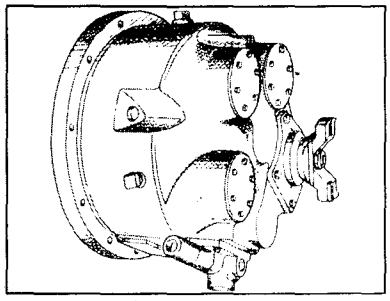
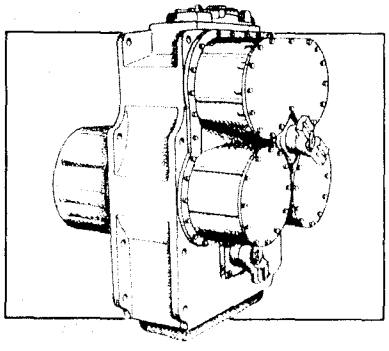
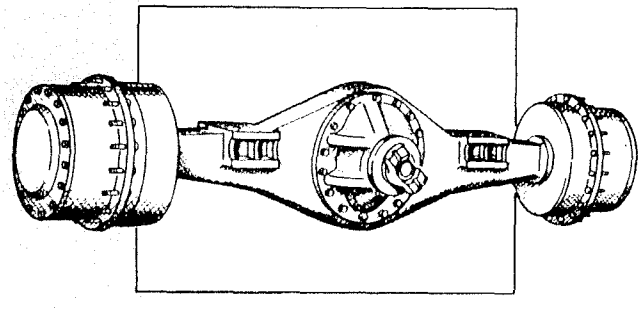
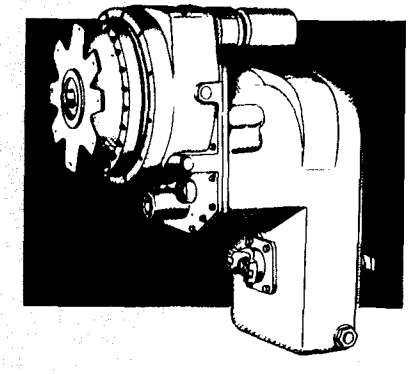
Maintenance and Service Manual









28000 Powershift Transmission

R-HR & MHR MODEL
4 SPEED LONG DROP

CLARK-HURTH COMPONENTS

SM R-HR-MHR284 Rev. 6-95

Service Publications

1293 Glenway Drive

Statesville, NC 28677

TOWING OR PUSH STARTING

Before towing the vehicle, be sure to lift the rear wheels off the ground or disconnect the driveline to avoid damage to the transmission during towing.

NOTE: If the transmission has 4 wheel drive, disconnect both front and rear drivelines. Because of the design of the hydraulic system, the engine **cannot** be started by pushing or towing.

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-HURTH COMPONENTS** product.

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 product, its principle 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-Hurth Components**-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. **Clark-Hurth Components** does not warrant repair or replacement parts, nor failures resulting from the use of parts which are not supplied by or approved by **Clark-Hurth Components.** IMPORTANT: **Always furnish the Distributor with the serial and model number when ordering parts.**

TABLE OF CONTENTS

NOTE: Metric Dimensions Shown in Brackets [ ].

TRANSMISSION ASSEMBLY

The transmission and hydraulic torque portion of the power train enacts an important role in transmitting 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. It is necessary to consider both units in the study of their function and operation.

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

Basic Design Silhouette
Converter Assembly
Converter and Transmission Case Group
Four Speed Case and Clutch Group
Clutch Group
Regulating Valve, Charging Pump and Filter Group
Control Valve
Axle Disconnect and Mechanical Parking Brake
Typical 28000 Cross Section
External Plumbing Diagram
Typical Four Speed Power Flow
Clutch and Gear Arrangement
Shielded Bearing Installation
Ring Gear Installation

The R, HR, and MHR Model Transmissions are of three basic designs.

The R Model consists of a separate torque converter, mounted to the engine with the powershift transmission remotely mounted and connected to the torque converter with a drive shaft.

The HR Model consists of a torque converter and powershifted transmission in one package mounted directly to the engine.

The MHR version is a mid-mount torque converter and transmission assembly connected to the engine by means of a drive shaft. (See Fig. A for basic design silhouette.)

The shift control valve assembly may be mounted directly on the side of the converter housing or front transmission cover, or remote mounted and connected to the transmission by means of flexible hoses. The function of the control valve assembly is to direct oil under pressure to the desired directional and speed clutch. A provision is made on certain models to neutralize the transmission when the brakes are applied. This is accomplished through use of a brake actuated shutoff valve. The speed and direction clutch assemblies are mounted inside the transmission case and are connected to the output shaft of the converter either by direct gearing or drive shaft. The purpose of the speed or directional clutches is to direct the power flow through the gear train to provide the desired speed range and direction.

An axle disconnect is optional and is located on the output shaft. The drive to the front or rear axle can be disconnected or connected by manual shifting.

HOW THE UNITS OPERATE

'ith the engine running, the converter charging pump draws oil from the transmission sump through the emovable oil suction screen and directs it through the pressure regulating valve and oil filter.

The pressure regulating valve maintains pressure to the transmission control cover for actuating the direction and speed clutches. This requires a small portion of the total volume of oil used in the system. The remaining volume of oil is directed through the torque converter circuit to the oil cooler and returns to the transmission for positive lubrication. This regulator valve consists of a hardened valve spool operating in a closely fitted bore. The valve spool is spring loaded to hold the valve in a closed position. When a specific pressure is achieved, the valve spool works against the spring until a port is exposed along the side of the bore. This sequence of events provides the proper system pressure.

After entering the converter housing the oil is directed through the stator support to the converter blade cavity and exits in the passage between the turbine shaft and converter support. The oil then flows out of the converter to the oil cooler. After leaving the cooler, the oil is directed to a fitting on the transmission. Then through a series of tubes and passages lubricates the transmission bearings and clutches. The oil then gravity drains to the transmission sump.

The hydraulic torque converter consists basically of three elements and their related parts to multiply engine torque. The engine power is transmitted from the engine flywheel to the impeller element through the impeller cover. This element is the pump portion of the hydraulic torque converter and is the primary component which starts the oil flowing to the other components which results in torque multiplication. This element can be compared to a centrifugal pump in that it picks up fluid at its center and discharges at its outer diameter.

The torque converter turbine is mounted opposite the impeller and is connected to the output shaft of the torque converter. This element receives fluid at its outer diameter and discharges at its center. Fluid directed by the impeller out into the particular design of blading in the turbine and reaction member is the means by which the hydraulic torque converter multiplies torque.

The reaction member of the torque converter is located between and at the center or inner diameters of the impeller and turbine elements. Its function is to take the fluid which is exhausting from the inner portion of the turbine and change its direction to allow correct entry for recirculation into the impeller element.

The torque converter will multiply engine torque to its designed maximum multiplication ratio when the output shaft is at zero RPM. Therefore, we can say that as the output shaft is decreasing in speed the torque multiplication is increasing.

The shift control valve assembly consists of a valve body with selector valve spools. A detent ball and spring in the selector spool provides 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.

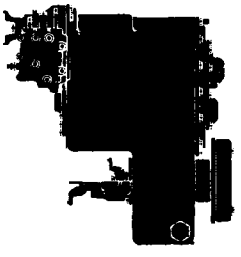
With the engine running and the directional control lever in neutral position, oil pressure from the regulating valve is blocked at the control valve, and the transmission is in neutral. Movement of the forward and reverse spool will direct oil, under pressure to either the forward or reverse direction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

When either directional clutch is selected the opposite clutch is relieved of pressure and vents back through the direction selector spool. The same procedure is used in the speed selector.

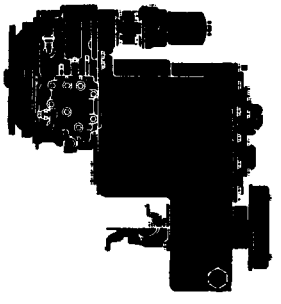
The direction or speed clutch assembly consists of a drum with internal splines and a bore to receive a hydraulically actuated piston. The piston is "oil tight" by the use of sealing rings. A steel disc with external splines is inserted into the drum and rests against the piston. Next, a friction disc with splines at the inner diameter is inserted. Discs are alternated until the required total is achieved. A heavy back-up plate is then inserted and secured with a snap ring. A Hub with O.D. splines is inserted into the splines of discs with teeth on the inner diameter The discs and hub are free to increase in speed or rotate in the opposite direction as long as no pressure is present in that specific 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 valve, through a tube, to a chosen clutch shaft. This shaft has a drilled passageway for oil under pressure to enter the shaft. Oil pressure sealing rings are located on the clutch shaft. These rings direct oil under pressure to a desired clutch. Pressure of the oil forces the piston and discs against the heavy back-up plate. The discs, with teeth on the outer diameter, clamping against discs with teeth on the inner diameter, enables the hub and clutch shaft to be locked together and allows them to drive as a unit.

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



R-28000



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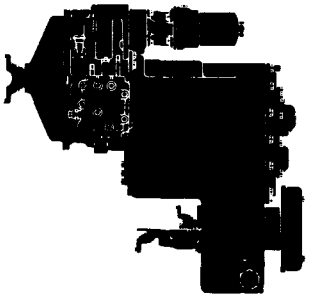

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FIG. A

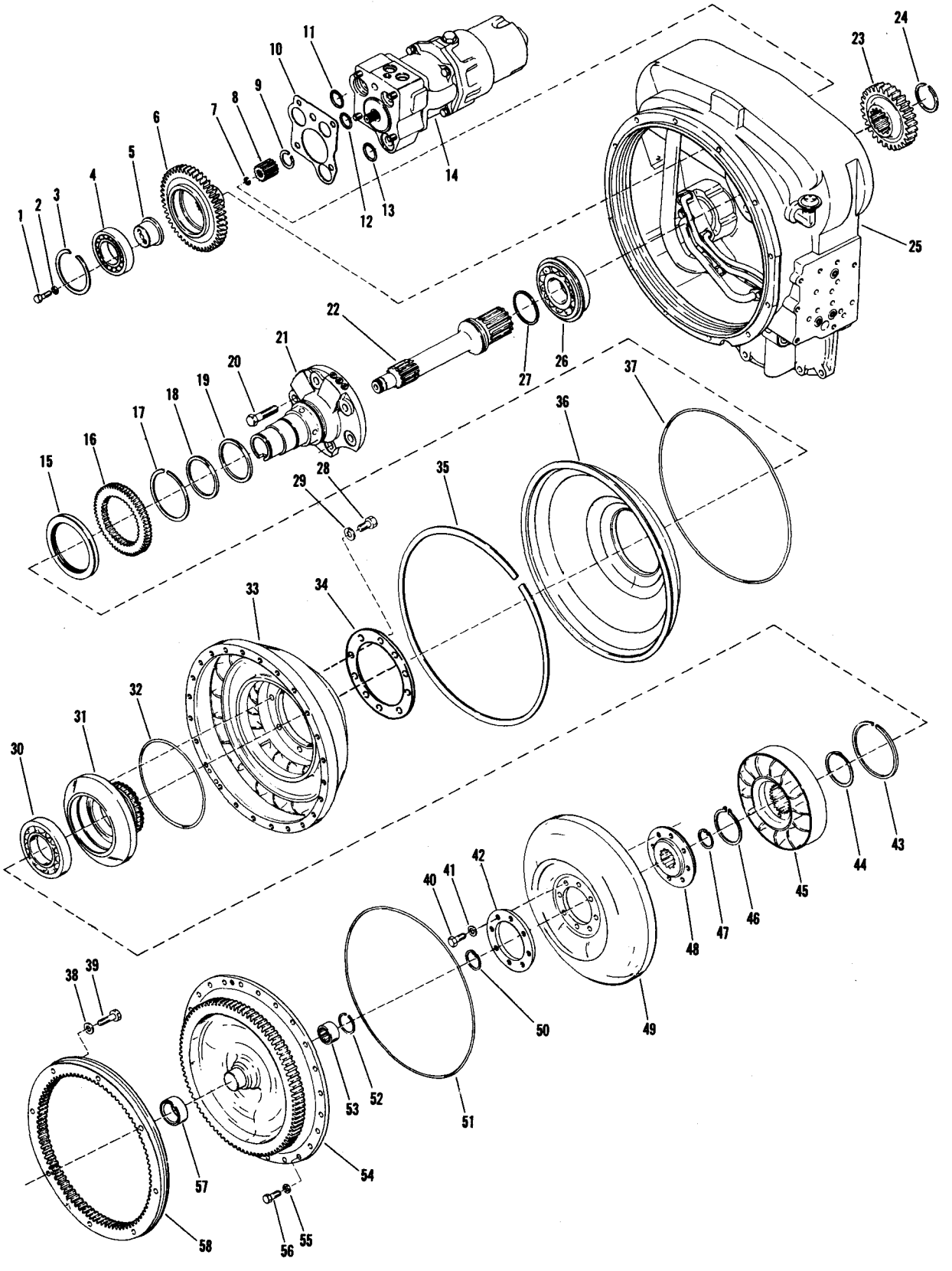
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Figure B

HR 28000 CONVERTER GROUP

(See page 39 for R Model Front Cover Group)

ITEM	DESCRIPTION	QTY.
1	Bearing Support Screw	6
2	Bearing Support Screw Lockwasher	6
3	Drive Gear Snap Ring	3
4	Pump Drive Gear Bearing	3
5	Pump Drive Bearing Support	3
6	Pump Drive Gear	3
7	Pump Sleeve Snap Ring	1
8	Charging Pump Drive Sleeve Assembly	1
9	Pump Sleeve Snap Ring	1
10	Valve to Housing Gasket	1
11	Valve Body "O" Ring	1
12	Valve Body "O" Ring	1
13	Valve Body "O" Ring	1
14	Regulator Valve, Charging Pump and Filter Assembly	1
15	Oil Baffle Oil Seal	1
16	Impeller Hub Gear	1
17	Impeller Hub Gear Snap Ring	1
18	Piston Ring Expander Spring	1
19	Piston Ring	1
20	Stator Support Screw	6
21	Stator Support	1
22	Turbine Shaft	1
23	Turbine Shaft Gear	1
24	Turbine Shaft Gear Snap Ring	1
25	Converter Housing and Tube Assembly	1
26	Turbine Shaft Bearing	1
27	Piston Ring	1
28	Hub to Impeller Screw	8
29	Hub to Impeller Screw Washer	8
30	Impeller Hub Bearing	1
31	Impeller Hub	1
32	Impeller Hub "O" Ring	1
33	Impeller	1
34	Impeller Hub Screw Backing Ring (Not used on all models)	1
35	Oil Baffle Retainer Ring	1
36	Oil Baffle	1
37	Oil Baffle Seal Ring	1
38	Ring Gear Screw Washer	32
39	Ring Gear Screw	32
40	Turbine Hub Screw	8
41	Turbine Hub Screw Washer	8
42	Turbine Hub Screw Backing Ring	1
43	Bearing Snap Ring	1
44	Reaction Member Spacer	1
45	Reaction Member	1
46	Reaction Member Snap Ring	1
47	Turbine Hub Locating Ring	1
48	Turbine Hub	1
49	Turbine	1
50	Turbine Hub Retaining Ring	1
51	Impeller to Cover "O" Ring	1
52	Bearing Snap Ring	1
53	Impeller Cover Bearing	1
54	Impeller Cover	1
55	Impeller to Cover Screw Lockwasher	24
56	Impeller to Cover Screw	24
57	Impeller Cover Sleeve	1
58	Flywheel Ring Gear	1

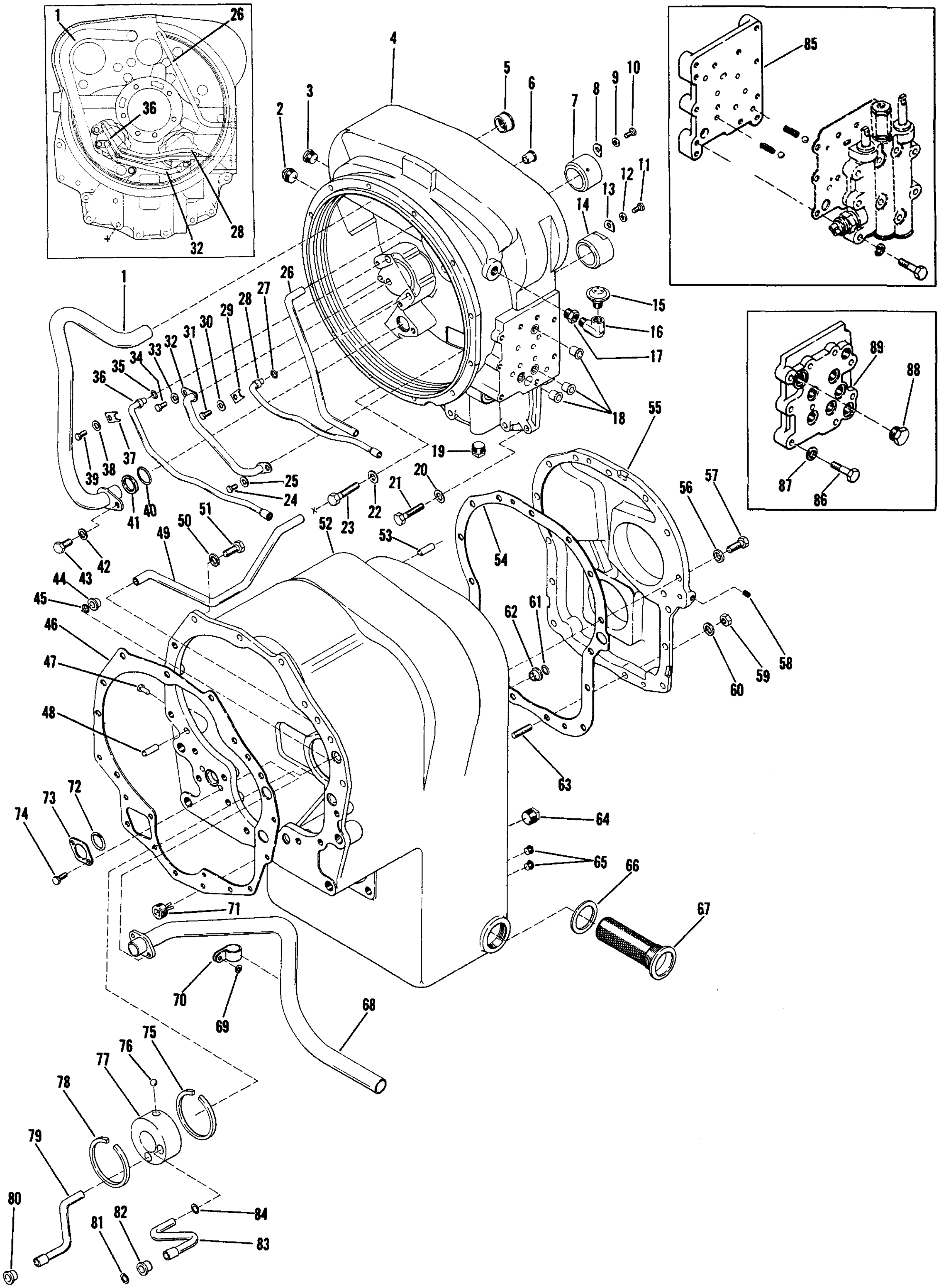
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Figure C

HR 28000 CONVERTER AND TRANSMISSION CASE GROUP

ITEM	DESCRIPTION	QTY
1	Suction Tube Assembly	1
2	Pipe Plug	1
3	Pipe Plug	1
4	Converter Housing and Tube Assembly	1
5	Tube Sleeve	1
6	Tube Sleeve	1
7	Converter Housing Sleeve	1
8	Converter Housing Sleeve Lock	1
9	Converter Housing Sleeve Screw Lockwasher	1
10	Converter Housing Sleeve Screw	1
11	Converter Housing Sleeve Screw	1
12	Converter Housing Sleeve Screw Lockwasher	1
13	Converter Housing Sleeve Lock	1
14	Converter Housing Sleeve	1
15	Breather	1
16	Street Ell	1
17	Tube Sleeve	3
18	Breather Reducing Bushing	1
19	Pipe Plug	1
20	Converter Housing to Transmission Housing Screw Lockwasher	4
21	Converter Housing to Transmission Housing Screw	4
22	Converter Housing to Transmission Housing Lockwasher	4
23	Converter Housing to Transmission Housing Screw	4
24	Lube Tube Retaining Screw	1
25	Lube Tube Retaining Screw Lockwasher	1
26	Valve Oil Supply Tube	1
27	3rd Speed Tube "O" Ring	1
28	3rd Speed Tube Assembly	1
29	Tube Clip	1
30	Tube Clip Screw Lockwasher	1
31	Tube Clip Screw	1
32	Lube Tube Assembly	1
33	Lube Tube Retainer Screw Lockwasher	1
34	Lube Tube Retainer Screw	1
35	Reverse Tube "O" Ring	1
36	Reverse Tube Assembly	1
37	Tube Clip	1
38	Tube Clip Screw Lockwasher	1
39	Tube Clip Screw	1
40	Suction Tube "O" Ring	1
41	Suction Tube Spacer Ring	1
42	Suction Tube Retainer Lockwasher	1
43	Suction Tube Retainer Screw	1
44	Tube Sleeve	1
45	Clutch Pressure Tube "O" Ring	1

ITEM	DESCRIPTION	QTY.
46	Converter Housing to Transmission Case Gasket	1
47	Suction Line Tube Clip Rivet	1
48	Converter Housing to Transmission Case Dowel Pin	2
49	Low Speed Clutch Pressure Tube	1
50	Transmission Case to Converter Housing Screw Lockwasher	10
51	Transmission Case to Converter Housing Screw	10
52	Transmission Case Assembly	1
53	Transmission Case to Rear Cover Dowel Pin	2
54	Transmission Case to Rear Cover Gasket	1
55	Transmission Case Rear Cover	1
56	Rear Cover to Case Screw Lockwasher	13
57	Rear Cover to Case Screw	13
58	Rear Cover Pipe Plug	1
59	Rear Cover to Transmission Case Stud Nut	2
60	Rear Cover to Transmission Case Lockwasher	2
61	Clutch Pressure Tube "O" Ring	1
62	Tube Sleeve	1
63	Transmission Case to Rear Cover Stud	2
64	Drain Plug	1
65	Oil Level Plug	2
66	Screen Assembly Gasket	1
67	Screen Assembly	1
68	Suction Tube Assembly	1
69	Suction Tube Clip Washer	1
70	Suction Tube Clip	1
71	Pipe Plug	1
72	Suction Tube "O" Ring	1
73	Suction Tube Retainer Washer	1
74	Suction Tube Retainer Washer Screw	2
75	Oil Distributor Retainer Ring	1
76	Oil Distributor Lock Ball	1
77	Oil Distributor	1
78	Oil Distributor Retainer Ring	1
79	4th Clutch Lube Tube	1
80	Tube Sleeve	1
81	Clutch Pressure Tube "O" Ring	1
82	Tube Sleeve	1
83	4th Speed Pressure Tube	1
84	4th Speed Pressure Tube "O" Ring	1
85	Control Valve Mounting Plate	1
86	Remote Valve Plate Screw	9
87	Remote Valve Plate Screw Lockwasher	9
88	Control Valve Mounting Plate Plug	1
89	Valve Cover Plate	1

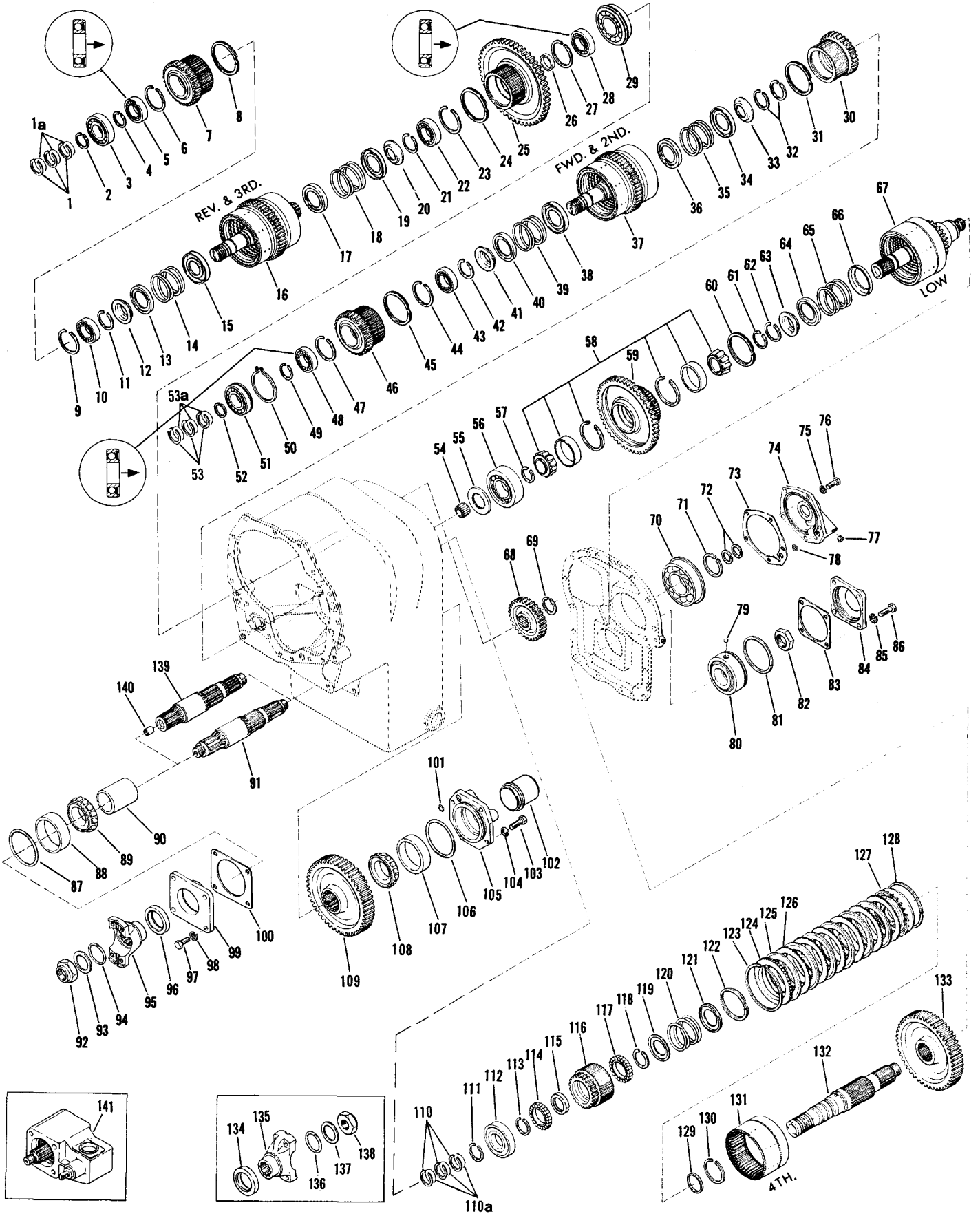
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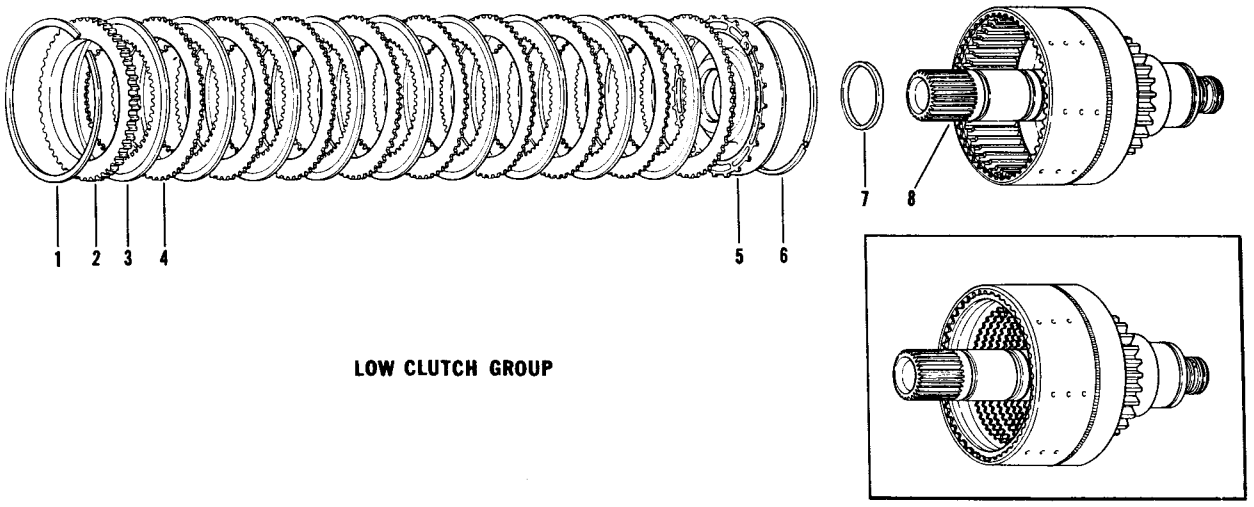
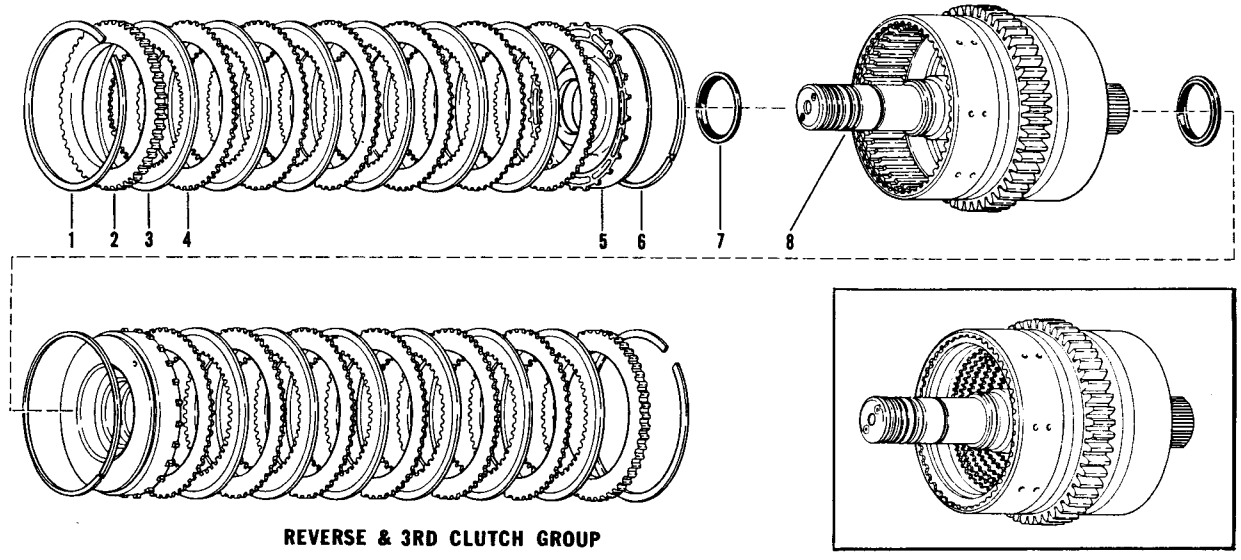
Figure D

