POWER SHIFT
TRANSMISSION
32000
MAINTENANCE AND SERVICE

TOWING OR PUSH STARTING

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

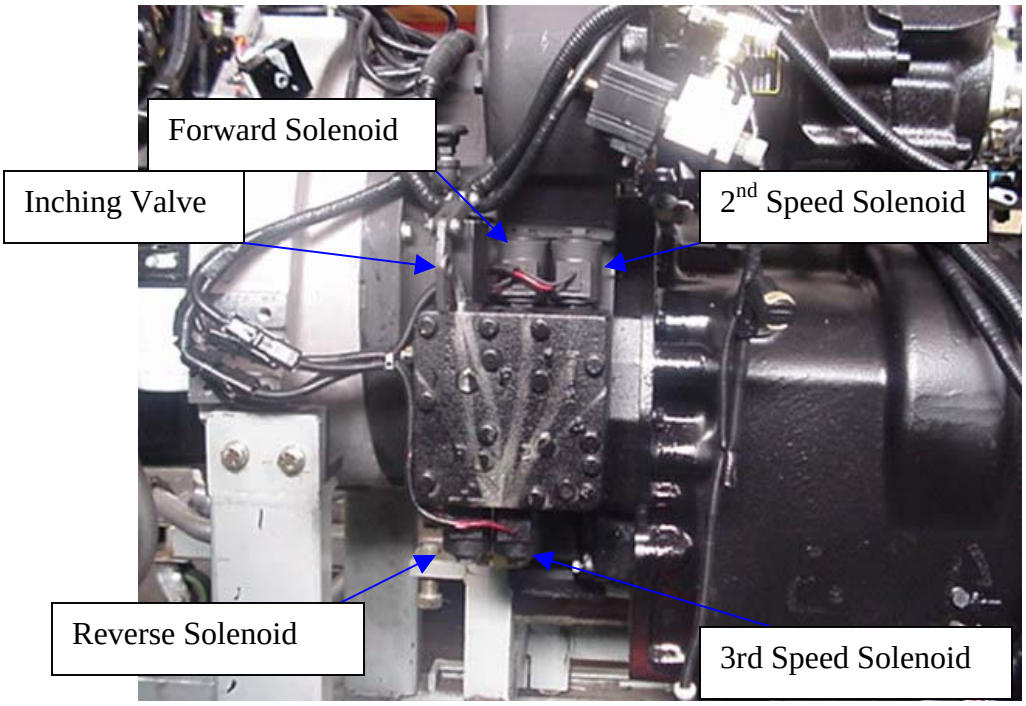
The engine cannot be started by pushing or towing.

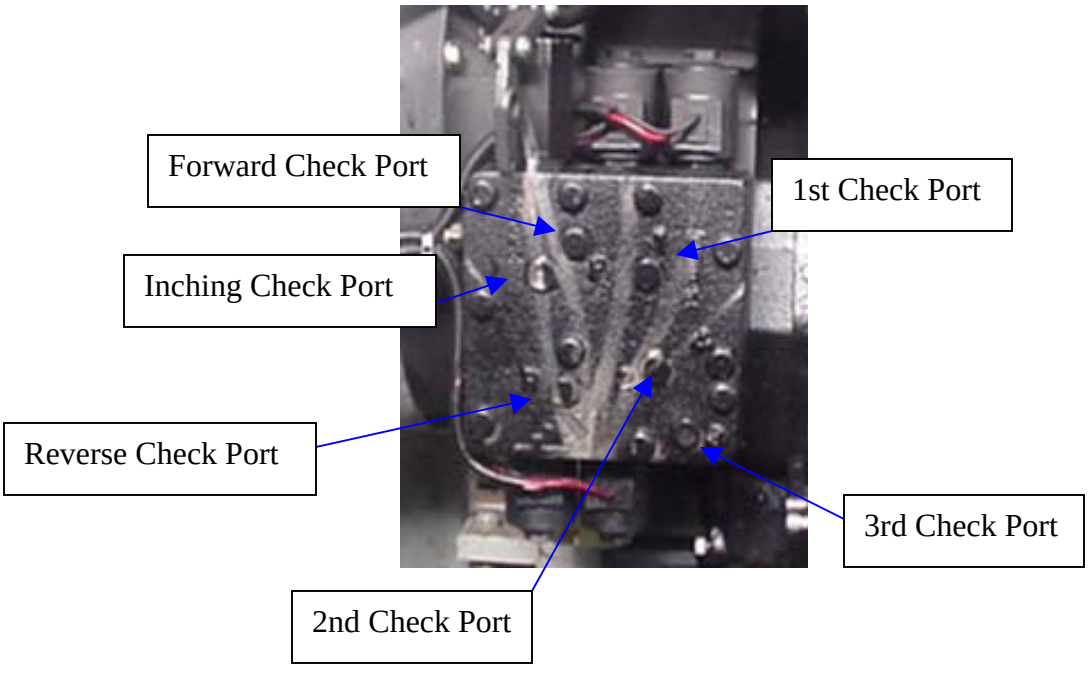
Transmission Filter

NOTE: This picture was taken from under side of the truck

Change the transmission filter every 250hrs located next to the hydraulic tank. Use SAE 30

32000 Transmission Control Valve





Clutch pressure 240-300 PSI with parking brake set, oil temperture180 –200 F and engine idle 400 to 600 RPM. Shift thru the direction and speed clutches NOTE: all pressure must be equal within 5 PSI if clutch pressure varies in any one clutch more than 5 PSI repair the clutch.

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NOTE: Metric Dimensions Shown in Brackets [ ].

TRANSMISSION ASSEMBLY

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

The transmission and torque converter function together and operate through a common hydraulic system. It is necessary to consider both units in the study of their function and operation.

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

Basic Design Silhouette
Converter Group
Converter and Transmission Case Group
3 & 4 Speed Clutch and Gear Group
Regulating Valve, Charging Pump and Filter Group
Control Valve Assembly (Mechanical & Electric Shift)
Mechanical Parking Brake
Assembly Instruction
Ring Gear Installation
Clutch and Gear Arrangement
Shielded Bearing Installation
3 & 4 Speed Power Flow
External Plumbing
4 Speed Section

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

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

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

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

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

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

HOW THE UNITS OPERATE

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

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

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

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

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

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

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

The shift control valve assembly consists of a valve body with selector valve spools. A detent ball and spring in the selector spool provides one position for each speed range. A detent ball and spring in the direction spool provides three positions, one each for forward, neutral and reverse.

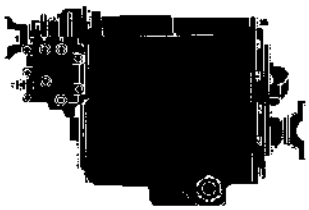
With the engine running and the directional control lever in neutral position, oil pressure from the regulating valve is blocked at the control valve, and the transmission is in neutral. Movement of the forward and reverse spool will direct oil, under pressure to either the forward or reverse direction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

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

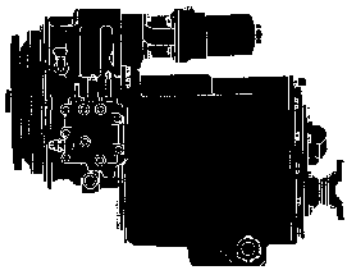
The direction or speed clutch assembly consists of a drum with internal splines and a bore to receive a hydraulically actuated piston. The piston is "oil tight" by the use of sealing rings. A steel disc with external splines is inserted into the drum and rests against the piston. Next, a friction disc with splines at the inner diameter is inserted. Discs are alternated until the required total is achieved. A heavy back-up plate is then inserted and secured with a snap ring. A Hub with O.D. splines is inserted into the splines of discs with teeth on the inner diameter The discs and hub are free to increase in speed or rotate in the opposite direction as long as no pressure is present in that specific clutch.

To engage the clutch, as previously stated, the control valve is placed in the desired position. This allows oil under pressure to flow from the control valve, through a tube, to a chosen clutch shaft. This shaft has a drilled passageway for oil under pressure to enter the shaft. Oil pressure sealing rings are located on the clutch shaft. These rings direct oil under pressure to a desired clutch. Pressure of the oil forces the piston and discs against the heavy back-up plate. The discs, with teeth on the outer diameter, clamping against discs with teeth on the inner diameter, enables the hub and clutch shaft to be locked together and allows them to drive as a unit.

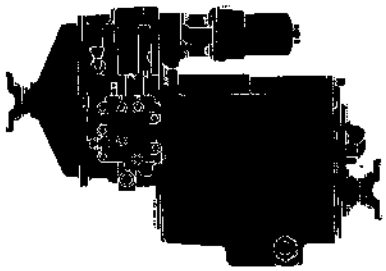
There are bleed balls in the clutch piston which allow quick escape for oil when the pressure to the piston is released.



R-32000
(SHORT DROP)



HR-32000
(SHORT DROP)



MHR-32000
(SHORT DROP)

FIG. A

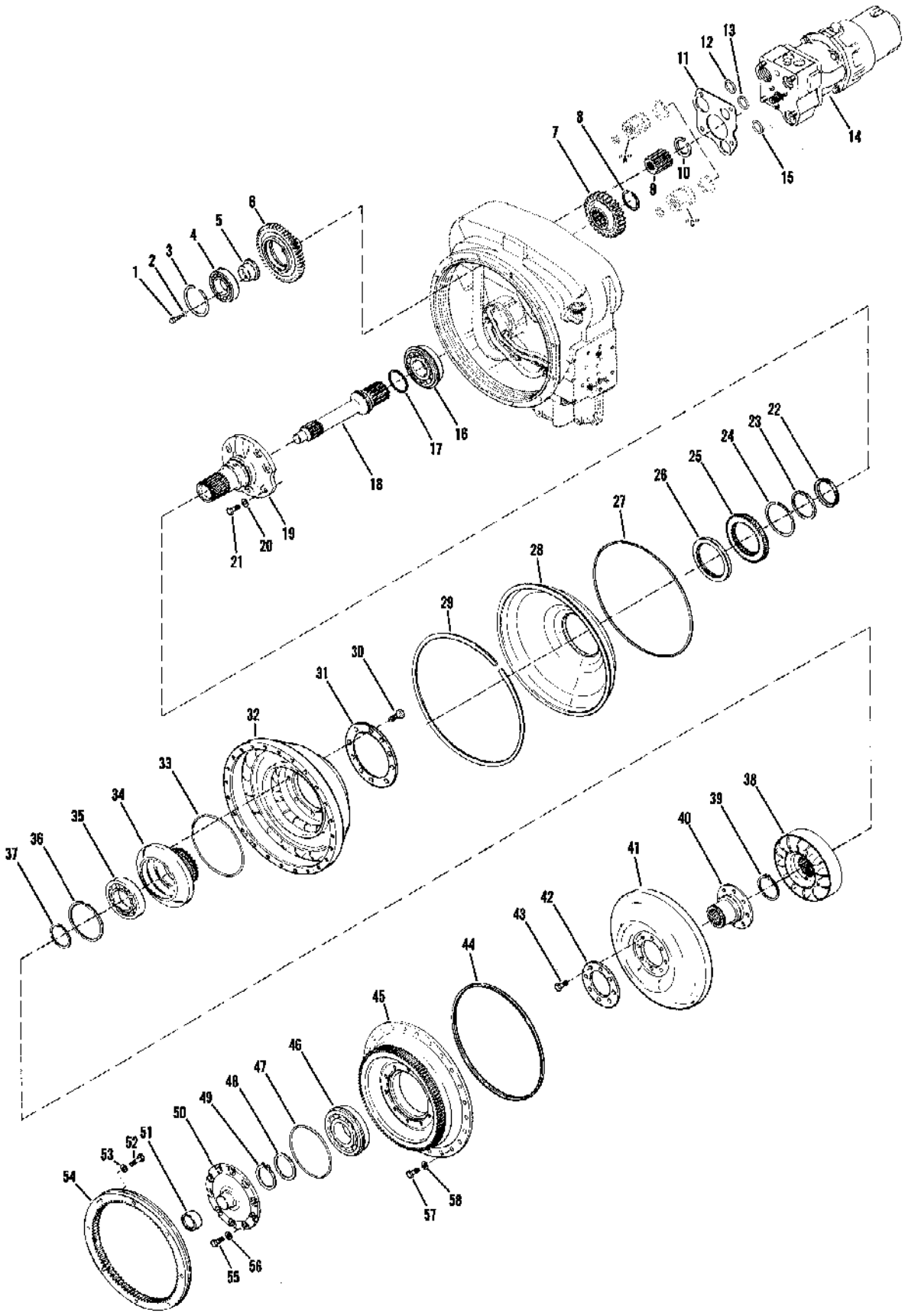

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Figure B

HR32000 CONVERTER GROUP

ITEM	DESCRIPTION	QTY.
1	Bearing Support Screw	6
2	Bearing Support Screw Lockwasher	6
3	Drive Gear Snap Ring	3
4	Pump Drive Gear Bearing	3
5	Pump Drive Bearing Support	3
6	Pump Drive Gear	3
7	Turbine Shaft Gear	1
8	Turbine Shaft Gear Snap Ring	1
9	Charging Pump Drive Sleeve	1
10	Pump Sleeve Snap Ring	1
11	Valve to Housing Gasket	1
12	Valve Body "O" Ring	1
13	Valve Body "O" Ring	1
14	Charging Pump & Oil Filter Assembly	1
15	Valve Body "O" Ring	1
16	Turbine Shaft Bearing	1
17	Turbine Shaft Piston Ring	1
18	Turbine Shaft	1
19	Stator Support	1
20	Stator Support Screw Lockwasher	6
21	Stator Support Screw	6
22	Piston Ring	1
23	Piston Ring Expander Spring	1
24	Impeller Hub Gear Snap Ring	1
25	Impeller Hub Gear	1
26	Oil Baffle Oil Seal	1
27	Oil Baffle Seal Ring	1
28	Oil Baffle	1
29	Oil Baffle Retainer Ring	1
30	Hub to Impeller Screw	12
31	Impeller Hub Screw Backing Ring	1
32	Impeller	1
33	Impeller Hub "O" Ring	1
34	Impeller Hub	1
35	Impeller Hub Bearing	1
36	Bearing Snap Ring	1
37	Reaction Member Spacer	1
38	Reaction Member	1
39	Reaction Member Snap Ring	1
40	Turbine Hub	1
41	Turbine	1
42	Turbine Hub Backing Ring	1
43	Turbine Hub Screw	8
44	Impeller to Cover "O" Ring	1
45	Impeller Cover	1
46	Impeller Cover Bearing	1
47	Bearing Cap to Impeller Cover "O" Ring	1
48	Bearing Washer	1
49	Bearing Snap Ring	1
50	Impeller Cover Bearing Cap	1
51	Impeller Cover Sleeve	1
52	Ring Gear Screw	16
53	Plain Washer	16
54	Flywheel Ring Gear	1
55	Bearing Cap to Impeller Cover Screw	10
56	Bearing Cap to Impeller Cover Screw Lockwasher	10
57	Impeller to Cover Screw	24
58	Impeller to Cover Screw Lockwasher	24

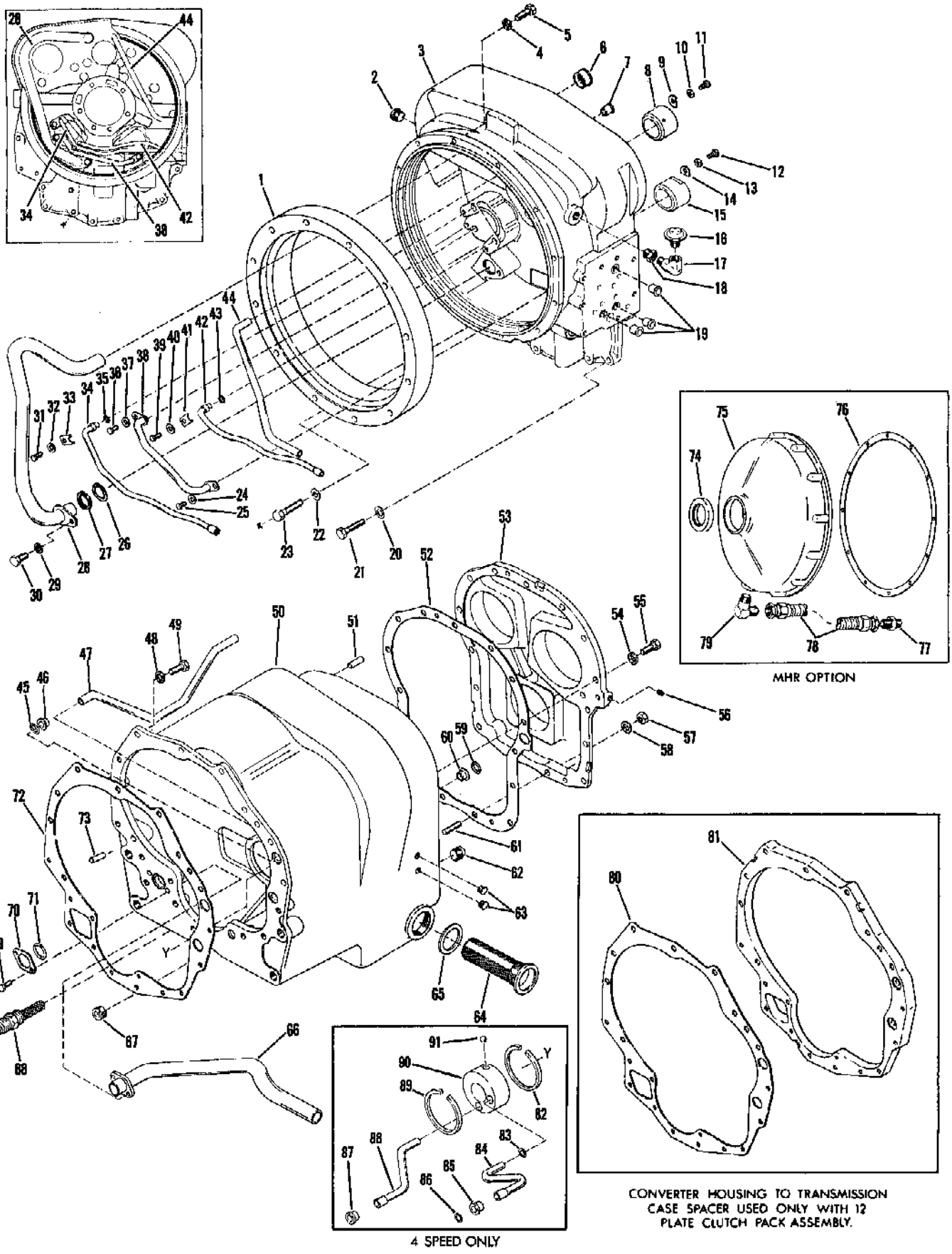
MHR OPTION
4 SPEED ONLY
CONVERTER HOUSING TO TRANSMISSION CASE SPACER USED ONLY WITH 12 PLATE CLUTCH PACK ASSEMBLY.

Figure C

32000 CONVERTER HOUSING, TRANSMISSION CASE & REAR COVER GROUP 3 & 4 SPEED, SHORT DROP FOR R-MODEL FRONT COVER GROUP SEE R-MODEL SECTION

ITEM	DESCRIPTION	QTY.
1	Converter Housing Adaptor Ring	1
2	Pipe Plug	1
3	Converter Housing & Tube Assembly	1
4	Converter Housing to Front Cover Screw Lockwasher	12
5	Converter Housing to Front Cover Screw	12
6	Tube Sleeve	1
7	Tube Sleeve	1
8	Converter Housing Sleeve	1
9	Converter Housing Sleeve Lock	1
10	Converter Housing Sleeve Screw Lockwasher	1
11	Converter Housing Sleeve Screw	1
12	Converter Housing Sleeve Screw	1
13	Converter Housing Sleeve Screw Lockwasher	1
14	Converter Housing Sleeve Lock	1
15	Converter Housing Sleeve	1
16	Breather	1
17	Street Ell	1
18	Breather Reducing Bushing	1
19	Tube Sleeve	3
20	Converter Housing to Transmission Housing Screw Lockwasher	4
21	Converter Housing to Transmission Housing Screw	4
22	Converter Housing to Transmission Housing Lockwasher	4
23	Converter Housing to Transmission Housing Screw	4
24	Lube Tube Retaining Screw Lockwasher	1
25	Lube Tube Retaining Screw	1
26	Suction Tube "O" Ring	1
27	Suction Tube Spacer Ring	1
28	Suction Tube Assembly	1
29	Suction Tube Retainer Screw Lockwasher	1
30	Suction Tube Retainer Screw	1
31	Tube Clip Screw	1
32	Tube Clip Screw Lockwasher	1
33	Tube Clip	1
34	Reverse Tube Assembly	1
35	Reverse Tube "O" Ring	1
36	Lube Tube Retainer Screw	1
37	Lube Tube Retainer Screw Lockwasher	1
38	Lube Tube Assembly	1
39	Tube Clip Screw	1
40	Tube Clip Screw Lockwasher	1
41	Tube Clip	1
42	3rd Speed Tube Assembly	1
43	3rd Speed Tube "O" Ring	1
44	Valve Oil Supply Tube	1
45	Pressure Tube "O" Ring	1
46	Tube Sleeve	1
47	Low Speed Clutch Pressure Tube	1
48	Transmission Case to Converter Housing Screw Lockwasher	10
49	Transmission Case to Converter Housing Screw	10
50	Transmission Case Assembly	1
51	Transmission Case to Rear Cover Dowel Pin	2
52	Transmission Case to Rear Cover Gasket	1
53	Transmission Case Rear Cover	1
54	Rear Cover to Case Screw Lockwasher	13
55	Rear Cover to Case Screw	13
56	Rear Cover Pipe Plug	1
57	Rear Cover to Transmission Case Stud Nut	2
58	Rear Cover to Transmission Case Lockwasher	2
59	Tube Sleeve "O" Ring	1
60	Tube Sleeve	1
61	Transmission Case to Rear Cover Stud	2
62	Drain Plug	1
63	Oil Level Plug	2
64	Screen Assembly	1
65	Screen Assembly Gasket	1
66	Suction Tube Assembly	1
67	Pipe Plug	1
68	Suction Screen Assembly	1
69	Suction Tube Retainer Washer Screw	2
70	Suction Tube Retainer Washer	1
71	Suction Tube "O" Ring	1
72	Converter Housing to Transmission Case Gasket	1
73	Converter Housing to Transmission Case Dowel Pin	2
74	Front Cover Oil Seal	1
75	Converter Housing Front Cover	1
76	Converter Housing Front Cover Gasket	1
77	Hose Fitting	1
78	Hose Assembly	1
79	Hose Fitting	1
80	Converter Housing to Transmission Case Gasket	1
81	Converter Housing to Transmission Case Spacer	1
82	Oil Distributor Retainer Ring	1
83	Pressure Tube "O" Ring	1
84	4th Clutch Pressure Tube	1
85	Tube Sleeve	1
86	Pressure Tube "O" Ring	1
87	Tube Sleeve	1
88	4th Clutch Lube Tube	1
89	Oil Distributor Retainer Ring	1
90	Oil Distributor	1
91	Oil Distributor Lock Ball	1

