cleaned and heated. This will aid the evaporation of the cleaning solution and rinse water. Parts cleaned in solution tanks must be thoroughly rinsed with clean water to remove all traces of alkali. Cast parts may also be cleaned with steam cleaner.

CAUTION: Care should be exercised to avoid inhalation of vapors and skin rashes when using alkali cleaners.

All parts cleaned must be thoroughly dried immediately by using moisture-free compressed air or soft, lintless absorbent wiping rags free of abrasive materials such as metal filings, contaminated oil or lapping compound.

INSPECTION

The importance of careful and thorough inspection of all parts cannot be overstressed. Replacement of all parts showing indication of wear or stress will eliminate costly and avoidable failures at a later date.

Bearings

Carefully inspect all rollers, cages and cups for wear, chipping or nicks to determine fitness of bearings for further use. Do not replace a bearing cone or cup individually without replacing the mating cup or cone at the same time. After inspection, dip bearings in Type "A" Automatic Transmission Fluid and wrap in clean lintless cloth or paper to protect them until installed.

Oil Seals, Gaskets, Etc.

Replacement of spring load oil seals, "O" rings, metal sealing rings, gaskets and snap rings is more economical when unit is disassembled than premature overhaul to replace these parts at a future time. Further loss of lubricant through a worn seal may result in failure of other more expensive parts of the assembly. Sealing members should be handled carefully, particularly when being installed. Cutting, scratching, or curling under of lip of seal seriously impairs its efficiency. Apply a thin coat of Permatex No. 2 on the outer diameter of the oil seal to assure an oil tight fit into the retainer. When assembling new metal type sealing rings, same should be lubricated with coat of chassis grease to stabilize rings in their grooves for ease of assembly of mating members. Lubricate all "O" rings and seals with Type "A" Automatic Transmission Fluid before assembly.

Gears and Shafts

If magna-flux process is available, use process to check parts. Examine teeth on all gears carefully for wear pitting, chipping, nicks, cracks or scores. If gear teeth show spots where case hardening is worn through or cracked, replace with new gear. Small nicks may be removed with suitable hone. Inspect shafts to make certain they are not sprung, bent, or splines twisted, and that shafts are true.

Housing, Covers, etc.

Inspect housings, covers and bearing caps to be certain they are thoroughly cleaned and that mating surfaces, bearing bores, etc., are free from nicks or burrs. Check all parts carefully for evidence of cracks or condition which would cause subsequent oil leaks or failures.

REASSEMBLY OF TRANSMISSION

Instructions given below on reassembly of components of transmission assembly are given in the sequence that must be followed in rebuilding. Principle of operations cited and views shown are similar and parallel on all shafts. The various drive shafts are assembled in the following order:

1. Idler Shaft —"I"
2. First and Third Shaft —"B"
3. Second and Fourth Shaft —"A"
4. Output Shaft —"O"
5. Reverse Shaft —"R"
6. Input Shaft — "F"

REASSEMBLY OF IDLER SHAFT

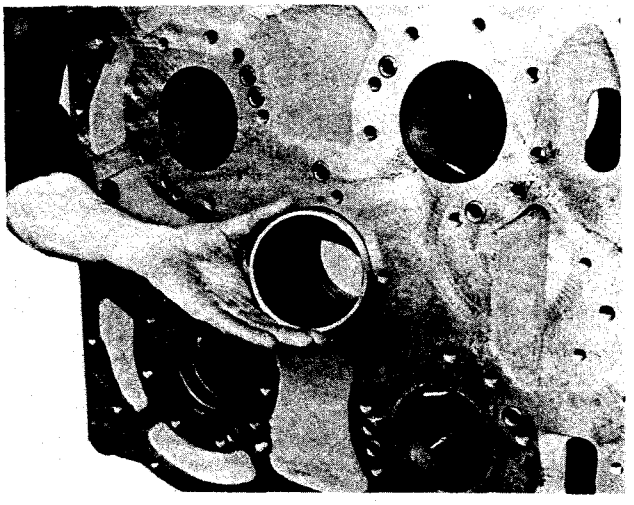


Figure 56

If transmission case was changed, install idler bearing cup locating ring. Install oil baffle in idler bearing bore. This must be done from inside the case and flange of the oil baffle must be 1/8" from the bearing cup locating ring. Install idler shaft inner cone bearing cup in transmission case.

Press roller bearing on idler shaft. Install bearing and shaft in case, opposite side of inner bearing cup. On taper bearing end of shaft install bearing spacer.

CAUTION: This spacer has a taper on the outer edge. This taper must go toward taper bearing. If installed wrong the large idler gear snap ring will not seat in ring groove.

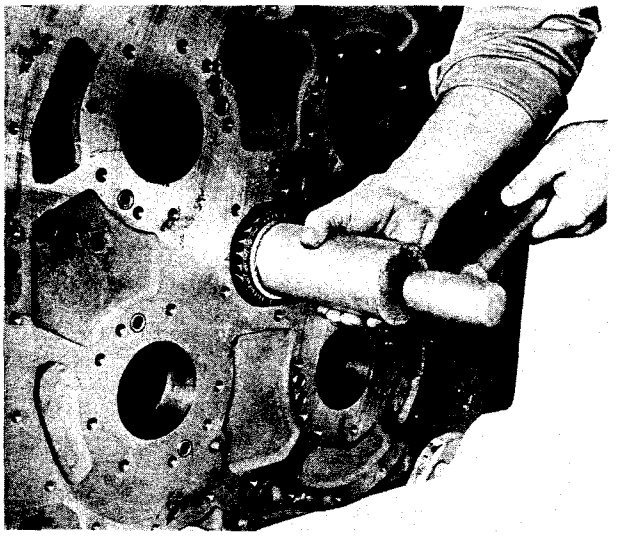


Figure 57

Install inner taper bearing on shaft with large diameter of taper outward.

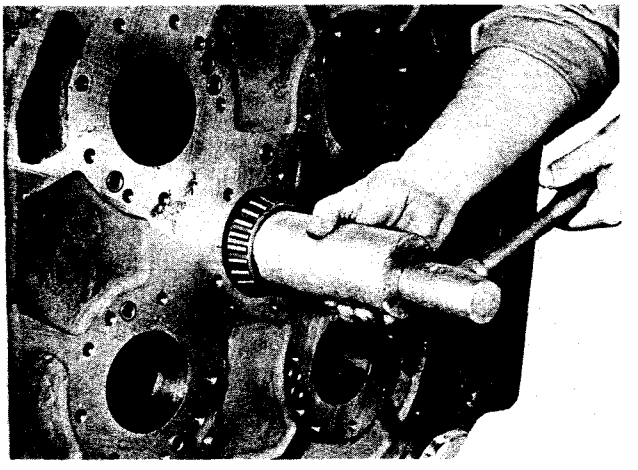


Figure 58

Install outer taper bearing on shaft with large diameter inward.

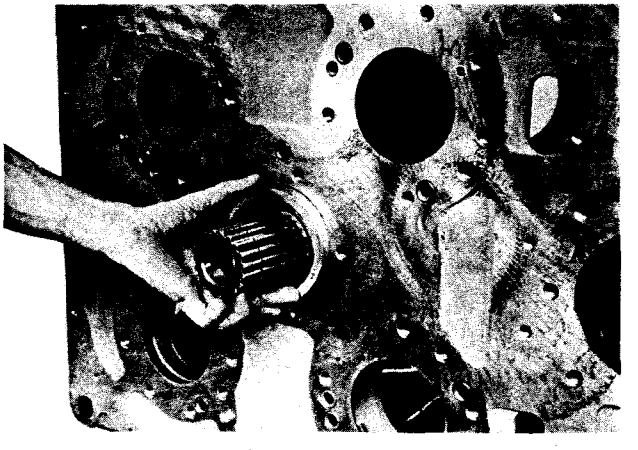


Figure 59

Install outer taper bearing cup on idler shaft.

