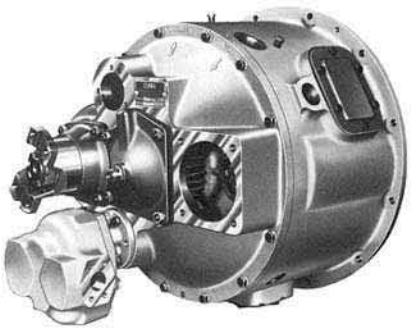
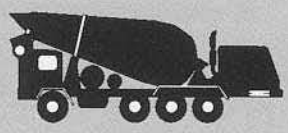
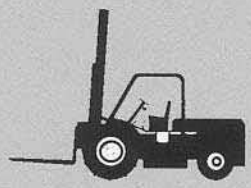
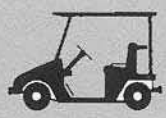
6000 SERIES 4 SPEED TRANSMISSION

0077









SPICER OFF-HIGHWAY COMPONENTS

DANA

FORWARD

This manual has been prepared to provide the customer and the maintenance personnel with information and instructions on the maintenance and repair of the **DANA SPICER OFF-HIGHWAY PRODUCTS DIVISION** 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 **DANA SPICER OFF-HIGHWAY PRODUCTS DIVISION** 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. **DANA SPICER OFF-HIGHWAY PRODUCTS DIVISION** does not warrant repair or replacement parts, nor failures resulting from the use of parts which are not supplied by or approved by **DANA SPICER OFF-HIGHWAY PRODUCTS DIVISION. IMPORTANT: Always furnish the Distributor with the serial and model number when ordering parts.**

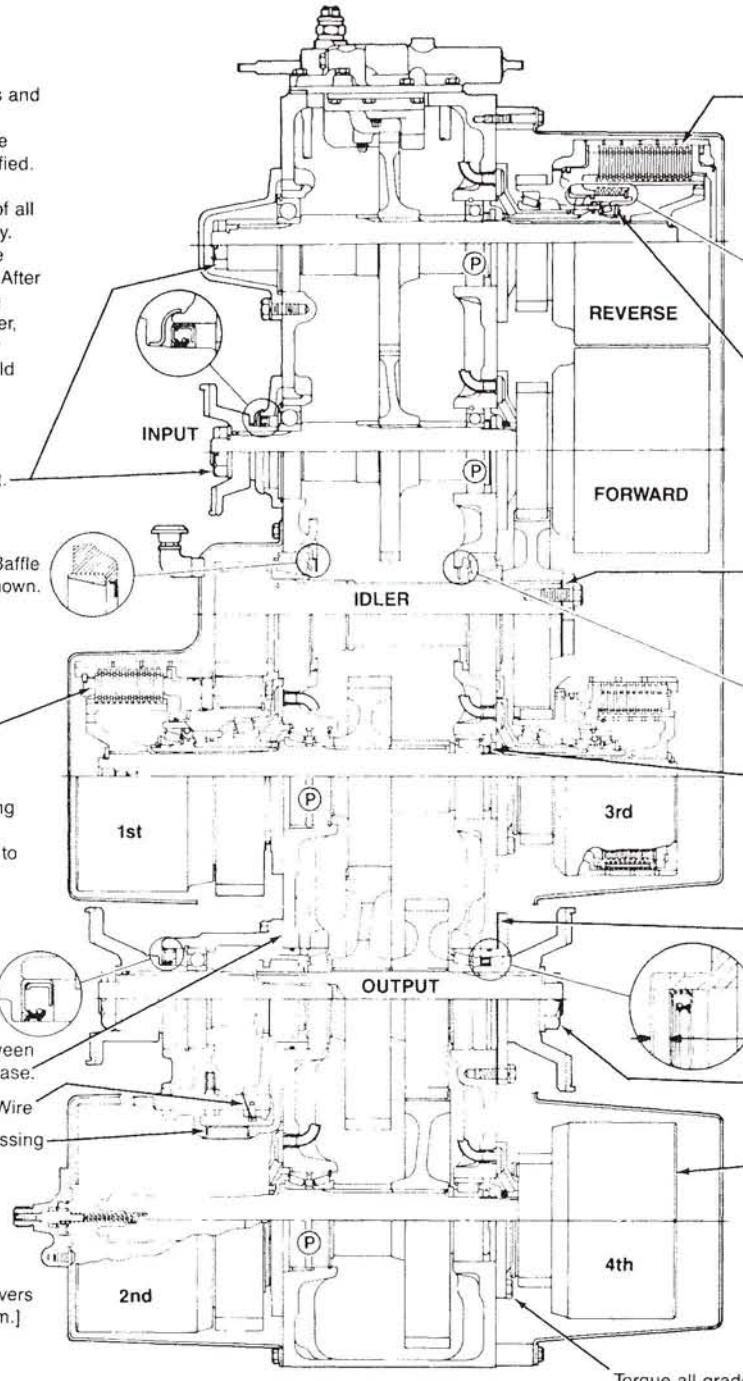
TABLE OF CONTENTS

NOTE: Metric Dimensions Shown in Brackets [ ].

NOTES

6420 SERIES ASSEMBLY INSTRUCTIONS

NOTE:
1. Lubricate all piston rings and "O" rings at assembly.
2. Use Permatex and Crane Sealer only where specified.
3. Apply very light coat of Permatex No. 2 to O.D. of all oil seals before assembly.
4. Apply light coat of Crane Sealer to all pipe plugs. After assembly of parts, using Permatex or Crane Sealer, there must be no free or excess material that could enter the oil circuit.



Fwd. and Rev. clutches
16 inner graphitic plates
15 outer steel plates
Assemble alternately starting with inner graphitic plate

Forward and Reverse clutch return springs in sets of two, assemble concave sides against each other. 5 sets, total of 10 springs required each clutch

Adjust Taper Bearings as shown on pages 58 & 59.

Torque nuts 150-175 Lbs. Ft. [203,4-237,2 N·m]

Press Front Bearing Oil Baffle flush with bore face as shown.

Shim Idler Shaft to produce a 6 to 10 Lbs. In. [0,68-1,13 N·m] pre-load (rolling torque)

Press Rear Bearing Oil Baffle flush with bore face as shown.

Two clutches front side
12 inner graphitic plates
11 outer steel plates
Assemble alternately starting with inner graphitic plate.
8 springs and 8 pins, ends to rest against piston teeth and end plate teeth

Torque bearing lock nuts 175-200 Lbs. Ft. [237,3-271,1 N·m]*
CAUTION:
Drive bearing in place before tightening locknuts.

Shim Output Shaft Bearings to produce 6 to 8 Lbs. In. [0,68-0,90 N·m] in pre-load (rolling torque). Shim one side only.

.375 [9,5 mm]

NOTE:
No gaskets or shims between disconnect housing and case.

Wire

Apply Permatex before pressing into place.

Torque output shaft nuts 250-300 Lbs. Ft. [339,0-406,7 N·m]

3rd and 4th clutches
10 inner bronze plates
9 outer steel plates
Assemble alternately starting with inner bronze plate
6 springs and 6 pins, ends to rest against piston teeth and end plate teeth.

Torque bolts in pan and covers 23-25 lbs. Ft. [31,2-33,8 N·m.]

Torque all grade 8 clutch support bolts 80-88 Lbs. Ft. [108,5-119,3 N·m]

*On the 3rd & 4th clutch, some units will have a double locknut with a tanged washer & some units will have a single elastic locknut -- the tightening torque is the same on both style nuts.

NOTE: Metric dimensions shown in brackets [ ].

(P) = Pinned Bearing

Torque Specification for Lubricated or Plated Screw Threads

Grade 5 | Grade 8

NOM. SIZE	FINE THREAD LB-FT	FINE THREAD [N·M]	COARSE THREAD LB-FT	COARSE THREAD [N·M]	FINE THREAD LB-FT	FINE THREAD [N·M]	COARSE THREAD LB-FT	COARSE THREAD [N·M]
.7500	223 - 245	[302,4 - 332,1]	200 - 220	[271,2 - 298,2]	315 - 347	[427,1 - 470,4]	282 - 310	[382,4 - 420,3]
.6250	128 - 141	[173,6 - 191,1]	113 - 124	[153,3 - 168,1]	180 - 198	[224,1 - 268,4]	159 - 175	[215,6 - 237,2]
.5625	91 - 100	[123,4 - 135,5]	82 - 90	[111,2 - 122,0]	128 - 141	[173,6 - 191,1]	115 - 127	[156,0 - 172,2]
.5000	64 - 70	[86,8 - 94,9]	57 - 63	[77,3 - 85,4]	90 - 99	[122,1 - 134,2]	80 - 88	[108,5 - 119,3]
.4375	41 - 45	[55,6 - 61,0]	37 - 41	[50,2 - 55,5]	58 - 64	[78,7 - 86,7]	52 - 57	[70,6 - 77,2]
.3750	26 - 29	[35,3 - 39,3]	23 - 25	[31,2 - 33,8]	37 - 41	[50,2 - 55,5]	33 - 36	[44,8 - 48,8]
.3125	16 - 20	[21,7 - 27,1]	12 - 16	[16,3 - 21,6]	28 - 32	[38,0 - 43,3]	26 - 30	[35,3 - 40,6]
.2500	9 - 11	[12,3 - 14,9]	8 - 10	[10,9 - 13,5]	11 - 13	[15,0 - 17,6]	9 - 11	[12,3 - 14,9]

HOW THE UNITS OPERATE —

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.

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 friction 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.

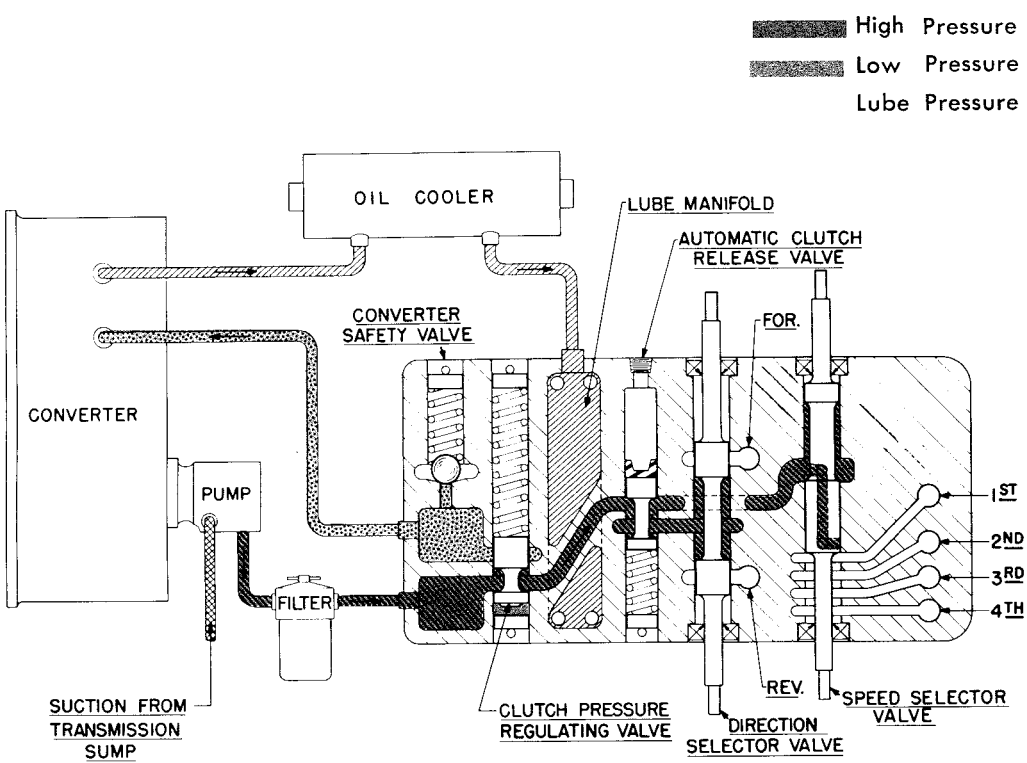
To engage the clutch, as previously stated, the control valve is placed in the desired position. This allows oil under pressure to flow from the control cover valve, through a tube in the transmission case, to a chosen clutch. Once into the drum, oil is directed through a drilled hole into the rear side 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.

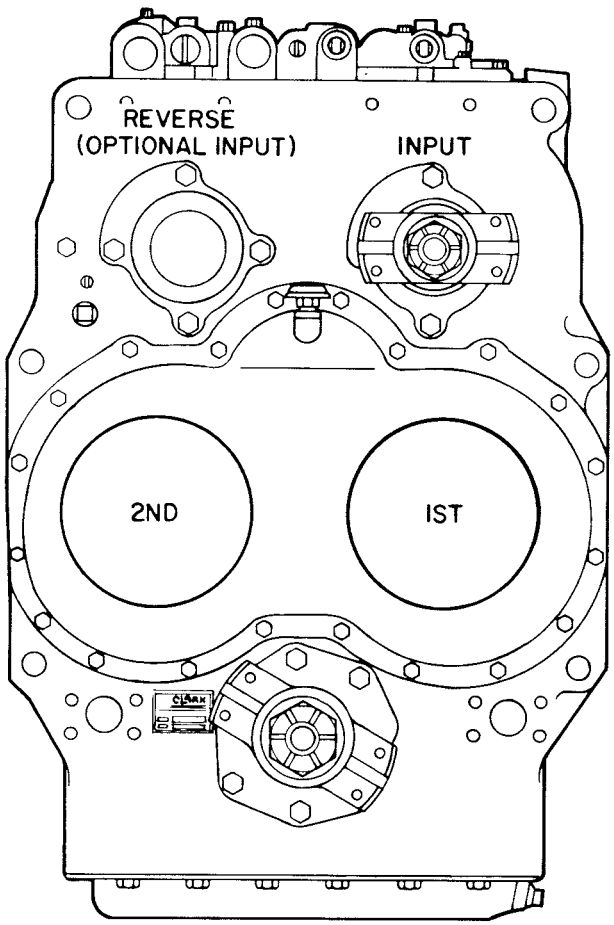
A screen mounted in a frame is positioned on the bottom of the transmission case, to screen out any foreign material. This screen is covered by the sump pan. This pan is provided with magnets to catch any metallic particles.

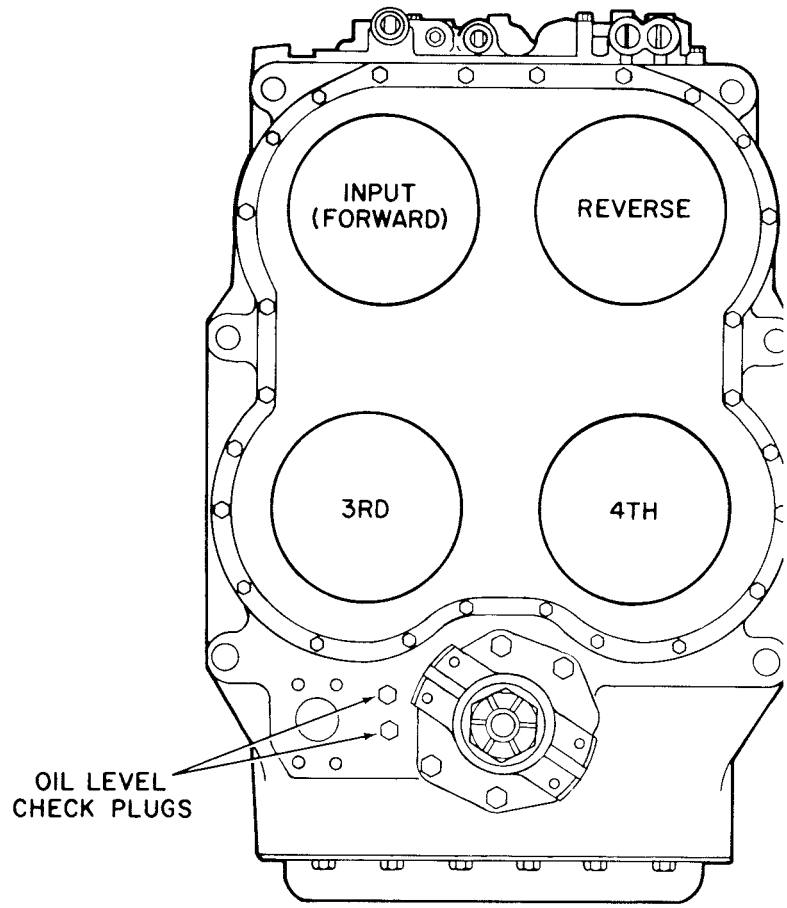
Some transmissions may have an axle declutching unit as optional equipment, this unit consists of a split output shaft with a sliding splined sleeve to engage or disengage the axle. This is accomplished by manually shifting a lever in the operator's compartment which is mechanically connected to the 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.



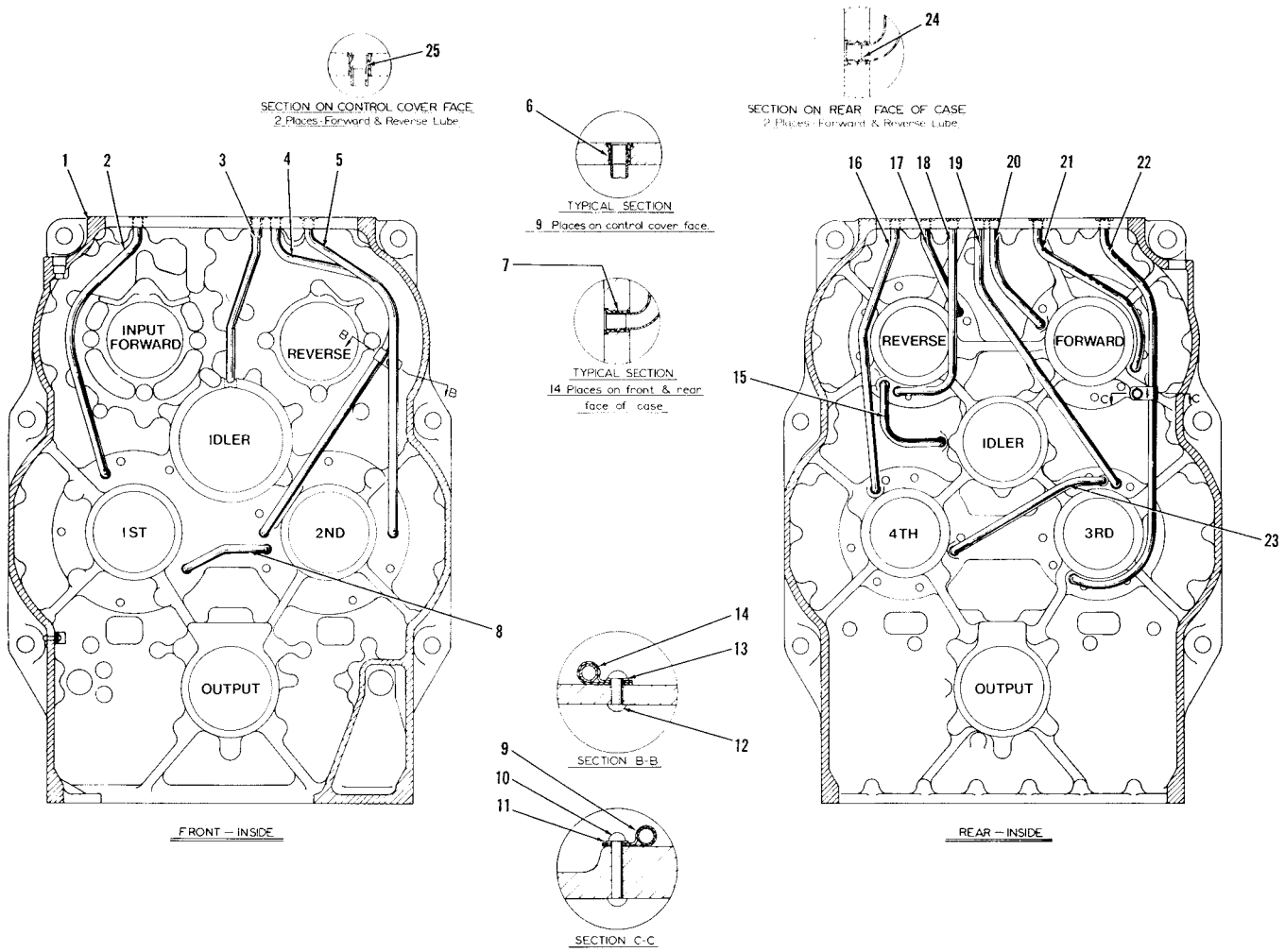
TRANSMISSION CONTROL COVER INTERNAL OILFLOW

TRANSMISSION ASSEMBLY SHAFT IDENTIFICATION





TRANSMISSION CASE ASSEMBLY



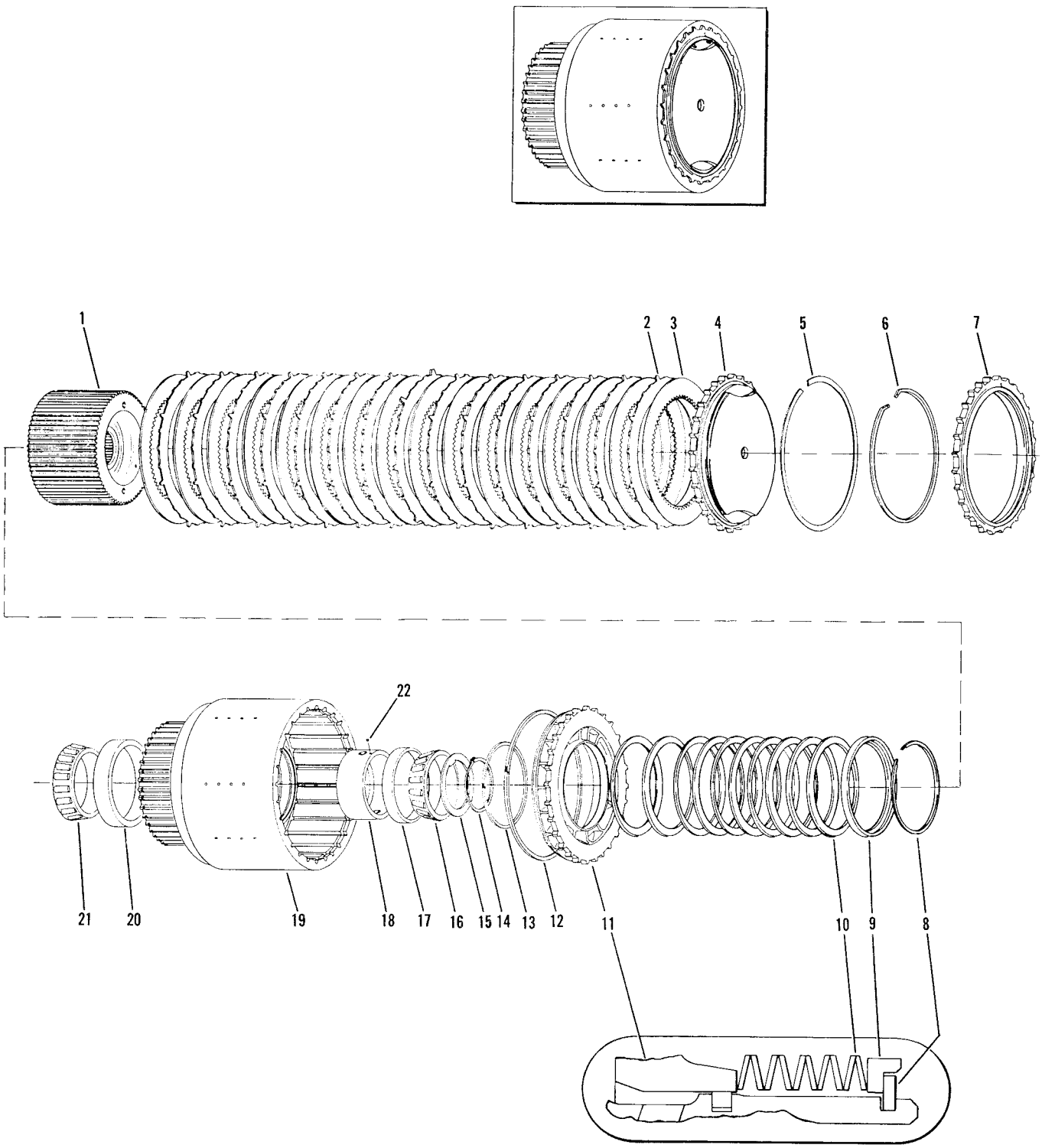
6000 SERIES CASE ASSEMBLY

(4 SPEED)

ITEM	DESCRIPTION	QTY.
1	Transmission Case	1
2	1st Clutch Pressure Tube	1
3	Idler Front Bearing Lube Tube	1
4	2nd Clutch Lube Tube	1
5	2nd Clutch Pressure Tube	1
6	Tube Sleeve	9
7	Tube Sleeve	14
8	2nd to 1st Cross Over Lube Tube	1
9	Tube Clip	1
10	Rivet	1
11	Washer	1
12	Rivet	1

ITEM	DESCRIPTION	QTY.
13	Washer	1
14	Tube Clip	1
15	Reverse to Idler Cross Over Lube Tube	1
16	4th Clutch Pressure Tube	1
17	Reverse Clutch Pressure Tube	1
18	Reverse Clutch Lube Tube	1
19	3rd Clutch Lube Tube	1
20	Forward Lube Tube	1
21	Forward Clutch Pressure Tube	1
22	3rd Clutch Pressure Tube	1
23	3rd to 4th Cross Over Lube Tube	1
24	Tube Sleeve	2
25	Tube Sleeve	2

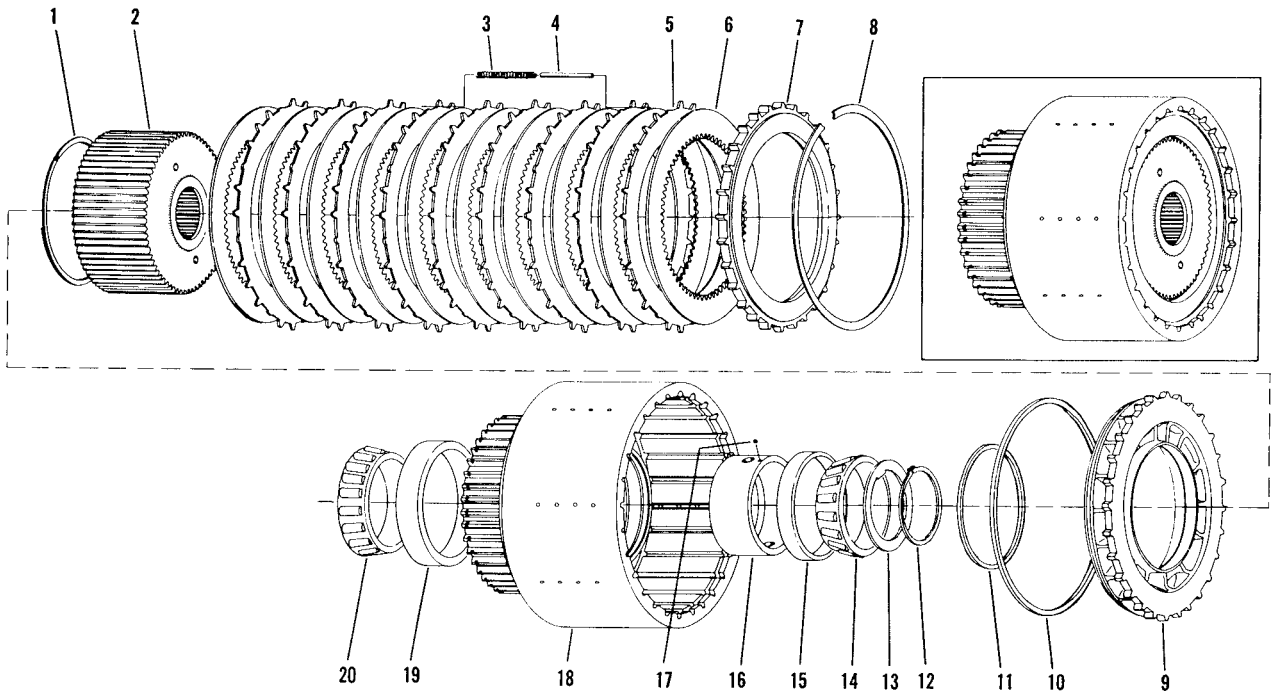
INPUT(FORWARD)-REVERSE CLUTCH GROUP



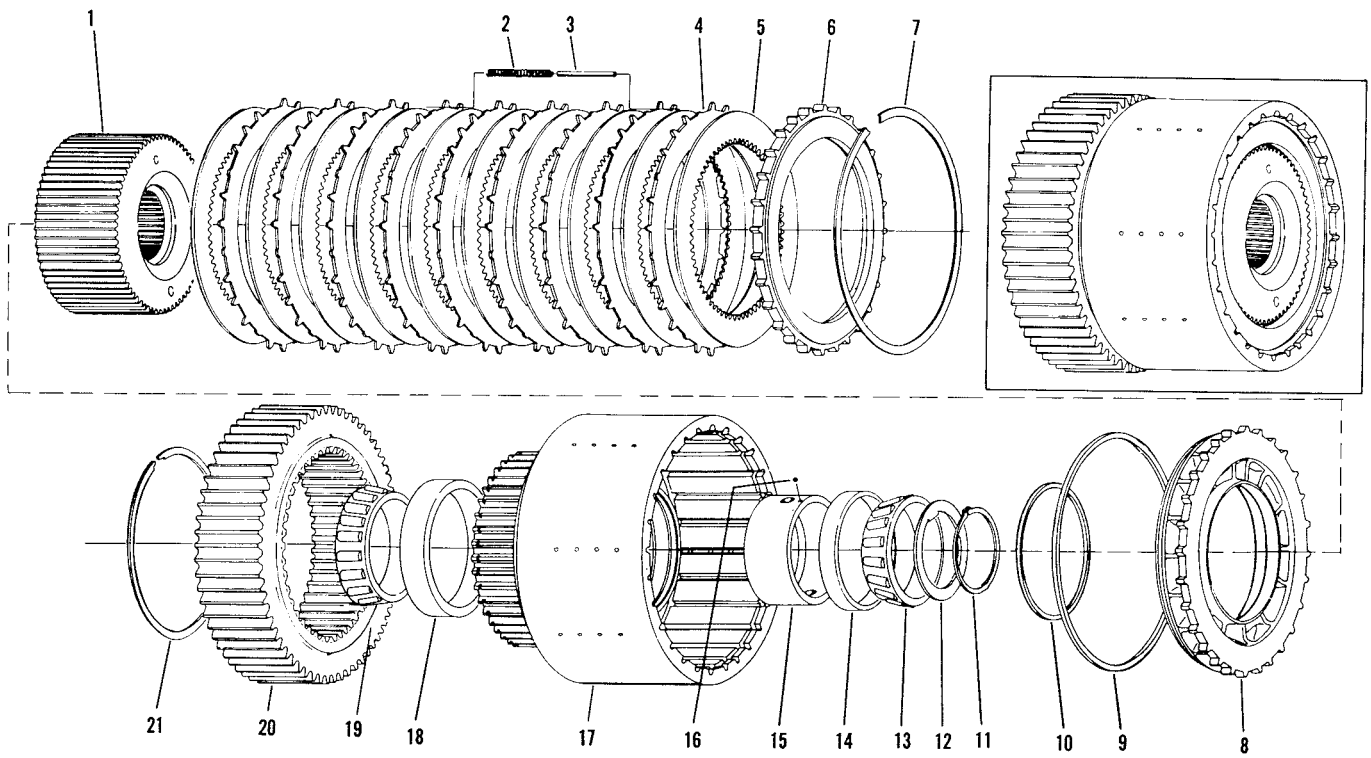
INPUT, (FORWARD) & REVERSE CLUTCH GROUP

ITEM	DESCRIPTION	QTY.
1	Disc Hub Assembly	1
2	Outer Disc	15
3	Inner Disc	16
4	End Plate	1
5	End Plate Snap Ring	1
6	Snap Ring	1
7	Snap Ring Retainer	1
8	Spring Retainer Snap Ring	1
9	Spring Retainer	1
10	Belleville Washer	10
11	Piston	1
12	Piston Outer Piston Ring	1
13	Piston Inner Piston Ring	1
14	Washer Snap Ring - Selected at assembly, variable thickness rings are used to assure proper bearing tightness	AR
15	Bearing Washer	1
16	Taper Roller Bearing Cone - Outer	1
17	Taper Roller Bearing Cup - Outer	1
18	Piston Ring Outer Race	1
19	Clutch Drum Assembly	1
20	Support Bearing Cup - Inner	1
21	Support Bearing Cone - Inner	1
22	Outer Race Ball	1