28000 FOUR SPEED CASE AND CLUTCH GROUP

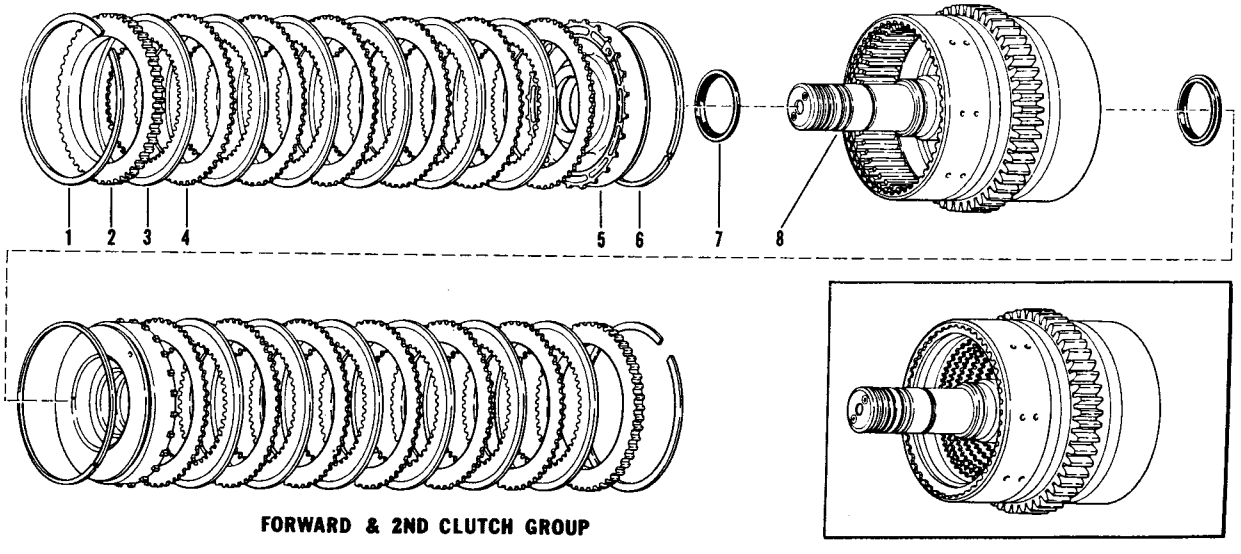
ITEM	DESCRIPTION	QTY
1	Reverse and 3rd Clutch Shaft Piston Ring	3
1A	Piston Ring Expander Spring	3
2	Front Bearing Retainer Ring	1
3	Reverse and 3rd Shaft Front Bearing	1
4	Front Bearing Retainer Ring	1
5	Clutch Driven Gear Bearing	1
6	Clutch Driven Gear Bearing Snap Ring	1
7	Clutch Driven Gear	1
8	Clutch Hub Oil Baffle Ring	1
9	Clutch Driven Gear Bearing Snap Ring	1
10	Clutch Driven Gear Bearing	1
11	Spring Retainer Snap Ring	1
12	Snap Ring Retainer	1
13	Spring Retainer	1
14	Piston Return Spring	1
15	Spring Retainer	1
16	Reverse & 3rd Clutch Shaft & Drum Assembly	1
17	Spring Retainer	1
18	Piston Return Spring	1
19	Spring Retainer	1
20	Snap Ring Retainer	1
21	Spring Retainer Snap Ring	1
22	3rd Gear Bearing	1
23	3rd Gear Bearing Snap Ring	1
24	Clutch Hub Oil Baffle Ring	1
25	3rd Gear	1
26	3rd Gear Bearing Spacer	1
27	3rd Gear Bearing Snap Ring	1
28	3rd Gear Bearing	1
29	Reverse and 3rd Shaft Rear Bearing	1
30	2nd Gear	1
31	Clutch Hub Oil Baffle Ring	1
32	Gear & Spring Retainer Snap Ring	2
33	Snap Ring Retainer	1
34	Spring Retainer	1
35	Return Spring	1
36	Spring Retainer	1
37	Forward & 2nd Clutch Shaft & Drum Assembly	1
38	Spring Retainer	1
39	Return Spring	1
40	Spring Retainer	1
41	Snap Ring Retainer	1
42	Spring Retainer Snap Ring	1
43	Clutch Driven Gear Bearing	1
44	Clutch Driven Gear Snap Ring	1
45	Clutch Hub Oil Baffle Ring	1
46	Clutch Driven Gear	1
47	Clutch Driven Gear Bearing Snap Ring	1
48	Clutch Driven Gear Bearing	1
49	Front Bearing Retainer Ring	1
50	Front Bearing Locating Ring	1
51	Forward and 2nd Shaft Front Bearing	1
52	Front Bearing Retainer Ring	1
53	Forward and 2nd Shaft Piston Ring	3
53A	Piston Ring Expander Ring	3
54	Low Speed Clutch Shaft Pilot Bearing	1
55	2nd Gear Bearing End Plate	1
56	2nd Gear Bearing	1
57	Low Speed Gear Bearing Retainer Ring	1
58	Low Speed Gear Bearing Assembly	1
59	Low Speed Gear	1
60	Clutch Hub Oil Baffle Ring	1
61	Bearing Retainer Ring	1
62	Spring Retainer Snap Ring	1
63	Snap Ring Retainer	1
64	Spring Retainer	1
65	Piston Return Spring	1
66	Spring Retainer	1
67	Low Speed Clutch Shaft & Drum Assembly	1
68	Low & 4th Clutch Drive Gear	1
69	Gear Retaining Ring	1
70	Low Speed Shaft Rear Bearing	1
71	Rear Bearing Retaining Ring	1
72	Clutch Shaft Piston Ring	2
73	Rear Bearing Cap Gasket	1
74	Rear Bearing Cap	1
75	Bearing Cap Screw Washer	5
76	Bearing Cap Screw	5
77	Bearing Cap Plug	1
78	Bearing Cap "O" Ring	1
79	Idler Shaft Rear Bearing Lock Ball	1
80	Idler Shaft Rear Bearing Assembly	1
81	Rear Bearing Locating Ring	1
82	Idler Shaft Nut	1
83	Bearing Cap Gasket	1
84	Rear Bearing Cap	1
85	Rear Bearing Cap Screw Washer	4
86	Bearing Cap Screw	4
87	Bearing Cap "O" Ring	1
88	Front Bearing Cap	1
89	Front Bearing Cap	1
90	Output Shaft Gear Spacer	1
91	Output Shaft	1
92	Flange Nut	1
93	Flange Washer	1
94	Flange "O" Ring	1
95	Output Flange	1
96	Bearing Cap Oil Seal	1
97	Bearing Cap Screw	4
98	Lockwasher	4
99	Bearing Cap	1
100	Bearing Cap Shim	AR
101	Bearing Cap "O" Ring	1
102	Rear Bearing Cap Bore Plug	1
103	Bearing Cap Screw	4
104	Bearing Cap Screw Lockwasher	4
105	Output Shaft Rear Bearing Cap	1
106	Bearing Cap "O" Ring	1
107	Rear Bearing Cup	1
108	Rear Bearing Cone	1
109	Output Shaft Gear	1
110	4th Gear Piston Ring	3
110A	Piston Ring Expander Spring	3
111	4th Gear Bearing Snap Ring	1
112	4th Gear Shaft Front Bearing	1
113	4th Gear Front Bearing Locating Ring	1
114	4th Gear Bearing	1
115	4th Gear Spacer	1
116	4th Gear	1
117	4th Gear Bearing	1
118	Bearing Snap Ring	1
119	Spring Retainer	1
120	Piston Return Spring	1
121	Spring Retainer	1
122	Oil Baffle Ring	1
123	Backing Plate Snap Ring	1
124	Clutch Disc Backing Plate	1
125	Clutch Inner Disc	6
126	Clutch Outer Disc	6
127	Clutch Piston Assembly	1
128	Clutch Piston Outer Ring	1
129	Clutch Piston Inner Seal	1
130	4th Clutch Drum Locating Ring	1
131	4th Clutch Drum & Hub Assembly	1
132	Idler Shaft & Plug Assembly	1
133	Idler Shaft Gear	1
134	Oil Seal	1
135	Companion Flange	1
136	Flange "O" Ring	1
137	Flange Washer	1
138	Flange Nut	1
139	Output Shaft (used with disconnect only)	1
140	Bushing (used with disconnect only)	1
141	Disconnect (optional)	1



LOW CLUTCH GROUP



REVERSE & 3RD CLUTCH GROUP



FORWARD & 2ND CLUTCH GROUP

Figure E

LOW CLUTCH GROUP

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	End Plate Retainer Ring	1	5	Clutch Piston	1
2	End Plate	1	6	Clutch Piston Outer Seal Ring	1
3	Clutch Inner Disc	9	7	Clutch Piston Inner Seal Ring	1
4	Clutch Outer Disc	9	8	Low Speed Clutch Drum and Shaft	1

REVERSE AND 3rd CLUTCH GROUP

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	End Plate Retainer Ring	2	5	Clutch Piston	2
2	End Plate	2	6	Clutch Piston Outer Seal Ring	2
3	Clutch Inner Disc	12	7	Clutch Piston Inner Seal Ring	2
4	Clutch Outer Disc	12	8	Reverse and 3rd Clutch Drum and Shaft	1

FORWARD AND 2nd CLUTCH GROUP

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	End Plate Retainer Ring	2	5	Clutch Piston	2
2	End Plate	2	6	Clutch Piston Outer Seal Ring	2
3	Clutch Inner Disc	12	7	Clutch Piston Inner Seal Ring	2
4	Clutch Outer Disc	12	8	Forward and 2nd Clutch Drum and Shaft	1

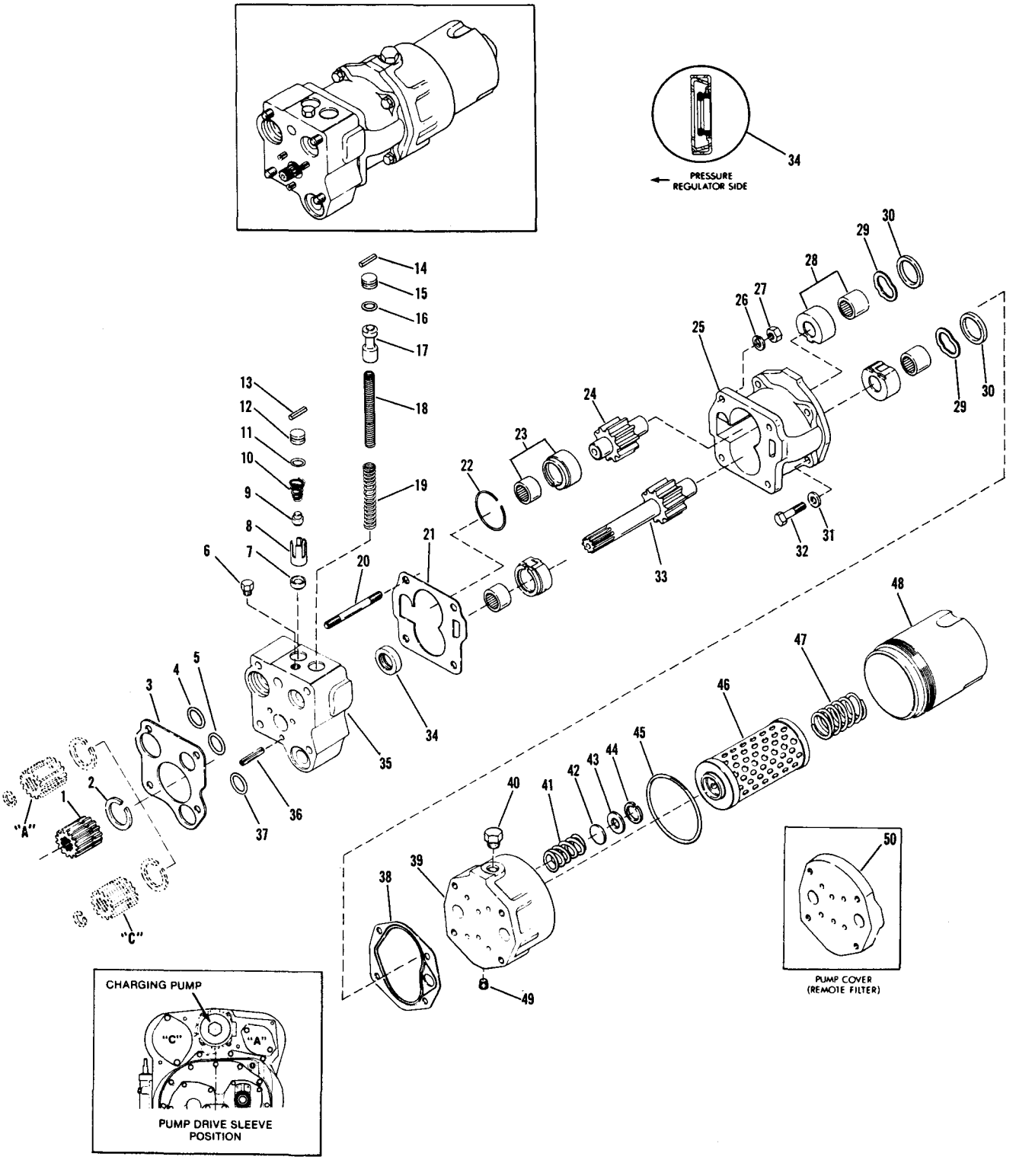

PRESSURE REGULATOR SIDE
CHARGING PUMP
"C"
"A"
PUMP DRIVE SLEEVE POSITION
PUMP COVER (REMOTE FILTER)

Figure F

PRESSURE REGULATOR VALVE, CHARGING PUMP & OIL FILTER GROUP

ITEM	DESCRIPTION	QTY.
1	Charging Pump Drive Sleeve	1
2	Pump Sleeve Snap Ring	1
3	Valve to Housing Gasket	1
4	Valve Body "O" Ring	1
5	Valve Body "O" Ring	1
6	Pipe Plug	1
7	Safety Valve Seat	1
8	Safety Valve Spacer	1
9	Safety Valve Plunger	1
10	Safety Valve Spring	1
11	Valve Stop "O" Ring	1
12	Valve Stop	1
13	Valve Stop Roll Pin	1
14	Valve Stop Roll Pin	1
15	Valve Stop	1
16	Valve Stop "O" Ring	1
17	Valve Piston	1
18	Valve Spring - Inner	1
19	Valve Spring - Outer	1
20	Valve to Converter Housing Stud	4
21	Valve Body to Pump Gasket	1
22	Pump Body Snap Ring	1
23	Thrust Plate & Bearing Assembly	2
24	Pump Driven Shaft Assembly	1
25	Charging Pump Housing	1

ITEM	DESCRIPTION	QTY.
26	Valve to Housing Stud Lockwasher	4
27	Valve to Housing Stud Nut	4
28	Thrust Plate & Bearing Assembly	2
29	Wave Spring	2
30	Pump Shaft Seal	2
31	Pump to Filter Adaptor Screw Lockwasher	4
32	Pump to Filter Adaptor Screw	4
33	Pump Drive Shaft Assembly	1
34	Pump Drive Shaft Oil Seal	1
35	Pressure Regulator Valve	1
36	Valve Body Roll Pin	3
37	Valve Body "O" Ring	1
38	Pump to Filter Gasket	1
39	Filter Adaptor	1
40	Filter Adaptor Plug	1
41	By-Pass Filter Disc Spring	1
42	By-Pass Filter Disc	1
43	By-Pass Filter Disc Seat	1
44	Filter Seat Retainer Ring	1
45	Filter Housing "O" Ring	1
46	Oil Filter Element Assembly	1
47	Oil Filter Element Spring	1
48	Filter Housing	1
49	Pipe Plug	1
50	Optional Adaptor for Remote Filter	1

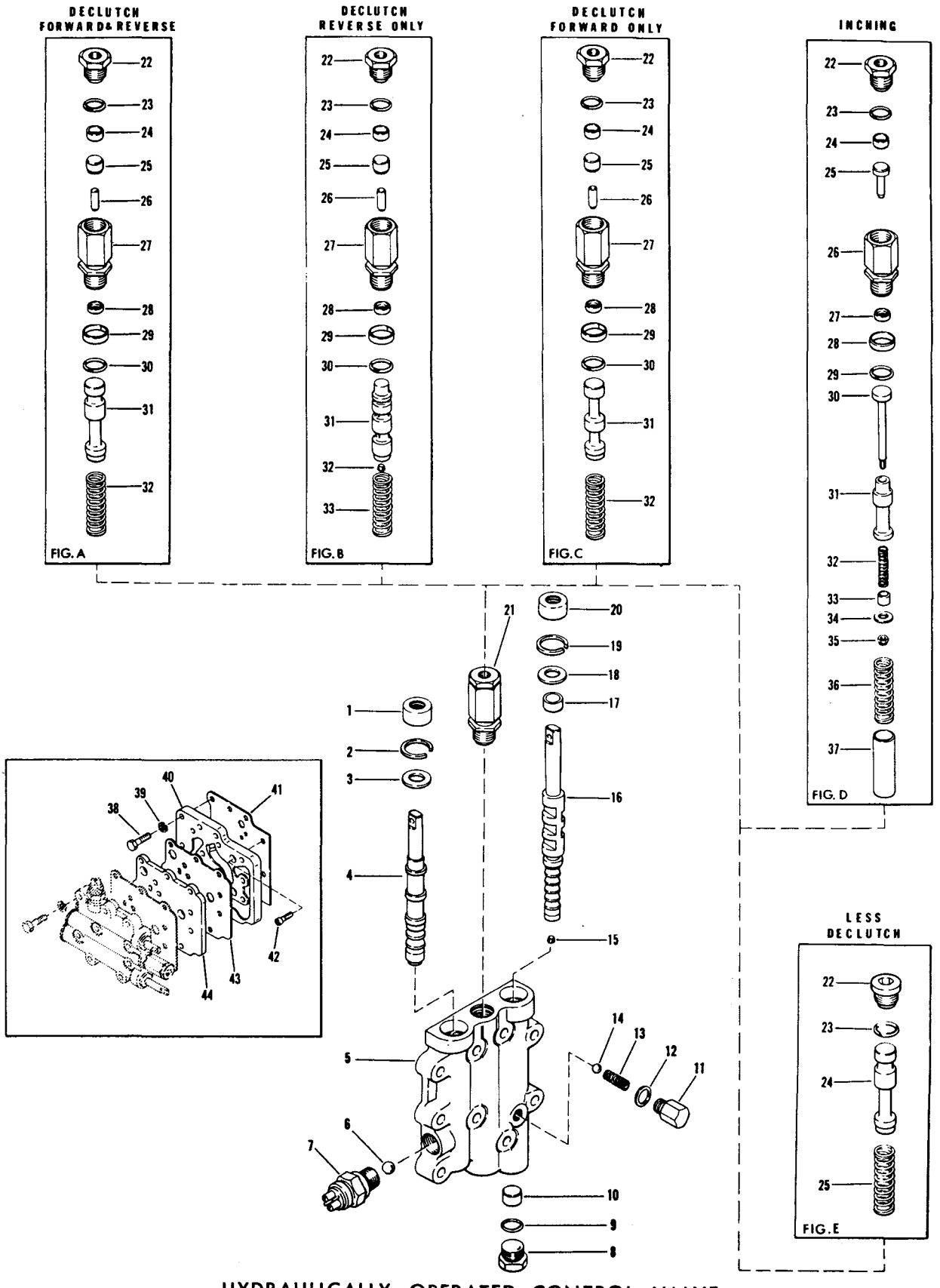
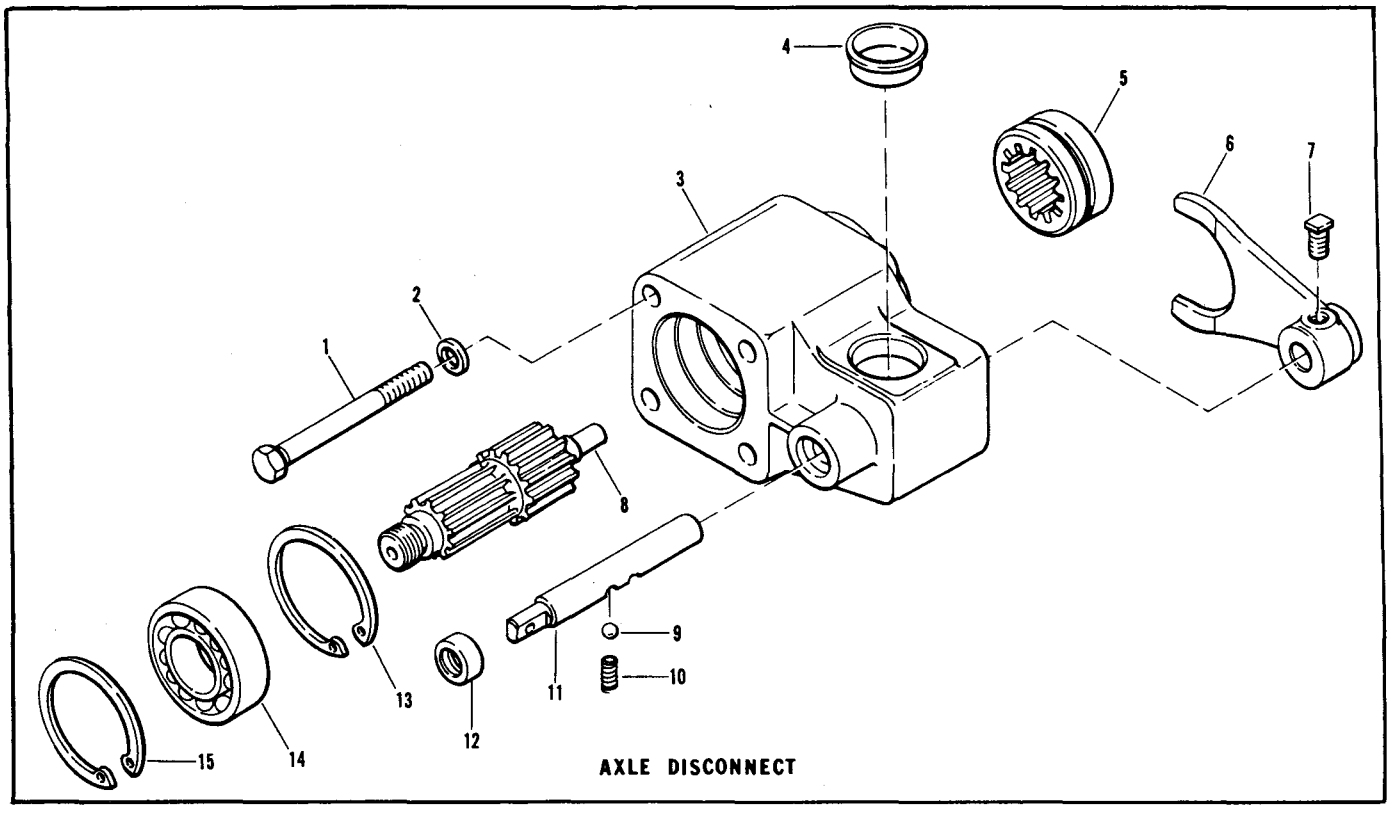

DECLUTCH FORWARD & REVERSE
DECLUTCH REVERSE ONLY
DECLUTCH FORWARD ONLY
INCHING
FIG. A
FIG. B
FIG. C
FIG. D
LESS DECLUTCH
FIG. E
HYDRAULICALLY OPERATED CONTROL VALVE

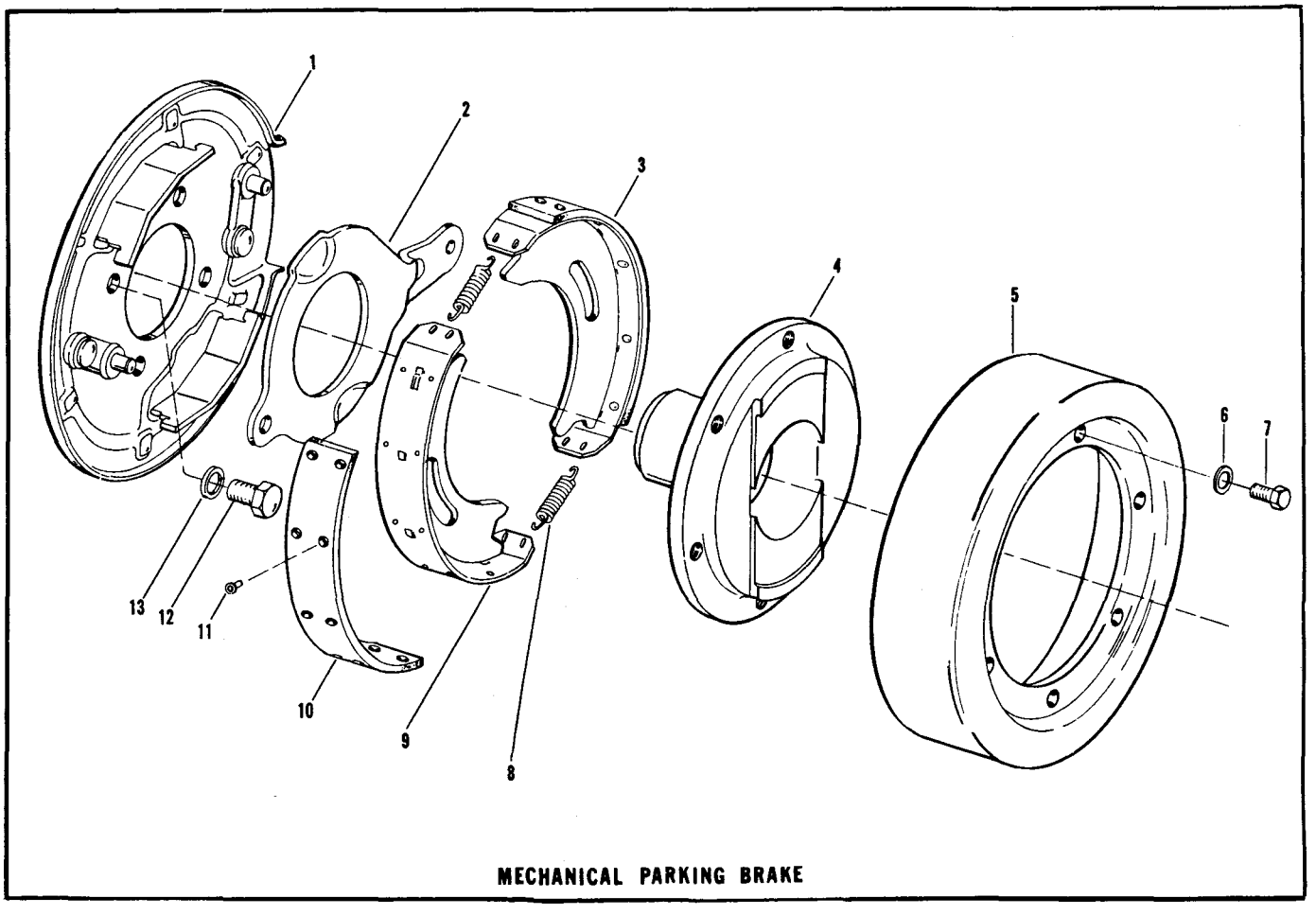
Figure G

CONTROL VALVE ASSEMBLY

ITEM	DESCRIPTION	QTY.
1	Valve Spool Oil Seal	1
2	Valve Spool Oil Seal Retainer Ring	1
3	Valve Spool Oil Seal Washer	1
4	Forward and Reverse Valve Spool	1
5	Control Valve Assembly — Incl. items 1 thru 9, 15, 16 and 18 thru 20	1
6	Neutral Switch Detent Ball	1
7	Neutral Switch	1
8	Valve Housing Plug	1
9	Valve Housing Plug "O" Ring	1
10	Overshift Spacer	1
11	Detent Spring Plug (Optional)	1
12	Detent Spring Plug Washer (Optional)	1
13	Detent Spring (Optional)	1
14	Detent Ball (Optional)	1
15	Speed Selector Spool Pipe Plug	1
16	Speed Selector	1
17	Overshift Spacer	1
18	Valve Spool Oil Seal Washer	1
19	Valve Spool Oil Seal Retainer Ring	1
20	Valve Spool Oil Seal	1
21	Hydraulic Piston Housing Assembly	1
	NOTE: Items 22 thru 25, 32, 33 and 37 are various declutch options.	
38	Adaptor to Converter Housing Screw	4
39	Adaptor to Converter Housing Screw Lockwasher	4
40	Valve Adaptor Housing	1
41	Converter Housing to Valve Adaptor Housing Gasket	1
42	Adaptor Housing to Converter Housing Screw	5
43	Adaptor Housing to Adaptor Plate Gasket	1
44	Valve Adaptor Plate	1