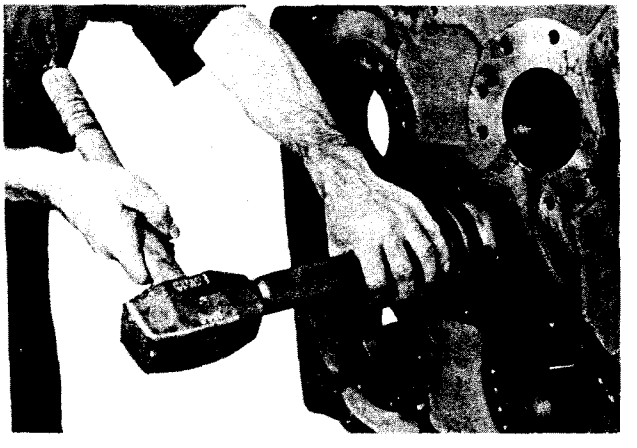


Figure 60

Drive outer taper bearing cup against outer taper bearing.

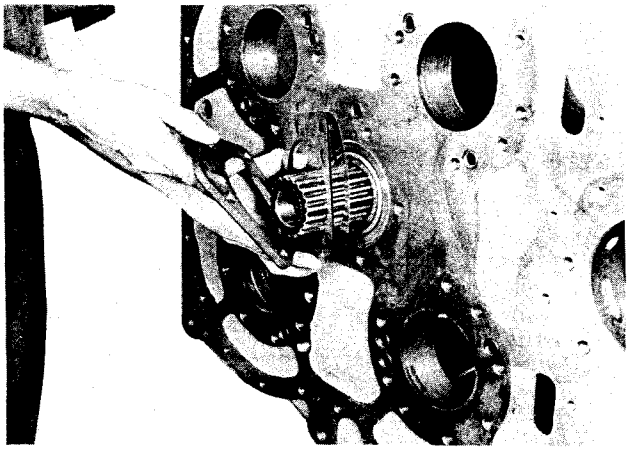


Figure 61

Install idler shaft bearing cap and shims.

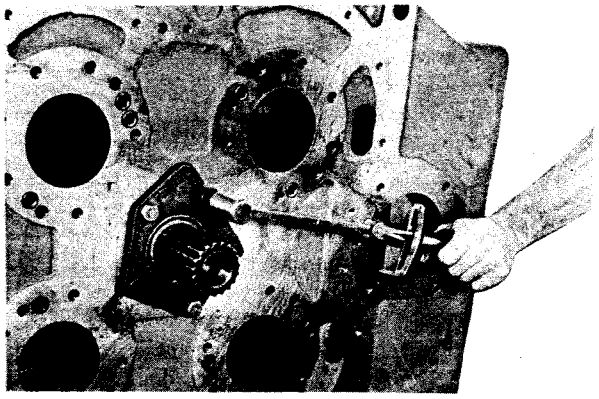


Figure 62

Install bearing cap bolts, torque bolts 47 to 65 ft. lbs.

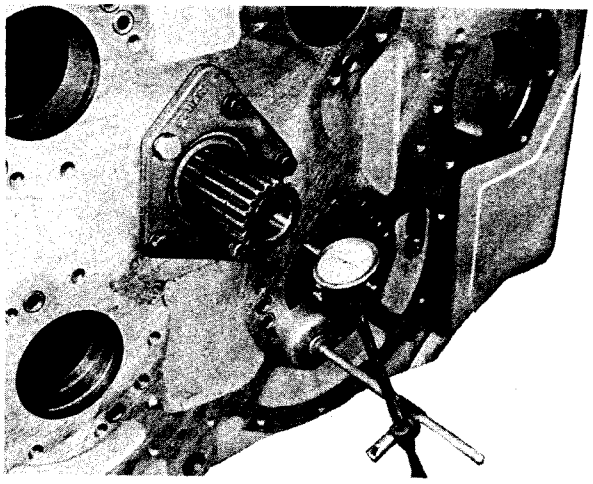


Figure 63

Adjust idler shaft taper bearing by adding or omitting shims. Check adjustment as shown in Figure 63. Adjust taper bearings .0 to .003 end play.

REASSEMBLY OF 1st AND 3rd SHAFT

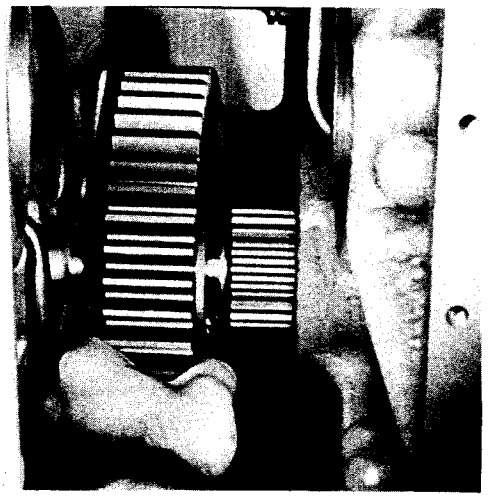


Figure 64

Press 1st and 3rd double taper bearing assembly on 1st and 3rd shaft. **CAUTION:** These bearings are in matched sets and under no circumstances can any of the four (4) parts be changed or mixed up with another bearing.

Position 1st and 3rd gear in transmission case. Install long gear spacer on shaft and against taper bearing assembly.

Insert shaft into bore of case and through 1st and 3rd gear. See Figure 64.

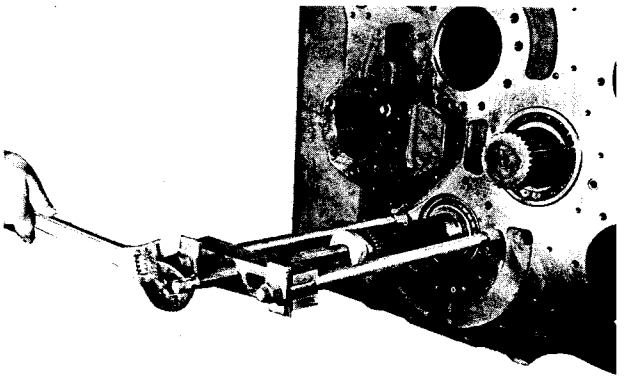


Figure 65

Push shaft assembly in case until taper bearing shoulders against locating ring in bore of case. Do not remove shaft pusher.

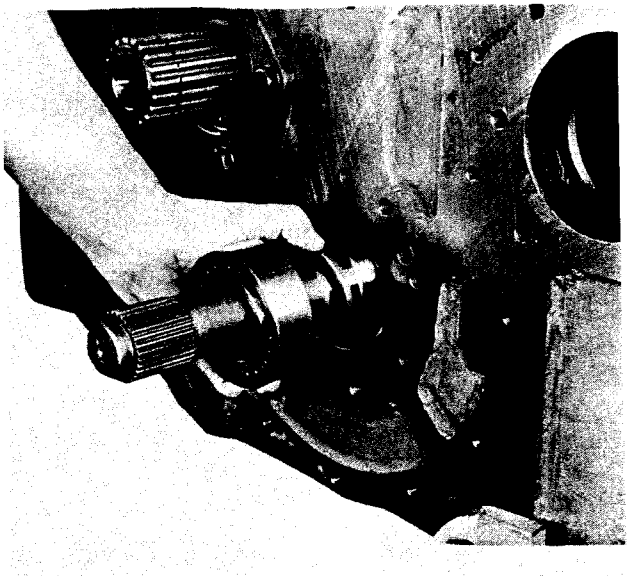


Figure 66

On opposite end of shaft install short spacer against 1st and 3rd gear. Install roller bearing as shown in Figure 66.