3rd & 4th CLUTCH GROUP



1st & 2nd CLUTCH GROUP

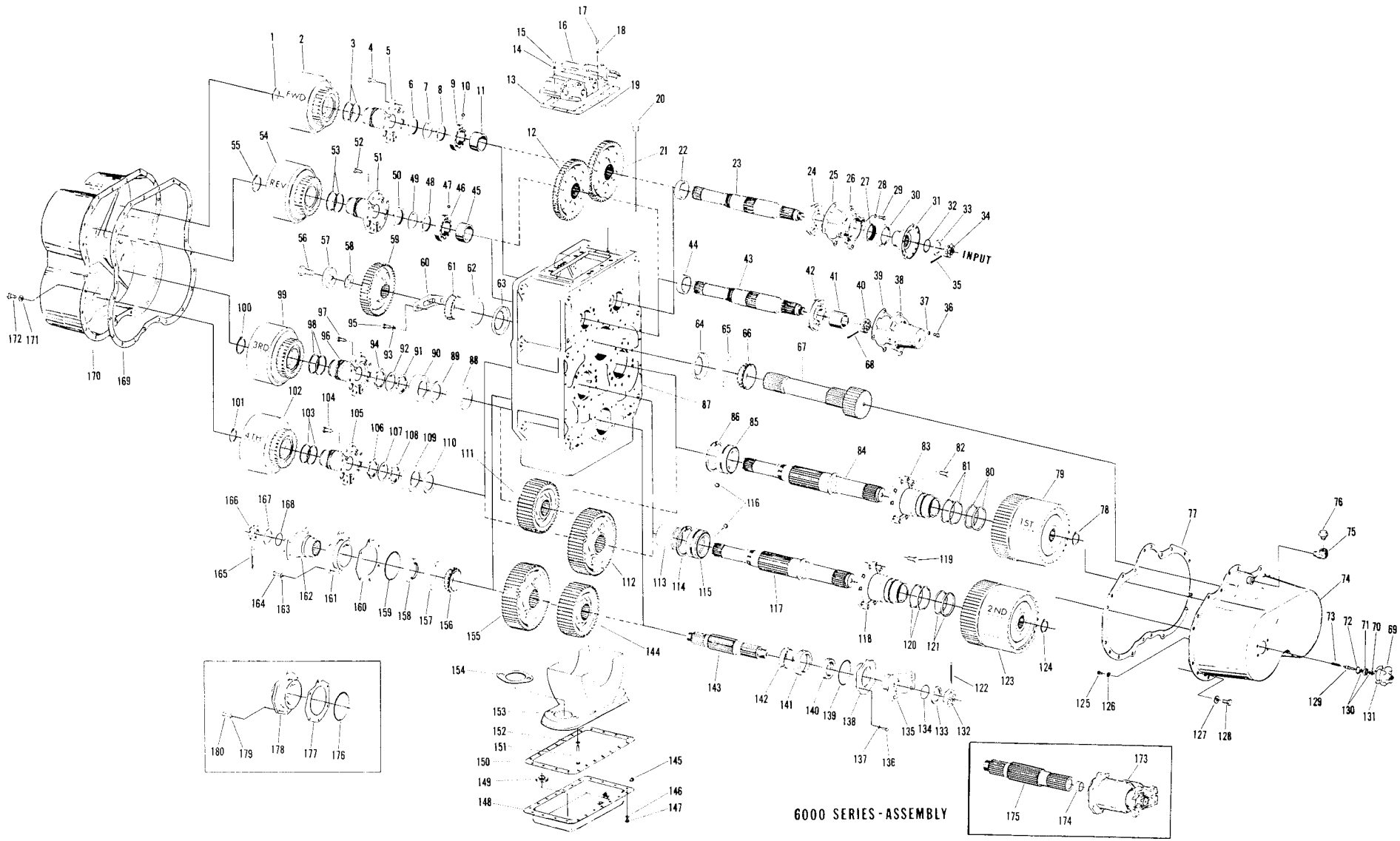


3RD & 4TH CLUTCH GROUP

ITEM	DESCRIPTION	QTY.
1	Disc Hub Oil Baffle Ring	1
2	Disc Hub Assembly	1
3	Disc Spring	6
4	Disc Spring Pin	6
5	Outer Disc	9
6	Inner Disc	10
7	End Plate	1
8	End Plate Snap Ring	1
9	Piston	1
10	Piston Outer Piston Ring	1
11	Piston Inner Piston Ring	1
12	Washer Snap Ring - Selected at assembly variable thickness rings are used to assure proper taper bearing tightness	AR
13	Bearing Washer	1
14	Taper Roller Bearing Cone - Outer	1
15	Taper Roller Bearing Cup - Outer	1
16	Piston Ring Outer Race	1
17	Outer Race Ball	1
18	Clutch Drum Assembly	1
19	Support Bearing Cup - Inner	1
20	Support Bearing Cone - Inner	1

1ST & 2ND CLUTCH GROUP

ITEM	DESCRIPTION	QTY.
1	Disc Hub Assembly	1
2	Disc Spring	8
3	Disc Spring Pin	8
4	Outer Disc	11
5	Inner Disc	12
6	End Plate	1
7	End Plate Snap Ring	1
8	Piston	1
9	Clutch Piston Outer Seal	1
10	Clutch Piston Inner Seal	1
11	Washer Snap Ring - Selected at assembly variable thickness rings are used to assure proper taper bearing tightness	AR
12	Bearing Washer	1
13	Taper Bearing Cone	1
14	Taper Bearing Cup	1
15	Piston Ring Outer Race	1
16	Outer Race Ball	1
17	Clutch Drum Assembly	1
18	Clutch Hub Bearing Cup	1
19	Clutch Hub Bearing Cone	1
20	Clutch Drum Hub Gear	1
21	Gear Snap Ring	1

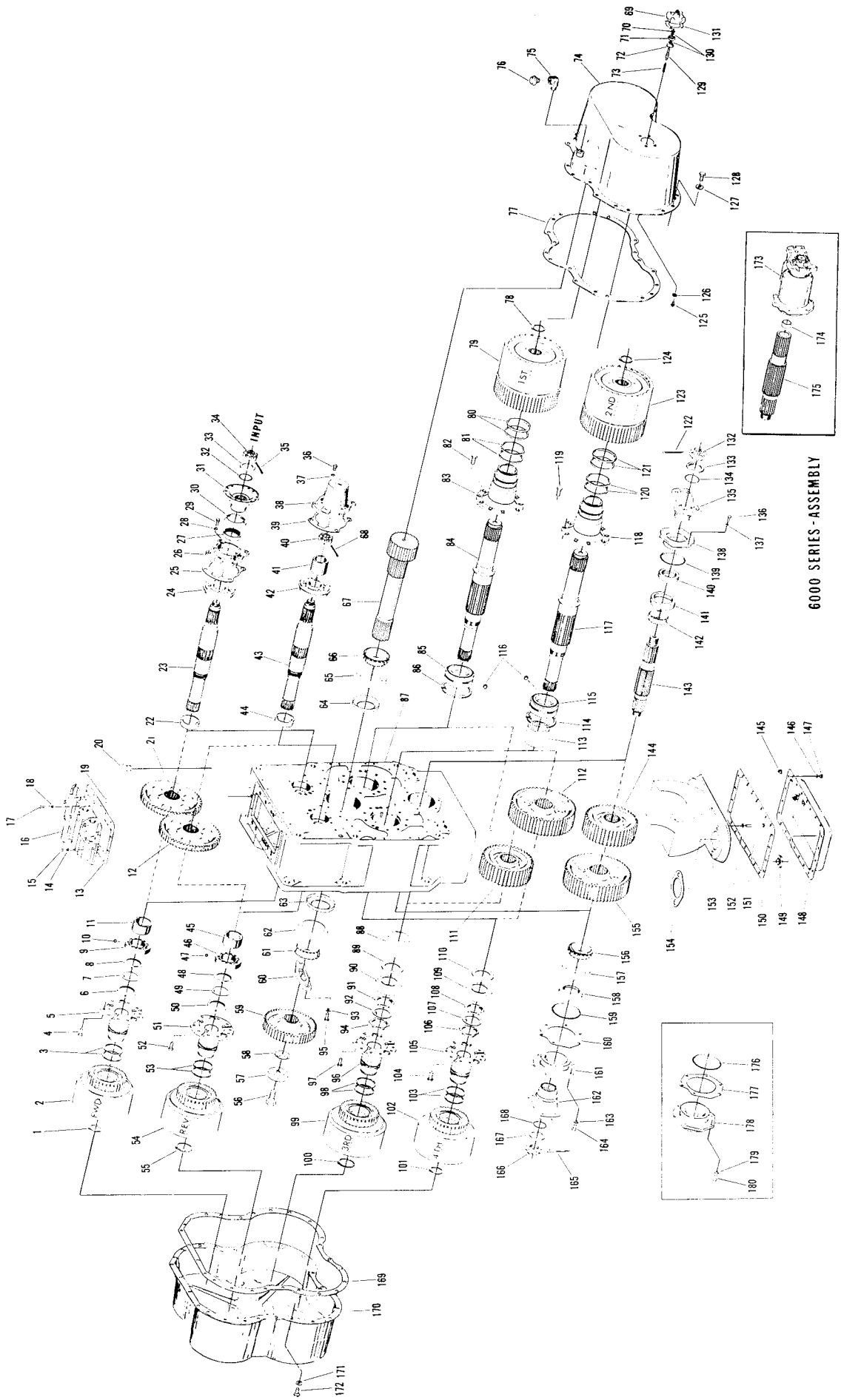

INPUT
6000 SERIES - ASSEMBLY

6000 TRANSMISSION ASSEMBLY

ITEM	DESCRIPTION	QTY.
1	Disc Hub Snap Ring	1
2	Input (Forward) Clutch	1
3	Clutch Support Piston Ring	2
4	Clutch Support to Case Screw	8
5	Clutch Support	1
6	Input Shaft Bearing Lock Nut	1
7	Input Nut Lock	1
8	Input Shaft Bearing Lock Nut	1
9	Input Shaft Rear Bearing	1
10	Input Shaft Bearing Lock Ball	1
11	Input Shaft Bearing Spacer	1
12	Reverse Shaft Gear	1
13	Valve to Case Gasket	1
14	Valve to Case Screw Lockwasher	6
15	Valve to Case Screw	6
16	Control Valve Assembly	1
17	Valve to Case Screw	6
18	Valve to Case Screw Lockwasher	6
19	Valve to Case "O" Ring	6
20	Hole Plug	1
21	Input Shaft Gear	1
22	Gear Spacer	1
23	Input Shaft (Forward)	1
24	Front Bearing	1
25	Bearing Cap Gasket	1
26	Input Shaft Bearing Cap	1
27	Input Shaft Oil Seal	1
28	Bearing Cap Screw Lockwasher	4
29	Bearing Cap Screw	4
30	Flange Deflector	1
31	Input Flange	1
32	Flange "O" Ring	1
33	Flange Washer	1
34	Flange Nut	1
35	Cotter Pin	1
36	Bearing Cap Screw	4
37	Bearing Cap Screw Lockwasher	4
38	Reverse Shaft Bearing Cap	1
39	Reverse Shaft Bearing Cap Gasket	1
40	Nut	1
41	Bearing Spacer	1
42	Front Bearing	1
43	Reverse Shaft	1
44	Reverse Shaft Gear Spacer	1

ITEM	DESCRIPTION	QTY.
45	Reverse Shaft Gear Spacer	1
46	Rear Bearing	1
47	Rear Bearing Lock Ball	1
48	Bearing Lock Nut	1
49	Nut Lock	1
50	Bearing Lock Nut	1
51	Clutch Support	1
52	Clutch Support to Case Screw	8
53	Clutch Support Piston Ring	2
54	Reverse Clutch	1
55	Disc Hub Snap Ring	1
56	Retainer Plate Bolt	3
57	Idler Gear Retaining Plate	1
58	Retaining Plate Shim	AR
59	Idler Gear	1
60	Idler Shaft Lube Plate	1
61	Rear Bearing Cone	1
62	Rear Bearing Cup	1
63	Rear Bearing Oil Baffle	1
64	Front Bearing Oil Baffle	1
65	Front Bearing Cup	1
66	Front Bearing Cone	1
67	Idler Shaft	1
68	Cotter	1
69	Speedometer Drive Housing	1
70	Oil Seal	1
71	Speedometer Drive Bearing	1
72	Bearing To Housing Snap Ring	1
73	Speedometer Drive Spring	1
74	1st & 2nd Clutch Cover	1
75	Air Breather Street Ell	1
76	Air Breather	1
77	1st & 2nd Clutch Cover Gasket	1
78	Disc Hub Snap Ring	1
79	1st Clutch	1
80	Clutch Support Piston Ring	2
81	Clutch Support Piston Ring Expander	2
82	Clutch Support to Case Screw	8
83	Clutch Support	1
84	Shaft (1st & 3rd)	1
85	Tapered Bearing Assembly	1
86	Tapered Bearing Snap Ring	1
87	Transmission Case Assembly	1
88	Spacer	1

Continued on next page.

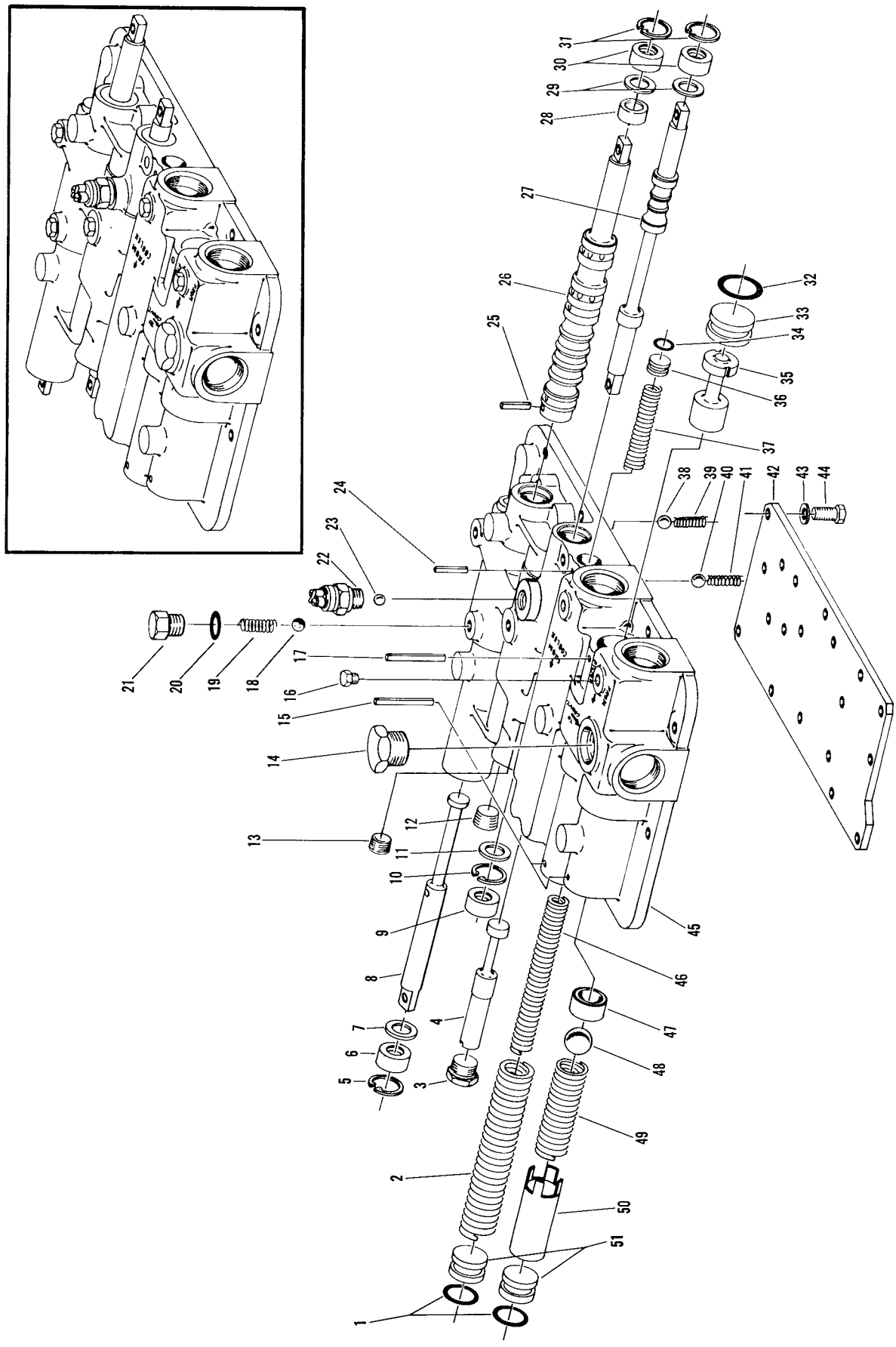

INPUT
1ST
2ND
3RD
4TH
REV
6000 SERIES-ASSEMBLY

Continued

ITEM	DESCRIPTION	QTY.
89	Spacer	1
90	Roller Bearing	1
91*	Bearing Lock Nut	1
92*	Nut Lock	1
93	Idler Shaft Lube Plate Lockwasher	2
94*	Bearing Lock Nut	1
95	Idler Shaft Lube Plate Cap Screw	2
96	Clutch Support	1
97	Clutch Support to Case Screw	8
98	Clutch Support to Piston Ring	2
99	3rd Clutch Assembly	1
100	Disc Hub Snap Ring	1
101	Disc Hub Snap Ring	1
102	4th Clutch	1
103	Clutch Support Piston Ring	2
104	Clutch Support to Case Screw	8
105	Clutch Support	1
106*	Bearing Lock Nut	1
107*	Bearing Nut Lock	1
108*	Bearing Lock Nut	1
109	Roller Bearing	1
110	Spacer	1
111	Gear (1st & 3rd)	1
112	Gear (2nd & 4th)	1
113	Spacer	1
114	Bearing Snap Ring	1
115	Tapered Bearing Assembly	1
116	Bearing Lock Pin	2
117	Shaft (2nd & 4th)	1
118	Clutch Support	1
119	Clutch Support to Case Screw	8
120	Clutch Support Piston Ring	2
121	Clutch Support Piston Ring Expander	2
122	Flange Cotter	1
123	2nd Clutch	1
124	Disc Hub Snap Ring	1
125	Speedometer Attaching Bolt	4
126	Speedometer Bolt Lockwasher	4
127	Clutch Cover Screw Washer	20
128	Clutch Cover Screw	20
129	Speedometer Drive Shaft	1
130	Speedometer Bearing Snap Ring	2
131	Speedometer Housing Gasket	1
132	Flange Nut	1
133	Flange Washer	1
134	Flange "O" Ring	1
135	Flange	1

ITEM	DESCRIPTION	QTY.
136	Outer Bearing Cap Screw	6
137	Output Bearing Cap Screw Lockwasher	6
138	Output Bearing Cap	1
139	Output Bearing Cap "O" Ring	1
140	Output Bearing Cap Oil Seal	1
141	Bearing Cup	1
142	Bearing Cone	1
143	Output Shaft	1
144	Output Shaft Gear	1
145	Drain Plug	2
146	Oil Sump Screw Belleville Washer	18
147	Oil Sump Screw	18
148	Oil Sump Assembly	1
149	Sump Magnet	2
150	Oil Sump Gasket	1
151	Screen Assembly to Case Screw	3
152	Screen Assembly to Case Screw Lockwasher	3
153	Oil Sump Frame and Screen Assembly	1
154	Oil Sump Frame Gasket	1
155	Output Shaft Gear	1
156	Bearing Cone	1
157	Bearing Cup	1
158	Output Shaft Oil Seal	1
159	Bearing Cap "O" Ring	1
160	Bearing Cap Shim	AR
161	Outer Bearing Cap	1
162	Output Flange	1
163	Bearing Cap Screw Lockwasher	6
164	Bearing Cap Screw	6
165	Flange Cotter	1
166	Flange Nut	1
167	Flange Washer	1
168	Flange "O" Ring	1
169	Clutch Cover Gasket	1
170	Clutch Cover	1
171	Clutch Cover Screw Lockwasher	26
172	Clutch Cover Screw	26
173	Disconnect Assembly (Optional)	1
174	Disconnect Bushing	1
175	Disconnect Shaft	1
176	Capped Bearing Cap "O" Ring	1
177	Capped Bearing Cap Gasket	1
178	Capped Bearing Cap (Optional)	1
179	Bearing Cap Washer	6
180	Bearing Cap Screw	6

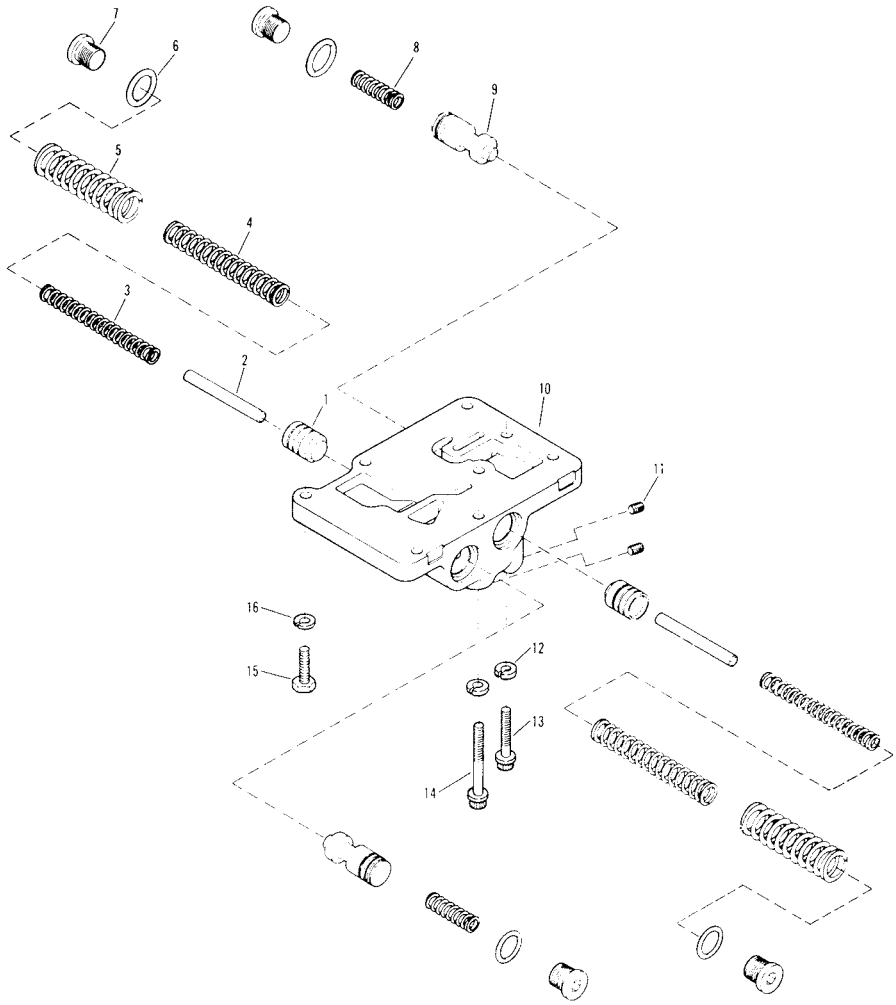
*On the 3rd and 4th clutch, some units will have a double locknut with a tanged washer and some units will have a single elastic lock nut.



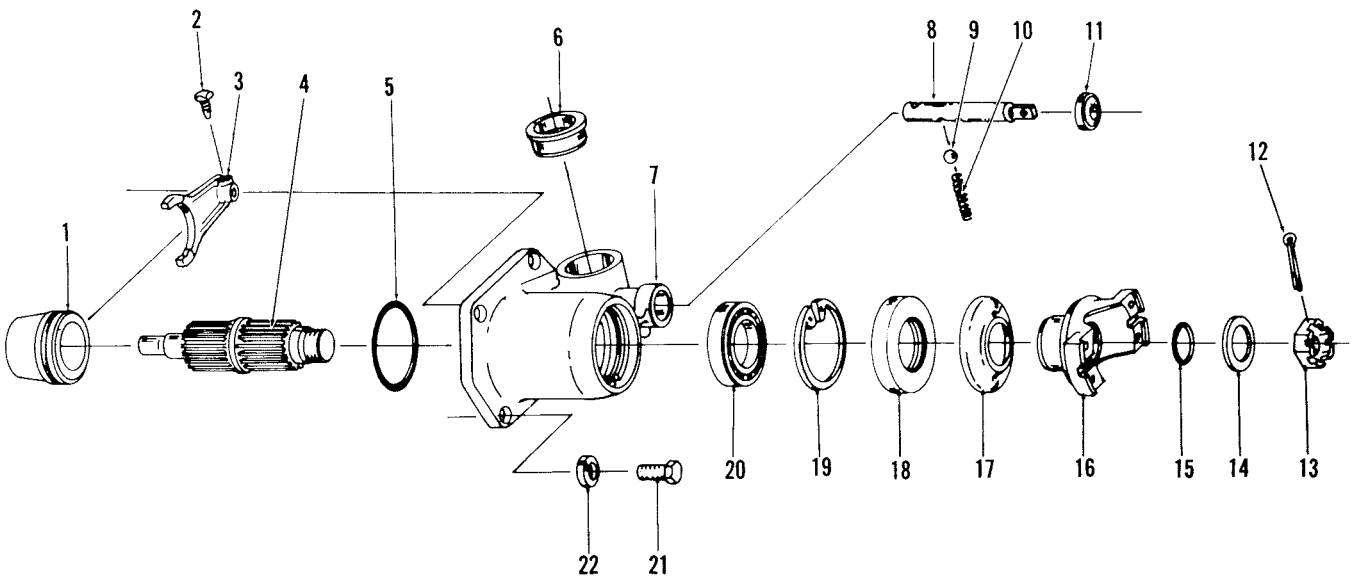
CONTROL COVER ASSEMBLY

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

MODULATOR VALVE



MECHANICAL DISCONNECT



MODULATOR VALVE ASSEMBLY

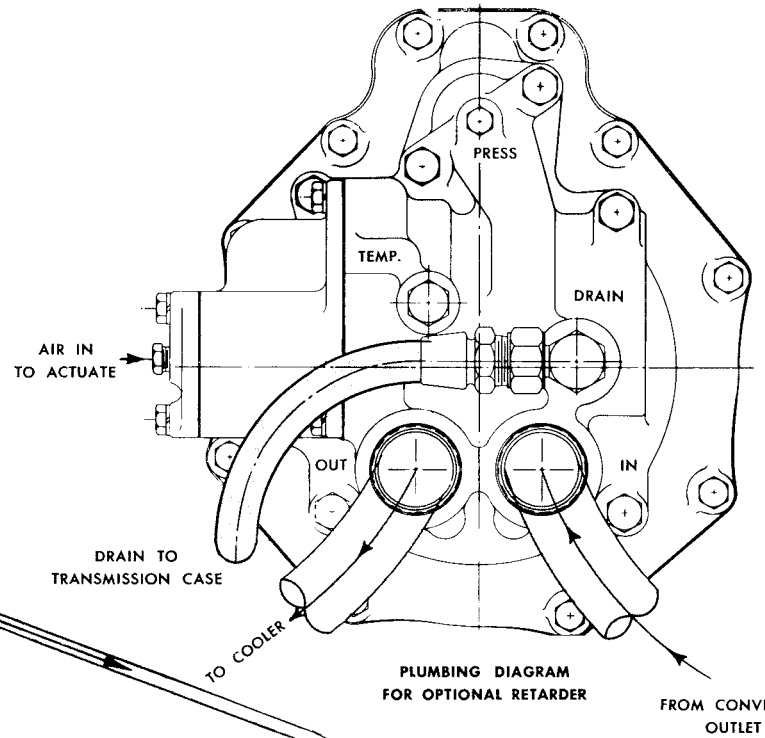
ITEM	DESCRIPTION	QTY.
1	Accumulator Valve	2
2	Accumulator Stop Pin	2
3	Accumulator Spring - Inner	2
4	Accumulator Spring - Middle	2
5	Accumulator Spring - Outer	2
6	Spool Stop Plug "O" Ring	4
7	Spool Stop Plug	4
8	Regulator Spring	2
9	Regulator Spool	2
10	Modulator Valve Housing	1
11	Plug	2
12	Modulator to Cover Screw Lockwasher	3
13	Modulator to Cover Screw	1
14	Modulator to Cover Screw	2
15	Modulator to Cover Screw	6
16	Modulator to Cover Screw Lockwasher	6

MECHANICAL DISCONNECT

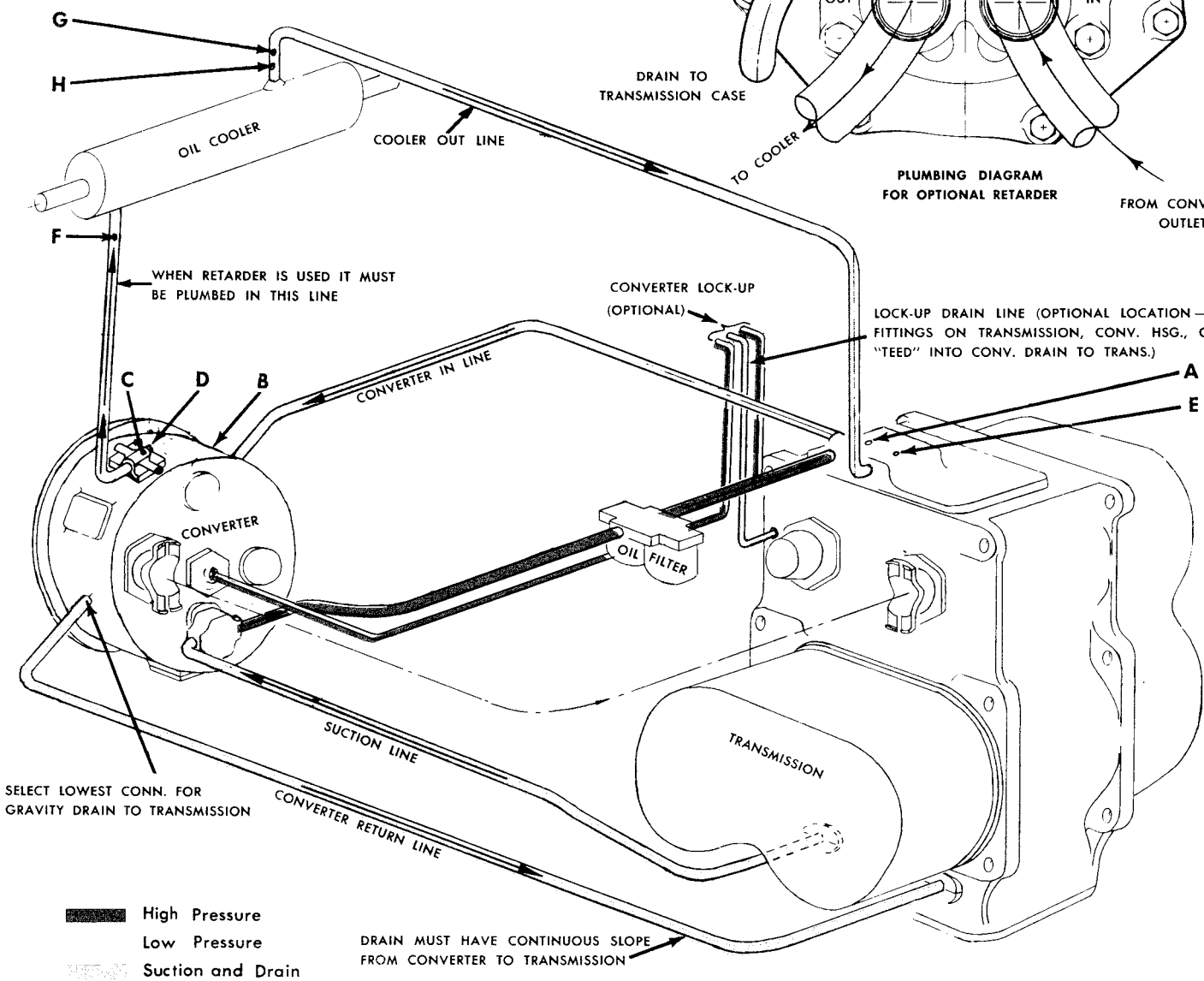
ITEM	DESCRIPTION	QTY.
1	Shift Hub	1
2	Lock Screw	1
3	Shift Fork	1
4	Disconnect Shaft	1
5	Housing "O" Ring	1
6	Housing Plug	1
7	Disconnect Housing	1
8	Shift Rail	1
9	Detent Ball	1
10	Detent Spring	1
11	Oil Seal	1
12	Cotter Pin	1
13	Nut	1
14	Washer	1
15	Flange "O" Ring	1
16	Disconnect Flange	1
17	Deflector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

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



OVERHAUL OF TRANSMISSION ASSEMBLY

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 is a basic 6000 series transmission with many options. Control covers, clutch covers, 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 absolute must in the repair and overhaul of this unit. Before attempting any repairs, the exterior of the unit must be thoroughly cleaned to prevent the possibility of dirt and foreign matter entering the mechanism.