AXLE DISCONNECT



MECHANICAL PARKING BRAKE

Figure H

AXLE DISCONNECT

ITEM	DESCRIPTION	QTY.
1	Disconnect Housing Capscrew	4
2	Disconnect Housing Capscrew Lockwasher	4
3	Disconnect Housing	1
4	Disconnect Housing Plug	1
5	Shift Hub	1
6	Shift Fork	1
7	Shift Fork Lockscrew	1
8	Disconnect Shaft	1
9	Detent Ball	1
10	Detent Spring	1
11	Shift Rail	1
12	Shift Rail Oil Seal	1
13	Bearing Retainer Ring	1
14	Bearing	1
15	Bearing Retainer Ring	1

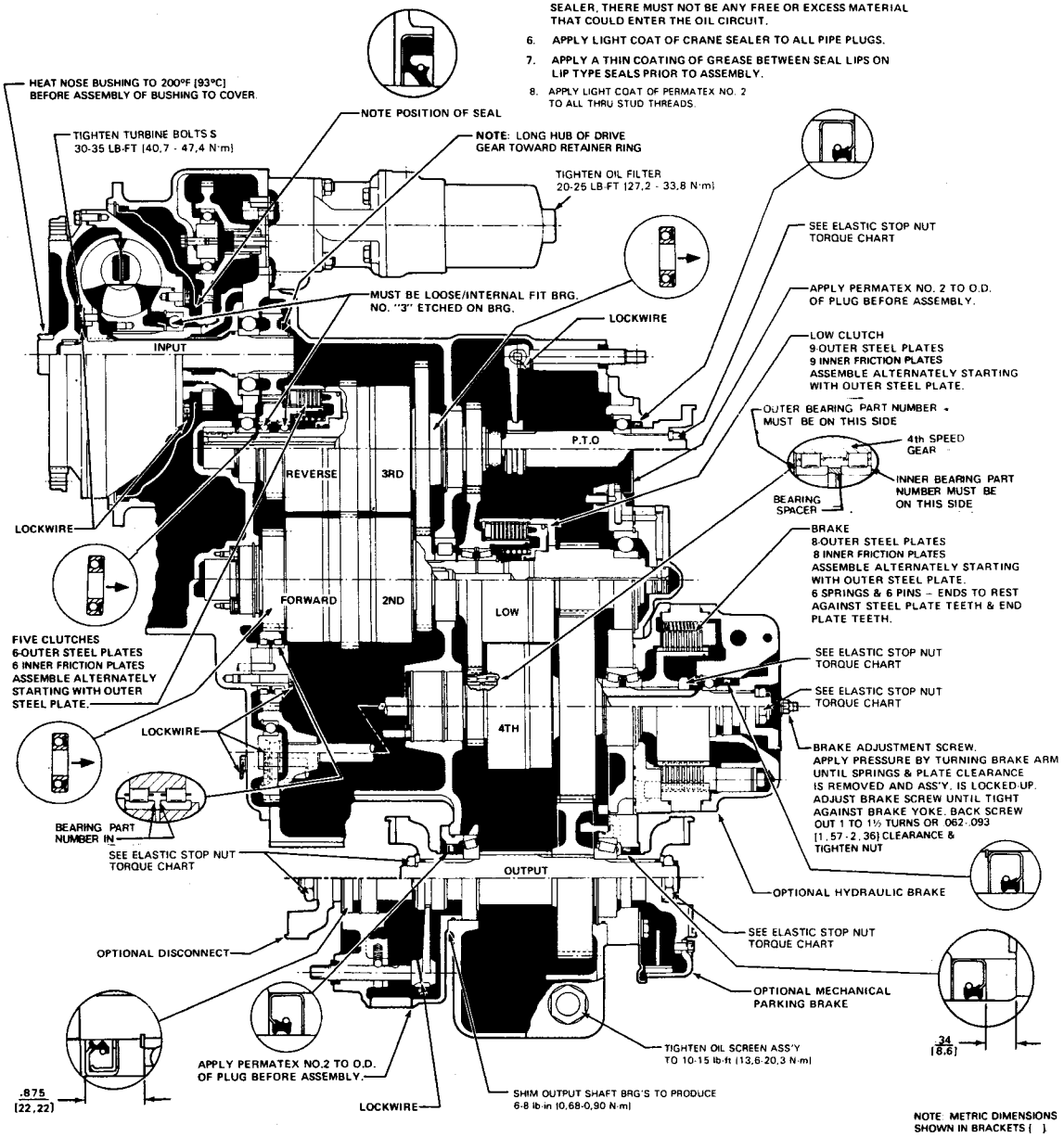
MECHANICAL PARKING BRAKE

ITEM	DESCRIPTION	QTY.
1	Backing Plate Assembly	1
2	Actuating Lever	1
3	Brake Shoe and Lining	2
4	Brake Flange	1
5	Brake Drum	1
6	Brake Drum to Flange Screw Lockwasher	6
7	Brake Drum to Flange Screw	6
8	Return Spring	2
9	Brake Shoe (see item 3)	
10	Brake Lining	2
11	Rivet	20
12	Backing Plate Screw	4
13	Backing Plate Screw Lockwasher	4

ELASTIC STOP NUT TORQUE

THREAD SIZE	LB.-FT.	[N·m]
1" - 20	150 - 200	[203,4 - 271,1]
1¼" - 18	200 - 250	[271,2 - 338,9]
1½" - 18	300 - 350	[406,8 - 474,5]
1¾" - 12	400 - 450	[542,4 - 610,1]

1. USE PERMATEX & CRANE SEALER ONLY WHERE SPECIFIED.
2. ALL LEAD IN CHAMFERS FOR OIL SEALS, PISTON RINGS & "O" RINGS MUST BE SMOOTH & FREE FROM BURRS. INSPECT AT ASSEMBLY.
3. LUBRICATE ALL PISTON RING GROOVES & "O" RINGS WITH OIL BEFORE ASSEMBLY.
4. APPLY VERY LIGHT COAT OF PERMATEX NO.2 TO O.D. OF ALL OIL SEALS BEFORE ASSEMBLY.
5. AFTER ASSEMBLY OF PARTS USING PERMATEX OR CRANE SEALER, THERE MUST NOT BE ANY FREE OR EXCESS MATERIAL THAT COULD ENTER THE OIL CIRCUIT.
6. APPLY LIGHT COAT OF CRANE SEALER TO ALL PIPE PLUGS.
7. APPLY A THIN COATING OF GREASE BETWEEN SEAL LIPS ON LIP TYPE SEALS PRIOR TO ASSEMBLY.
8. APPLY LIGHT COAT OF PERMATEX NO. 2 TO ALL THRU STUD THREADS.



28420 SERIES POWER SHIFT TRANSMISSION WITH VARIOUS OPTIONS

Figure I

MAINTENANCE AND SERVICE

The instructions contained herein cover the disassembly and reassembly of the transmission in a sequence that would normally be followed after the unit has been removed from the machine and is to be completely overhauled. It must also be understood that this a basic 28000 transmission with many options. Companion flanges and output shafts with and without disconnect assemblies may vary on specific models. The units are very similar to trouble shoot, disassemble, repair and reassemble.

CAUTION: Cleanliness is of extreme importance and an obsolute must in the repair and overhaul of this unit. Before attempting any repair, the exteriors of the unit must be thoroughly cleaned to prevent the possibility of dirt an foreign matter entering the mechanism.

NOTE: For R-Model (Remote Mounted) front cover removal, service and installation on transmission see page 42 Figure 2. For MHR front cover removal, service and installation on transmission see page 56 Figure 1.

DISASSEMBLY

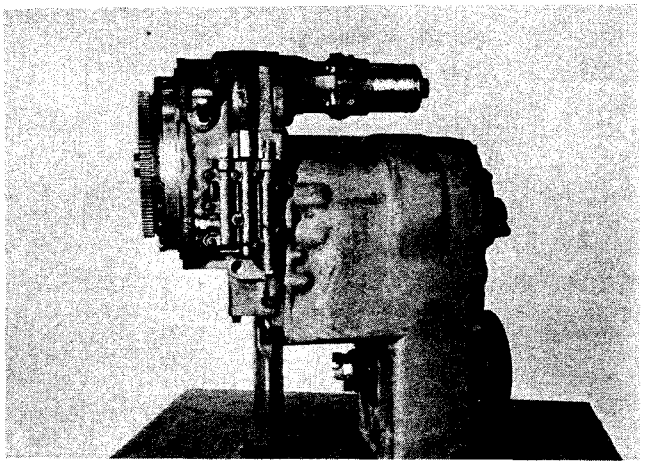


Figure 1
Side view of 4-speed transmission.

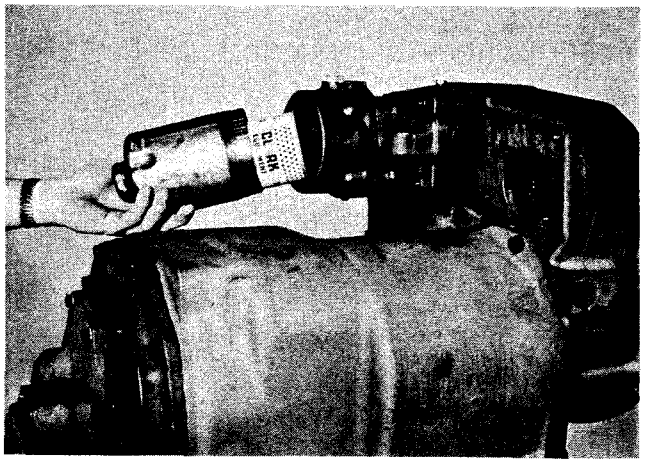


Figure 2

Remove filter housing and filter element.

NOTE: See lubrication section for filter cartridge change interval.

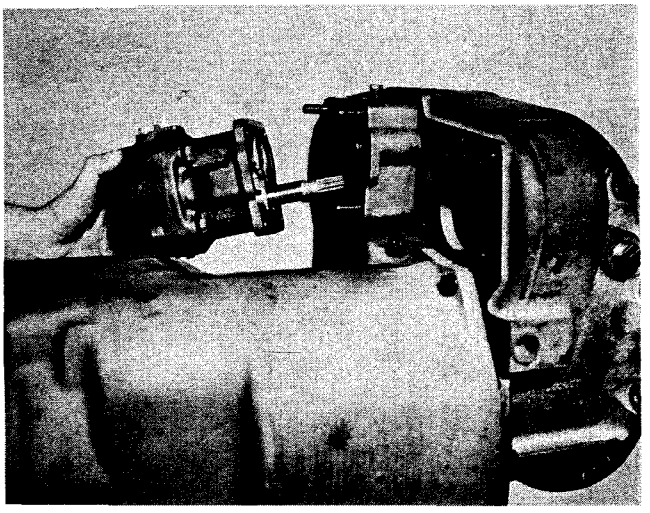


Figure 3
Remove charging pump to regulating valve stud nuts. Remove pump and filter adapter.

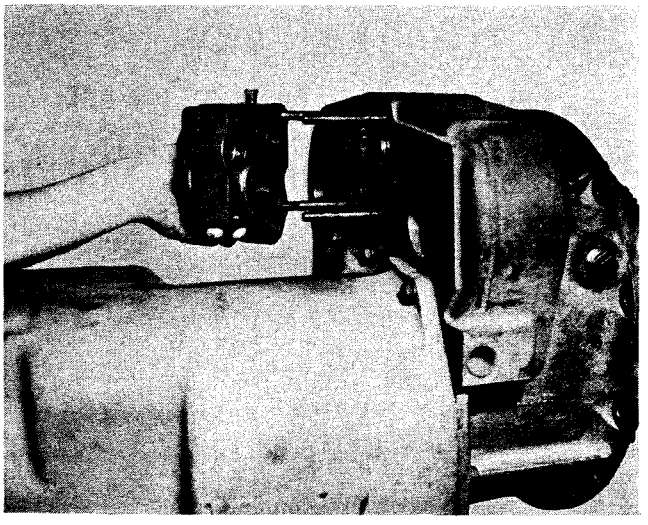


Figure 4
Remove pressure regulating valve assembly.

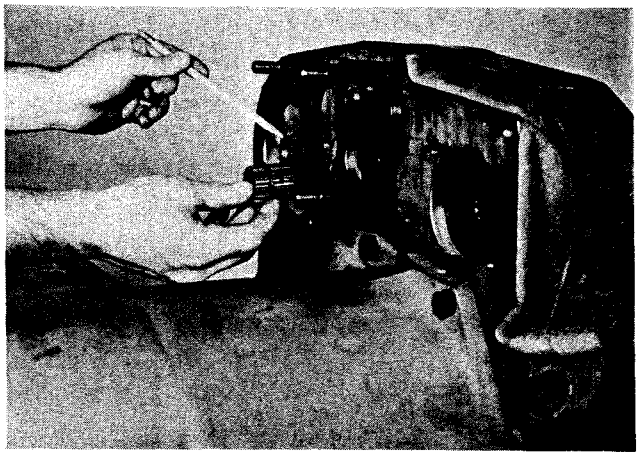


Figure 5
Remove pump drive sleeves.

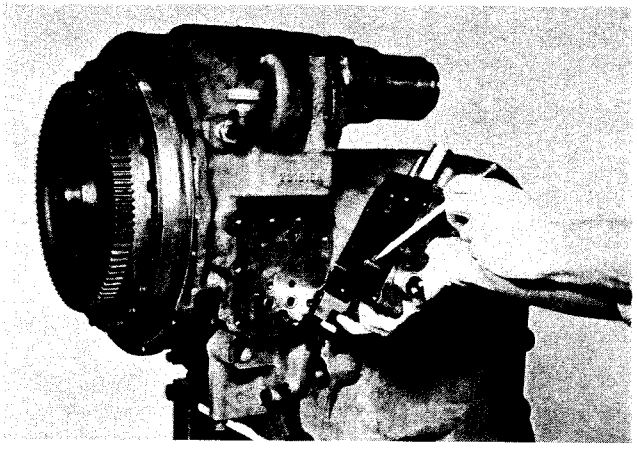


Figure 6
Remove control valve bolts and washers. Remove control valve. Use caution as not to lose detent springs and balls.

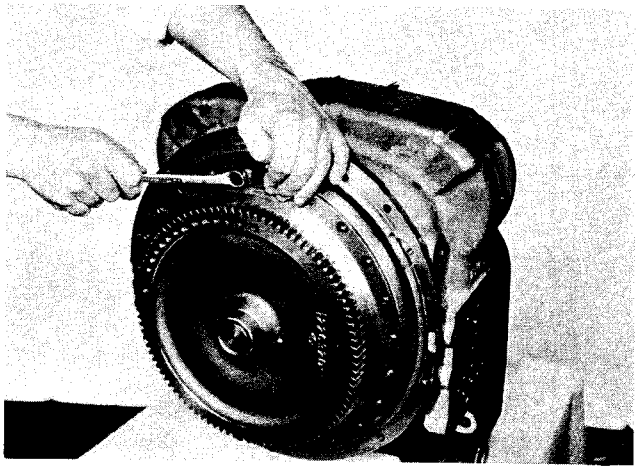


Figure 7
Remove impeller cover bolts.

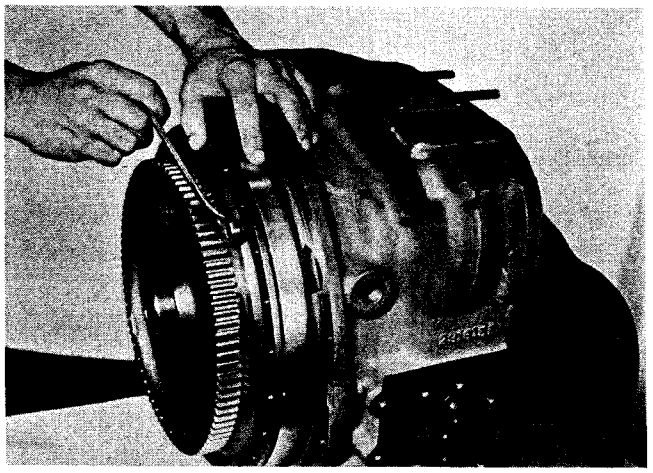


Figure 8
Install two bolts in threaded holes 180° apart to remove cover from impeller. **NOTE:** Some units may have pry slots instead of threaded holes.

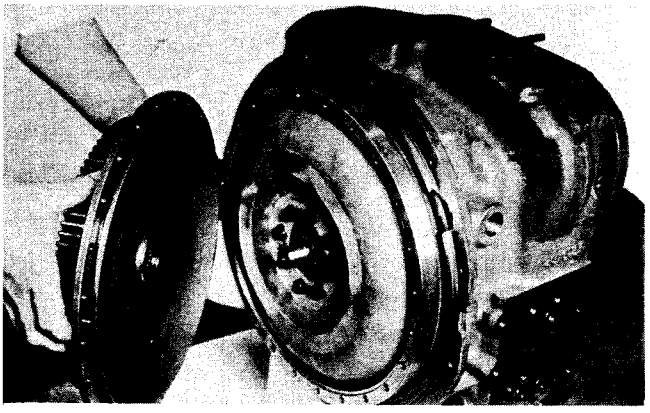


Figure 9
Remove impeller cover.

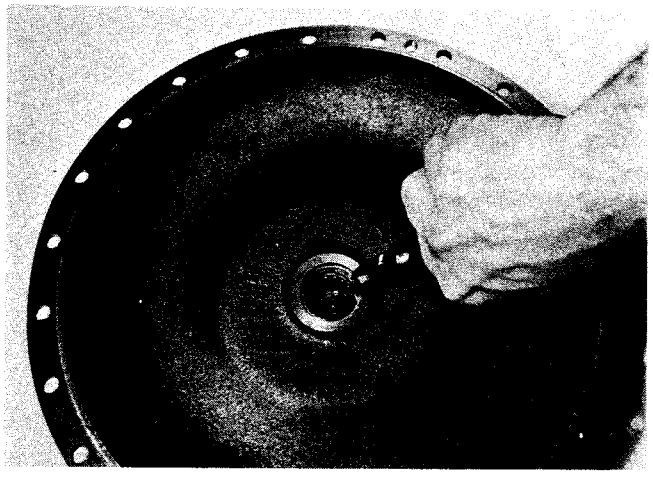


Figure 10
If impeller cover bearing is to be replaced remove retainer ring. Pry bearing from pocket.

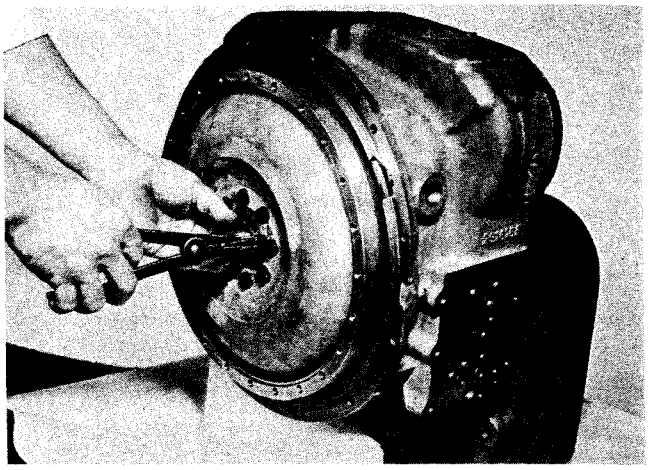


Figure 11
Remove turbine retaining ring.

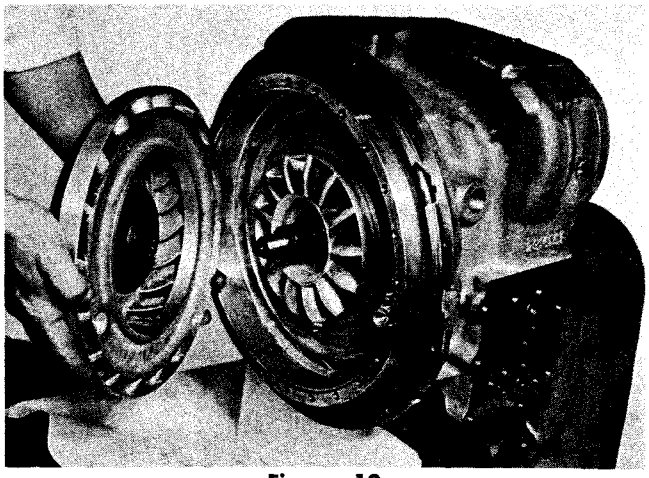


Figure 12
Remove turbine and hub assembly.

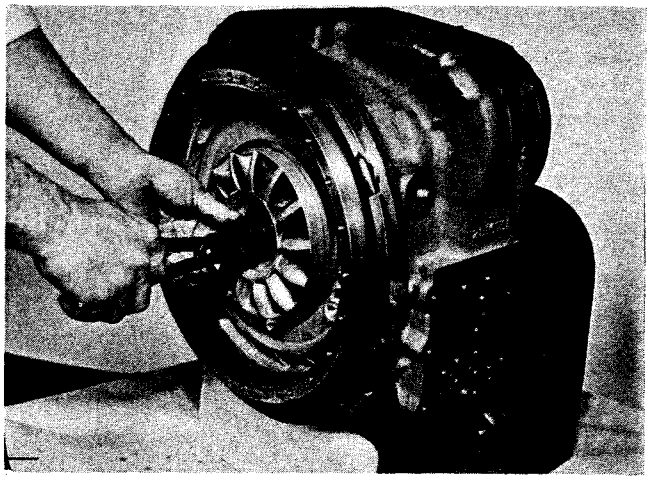


Figure 13
Remove turbine locating ring.

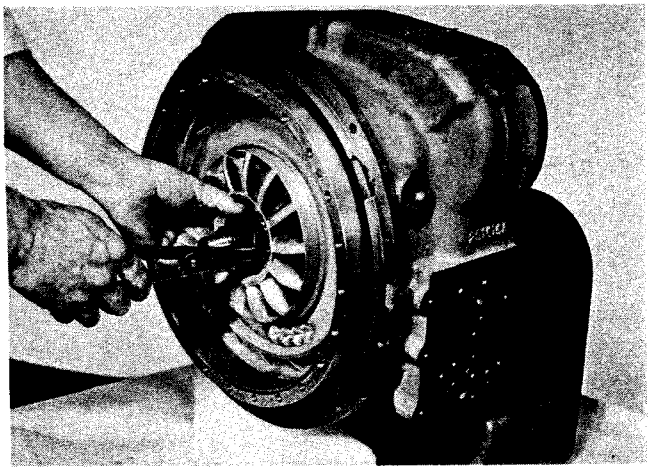


Figure 14
Remove reaction member retainer ring

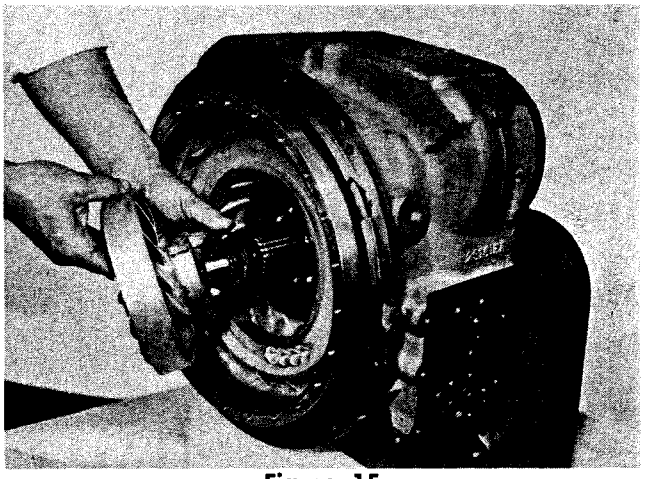


Figure 15
Remove reaction member and spacer.

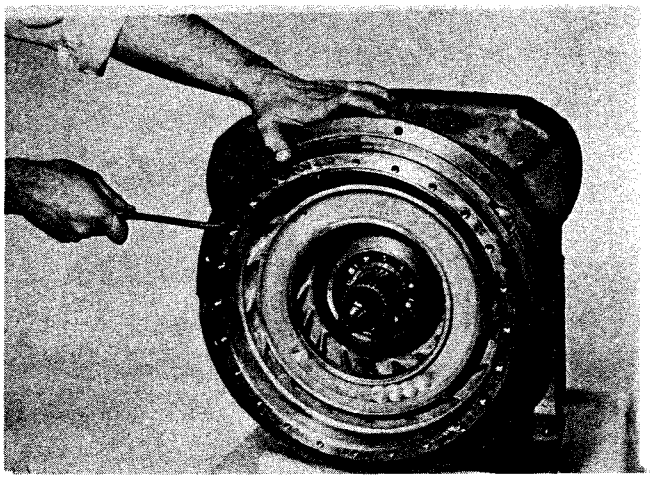


Figure 16
Remove oil baffle retainer ring.

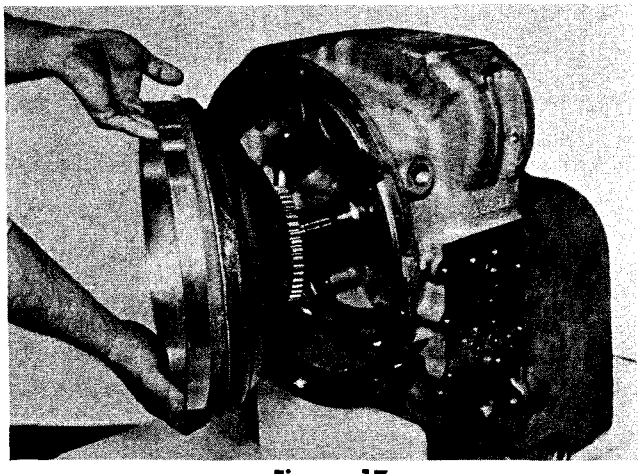


Figure 17

Using pry slots in converter housing, pry oil baffle and impeller from housing. **NOTE:** Impeller, oil baffle and impeller hub gear are removed as an assembly.