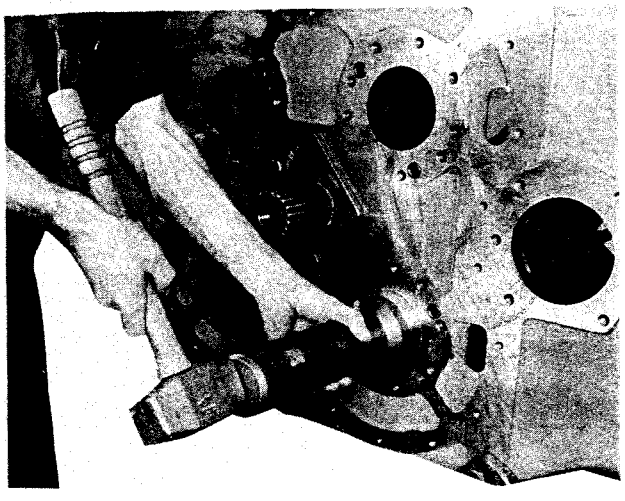


Figure 67

Drive bearing in place. **NOTE:** Bearing must be driven in tight. Check long spacer on shaft. When spacer can not be turned by hand, stack up between the front and rear bearing is tight. **DO NOT** attempt to draw bearing up tight with bearing lock nuts. Remove shaft pusher. This was left on only to hold shaft while installing roller bearing.

REASSEMBLY OF 2nd AND 4th SHAFT

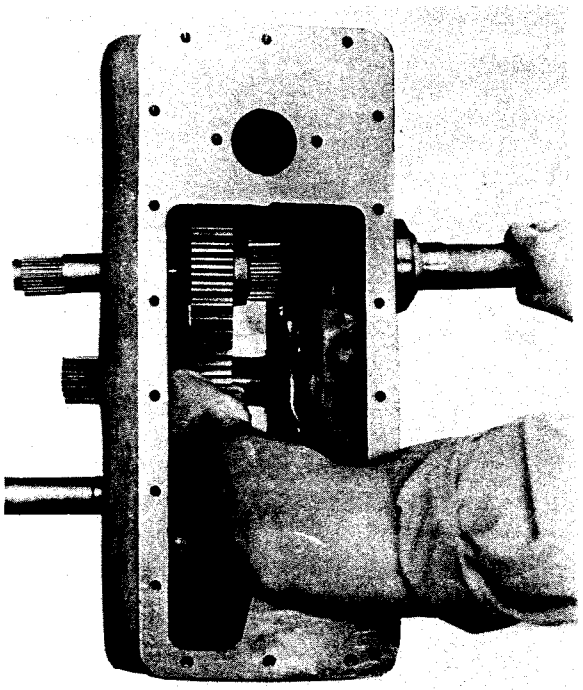


Figure 68

Press 2nd and 4th double taper bearing assembly on 2nd and 4th shaft. **CAUTION:** These bearings are in matched sets and under no circumstances can any of the four (4) parts be changed or mixed with another bearing.

Position 2nd and 4th gear in transmission case with long offset of gear hub toward front of case (input side). Insert shaft into bore of case and through 1st and 3rd gear. See Figure 68.

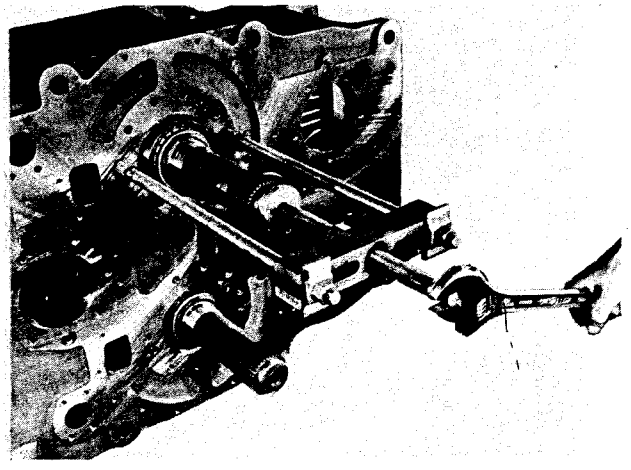


Figure 69

Push shaft assembly in case until taper bearing shoulders against locating ring in bore of case. Do not remove shaft pusher.

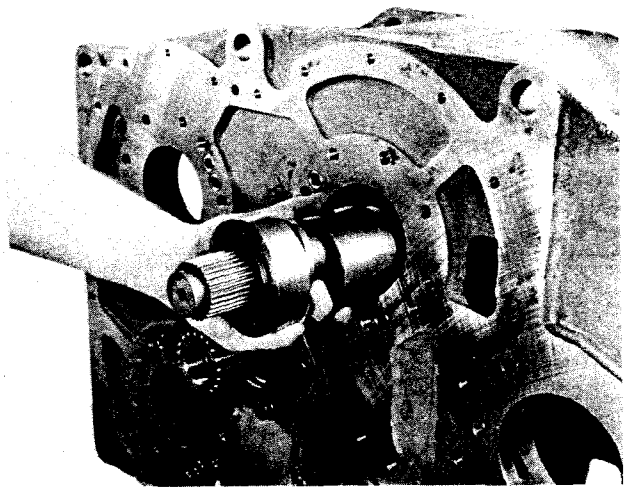


Figure 70

On opposite end of shaft, install long gear spacer on shaft and against 2nd and 4th gear. Install short spacer on shaft against long spacer. Install roller bearing and drive in place. **NOTE:** Bearing must be driven in tight. Check long spacer on shaft. When spacer can not be turned by hand, stack up between the front and rear bearing is tight. **DO NOT** attempt to draw bearing up tight with bearing lock nuts. Remove shaft pusher. This was left on only to hold shaft while installing roller bearing.

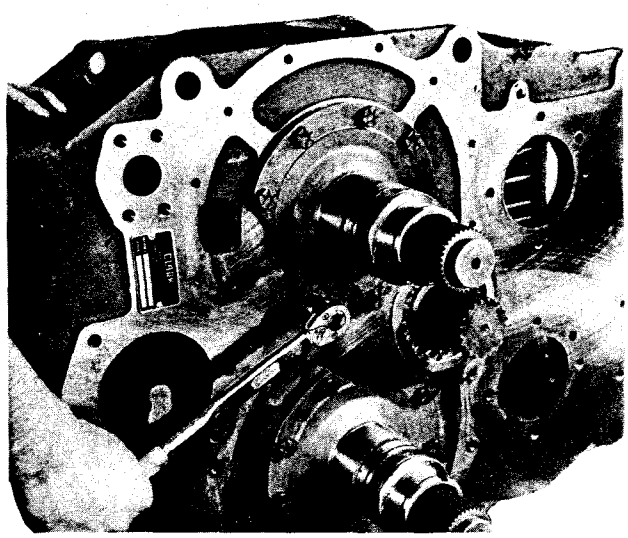


Figure 71

Install 1st and 2nd clutch supports. Align holes in clutch supports with holes in transmission case and install self locking bolts. Tighten bolts 70 to 85 ft. lbs. torque.

REASSEMBLY OF THE OUTPUT SHAFT

Assembly of the output shaft is optional. In the following illustrations the threaded end of the shaft is to the rear of the case, with the disconnect assembly toward the input side.

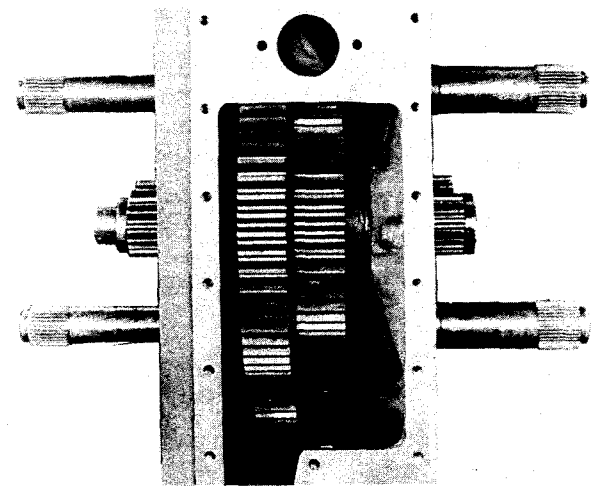


Figure 72

Press taper bearing (large diameter of taper inward) over threaded end of output shaft against shoulder on shaft. Position small output gear in transmission case to the input side (front) with longer offset of gear hub to the front. Position large output gear in transmission case to the rear with longer offset of gear hub to the rear. Insert output shaft through the rear bore of case and through large and small output gears. Figure 72 shows proper stack up of gears. Block output shaft and install front taper bearing (large diameter of taper inward) on output shaft until bearing shoulders against small output gear. Install bearing cups over front and rear bearings.