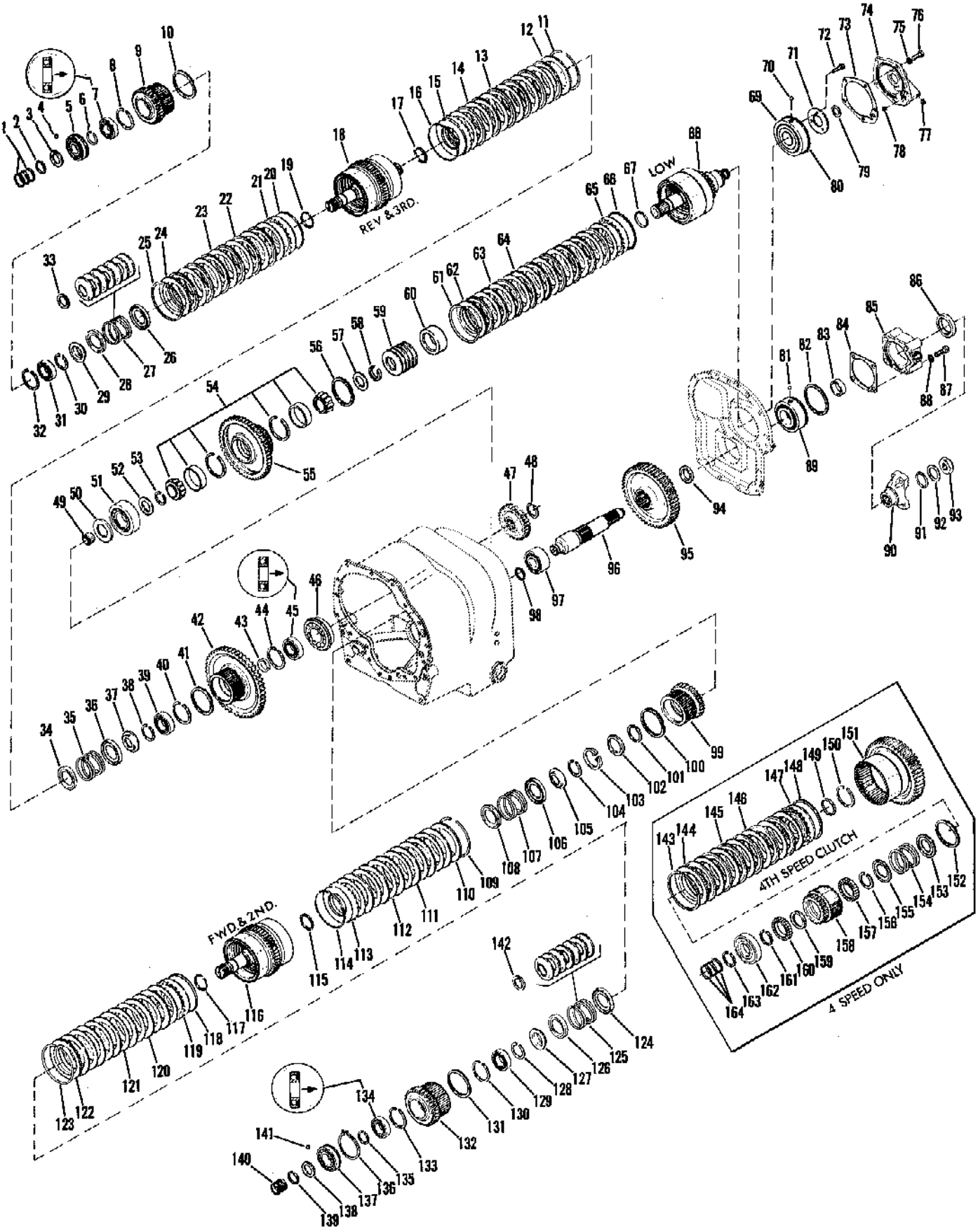

Figure D

R OR HR32000
SHORT DROP 3 & 4 SPEED
CLUTCH & GEAR GROUP

ITEM	DESCRIPTION	QTY.
1	Reverse & 3rd Clutch Shaft Piston Ring	3
2	Front Bearing Retainer Ring	1
3	Reverse & 3rd Shaft Front Bearing End Plate	1
4	Reverse and 3rd Shaft Bearing End Plate Ball	1
5	Reverse & 3rd Shaft Front Bearing	1
6	Front Bearing Retainer Ring	1
7	Clutch Driven Gear Bearing - Shield In	1
8	Clutch Driven Gear Bearing Snap Ring	1
9	Clutch Driven Gear	1
10	Clutch Hub Oil Baffle Ring	1
11	End Plate Retainer Ring	1
12	End Plate - 3rd Clutch	1
13	Clutch Inner Disc - 3rd Clutch	6
14	Clutch Outer Disc - 3rd Clutch	6
15	Clutch Piston - 3rd Clutch	1
16	Clutch Piston Outer Seal Ring	1
17	Clutch Piston Inner Seal Ring	1
18	Reverse & 3rd Clutch Drum	1
19	Clutch Piston Inner Seal Ring	1
20	Clutch Piston Outer Seal Ring	1
21	Clutch Piston Assembly - Reverse Clutch	1
22	Clutch Inner Disc - Reverse Clutch	12
23	Clutch Outer Disc - Reverse Clutch	12
24	End Plate - Reverse Clutch	1
25	End Plate Retainer Ring	1
26	Spring Retainer	1
27	Piston Return Belleville Washer/Spring	7
28	Spring Retainer	1
29	Spring Retainer Snap Ring Retainer	1
30	Spring Retainer Snap Ring	1
31	Clutch Driven Gear Bearing	1
32	Clutch Driven Gear Bearing Snap Ring	1
33	Spring Retainer Snap Ring	1
34	Spring Retainer	1
35	Piston Return Spring	1
36	Spring Retainer	1
37	Spring Retainer Snap Ring Retainer	1
38	Spring Retainer Snap Ring	1
39	3rd Gear Bearing	1
40	3rd Gear Bearing Snap Ring	1
41	Clutch Hub Oil Baffle Ring	1
42	3rd Gear	1
43	3rd Gear Bearing Spacer	1
44	3rd Gear Bearing Snap Ring	1
45	3rd Gear Bearing - Shield Out	1
46	Reverse & 3rd Shaft Rear Bearing	1
47	Low Clutch Drive Gear	1
48	Gear Retaining Ring	1
49	Low Speed Clutch Shaft Pilot Bearing	1
50	2nd Gear Bearing End Plate (4 Speed Transmission Only)	1
51	2nd Gear Bearing	1
52	Bearing Retaining Ring Retainer	1
53	Low Speed Gear Bearing Retainer Ring	1
54	Low Speed Gear Bearing Assembly	1
55	Low Speed Gear	1
56	Clutch Hub Oil Baffle Ring	1
57	Spring Retaining Ring Retainer	1
58	Spring Retaining Ring	1
59	Belleville Washer	5
60	Piston to Belleville Washer Spacer	1
61	End Plate Retainer Ring	1
62	End Plate	1
63	Clutch Outer Disc - Low Clutch	9
64	Clutch Inner Disc - Low Clutch	9
65	Clutch Piston - Low Clutch	1
66	Clutch Piston Outer Seal Ring	1
67	Clutch Piston Inner Seal Ring	1
68	Low Speed Clutch Drum	1
69	Low Speed Shaft Rear Bearing	1
70	Bearing Lockball	1
71	Rear Bearing Retainer Plate	1
72	Rear Bearing Retainer Plate Screw	3
73	Rear Bearing Cap Gasket	1
74	Rear Bearing Cap	1
75	Rear Bearing Cap Screw Lockwasher	5
76	Rear Bearing Cap Screw	5
77	Rear Bearing Cap Plug	1
78	Rear Bearing Cap "O" Ring	1
79	Clutch Shaft Piston Ring	1
80	Low Speed Shaft Rear Bearing Locating Ring	1
81	Output Shaft Rear Bearing Lock Ball	1
82	Rear Bearing Locating Ring	1

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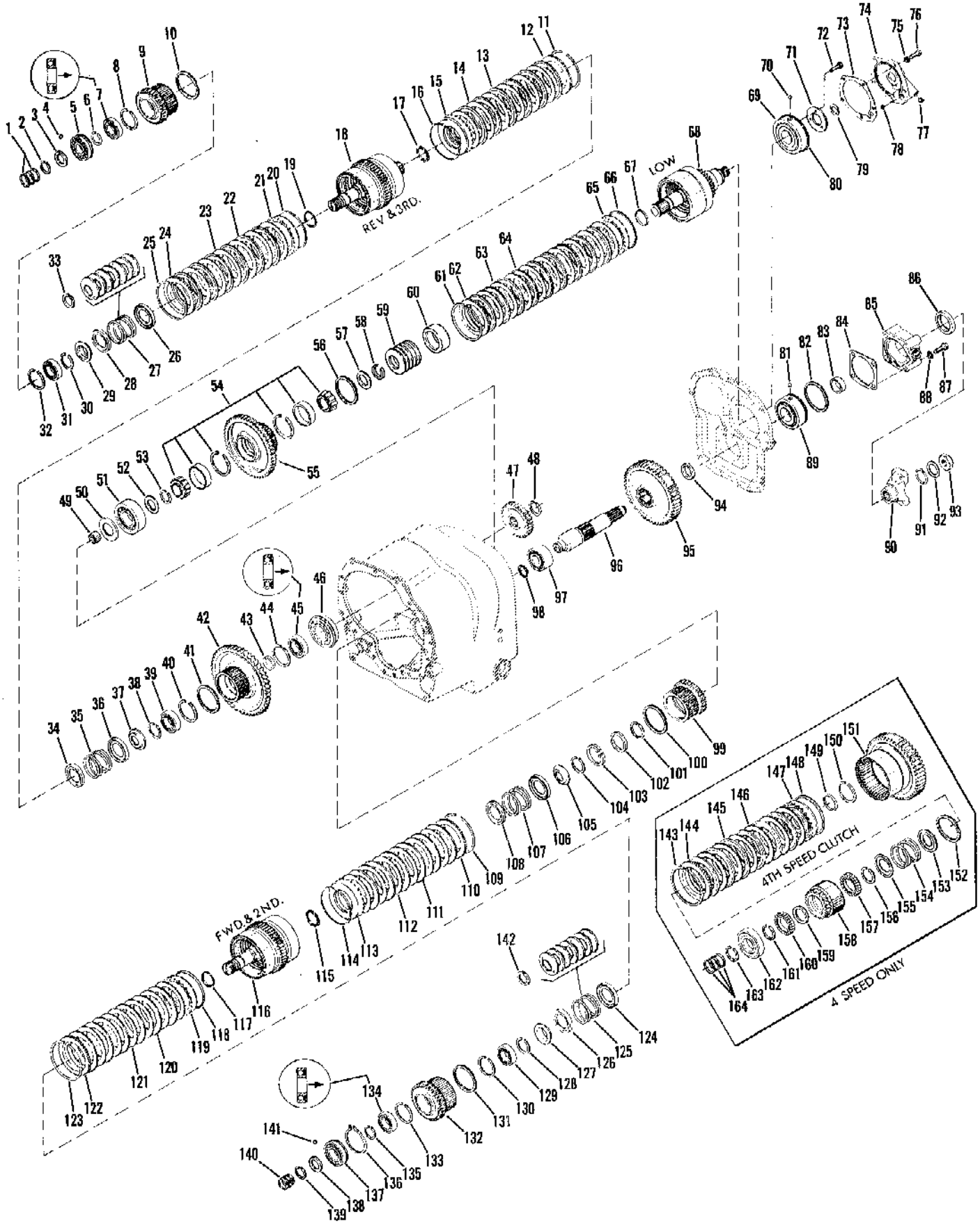


Figure D

R OR HR32000
SHORT DROP 3 & 4 SPEED
CLUTCH & GEAR GROUP
(continued)

ITEM	DESCRIPTION	QTY.
83	Rear Bearing Spacer	1
84	Output Shaft Bearing Cap Gasket	1
85	Output Shaft Rear Bearing Cap	1
86	Output Shaft Bearing Cap Oil Seal	1
87	Rear Bearing Cap Screw	4
88	Rear Bearing Cap Screw Lockwasher	4
89	Output Shaft Rear Bearing	1
90	Output Flange	1
91	Output Flange "O" Ring	1
92	Output Flange Washer	1
93	Output Flange Nut	1
94	Output Shaft Gear Spacer	1
95	Output Shaft Gear	1
96	Output Shaft	1
97	Output Shaft Front Bearing	1
98	Bearing Retaining Ring	1
99	2nd Gear	1
100	Clutch Hub Oil Baffle Ring	1
101	2nd Gear Retaining Ring	1
102	2nd Gear Locating Ring Retainer	1
103	2nd Gear Locating Ring Retainer Snap Ring	1
104	Spring Retainer Snap Ring	1
105	Spring Retainer Snap Ring Retainer	1
106	Spring Retainer	1
107	Piston Return Spring	1
108	Spring Retainer	1
109	End Plate Retainer Ring	1
110	End Plate - 2nd Clutch	1
111	Clutch Inner Disc - 2nd Clutch	6
112	Clutch Outer Disc - 2nd Clutch	6
113	Clutch Piston Assembly - 2nd Clutch	1
114	Clutch Piston Outer Seal Ring	1
115	Clutch Piston Inner Seal Ring	1
116	Forward & 2nd Clutch Drum	1
117	Clutch Piston Inner Seal Ring	1
118	Clutch Piston Outer Seal Ring	1
119	Clutch Piston Assembly - Forward Clutch	1
120	Clutch Inner Disc - Forward Clutch	12
121	Clutch Outer Disc - Forward Clutch	12
122	End Plate - Forward Clutch	1
123	End Plate Retainer Ring	1
124	Spring Retainer	1
125	Piston Return Belleville Washer/Spring	7
126	Spring Retainer	1
127	Spring Retainer Snap Ring Retainer	1
128	Spring Retainer Snap Ring	1
129	Clutch Driven Gear Bearing	1
130	Clutch Driven Gear Bearing Snap Ring	1
131	Clutch Hub Oil Baffle Ring	1
132	Forward Clutch Driven Gear	1
133	Clutch Driven Gear Bearing Snap Ring	1
134	Clutch Driven Gear Bearing - Shield In	1
135	Front Bearing Retainer Ring	1
136	Front Bearing Locating Ring	1
137	Forward & 2nd Shaft Front Bearing	1
138	Forward & 2nd Shaft Front Bearing End Plate	1
139	Front Bearing Retainer Ring	1
140	Forward & 2nd Shaft Piston Ring	3
141	Forward & 2nd Shaft Bearing End Plate Ball	1
142	Spring Retainer Snap Ring	1
143	End Plate	1
144	End Plate Retainer Ring	1
145	Clutch Inner Disc - 4th Clutch	6
146	Clutch Outer Disc - 4th Clutch	6
147	Clutch Piston Assembly - 4th Clutch	6
148	Clutch Piston Outer Seal Ring	1
149	Clutch Piston Inner Seal Ring	1
150	Not Used On This Model	
151	4th Clutch Drum & Output Gear Assembly	1
152	4th Gear Oil Baffle Ring	1
153	Spring Retainer	1
154	Piston Return Spring	1
155	Spring Retainer	1
156	Spring Retainer Snap Ring	1
157	4th Gear Bearing	1
158	4th Gear	1
159	Bearing Spacer	1
160	4th Gear Bearing	1
161	Bearing Snap Ring	1
162	Output Shaft Front Bearing	1
163	Front Bearing Retainer Ring	1
164	4th Clutch Oil Sealing Ring	3

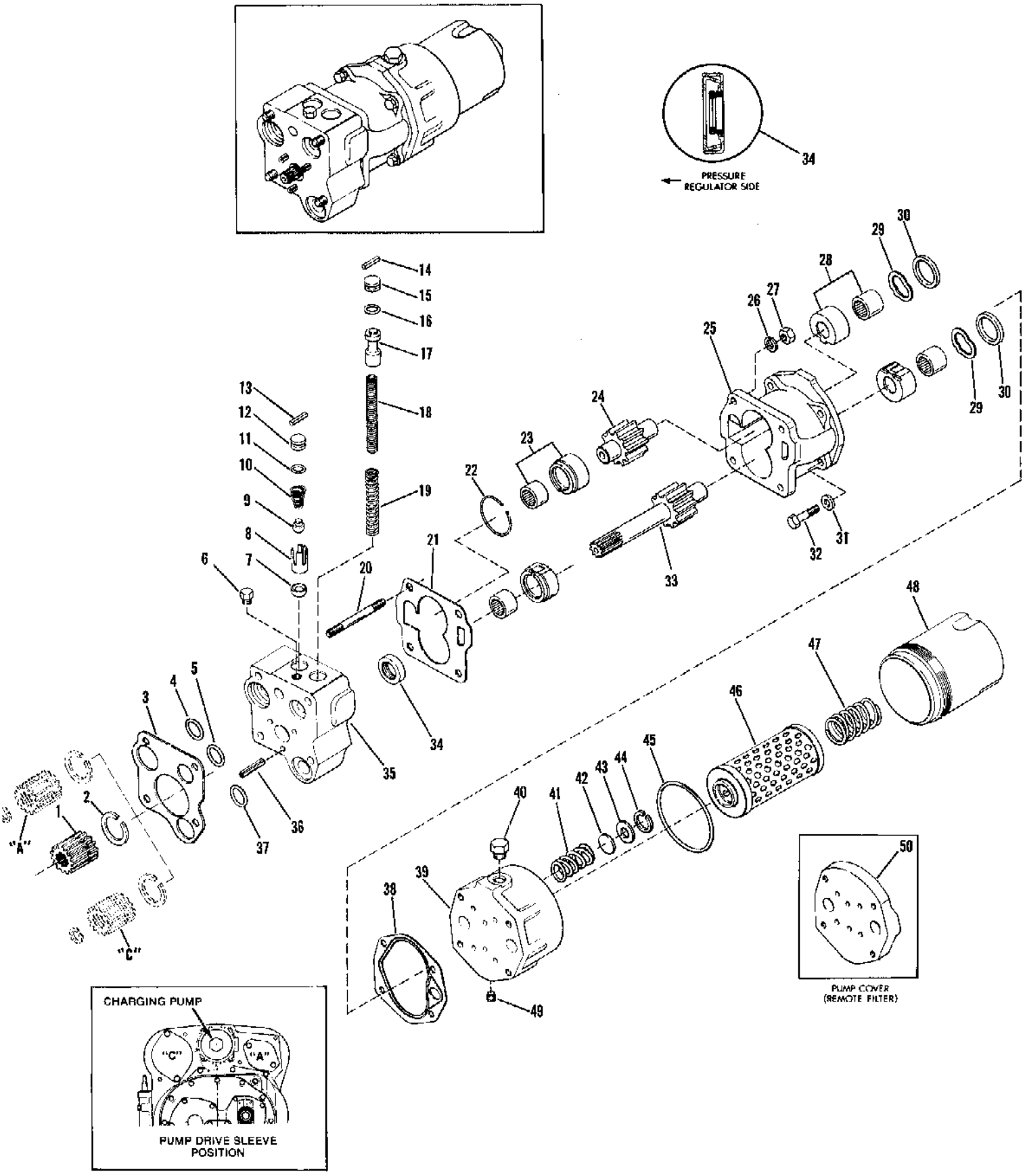
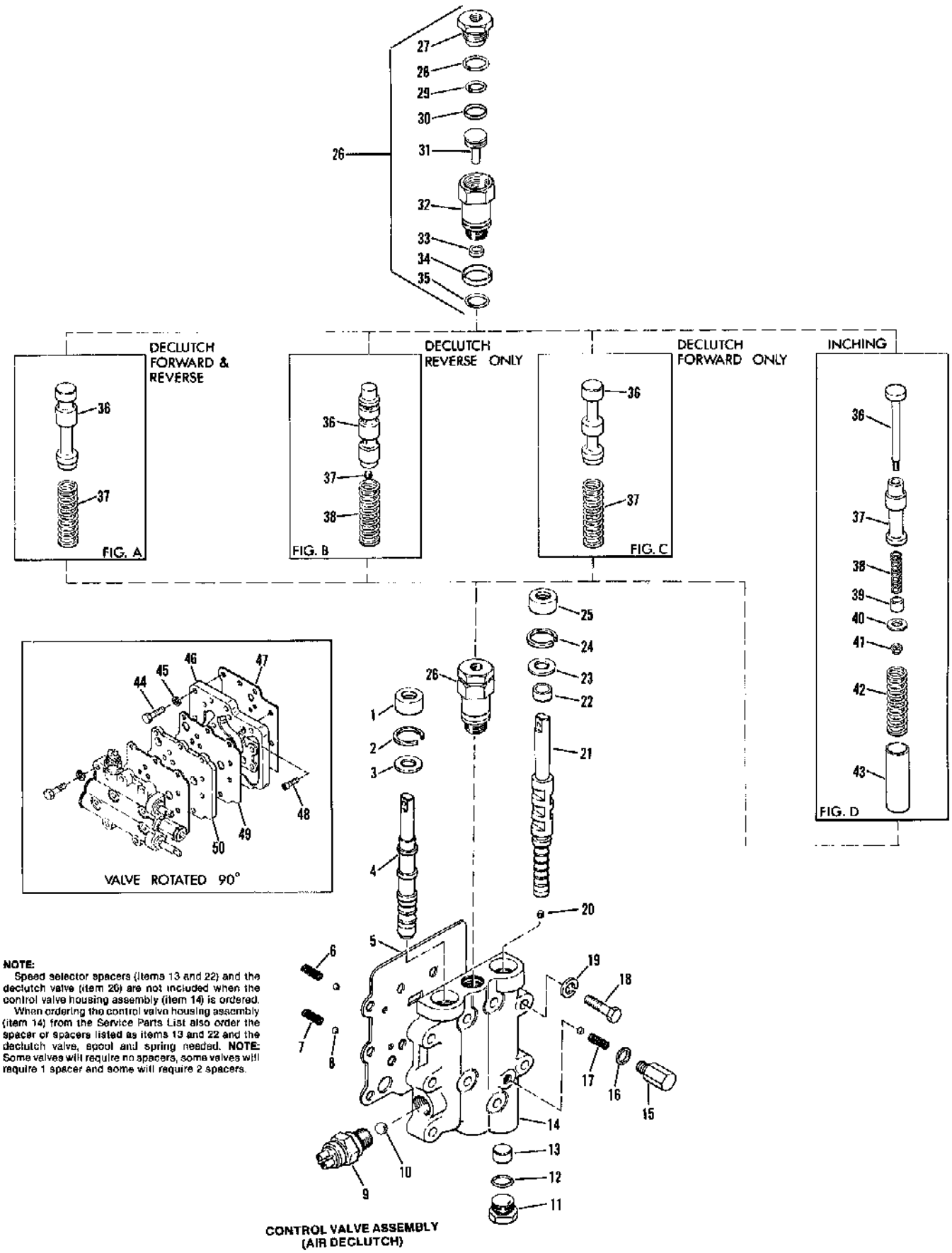

PRESSURE REGULATOR SIDE
CHARGING PUMP
"C"
"A"
PUMP DRIVE SLEEVE POSITION
PUMP COVER (REMOTE FILTER)

Figure E

PRESSURE REGULATOR VALVE, CHARGING PUMP & OIL FILTER GROUP

ITEM	DESCRIPTION	QTY.
1	Charging Pump Drive Sleeve	1
2	Pump Sleeve Snap Ring	1
3	Valve to Housing Gasket	1
4	Valve Body "O" Ring	1
5	Valve Body "O" Ring	1
6	Pipe Plug	1
7	Safety Valve Seat	1
8	Safety Valve Spacer	1
9	Safety Valve Plunger	1
10	Safety Valve Spring	1
11	Valve Stop "O" Ring	1
12	Valve Stop	1
13	Valve Stop Roll Pin	1
14	Valve Stop Roll Pin	1
15	Valve Stop	1
16	Valve Stop "O" Ring	1
17	Valve Piston	1
18	Valve Spring - Inner	1
19	Valve Spring - Outer	1
20	Valve to Converter Housing Stud	4
21	Valve Body to Pump Gasket	1
22	Pump Body Snap Ring	1
23	Thrust Plate & Bearing Assembly	2
24	Pump Driven Shaft Assembly	1
25	Charging Pump Housing	1
26	Valve to Housing Stud Lockwasher	4
27	Valve to Housing Stud Nut	4
28	Thrust Plate & Bearing Assembly	2
29	Wave Spring	2
30	Pump Shaft Seal	2
31	Pump to Filter Adaptor Screw Lockwasher	4
32	Pump to Filter Adaptor Screw	4
33	Pump Drive Shaft Assembly	1
34	Pump Drive Shaft Oil Seal	1
35	Pressure Regulator Valve	1
36	Valve Body Roll Pin	3
37	Valve Body "O" Ring	1
38	Pump to Filter Gasket	1
39	Filter Adaptor	1
40	Filter Adaptor Plug	1
41	By-Pass Filter Disc Spring	1
42	By-Pass Filter Disc	1
43	By-Pass Filter Disc Seat	1
44	Filter Seat Retainer Ring	1
45	Filter Housing "O" Ring	1
46	Oil Filter Element Assembly	1
47	Oil Filter Element Spring	1
48	Filter Housing	1
49	Pipe Plug	1
50	Optional Adaptor for Remote Filter	1



NOTE:
Speed selector spacers (items 13 and 22) and the declutch valve (item 26) are not included when the control valve housing assembly (item 14) is ordered.
When ordering the control valve housing assembly (item 14) from the Service Parts List also order the spacer or spacers listed as items 13 and 22 and the declutch valve, spool and spring needed. **NOTE:** Some valves will require no spacers, some valves will require 1 spacer and some will require 2 spacers.