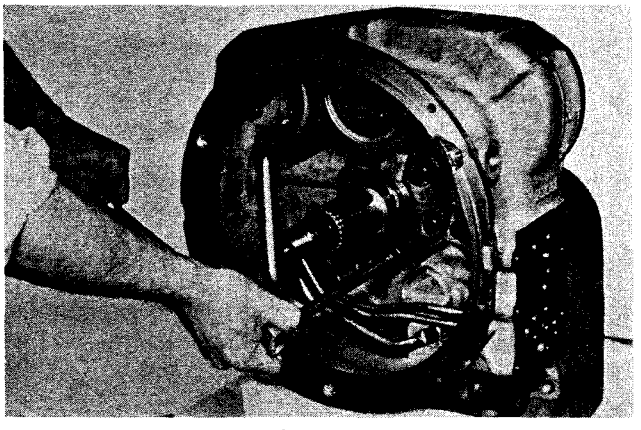


Figure 18

Remove stator support to housing bolts.

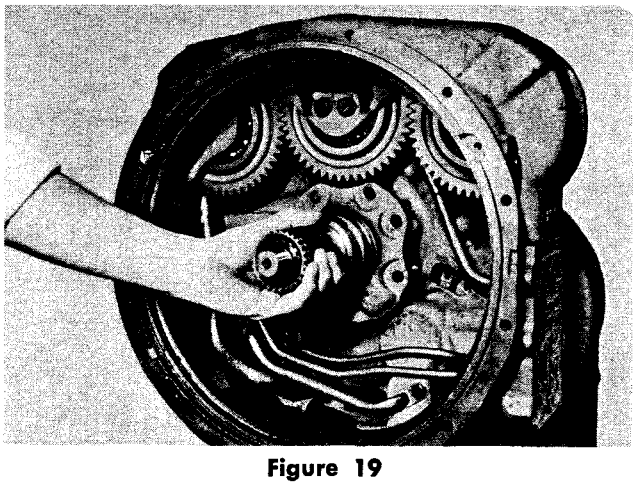


Figure 19

Remove stator support. **NOTE:** Support must be turned to clear pump drive gear.

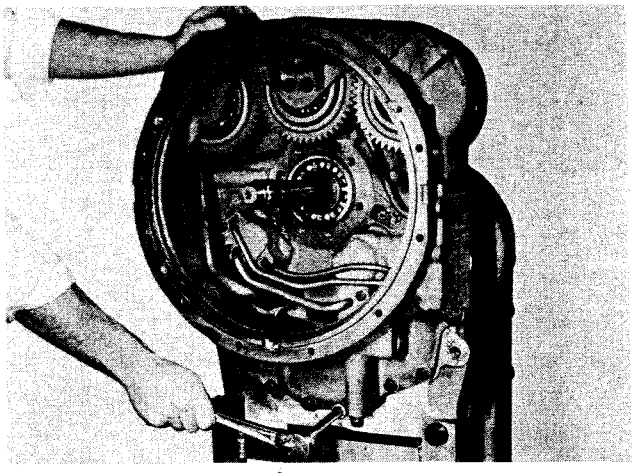


Figure 20

Remove bolts securing converter housing to transmission housing.

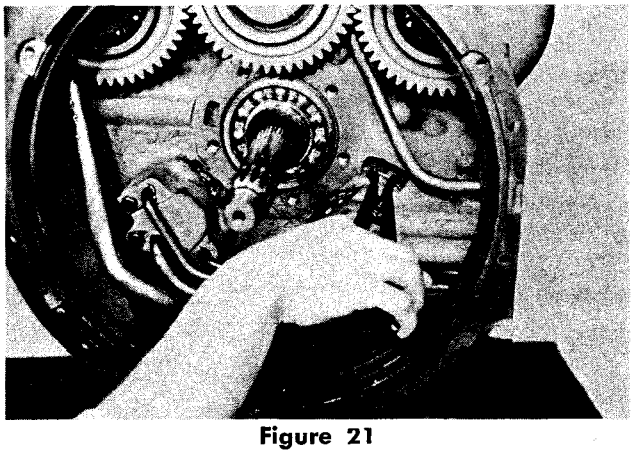


Figure 21

Support converter housing with a chain fall. Using spreading type snap ring pliers, spread ears on forward clutch front bearing retainer ring. Holding snap ring open tap converter housing from transmission housing.

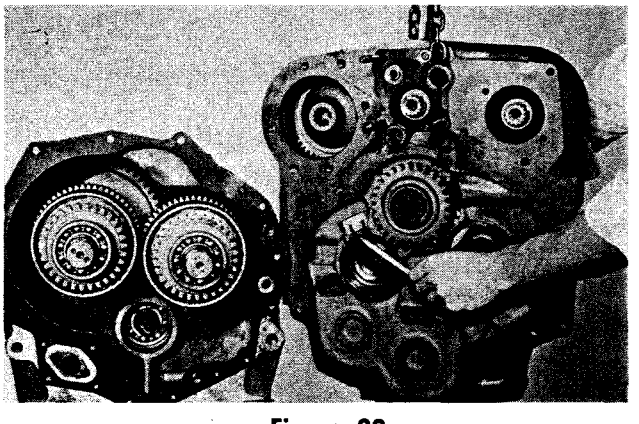


Figure 22

Converter housing removed. Note front bearing retaining ring relieved of front bearing.

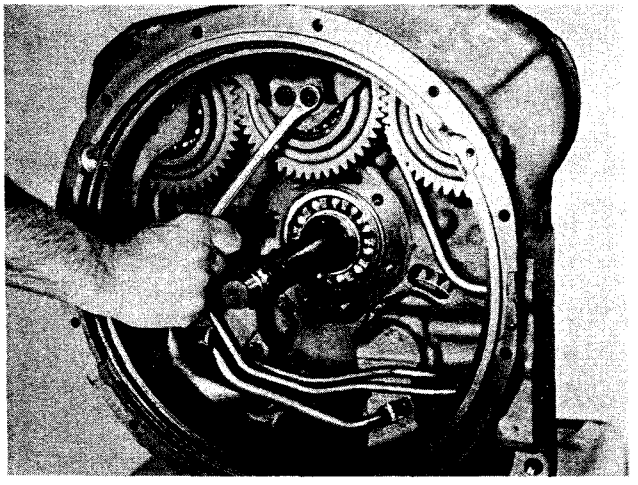


Figure 23
Remove pump drive gear bearing support bolts.

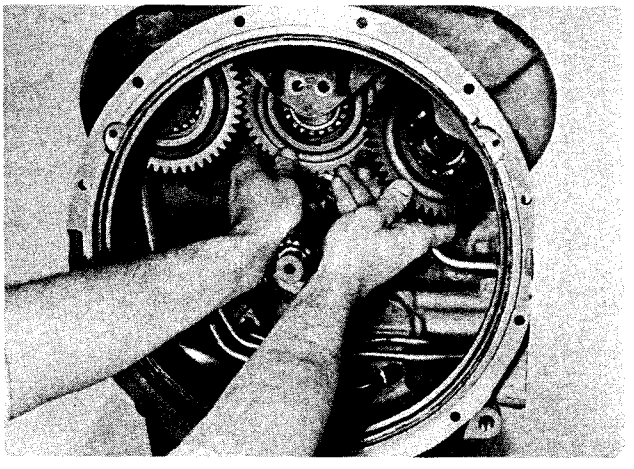


Figure 24
Move center gear toward the rear of converter housing. Remove pump drive gear on the right.

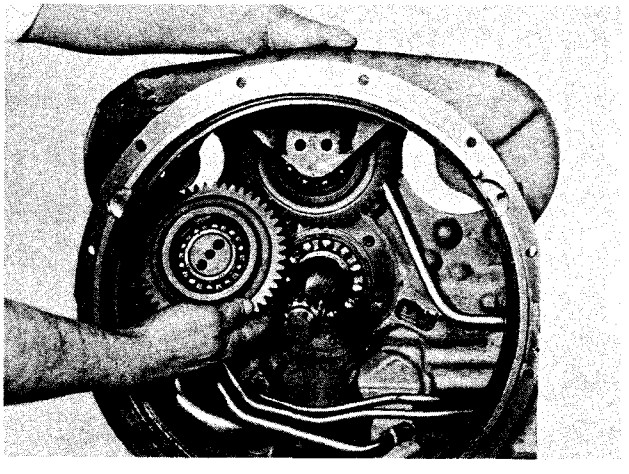


Figure 25
Remove pump drive gear on the left.

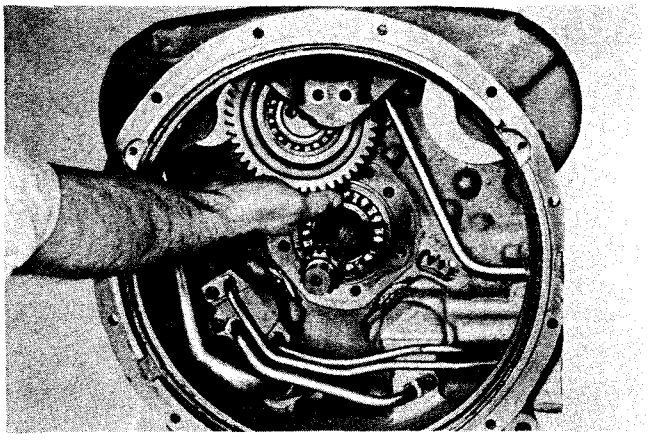


Figure 26
Remove center pump drive gear.

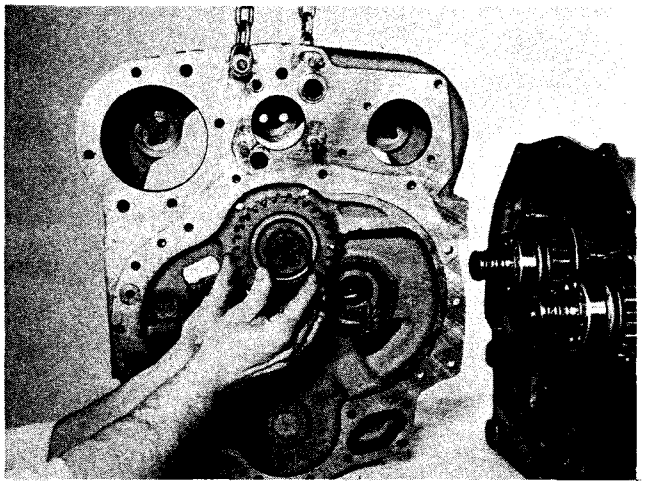


Figure 27
Remove turbine shaft gear retainer ring and gear.

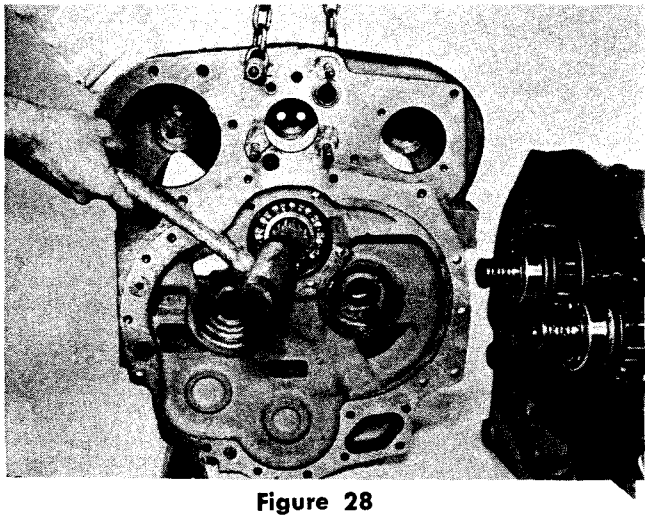


Figure 28
From rear of converter housing tap turbine shaft and bearing from housing.

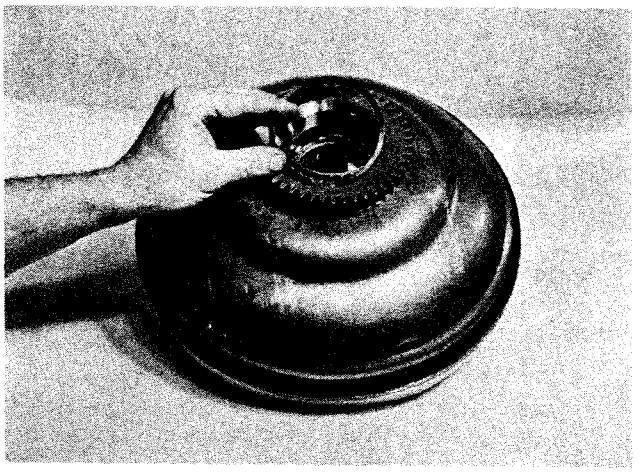


Figure 29
Remove impeller hub gear retainer ring.

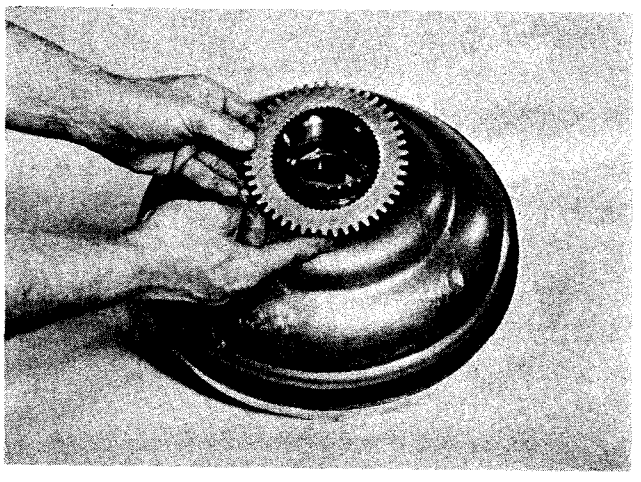


Figure 30
Remove impeller hub gear.

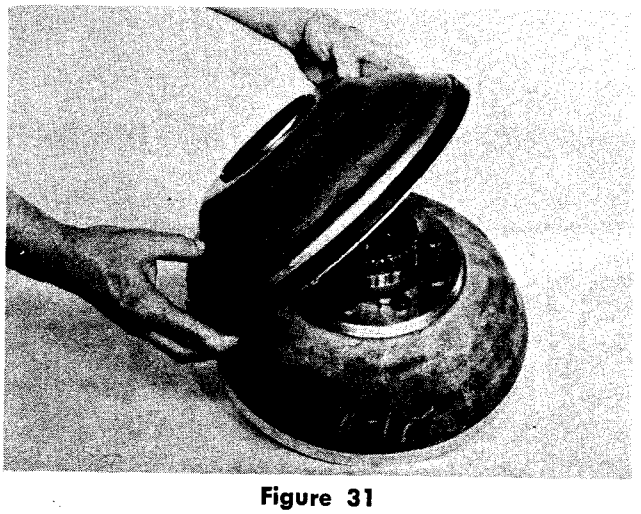


Figure 31
Lift oil baffle and oil seal assembly from impeller.

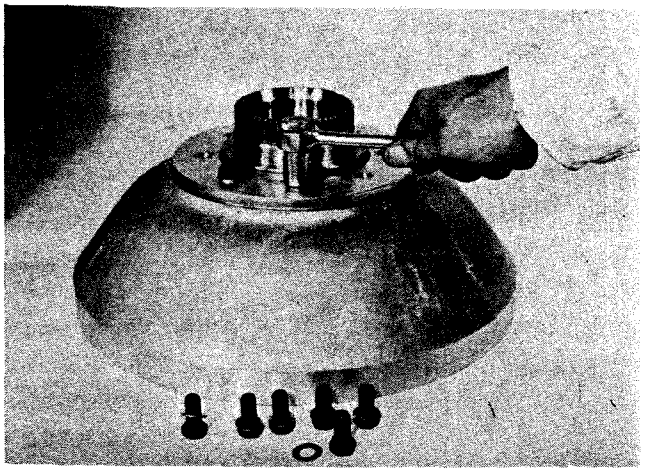


Figure 32
Remove impeller to hub bolts.

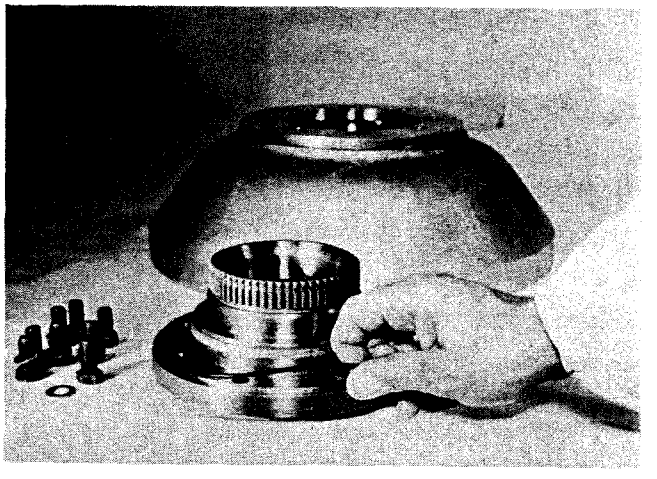


Figure 33
Remove impeller hub "O" ring.

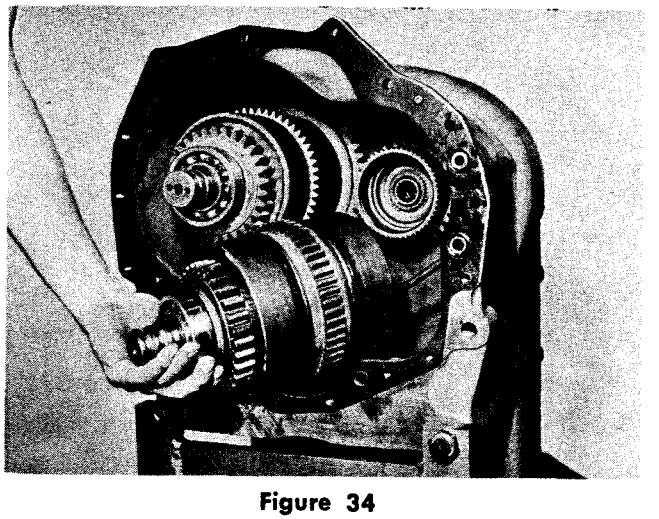


Figure 34
Remove forward and 2nd clutch assembly.

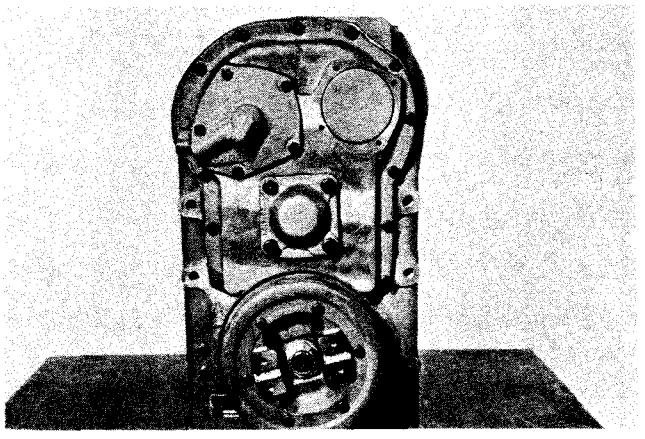


Figure 35

Rear view of transmission utilizing a mechanical parking brake option.

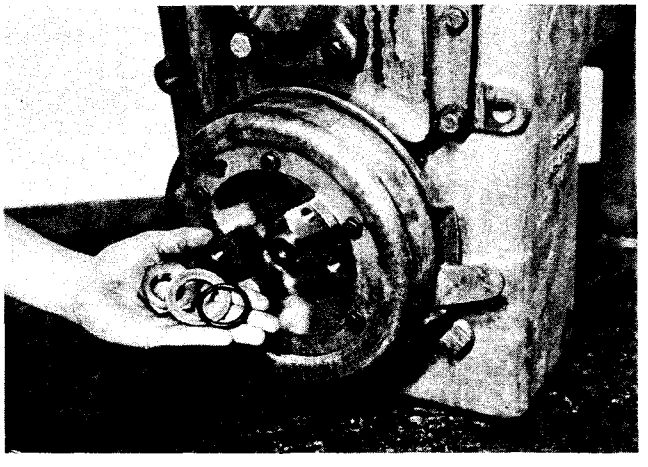


Figure 36

Remove output flange nut, washer and "O" ring. If parking brake is not used, remove companion flange and proceed to Figure 42.

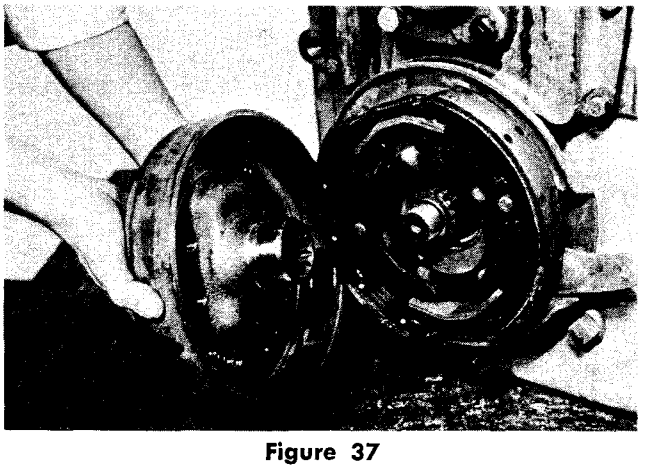


Figure 37

Remove parking brake drum and flange.

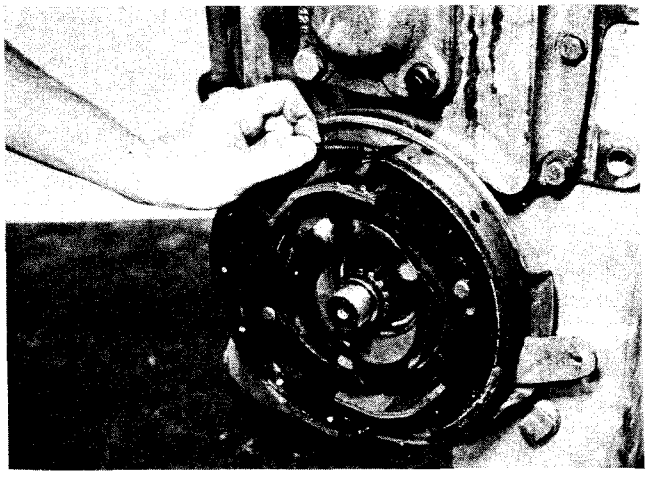


Figure 38

Remove upper and lower brake shoe return springs.

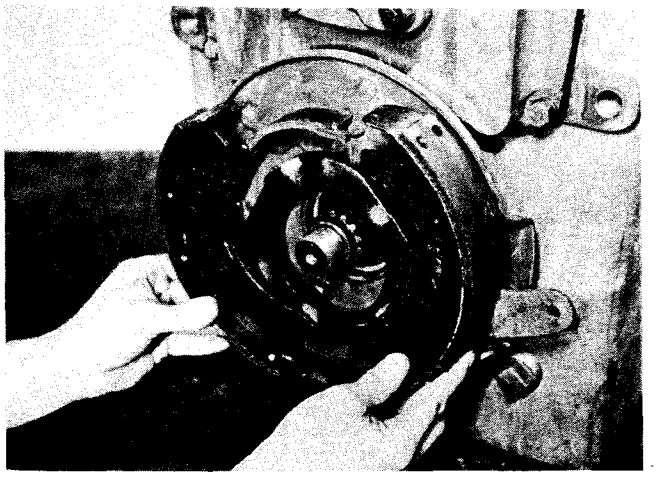


Figure 39

Remove brake shoes.

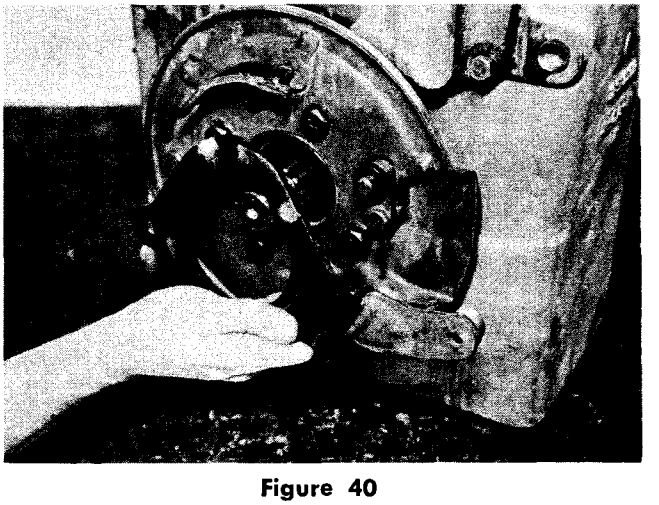


Figure 40

Remove brake actuator arm.

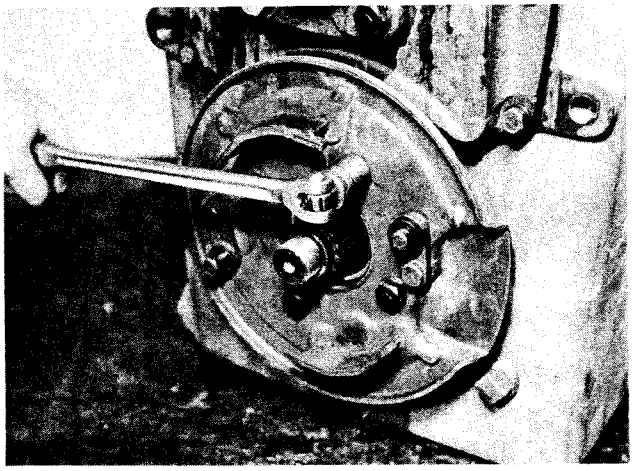


Figure 41
Remove brake backing plate bolts.

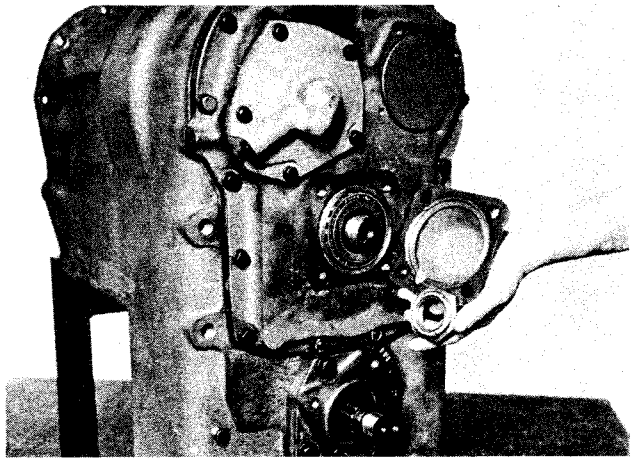


Figure 42
Remove idler shaft bearing cap bolts, bearing cap and idler shaft nut.

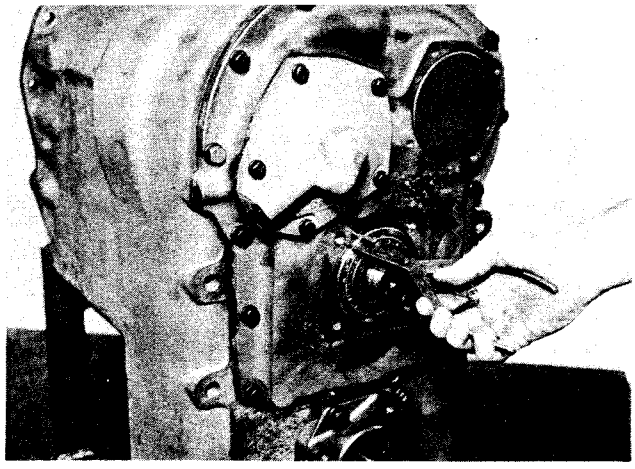


Figure 43
Remove idler shaft rear bearing locating ring.

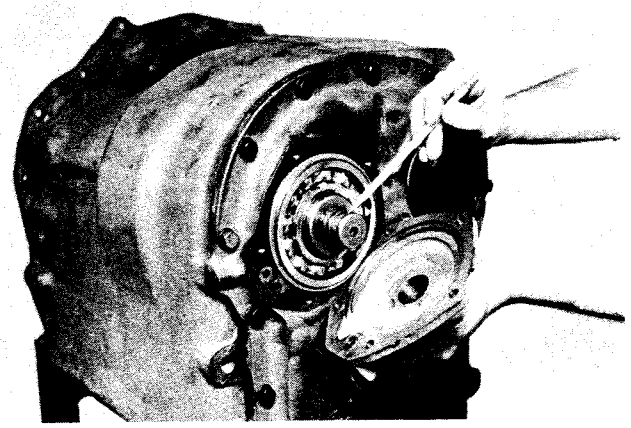


Figure 44
Remove low clutch rear bearing cap.