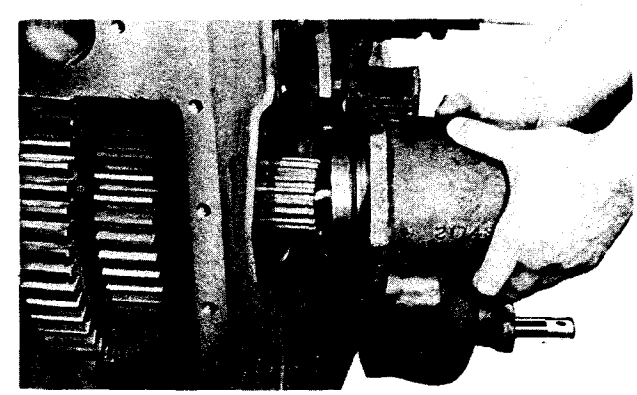


Figure 73

Install new "O" ring on disconnect housing. Lubricate "O" ring with Type "A" automatic transmission fluid. Install disconnect assembly on output shaft.

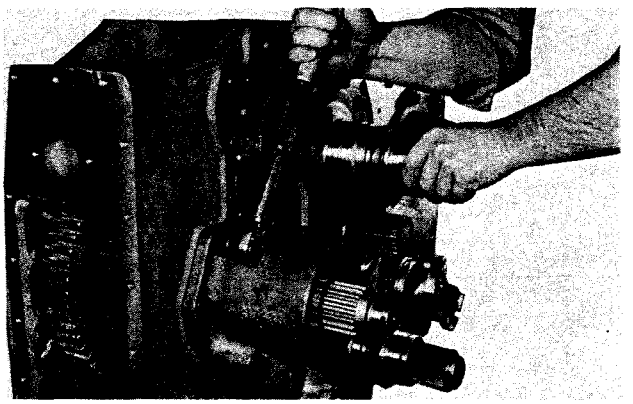


Figure 74

Secure disconnect assembly to transmission case with bolts and lockwashers. Tighten 47 to 55 ft. lbs. torque.

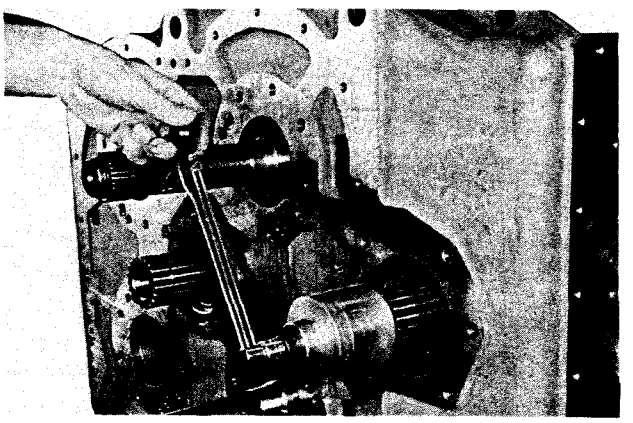


Figure 75

Install flange nut on threaded end of output shaft. Use an inch lb. torque wrench on the flange nut. Determine the amount of torque required to turn output shaft and gear train.

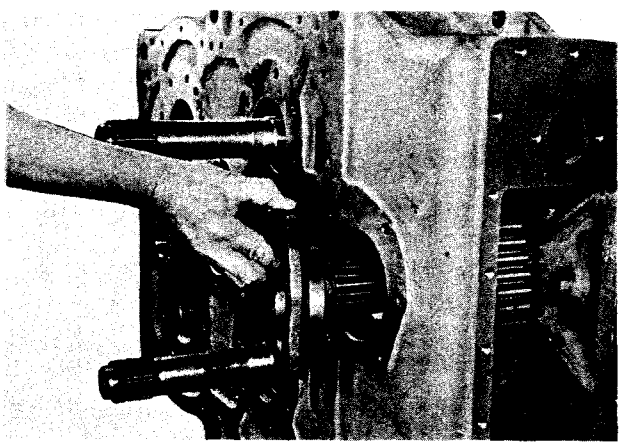


Figure 76

Install bearing cap, "O" ring and shims to transmission case.

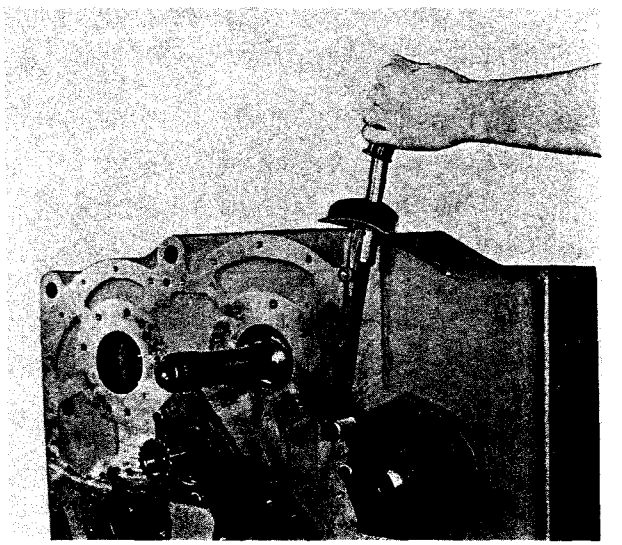


Figure 77

Install bearing cap bolts and lock washers. Tighten 47 to 55 ft. lbs. torque.

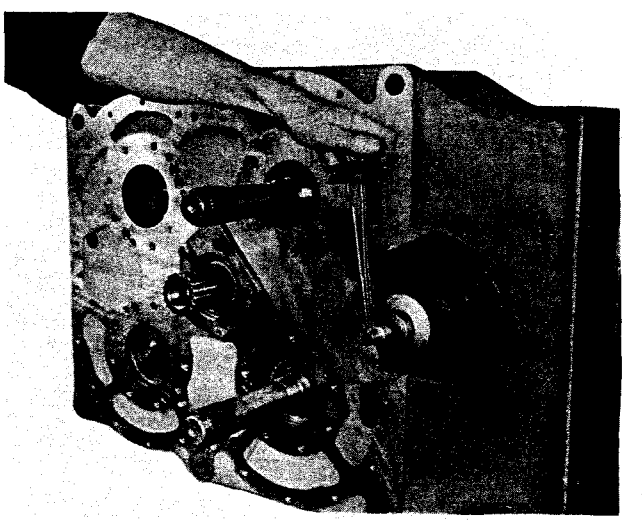


Figure 78

With an inch lb. torque wrench turn output shaft and gear train. Add or remove bearing cap shims to adjust preload. When bearings are properly adjusted, it will take 6 to 8 inch lbs. more to turn gear train than it did before bearing cap was installed.

REASSEMBLY OF INPUT AND REVERSE SHAFT

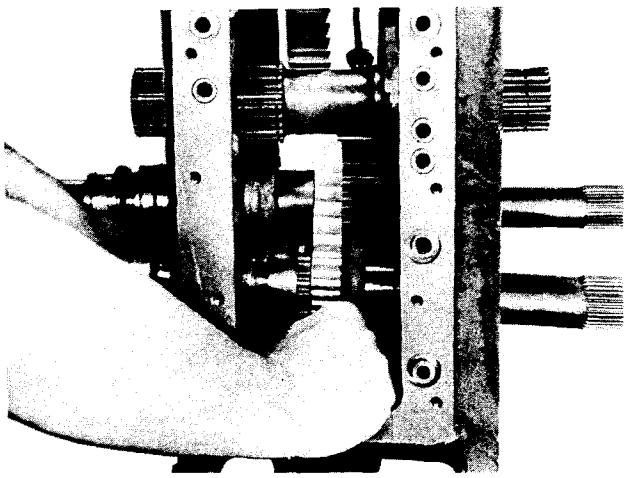


Figure 79

Press roller bearing on threaded end of input shaft. Install short spacer on shaft opposite threaded end. Position input gear in case with longer offset of gear to the rear. Install input shaft and bearing into front case bore and through input gear. Push bearing and shaft in case bore until bearing snap ring shoulders against transmission case. Do not remove shaft pusher. Install large spacer on shaft against input gear. Drive rear roller in place. **NOTE:** Bearing must be driven in tight. Check gear spacer on shaft. When spacer can not be turned by hand, stack up between input gear spacer and rear roller bearing is tight. **DO NOT** attempt to draw bearings up tight with bearing lock nuts. Remove shaft pusher.