CONTROL VALVE ASSEMBLY (AIR DECLUTCH)

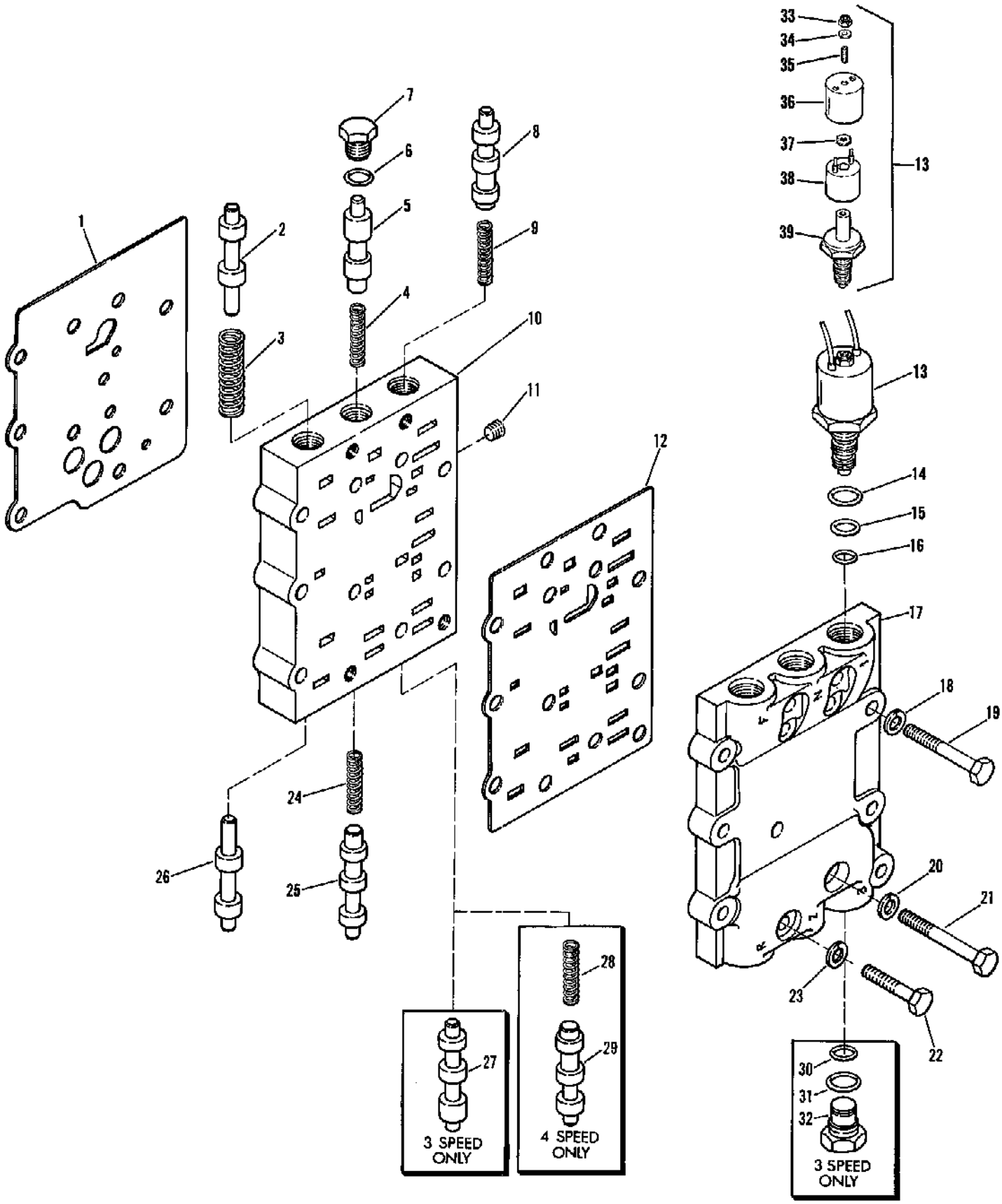
Figure F

CONTROL VALVE ASSEMBLY

ITEM	DESCRIPTION	QTY.
1	Oil Seal	1
2	Oil Seal Retainer Ring	1
3	Oil Seal Retainer Washer	1
4	Forward & Reverse Valve Spool	1
5	Control Valve Gasket	1
6	Detent Spring	1
7	Detent Spring	1
8	Detent Ball	3
9	Neutral Switch	1
10	Detent Ball	1
11	Valve Housing Plug	1
12	Valve Housing Plug "O" Ring	1
13	Overshift Spacer (Not on all models)	1
14	Control Valve Housing	1
15	Detent Spring Plug	1
16	Detent Spring Plug Washer	1
17	Detent Spring	1
18	Valve to Adaptor Housing Screw	9
19	Valve to Adaptor Housing Screw Lockwasher	9
20	Speed Selector Spool Plug	1
21	Speed Selector Spool	1
22	Overshift Spacer (Not on all models)	1
23	Oil Seal Retainer Washer	1
24	Oil Seal Retainer Ring	1
25	Oil Seal	1
26	Piston Housing Assembly	1
27	Stop Plug	1
28	Plug "O" Ring	1
29	Piston "O" Ring	1
30	Glyd Ring	1
31	Piston	1
32	Piston Housing	1
33	Oil Seal	1
34	Band Seal	1
35	"O" Ring	1

Figures A-B-C & D are various declutch options.

44	Adaptor Screw	4
45	Adaptor Screw Lockwasher	4
46	Valve Adaptor	1
47	Valve Adaptor Gasket	1
48	Adaptor Screw	5
49	Adaptor to Plate Gasket	1
50	Valve Adaptor Plate	1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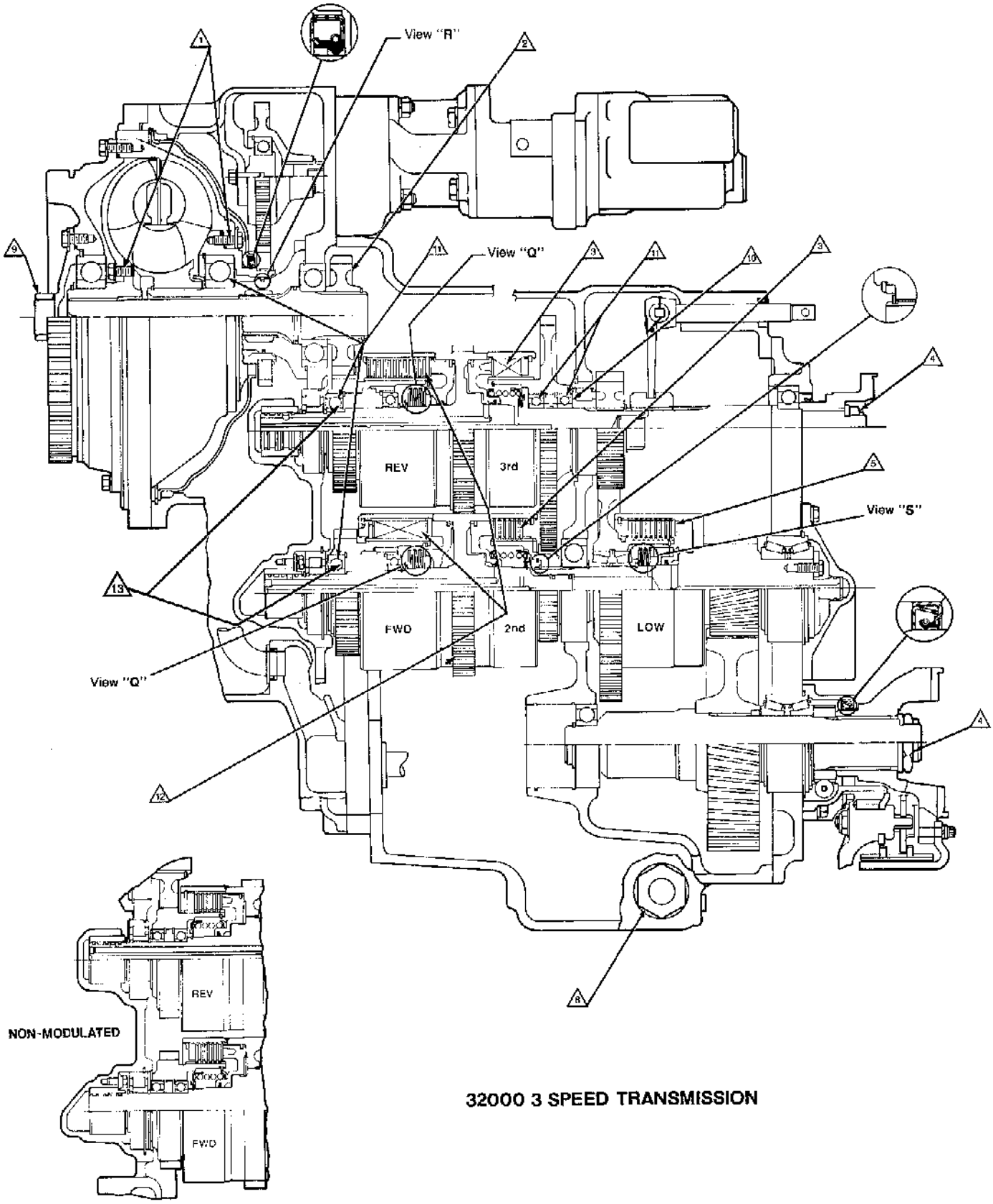
3 SPEED ONLY
4 SPEED ONLY
3 SPEED ONLY

Figure G

SOLENOID CONTROL VALVE ASSEMBLY

ITEM	DESCRIPTION	QTY.
1	Valve Housing to Converter Housing Gasket	1
2	Forward Spool	1
3	Forward & Reverse Spool Spring	1
4	Range Spool Spring	1
5	Range Spool	1
6	Stop Plug "O" Ring	6
7	Control Valve Spool Stop Plug	6
8	Low Speed Spool	1
9	Low Speed Spool Spring	1
10	Control Valve Assembly	1
11	Pipe Plug	1
12	Solenoid Housing to Control Valve Housing Gasket	1
13	Solenoid	*5
14	"O" Ring	*5
15	"O" Ring	*5
16	"O" Ring	*5
17	Solenoid Control Housing	1
18	Valve Mounting Screw Lockwasher	5
19	Valve Mounting Screw	5
20	Valve Mounting Screw Lockwasher	4
21	Valve Mounting Screw	4
22	Solenoid Housing to Control Valve Housing Screw	4
23	Solenoid Housing to Control Valve Housing Screw Lockwasher	4
24	2nd Speed Spool Spring	1
25	2nd Speed Spool	1
26	Reverse Spool	1
27	Speed Selector Spool	1
28	Speed Selector Spool Spring	1
29	Speed Selector Spool	1
30	Solenoid Plug "O" Ring	1
31	Solenoid Plug "O" Ring	1
32	Solenoid Plug	1
33	Stop Nut	*5
34	Washer	*5
35	Set Screw	*5
36	Coil Cover	*5
37	Washer	*5
38	Coil	*5
39	Solenoid Sub Assembly	*5

***Quantity depending on 3 or 4 speed. (4 speed Qty. 6)**



32000 3 SPEED TRANSMISSION

Figure H

⚠1 Impeller Hub and Turbine Hub Assembly with Backing Ring and Special Self Locking Screws.
1. Clean hub mounting surface and tapped holes with solvent. Dry thoroughly being certain tapped holes are dry & clean.
2. Install backing ring and special self locking screws.
Tighten screws 40 to 45 Lbs. Ft. [54,3-61,0 N·m]
Note: Assembly of hub must be complete within a fifteen minute period from start of screw installation. The special screw is to be used for one installation only. If the screw is removed for any reason it must be replaced. The epoxy left in the hub holes must be removed with the proper tap and cleaned with solvent. Dry hole thoroughly and use a new screw for reinstallation.

⚠2 Gear to be assembled with long hub length to this side.

⚠3 Two clutches, 6-outer steel plates, 6-inner friction plates. Assemble alternately, starting with outer steel plate.

⚠4 See Elastic Stop Nut Torque Chart

⚠5 Low clutch,9-outer steel plates,9-inner friction plates. Assemble alternately, starting with outer steel plate.

⚠6 Tighten oil screen ass'y. 10 to 15 Lbs. Ft. [13,6-20,0 N·m]

⚠9 Heat nose bushing to 200° F° (93°C) before ass'y. of bushing to cover.

⚠10 Bearing shield out

⚠11 Must be loose internal fit bearings, No. "3" etched on bearing.

⚠12 (12 Plate Modulation) Two clutches,12-outer steel plates,12-inner friction plates. Assemble alternately, starting with outer steel plate.

⚠13 Bearing shield in

Notes

A. - Use Permatex & Crane Sealer only where specified.
B. - All lead in chamfers for oil seals, piston rings & "O" rings must be smooth & free from burrs. Inspect at ass'y.
C. - Lubricate all piston ring grooves & "O" rings with oil before ass'y.
D. - Apply very light coat of Permatex No. 2 to O.D. of all oil seals before ass'y.
E. - After assembly of parts using Permatex or Crane sealer, there must not be any free or excess material that could enter the oil circuit.
F. - Apply light coat of Crane Sealer to all pipe plugs.
G. - Apply a thin coating of grease between seal lips on lip type seals prior to ass'y.
H. - Apply light coat of Permatex No. 2 to all thru hole stud threads.

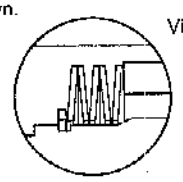
NOTE: The friction discs in the low clutch has a higher co-efficient rating than the friction discs in the other clutches, therefore the discs must not be mixed. The low clutch inner disc can be identified by an "X" stamped on one side of the inner teeth. The low clutch inner disc also has a strip of non-soluble yellow paint sprayed on the outer edge of the disc.

View "Q" 2 Places
Modulation only

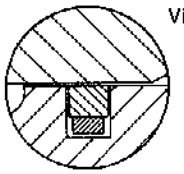
Forward & Reverse Clutch Return Springs. Concave side of first belleville washer to be placed against clutch piston. Remaining six washers of each clutch to be stacked alternately reversed as shown.

Low Clutch Return Springs. Concave side of first belleville washer to be placed against clutch piston. Remaining four washers to be stacked alternately reversed as shown.

View "S"



View "R"



Enlarged view of Piston Ring & Expander
Note: Expander gap to be approx. 180° from ring hook joint to aid ring assembly.

ELASTIC STOP NUT TORQUE

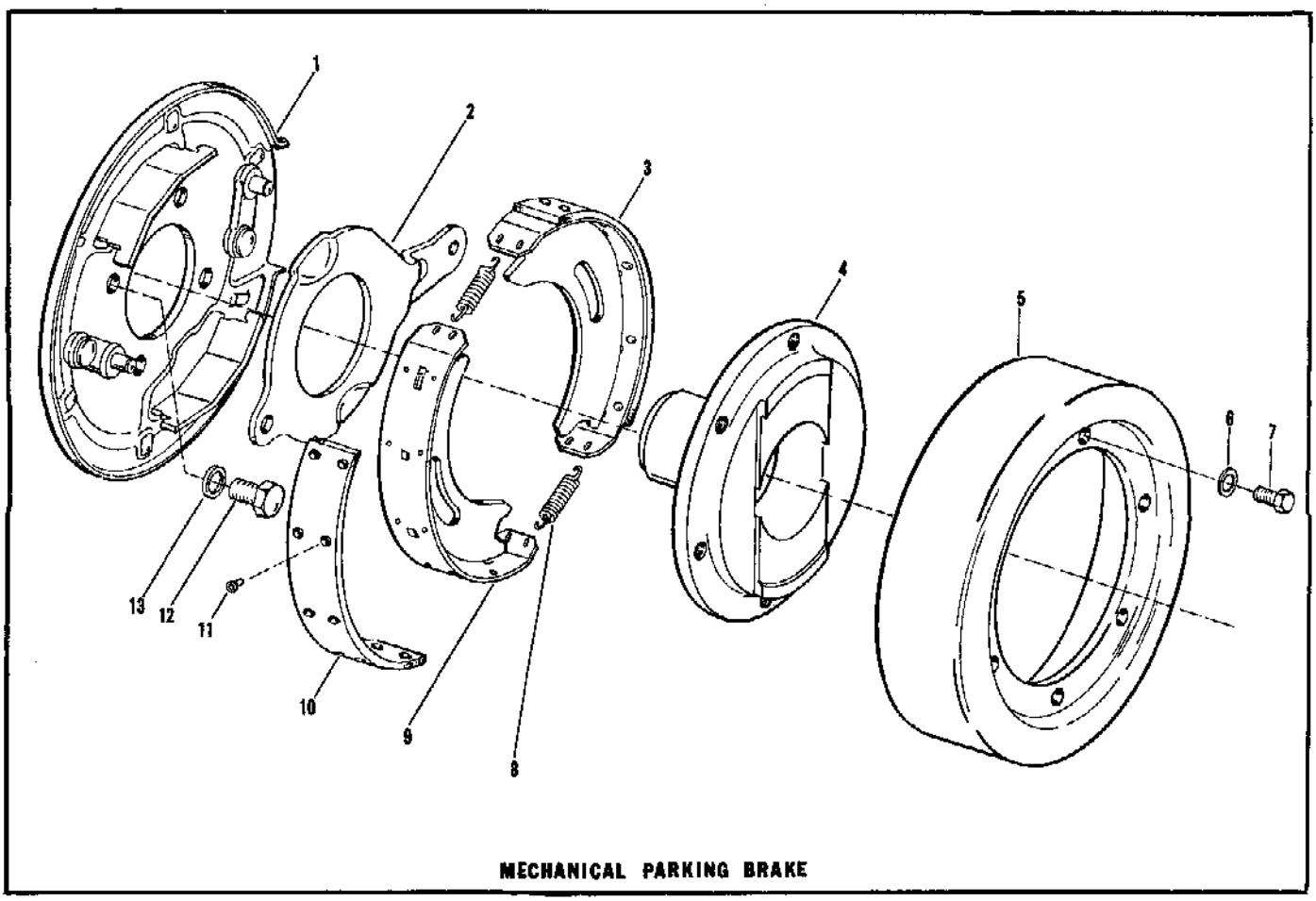
THREAD SIZE	LB.-FT.	[N·m]
1" - 20	150 - 200	[203,4 - 271,1]
1⅛" - 18	200 - 250	[271,2 - 338,9]
1½" - 18	300 - 350	[406,8 - 474,5]
1¾" - 12	400 - 450	[542,4 - 610,1]

NOTE: Metric dimensions shown in brackets [ ].

TORQUE SPECIFICATION FOR LUBRICATED OR PLATED SCREWS AND NUTS

NOMINAL SIZE	GRADE 5				GRADE 8			
	FINE THREAD		COARSE THREAD		FINE THREAD		COARSE THREAD	
	lbf·ft	[N·m]	lbf·ft	[N·m]	lbf·ft	[N·m]	lbf·ft	[N·m]
.2500	9-11	[12-15]	8-10	[11-14]	11-13	[15-18]	9-11	[12-15]
.3125	16-20	[22-27]	12-16	[16-22]	28-32	[38-43]	26-30	[35-41]
.3750	26-29	[35-39]	23-25	[31-34]	37-41	[50-56]	33-36	[45-49]
.4375	41-45	[56-61]	37-41	[50-56]	58-64	[79-87]	52-57	[71-77]
.5000	64-70	[87-95]	57-63	[77-85]	90-99	[122-134]	80-88	[108-119]
.5625	91-100	[123-136]	82-90	[111-122]	128-141	[174-191]	115-127	[156-172]
.6250	128-141	[174-191]	113-124	[153-168]	180-198	[224-268]	159-175	[216-237]
.7500	223-245	[302-332]	200-220	[271-298]	315-347	[427-470]	282-310	[382-420]

Figure H



MECHANICAL PARKING BRAKE

MECHANICAL PARKING BRAKE

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

Figure I

MAINTENANCE AND SERVICE

The instructions contained herein cover the disassembly and reassembly of the transmission in a sequence that would normally be followed after the unit has been removed from the machine and is to be completely overhauled.