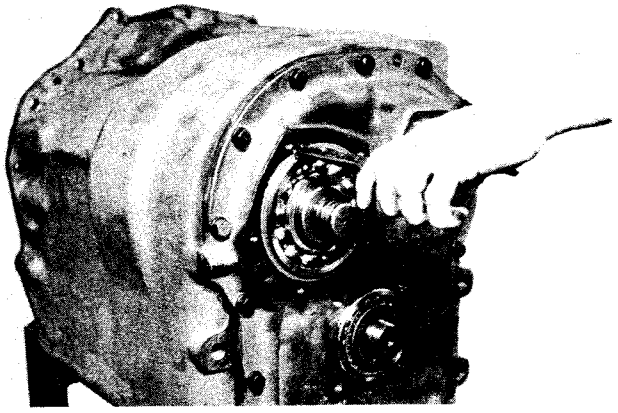


Figure 45
Remove low clutch rear bearing locating ring.

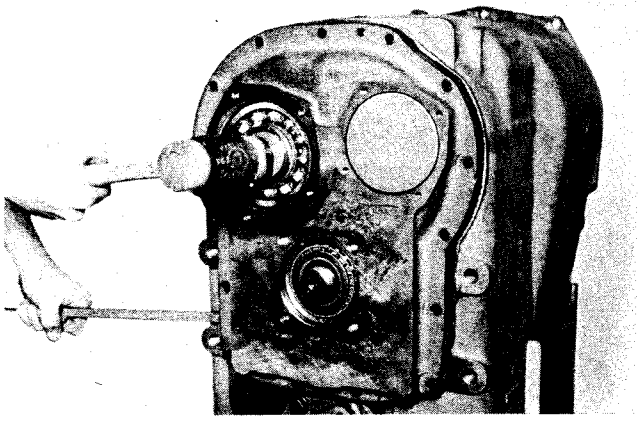


Figure 46
Remove rear cover bolts. Using pry slots provided, pry cover from transmission housing tapping on low clutch and idler shaft to allow cover to be removed without shaft binding.

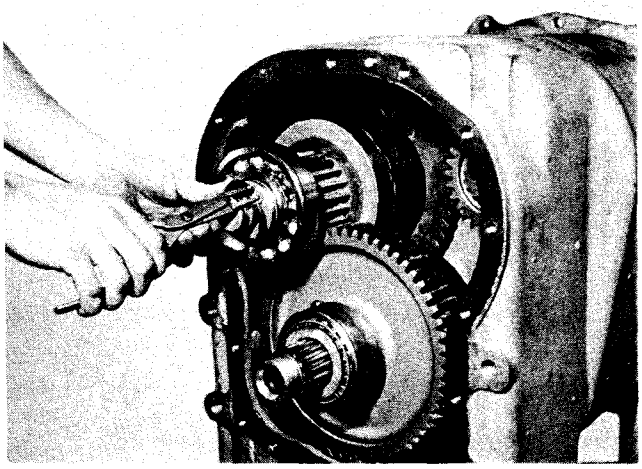


Figure 47

Remove low clutch rear bearing retaining ring.
NOTE: See page 33 for disassembly of low clutch utilizing a rear double taper bearing (helical gears).

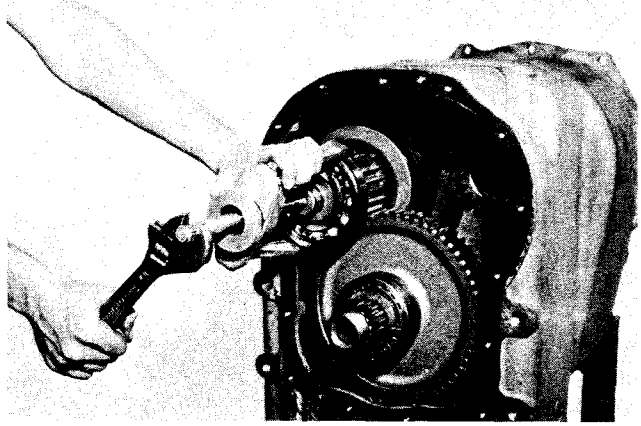


Figure 48

Remove low clutch rear bearing.

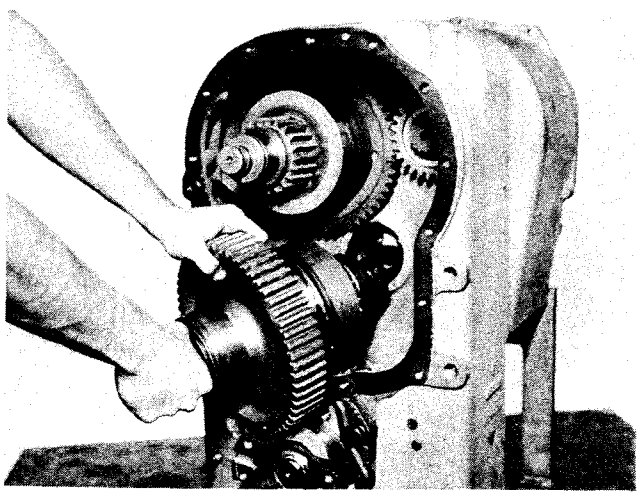


Figure 49

Remove idler shaft and 4th speed clutch from housing.
NOTE: Do not lose rear bearing lock ball.

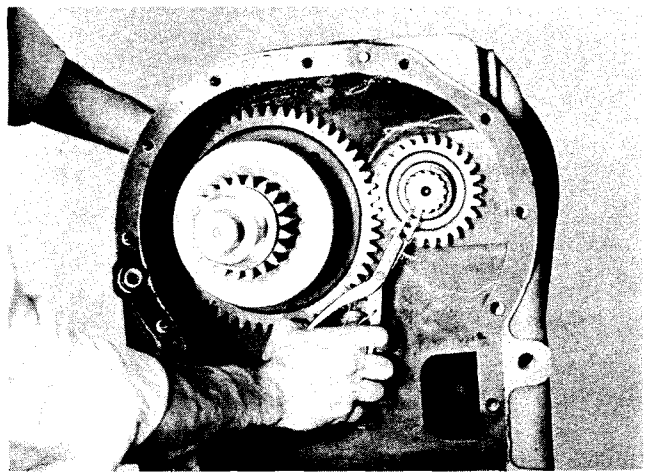


Figure 50

Remove low speed drive gear retainer ring and drive gear.

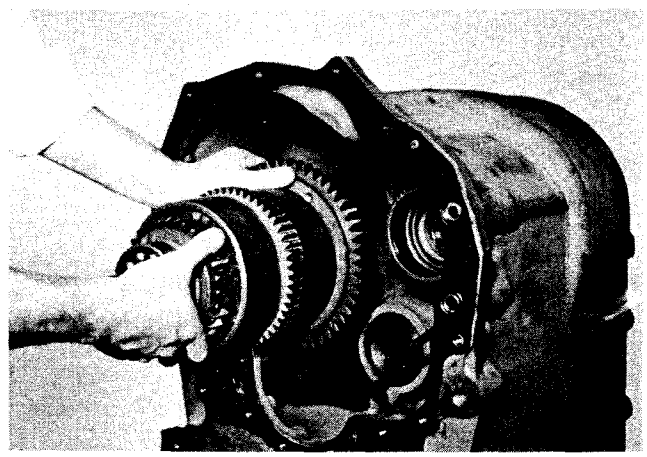


Figure 51

Remove reverse and 3rd clutch assembly.

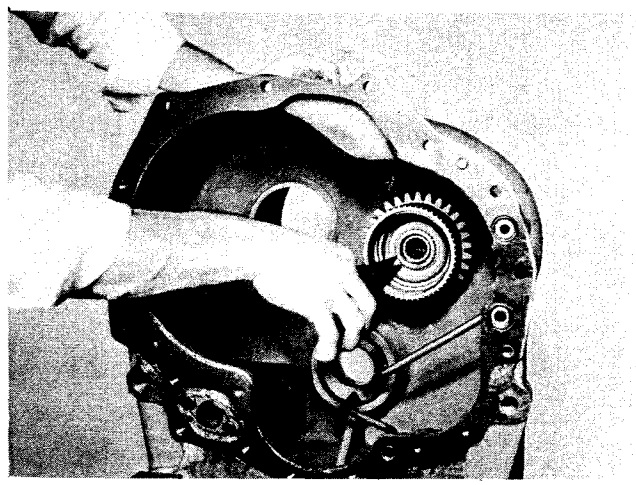


Figure 52

Remove 2nd gear retaining ring.

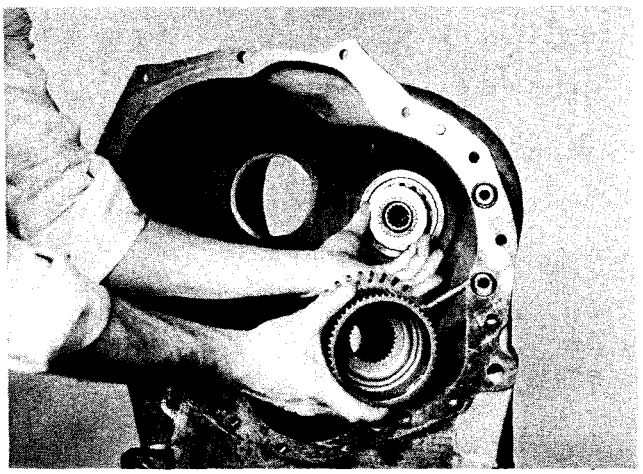


Figure 53
Remove 2nd gear and 2nd gear bearing end plate.

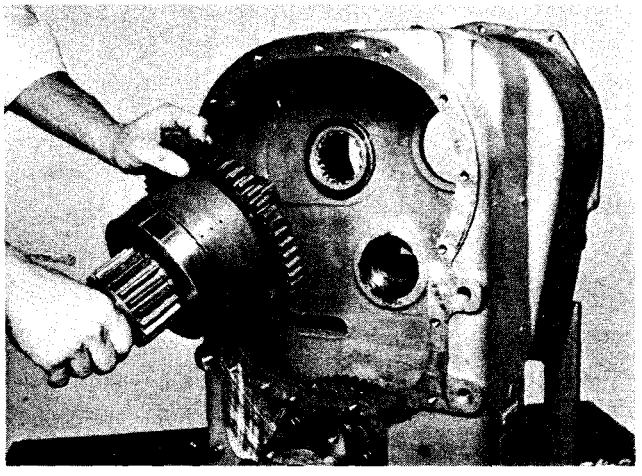


Figure 54
Remove low clutch assembly.

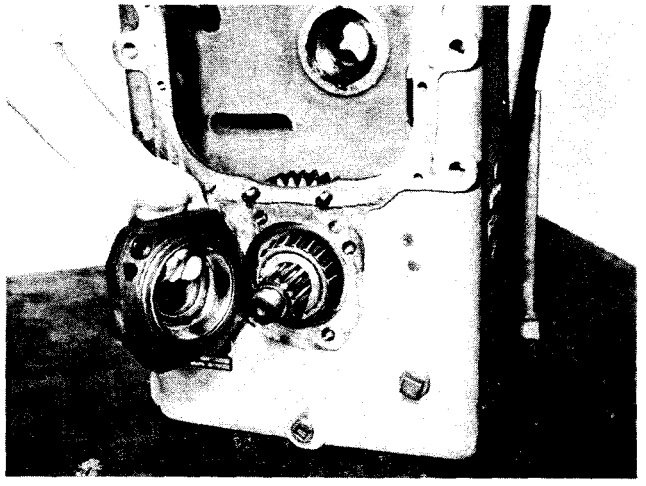


Figure 55
Remove rear output shaft bearing cap bolts and cap.

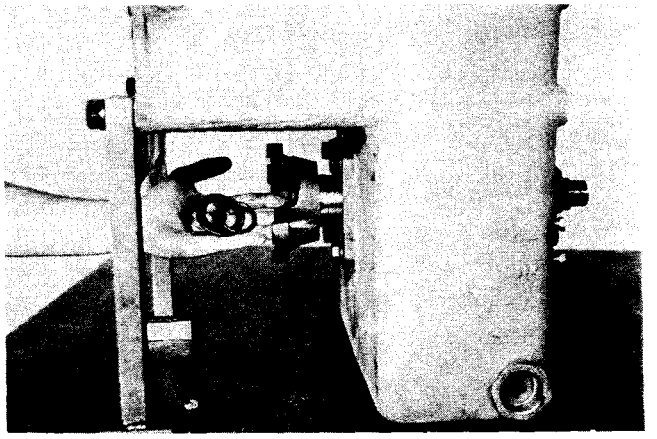


Figure 56
Remove front output flange nut, washer, "O" ring and companion flange.

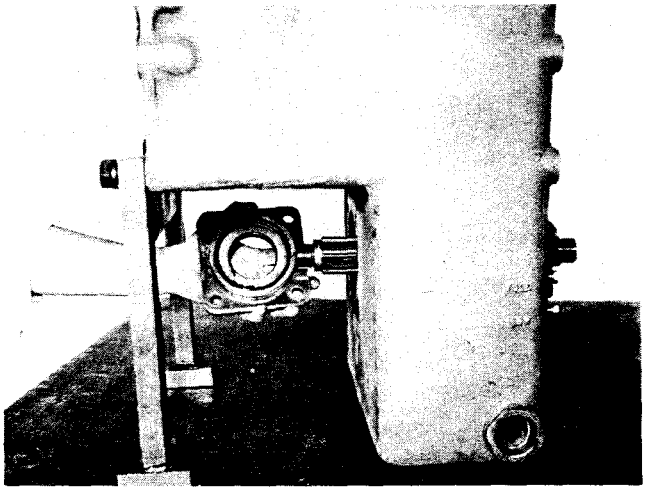


Figure 57
Remove output shaft front bearing cap bolts and cap.

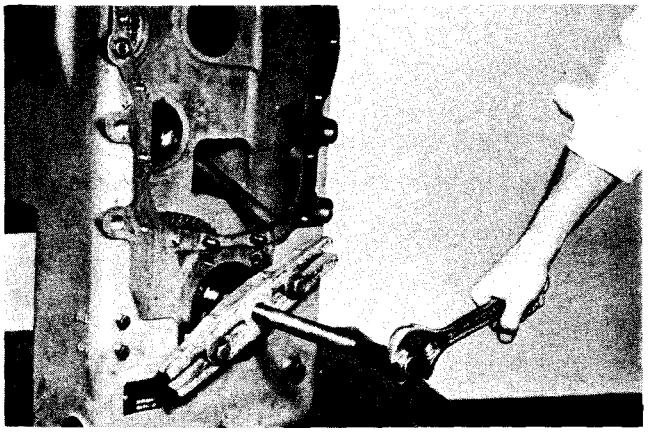


Figure 58
Block output gear. Push output shaft from rear through bearing and gear.

CLUTCH DISASSEMBLY

NOTE: DO NOT MIX THE FRICTION DISCS IN THE LOW CLUTCH WITH THE FRICTION DISCS OF ANY OF THE OTHER CLUTCHES. (SEE NOTE FOLLOWING FIGURE 95.)

LOW CLUTCH DISASSEMBLY

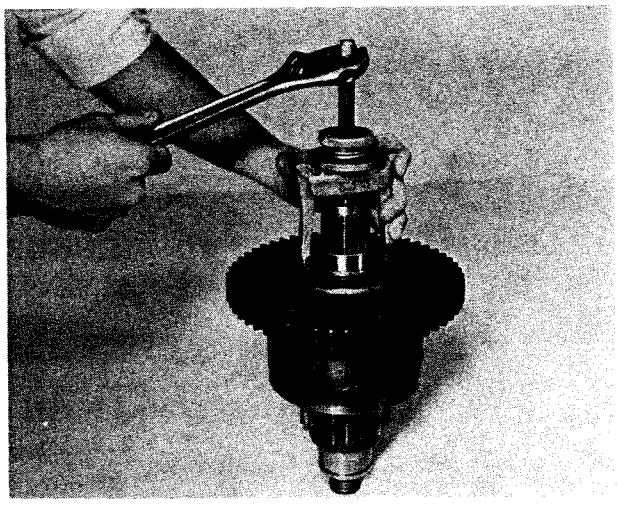


Figure 59
Remove low clutch shaft front bearing inner race.

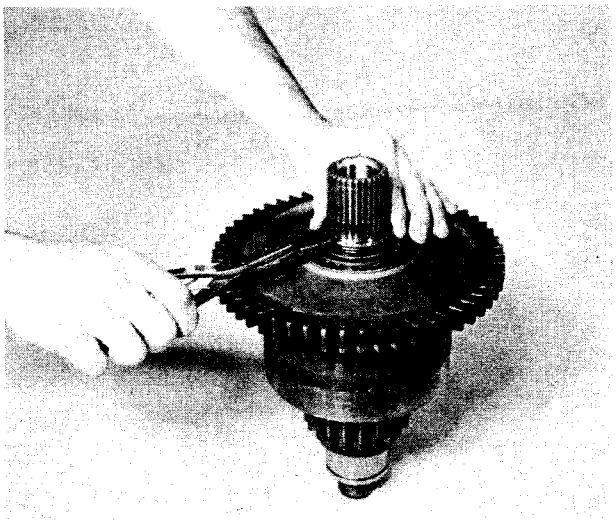


Figure 60
Remove low speed gear taper bearing retainer ring.

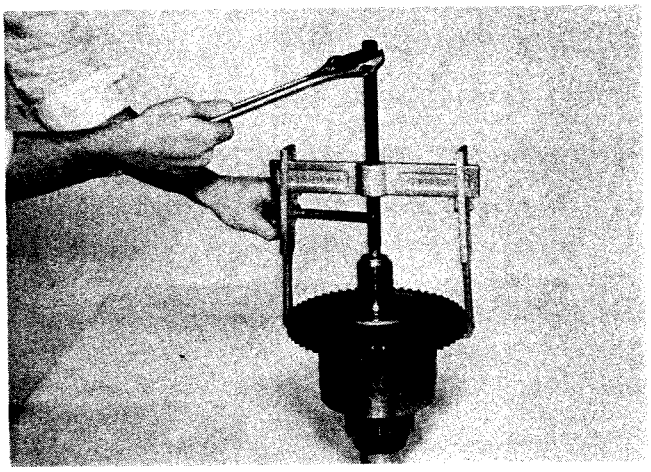


Figure 61
Remove low speed gear and outer taper bearing.

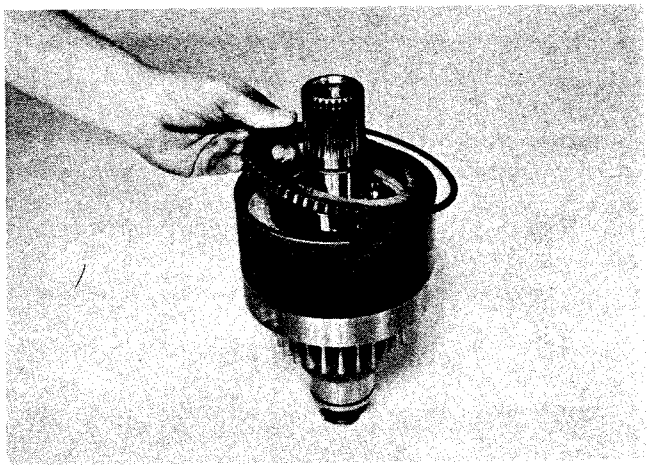


Figure 62
Remove clutch end plate retainer ring.
Remove clutch end plate and inner and outer clutch discs.

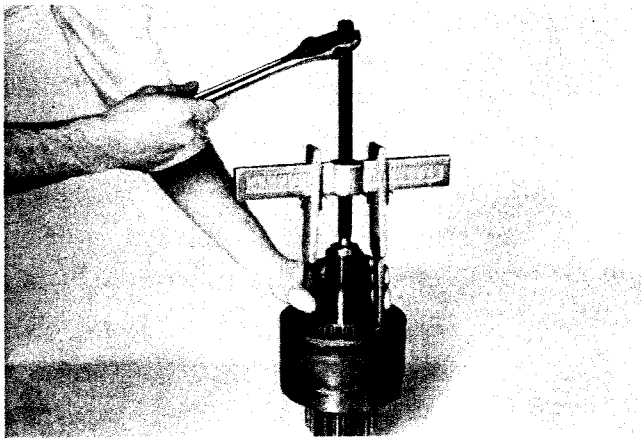


Figure 63
Remove low gear inner taper bearing.

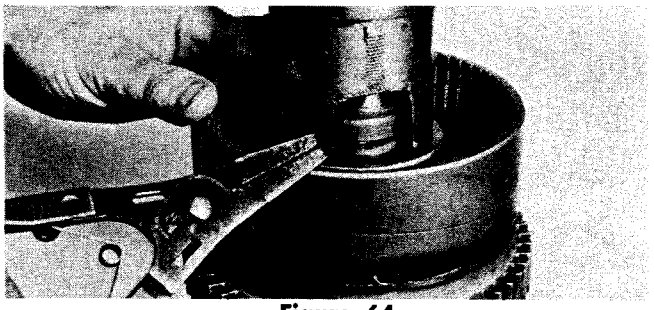


Figure 64

Remove clutch piston return spring. A sleeve with a portion removed is recommended for removing the clutch piston return spring, washer, and retainer ring. Sleeve shown is a common pipe, with a 1-1/2 x 1 [39,0x26,0mm] opening. The pipe is 6 x 3-1/4 x 2-3/4 [155,0x85,0x78,0mm]. Compress spring retainer washer. Through opening remove spring retainer snap ring. Release tension on spring retainer. Remove spring retainer and spring. Turn clutch over and tap clutch shaft on a block of wood to remove clutch piston.

FORWARD AND 2ND CLUTCH DISASSEMBLY (Forward being disassembled)

Forward and 2nd clutch and reverse and 3rd clutch disassemble and reassemble the same except when modulation is used. See page 46 for modulation cross section.

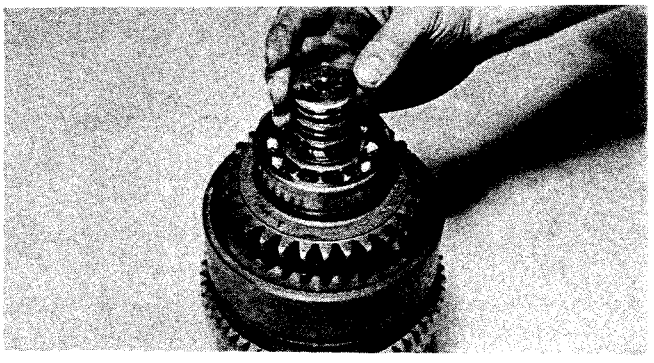


Figure 65

Remove clutch shaft piston rings and expander springs. See page 45 for proper piston ring and expander spring installation.

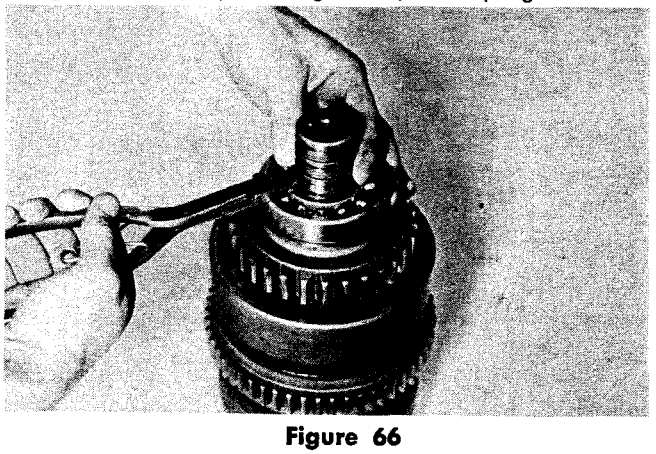


Figure 66

Remove front bearing retainer ring

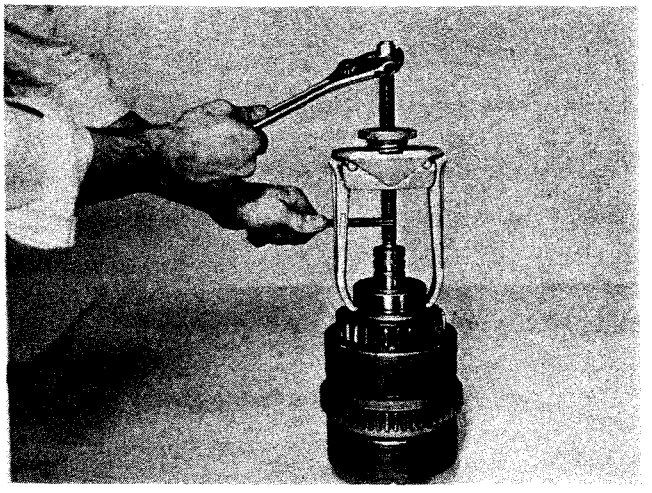


Figure 67

Remove front bearing.

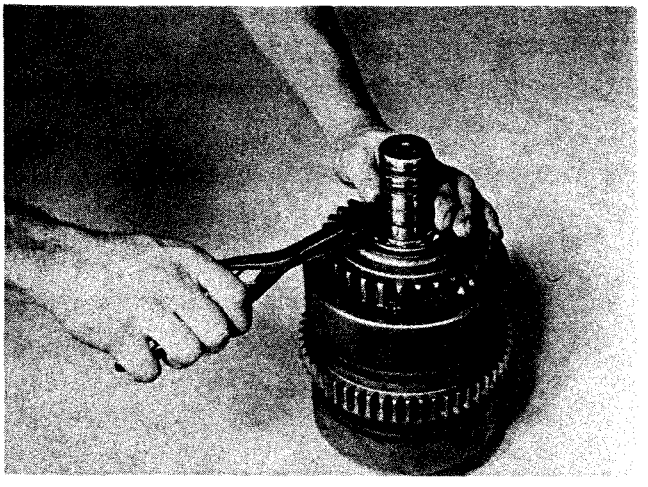


Figure 68

Remove front bearing locating ring.

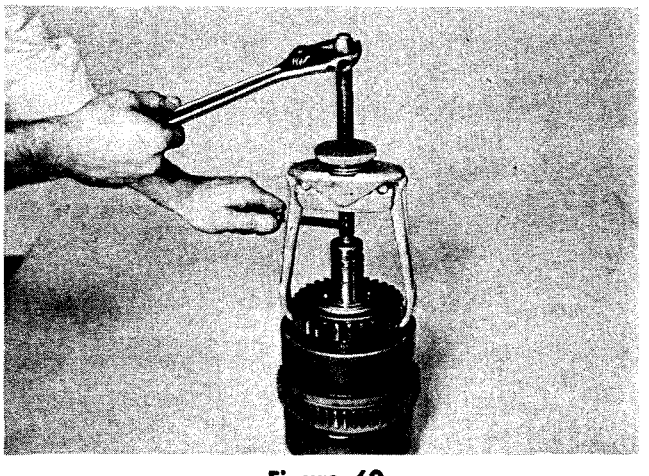


Figure 69

Remove clutch driven gear and outer bearing.

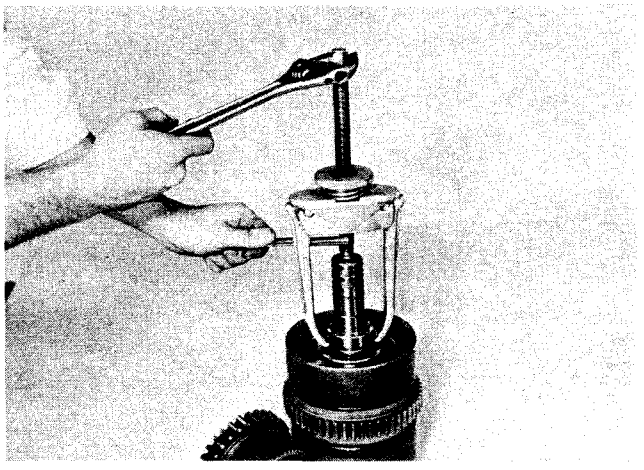


Figure 70
Remove inner bearing.

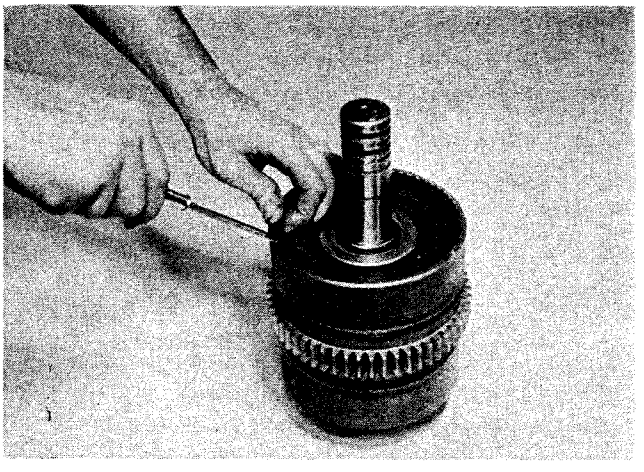


Figure 71
Remove end plate retainer ring.