DISASSEMBLY OF THE TRANSMISSION

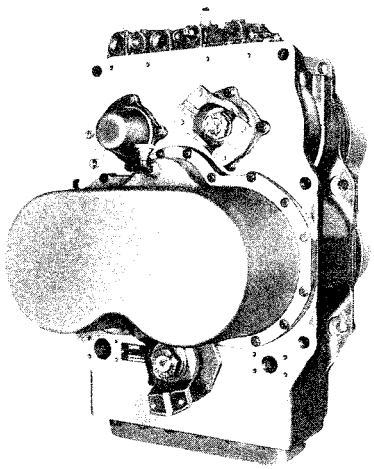


Figure 1
Input side view of the 6000 series transmission.

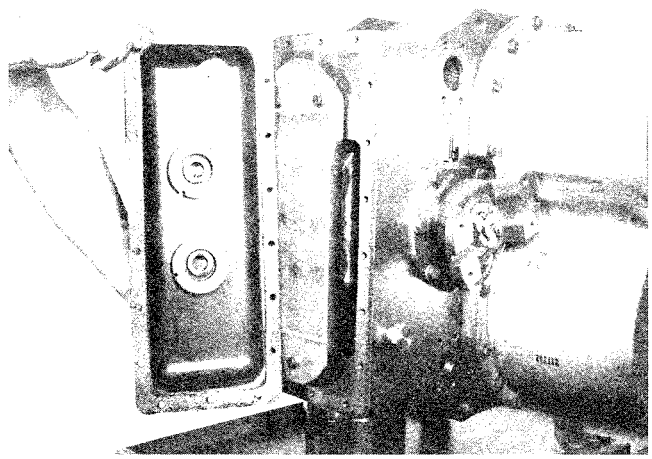


Figure 3
Remove sump pan and magnets.

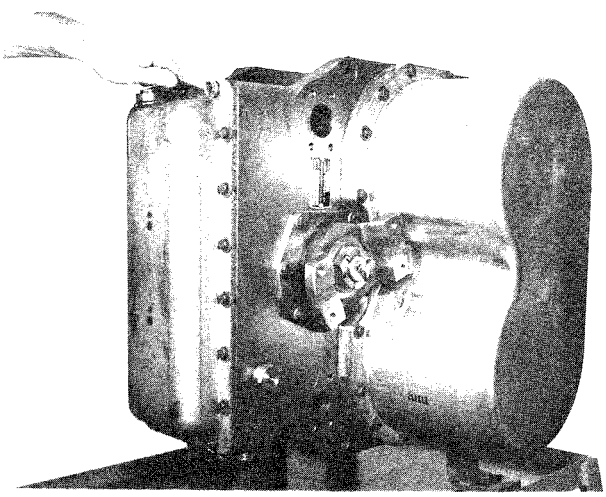


Figure 2
Position transmission on a sturdy transmission bench or cart. Remove sump pan bolts.

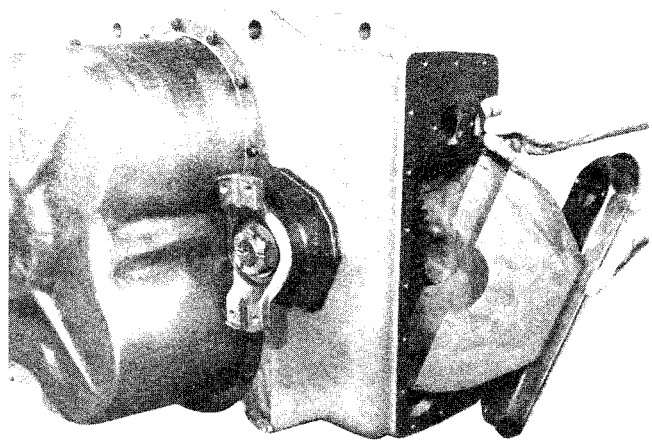


Figure 4
Remove sump screen and baffle assembly bolts. Remove sump screen and gasket.

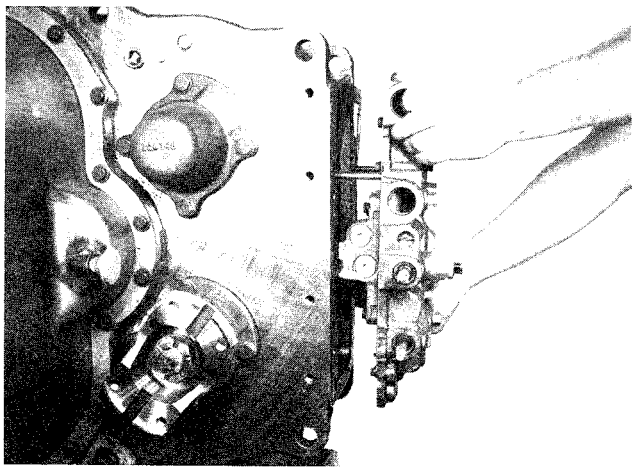


Figure 5

Remove control cover bolts. **NOTE:** Aligning studs were used to facilitate cover removal.

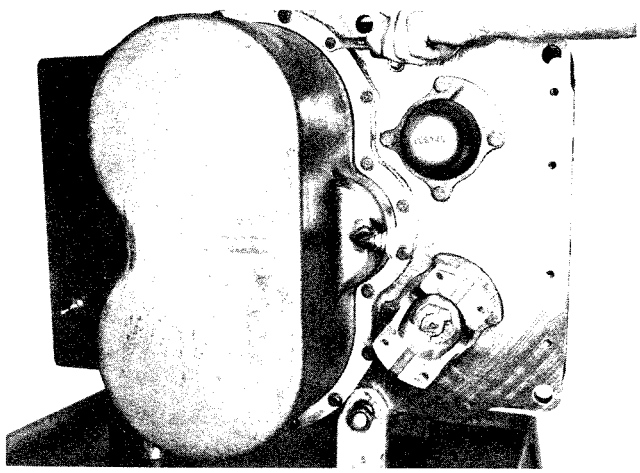


Figure 6

Remove 1st and 2nd clutch cover bolts.

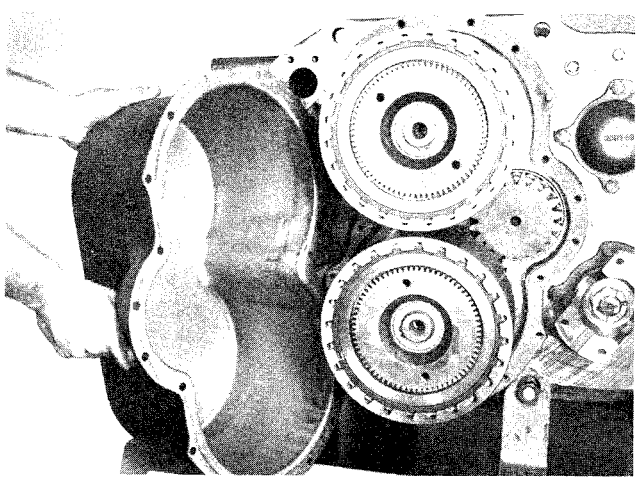


Figure 7

Remove clutch cover.

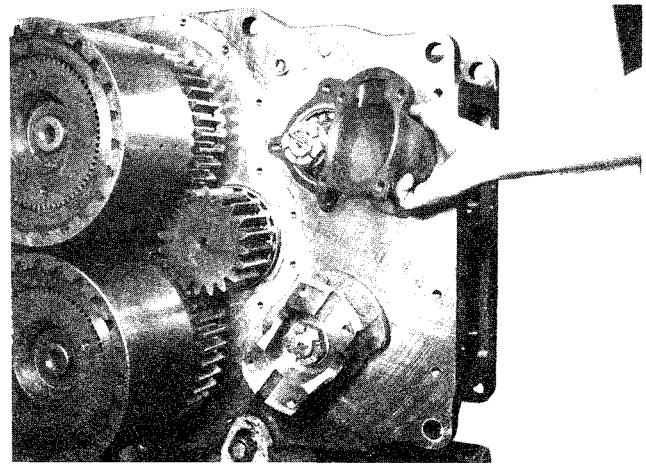


Figure 8

Remove reverse shaft bearing cap.

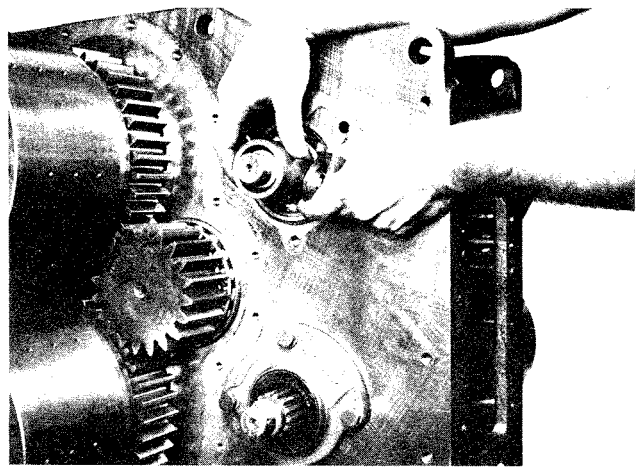


Figure 9

Remove input flange nut, washer, "O" ring and flange. Remove reverse shaft nut and bearing spacer.

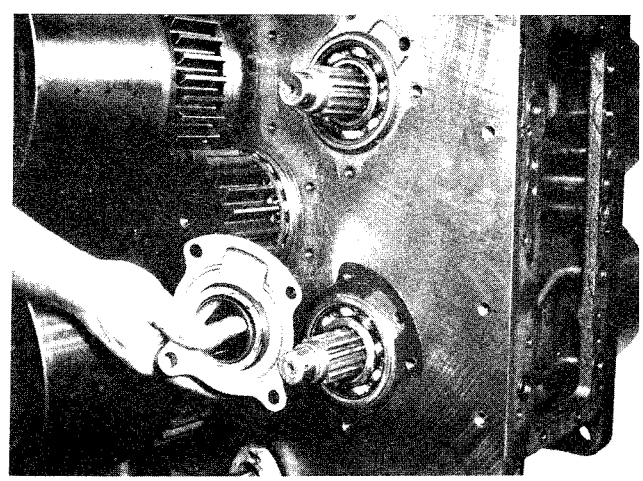


Figure 10

Remove input shaft bearing cap bolts and bearing cap.

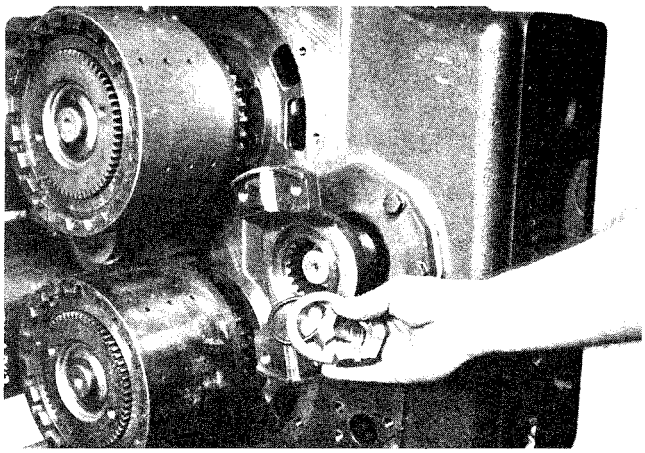


Figure 11

Remove output flange nut, washer, "O" ring and output flange on both front and rear of transmission. If axle disconnect is used remove disconnect as an assembly.

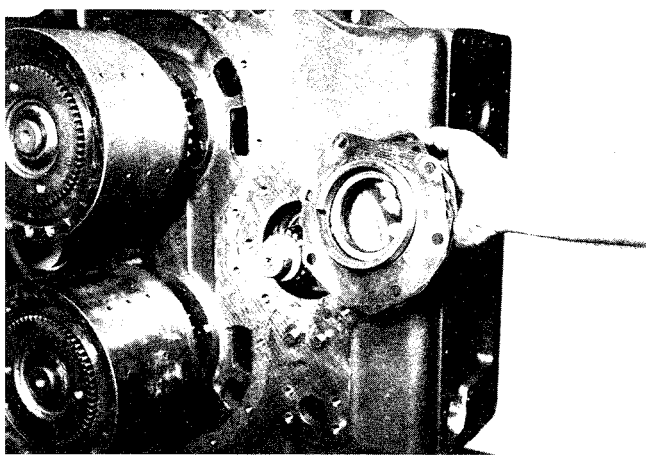


Figure 12

Remove output shaft bearing cap bolts. Remove bearing cap and shims.

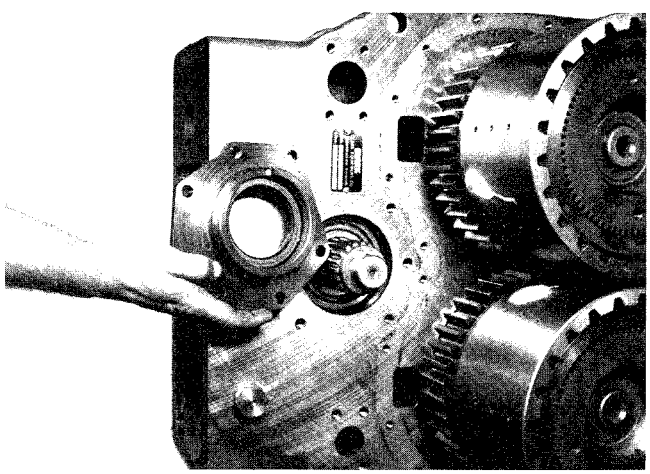


Figure 13

Remove rear output shaft bearing cap.

CLUTCH DISASSEMBLY

NOTE: 1st, 2nd, 3rd and 4th clutches are disassembled in a similar manner. The 1st and 2nd clutches are larger than the 3rd and 4th clutches and the 1st and 2nd clutch drums have a removable and replaceable clutch drum hub gear. Clutch being disassembled is the 2nd speed clutch.

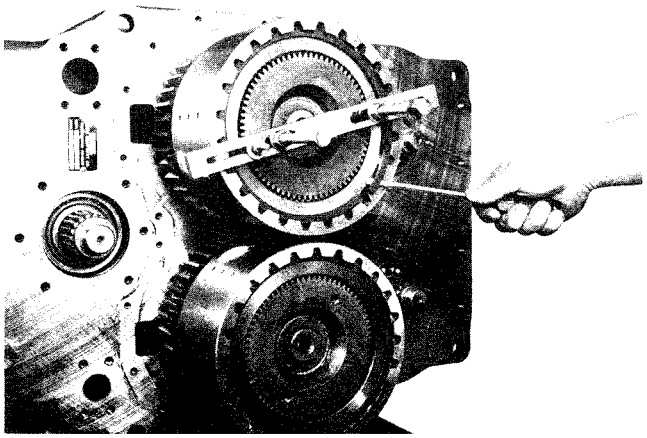


Figure 14

Depress end plate and remove end plate retainer ring.

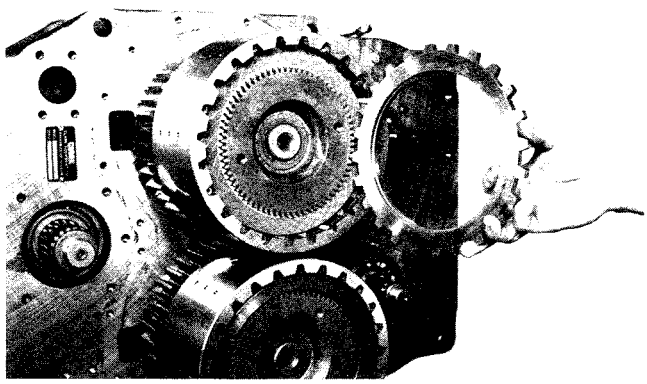


Figure 15

Remove end plate.

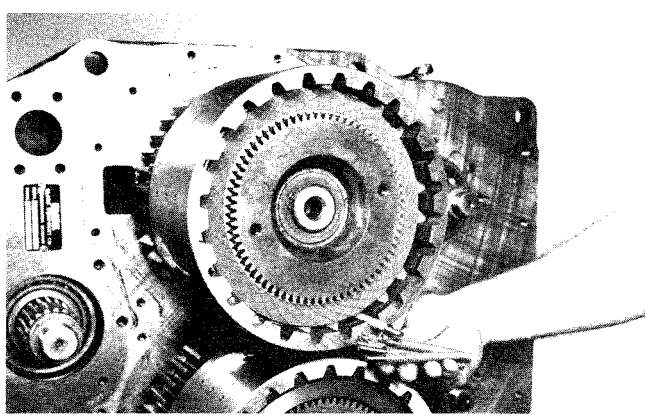


Figure 16

Remove clutch piston return springs and pins.

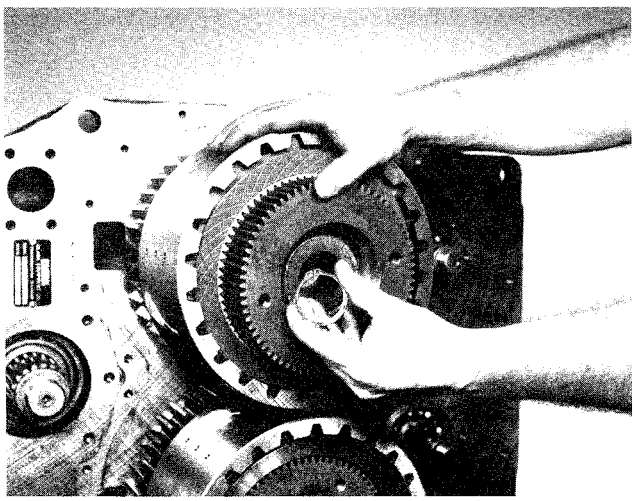


Figure 17

Remove clutch disc hub retainer ring and clutch disc hub. Threaded holes are incorporated in the disc hub to facilitate removal.

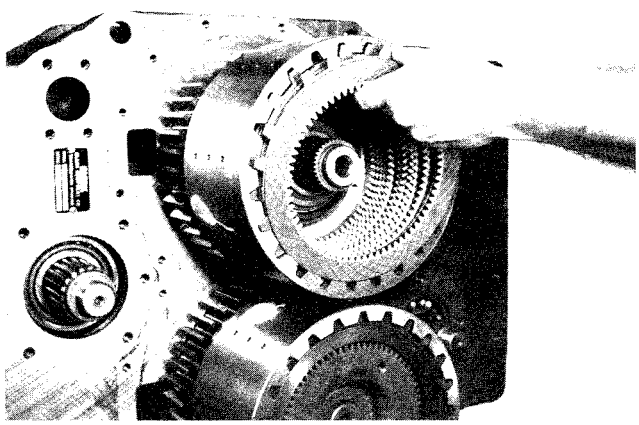


Figure 18

Remove inner and outer clutch discs.

NOTE: ALL CLUTCH PARTS REMOVED FROM THIS POINT ON MUST BE KEPT TOGETHER. THE CLUTCH RETAINER RING, WASHER, TAPER BEARINGS, DRUM AND CLUTCH SUPPORT MUST BE KEPT TOGETHER FOR PROPER REASSEMBLY. MARK EACH PART REMOVED TO MATCH WITH THE CLUTCH SUPPORT. THESE PARTS MUST BE REASSEMBLED ON THE SAME SUPPORT THEY WERE REMOVED FROM. IF TAPER BEARINGS, CLUTCH SUPPORT OR CLUTCH DRUM ARE TO BE REPLACED, REASSEMBLE WITH NEW PARTS AS EXPLAINED LATER IN THIS TEXT.

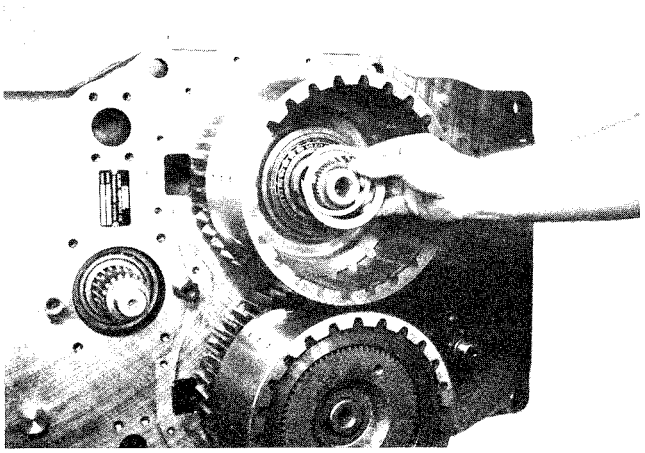


Figure 19

Remove clutch drum retainer ring and washer. Remove clutch drum and taper bearing.

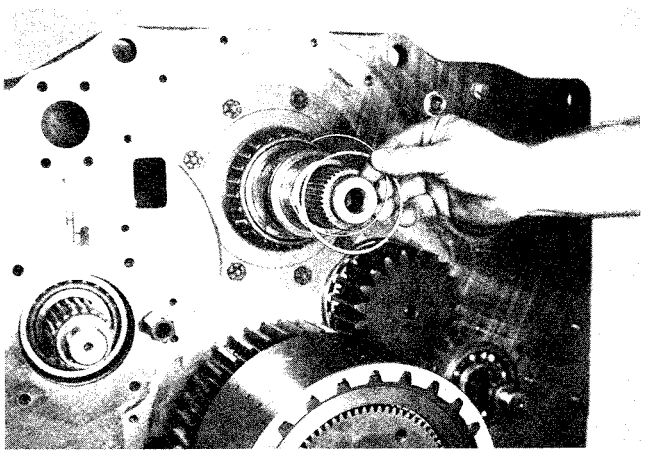


Figure 20

Remove clutch support oil sealing ring and sealing ring expander spring.

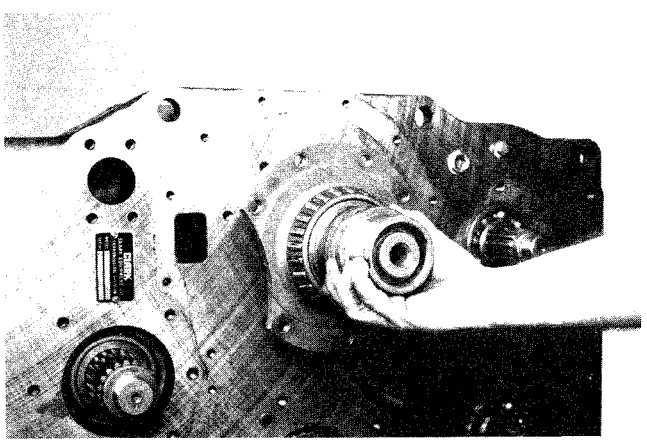
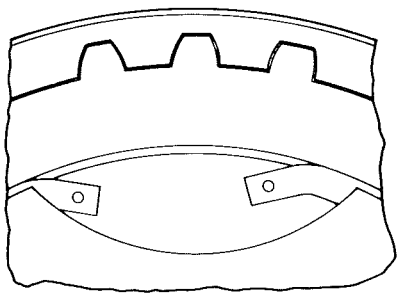


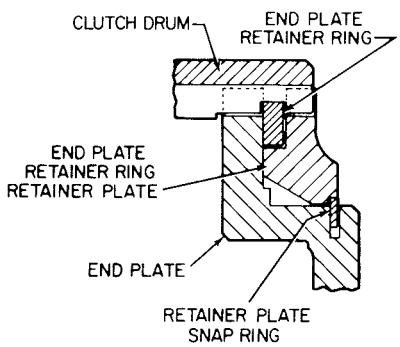
Figure 21

Remove clutch support bolts and support. See note after Fig. 18. Disassemble the 1st, 3rd and 4th clutches as explained in figures 14 thru 21.

INPUT (FORWARD) AND REVERSE CLUTCH DISASSEMBLY

Squeeze ends of end plate ring retainer plate snap ring. Remove ring retainer plate. See following line drawings.





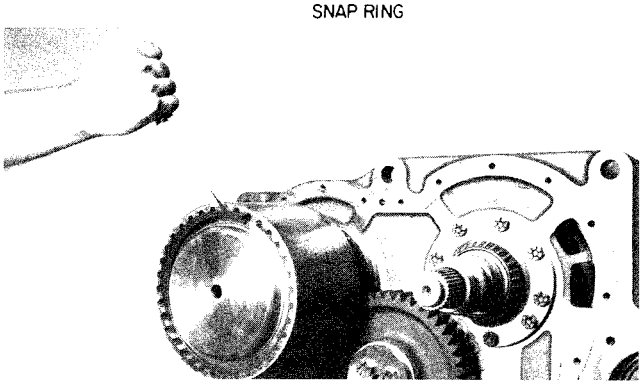


Figure 22

Remove end plate retainer ring.

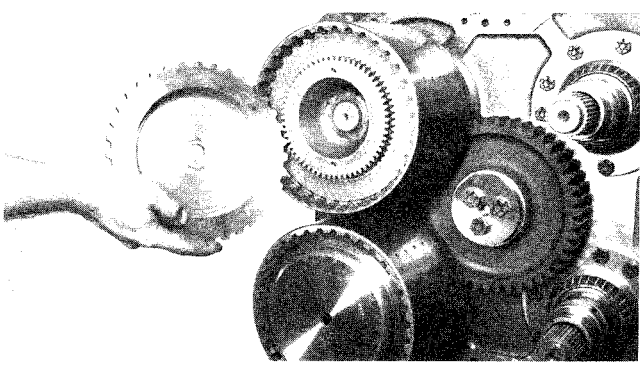


Figure 23

Remove end plate.

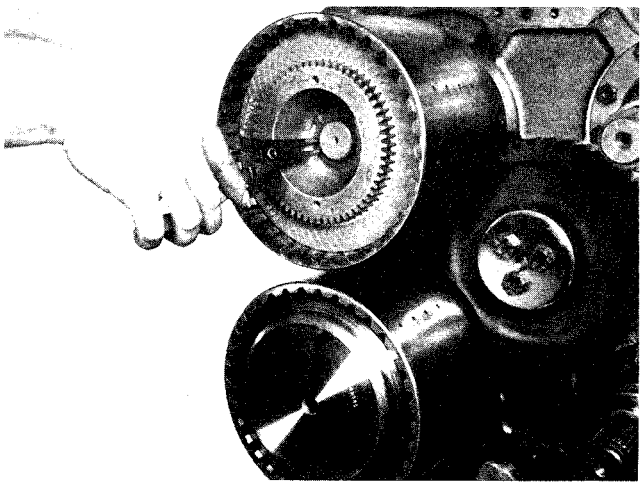


Figure 24

Remove clutch disc hub retainer ring.

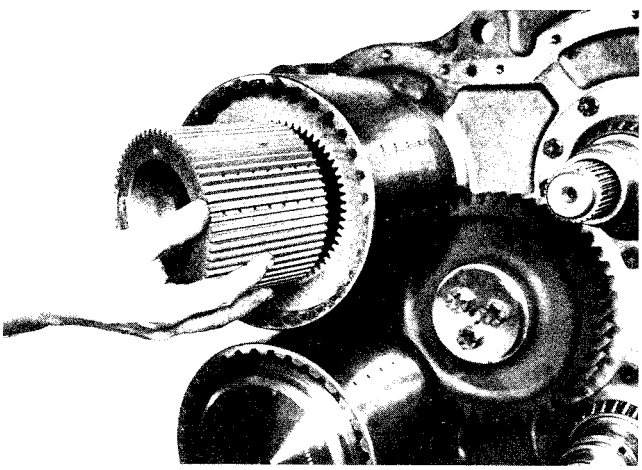


Figure 25

Remove clutch disc hub.

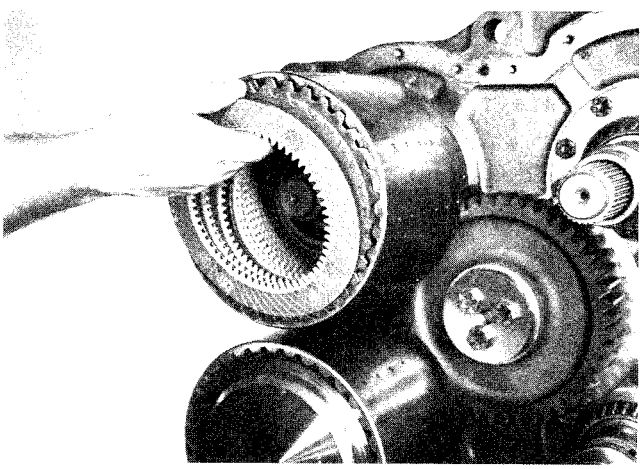


Figure 26

Remove inner and outer clutch discs.