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.

The photos shown in this text were taken of two different model transmissions. Although some of the photos may not be exactly like the transmission you are repairing, the procedures are identical. If a procedure is not identical, a clear photo and explanation will be shown. For R-Model (remote mounted) see R-Model section for front end removal, disassembly, reassembly and installation.

DISASSEMBLY

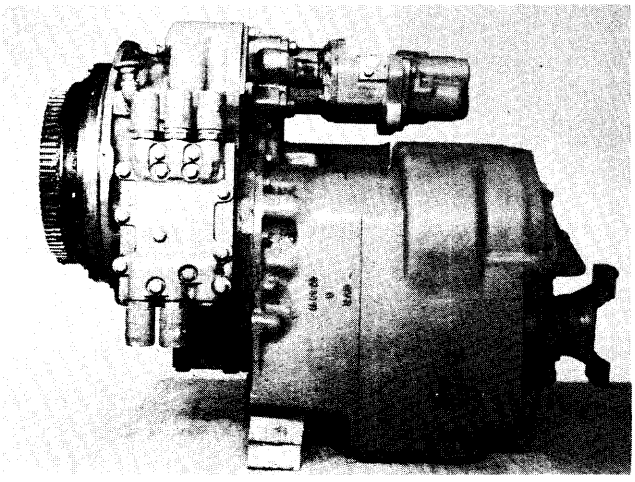


Figure 1
Side view of transmission.

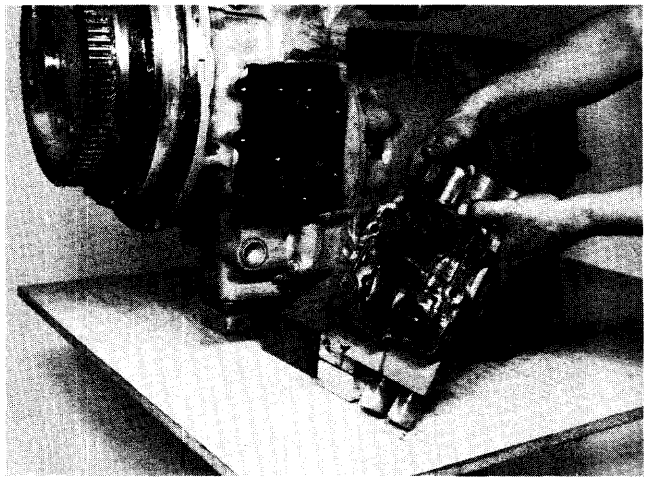


Figure 3
Remove valve assembly.

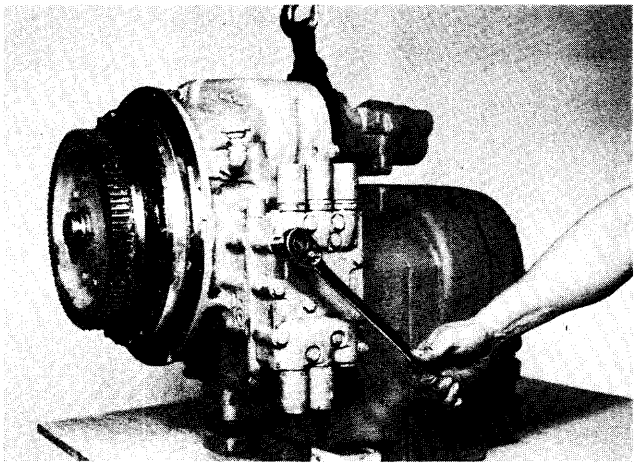


Figure 2
Remove control valve to housing bolts and washers. The valve shown is an electric shift with a modulator valve. **NOTE:** Control valves may vary from model to model.

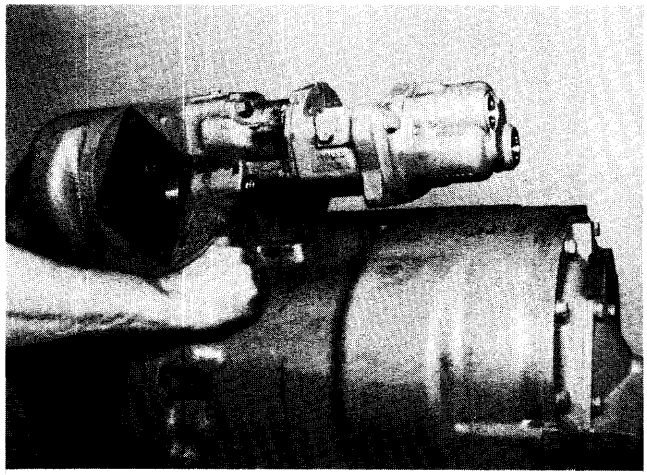


Figure 4
Remove charging pump to housing stud nuts. **NOTE:** Charging pumps may vary from model to model.

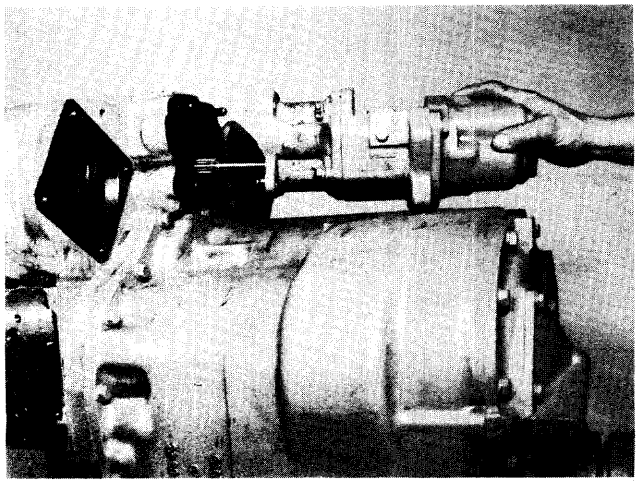


Figure 5
Remove charging pump assembly.

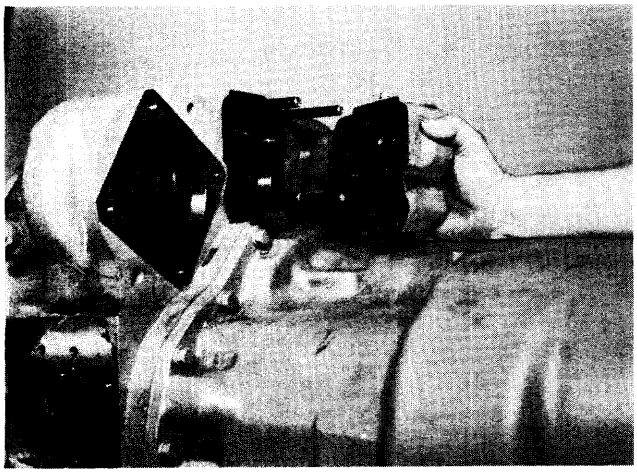


Figure 6
Remove pressure regulating valve assembly.

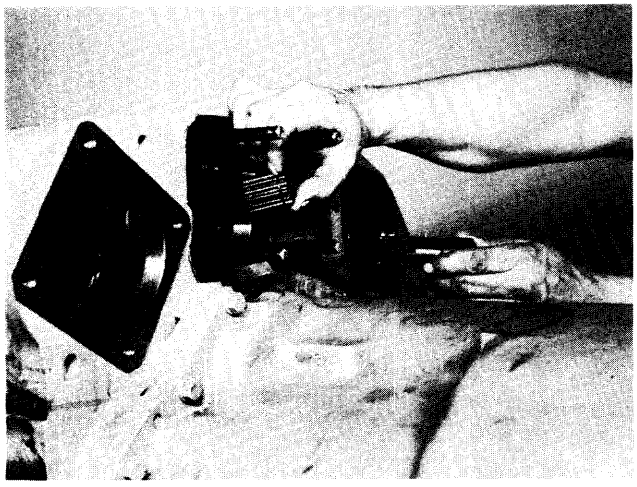


Figure 7
Remove pump drive sleeves.

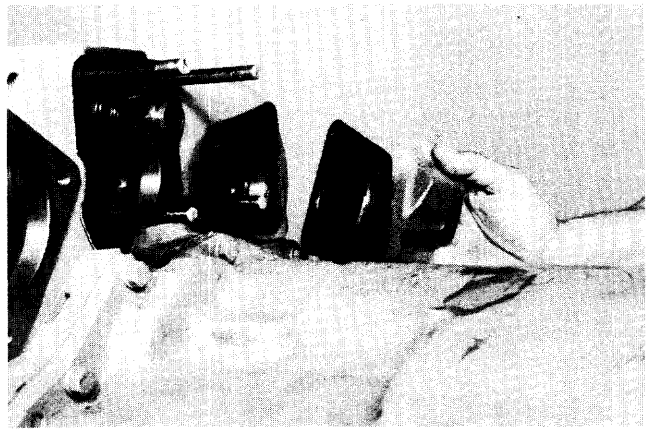


Figure 8
Remove pump adaptor bolts and pump adaptor. (Adaptors may vary.)

NOTE: The following converter disassembly was taken with a long drop transmission. Disassembly of the converter is identical on long and short drop transmissions.

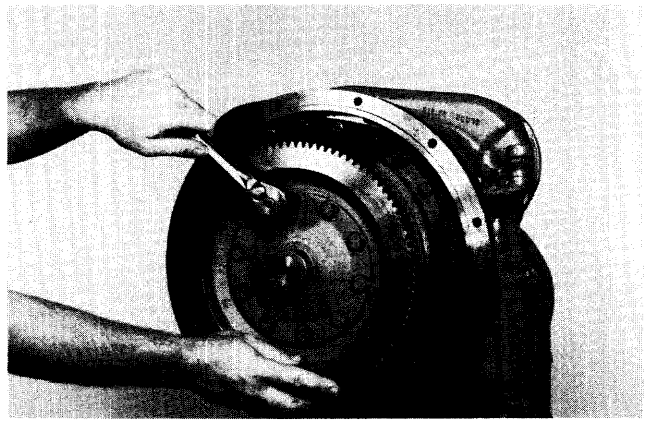


Figure 9
Remove impeller cover bearing cap bolts.

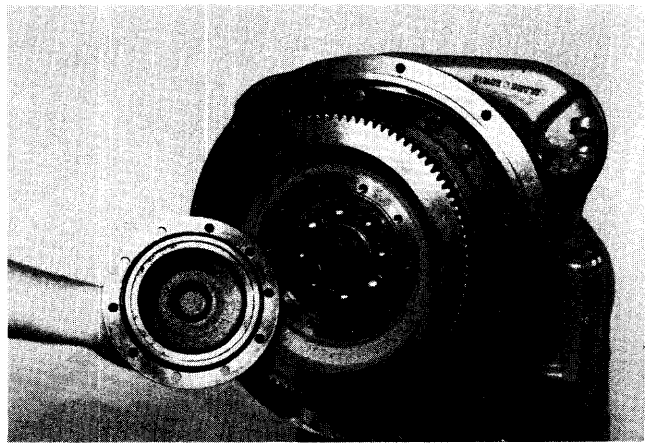


Figure 10
Remove impeller cover bearing cap.

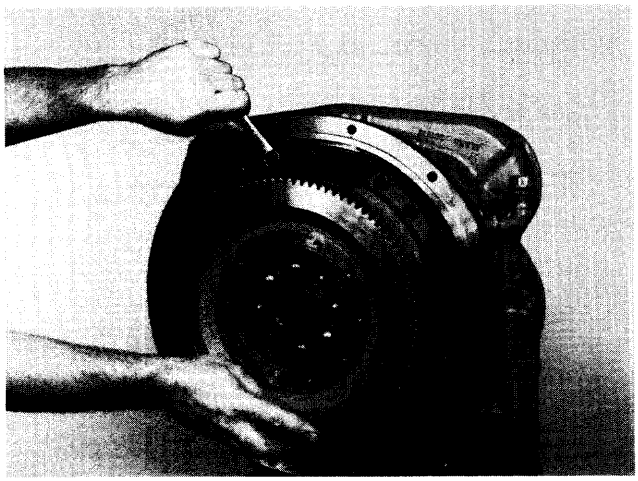


Figure 11
Remove impeller cover bolts.

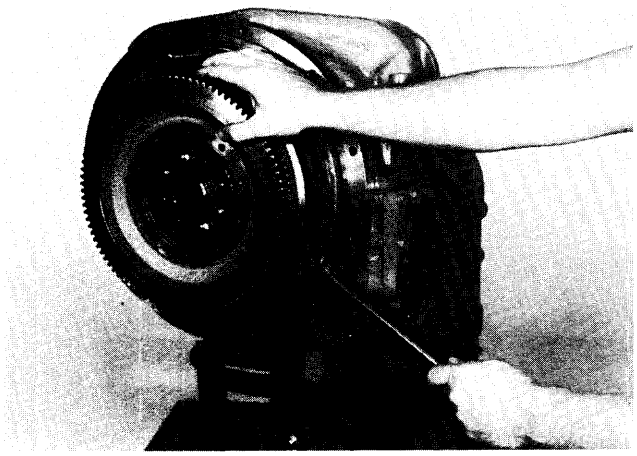


Figure 12
Install aligning stud. Use pry slots to remove cover.

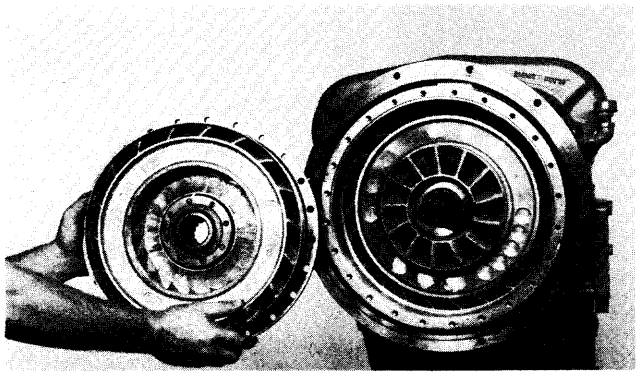


Figure 13
Remove impeller cover and turbine as an assembly.

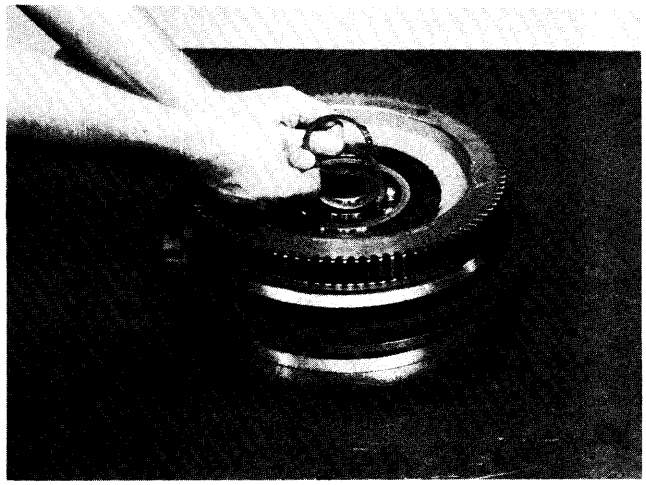


Figure 14
Remove impeller cover bearing snap ring and spacer. Separate impeller cover and turbine.

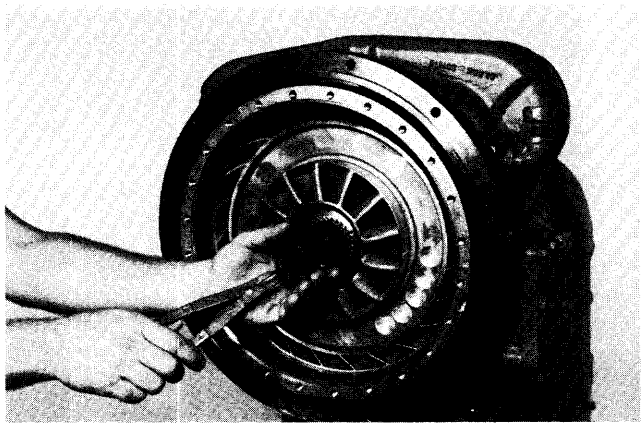


Figure 15
Remove reaction member retainer ring.

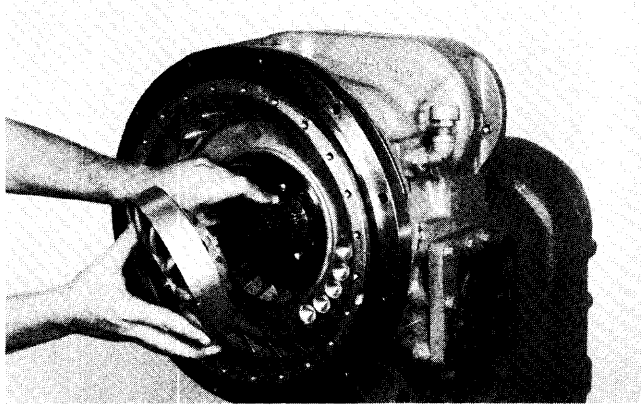


Figure 16
Remove reaction member and spacer.

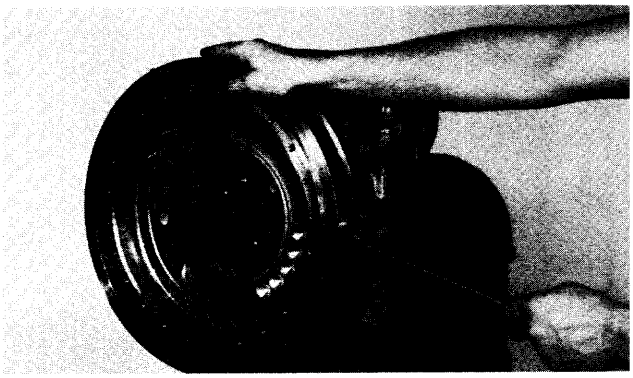


Figure 17
Remove converter housing to engine housing spacer ring.

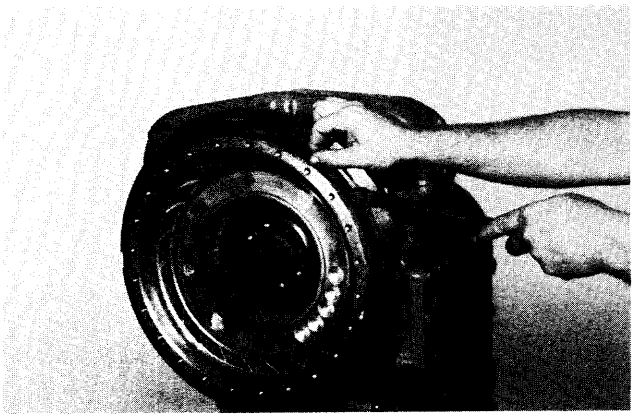


Figure 18
Remove oil baffle retainer ring.

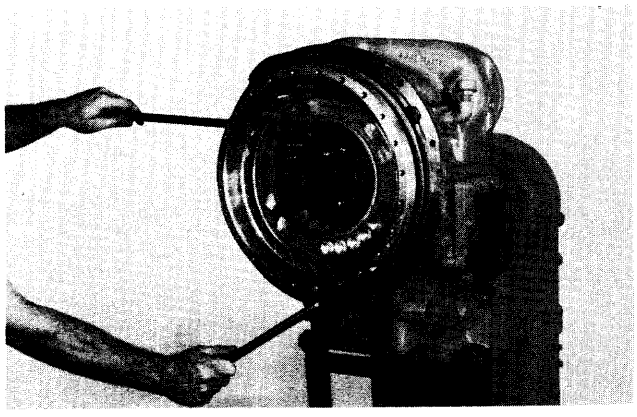


Figure 19
Using pry slots in converter housing, pry oil baffle and impeller from housing. **NOTE:** Impeller, oil baffle and impeller hub gear are removed as an assembly.

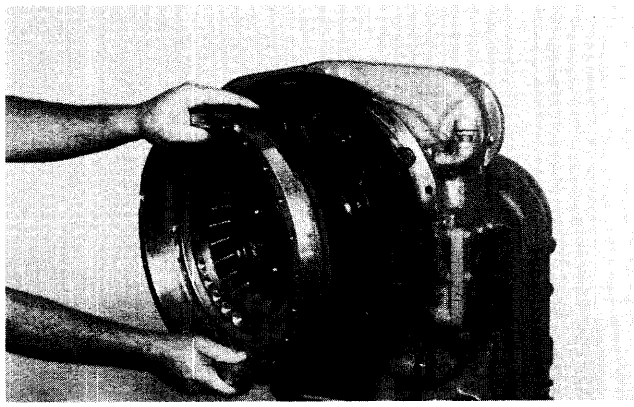


Figure 20
Remove impeller assembly.

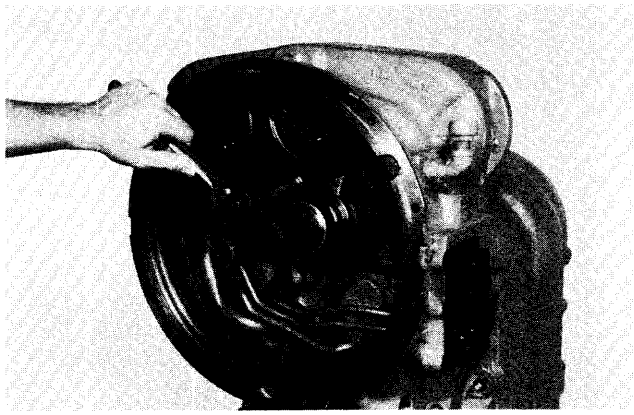


Figure 21
Remove stator support to housing bolts.

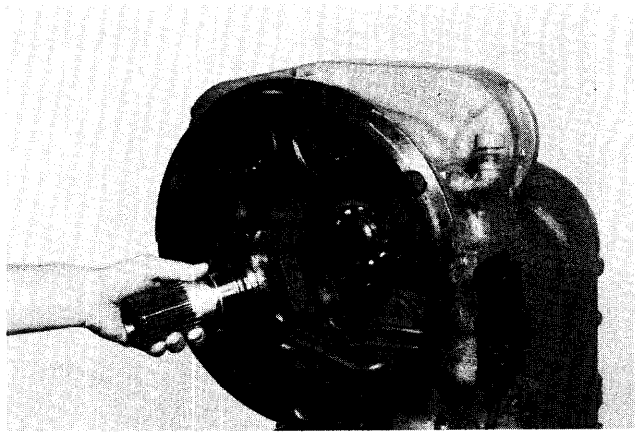


Figure 22
Remove stator support. **NOTE:** Support must be turned to clear pump drive gear.