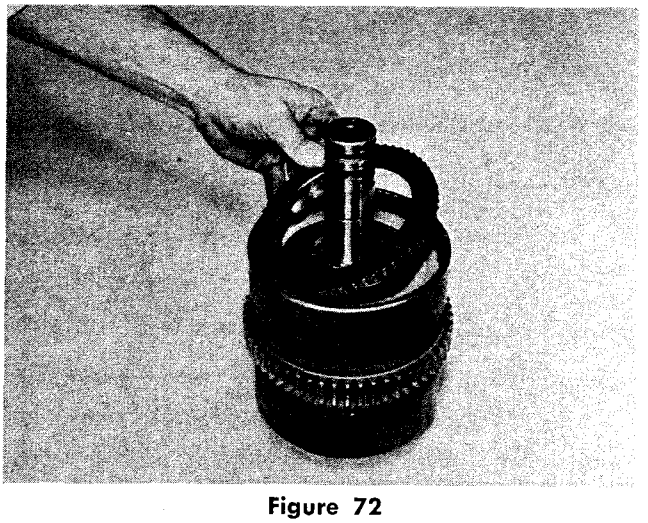


Figure 72
Remove end plate.

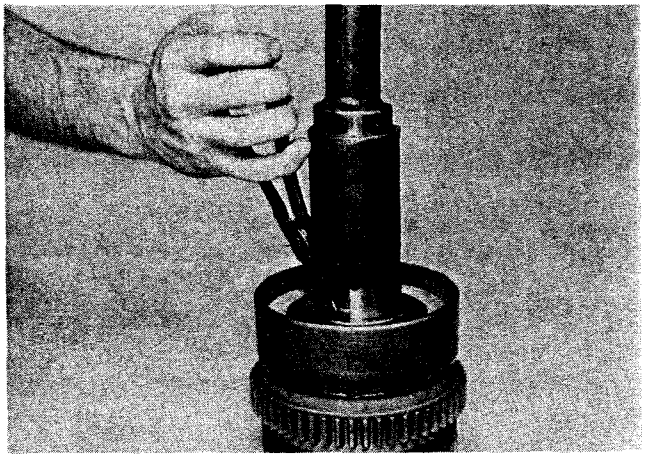


Figure 73
Compress return spring retainer. Remove retainer ring from groove.

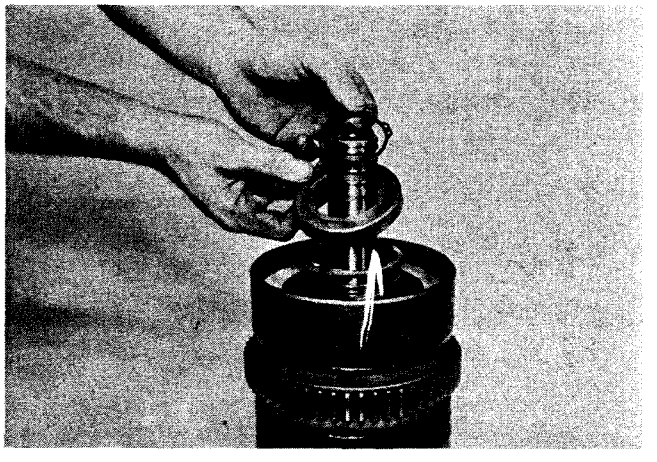


Figure 74
Relieve spring compression. Remove retainer ring, retainer and spring.

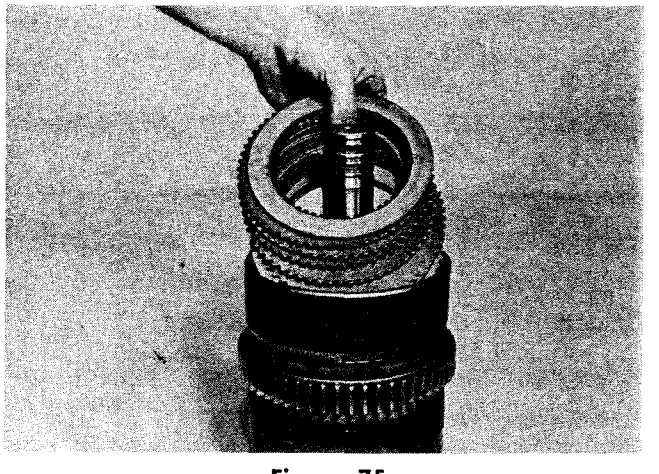


Figure 75
Remove inner and outer clutch discs. Turn clutch over and tap clutch shaft on a block of wood to remove clutch piston.

4th Clutch Disassembly

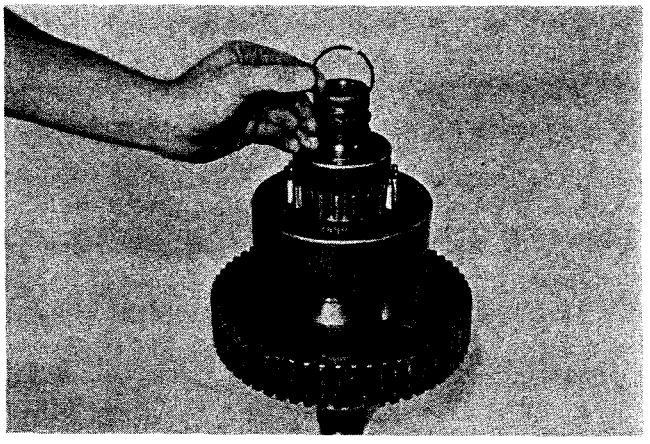


Figure 76
Remove clutch shaft piston rings and expander springs. See page 45 for proper piston ring and expander spring installation.

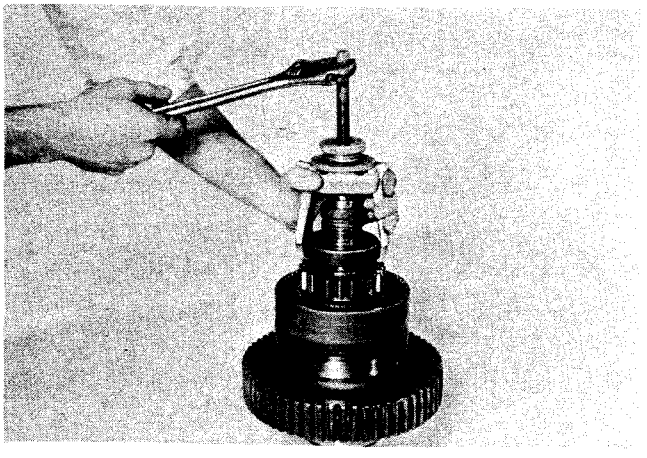


Figure 77
Remove front bearing retainer ring and front bearing.

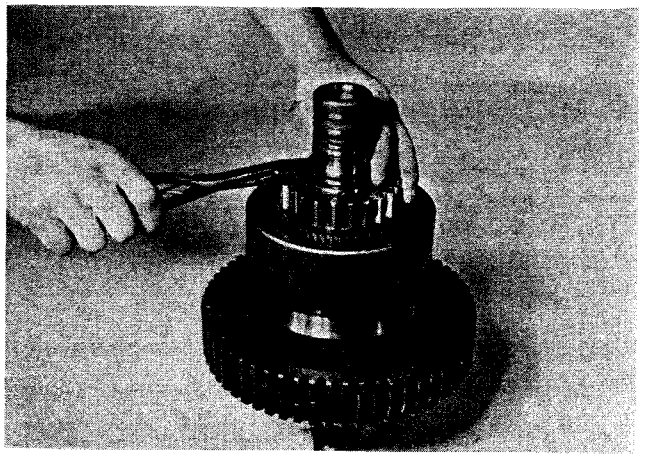


Figure 78
Remove front bearing locating ring.

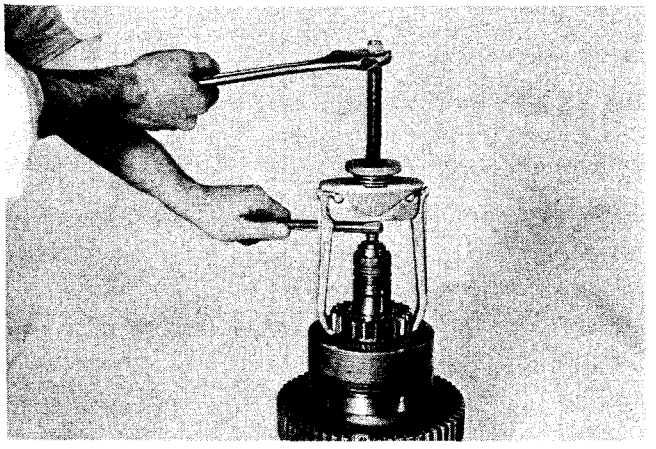


Figure 79
Remove 4th gear from clutch drum.

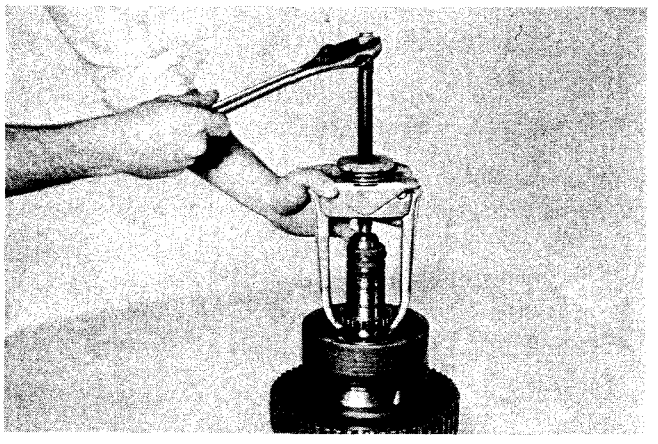


Figure 80
Remove inner bearing spacer and inner bearing. Disassemble clutch discs and piston as explained in Figure 71 through Figure 75.

CLEANING AND INSPECTION

CLEANING

Clean all parts thoroughly using solvent type cleaning fluid. It is recommended that parts be immersed in cleaning fluid and moved 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 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 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 recommended type 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 and quills 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

Forward and 2nd Clutch Reassembly

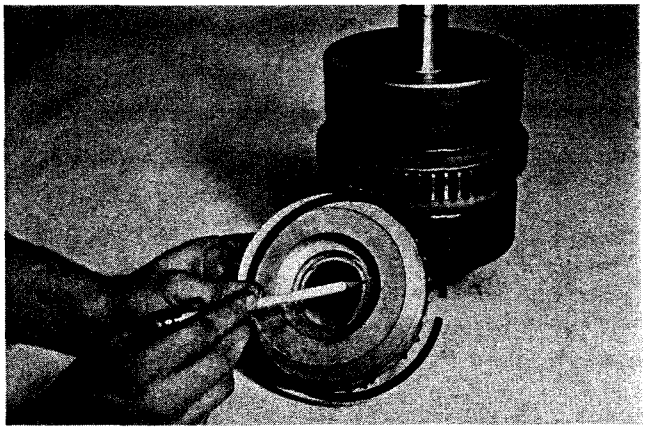


Figure 81

Install new clutch piston inner and outer sealing rings.

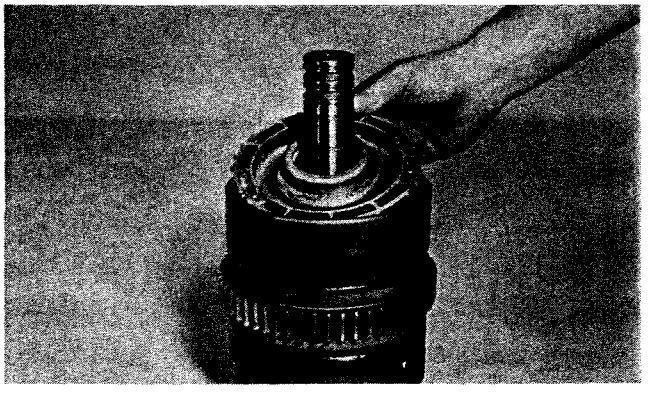


Figure 82

Insert clutch piston in clutch drum. Use caution as not to damage sealing rings.

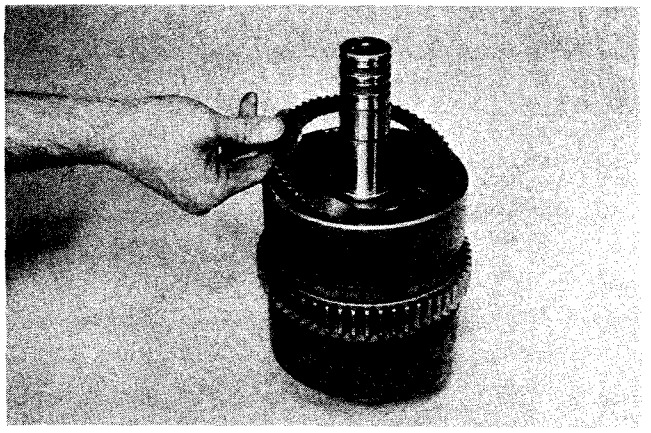


Figure 83

Install clutch piston return spring, spring retainer and retainer snap ring. Insert one steel disc. **NOTE: The 4th speed clutch does not use a snap ring retainer.**

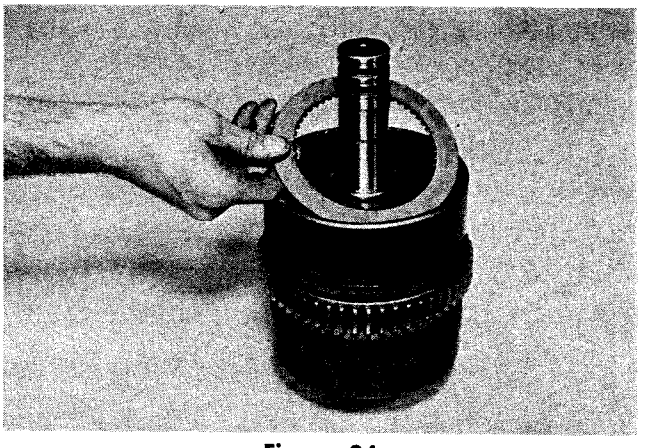


Figure 84

Install one friction disc. Alternate steel and friction discs until the proper amount of discs are installed. First disc next to the piston is steel, last disc installed is friction.

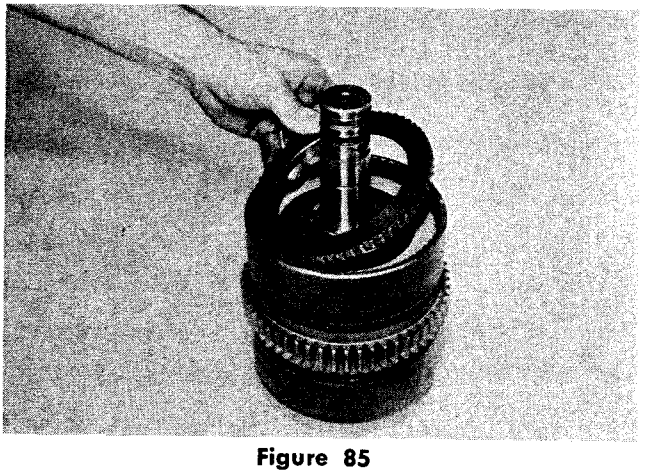


Figure 85

Install end plate.

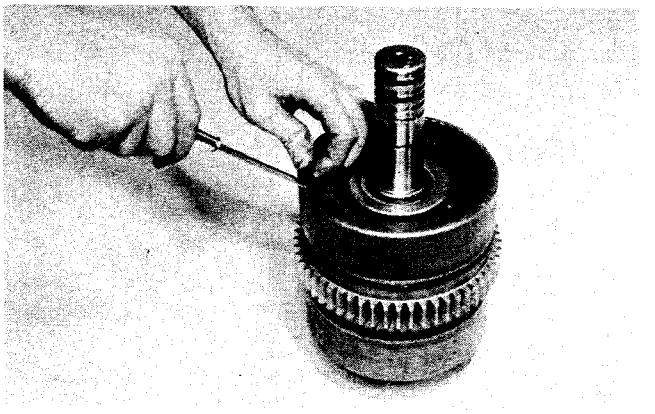


Figure 86

Install end plate retainer ring.

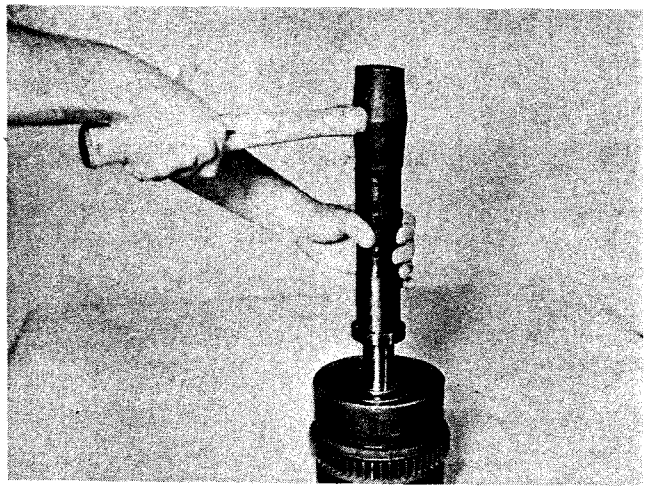


Figure 87

Install clutch driven gear inner bearing.

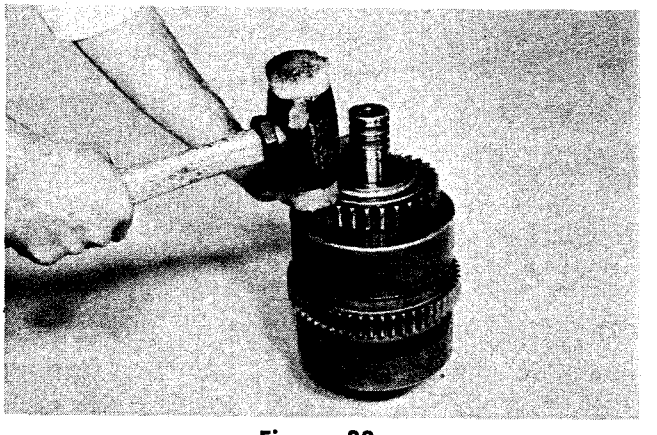


Figure 88

Install clutch driven gear into clutch drum. Align splines on clutch gear with internal teeth of friction discs. Tap gear into position. Do not force this operation. Gear splines must be in full position with internal teeth of all friction discs.

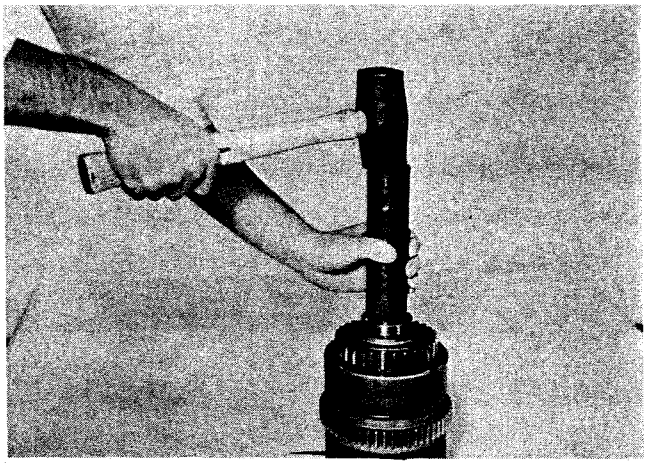


Figure 89
Install driven gear outer bearing.
See Fig. M for proper Shielded Bearing Installation.

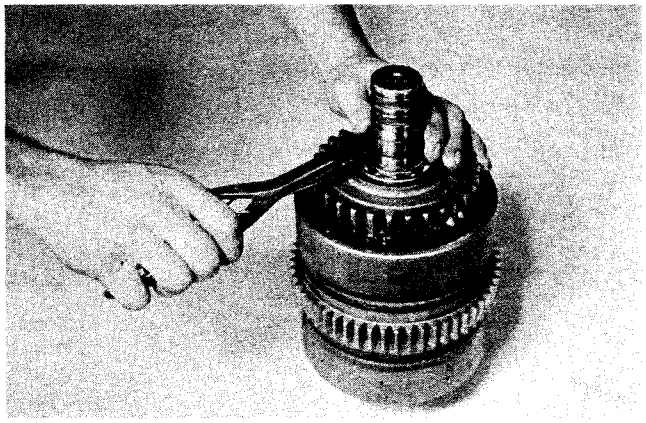


Figure 90
Install front bearing locating ring.

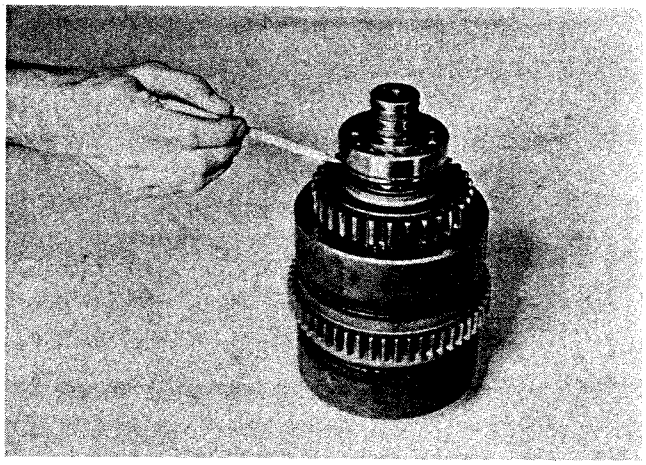


Figure 91
Install front bearing. **NOTE:** Snap ring groove in front bearing must be down.

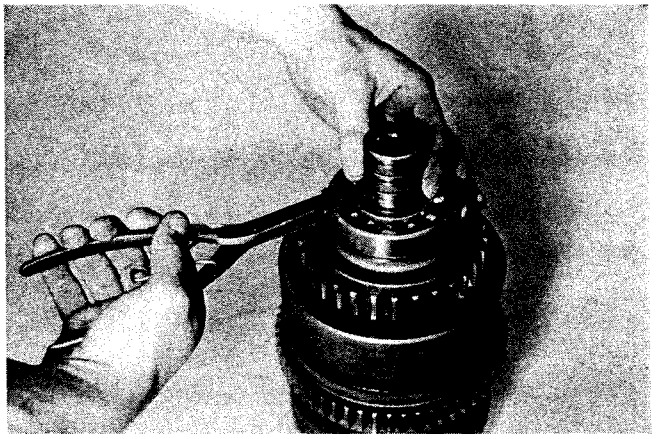


Figure 92
Install front bearing retaining ring.

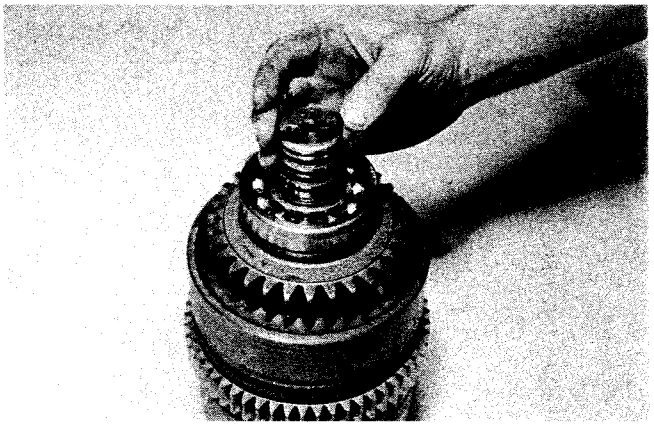


Figure 93
Install clutch shaft piston rings and expander springs per instructions on page 45.

LOW CLUTCH REASSEMBLY

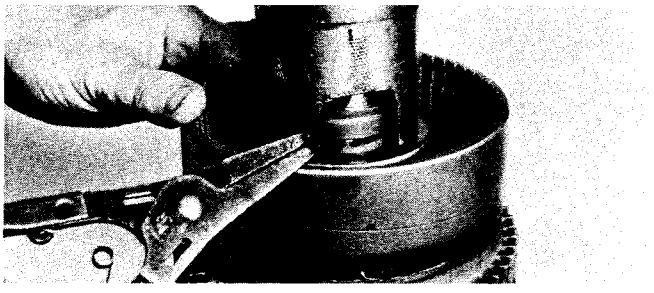


Figure 94
Install new clutch piston inner and outer sealing ring. Insert piston into clutch drum using caution as not to damage seals. Position piston return spring, spring retainer and retainer snap ring. Compress spring and retainer and install snap ring.

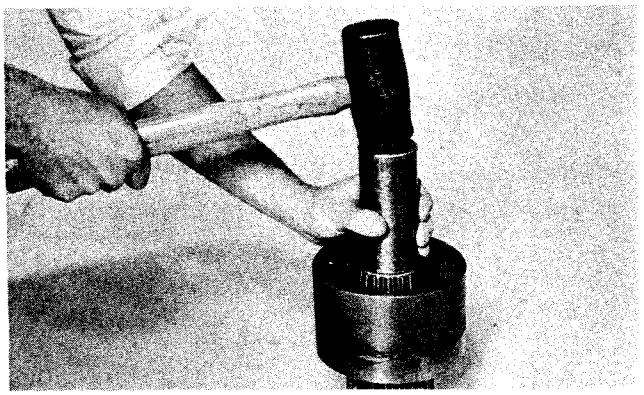


Figure 95

Install low gear inner taper bearing.

Install one steel disc.

Install one friction disc. **NOTE: The friction discs in the low clutch has a higher co-efficient rating than the friction discs in the other clutches, therefore the discs must not be mixed. The low clutch inner disc can be identified by an "X" stamped on one side of the inner teeth. The low clutch inner disc also has a strip of non-soluble yellow paint sprayed on the outer edge of the disc.** Alternate steel and friction discs until the proper amount of discs are installed. First disc next to the piston is steel, last disc installed is friction.

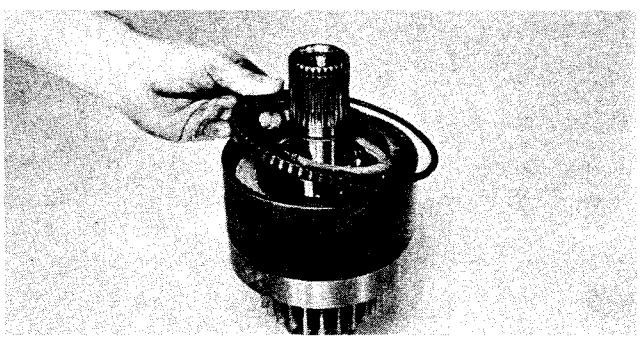


Figure 96

Install end plate and retainer ring.

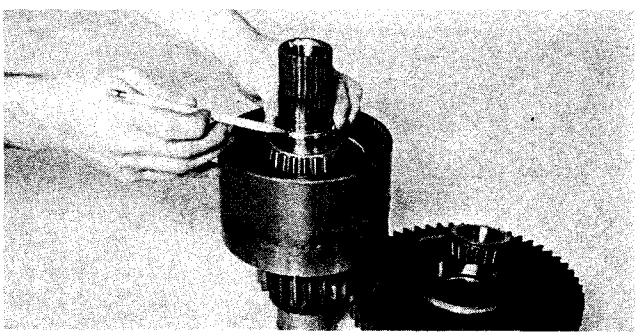


Figure 97

Install low clutch taper bearing spacer. **NOTE: When installing the 3rd gear in the 3rd speed clutch a bearing spacer is used between the inner and outer 3rd gear bearing also.**

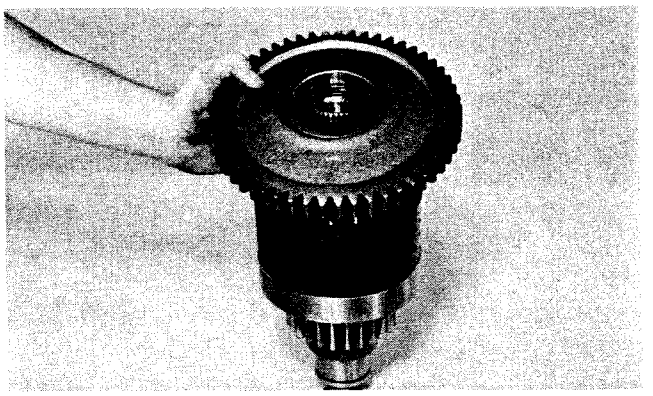


Figure 98

Install low gear into clutch drum. Align splines on low gear with internal teeth of friction discs. Tap gear into position. Do not force this operation. Gear splines must be in full position with internal teeth of all friction discs.