See note after figure 18.

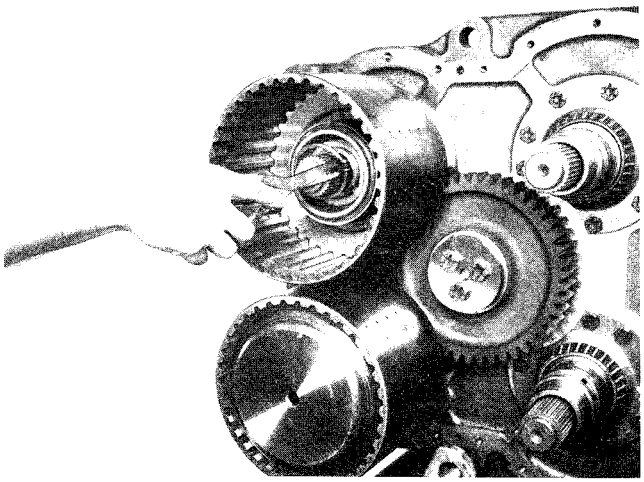


Figure 27
Remove clutch drum retainer ring.

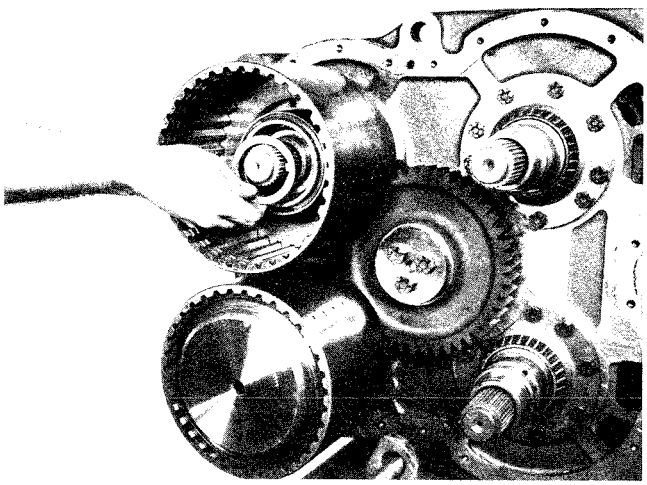


Figure 28
Remove retainer washer.

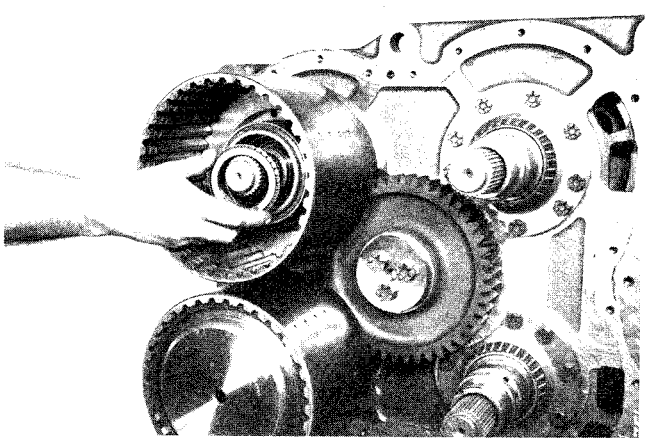


Figure 29
Remove clutch drum outer taper bearing.

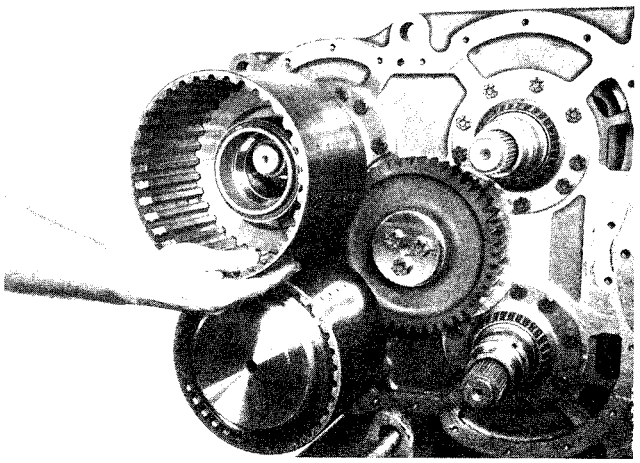


Figure 30
Remove clutch drum. See Fig. 109 & 110 for belleville washer disassembly and reassembly.

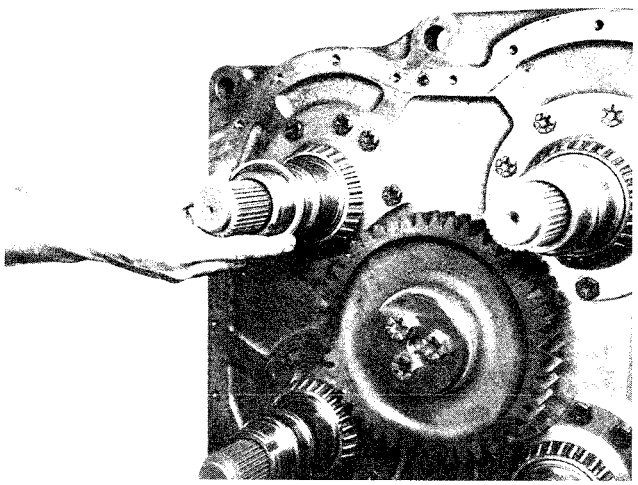


Figure 31
Remove clutch support oil sealing rings.

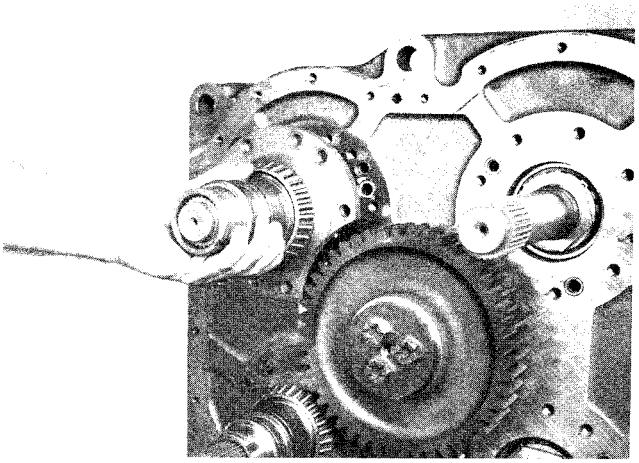


Figure 32
Remove clutch support bolts and supports.

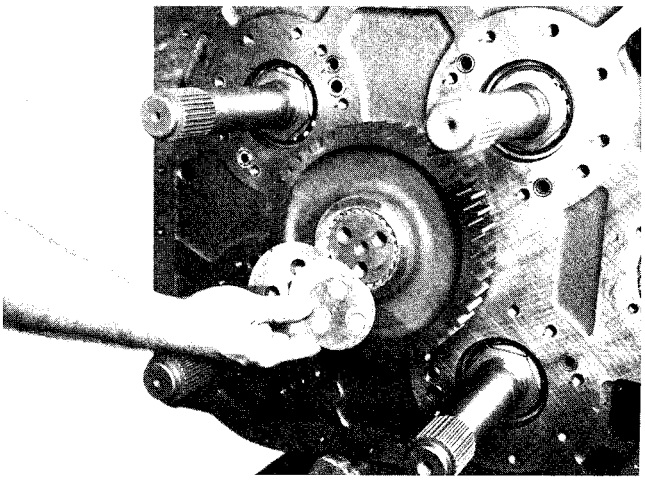


Figure 33

Remove the idler gear retaining plate bolts, retaining plate and shims.

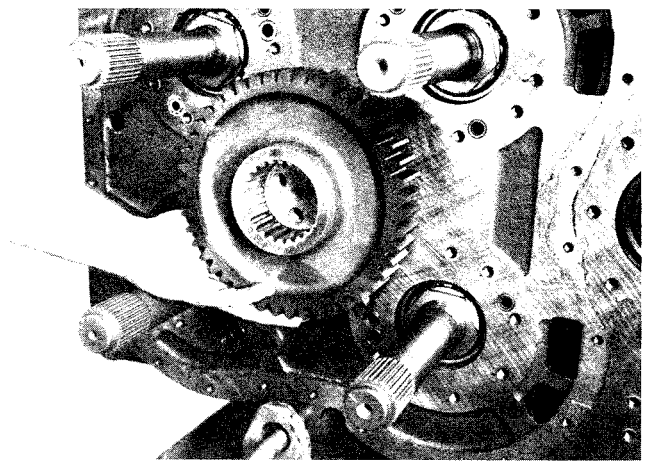


Figure 34

Remove idler gear.

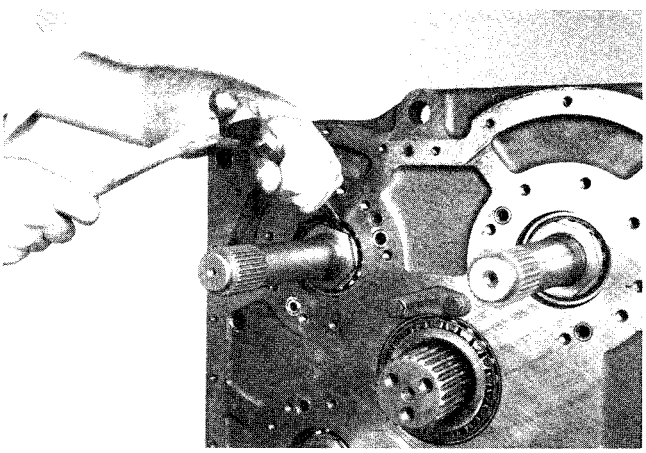


Figure 35

Straighten tangs on bearing nut lock.

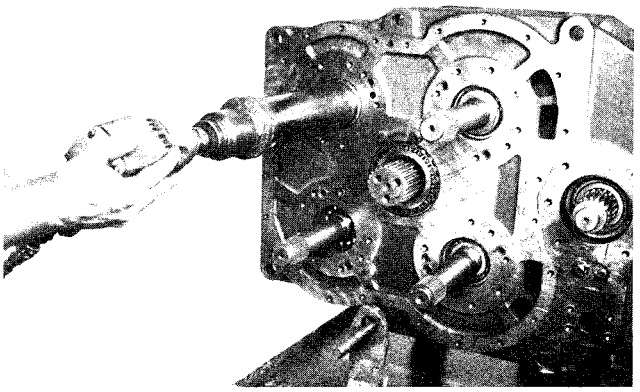


Figure 36

Lock transmission gears with a soft bar to prevent shaft from turning. Remove the outer bearing jam nut, the nut lock and the bearing inner lock nut.

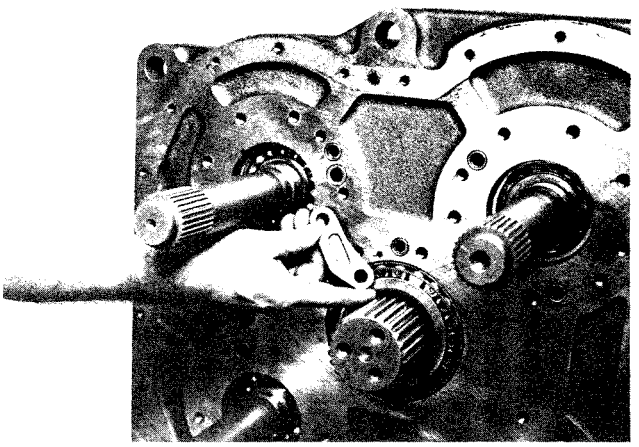


Figure 37

Remove idler shaft crossover lube plate bolts and plate.

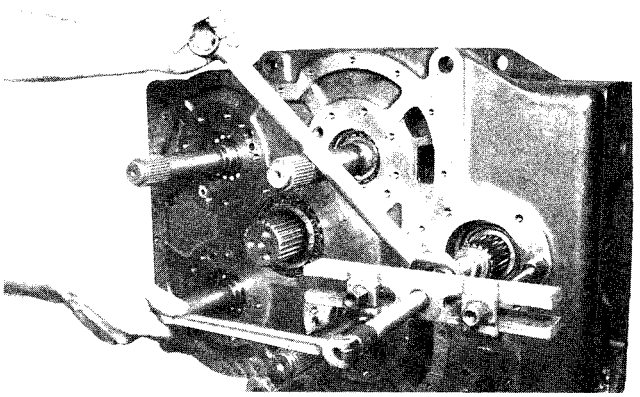


Figure 38

Press output shaft from transmission housing. Output shaft may be removed from either side.

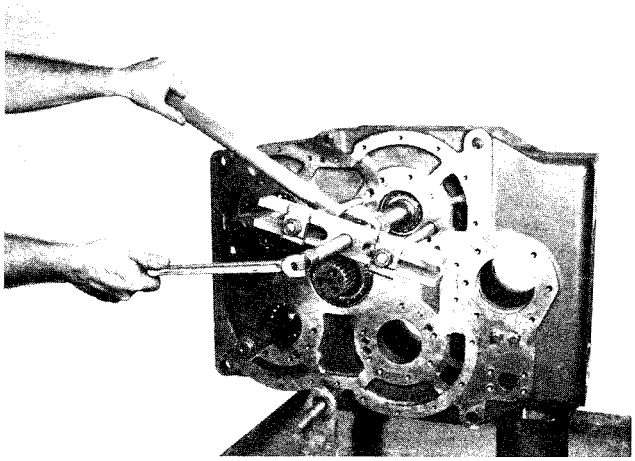


Figure 39
Remove the 1st, 3rd, 2nd and 4th clutch shafts as shown. (2nd and 4th being removed.)

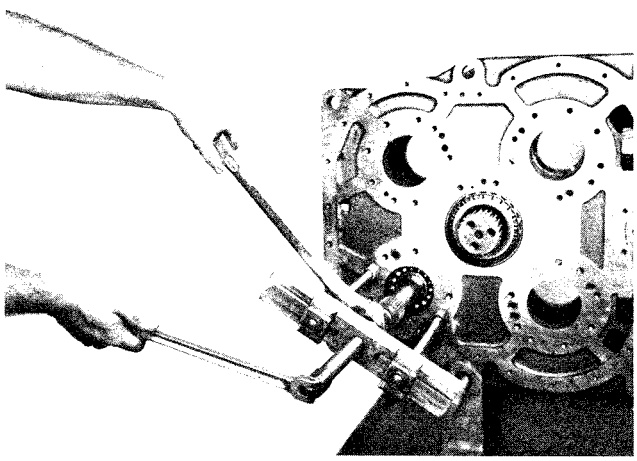


Figure 40
Remove the reverse and input shaft (forward) as shown. (Input shaft being removed.)

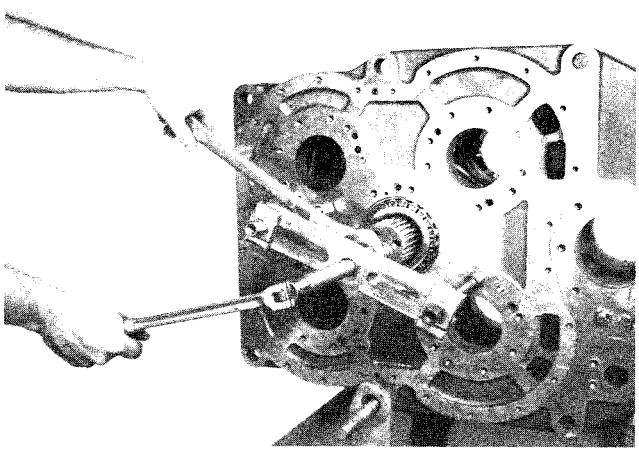


Figure 41
Remove idler shaft as shown.

DISASSEMBLY OF CONTROL COVER

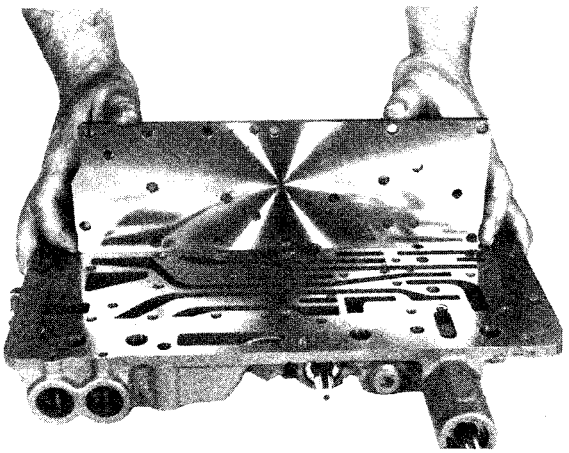


Figure 42
Remove bolts from oil circuit plate. Remove oil circuit plate
CAUTION: Do not lose detent springs.

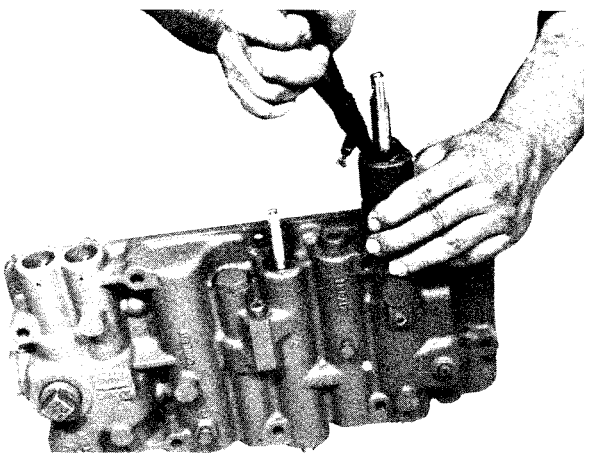


Figure 43
Remove speed selector valve assembly retainer ring.

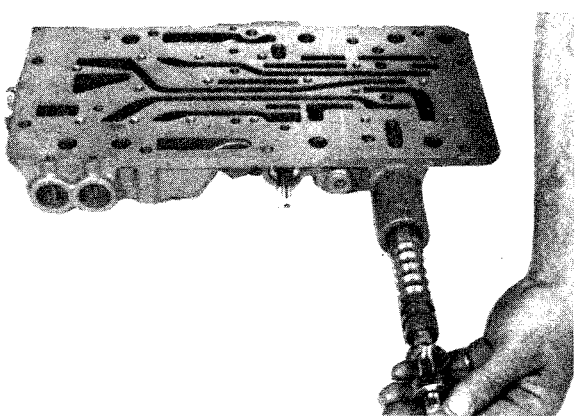


Figure 44
Tap lightly on opposite end of speed selector valve. Valve and valve oil seal will come out together.

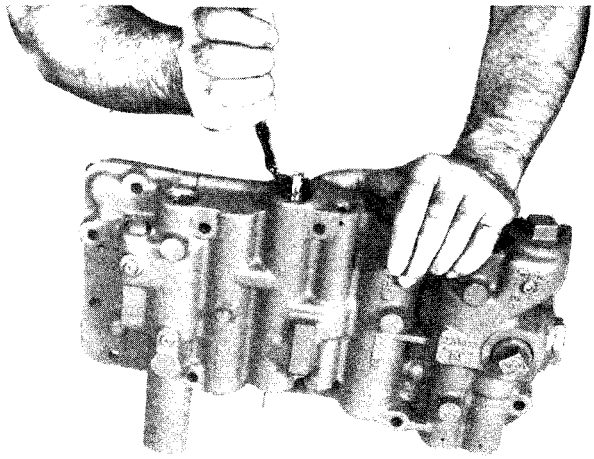


Figure 45
Remove forward and reverse selector valve retainer ring.

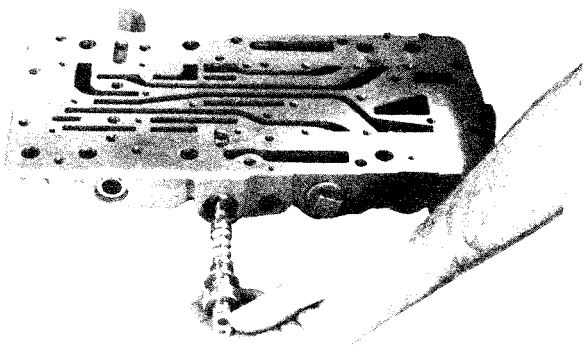


Figure 46
Tap lightly on opposite end of forward and reverse selector valve. Valve and valve oil seal will come out together.

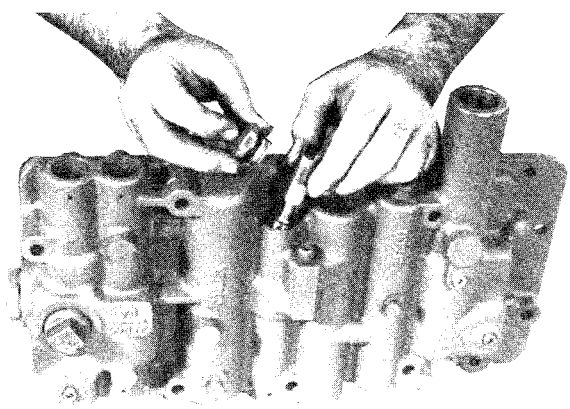


Figure 47
Remove shut-off valve plug and "O" ring. Remove shut-off valve.

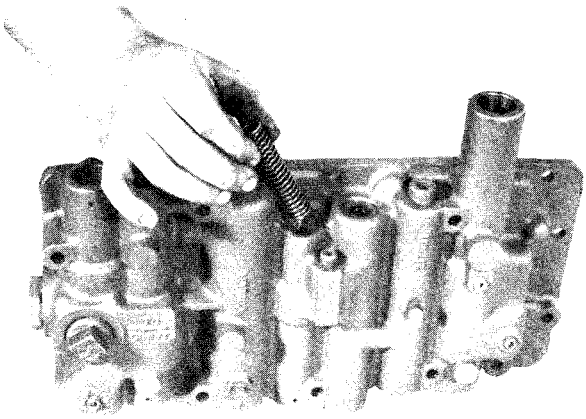


Figure 48
Remove shut-off valve spring.
CAUTION: When removing roll pins, it is recommended a press be used to depress valve stop, valve and spool springs.

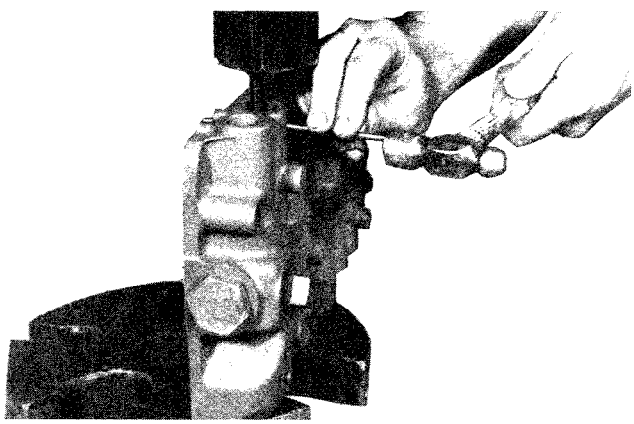


Figure 49
Depress regulating valve spring stop and spring. Remove roll pin.

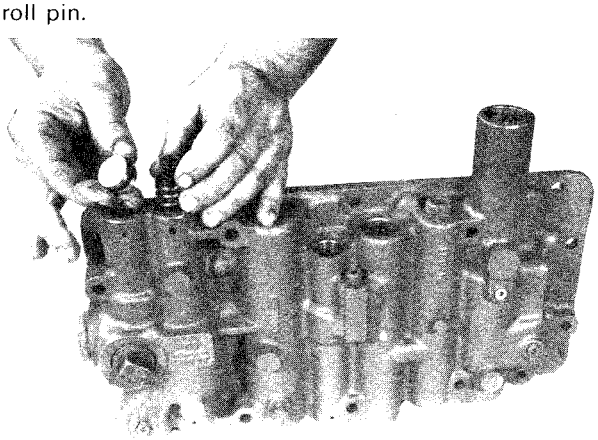


Figure 50
Release press slowly. Springs will push spring stop from control housing. Remove spring stop and inner and outer spring.

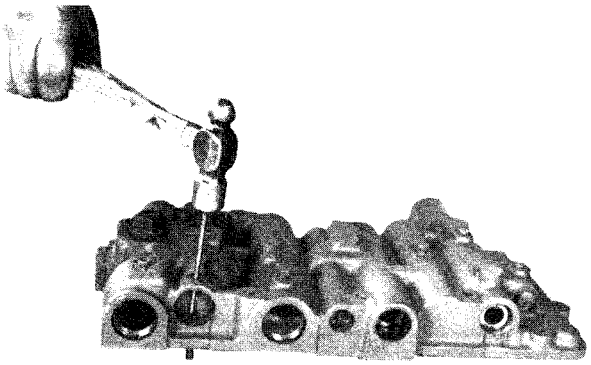


Figure 51
Remove roll pin on opposite end. Depressing valve stop is not necessary as the springs were removed in Figure 49.

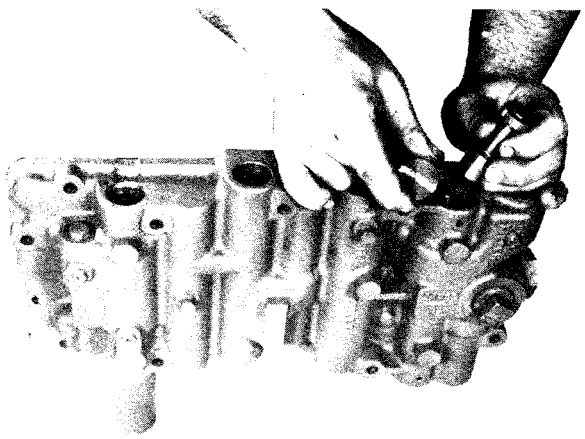


Figure 52
Remove regulating valve stop and valve from control housing.

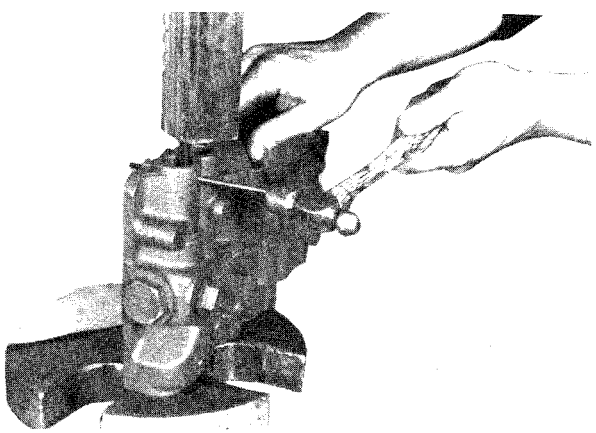


Figure 53
Depress safety valve spring and spring stop.

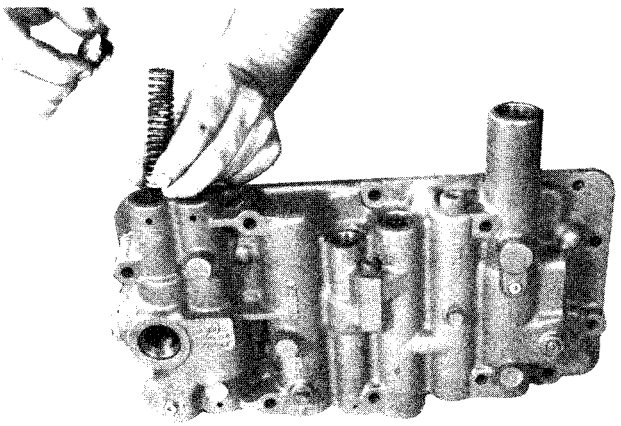


Figure 54
Remove safety valve spring stop, valve spring, and safety ball valve.

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 CE-805 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.

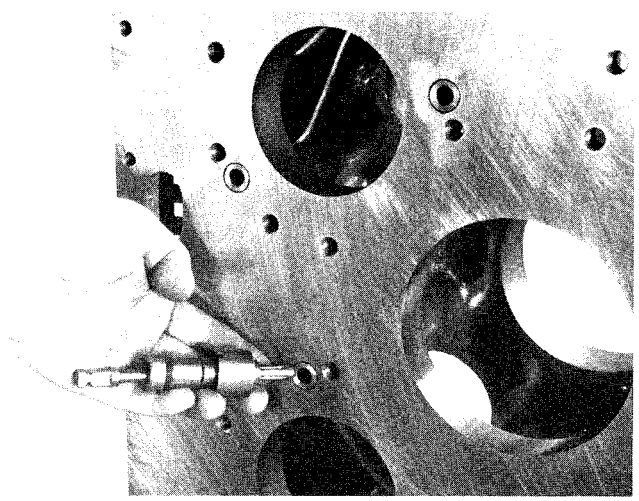


Figure 55
Pull mandrel on tool all the way back and insert tool in tube.

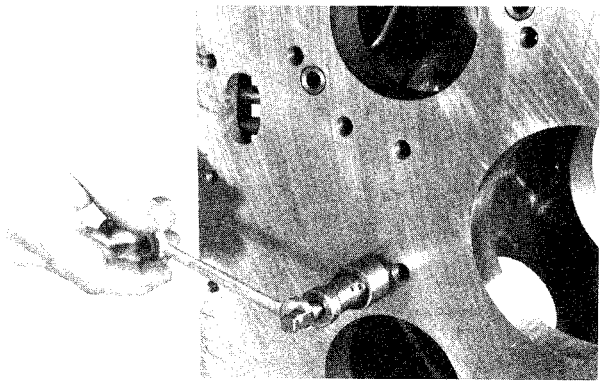


Figure 56

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 **Air Tool Division, Dresser Industries, Inc., 302 S. Center St., Springfield, Ohio 45501. Phone 513-323-4981. Attn: Order Dept.**

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 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 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 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 —
2. Input Shaft —
3. Reverse Shaft —
4. First and Third Shaft —
5. Second and Fourth Shaft —
6. Output Shaft —

REASSEMBLY OF IDLER SHAFT

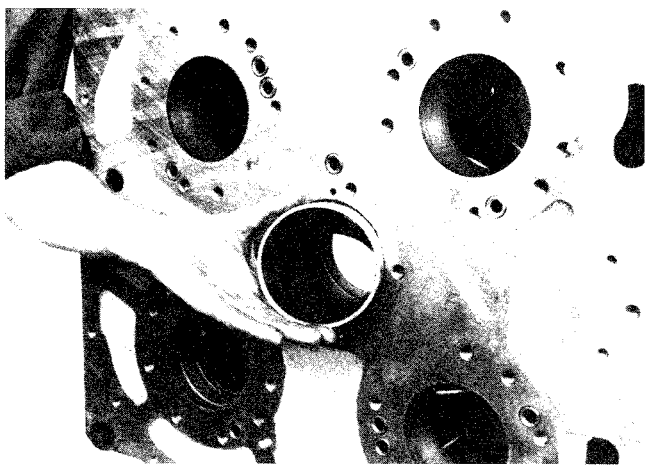


Figure 57

With oil baffles in position (See Figure 58) install idler shaft taper bearing cups in both sides of transmission housing.