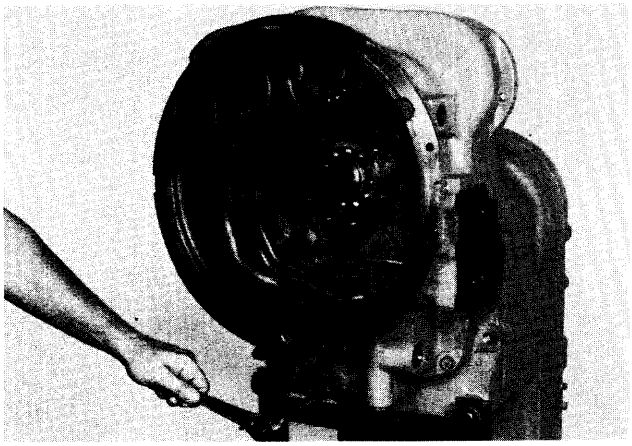


Figure 23
Remove converter housing to transmission housing bolts.

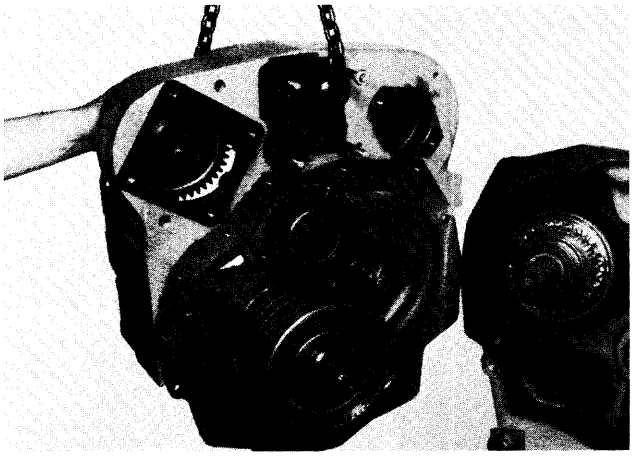


Figure 24
Support converter housing with chain fall and separate from transmission housing.

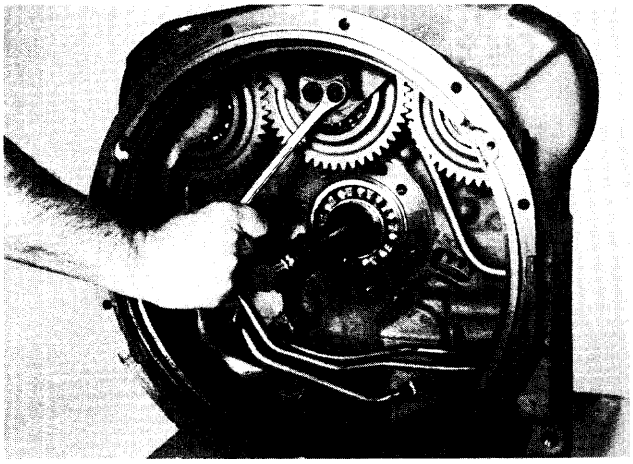


Figure 25
Remove pump drive gear bearing support bolts.

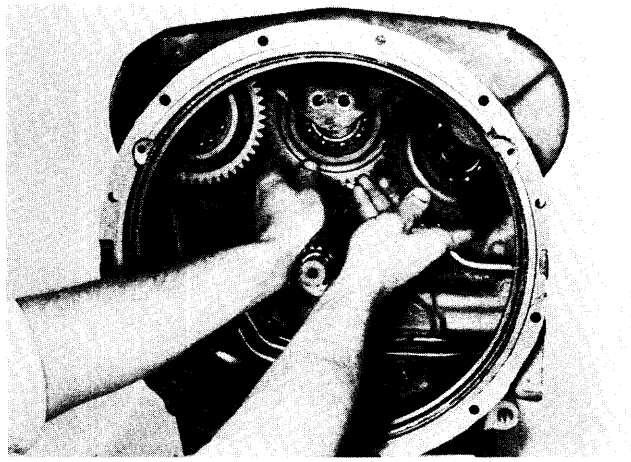


Figure 26
Move center gear toward the rear of converter housing. Remove pump drive gear on the right.

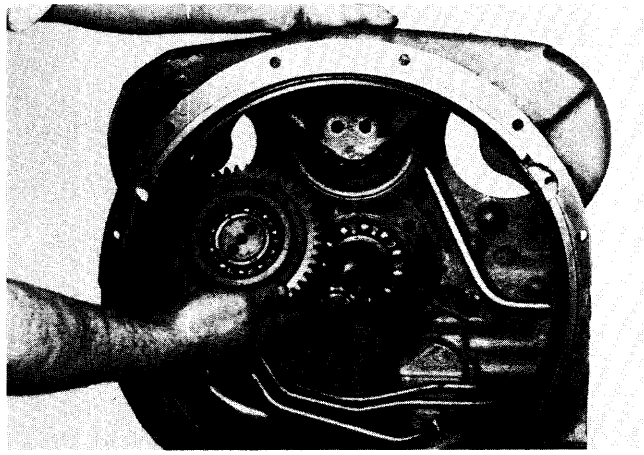


Figure 27
Remove pump drive gear on the left.

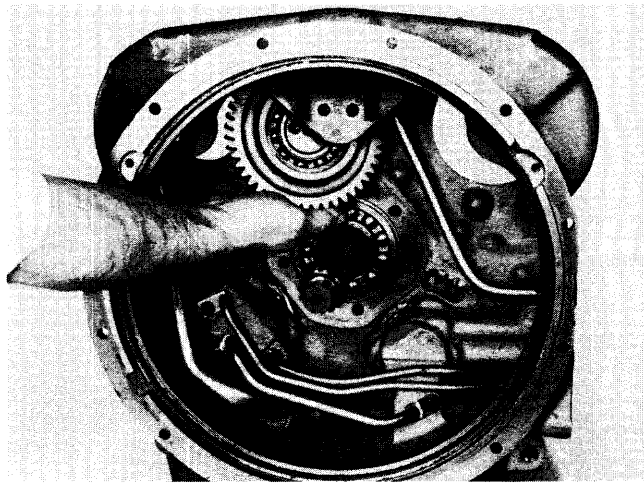


Figure 28
Remove center pump drive gear.

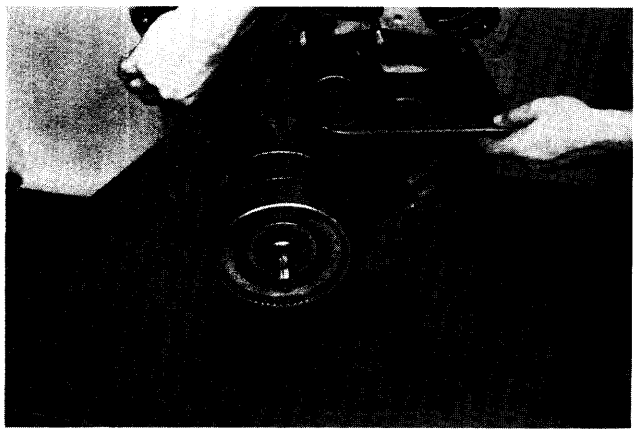


Figure 29
Use a spreading type snap ring pliers to spread the ears on forward clutch front bearing retainer ring. Remove forward clutch with pry bar.

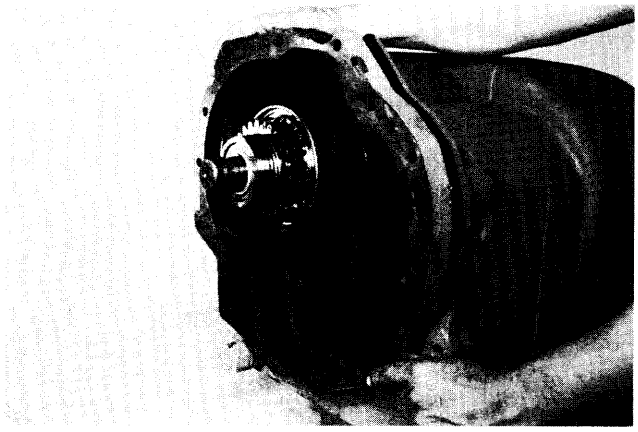


Figure 30
Remove converter to transmission spacer. (Used with 12 plate modulated clutches only.)

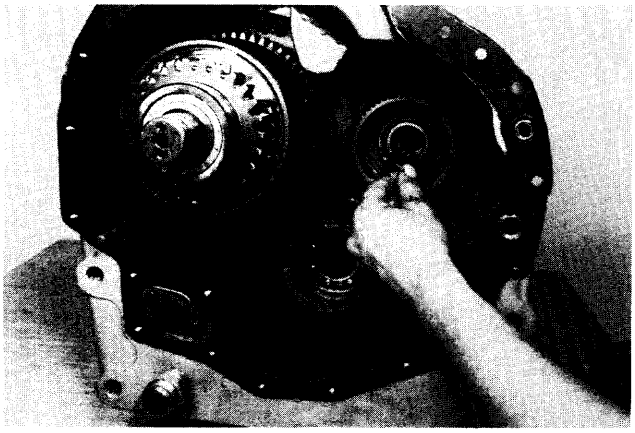


Figure 31
Remove 2nd clutch pilot bearing.

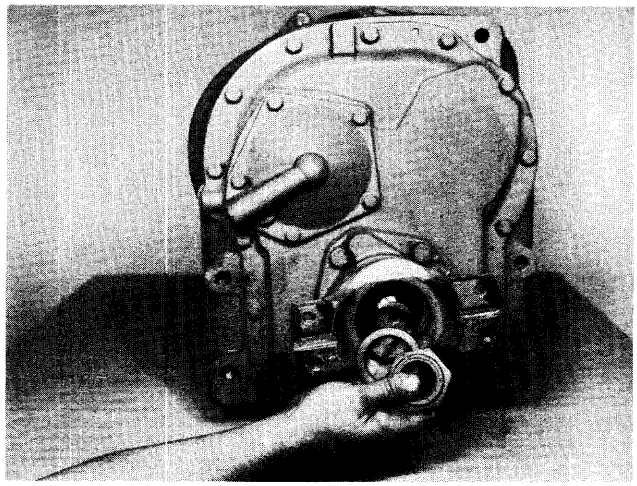


Figure 32
Remove output flange nut, washer and "O" ring.

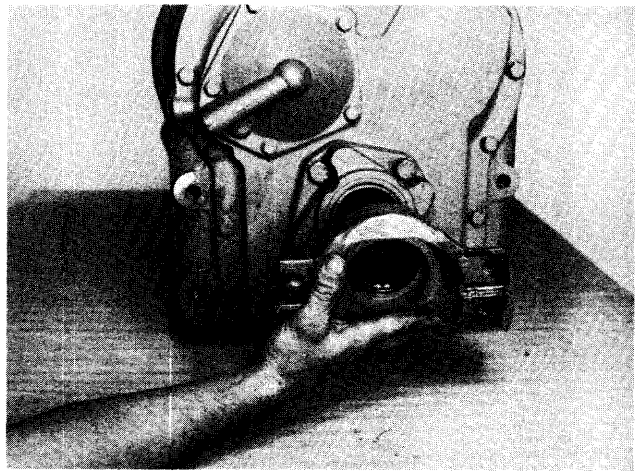


Figure 33
Remove output flange.

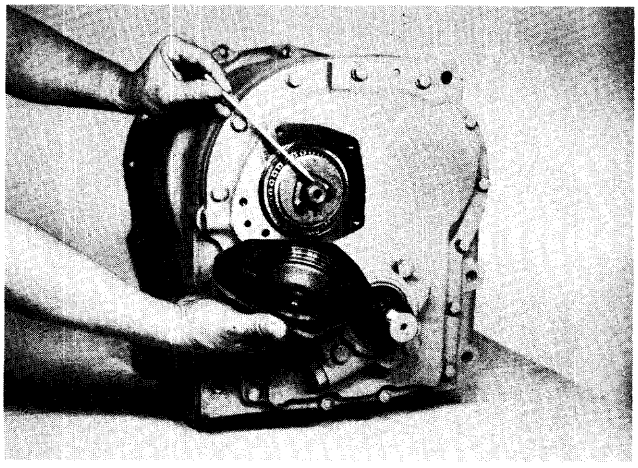


Figure 34
Remove low clutch bearing cap. Note oil sealing ring.

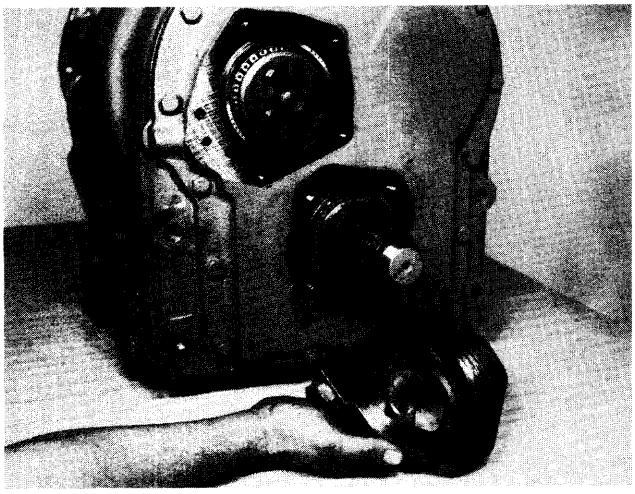


Figure 35
Remove output shaft bearing cap.

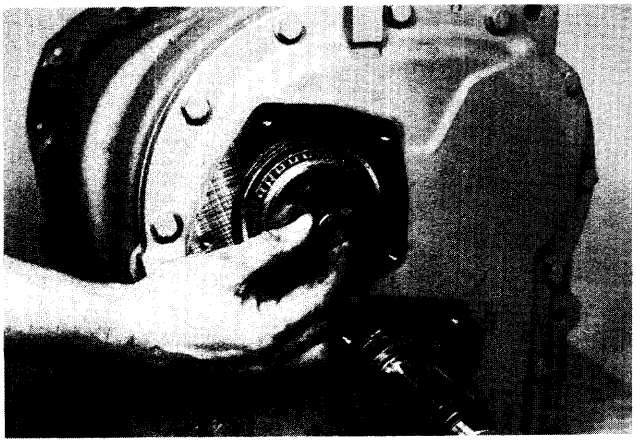


Figure 36
Cut and remove low clutch rear bearing retainer plate bolt lockwire. Remove low clutch shaft oil sealing ring.

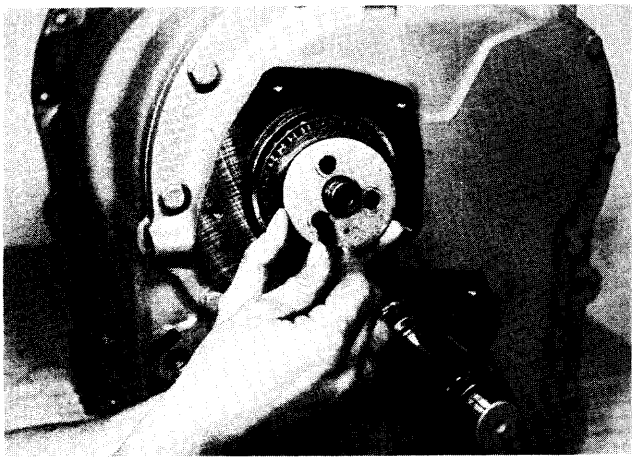


Figure 37
Remove retainer plate bolts and plate.

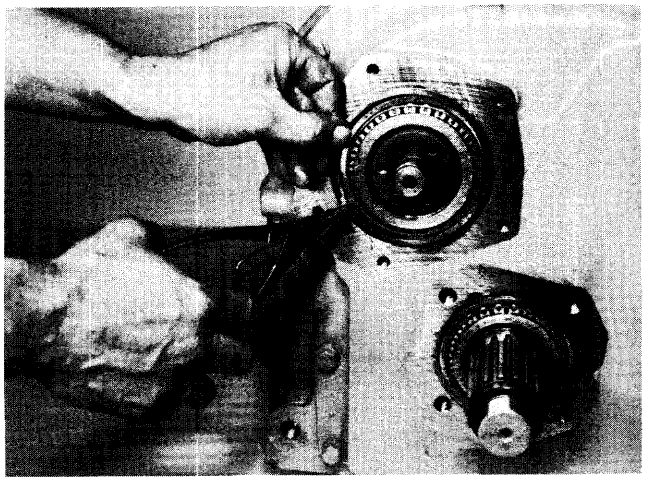


Figure 38
Remove output shaft and low clutch rear bearing locating ring.

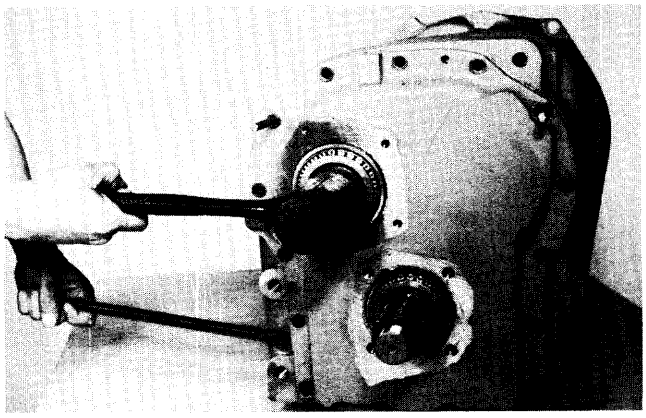


Figure 39
Remove rear cover bolts. Using pry slots provided, pry cover from transmission housing tapping on low clutch and output shaft to allow cover to be removed without shaft binding. **NOTE:** The use of alignment studs will facilitate cover removal.

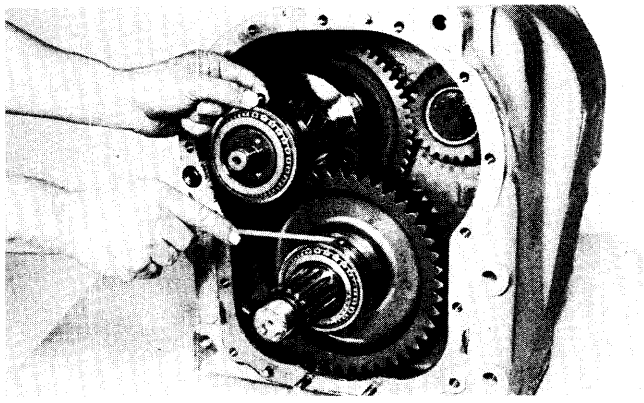


Figure 40
Remove bearing lock balls.

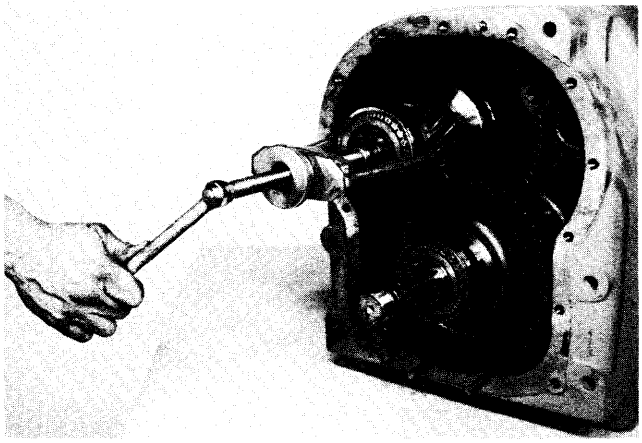


Figure 41

Remove low clutch double bearing cup, outer cone bearing and spacer.

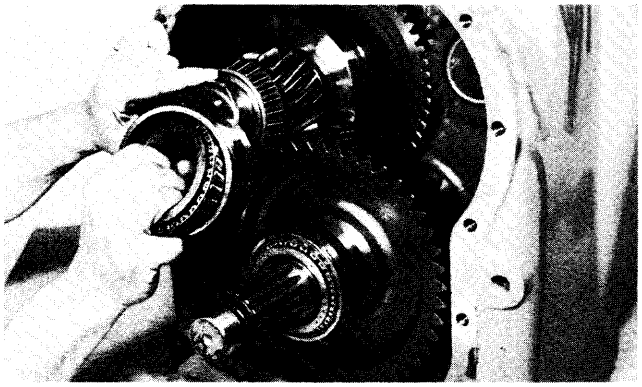


Figure 42

CAUTION: Outer cone bearing, double bearing cup, spacer and inner cone bearing are replaced as a set only.

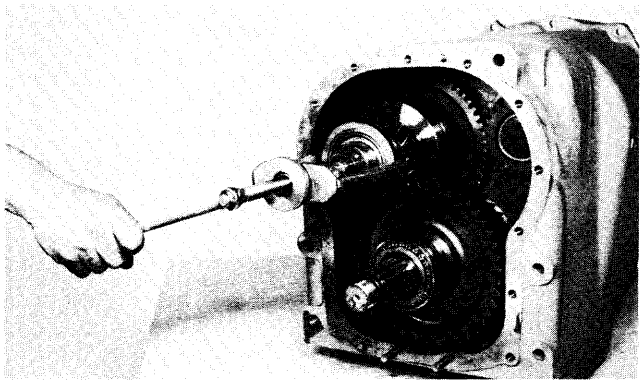


Figure 43

Remove low clutch inner bearing cone. **NOTE:** To remove the inner cone bearing without damage, a special bearing puller must be made (see diagram Fig. 43-A) or the outer cage and rollers may be pulled from the bearing inner race and the inner race can be removed after the low clutch assembly has been removed from the transmission. See caution in Figure 42.

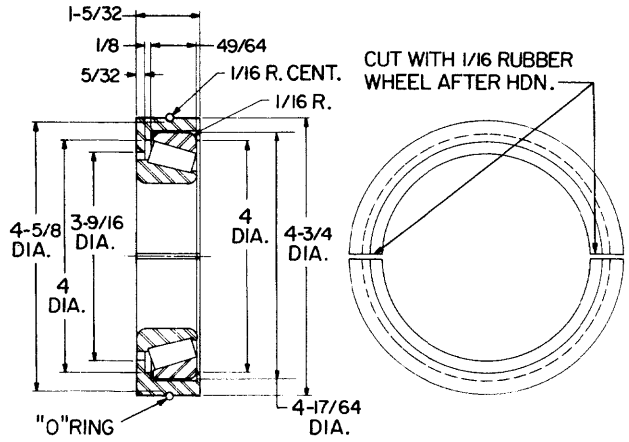


Figure 43-A

A timken bearing cup, No. 29520 must be used with the above bearing puller.

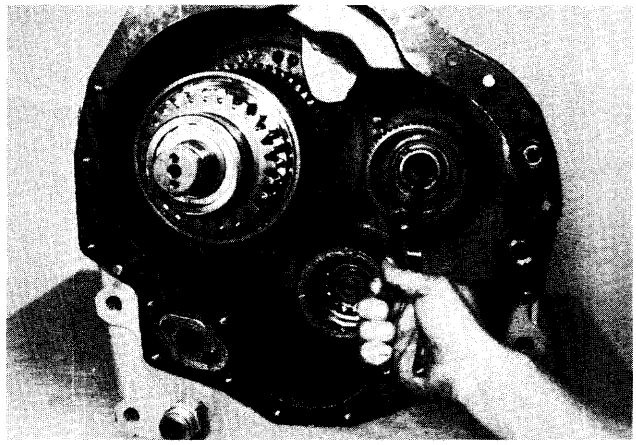


Figure 44

Remove 2nd gear ring retainer snap ring.