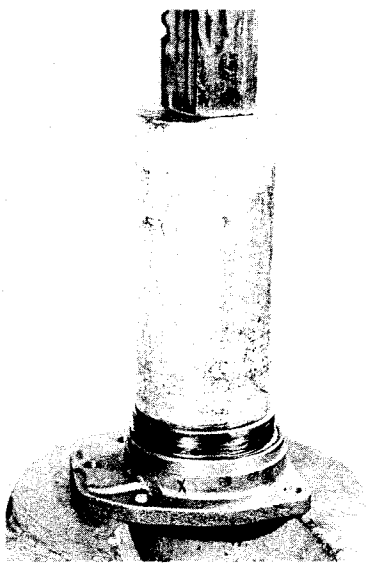


Figure 80

Apply a thin coat of Permatex No. 2 on the outer diameter of the input shaft oil seal. Press seal, lip of seal inward, into input shaft bearing cap.

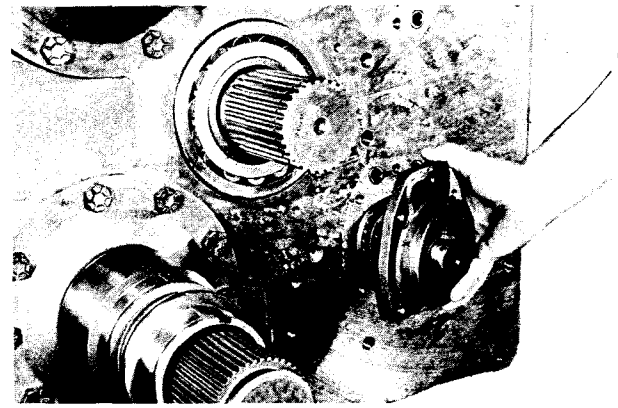


Figure 81

Install bearing cap and seal assembly on input shaft.

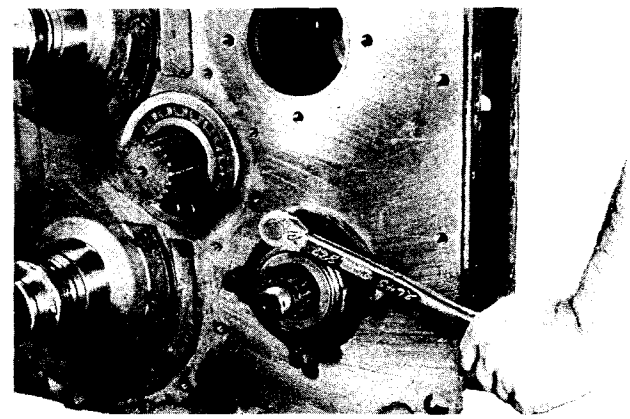


Figure 82

Install bearing cap bolts and lock washers. Torque bolts 47 to 55 ft. lbs. torque.

Install companion flange, flange "O" ring, washer and flange nut. Tighten nut 150 to 175 ft. lbs. torque.

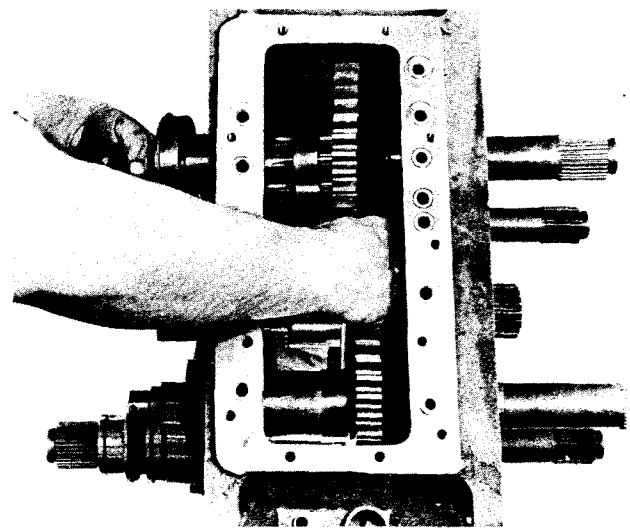


Figure 83

Assemble the reverse shaft the same as the input shaft (Figure 79). Install reverse shaft bearing spacer, washer and nut. Lock gears with a soft bar and tighten reverse nut 150 to 175 ft. lbs. torque. Install nut cotter. Place new gasket on reverse shaft. Install bolts and lock washers, tighten 47 to 55 ft. lbs. torque.

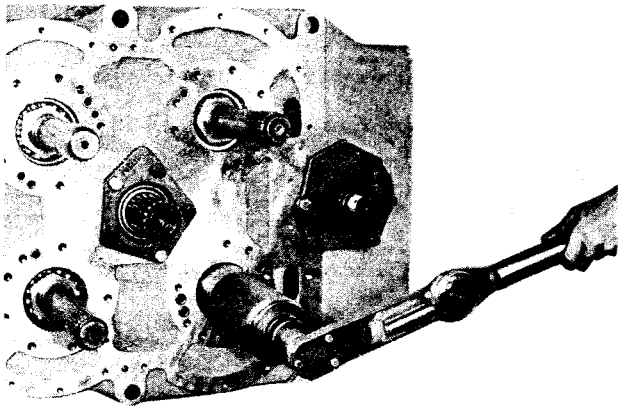


Figure 84

Lock gears using a soft bar, and install bearing inner lock nut (all four shafts). Tighten lock nuts 175 to 200 ft. lbs. torque. Install nut locks and outer lock nuts. Tighten outer lock nuts 175 to 200 ft. lbs. torque.

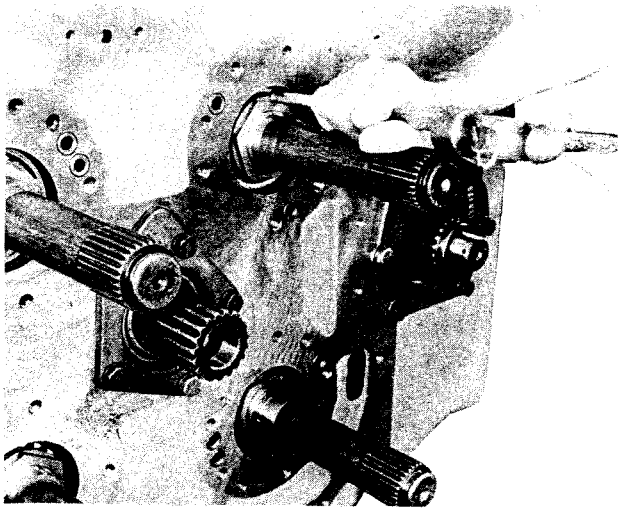


Figure 85

Bend a portion of the nut lock over one flat of the inner lock nut. Bend a portion of the nut lock over one flat of the outer lock nut.

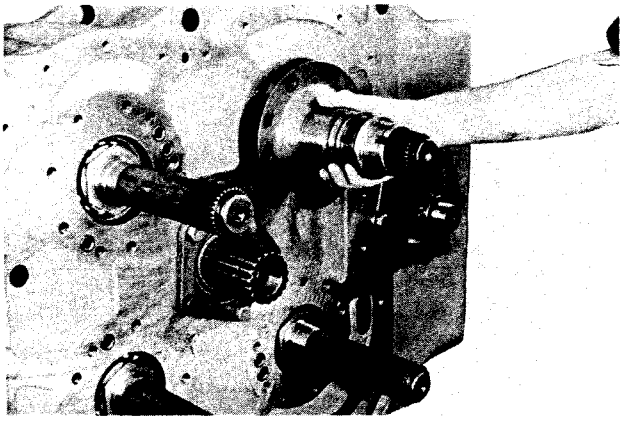


Figure 86

Install clutch supports. Align holes in clutch supports with holes in transmission case and install self locking bolts.