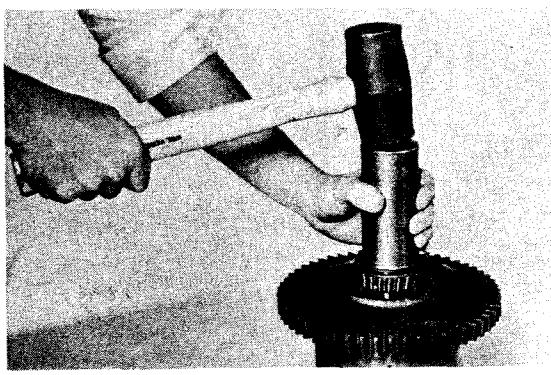


Figure 99

Install low gear outer taper bearing.

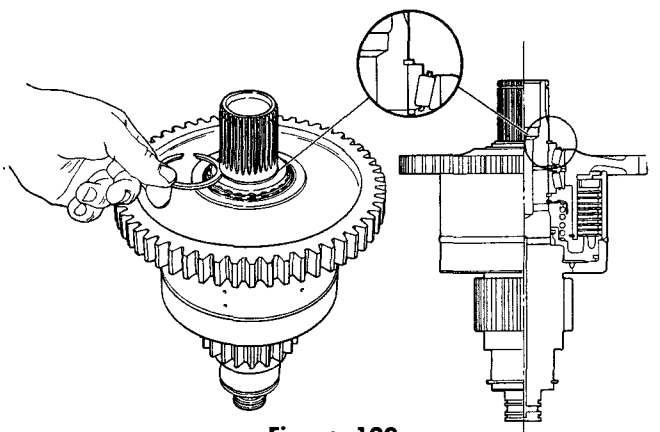


Figure 100

Install low clutch taper bearing retainer ring.

NOTE: Retainer ring is selected at assembly for proper thickness. A snap ring kit is available. Select the thickest of the three rings in the kit that can be fitted into the snap ring groove to assure a proper taper bearing tightness. Check ring as shown for tight ring to bearing fit.

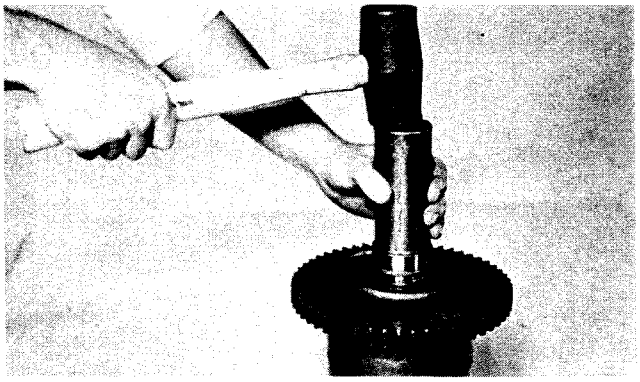


Figure 101

Install low clutch shaft front bearing inner race with large diameter of race down.

4th Speed Clutch Reassembly

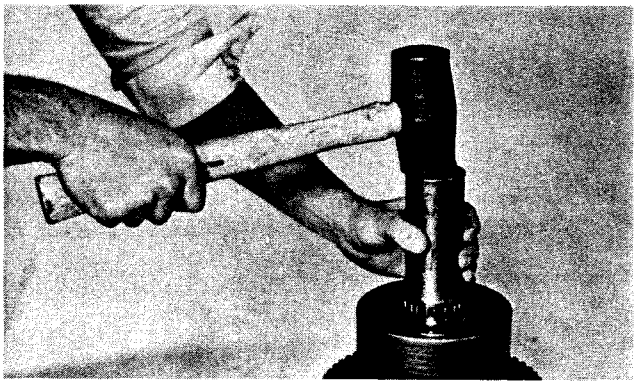


Figure 102

Install piston, piston return spring and inner and outer discs as explained in Fig. 81 through Fig. 86.

Install 4th speed gear inner bearing. **NOTE:** Bearing Part Number must go down. See Figure 104-A.

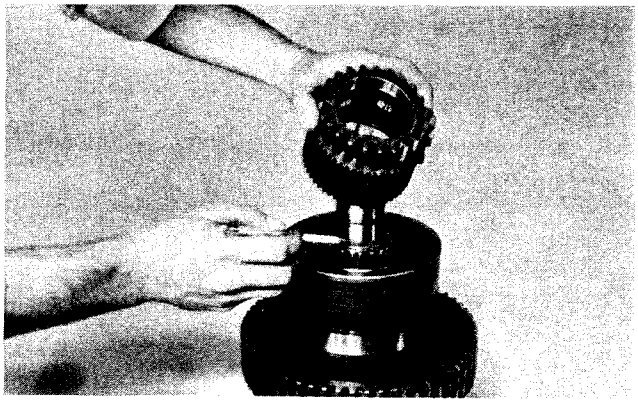


Figure 103

Install bearing spacer between inner and outer 4th speed gear bearings.

Install 4th speed gear into clutch drum. Align splines on clutch gear with internal teeth of friction discs. Tap gear into position. Do not force this operation. Gear splines must be in full position with internal teeth of all friction discs.

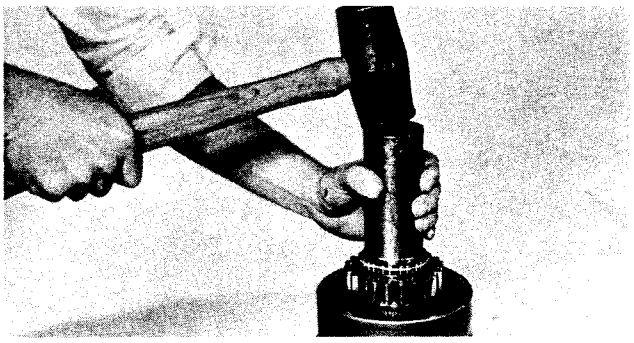


Figure 104

Install 4th speed gear outer bearing. **NOTE:** Bearing Part Number must go up. See Figure 104-A. It is recommended a rubber band be used to hold outer bearing rollers in position when installing bearing.

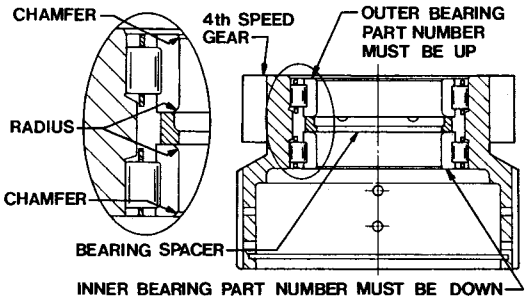


Figure 104-A

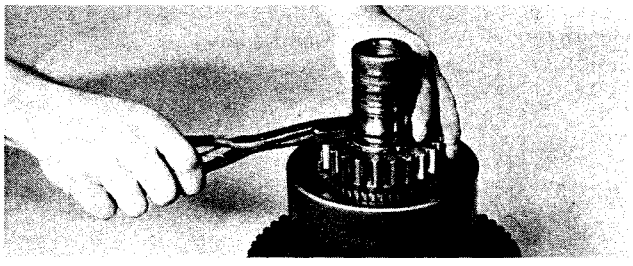


Figure 105

Install front bearing locating ring.

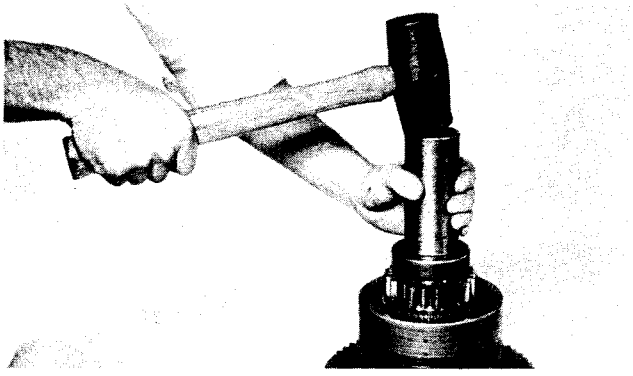


Figure 106

Install front bearing and bearing retainer ring.

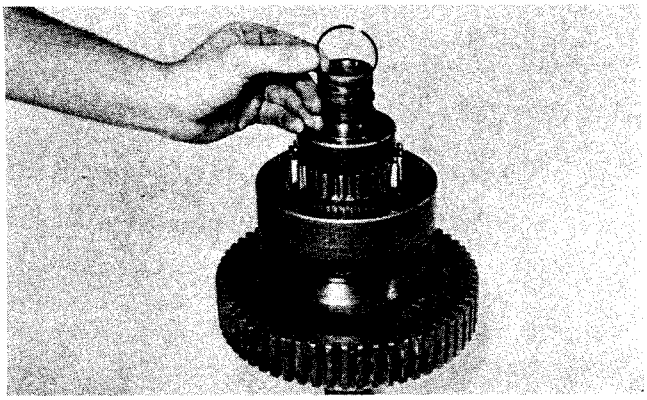


Figure 107

Install clutch shaft piston rings and expander springs per instructions on page 45.

REASSEMBLY OF THE OUTPUT SHAFT

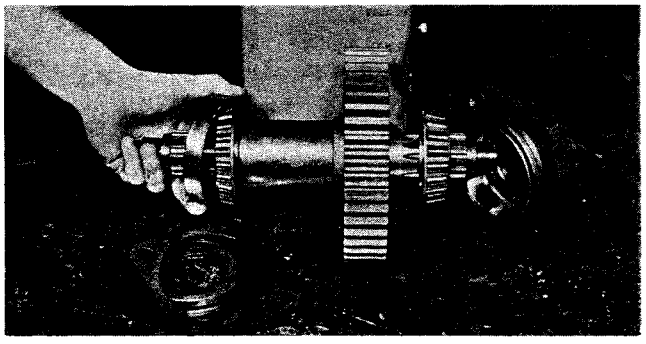


Figure 108

View of output shaft as it would be positioned in transmission case. Note front cone bearing shouldered on shaft with large diameter of bearing in.

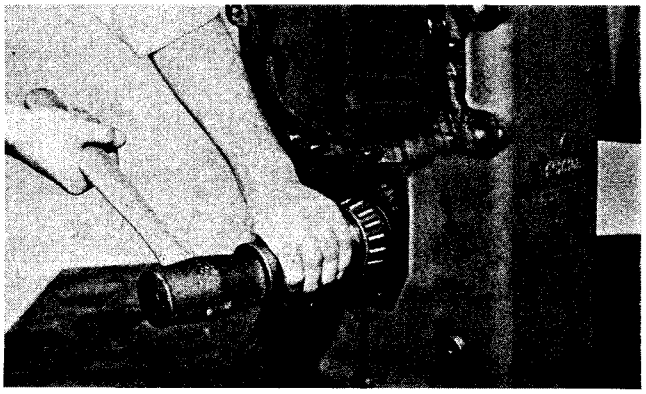


Figure 109

Position output gear in transmission case with protruding hub toward front of case. See Fig. 108. Insert output shaft, gear spacer and taper bearing from front of case and through output gear. Install front taper bearing cup. Block output shaft and install rear taper bearing with large diameter in.

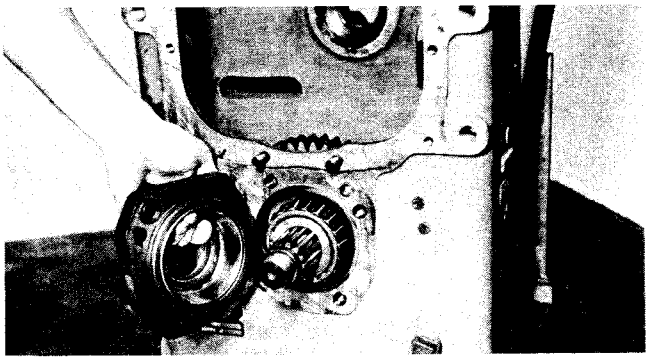


Figure 110

Install new oil seal (See Fig. I for position and depth). Using new "O" rings install rear output bearing cap, oil seal and taper bearing cup on transmission case. Lube opening in bearing cap must be aligned with lube opening in case. Tighten bearing cap bolts to specified torque. (See torque chart).

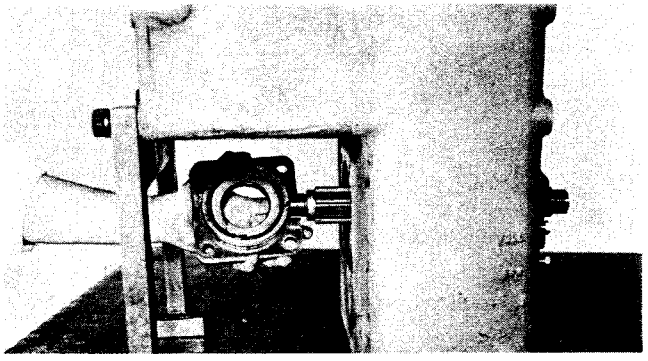


Figure 111

Install front bearing cap and shims. Tighten bolts to specified torque. Tap output shaft front and rear to seat taper bearings. Loosen front bearing cap bolts.

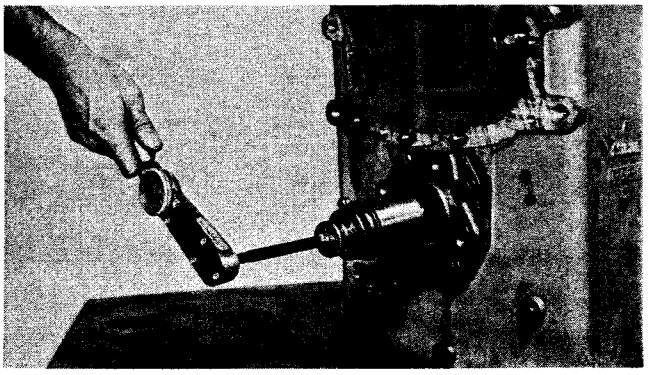


Figure 112

Using an inch lb. torque wrench, determine the rolling torque of the output shaft and record. Tighten front bearing cap bolts to specified torque. Check rolling torque with bolts tight. Torque must be 6 to 8 inch lbs. [0,68 - 0,90 N.m.] more than when bearing cap bolts were loose. Add or omit shims on the front bearing cap to achieve the proper preload.

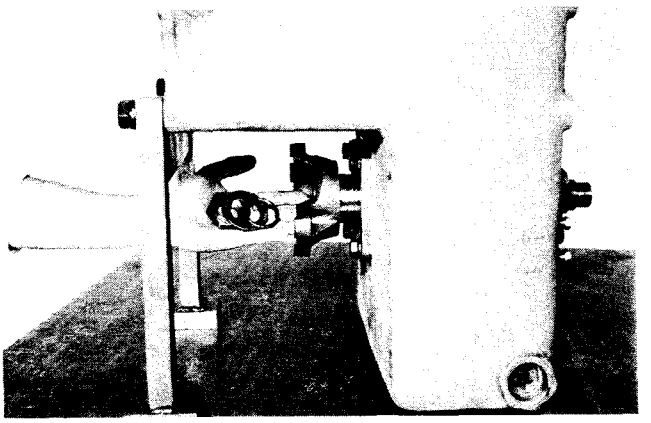


Figure 113

Install output shaft front companion flange, flange "O" ring, washer and flange nut. Block output gear. Tighten nut to specified torque. (See elastic stop nut torque chart.)

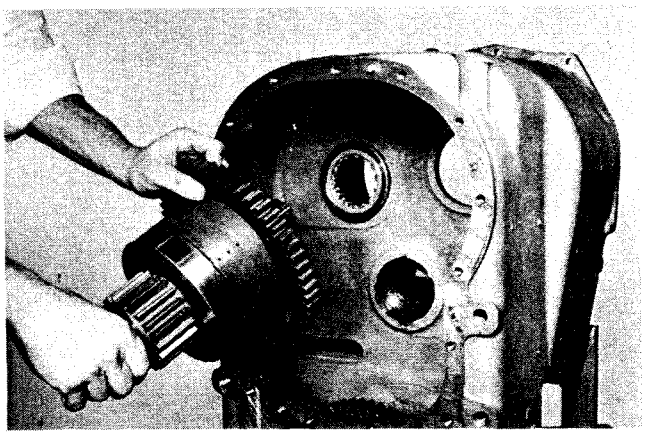


Figure 114

From the rear of the transmission case install the low clutch assembly.

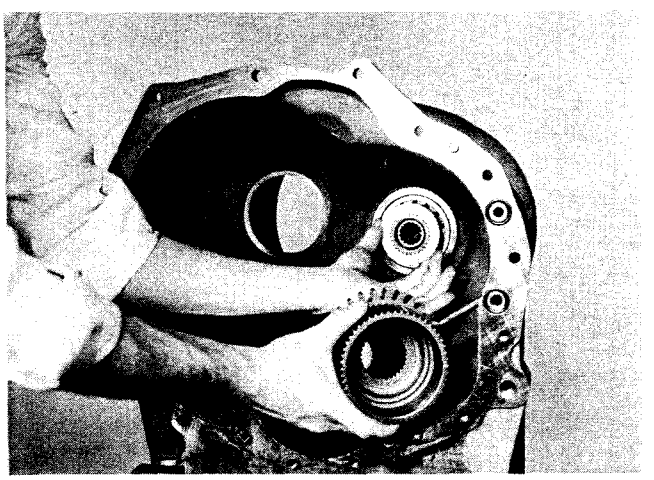


Figure 115

Install 2nd speed bearing end plate and 2nd speed gear on low clutch shaft.

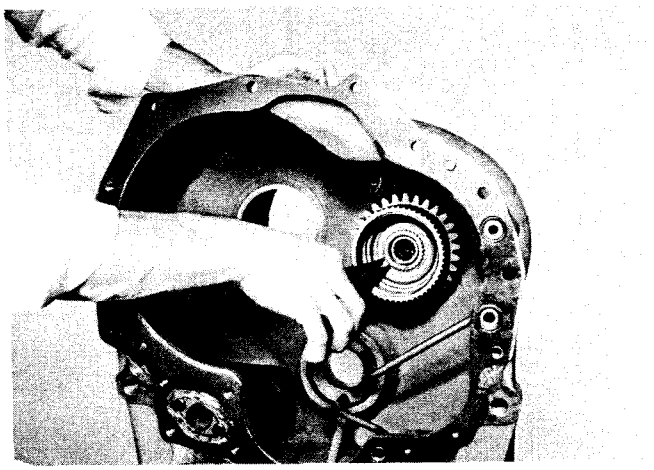


Figure 116

Install 2nd speed gear retainer ring.

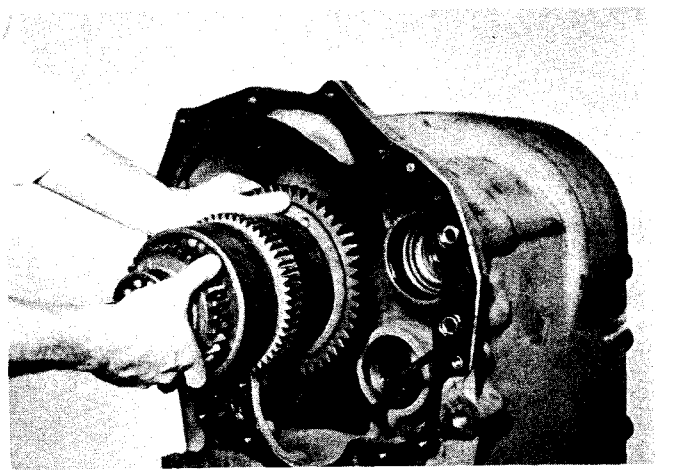


Figure 117

From the front of the transmission case install the reverse and 3rd clutch assembly.

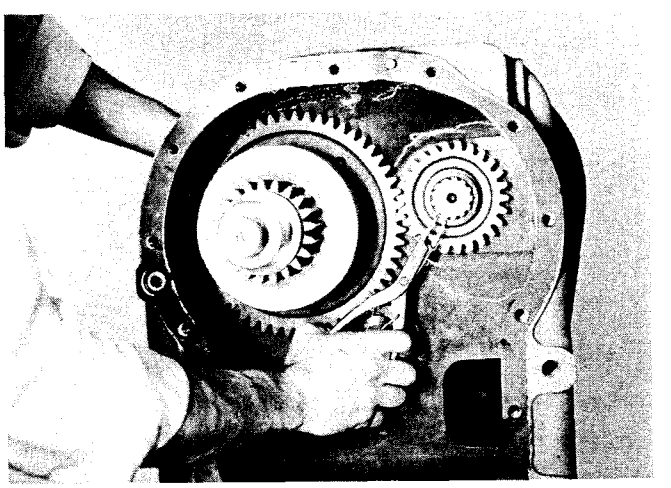


Figure 118

Install low speed drive gear and retainer ring.

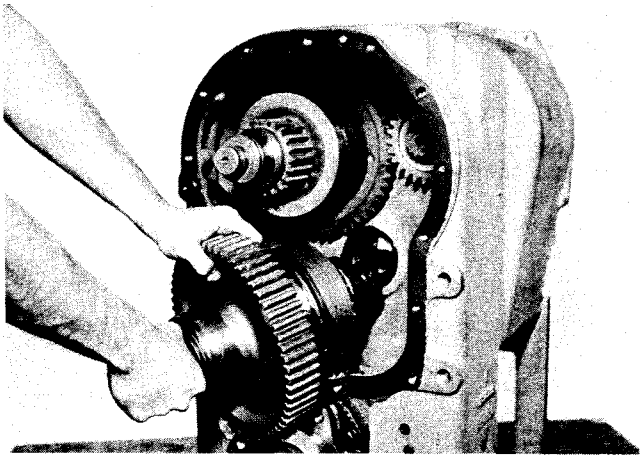


Figure 119
Install idler shaft and 4th speed clutch assembly.

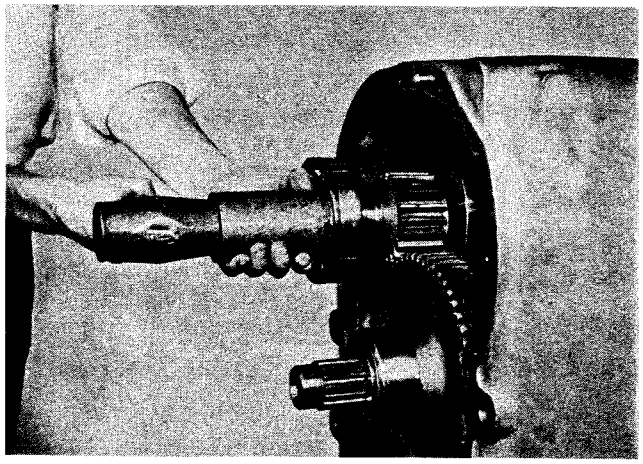


Figure 120
Install low clutch rear bearing with bearing ring groove to the rear. **NOTE:** For reassembly of low clutch utilizing rear double taper bearing see page 33 (helical gears).

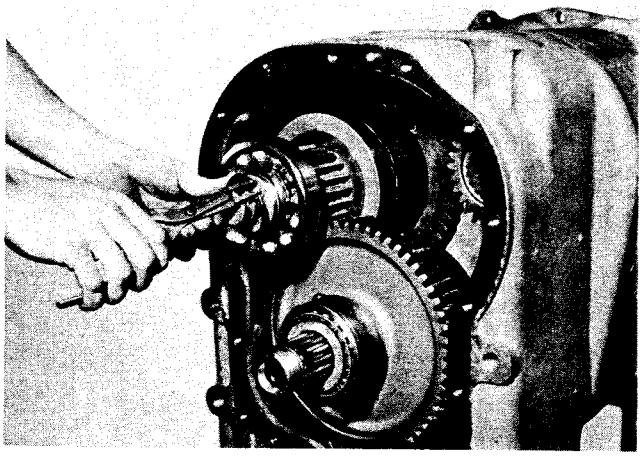


Figure 121
Install low clutch rear bearing retainer ring.

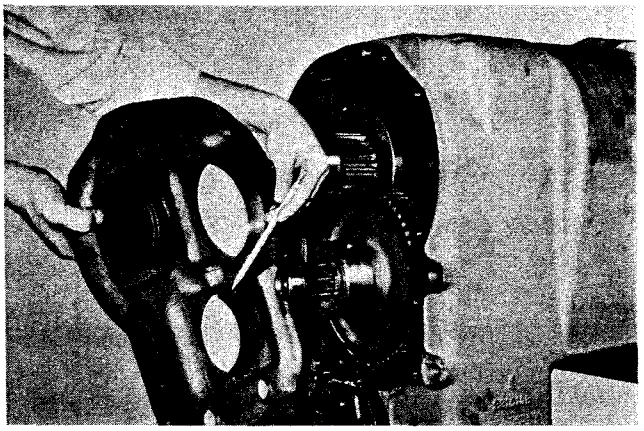


Figure 122
Position a new gasket on rear transmission case. Align lock ball in idler shaft rear bearing with notch in rear transmission cover. Tap cover in place and secure with bolts and lockwashers.

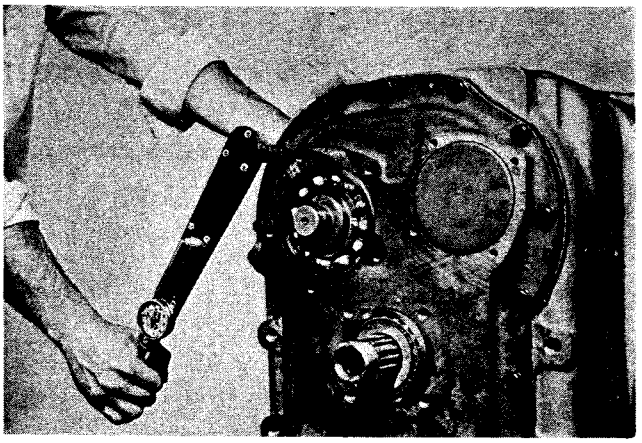


Figure 123
Torque rear cover bolts to specified torque.

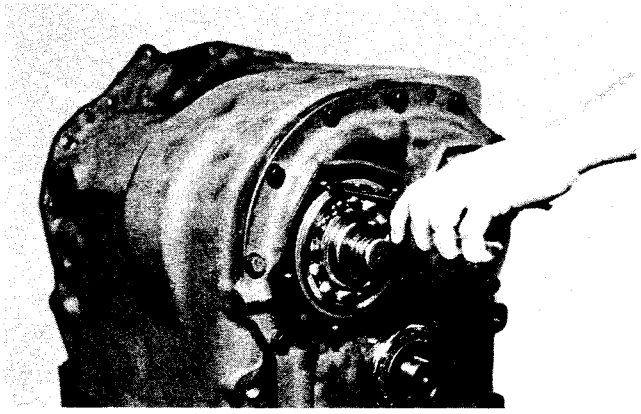


Figure 124
From front of transmission case tap low clutch and idler shaft to rear. This will allow clearance to install rear bearing snap ring.

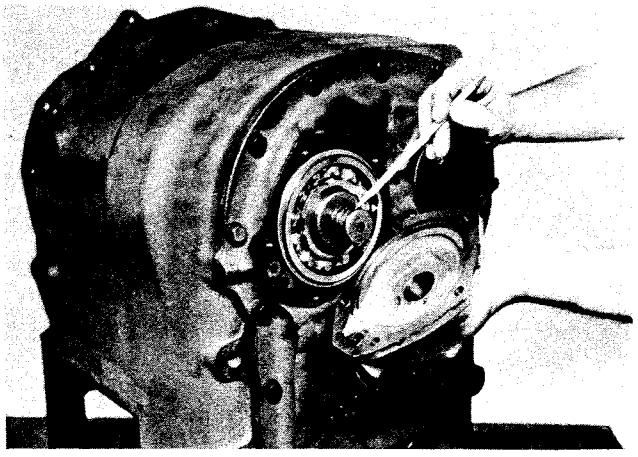


Figure 125

Install low clutch shaft piston rings. Install new gasket and "O" ring on low shaft bearing cap.

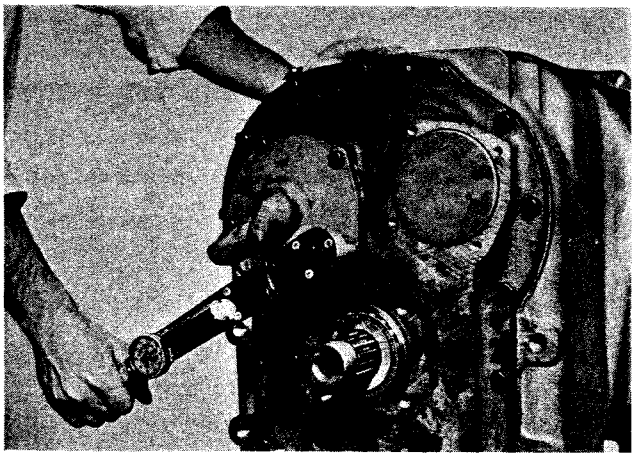


Figure 126

Install bearing cap and secure with lockwashers and bolts. Tighten to specified torque.