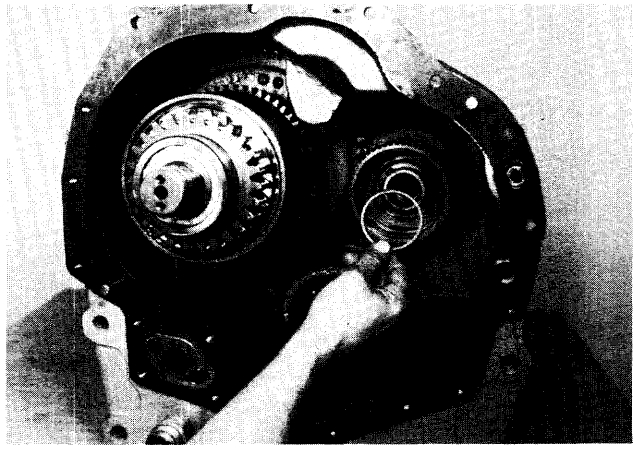


Figure 45

Remove 2nd gear retainer ring retainer.

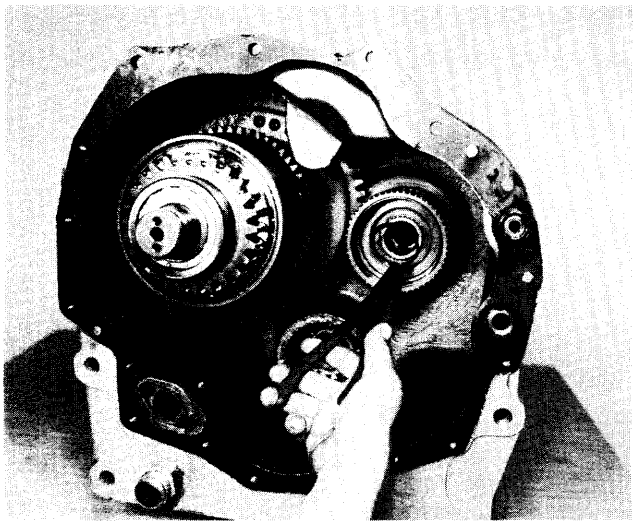


Figure 46
Remove 2nd gear retainer ring.

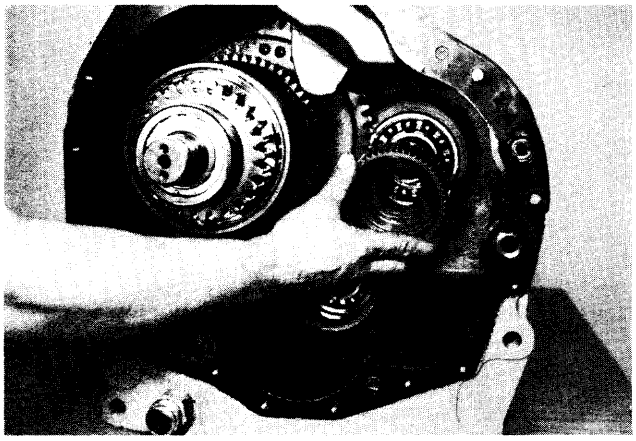


Figure 47
Remove 2nd gear. **NOTE:** On the 4 speed transmission there is a bearing end plate between the 2nd gear and bearing.

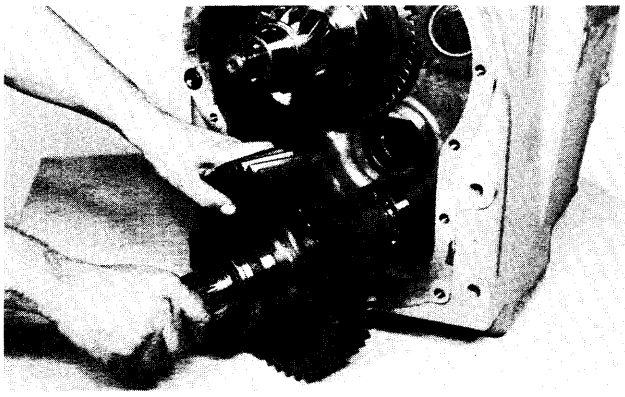


Figure 48
Remove output shaft assembly. (3 speed output shaft shown.)

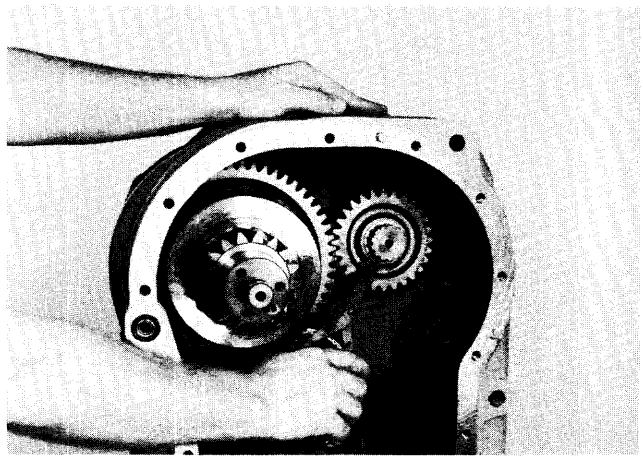


Figure 49
Remove low speed drive gear retainer ring and drive gear.

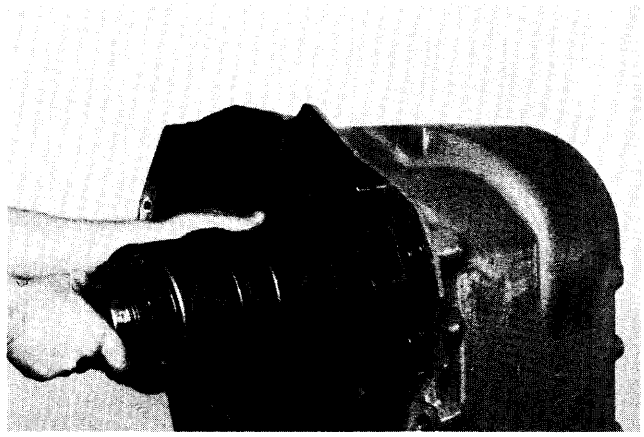


Figure 50
Remove reverse and 3rd clutch assembly.

Figure 51
Remove low clutch assembly.

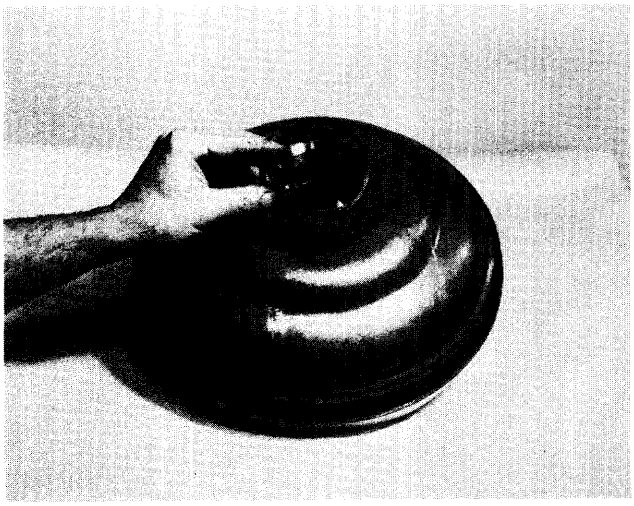


Figure 52
Remove impeller hub gear retainer ring.

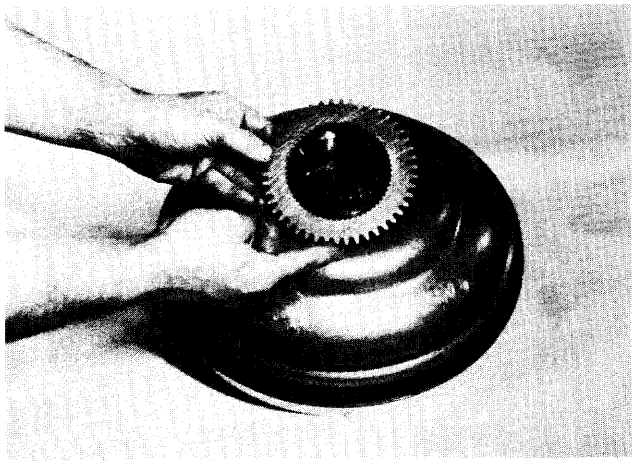


Figure 53
Remove impeller hub gear.

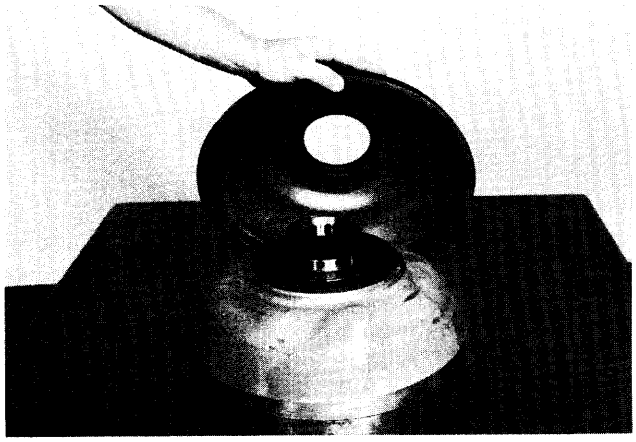


Figure 54
Lift oil baffle and oil seal assembly from impeller.

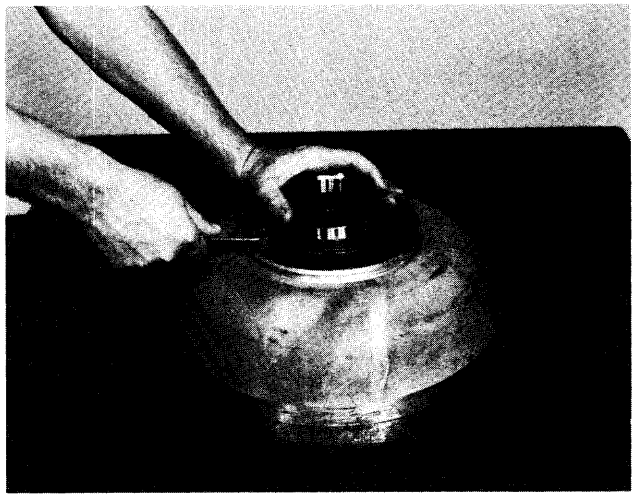


Figure 55
Remove impeller to hub bolts.

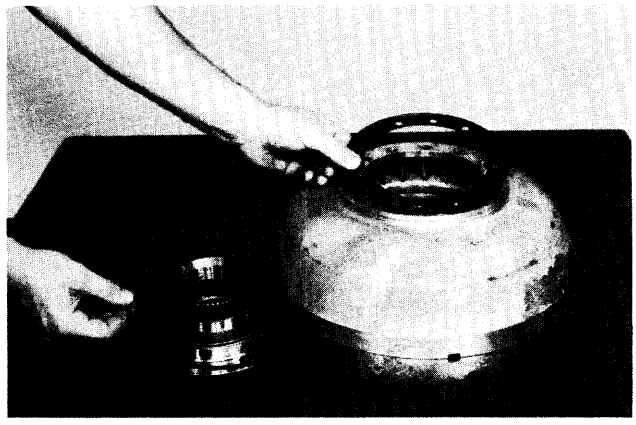


Figure 56
Remove impeller hub, "O" ring and impeller hub screw backing ring.

CLUTCH DISASSEMBLY

Figure 56

NOTE: Each disc spring assembly is made up of selected springs to precisely match each part within this assembly. Failure to replace all piston return springs can result in unequal deflection within the spring pack. The result of this imbalance may adversely affect overall life of springs.

The disc spring packs are to be used as complete assemblies and care should be taken not to intermix the individual disc springs with disc springs in another clutch or disc spring pack.

NOTE: DO NOT MIX THE FRICTION DISC IN THE LOW CLUTCH WITH THE FRICTION DISCS OF ANY OF THE OTHER CLUTCHES. (SEE NOTE FOLLOWING FIGURE 104).

LOW CLUTCH DISASSEMBLY

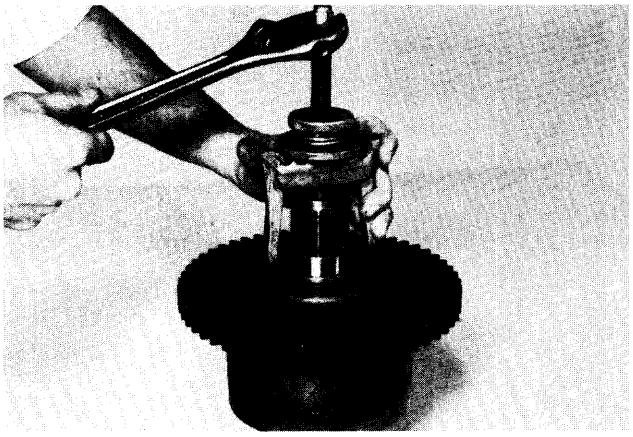


Figure 57
Remove low clutch shaft front bearing race.

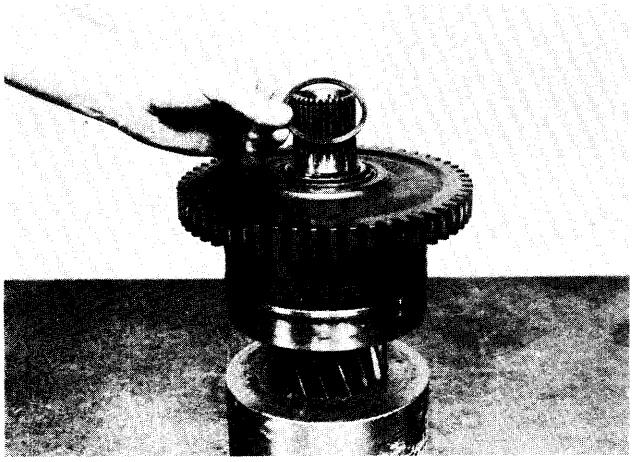


Figure 58
Remove low speed gear taper bearing retainer ring retainer.

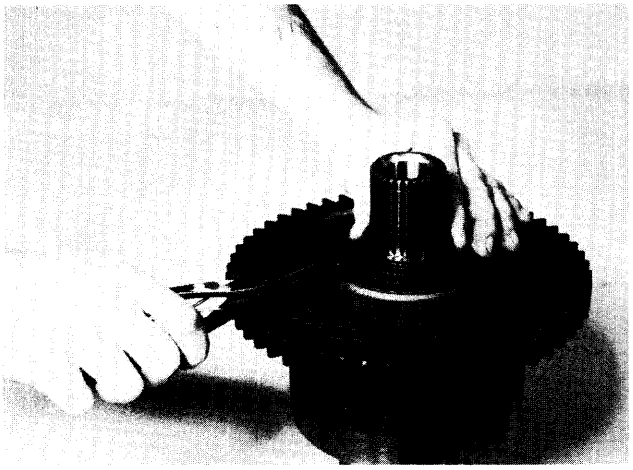


Figure 59
Remove low speed gear taper bearing retainer ring.

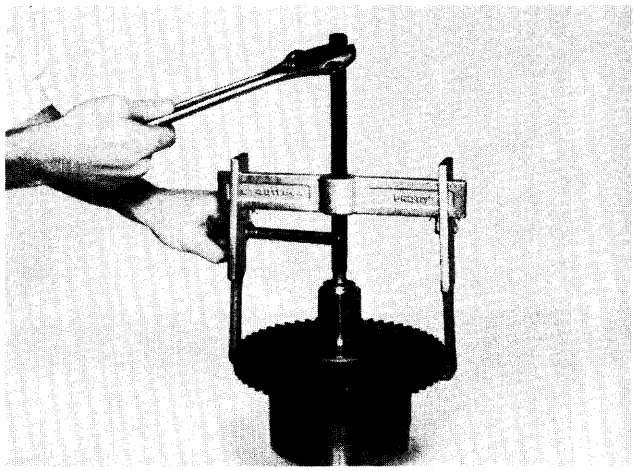


Figure 60
Remove low speed gear and outer taper bearing. Remove low clutch taper bearing spacer.

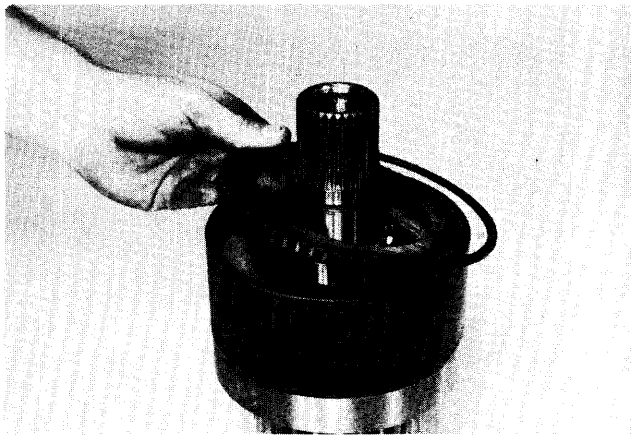


Figure 61
Remove clutch end plate retainer ring. Remove clutch end plate and inner and outer clutch discs.

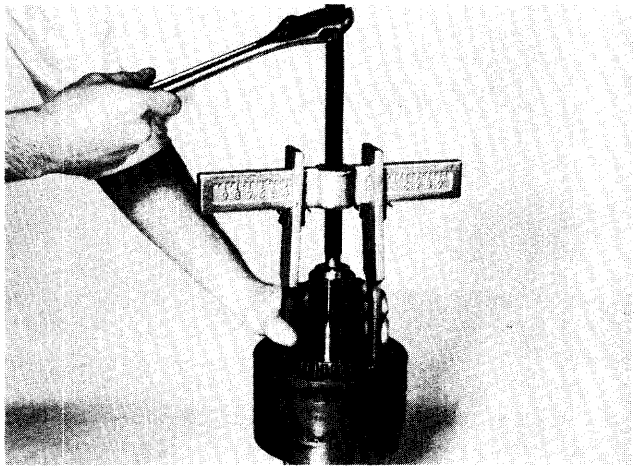


Figure 62
Remove low gear inner taper bearing.

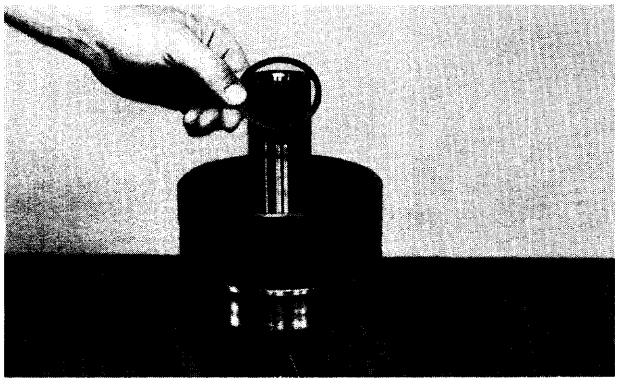


Figure 63
Remove snap ring, ring retainer.

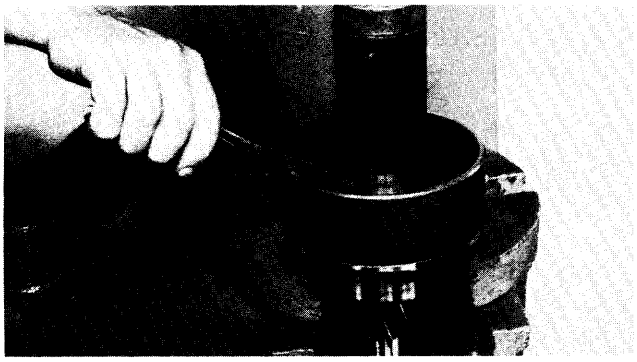


Figure 64
Remove clutch piston return disc spring retainer ring. A sleeve with a portion removed is recommended for removing the clutch piston return spring washers and retainer ring. Sleeve shown is a common pipe, with a 1-1/2 x 1 [39,0 x 26,0mm] opening. The pipe is 6 x 3-1/4 x 2-3/4 [155,0 x 85,0 x 78,0mm]. Compress disc springs washer. Through opening, remove retainer ring. Release tension on washers. Remove spring retainer ring.

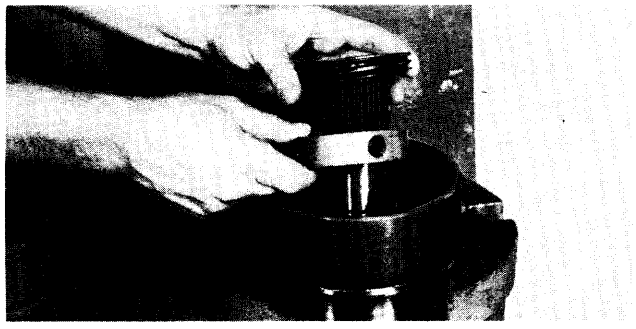


Figure 65
Remove disc springs and spacer. Turn clutch over and tap clutch shaft on a block of wood to remove clutch piston. **NOTE: Disc springs in the low clutch are different than disc springs in the forward and reverse clutch. Do not mix low clutch springs with forward and reverse springs. See page 40 for spring identification.**

FORWARD AND 2ND CLUTCH DISASSEMBLY
(Forward being disassembled)

Forward and 2nd clutch and reverse and 3rd clutch disassemble and reassemble the same except forward and reverse clutches use disc springs for the piston return and the 2nd and 3rd clutches use a spring for the piston return. **NOTE:** If forward and reverse clutches are non-modulated, they will also use a spring for piston return instead of disc springs.

Figure 66
Remove clutch shaft piston rings and expander springs. See page 67 for proper piston ring and expander spring installation.

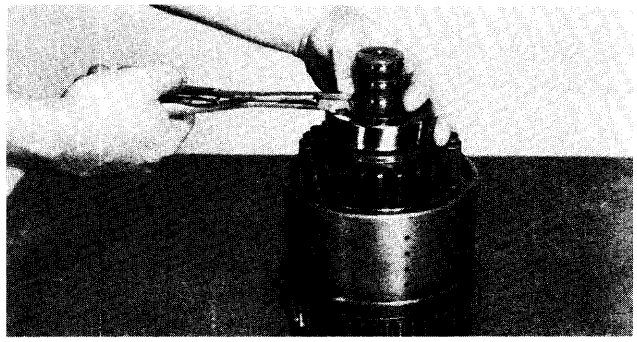


Figure 67
Remove front bearing retainer ring.

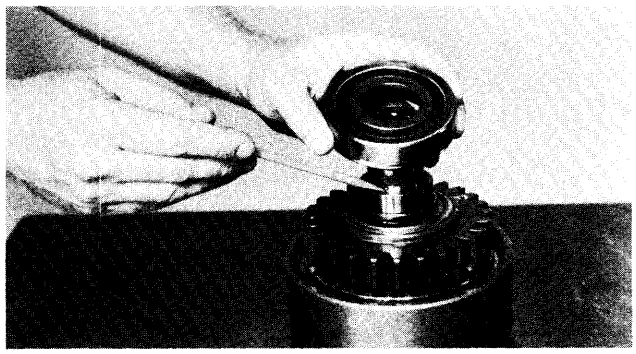


Figure 68
Remove spacer and bearing. **Caution:** Do not lose lock ball.