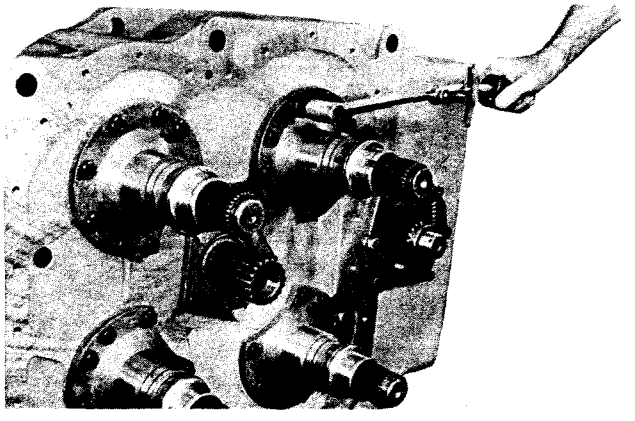


Figure 87

Tighten bolts 70-85 ft. lbs. torque.

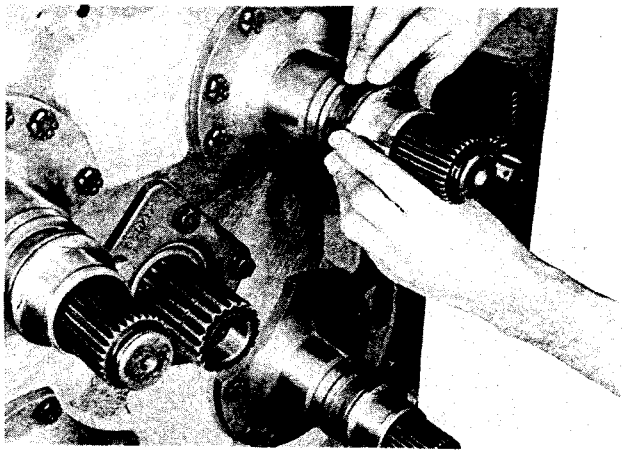


Figure 88

Install new clutch support piston rings. Lock rings in position. Lubricate piston rings with type "A" automatic transmission fluid.

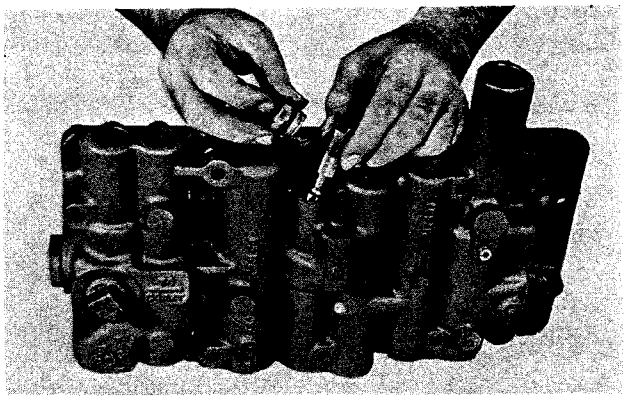
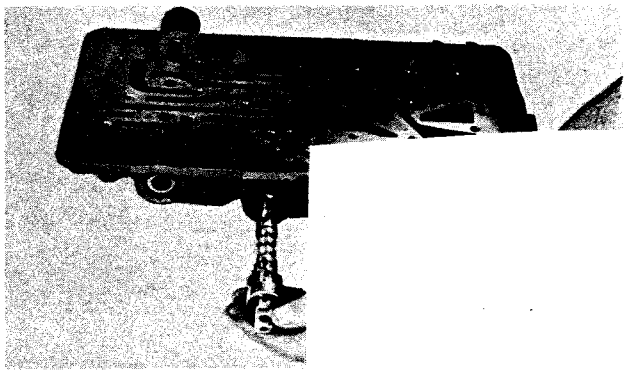


Figure 123
Install shut-off valve in housing. Depress valve and spring with valve plug. Tighten plug securely.



Figur
Install forward and revers
Install selector valve sto
selector valve.

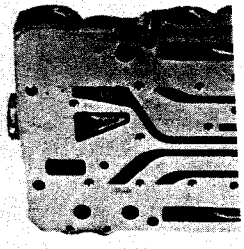


Figure
Apply a light coat of Perm
diameter of a new selector
seal in housing.

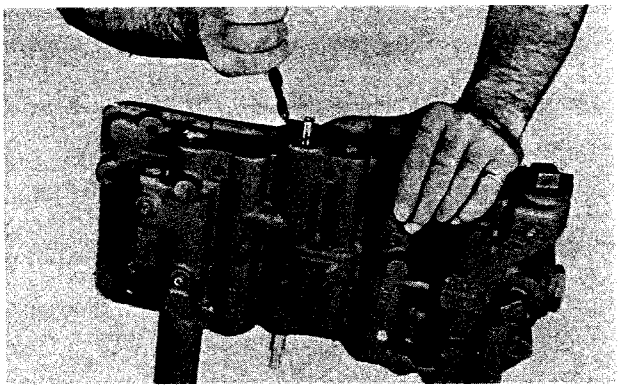
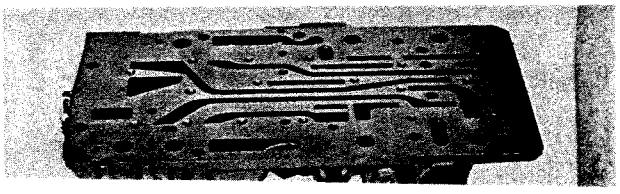


Figure 126
Install oil seal retainer ring.



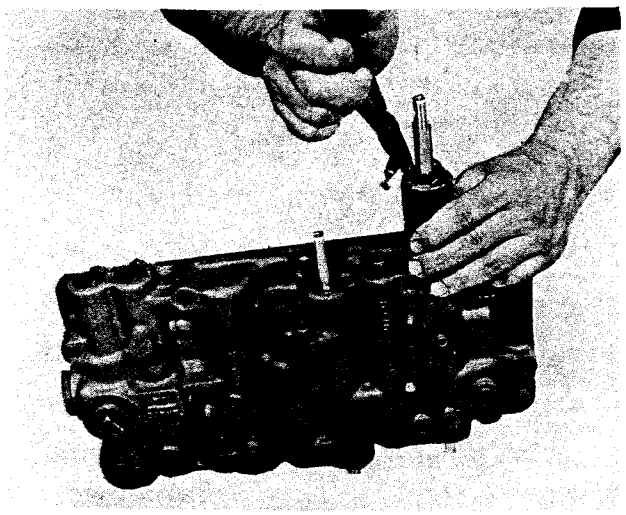


Figure 129
Install oil seal retainer ring.

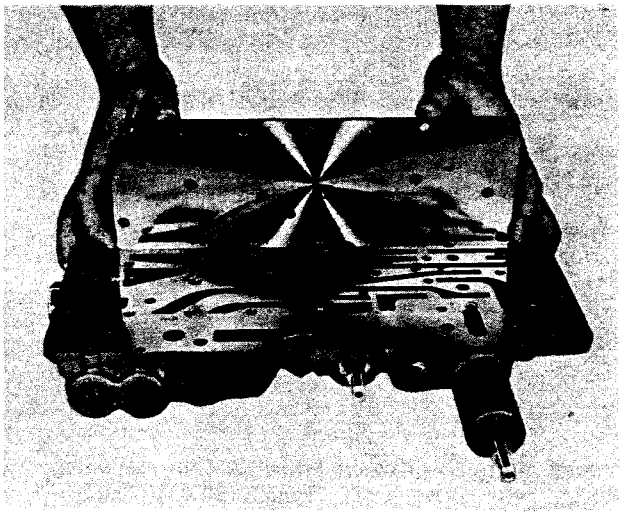


Figure 130
Install poppet balls and poppet springs in drilled ports in control cover. Install control cover plate. Secure with bolts and external shake proof washers. Tighten 10 to

SERVICING MACHINE AFTER TRANSMISSION OVERHAUL

The transmission, torque converter and its allied hydraulic system are important links in the drive line between the engine and wheels. The proper operation of either unit depends greatly on the condition and operation of the other, therefore, whenever repair or overhaul of one unit is performed, the balance of the system must be considered before the job can be considered completed.