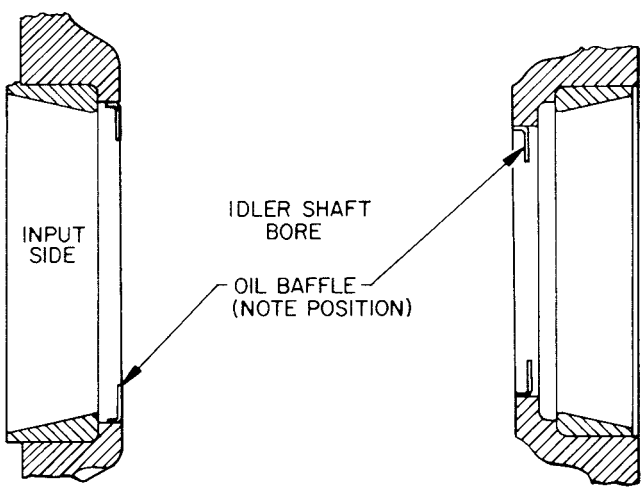


Figure 58

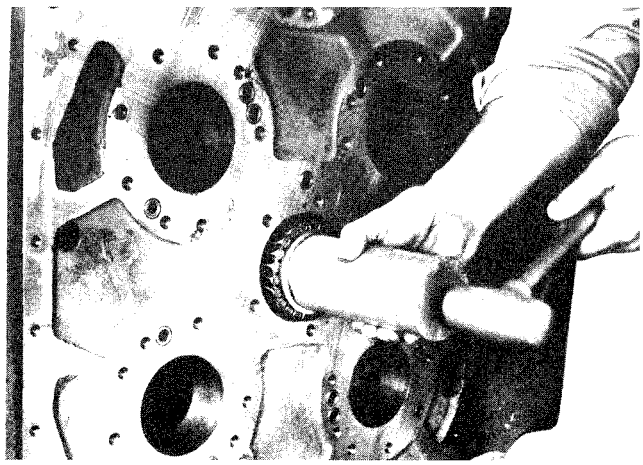


Figure 59

With the large taper bearing pressed on the idler shaft next to the gear, position shaft and bearing in transmission housing from the input side. Block idler shaft and from the opposite side tap taper bearing on shaft. Be sure taper bearing is fully seated.

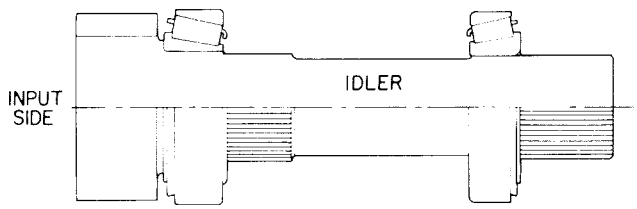


Figure 60

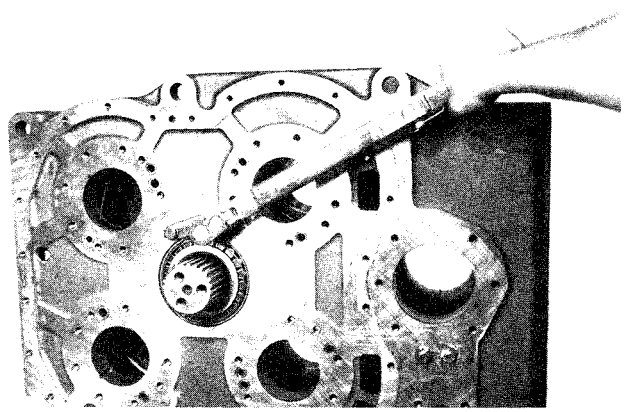


Figure 61

Install idler shaft cross over lube plate and bolts. Tighten bolts 82 to 90 ft. lbs. torque [111,2-122,0 N.m]

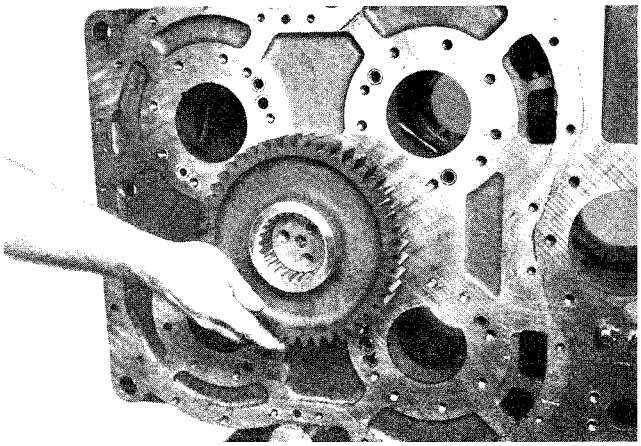


Figure 62

Position large idler gear on idler shaft. Be sure gear is tight against bearing.

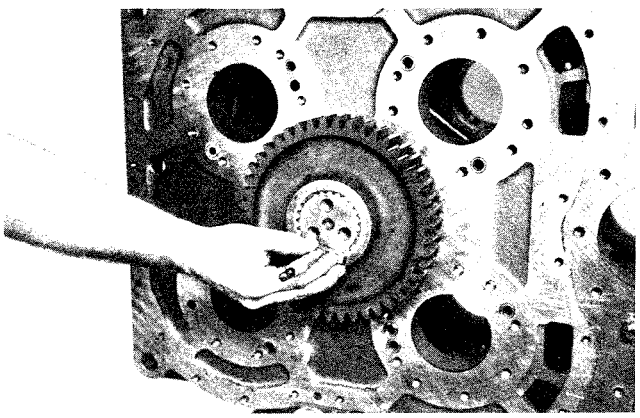


Figure 63

Using a micrometer depth gauge, measure the distance from the hub of the gear to the end of the idler shaft, record this distance.

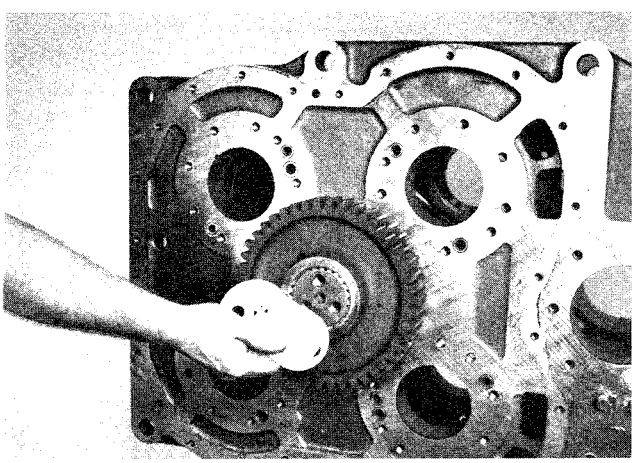


Figure 64

Choose and check shim pack with micrometer. When the proper amount of shims as recorded in Figure 63 is achieved, remove one .004 [.1016 mm] shim.

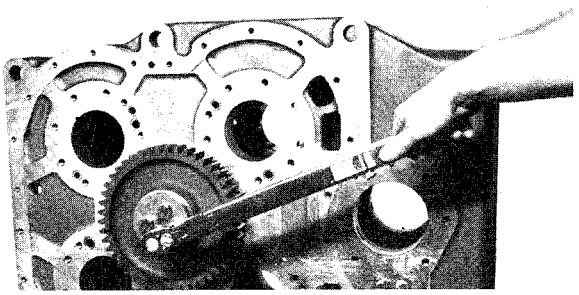


Figure 65

Position shims and retaining plate on idler gear and shaft. Install retaining plate bolts. Block idler gear to prevent turning and torque retainer plate bolts 113 to 124 ft. lbs. torque [153,3-168,1 N.m].

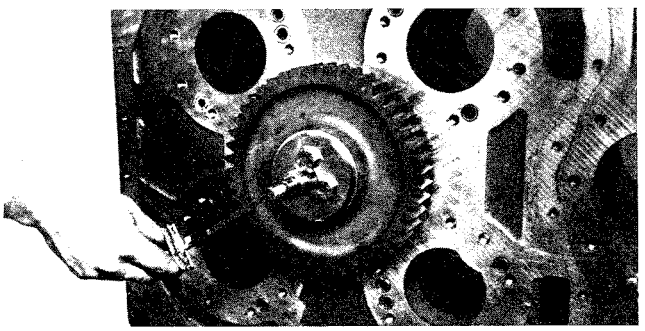


Figure 66

Using the threaded hole provided in the center of the retainer plate, install a ⅝-11 Hex Head bolt until tight in hole. Check rolling torque on idler shaft. Proper rolling torque is 6 to 10 inch lbs. [0,7-1,1 N.m]. Add shims for less rolling torque, remove shims for more rolling torque.

REASSEMBLY OF FORWARD (INPUT) AND REVERSE SHAFTS

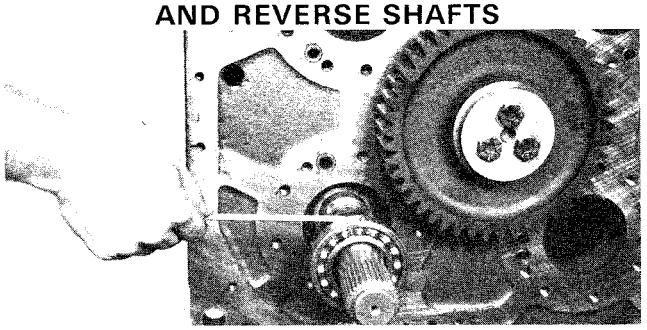


Figure 67

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. Position rear bearing on shaft. Align bearing lock ball with notch in bearing bore.

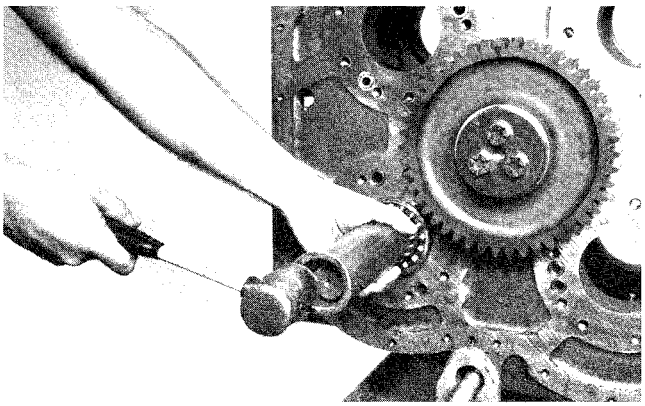


Figure 68

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.

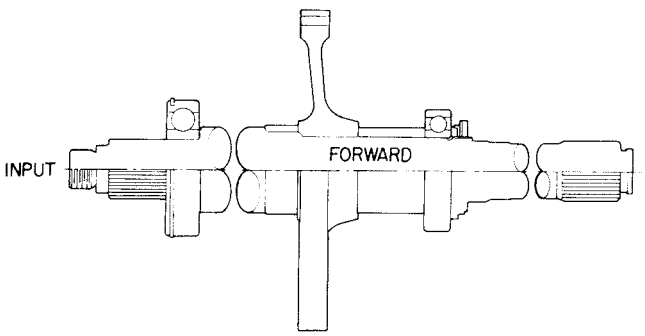


Figure 69

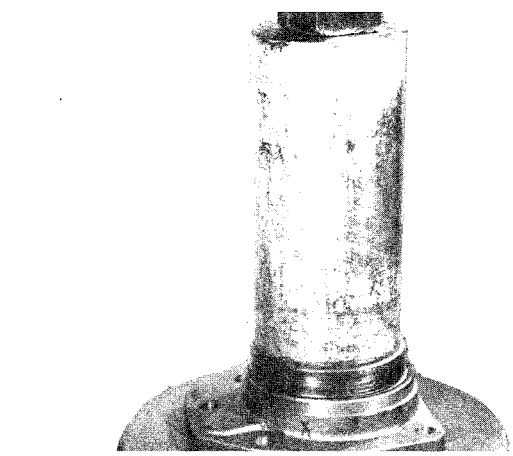


Figure 70

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.

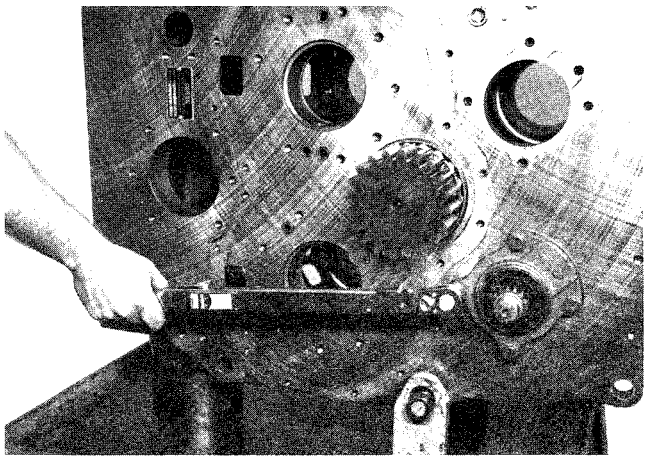


Figure 71

With a new gasket in place, position bearing cap and seal on shaft. Install bearing cap bolts and tighten 57 to 63 ft. lbs. torque [77,3-85,4 N.m].

Assemble the reverse shaft as explained in Figures 67 and 68.

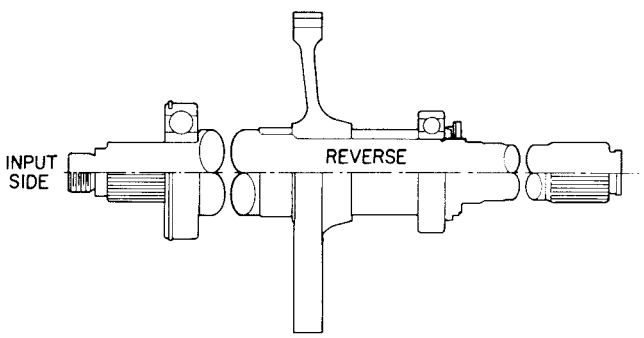


Figure 72

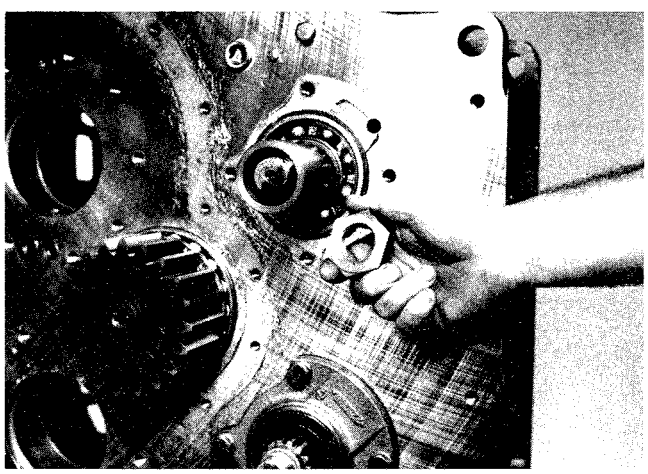


Figure 73

On the reverse shaft install the front bearing spacer and nut.

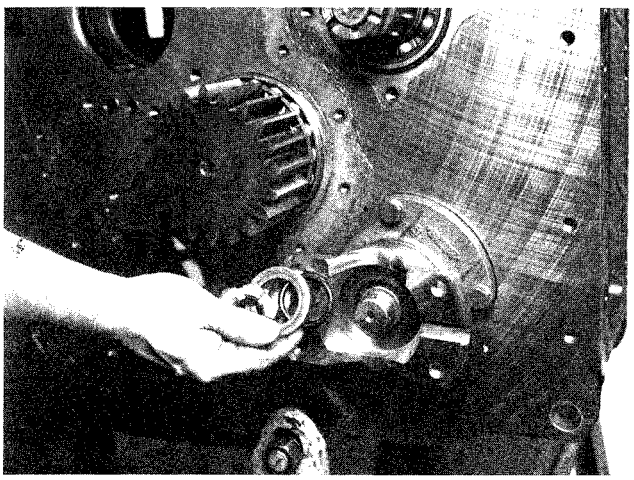


Figure 74

On the input shaft install the input flanges, flange "O" ring washer and flange nut.

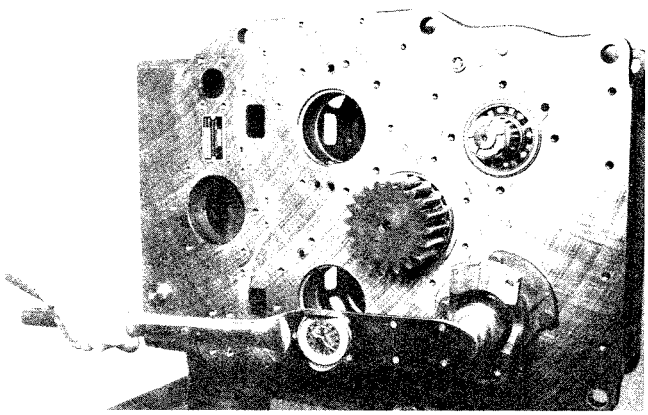


Figure 75

Block input and reverse shafts to prevent turning. Tighten input flange nut and reverse shaft nut 150 to 175 ft. lbs. torque [203,4-237,2 N.m]. Install nut cotters.

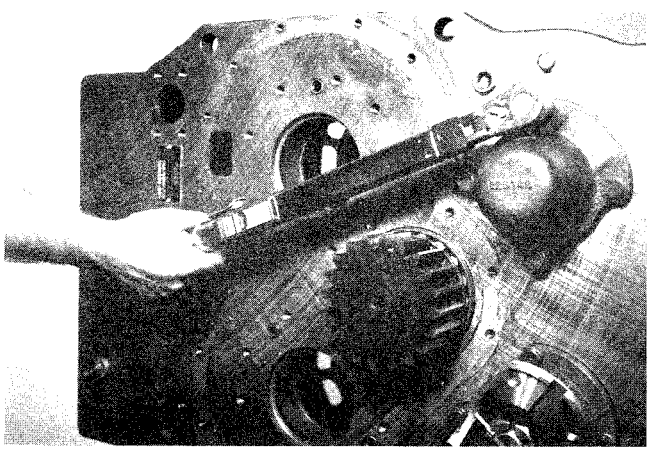


Figure 76

With new gasket in place position reverse shaft bearing cap on shaft. Install bearing cap bolts and tighten 57 to 63 ft. lbs. torque [77,3-85,4 N.m].

REASSEMBLY OF 1st & 3rd & 2nd & 4th SHAFTS

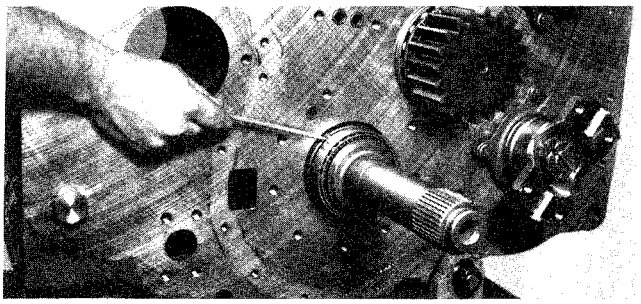


Figure 77

Press the double taper bearing assembly on the 1st & 3rd shaft tight against shoulder on 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 the 1st & 3rd gear in the transmission case with long hub of gear toward the input side of the case. Insert shaft into shaft bore and through the 1st & 3rd gear. Align double taper bearing lock pin with notch in bearing bore.

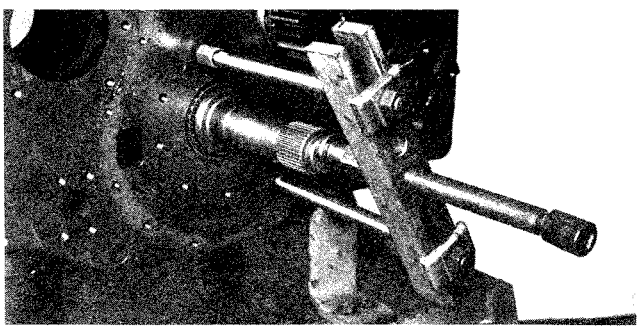


Figure 78

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

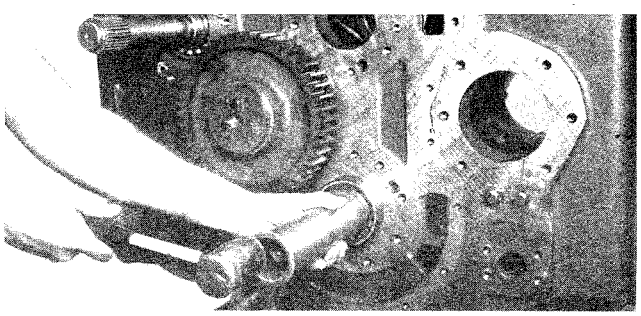


Figure 79

On opposite end of shaft, position long spacer on shaft and against the gear. Install bearing spacer (washer) against long spacer. Drive rear bearing tight against washer. 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 nut. Remove shaft pusher. This was left on only to hold shaft while installing roller bearing.

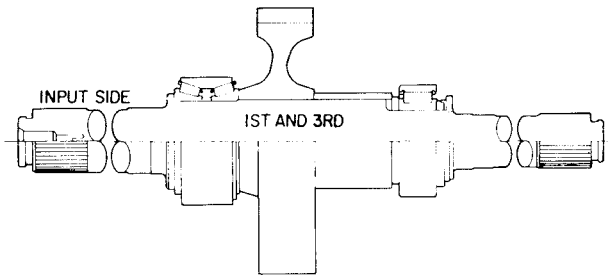


Figure 80

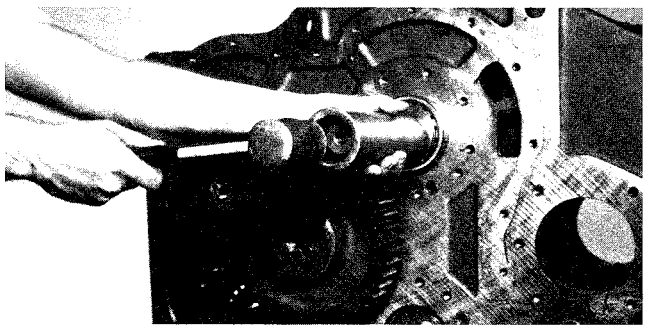


Figure 81

Press the double taper bearing assembly on the 2nd & 4th shaft tight against shoulder on 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.

Install the long spacer on the 2nd & 4th shaft against the double taper bearing. Position the 2nd & 4th gear in the transmission case with the long hub of the gear toward the input side of the case. Insert shaft into shaft bore and through the 2nd and 4th gear. Align double bearing lock pin with notch in bearing bore. (See Figure 77) Use shaft pusher as shown in Figure 78. Push shaft assembly in case until taper bearing shoulders in bore of case. Do not remove shaft pusher. On opposite end of the shaft install bearing spacer (washer) against the gear. Drive rear bearing tight against washer. **NOTE**: Bearings 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 nut.

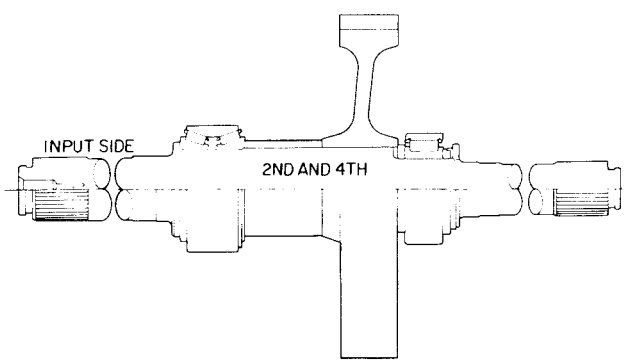


Figure 82

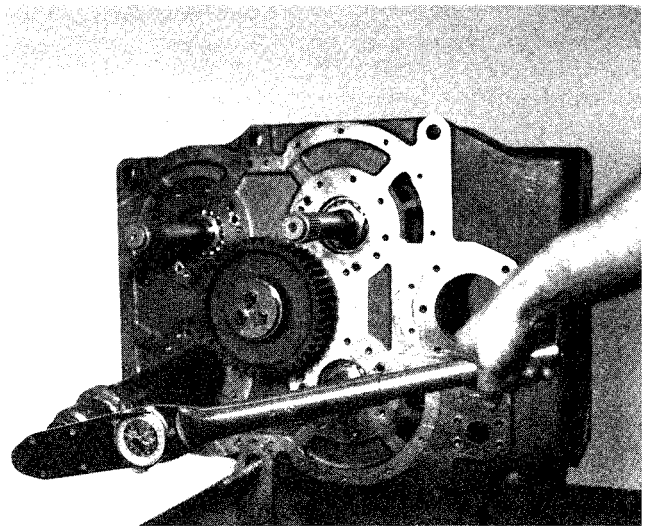


Figure 83

Lock gears using a soft bar, and install bearing inner lock nut (see note). Tighten lock nuts 175 to 200 ft. lbs. torque [237,3-271,1 N.m]. Install nut locks and outer lock nuts. Tighten outer lock nuts 175 to 200 ft. lbs. torque (273,3-271,1 N.m]. **NOTE:** On the 3rd & 4th clutch, some units will have a double locknut with a tanged washer & some units will have a single elastic locknut — the tightening torque is the same on both style nuts.

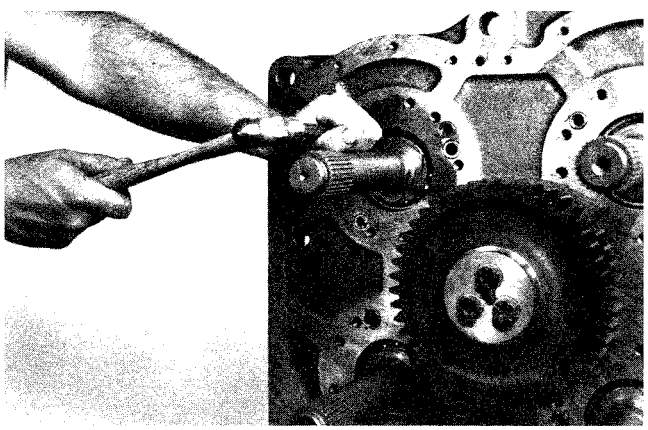


Figure 84

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.

OUTPUT SHAFT REASSEMBLY

There are two types of output shafts. One shaft (threaded on both ends) is used for continuous 4 wheel drive or 2 wheel drive with one side capped, see Figure 87. This is the type of shaft being assembled in the following photos. The other shaft is threaded on one end and a pilot bearing pocket on the other used with a axle disconnect. See Figure 92.

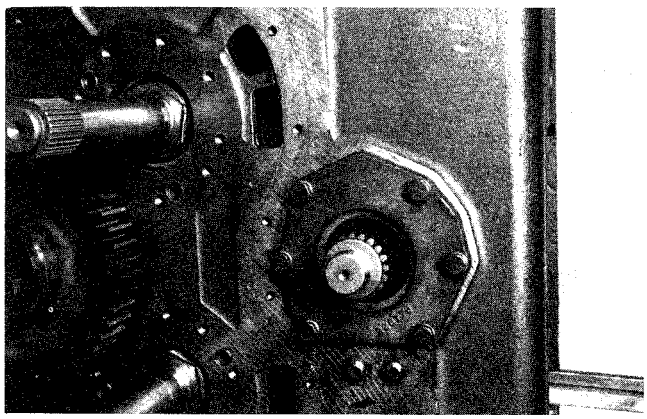


Figure 85

Press taper bearing (large diameter of taper inward) over threaded end of output shaft against shoulder on shaft. Position large output gear in transmission case to the input side (front) with longer offset of gear hub to the front. Position small output gear in transmission case to the rear with longer offset of gear hub to the front. Insert output shaft through the rear bore of case and through small and large output gears. Figure 87 shows proper stack up of gears. Install taper bearing cup over rear bearing. Apply a very light coat of Permatex No. 2 to the outer diameter of the output oil seal. Press seal in output bearing cap to depth shown in Figure 86. Position a New "O" ring on bearing cap. Position bearing cap assembly on output shaft. Install bearing cap bolts and tighten 57 to 63 ft. lbs. torque [77,3-85,4 N.m]

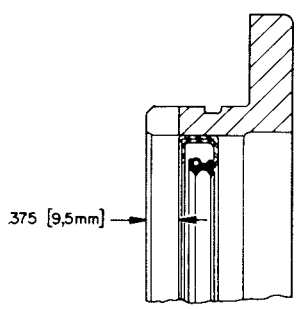


Figure 86

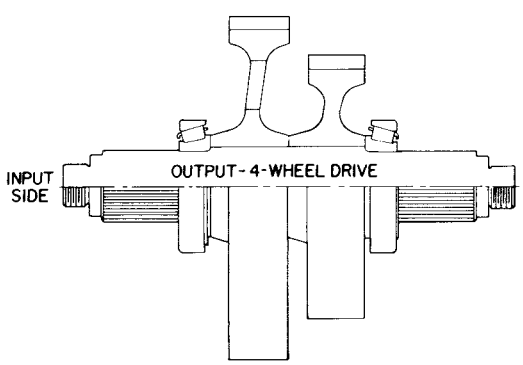


Figure 87

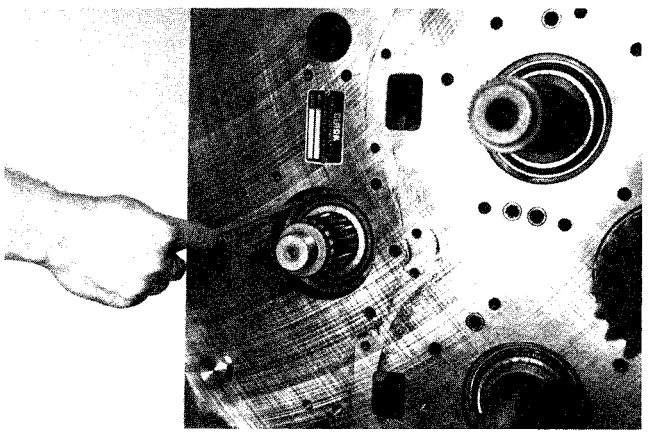


Figure 88

Block output shaft and install front taper bearing (large diameter of taper inward) on output shaft until bearing shoulders against large output gear. Install bearing cup over front bearing.

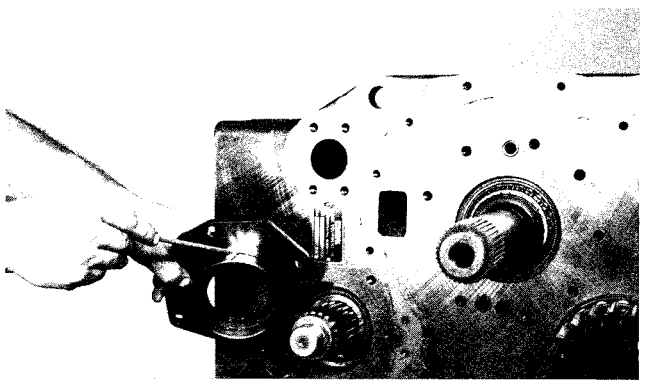


Figure 89

Apply a thin coat of Permatex No. 2 on the outer diameter of the output shaft oil seal. Press oil seal, lip of seal inward, into output shaft bearing cap. See Figure 86.

Install a new "O" ring on output shaft bearing cap. Lubricate ring with automatic transmission fluid. Install bearing cap and shims. Do not tighten bearing cap bolts.

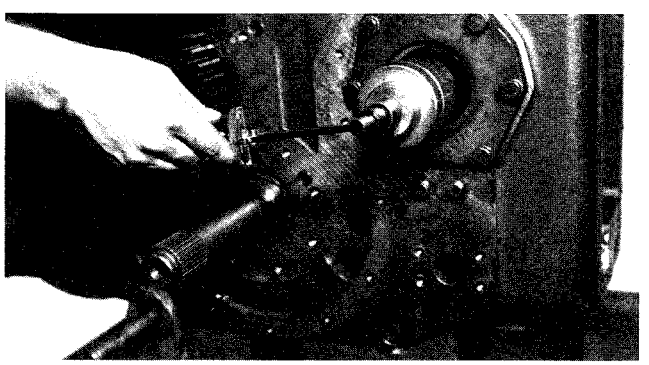


Figure 90

Using an inch pound torque wrench on the output flange nut, determine the amount of torque required to turn gear train.