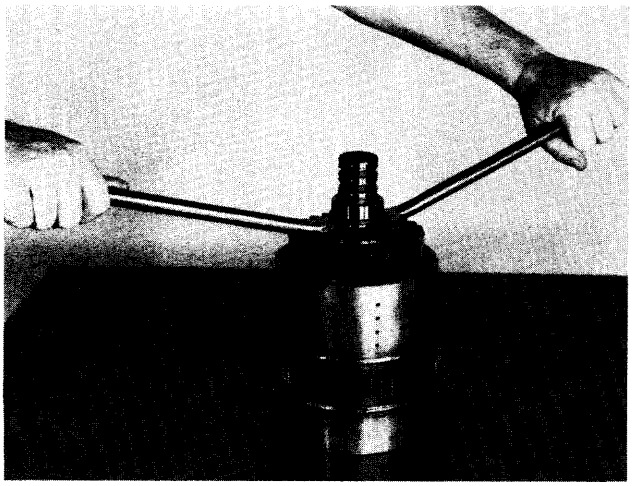


Figure 69
Pry front bearing inner race from shaft. **Caution:** Do not damage bearing roller surface.

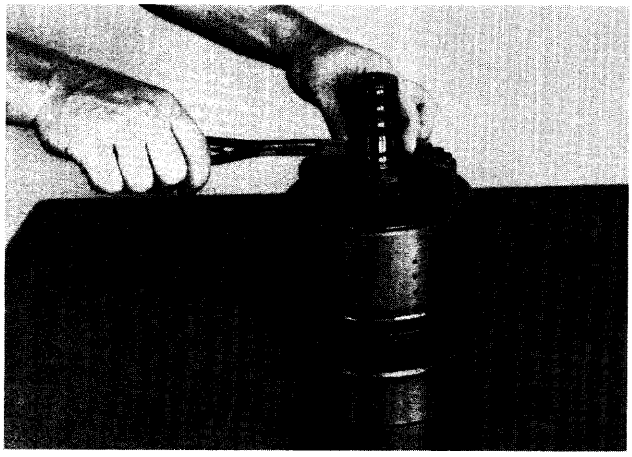


Figure 70
Remove front bearing locating ring.

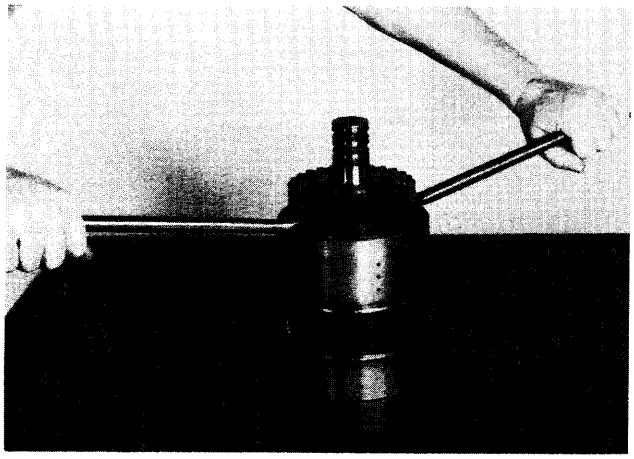


Figure 71
Pry gear up to accommodate gear puller.

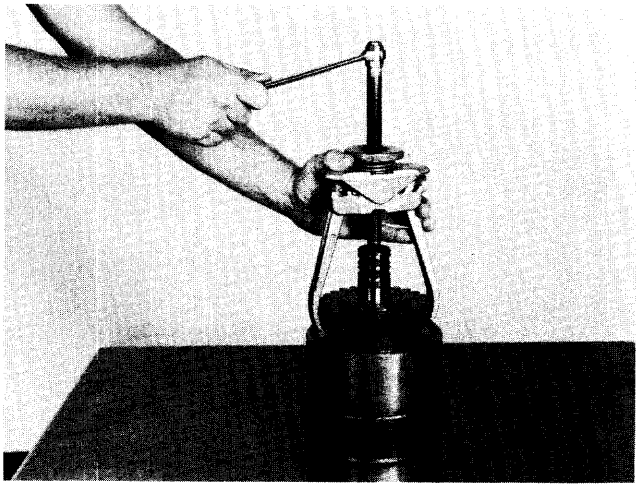


Figure 72
Remove clutch driven gear and outer bearing.

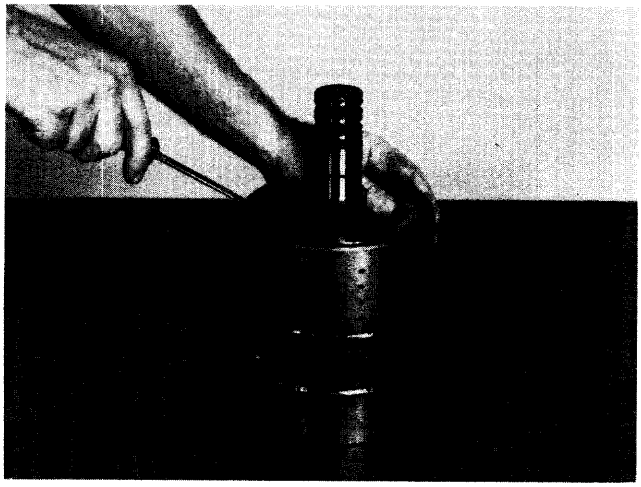


Figure 73
Remove end plate retainer ring.

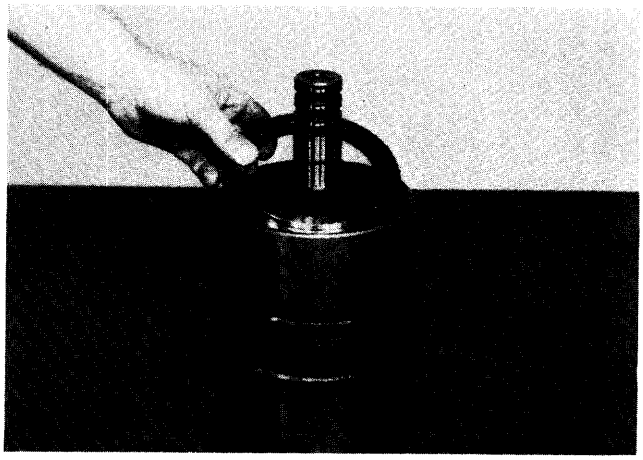


Figure 74
Remove end plate.

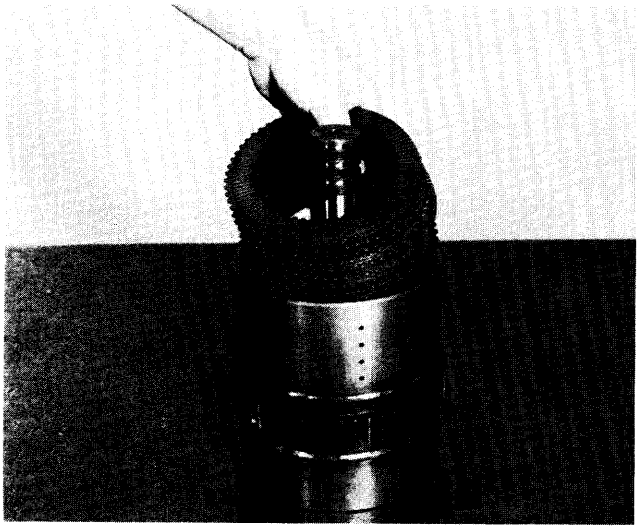


Figure 75
Remove inner and outer clutch discs.

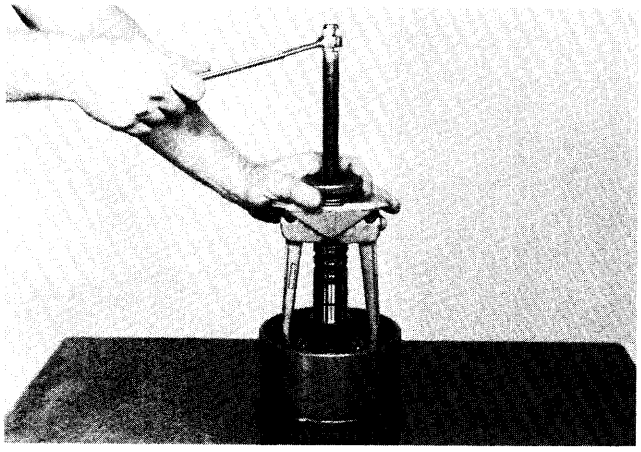


Figure 76
Remove inner bearing.

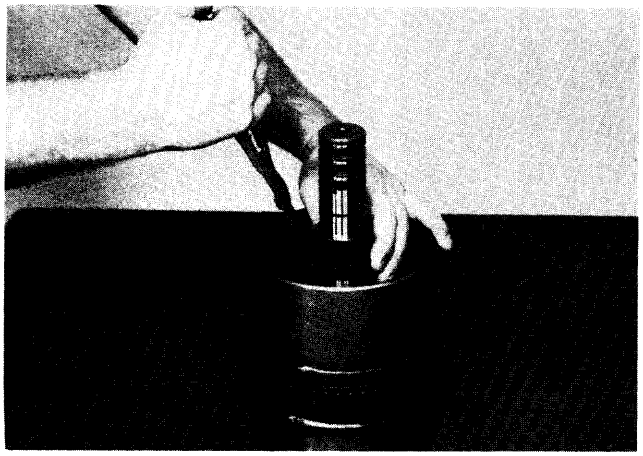


Figure 77
Remove bearing locating ring.

Figure 78
Compress spring retainer washer. Through opening remove spring retainer snap ring. Release tension on spring retainer.

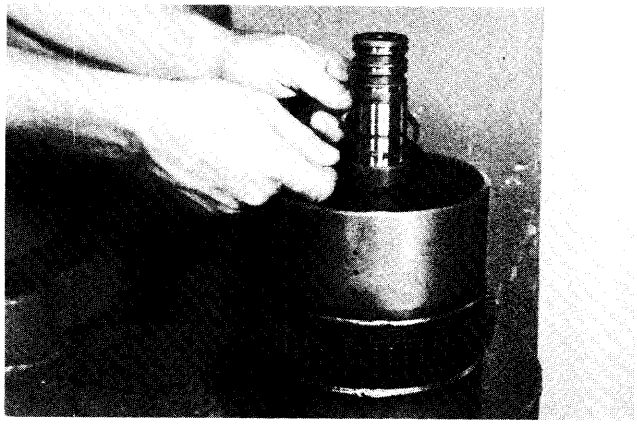


Figure 79
Remove snap ring and snap ring retainer.

Figure 80
Remove disc spring washers. **NOTE:** Non-modulated clutches will have a piston return spring in forward & reverse. **See note in Figure 65.**

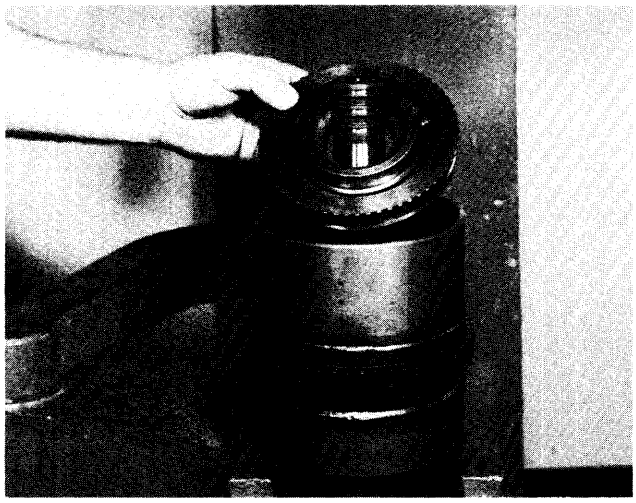


Figure 81

Remove clutch piston.

CLEANING AND INSPECTION

CLEANING

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

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

Bearings

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

Housings

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

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

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

INSPECTION

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

Bearings

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

Oil Seals, Gaskets, Etc.

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

Gears and Shafts

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

Housing, Covers, etc.

Inspect housings, covers and bearing caps to be certain they are thoroughly clean 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.

FORWARD AND 2nd CLUTCH REASSEMBLY

(Forward being assembled)

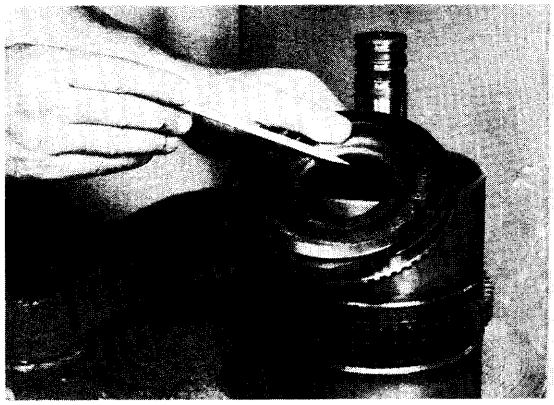


Figure 82
Install new clutch piston inner and outer sealing rings.

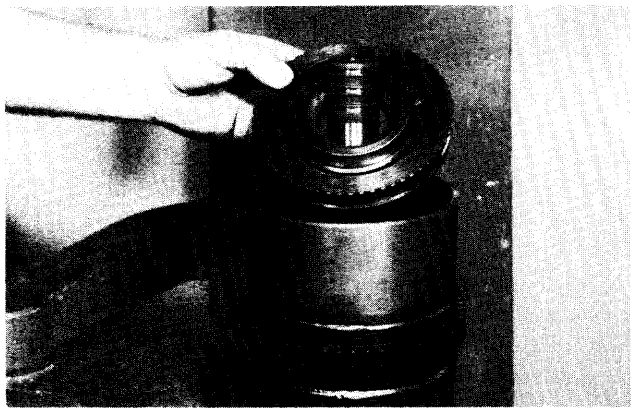


Figure 83
Insert clutch piston in clutch drum. **CAUTION:** Do not damage sealing rings. See note in Figure 80.

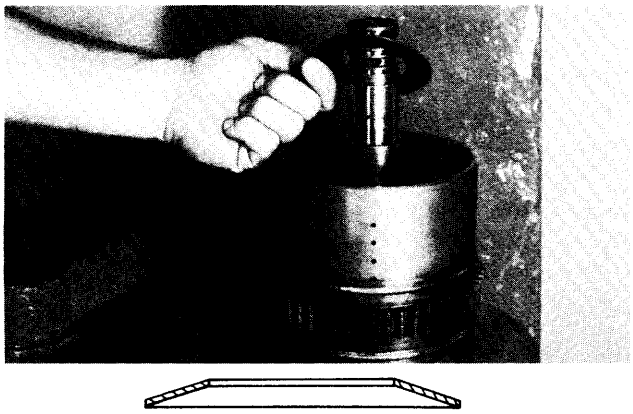


Figure 84
Install 1st disc spring washer, large diameter of bevel down as shown. **NOTE:** Do not mix forward clutch disc spring washers with low clutch washers. **See NOTE in Figure 65.**

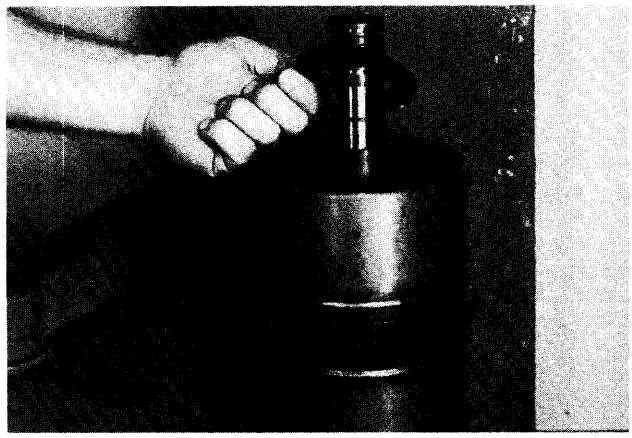


Figure 85
Install 2nd disc spring washer with large diameter of bevel up. Install balance of washers, quantity (7) seven alternating bevel.

Figure 86
Install disc spring snap ring retainer and snap ring. Compress washers and snap ring retainer, install snap ring in lower snap ring groove. Install bearing locating ring. **See page 40, Figure A.**

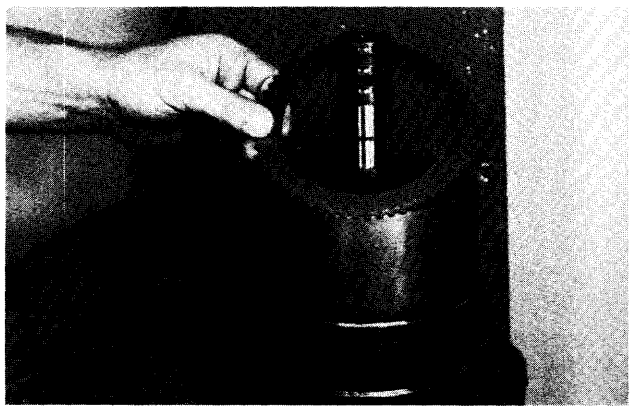


Figure 87
Insert one steel disc.

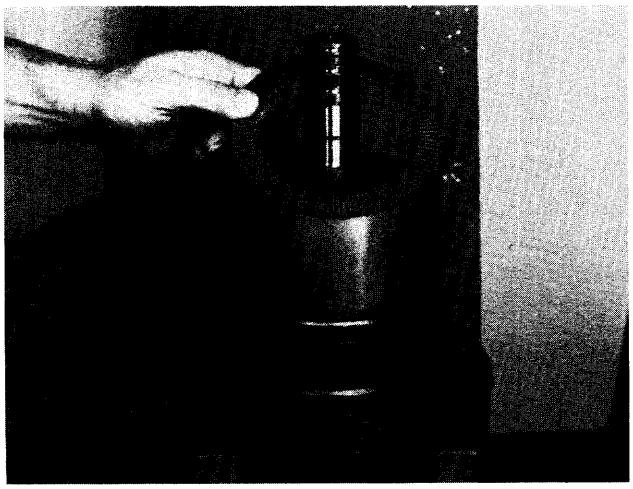


Figure 88

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

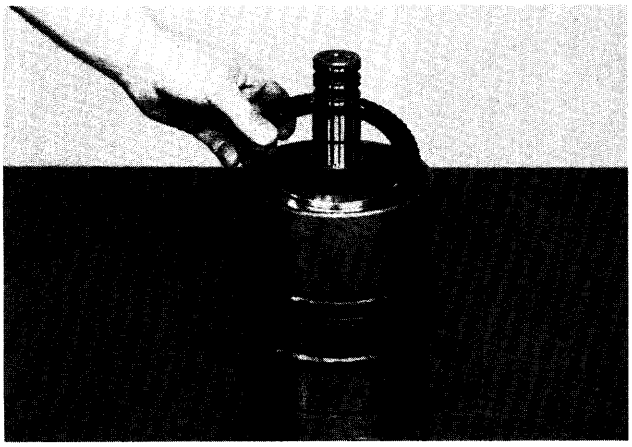


Figure 89

Install end plate.

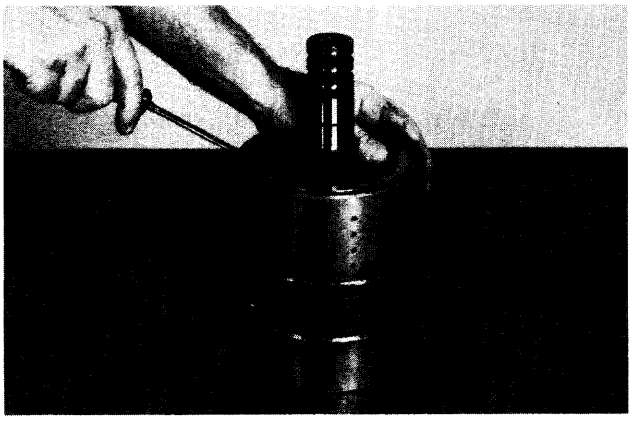


Figure 90

Install end plate retainer ring.

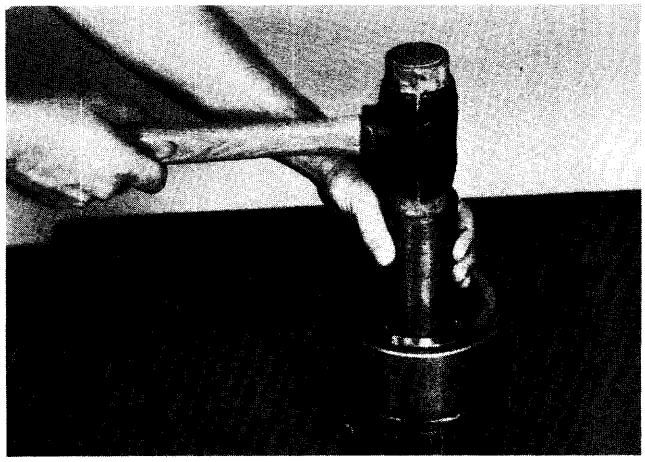


Figure 91

Install clutch driven gear inner bearing. NOTE: **The inner bearing does not have a bearing shield.**

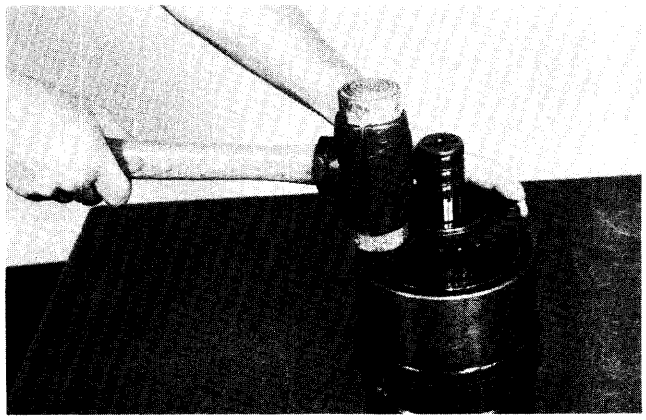


Figure 92

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

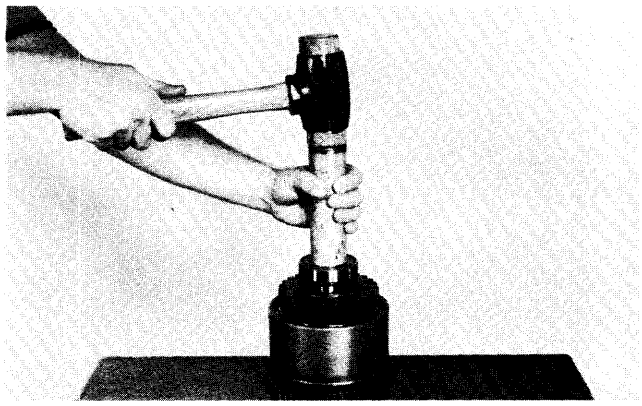


Figure 93

Install driven gear outer bearing. **NOTE:** Bearing shield in. See page 43.