After the overhauled or repaired transmission has been installed in the machine, the torque converter, oil cooler, filter and connecting hydraulic system must be thoroughly cleaned. This can be accomplished in several manners and a degree of judgment must be exercised as to the method employed.

The following are considered the minimum steps to be taken:

1. Drain entire system thoroughly.
2. Disconnect and clean all hydraulic lines. Where feasible hydraulic lines should be removed from machine for cleaning.
3. Replace oil filter elements, cleaning out filter cases thoroughly.
4. The oil cooler at bottom of radiater must be thoroughly cleaned. The cooler should be "back flushed" with oil and compressed air until all foreign material has been removed. Flushing in direction of normal oil flow will not adequately clean the cooler. If necessary, radiater and cooler assembly should be removed from machine for cleaning, using oil, compressed air and steam cleaner for that purpose. **DO NOT** use flushing compounds for cleaning purposes.
5. Remove bottom drain cover and plug from torque converter and inspect interior of converter housing, gears, etc. If presence of considerable foreign material is noted, it will be necessary that converter be removed, disassembled and cleaned thoroughly. It is realized this entails extra labor, however, such labor cost is a minor cost compared to cost of difficulties which can result from presence of such foreign material in the system.
6. Reassemble all components and using only Type "A" Automatic Transmission Fluid, fill torque converter and transmission through filler opening until fluid comes up to FULL mark on transmission dip-stick. Reinstall fill plug and dipstick and run engine two minutes at 500 - 600 RPM to prime torque converter and hydraulic lines. Recheck level of fluid in transmission **with engine running** at idle (500-600 RPM) and add quantity necessary to bring level up to FULL mark on dipstick. Recheck with hot oil (180 to 200 degrees).
7. Recheck all drain plugs, lines, connections, etc., for leaks and tighten where necessary.

SPECIFICATIONS AND SERVICE DATA — POWER SHIFT TRANSMISSION AND TORQUE CONVERTER

GEAR TYPE	Spur
CONTROLS	Forward and Reverse — Manual Speed Selection — Manual
CLUTCH TYPE	Multiple discs, hydraulically actuated, spring released, automatic wear compensation and no adjustment. All clutches oil-cooled and lubricated.
CLUTCH INNER DISC	Steel
CLUTCH OUTER DISC	Sintered Bronze
CLUTCH PRESSURE	180-220
OIL FILTRATION	Full flow oil filter safety by-pass, also strainer screen and magnets in sump at bottom of transmission case.

LUBRICATION

TYPE OF OIL — Type "A" Automatic Transmission Fluid

CAPACITY — Consult Operator's Manual on applicable machine model for system capacity. Torque Converter, Transmission and allied hydraulic system must be considered as a whole to determine capacity.

CHECK PERIOD — Check oil level DAILY with engine running at 500-600 RPM and oil at 180 degrees F. to 200 degrees F.

DRAIN PERIOD — Maintain oil level to FULL mark on dipstick. Every 250 hours change oil filter element. Every 500 hours, drain and refill system as follows: Drain with oil at 150 degrees F. to 200 degrees F.

(a) Drain converter at bottom rear of converter housing.

(b) Drain transmission and remove sump. Clean pan and screen thoroughly and replace using new gaskets.

(c) Drain oil filters, remove and discard filter elements. Clean filter shells and install new elements.

(d) Refill transmission to FULL mark on dipstick.

(e) Run engine at 500-600 RPM to prime converter and lines.

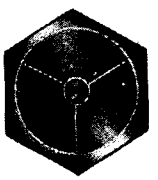
(f) Recheck level with engine running at 500-600 RPM and add oil to bring level to FULL mark on dipstick. When oil temperature is hot (180 degrees to 200 degrees), make final oil level check.

TABLE OF TORQUE LIMITS

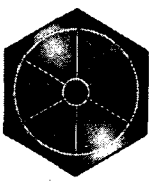
	TORQUE IN FT. LBS.								
	Minimum				Maximum				
Transmission Series	3000	5000	8000	16,000	3000	5000	8000	16,000	
BOLT									ITEM
Self Locking	70	70	150	260	80	85	175	300	1st and 2nd CLUTCH SUPPORT
Self Locking	70	70	70	150	80	85	85	175	Fwd., Rev., 3rd and 4th CLUTCH SUPPORT
	150	150	250	250	175	175	300	300	INPUT FLANGE NUT
	175	250	400	400	200	300	450	450	OUTPUT FLANGE NUT

TORQUE IN (LBS. — FT.) BOLTS, CAPSCREWS, STUDS AND NUTS

Grade 5 Identification, 3 Radial Dashes 120° Apart on Head of Bolt



Grade 8 Identification, 6 Radial Dashes 60° Apart on Head of Bolt



COARSE THREADS	Grade 5 Dry	Grade 5 Lubricated or Plated	Grade 8 Dry	Grade 8 Lubricated or Plated
3/8 — 16	31 — 34	23 — 25	44 — 48	33 — 36
7/16 — 14	49 — 54	37 — 41	70 — 77	52 — 57
1/2 — 13	75 — 83	57 — 63	106 — 117	80 — 88
9/16 — 12	109 — 120	82 — 90	153 — 168	115 — 127
5/8 — 11	150 — 165	113 — 124	212 — 233	159 — 175

PRESSURE AND OIL FLOW CHECK SPECIFICATIONS (180 DEGREES F. to 200 DEGREES F.)

A.	Temperature Gauge Connection	See external oil flow diagram.
B.	Converter-Out Pressure	See Pressure and Oil Flow Checks (Paragraph A)
C.	Converter Drain Back Line	See External Oil Flow Diagram.
D.	Lubricating Pressure	25 p.s.i. Maximum at High Free Idle.
E.	Converter Pump Output Line	See Pump Chart (Paragraph C).
F.	Clutch Pressure at Transmission Control Cover	180-220 p.s.i. at Engine idle, each clutch and no more than a 5 p.s.i. variation between all clutches.
G.	Transmission to Converter Line	See Pressure and Oil Flow Checks (Paragraph B.)

TROUBLE SHOOTING GUIDE

The following data is presented as an aid to locating the source of difficulty in a malfunctioning unit. It is necessary to consider the torque converter charging pump, transmission, oil cooler and connecting oil lines as a complete system when running down the source of trouble since the proper operation of any unit therein depends greatly on the condition and operations of the others. By studying the principles of operation together with data in this section, it may be possible to correct any malfunction which may occur in the system.

TROUBLE SHOOTING PROCEDURE BASICALLY CONSISTS OF TWO CLASSIFICATIONS: MECHANICAL AND HYDRAULIC.

MECHANICAL CHECKS

Prior to checking any part of the system from a hydraulic standpoint, the following mechanical checks should be made.

1. A check should be made to be sure all control lever linkage is properly connected and adjusted at all connecting points.

2. Check shift levers and rods for binding or restrictions in travel that would prevent full engagement. Shift levers by hand at transmission case, if full engagement cannot be obtained, difficulty may be in control cover and valve assembly.

HYDRAULIC CHECKS

Before checking on the torque converter, transmission, and allied hydraulic system for pressures and rate of oil flow, it is essential that the following preliminary checks be made:

1. Check oil level in transmission. This should be done with oil temperatures of 180 to 200 degrees F. — DO NOT ATTEMPT THESE CHECKS WITH COLD OIL. To bring the oil temperature to this specification it is necessary to either work the machine or "stall" out the converter. Where the former means is impractical, the latter means should be employed as follows:

Engage shift levers in forward and fourth speed and apply brakes. Accelerate engine half to three-quarter throttle.