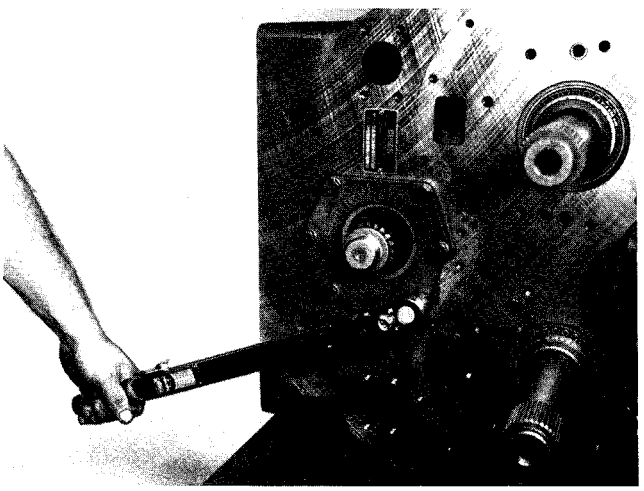


Figure 91

Tighten output shaft bearing cap bolts 57 to 63 ft. lbs. torque [77,3-85,4 N.m]

Add or remove shims from bearing cap to adjust preload. When bearings are adjusted properly, it will take 6 to 8 inch lbs. [0,68-0,90 N.m] more torque to turn gear train with cap bolts torque than when bolts were loose.

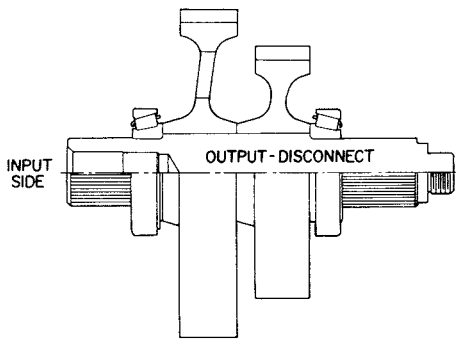


Figure 92

CLUTCH DRUM REASSEMBLY

If clutch drum taper bearings, clutch support, or clutch drum are to be replaced, reassemble with new parts as explained in Figures 93 thru 101.

NOTE: Do not install clutch support on transmission housing until proper stack up of parts in the clutch drum is achieved. Mark all parts of each set (clutch support, clutch drum taper bearing, selected tanged washer and selected snap ring). Keep all parts together.

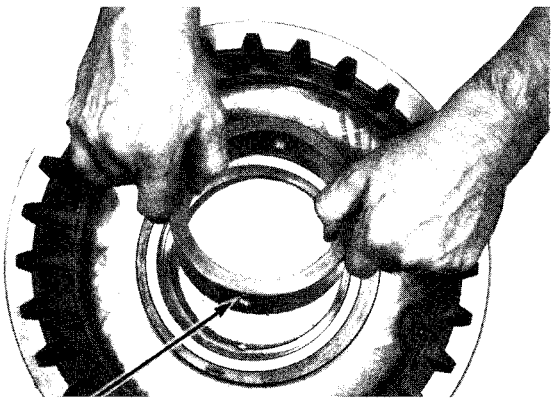


Figure 93

Insert lock ball in clutch piston ring outer race. Press outer race and ball in clutch drum. Install the inner and outer taper bearing cups in the clutch drum.

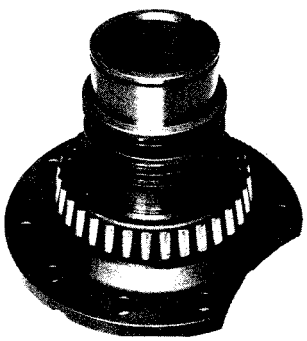
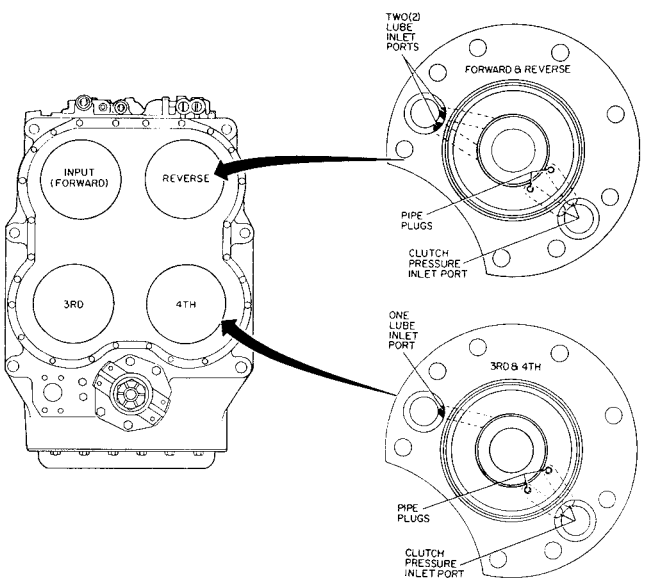


Figure 94

Press inner taper bearing on clutch support.

NOTE: The input (forward) and reverse clutch supports are different than the 3rd and 4th supports. The 3rd and 4th supports have one (1) lube hole (see line drawing) and the input (forward) and reverse supports have two (2) lube holes (see line drawing).



SEE PAGES 58 & 59 FOR PROPER SELECTION OF VARIABLE THICKNESS TANG WASHER & SELECTED VARIABLE THICKNESS SNAP RING.

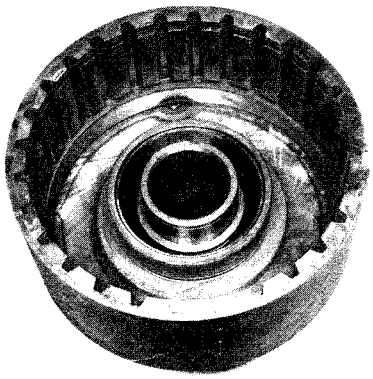


Figure 95

Position clutch drum and cup assembly on clutch support. Be sure the proper drum is matched to the proper support. See note following Figure 94.

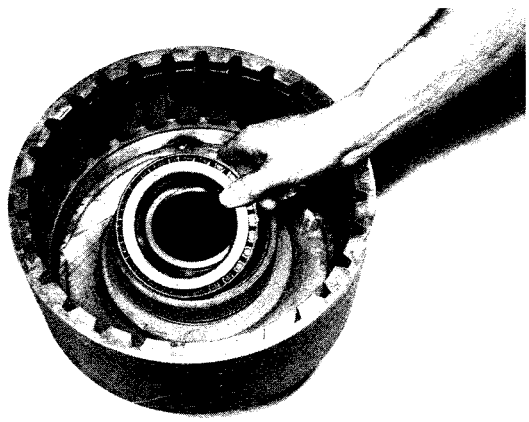


Figure 96

Install outer taper bearing.

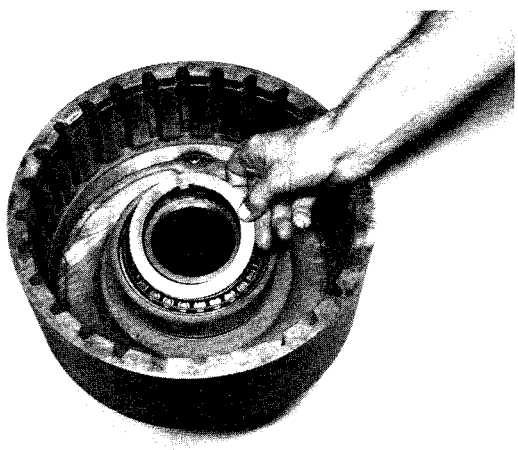


Figure 97

Position outer bearing retainer washer on clutch support aligning tang on washer with notch on support. **(See pages 58 & 59 for proper selection of washer).**

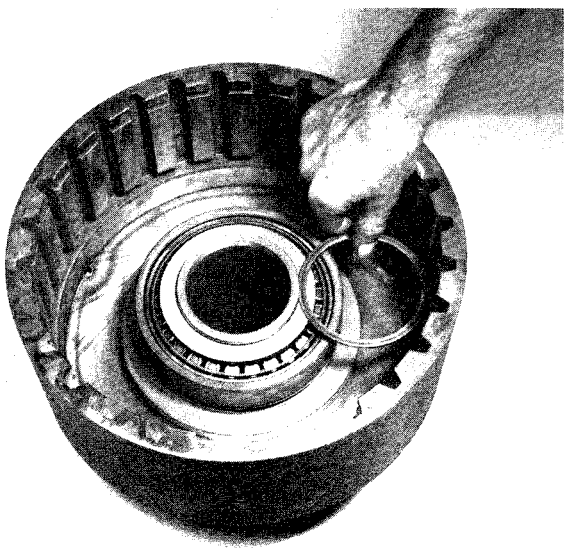


Figure 98

Clutch drum retainer ring is selected at assembly for proper thickness. Variable thickness rings are used in snap ring grooves to assure proper taper bearing tightness. Check ring as shown for tight ring to bearing fit. **(See pages 58 & 59 for proper selection of snap ring.)**

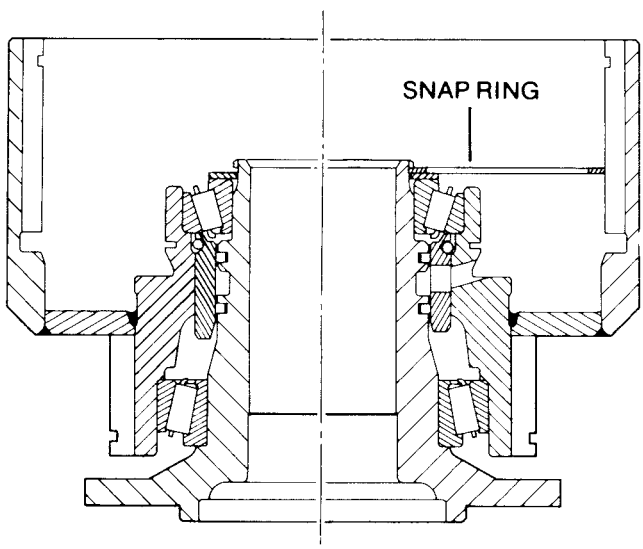


Figure 99

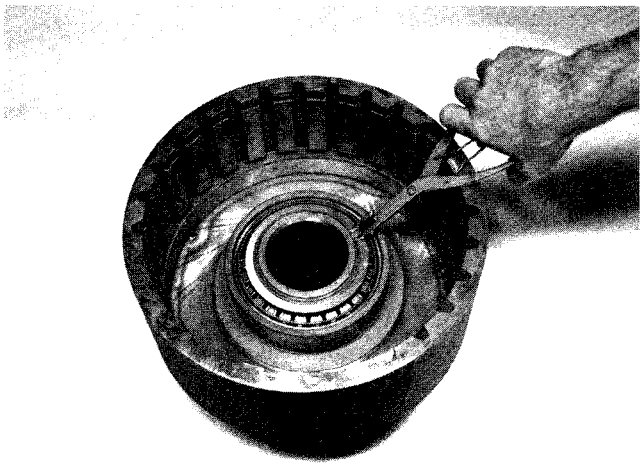


Figure 100

Install retainer ring, being certain ring is in full position in ring groove. **NOTE:** Use ring that will give the tightest fit between washer and snap ring groove as explained on pages 58 & 59.

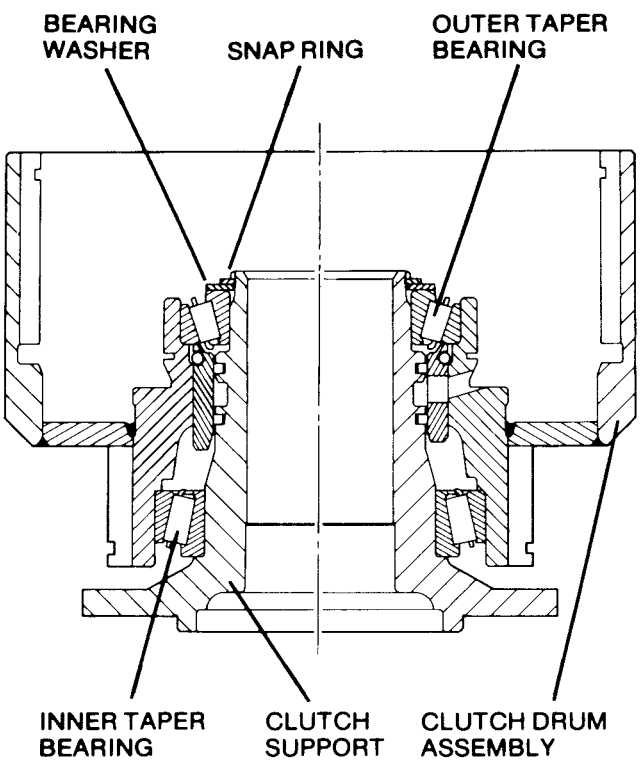


Figure 101

CAUTION: After parts have been matched with each other do not mix with other clutch parts.

Remove retainer ring and washer. Remove drum assembly from clutch drum support.

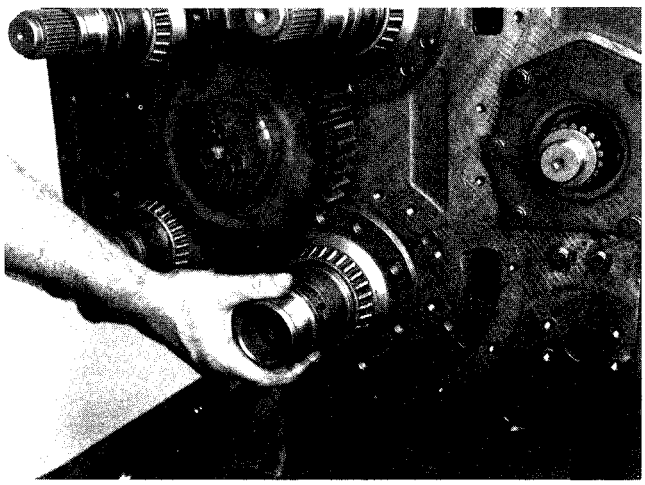


Figure 102

Position clutch support and taper bearing assembly on transmission housing. See note following Figure 94.

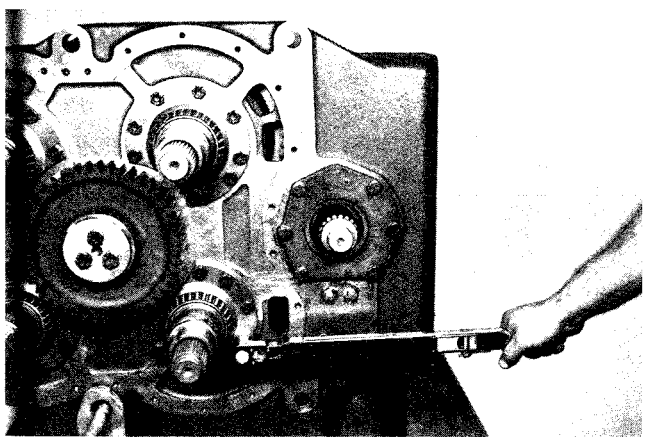


Figure 103

Tighten support bolts 80 to 88 ft. lbs. torque [108,5-119,3 N.m].

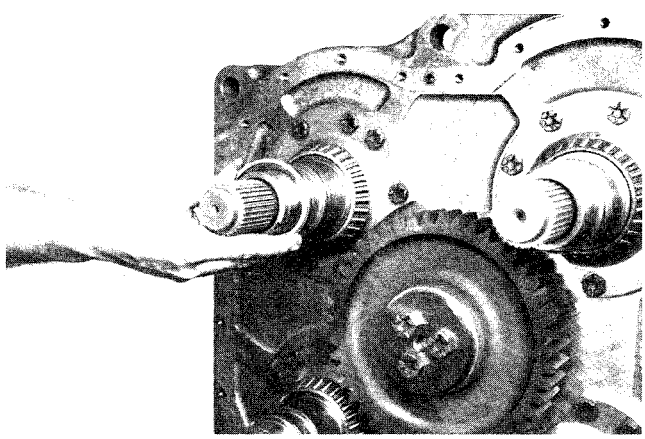


Figure 104

Install two lock type oil sealing rings on each clutch support. Lock rings in position. Grease rings to facilitate drum to support assembly.

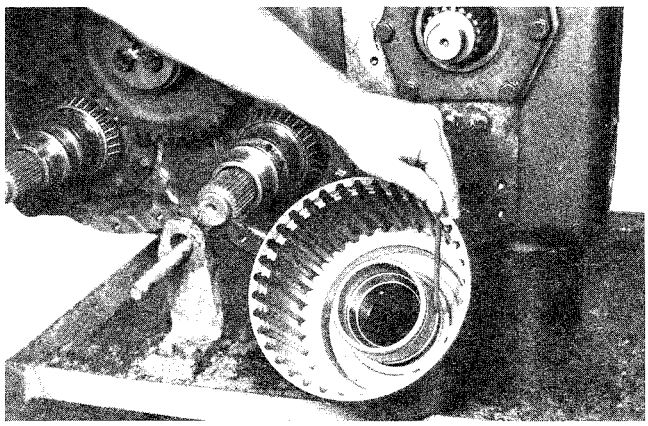


Figure 105

Install a new clutch piston inner sealing ring.

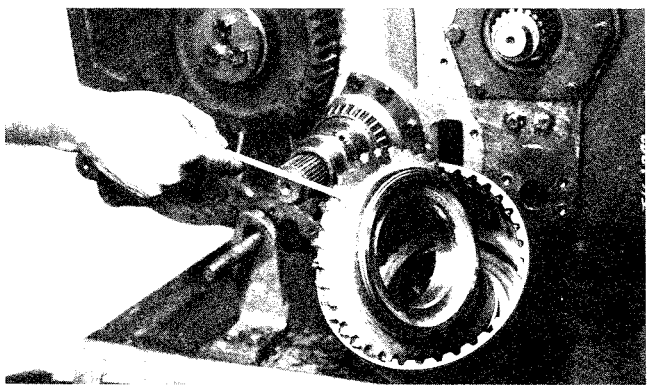


Figure 106

Install a new clutch piston outer sealing ring. Position clutch piston in clutch drum.

INPUT (FORWARD) & REVERSE CLUTCH REASSEMBLY (Reverse Clutch Being Assembled)

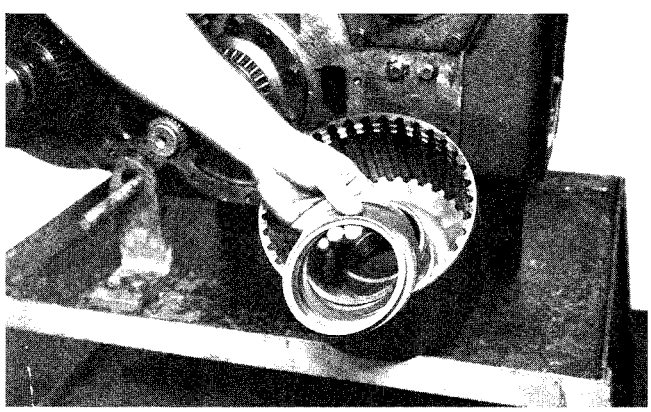


Figure 107

Position belleville washers against the clutch piston as shown in Figure 109. Concave sides against each other. Five (5) sets, total of ten (10) washers in each clutch, input (forward) and reverse. Locate snap ring retainer on belleville washers.

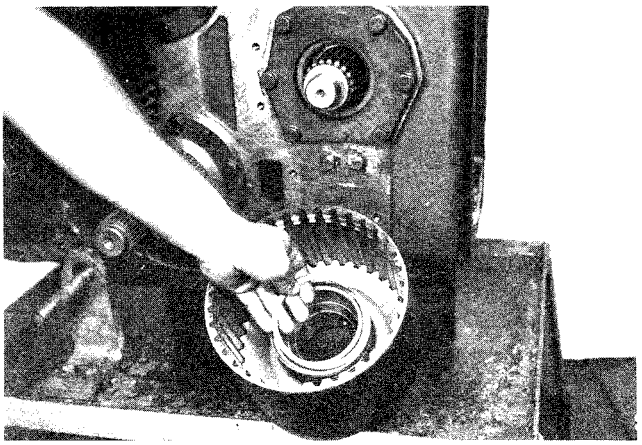


Figure 108

Position snap ring over clutch hub. Compress snap ring retainer and belleville washers below snap ring groove, (See Figure 109). Install snap ring in full position in snap ring groove and release tension on ring retainer. Retainer must fit all around snap ring, (See Figure 110).

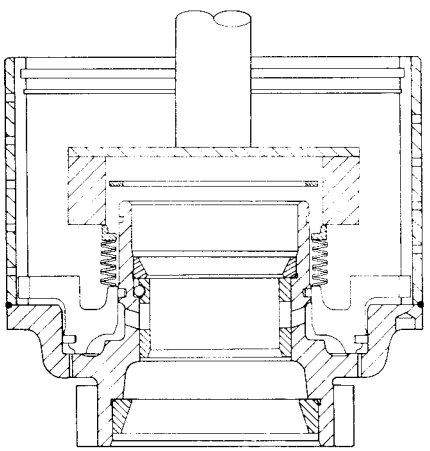


Figure 109

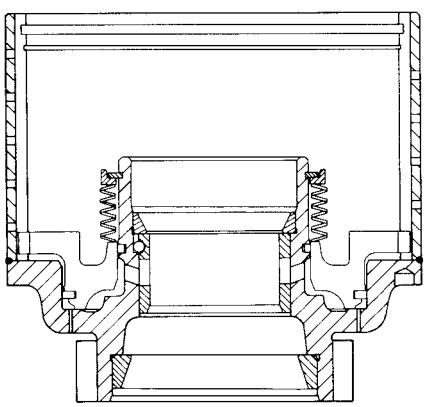


Figure 110

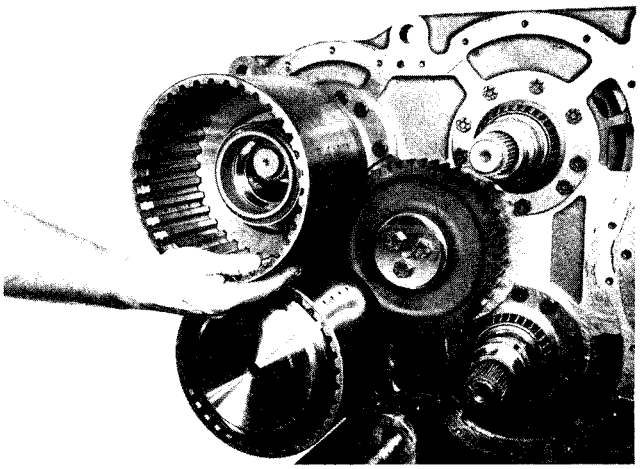


Figure 111

Position clutch drum on support, being sure the drum is matched with the support as explained in note following Figure 18.

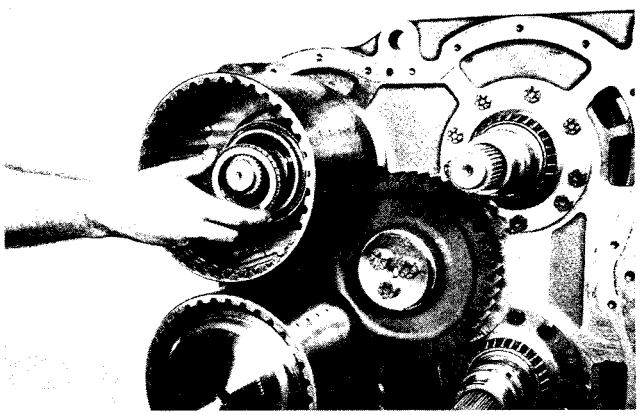


Figure 112

Position matched outer taper bearing in clutch drum and over clutch support.

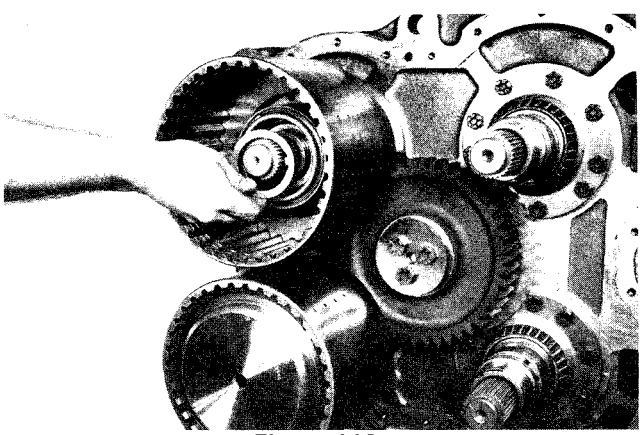


Figure 113

Position matched retainer washer on clutch support aligning tang on washer with notch in support.

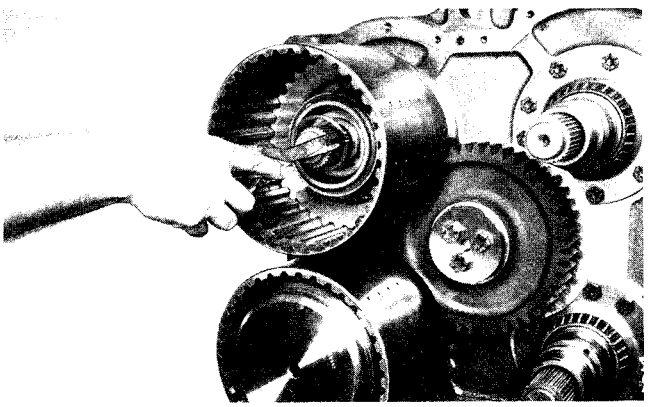


Figure 114

Install selected clutch drum snap ring, being certain ring is in full position in ring groove. Check to make sure end play on clutch drum does not exceed specifications .0000 (line to line) to a maximum of .0040 loose (end play).

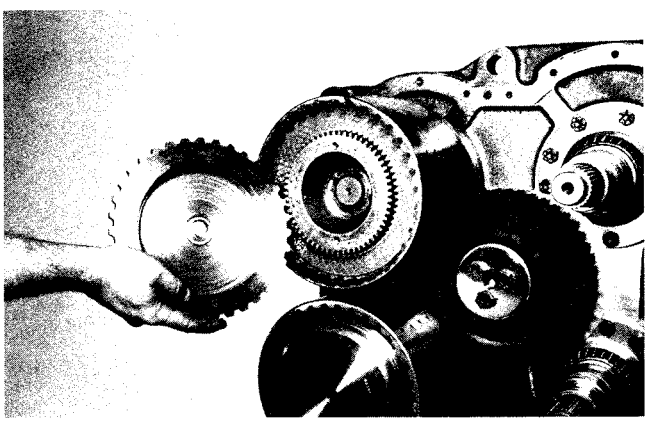


Figure 115

Install the clutch disc hub and hub retainer ring. Install one friction disc next to the piston. Install one steel disc. Alternate clutch plates until a quantity of sixteen (16) inner friction plates and fifteen (15) outer steel plates are installed. You start with a friction plate and end with friction plate. Position clutch end plate against clutch plates.

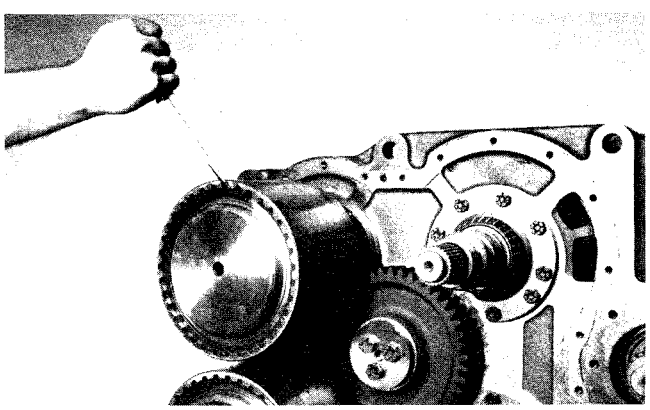
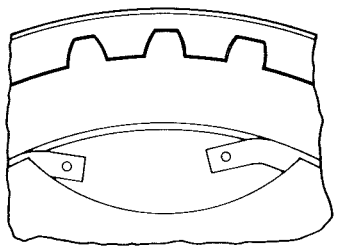
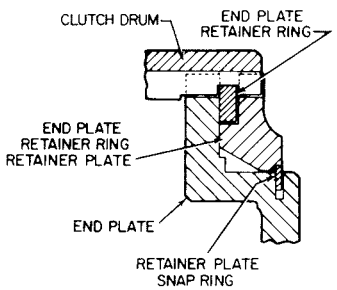


Figure 116

Install end plate retainer ring.





With the retainer plate snap ring in place in the clutch end plate, squeeze the ends of the snap ring together. Install ring retainer plate over snap ring and against the end plate. Release the snap ring in undercut of retainer plate. Be sure ring is in full position over retainer plate. (See line drawing)

3rd & 4th CLUTCH REASSEMBLY (4th Being Assembled)

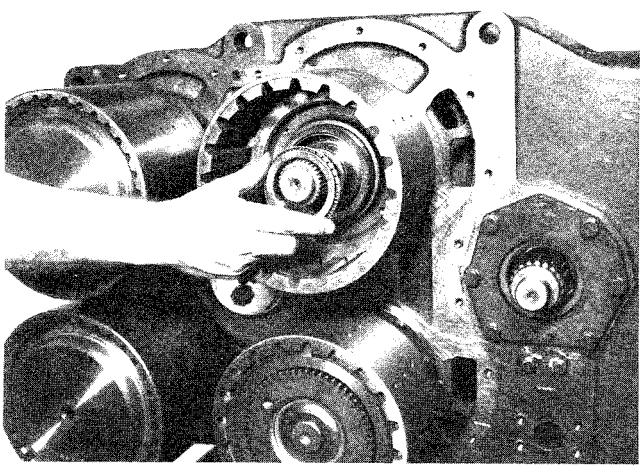


Figure 117

Position clutch drum on support, being sure the drum is matched with the support as explained in note following Figure 18. Position matched outer taper bearing in clutch drum and over clutch support.

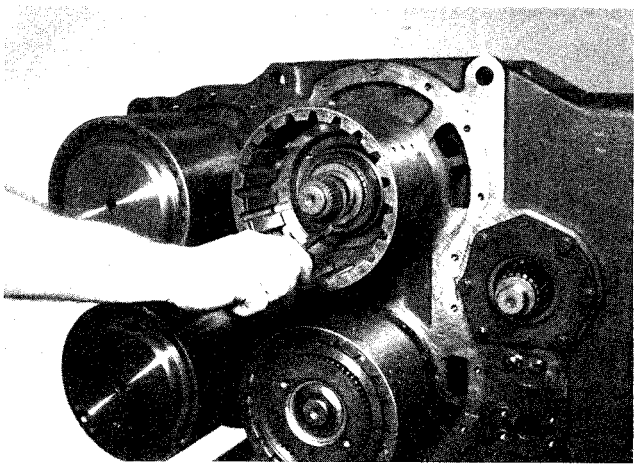


Figure 118

Position matched retainer washer on clutch support, aligning tang on washer with notch in support. Install selected clutch drum snap ring being certain ring is in full position in ring groove. Check to make sure end play on clutch drum does not exceed specifications. (See Figure 114.)