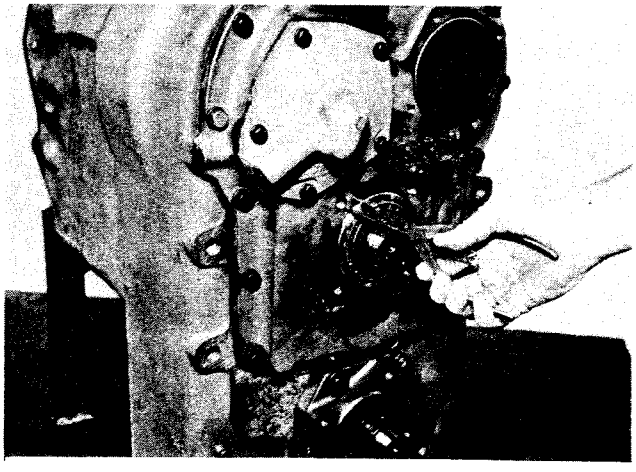


Figure 127

Install idler shaft rear bearing locating ring.

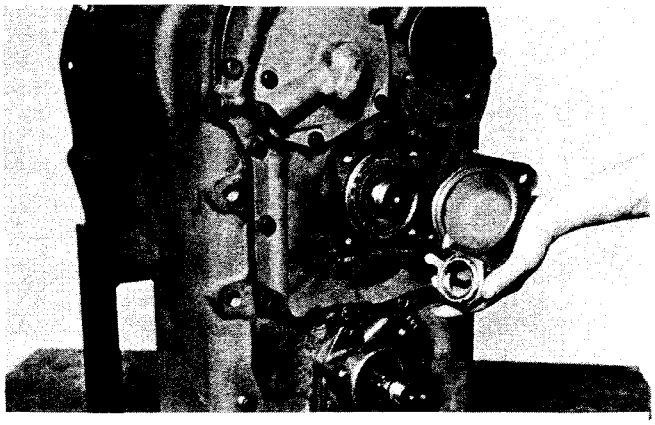


Figure 128

Install idler shaft nut. Block idler gear, tighten nut to specified torque. (See elastic stop nut torque chart.) With a new gasket in position install idler shaft bearing cap. Tighten bolts to specified torque.

If a mechanical parking brake is not used proceed to Figure 134.

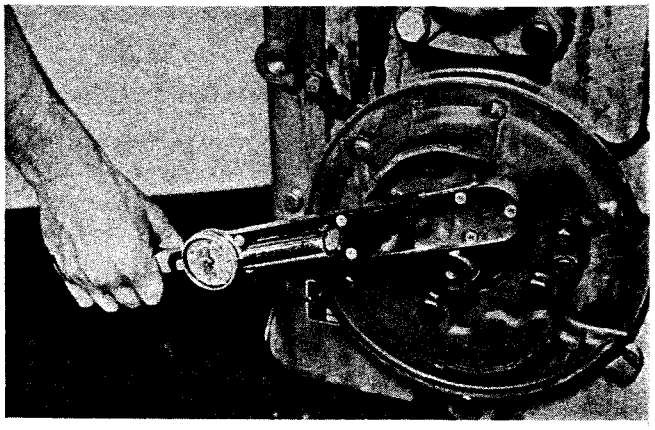


Figure 129

Install brake backing plate assembly. Tighten bolts to specified torque.

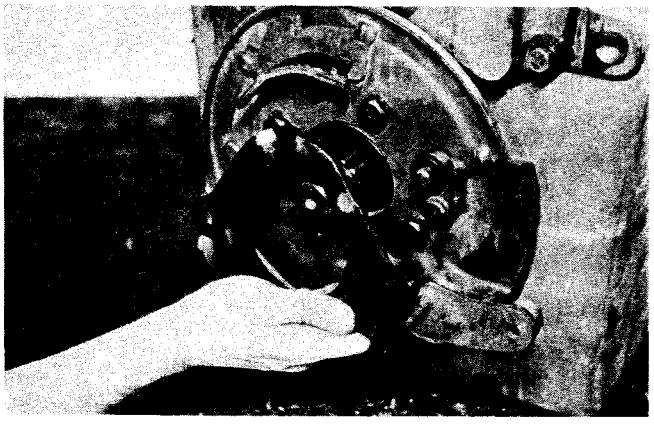


Figure 130

Position brake actuating arm.

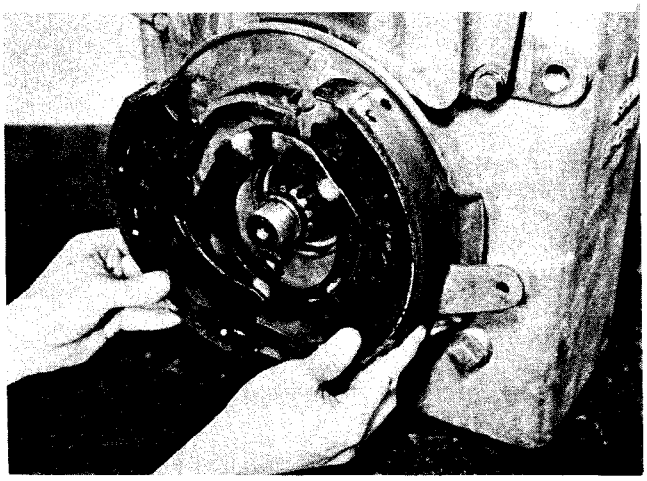


Figure 131
Locate brake shoes.

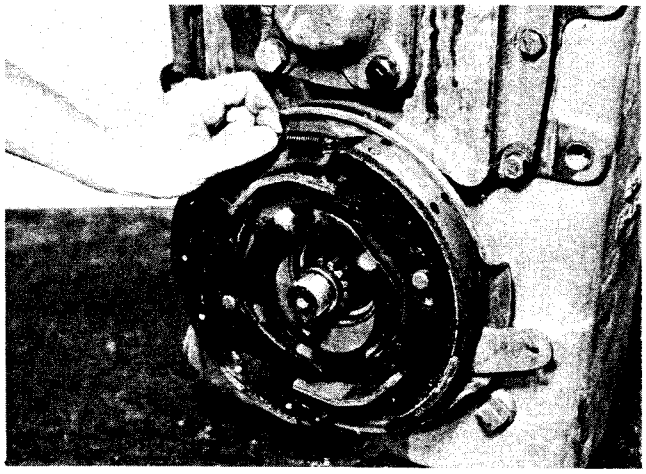


Figure 132
Install upper and lower brake shoe return springs.

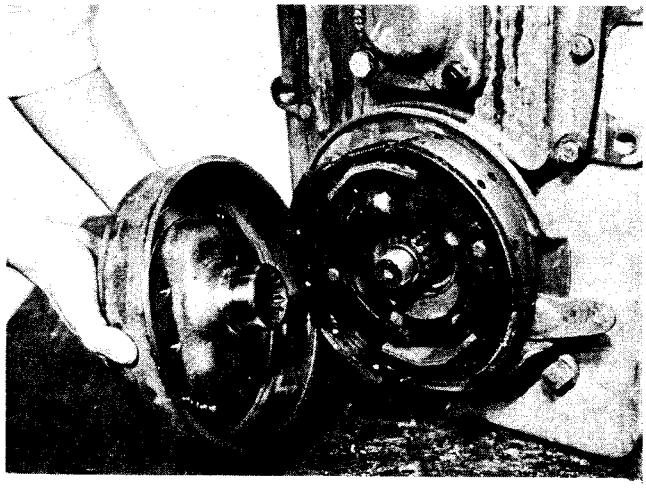


Figure 133
Install brake drum and flange assembly.

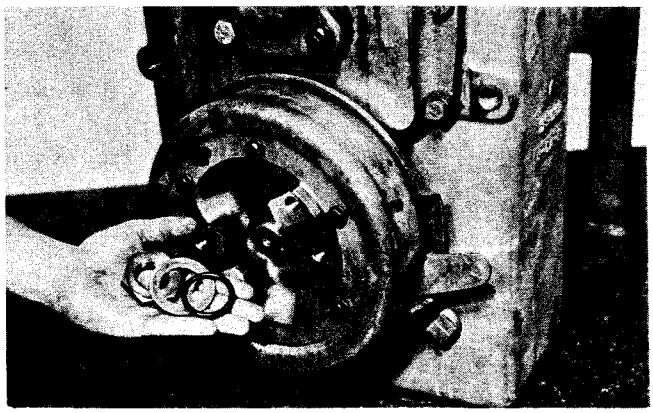


Figure 134
Secure flange with a new "O" ring, washer and flange nut. Block output shaft and tighten nut to specified torque. (See elastic stop nut torque chart.)

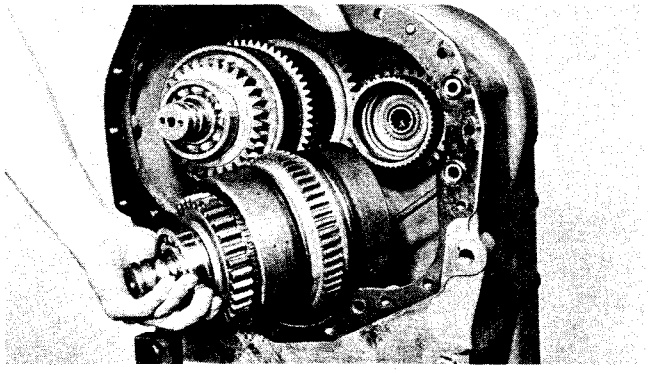


Figure 135
Position 2nd speed clutch shaft pilot bearing on shaft. From the front of the transmission case install the forward and 2nd clutch assembly. **NOTE: For R Model front end see page 43 Figure 10.**

Figure 136

NOTE: See Fig. N for 13 inch special impeller hub bearing and 12 bolt assembly instructions.

Install new "O" ring on impeller hub. Align holes in impeller hub with holes in impeller. Install bolts and tighten to specified torque. Lockwire in pairs to prevent loosening.

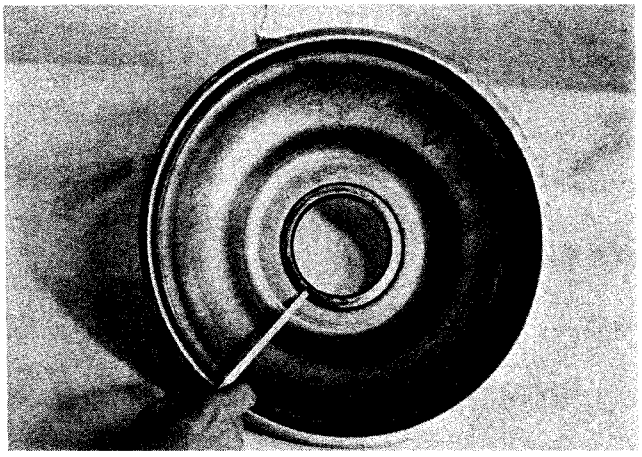


Figure 137
Apply a light coat of Permatex No. 2 on the outer diameter of the oil baffle seal. Press seal in oil baffle with lip of seal down.

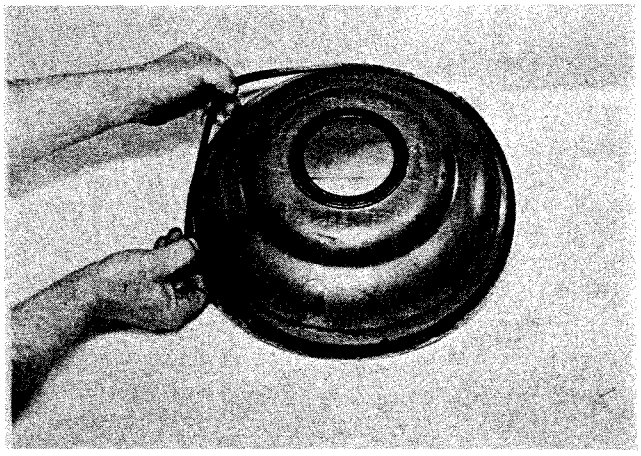


Figure 138
Install a new oil baffle seal ring.

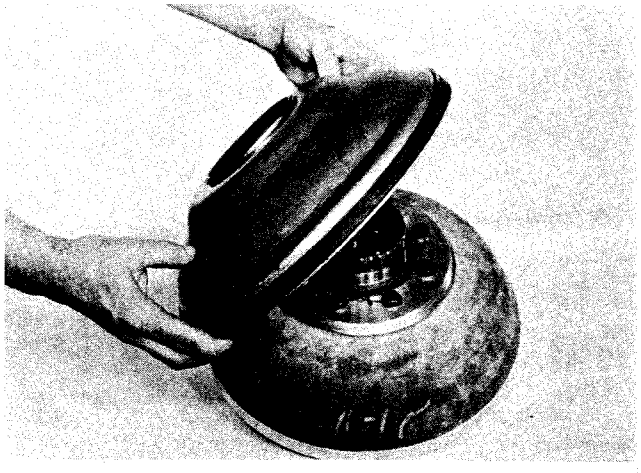


Figure 139
Install oil baffle on impeller assembly.

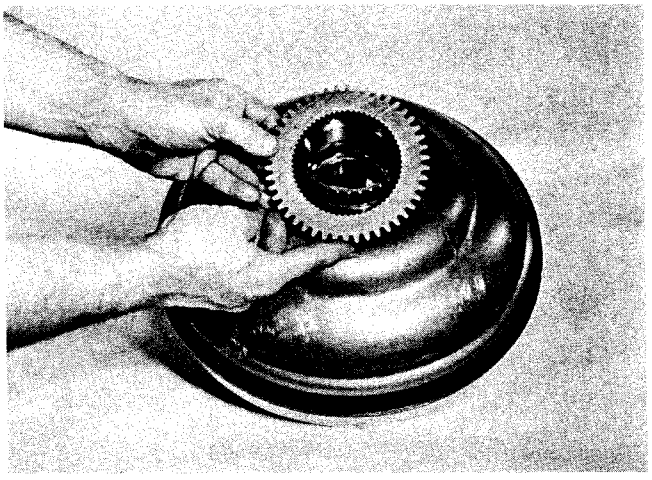


Figure 140
Install impeller hub gear.

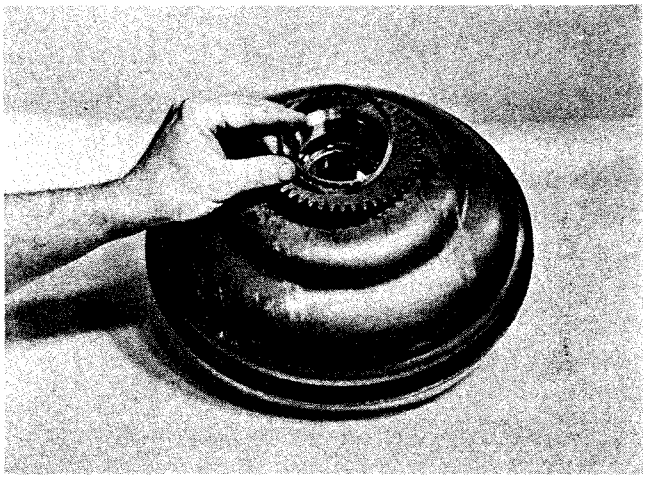


Figure 141
Secure impeller hub gear with retainer ring.

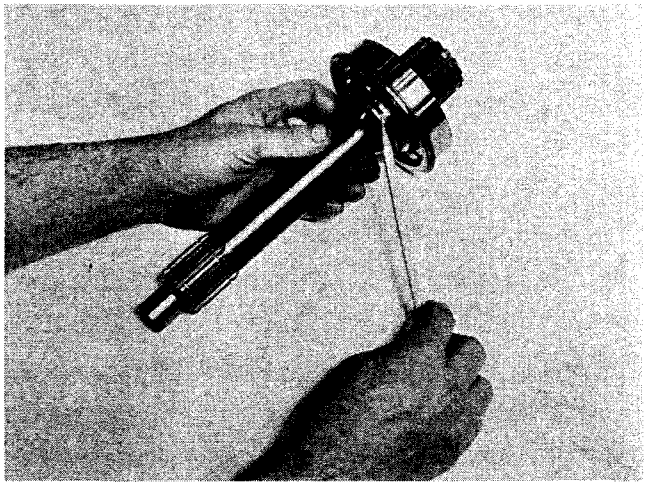


Figure 142
Install new turbine shaft piston ring.

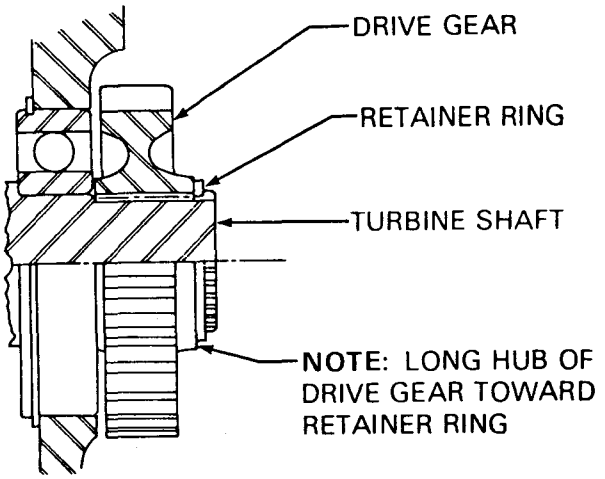


Figure 143

Tap turbine shaft and bearing assembly into converter housing from front. At the rear of the converter housing install turbine shaft gear and retainer ring as shown.

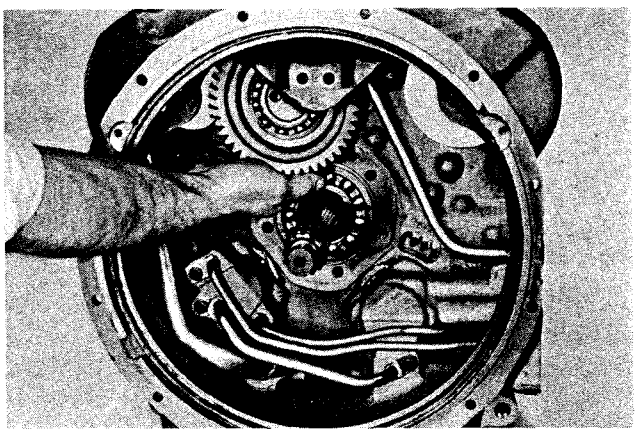


Figure 144

Position center pump drive gear.

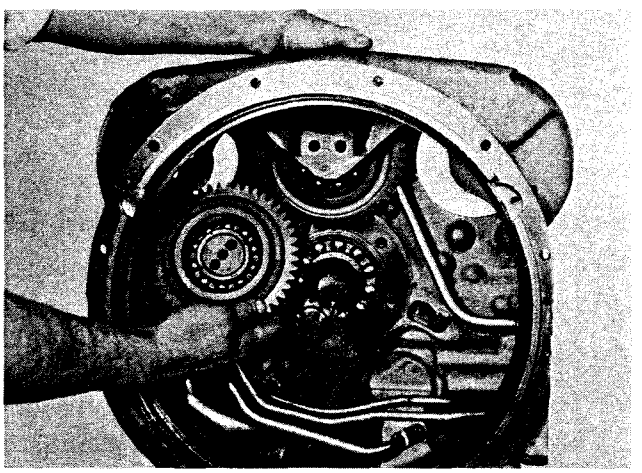


Figure 145

Install left pump drive gear.

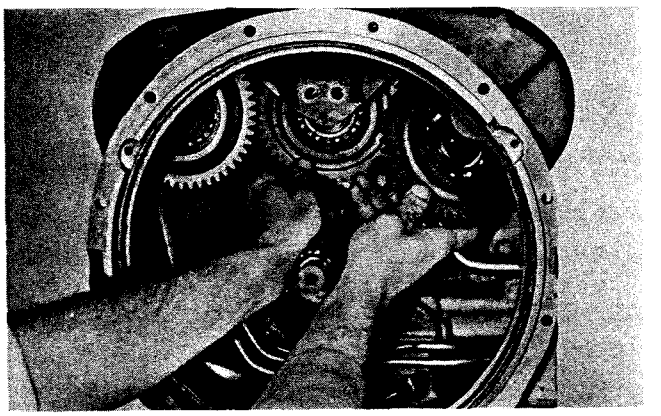


Figure 146

Install right pump drive gear.

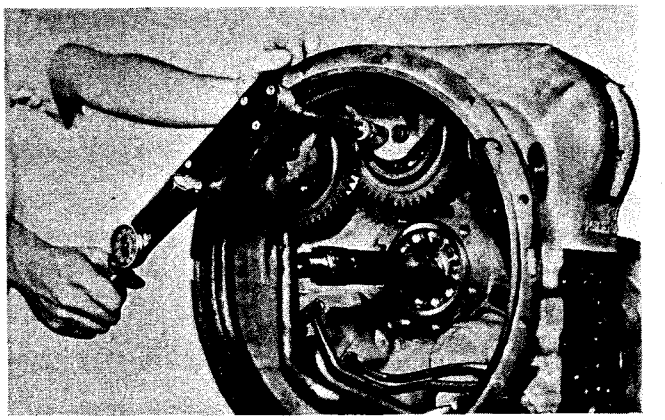


Figure 147

Align holes in pump drive gear bearing supports with holes in converter housing. Install bolts and washers and tighten to specified torque.

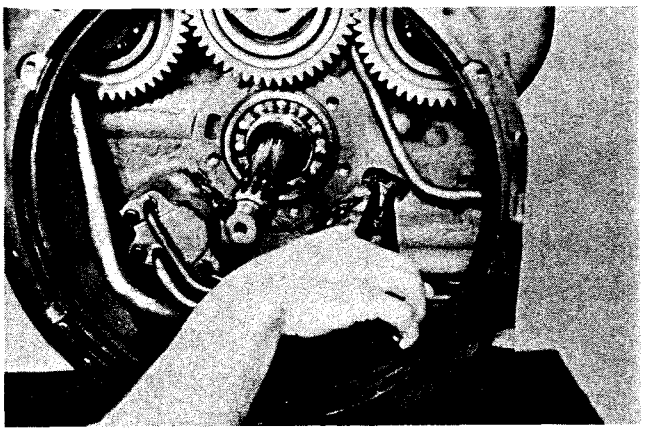


Figure 148

Support converter housing with a chain fall. Spread forward clutch front bearing retainer ring. Position converter housing to transmission case assembly. Tap housing into place using caution as not to damage any of the clutch shaft piston rings.

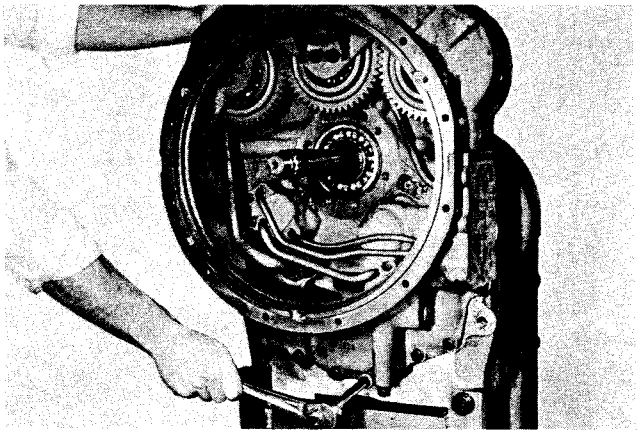


Figure 149

Secure converter housing to transmission case with bolts and washers. Tighten to specified torque.

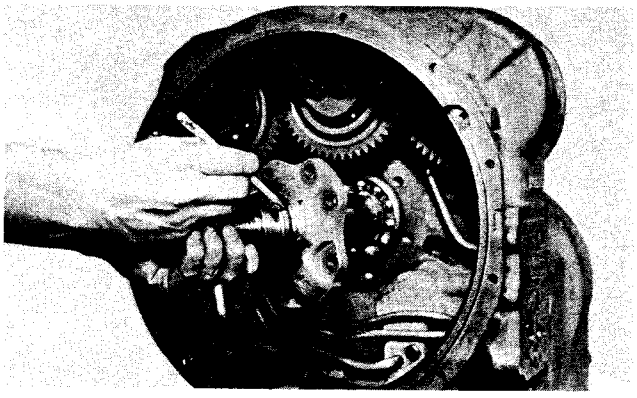


Figure 150

Install new sealing ring expander spring and oil sealing ring on support. **NOTE:** Expander spring gap to be 180° from sealing ring hook joint. Position support on turbine shaft to clear pump drive gear. Align support holes with converter housing.

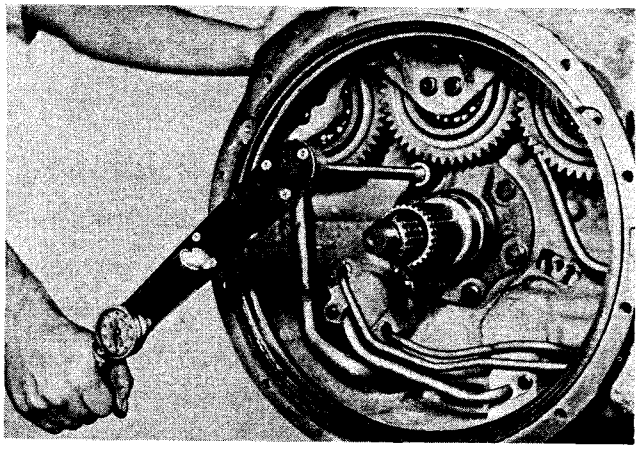


Figure 151

Install stator support bolts and tighten to specified torque.

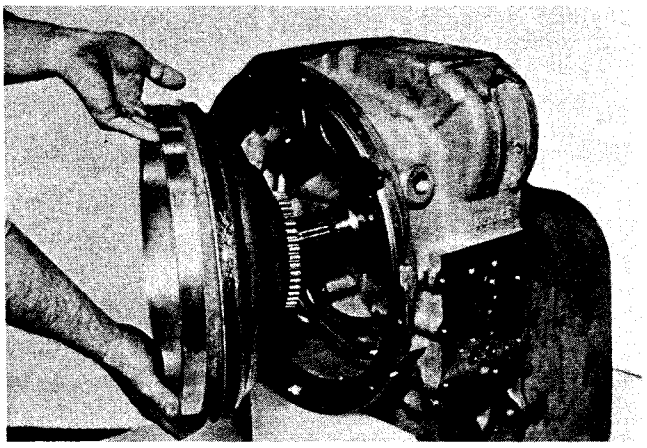


Figure 152

Grease stator support piston ring, oil baffle oil seal and seal ring to facilitate reassembly. Install impeller and oil baffle assembly in converter housing.

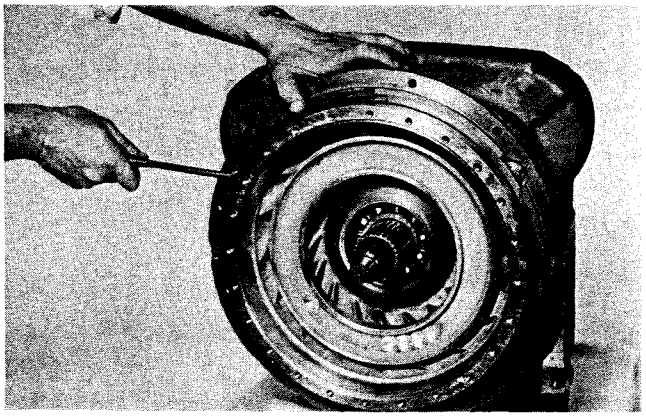


Figure 153

Position oil baffle in housing. Secure with oil baffle retainer ring, being sure ring is in full position in ring groove.

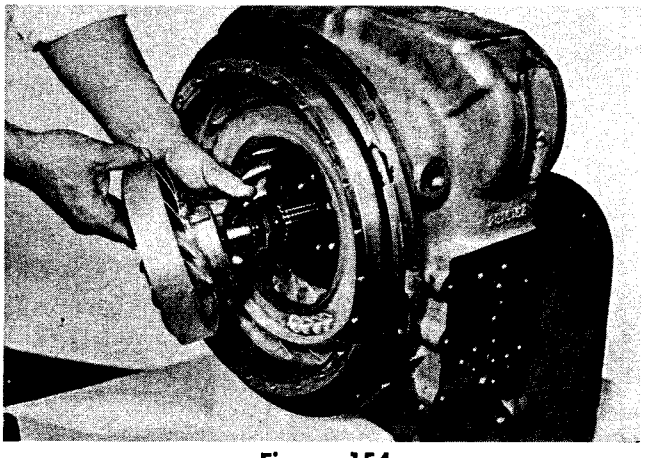


Figure 154

Install reaction member spacer with tang of spacer out. Install reaction member.