Hold stall until desired converter outlet temperature is reached. CAUTION: FULL THROTTLE STALL SPEEDS FOR AN EXCESSIVE LENGTH OF TIME WILL OVERHEAT THE CONVERTER.

PRESSURE AND OIL FLOW CHECKS

Whenever improper performance is evident the following basic pressure and oil flow checks should be performed and recorded. It is also recommended that these checks be taken periodically as a preventative maintenance measure. Doing so will permit possible detection of difficulties in advance of actual breakdown, thus permitting scheduling of repair operation. Likewise repair of minor difficulties as they can be made at considerably less cost and down-time than when delayed until major and complete breakdowns occur.

Analyzing the results of these checks by comparison with specifications and with each other will indicate in most cases the basic item or assembly in the system as the source of difficulty. Further checking of that assembly will permit isolation of the specific cause of trouble.

(SEE PLUMBING AND CHECK POINT DIAGRAM)

A. OIL PRESSURE AT **CONVERTER OUT** PORT.

Install hydraulic pressure gauge at **PRESSURE** connection on Converter Regulator Valve or at **CONVERTER OUT** pressure tap. (all models do not have pressure regulating valves). Check and record oil pressure at 2000 RPM and at maximum speed (engine at full throttle) (see instructions on Stalling Converter previously listed.)

CONVERTER MODEL	MAXIMUM CONVERTER OUT PRESSURE
C-270	40 p.s.i.
C-8000	70 p.s.i.
C-16000	70 p.s.i.

B. If a flow meter is available, install in line between converter charging pump and oil filters. Flow meter must be able to withstand 300 p.s.i.

Disconnect hose between pump and filter at filter end and using suitable fittings connect to pressure port of tester. Install hose between filter and tester, connecting same to reservoir port of tester.

DO NOT USE TESTER LOAD VALVE AT ANY TIME DURING TEST. When taking flow reading, all readings should be taken on the first (left) half of flow gauge. Whenever the needle shows on the right half of gauge, correct by switching to higher scale.

C. If a flow meter is not available for checking converter pump output, proceed with manual transmission and converter checks. If the converter shows leakage within specifications and clutch pressures (180 to 220 p.s.i.) are all equal within 5 p.s.i. refer to paragraph on Low Converter Charging Pump Output.

PUMPS ARE RATED AT 2000 RPM—Refer to Vehicle Manufacture Manual for specific pump output.

D. NOMINAL PUMP RATINGS:

C-270	C-8000	C-16000
11 G.P.M.	21 G.P.M.	40 G.P.M.
15 G.P.M.	31 G.P.M.	50 G.P.M.
21 G.P.M.	40 G.P.M.	65 G.P.M.
	50 G.P.M.	

Pump output listed applies to a new pump in each case. A 20% tolerance below this figure is permissible; however, if pump output is more than 20% below specification the pump must be replaced and not rebuilt.

E. TRANSMISSION CLUTCH LEAKAGE

Check clutch pressures at low engine idle with oil at operating temperatures 180° to 200°. Engine speed must remain constant during entire leakage check. Shift levers into forward and 1st speed, 2nd speed, 3rd speed, and 4th speed. Record pressures. Shift direction lever in reverse and record pressures. All pressure must be equal within 5 p.s.i. If clutch pressure varies in any one clutch more than 5 p.s.i., repair clutch. All pressures must be taken with two clutches engaged.

EXAMPLE:

Forward and 1st speed.....200 p.s.i.
Forward and 2nd speed.....200 p.s.i.
Reverse and 1st speed.....200 p.s.i.
Forward and 3rd speed.....200 p.s.i.
Forward and 4th speed.....200 p.s.i.

If a flow meter is available install in line coming out of converter pump. See flow diagram for location of pressure on flow checks. Check pump volume at 2000 RPM and at low engine idle, record readings. See pump volume specifications at 2000 RPM.

Install flow meter in the line coming from transmission to converter. Check oil volume at 2000 RPM and at low idle in the following speed selections. Record readings.

Forward — 1st speed
Forward — 2nd speed
Forward — 3rd speed
Forward — 4th speed
Reverse — 1st speed

Subtract readings in each speed from pump volume reading to get transmission clutch leakage.

Example: Pump Volume at idle, 8 gal.

Forward—1st speed	6 gal.	Pump volume	8 gal.
Forward—2nd speed	6 gal.	Forward — 1st speed	6 gal.
Forward—3rd speed	6 gal.	Clutch leakage	2 gal.
Forward—4th speed	6 gal.		
Reverse — 1st speed	6 gal.		

If clutch leakage varies more than 1 gal. correct clutch.

LEAKAGE IN TRANSMISSION CLUTCHES

Leakage in 3000 series must not exceed 4 gal. max.
Leakage in 5000 series must not exceed 4 gal. max.
Leakage in 8000 series must not exceed 6 gal. max.
Leakage in 16000 series must not exceed 7 gal. max.

F. CONVERTER LUBE FLOW

Disconnect CONVERTER DRAIN BACK line at transmission with engine running at 2000 RPM, and measure oil into a gallon container. Measure oil leakage for 15 seconds and multiply the volume of oil by four to get gallons per minute leakage.

LEAKAGE IN CONVERTER

Leakage in C270 series not to exceed 2 gal. max.
Leakage in C8000 series not to exceed 5 gal. max.
Leakage in C16000 series not to exceed 5 gal. max.

LOW CLUTCH PRESSURE WITH NORMAL CLUTCH LEAKAGE

CAUSE	REMEDY
1. Low Oil Level.	1. Fill to proper level.
2. Broken spring in transmission regulator valve.	2. Replace spring.
3. Clutch pressure regulator valve spool stuck in open position.	3. Clean valve spool and sleeve.
4. Faulty charging pump.	4. See paragraph on charging pump output.

LOW CLUTCH PRESSURE WITH EXCESSIVE CLUTCH LEAKAGE

1. Broken or worn clutch piston sealing rings.	1. Replace sealing rings.
2. Clutch drum bleed valve ball stuck in open position.	2. Clean bleed valve thoroughly.
3. Broken or worn sealing rings on clutch support.	3. Replace sealing rings.
4. Low converter charging pump output.	4. See paragraph on charging pump output.

LOW CONVERTER CHARGING PUMP OUTPUT

CAUSE	REMEDY
1. Low oil level.	1. Fill to proper level.
2. Sump screen plugged.	2. Clean screen and sump.
3. Air leaks at pump intake hose and connections or collapsed hose.	3. Tighten all connections or replace hose if necessary.
4. Defective oil pump.	4. Replace pump.

LOW FLOW THROUGH COOLER WITH LOW CONVERTER IN PRESSURE

1. Defective safety by-pass valve spring.	1. Replace spring.
2. Converter by-pass valve partially open.	2. Check for worn by-pass ball seat.
3. Excessive converter internal leakage. See paragraph E, check converter lube flow.	3. Remove, disassemble, and rebuild converter assembly, replacing all worn or damaged parts.
4. Broken or worn sealing rings in transmission clutches.	4. See paragraph on Clutch leakage.

LOW FLOW THROUGH COOLER WITH HIGH CONVERTER OUT PRESSURE

1. Plugged oil cooler. Indicated if transmission lube pressure is low.	1. Back flush and clean oil cooler.
2. Restricted cooler return line.	2. Clean out lines.
3. Lube oil ports in transmission plugged. Indicated if transmission lube pressure is high.	3. Check lube lines for restrictions.

OVERHEATING

1. Worn oil sealing rings. See paragraph E.	1. Remove, disassemble, and rebuild converter assembly.
2. Worn oil pump.	2. Replace.
3. Low oil level.	3. Fill to proper level.
4. Pump suction line taking air.	4. Check oil line connections and tighten securely.

NOISY CONVERTER

1. Worn coupling gears.	1. Replace.
2. Worn oil pump.	2. Replace.
3. Worn or damaged bearings.	3. A complete disassembly will be necessary to determine what bearing is faulty.

LACK OF POWER

1. Low engine RPM at converter stall.	1. Tune engine check governor.
2. See "Over-heating" and make same checks.	2. Make corrections as explained in "Over-Heating.