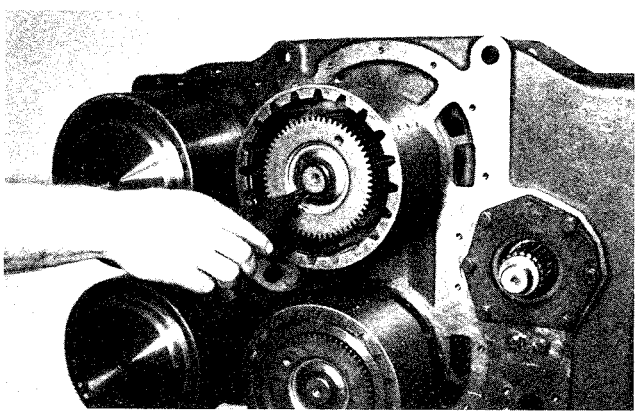


Figure 119

Install the clutch disc hub and hub retainer ring.

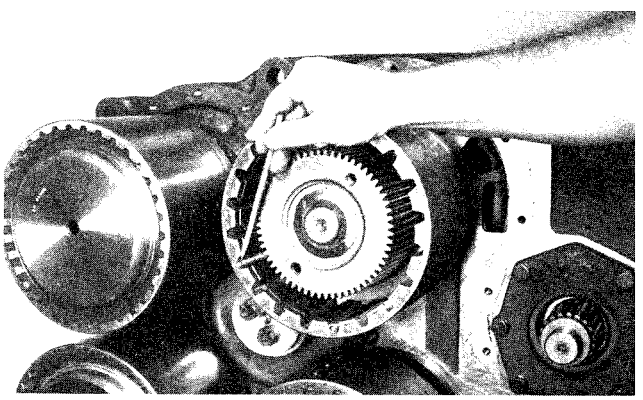


Figure 120

The outer disc has teeth missing on the outer diameter. This is to allow passage for the clutch release springs. Insert two or more release springs in drum and against the teeth of the clutch piston.

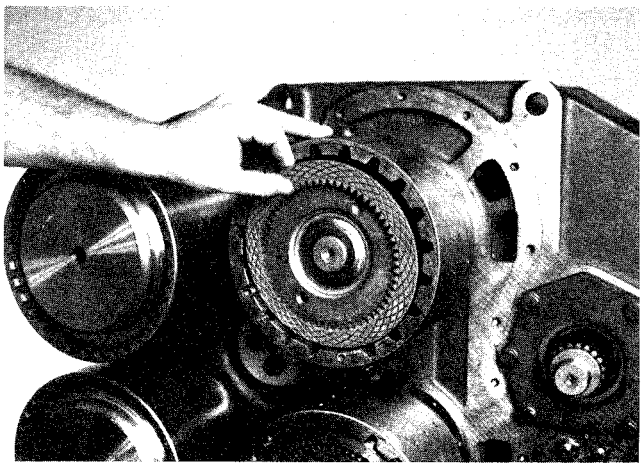


Figure 121

Install one friction disc next to the piston.

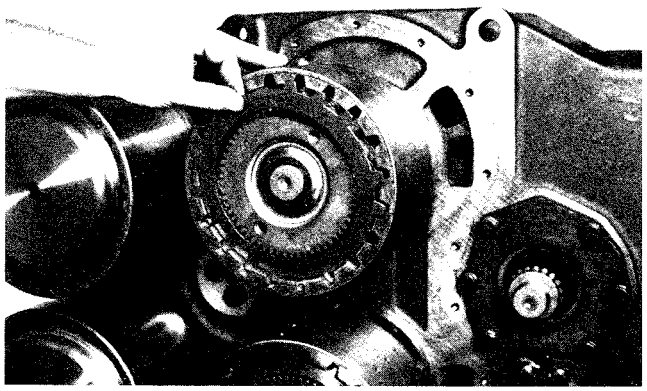


Figure 122

Install one steel disc. Alternate clutch plates until a quantity of ten (10) inner friction plates and nine (9) outer steel plates are installed. If assembly is correct each release spring is against a tooth on the clutch piston and you start with an inner disc and end with an inner disc.

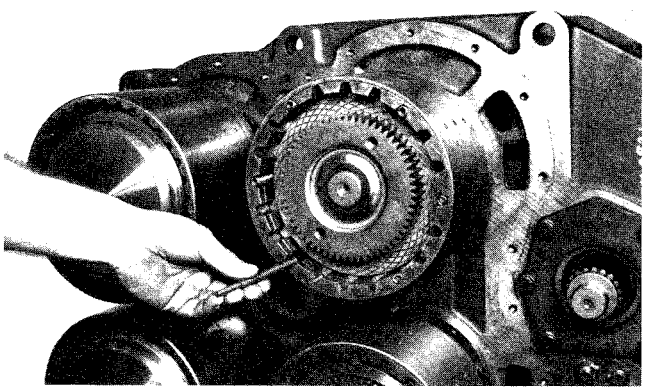


Figure 123

Install remaining clutch release springs and pins in open passages in the steel outer discs. Total quantity six (6) springs and six (6) pins.

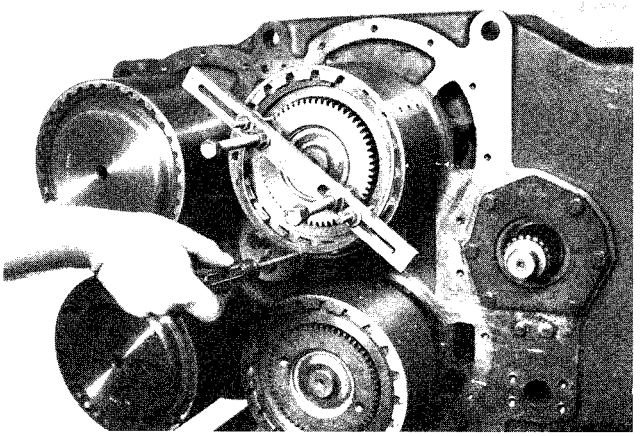


Figure 124

Position end plate against last friction disc. Compress end plate and install end plate retainer ring.

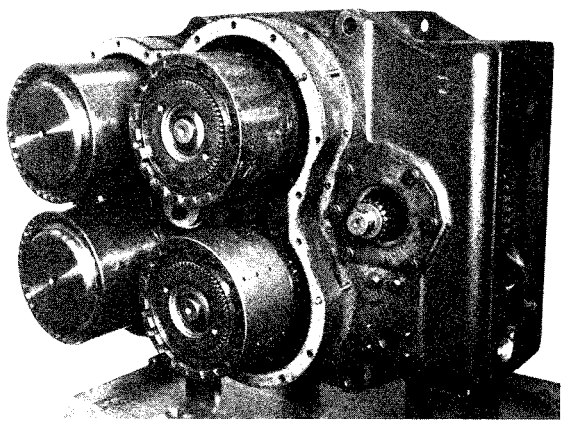


Figure 125

Position new clutch cover gasket on transmission housing, a thin coat of chassis grease will hold the gasket in place. Use aligning studs to hold clutch cover spacer in place. Position outer gasket on cover spacer.

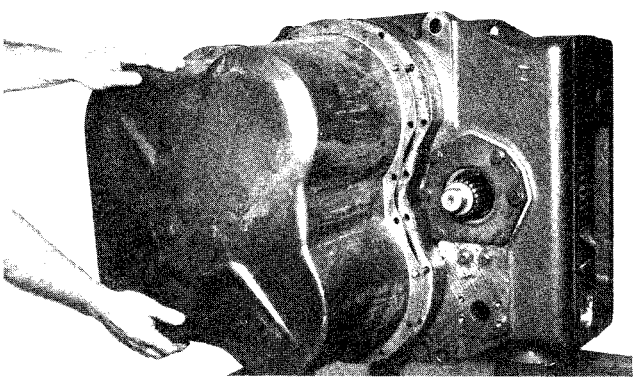


Figure 126

Position clutch cover on aligning studs. Install all of the cover bolts and washers. Remove aligning studs and install remaining bolts and washers.

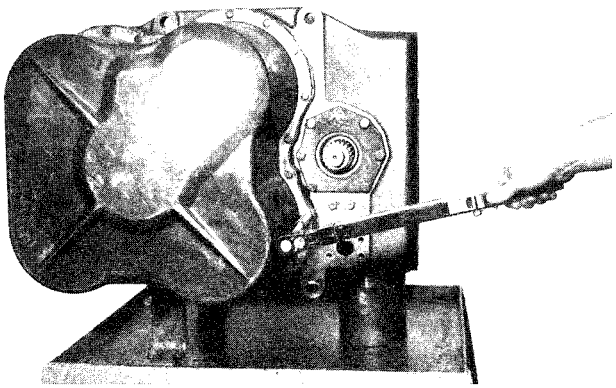


Figure 127

Tighten cover bolts 23 to 25 ft. lbs. torque [31,2-33,9 N.m].

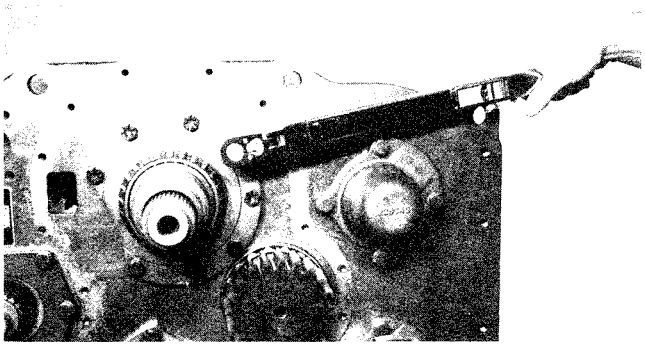


Figure 128

Position the 1st & 2nd clutch supports on housing. Install support bolts and tighten 80 to 88 ft. lbs. torque [108,5-119,3 N.m]. Install new clutch support sealing rings and expander springs. Expander spring gap to be 180° from sealing ring hook joint. Lock rings in position. Grease rings to facilitate drum to support assembly. **NOTE:** Oil sealing ring expander springs used under the oil sealing rings on the 1st and 2nd supports only.

REASSEMBLY OF 1st & 2nd CLUTCHES (2nd Being Assembled)

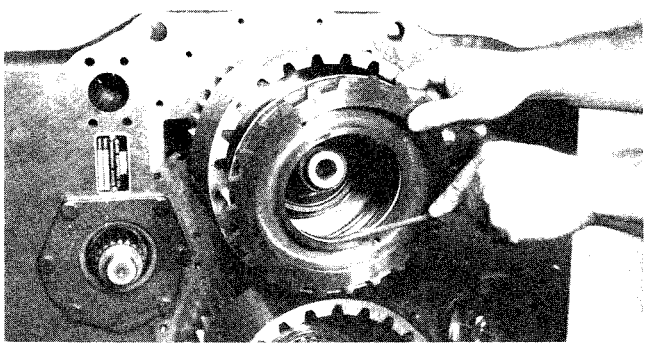


Figure 129

Position clutch drum on support, being sure the drum is matched with the support as explained in note following Figure 18. Install new inner and outer clutch piston oil sealing rings.

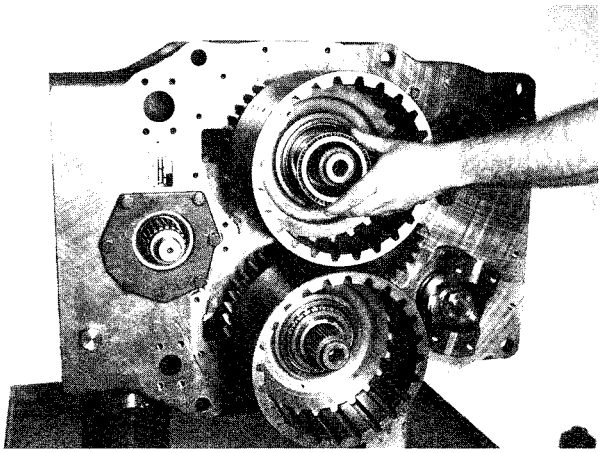


Figure 130

Position matched outer taper bearing in clutch drum and over support.

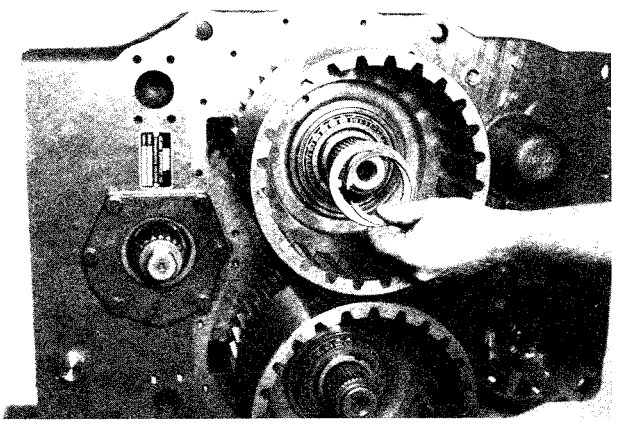


Figure 131

Position matched drum retainer washer on clutch support aligning tang on washer with notch in support. Install selected clutch drum snap ring, being certain ring is in full position in ring groove. Check to make sure end play on clutch drum does not exceed specifications. (See Figure 114.)

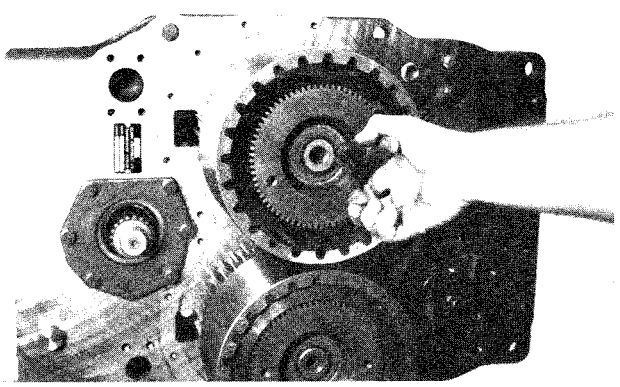


Figure 132

Install clutch disc hub and hub retainer ring.

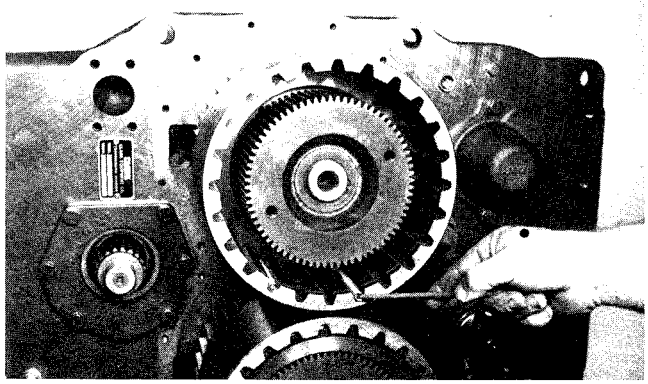


Figure 133

The outer disc has teeth missing on the outer diameter. This is to allow passage for the clutch release springs. Insert two or more release springs in drum and against the teeth of the clutch piston.

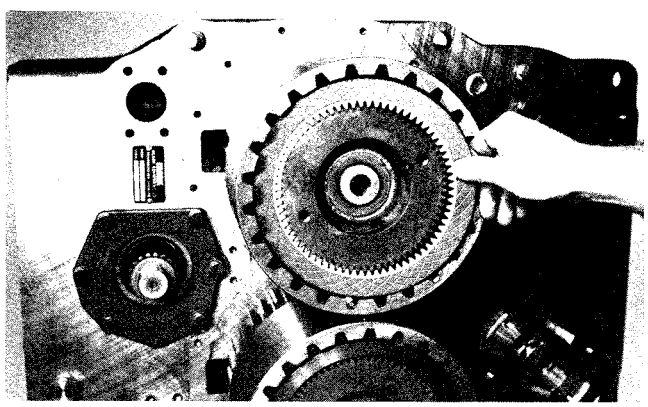


Figure 134

Install one inner clutch disc (spline teeth on inner diameter) on disc hub and against the clutch piston.

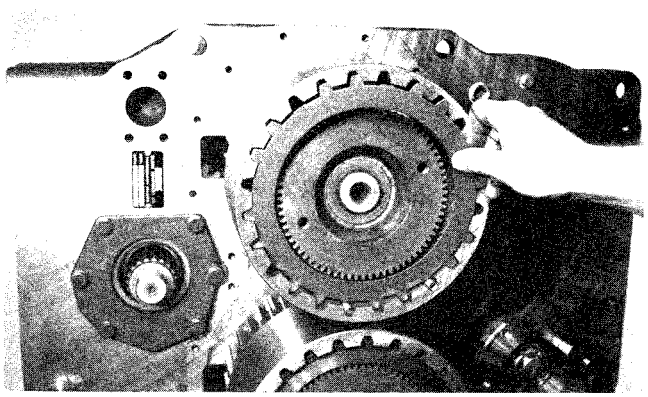


Figure 135

Install one steel outer disc, install next inner disc, alternate clutch discs, outer against inner, and always align the teeth on each outer disc with the teeth on the preceding outer disc. If assembly is correct each release spring is against a tooth on the clutch piston and you start with an inner disc and end with an inner disc. There are twelve (12) inner discs and eleven (11) outer discs.

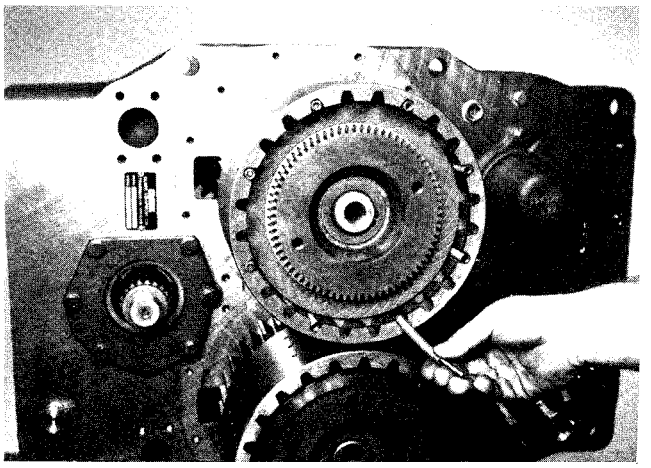


Figure 136

Install remaining clutch release springs and pins in open passages in the steel outer discs. Total quantity eight (8) springs and eight (8) pins.

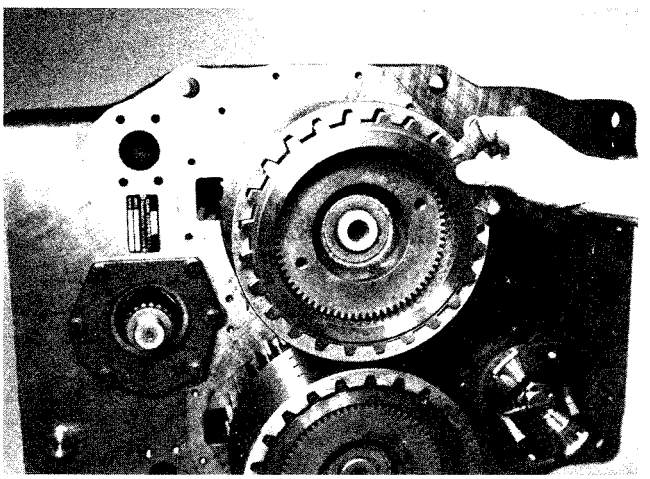


Figure 137

Position end plate against last friction disc.

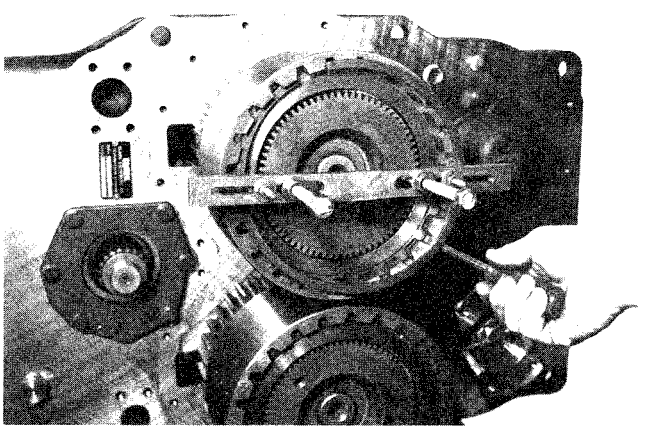


Figure 138

Compress end plate and install end plate retainer ring.

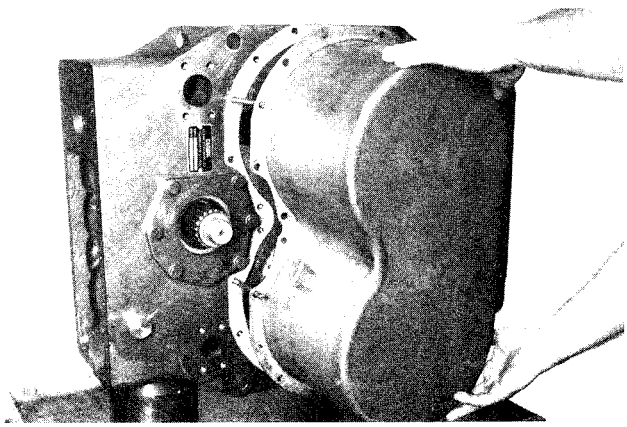


Figure 139

Position a new clutch cover gasket on transmission housing. Use aligning studs to hold clutch cover in position. Install all of the bolts and washers. Remove aligning studs and install remaining bolts and washers.

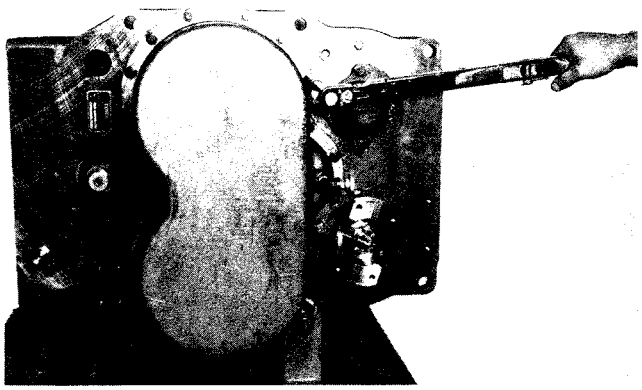


Figure 140

Tighten cover bolts 23 to 25 ft. lbs. torque [31,2-33,9 N.m].

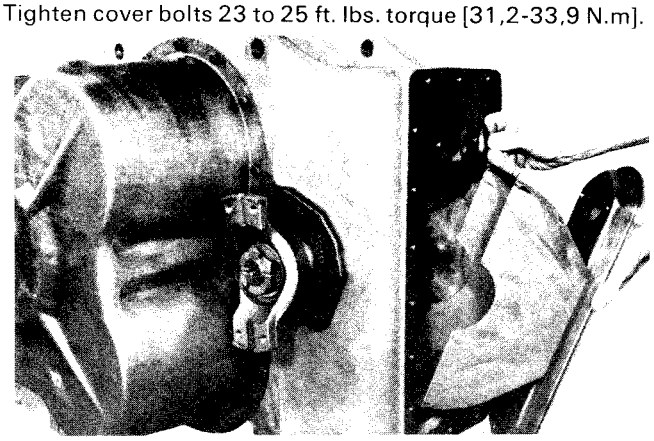


Figure 141

Install output flange, flange "O" ring, washer and flange nut. Block output shaft or use a soft bar to block the gear train, tighten output flange nuts 250 to 300 ft. lbs. torque [339,0-406,7 N.m]. Install new gasket on sump screen opening. Install sump screen and baffle assembly in housing and secure with bolts and lockwashers. Tighten 23 to 25 ft. lbs. torque [31,2-33,9 N.m].

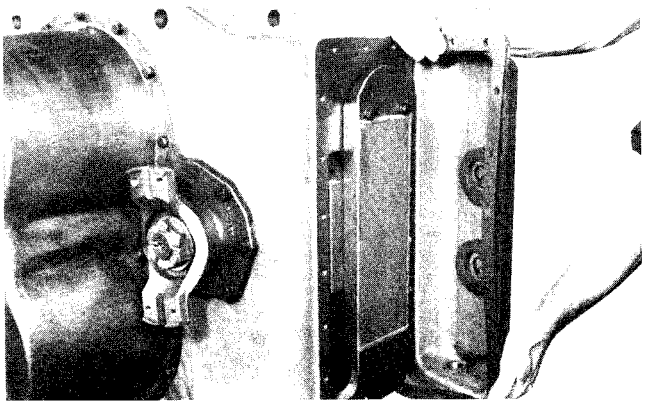


Figure 142

Install new gasket on transmission sump pan. Set pan magnets over welded washers in sump pan. Secure pan with bolts and belleville washers.

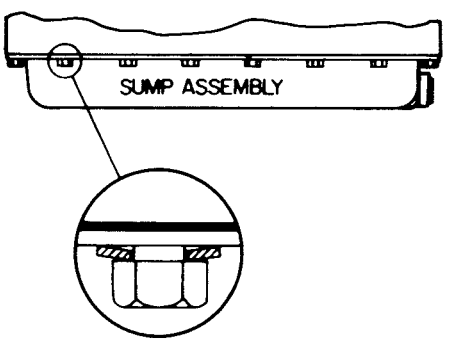


Figure 143

Tighten sump pan bolts 23 to 25 ft. lbs. torque [31,2-33,9 N.m].

REASSEMBLY OF CONTROL COVER

See page 16 for sequence of parts and parts identification.
NOTE: Lubricate all valves, springs, "O" rings, sleeves and oil seals with a light coat of automatic transmission fluid.

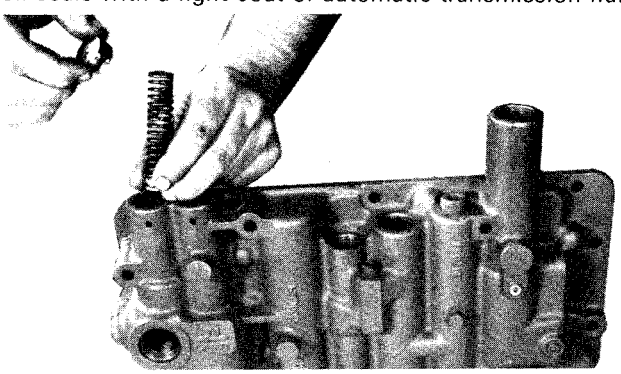


Figure 144

Install safety valve ball and spring in cover. With new "O" ring in position install spring stop on spring.

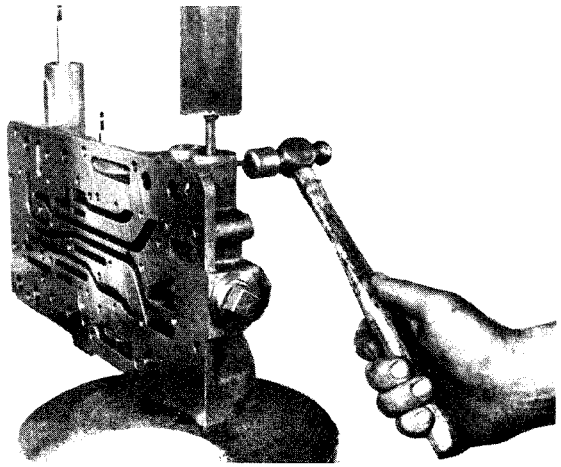


Figure 145

Depress spring stop and spring. Install spring stop roll pin.

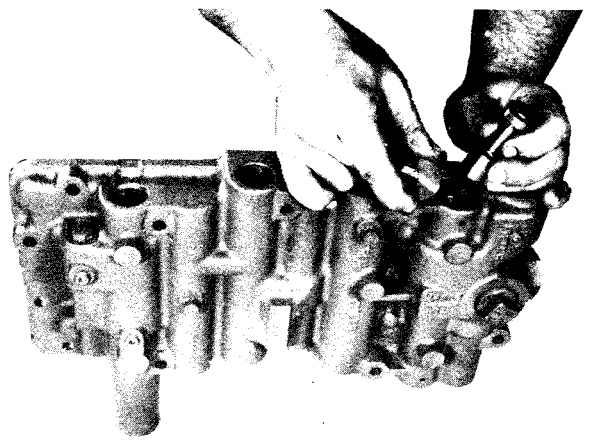


Figure 146

Install regulating valve spool in valve cover. Install new "O" ring on valve stop. Install valve stop in cover and retain with roll pin.

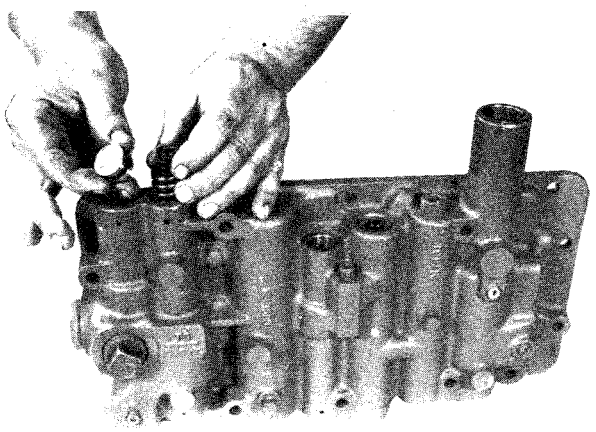


Figure 147

At opposite end of regulating valve install inner and outer valve spring. Install new "O" ring on spring stop. Install spring stop on springs.

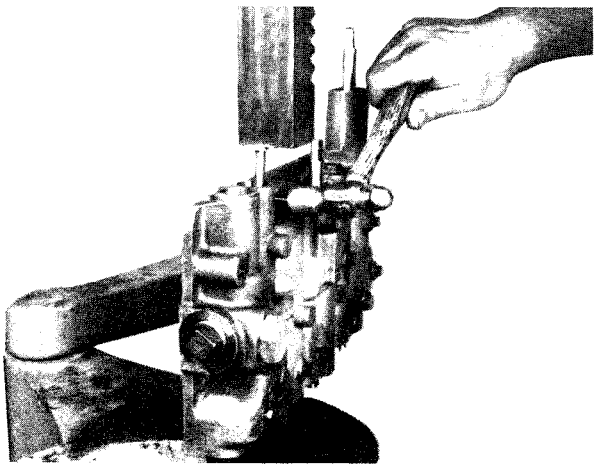


Figure 148

Depress spring stop and spring. Install spring stop roll pin.

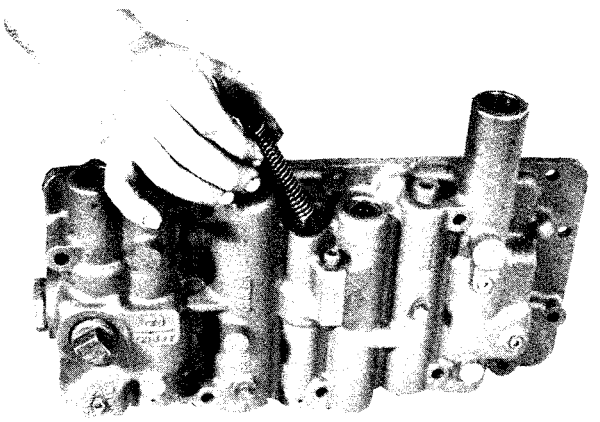


Figure 149

Install shut-off valve spring.

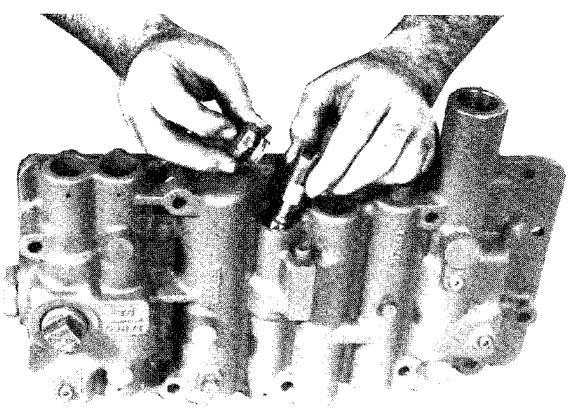


Figure 150

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

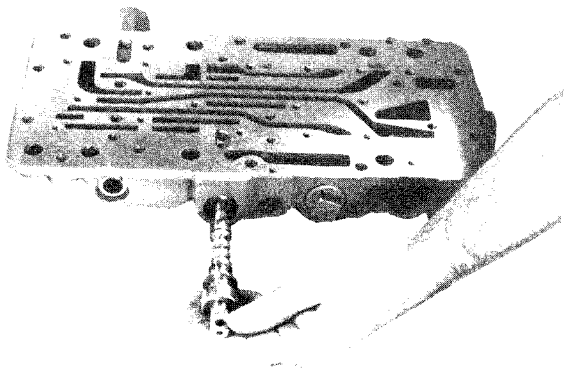


Figure 151

Install forward and reverse selector valve in housing. Install selector valve stop washer and oil seal on selector valve.

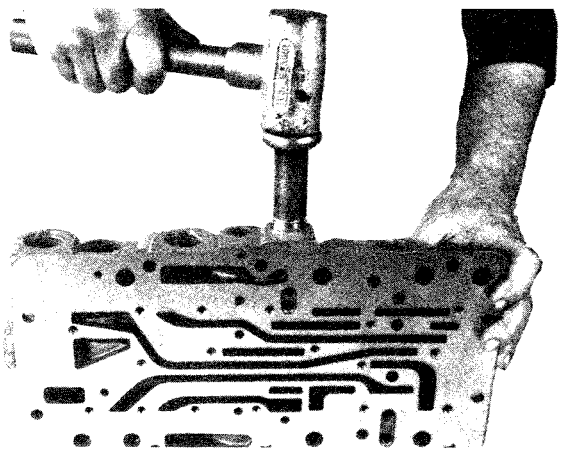


Figure 152

Apply a light coat of Permatex No. 2 on the outer diameter of a new selector valve oil seal. Install oil seal in housing.

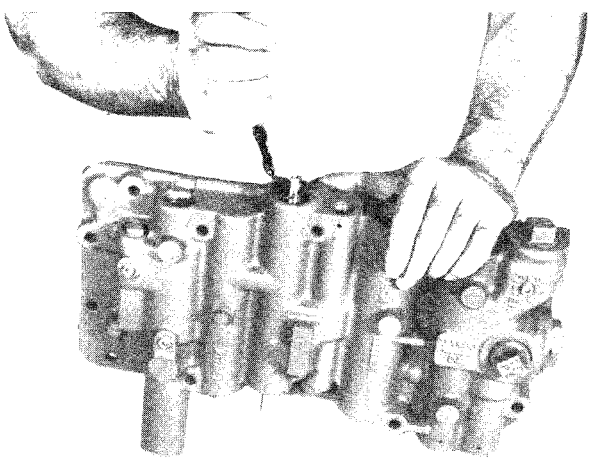


Figure 153

Install oil seal retainer ring.

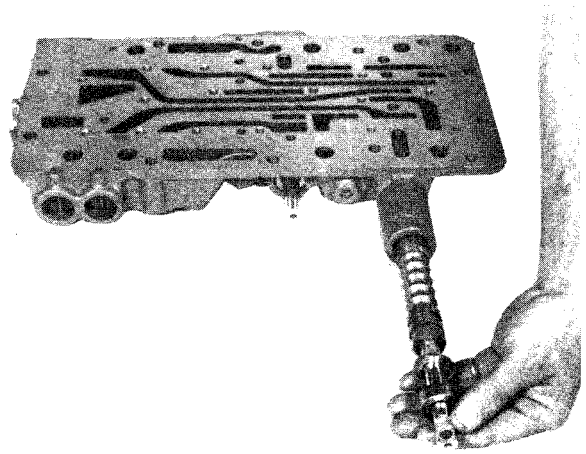


Figure 154

Install speed selector valve in housing. Install selector valve stop washer and oil seal on selector valve.

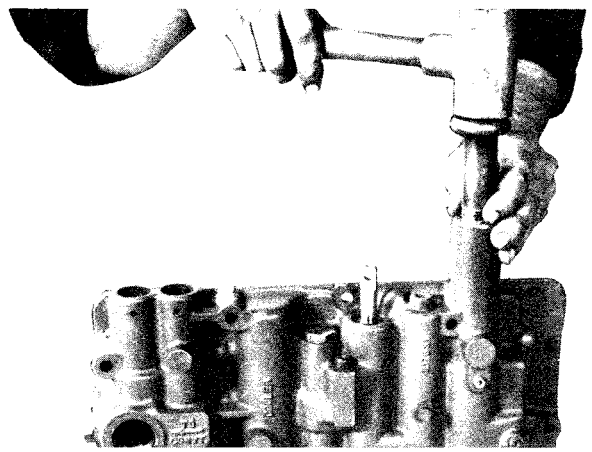


Figure 155

Apply a light coat of Permatex No. 2 on the outer diameter of a new selector valve oil seal. Install oil seal in housing.

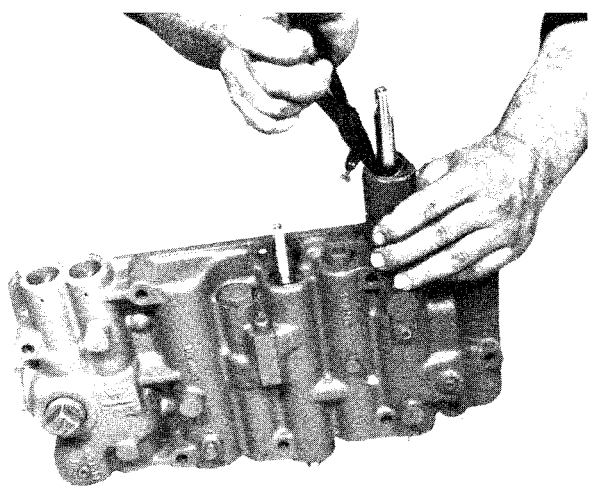


Figure 156

Install oil seal retainer ring.

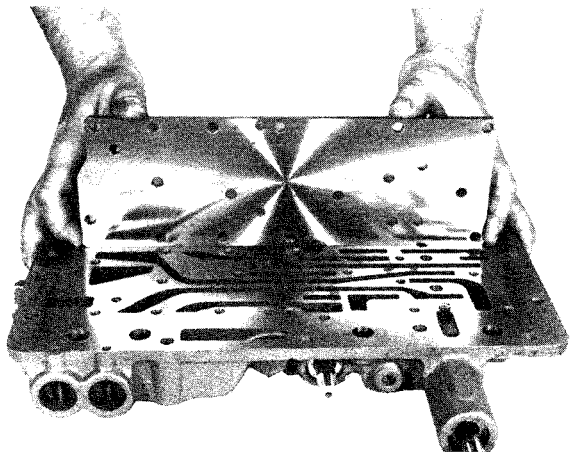


Figure 157

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 12 to 16 ft. lbs. torque [16,3-21,7 N.m].

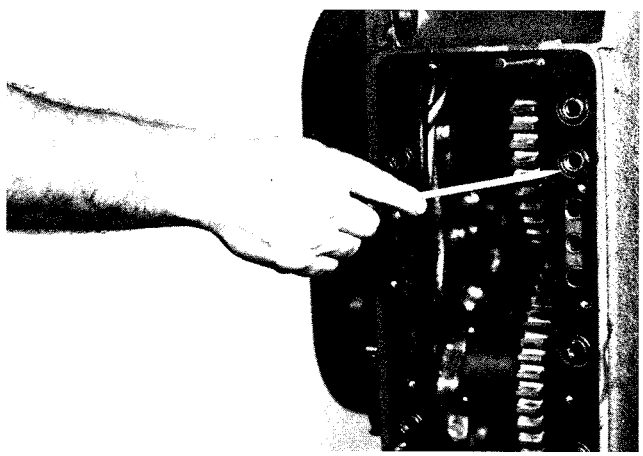


Figure 158

Position new control cover gasket and "O" rings on transmission housing. Aligning studs will hold gasket in place and facilitate cover installation.

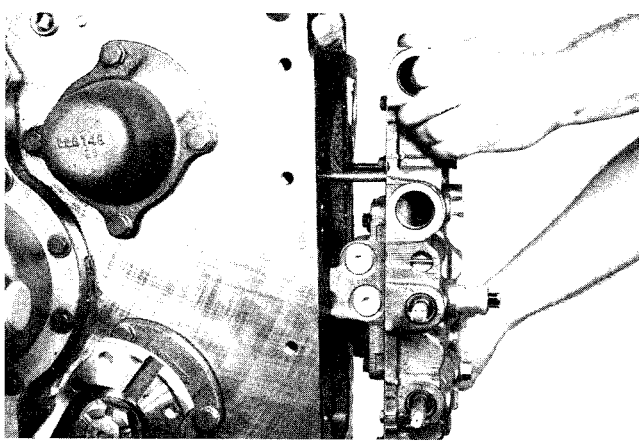


Figure 159

Locate control cover on aligning studs.

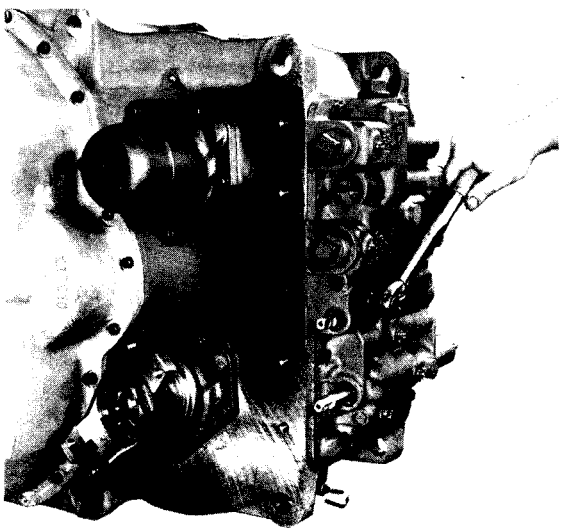


Figure 160

Install control cover bolts and washers, tighten 23 to 25 ft. lbs. torque [31,2-33,9 N.m].

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 the 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 oil cooler, 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 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, 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. On remote mounted torque converters remove drain 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 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 use only type oil recommended in lubrication section. Fill transmission through filler opening until fluid comes up to **LOW** mark on transmission dipstick. **NOTE:** If the dipstick is not accessible oil level check plugs are provided.

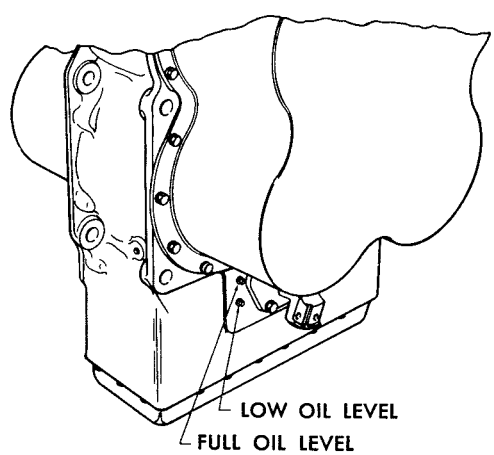
   Remove **LOWER** check plug, fill until oil runs from **LOWER** oil hole. Replace filler and level plug.

   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).

   Add quantity necessary to bring fluid level to **LOW** mark on dipstick or runs freely from **LOWER** oil level check plug hole. Install oil level plug or dipstick. Recheck with hot oil (180-200° F.) [82, 2-93, 3° C].

   Bring oil level to **FULL** mark on dipstick or runs freely from **UPPER** oil level plug.

7. Recheck all drain plugs, lines, connections, etc., for leaks and tighten where necessary.



SPECIFICATIONS AND SERVICE DATA—POWER SHIFT TRANSMISSION AND TORQUE CONVERTER

CONVERTER OUT PRESSURE	Converter outlet oil temp. 180° - 200° F. [82,3° - 93,3° C]. • Transmission in **NEUTRAL**. Operating specifications: 55 psi [379,3 kPa] minimum pressure at 20000 R.P.M. engine speed **AND** a maximum of 70 psi [482,6 kPa] outlet pressure with engine operating at no-load governed speed.
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	Friction.
CLUTCH OUTER DISC	Steel.
OIL FILTRATION	Full flow oil filter safety by-pass, also strainer screen in sump at bottom of transmission case.
CLUTCH PRESSURE	180-220 psi [1241,1 - 1516,8 kPa] — With parking brake set **(see note)** , oil temperature 180° - 200° F. [82,2° - 93,3° C], engine at idle (400 to 600 RPM), shift thru direction and speed clutches. All clutch pressure must be equal within 5 psi, [34,5 kPa]If ,clutch pressure varies in any one clutch more than 5 psi, [34,5 kPa] repair clutch.

NOTE: Never use service brakes while making clutch pressure checks. Units having brake actuated declutching in forward and/or reverse will not give a true reading.

ALWAYS USE PARKING BRAKE WHEN MAKING CLUTCH PRESSURE CHECKS.

LUBRICATION

TYPE OF OIL	See Lube Chart.
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° to 200° F. [82, 2 - 93, 3° C]. Maintain oil level to FULL mark.
NORMAL * DRAIN PERIOD	Every 500 hours, change oil filter element. Every 1000 hours, drain and refill system as follows: Drain with oil at 150° to 200° F. [65, 6 - 93, 3° C].

NOTE: It is recommended that filter elements be changed after 50 and 100 hours of operation on new and rebuilt or repaired units.

(a) Drain transmission and remove sump screen. Clean screen thoroughly and replace, using new gaskets.

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

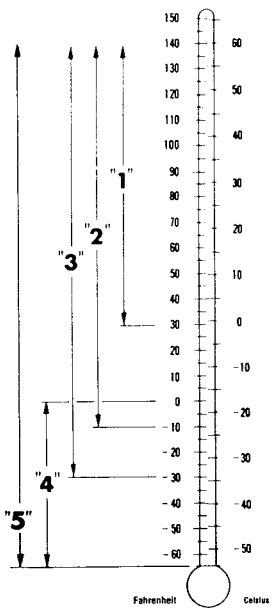
(c) Refill transmission to **LOW** mark.

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

(e) Recheck level with engine running at 500 - 600 RPM and add oil to bring level to **LOW** mark. When oil temperature is hot (180-200° F.) [82,2-93,3° C] make final oil level check. **BRING OIL LEVEL TO FULL MARK.**

RECOMMENDED LUBRICANTS FOR CLARK-HURTH COMPONENTS POWER SHIFTED TRANSMISSION AND TORQUE CONVERTERS

Prevailing Ambient Temperature



*Dexron is a registered trademark of General Motors Corporation.

Temperature Range "1"
(a) C-2 Grade 30
(b) C-3 Grade 30
(c) Engine Oil:-Grade 30 API-CD/SE or CD/SF
(d) MIL-L-2104C-Grade 30
(e) MIL-L-2104D-Grade 30

Temperature Range "2"
(a) MIL-L-2104C-Grade 10
(b) MIL-L-2104D-Grade 10
(c) C-2 Grade 10
(d) C-3 Grade 10
(e) Engine Oil:-Grade 10 API-CD/SE or CD/SF
(f) Quintolubric 822-220 (Non Phosphate Ester Fire Resistant Fluid)

Temperature Range "3"
(a) *Dexron
(b) *Dexron II D - **See Caution Below**

Temperature Range "4"
(a) MIL-L-46167
(b) MIL-L-46167 A

Temperature Range "5"
(a) Conoco High-Performance Synthetic Motor Oil — Spec. No. 6718

PREFERRED OIL VISCOSITY: Select highest oil viscosity compatible with prevailing ambient temperatures and oil application chart.

Temperature ranges "2" and "3" may be used to lower ambient temperatures when sump preheaters are used.

Temperature range "4" should be used only in ambient temperature range shown.

MODULATED SHIFT TRANSMISSIONS: T12000, 18000, 24000, 28000 & 32000 series transmissions with modulated shift use only C-3 or temperature range 3 items (a) & (b) *Dexron or *Dexron II D. **SEE CAUTION BELOW.** 3000, 4000, 5000, 6000, 8000, 16000 & 34000 series transmissions with modulated shift use only C-3 or temperature range 3 item (a) only *Dexron. Do **NOT** use *Dexron II D. **SEE CAUTION BELOW.**

CAUTION: *Dexron II D is not compatible with graphitic clutch plate friction material UNLESS IT MEETS THE APPROVED C-3 SPECIFICATIONS. *Dexron II D cannot be used in the 3000, 4000, 5000, 6000, 8000, 16000 or 34000 series power shift transmissions, or the HR28000 & HR32000 series having converter lock-up, or the C270 series converter having lock-up UNLESS IT MEETS THE APPROVED C-3 SPECIFICATIONS.

Any deviation from this chart must have written approval from the application department of the Clark-Hurth Components Engineering and Marketing Department.

*** Normal drain periods and filter change intervals are for average environmental and duty-cycle conditions. Severe or sustained high operating temperatures or very dusty atmospheric conditions will cause accelerated deterioration and contamination. For extreme conditions judgment must be used to determine the required change intervals.**

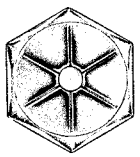
TORQUE IN (FT.—LBS.)
BOLTS, CAPSCREWS, STUDS AND NUTS

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

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

Grade 5

LUBRICATED OR PLATED



Grade 8

Nominal Size	Fine Thread Torque Lbs. Ft./N.m.	Course Thread Torque Lbs. Ft./N.m.	Fine Thread Torque Lbs. Ft./N.m.	Course Thread Torque Lbs. Ft./N.m.
.2500	9-11 [12,2-14,9]	8-10 [10,8-13,6]	11-13 [14,9-17,6]	9-11 [12,2-14,9]
.3125	16-20 [21,7-27,1]	12-16 [16,3-21,7]	28-32 [38,0-43,4]	26-30 [35,3-40,7]
.3750	26-29 [35,3-39,3]	23-25 [31,2-33,9]	37-41 [50,2-55,6]	33-36 [44,7-48,8]
.4375	41-45 [55,6-61,0]	37-41 [50,2-55,6]	58-64 [78,6-86,8]	52-57 [70,5-77,3]
.5000	64-70 [86,8-94,9]	57-63 [77,3-85,4]	90-99 [122,0-134,2]	80-88 [108,5-119,3]
.5625	91-100 [123,4-135,6]	82-90 [111,2-122,0]	128-141 [173,5-191,2]	115-127 [156,0-172,2]
.6250	128-141 [173,5-191,2]	113-124 [153,2-168,1]	180-198 [244,0-268,4]	159-175 [215,6-237,3]

PRESSURE AND OIL FLOW CHECK SPECIFICATIONS. ALL CHECKS MADE WITH HOT OIL (180 - 200° F.) [82,2 - 93,3° C.]

A.	Clutch Pressure at Transmission Control Cover	See Specifications and Service Data.
B.	Transmission to Converter Line	See External Oil Flow Diagram.
C.	Converter-Out Pressure	See Pressure and Oil Flow Checks.
D.	Temperature Gauge Connection	See External Oil Flow Diagram.
E.	Lubricating Pressure	25 p.s.i. [172,4 kPa] Maximum at High Free Idle.
	Converter Return Line	See External Oil Flow Diagram.
	Converter Pump Output	See Pump Chart.

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 operation 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 systems 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 180-200 F. [82,2-93,3 C.]. 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 high 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 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)

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	MINIMUM CONVERTER OUT PRESSURE	MAXIMUM CONVERTER OUT PRESSURE
C-5000	55 p.s.i. [379,3 kPa]	70 p.s.i. [482,6 kPa]
C-8000	55 p.s.i. [379,3 kPa]	70 p.s.i. [482,6 kPa]
C-16000	55 p.s.i. [379,3 kPa]	70 p.s.i. [482,6 kPa]

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. [2068,4 kPa].

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.

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.) [1241,1 - 1516,8 kPa] are all equal within 5 p.s.i. [34,5 kPa] refer to paragraph on Low Converter Charging Pump Output.

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

NOMINAL PUMP RATINGS:	C-5000	C-8000	C-16000
	21 G.P.M.	21 G.P.M.	40 G.P.M.
	31 G.P.M.	31 G.P.M.	50 G.P.M.
		40 G.P.M.	65 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 or rebuilt.

TRANSMISSION CLUTCH LEAKAGE

Check clutch pressures at low engine idle with oil at operating temperatures 180 - 200 F. [82, 2 - 93, 3° C]. Engine speed must remain constant during entire leakage check. Shift lever into forward 4 or 8 speeds. Record pressures. Shift lever in reverse and 1st. Record pressure. All pressure must be equal within 5 p.s.i. [34,5 kPa]. If clutch pressure varies in any one clutch more than 5 p.s.i. [34,5 kPa] , repair clutch.

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 — Low speed thru High Reverse — Low speed

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

Example:				
	Pump Volume at idle	8 gal.	Pump volume	8 gal.
	Forward—Low speed thru High	6 gal.	Forward — Low speed	6 gal.
	Reverse—Low speed	6 gal.	Clutch leakage	2 gal.

If clutch leakage varies more than 1 gal. from one clutch to another, repair 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.

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 C5000 series not to exceed 3 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.

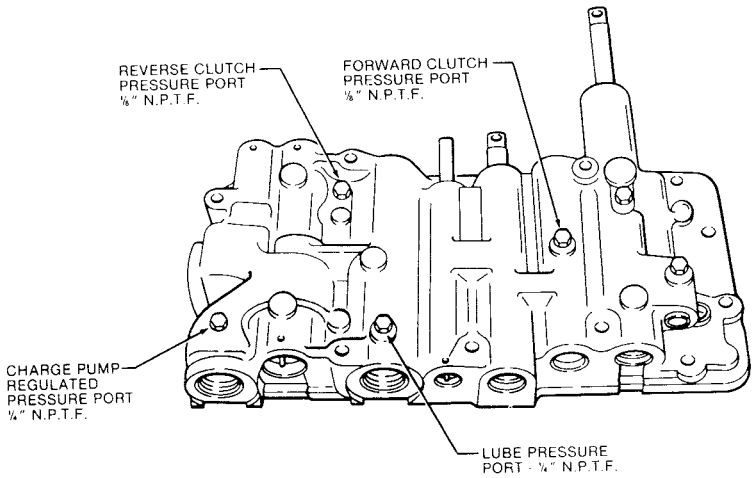
NOISY CONVERTER

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.

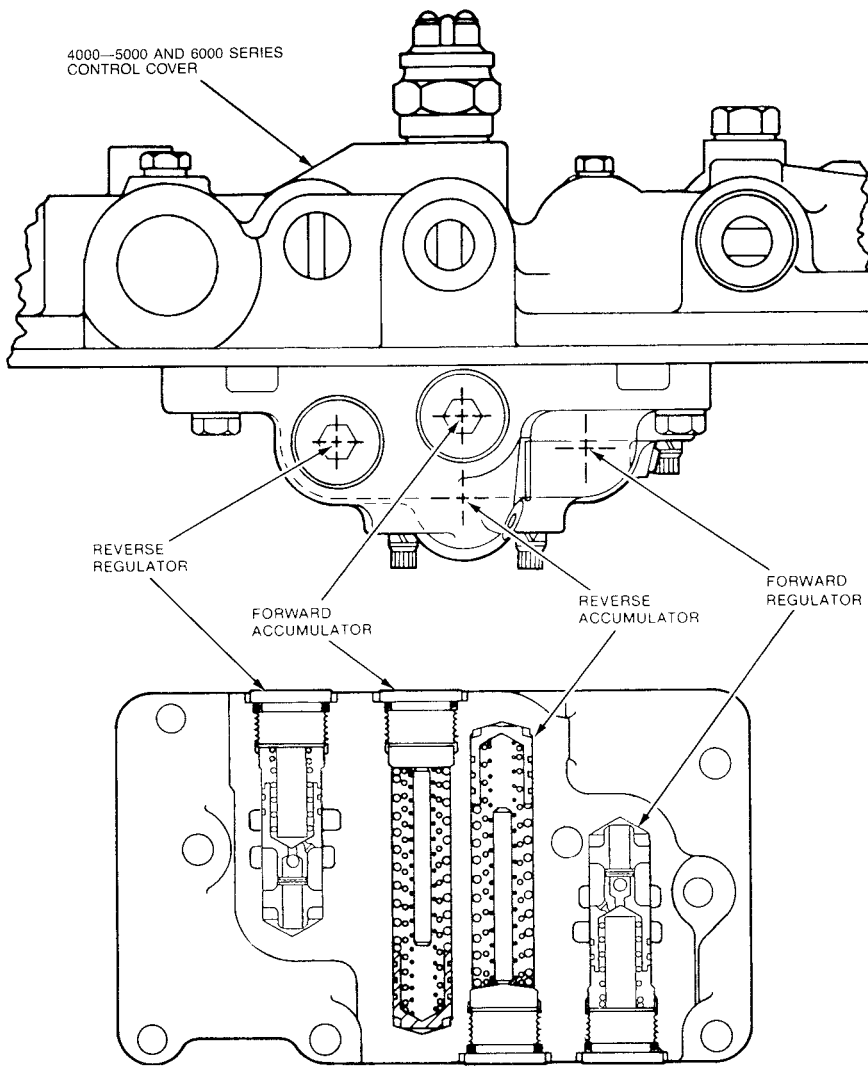
LACK OF POWER

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.

6000 CHECK PORTS



6000 SERIES MODULATION



For Further Modulation Information Refer To 6000 Series Transmission Data In The Transmission Clutch Modulation Operation And Trouble Shooting Guide Supplement

6000 SERIES POWER SHIFT TRANSMISSION
CLUTCH TAPER BEARING ADJUSTMENT

9.25 DIA.
1ST & 2ND CLUTCH
KIT 802313

Select a variable thickness snap ring and variable thickness tanged washer to be assured of the tightest stack up of parts from .0000 (line to line) to a max. of .0040 loose (end play).

1 NOTCH

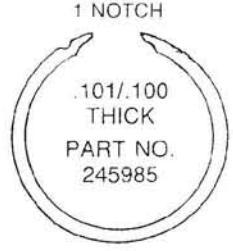
4 NOTCHES

NO NOTCH

2 NOTCHES

5 NOTCHES

1 NOTCH



3 NOTCHES

6 NOTCHES

3 NOTCHES

7.75 DIA.
FWD., REV.,
3RD & 4TH CLUTCHES
KIT 802314

1 NOTCH

4 NOTCHES

NO NOTCH

2 NOTCHES

5 NOTCHES

1 NOTCH

3 NOTCHES

6 NOTCHES

3 NOTCHES

ASSEMBLY INSTRUCTIONS

1st, 2nd, Forward, Reverse, 3rd and 4th clutch drum taper bearing installation for the 6000 series power shift transmission.

NOTE: Do not install clutch support on transmission housing until proper stack up of parts in the clutch drum is achieved. The following information must be done on the bench before installation on the transmission.

SUBJECT: Procedure for Clutch Taper Bearing Adjustment

Prior to selecting washer and snap ring, assure that bearings are seated by tapping outer cone assembly and rotating drum assembly on support.

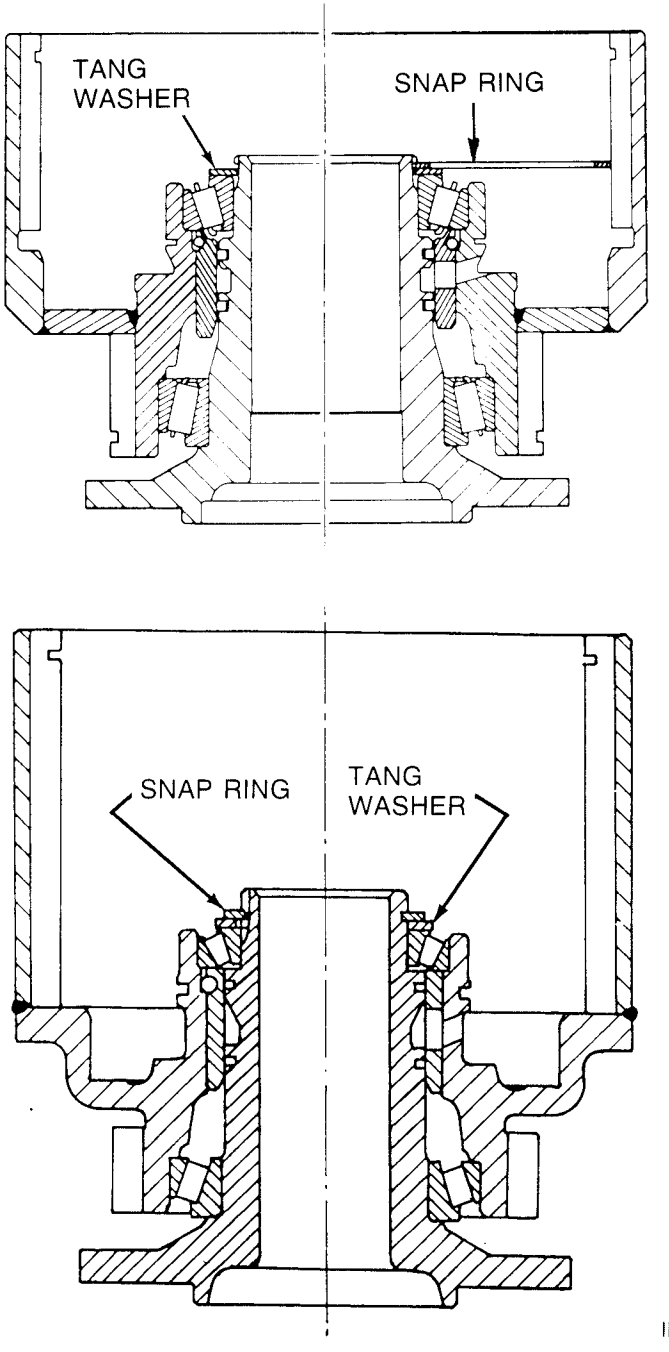
1. Select the thickest snap ring (with no notches) and try each tang washer in sequence from the thickest to the thinnest (one notch through six notches).
2. If above will not assemble, select next thinnest snap ring, with one notch, and repeat the trial of the tang washers from the thickest to the thinnest.
3. If above step 2 will not assemble, select the thinnest snap ring with 3 notches, and repeat the trial of the tang washers from the thickest to the thinnest.

Above procedure will set the taper bearing preload from .0000 (line to line) to a maximum .0040 loose (end play).

CAUTION: After parts have been matched with each other, do not mix with other clutch parts.

Remove retainer ring and washer. Remove drum assembly from clutch drum support.

Assemble clutch support on transmission housing as prescribed in the applicable maintenance manual. Assemble the clutch drum on the support using the same selected tang washer and selected retainer ring that was chosen on the bench assembly.



INST. DRAWING
802316

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