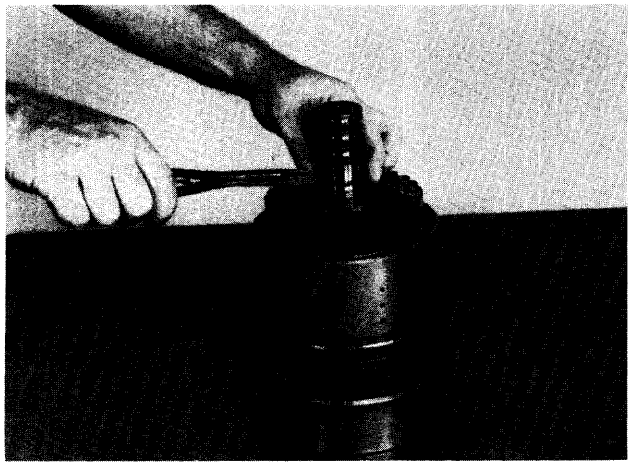


Figure 94
Install front bearing locating ring.

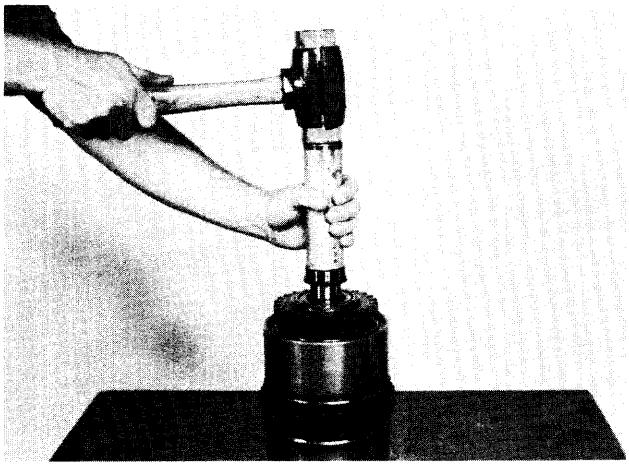


Figure 95
Install front bearing inner race.

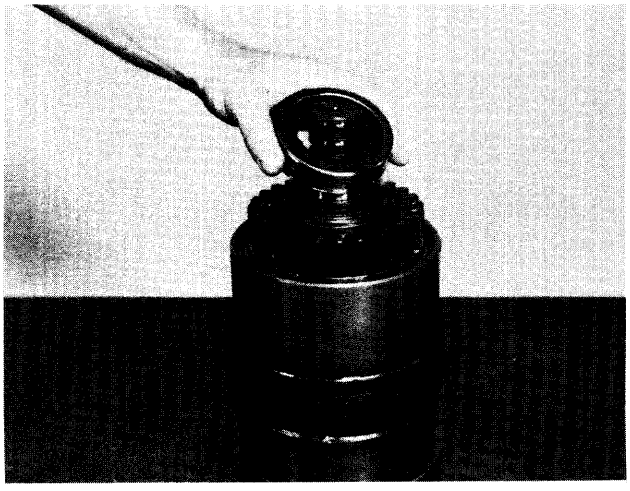


Figure 96
Install front bearing and outer race.

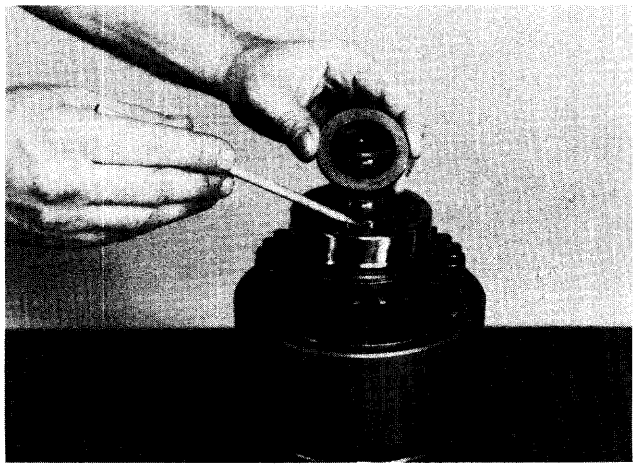


Figure 97
Install lock ball and bearing spacer.

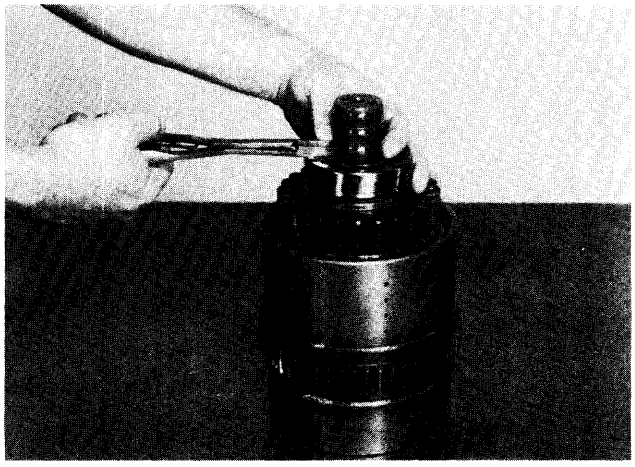


Figure 98
Install bearing retainer ring.

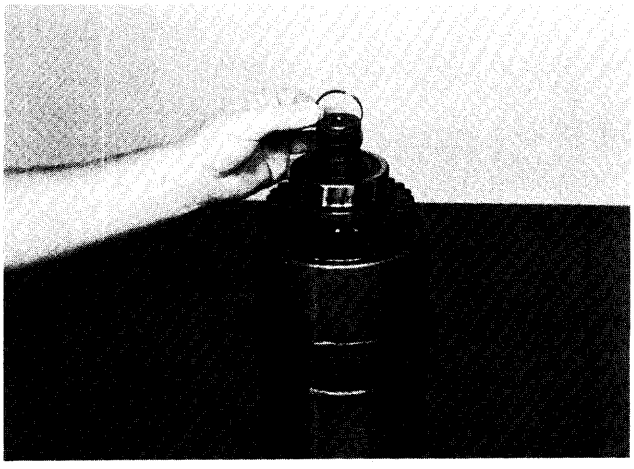


Figure 99
Install piston rings and expander springs as explained on page 67.

FORWARD & REVERSE NON-MODULATED CLUTCHES AND 2nd & 3rd CLUTCH PISTON RETURN SPRING REASSEMBLY

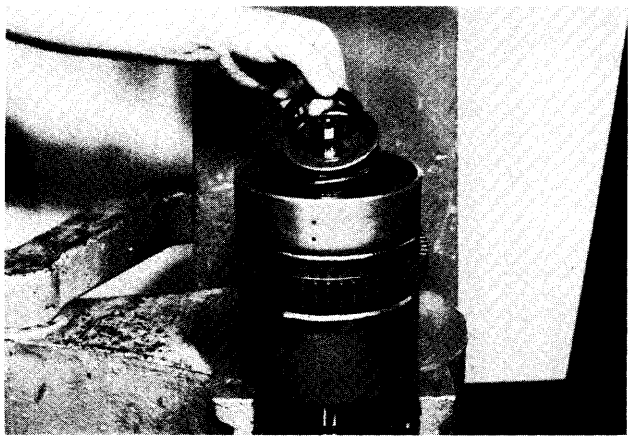


Figure 100

Install new clutch piston inner and outer sealing ring. Insert piston into clutch drum using caution as not to damage seals. Position inner spring retainer, piston return spring, outer spring retainer and retainer snap ring retainer and snap ring. Compress spring and retainer and install snap ring. **See page 40, Figure B.**

Assemble clutch discs and end plate as previously explained.

LOW CLUTCH REASSEMBLY

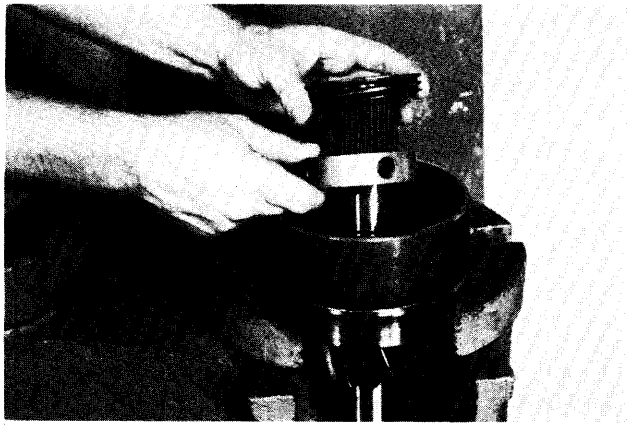


Figure 101

Install new clutch piston inner and outer sealing ring. Insert piston into clutch drum using caution as not to damage seals. Install piston to disc spring washer spacer. **See NOTE in Figure 65.** Install disc spring washers. First washer with large diameter of washer toward spacer. Alternate (5) five washers. **See page 40, Figure C.**

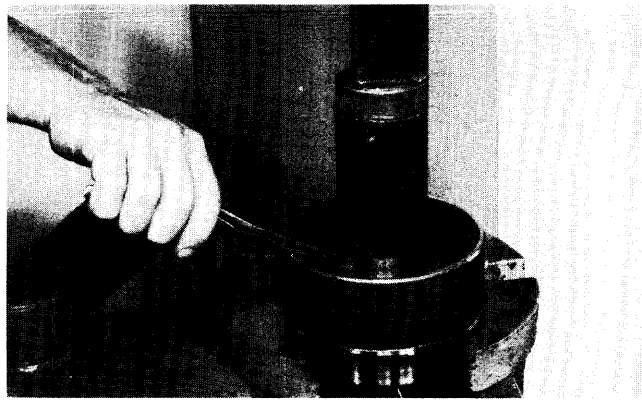


Figure 102

Position piston return disc spring washer snap ring. Compress washers and install snap ring.

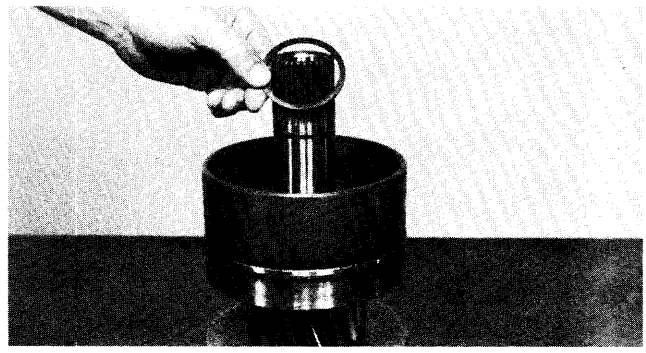


Figure 103

Install snap ring retainer.

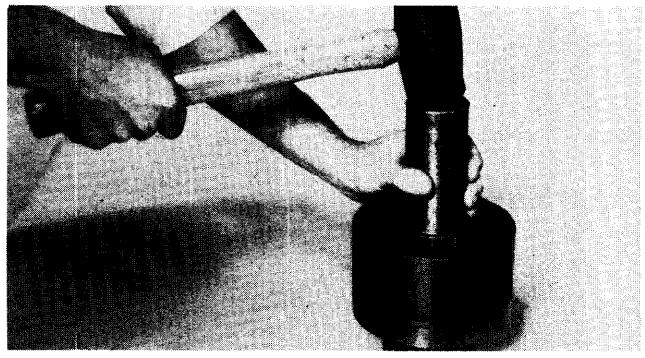


Figure 104

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

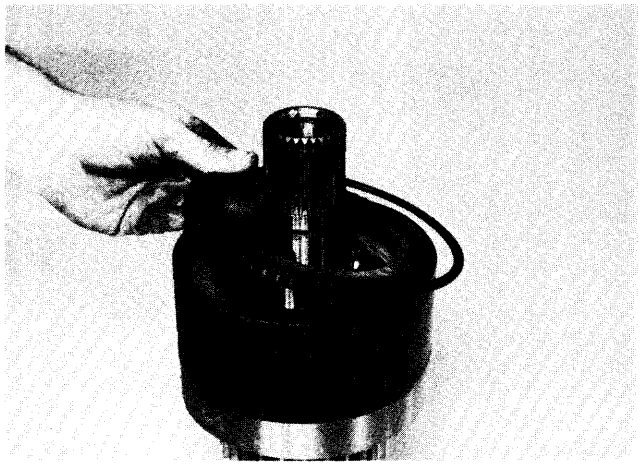


Figure 105
Install end plate and retainer ring.

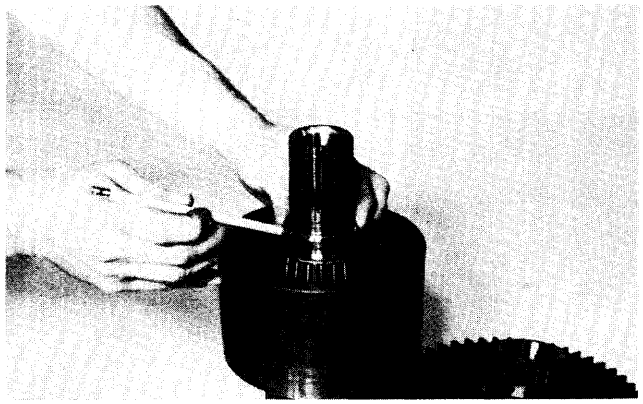


Figure 106
Install low clutch taper bearing spacer. **NOTE:** When installing the 3rd gear in the 3rd speed clutch a bearing spacer is used between the inner and outer 3rd gear bearing also.

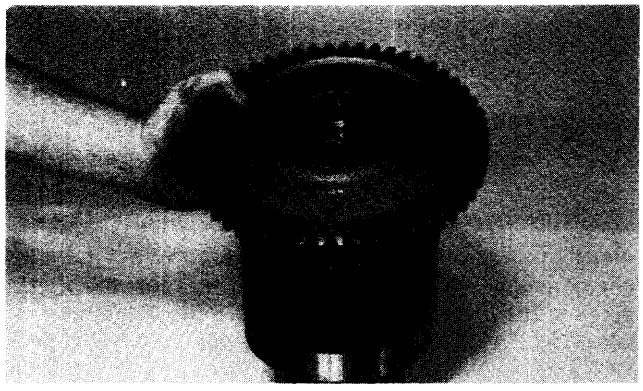


Figure 107
Install low gear into clutch drum. Align splines on low gear with internal teeth of friction discs. Tap gear into position. Do not force this operation. Gear splines must be in full position with internal teeth of all friction discs.

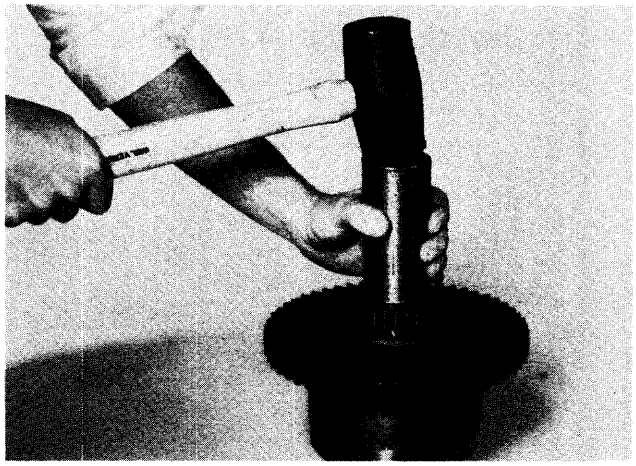


Figure 108
Install low gear outer taper bearing.

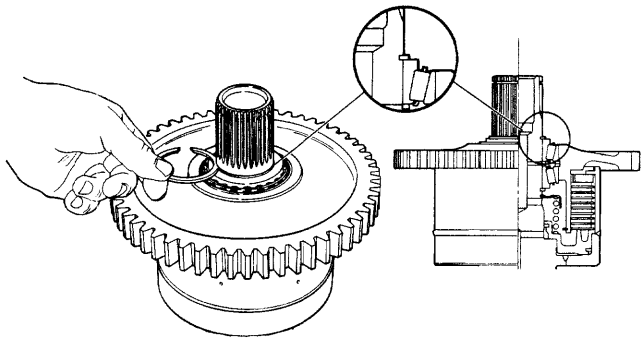


Figure 109

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

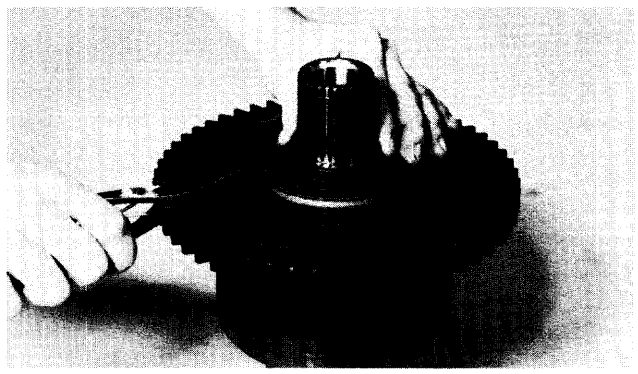


Figure 110
Install low clutch taper bearing retainer ring.

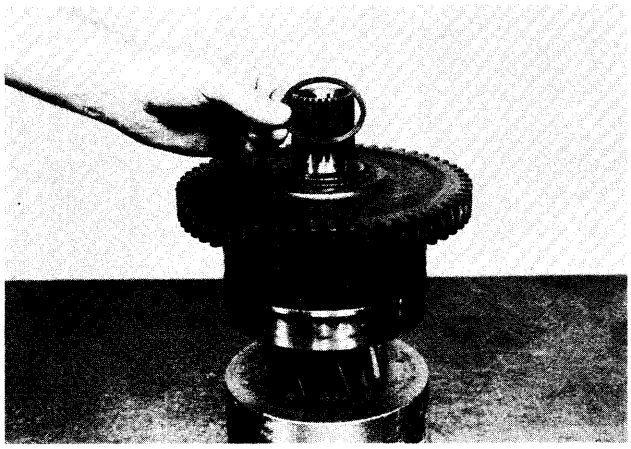


Figure 111
Install low speed gear taper bearing retainer ring retainer.

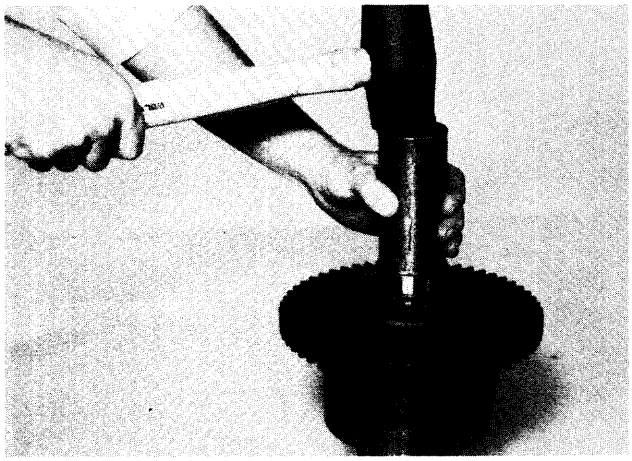


Figure 112
Install low clutch shaft front bearing inner race with large diameter of race down.

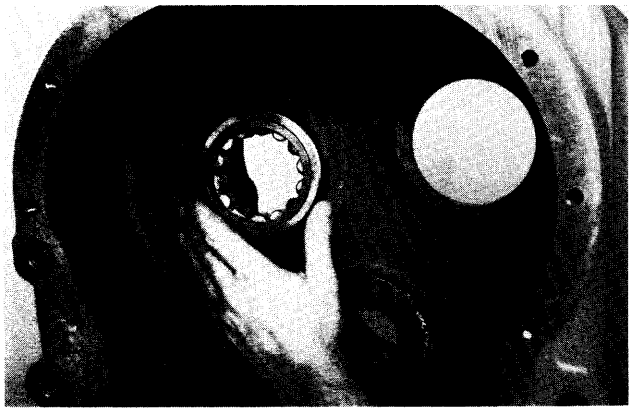


Figure 113
Install low clutch front bearing. Roller bearing on 4 speed transmission and a ball bearing on the 3 speed transmission.

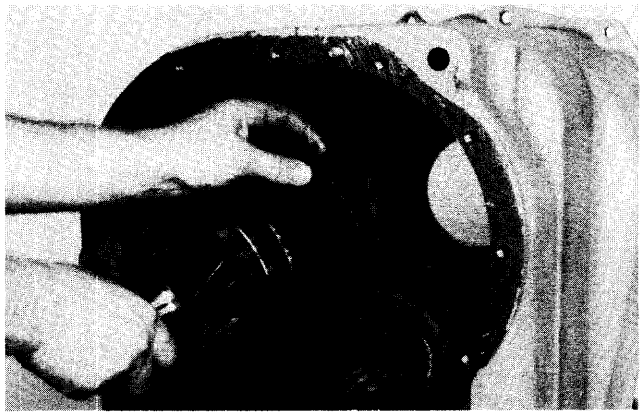


Figure 114
Install low clutch assembly from rear of transmission case.

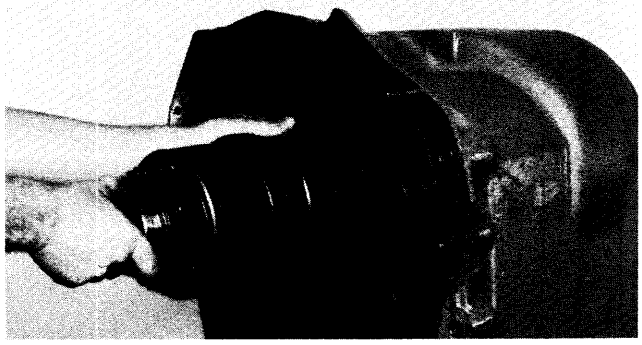


Figure 115
Install reverse and 3rd clutch assembly from the front of the transmission.

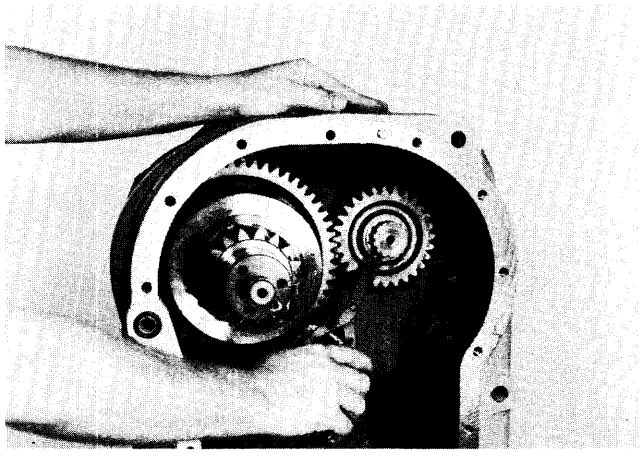


Figure 116
Install low speed drive gear and retainer ring.

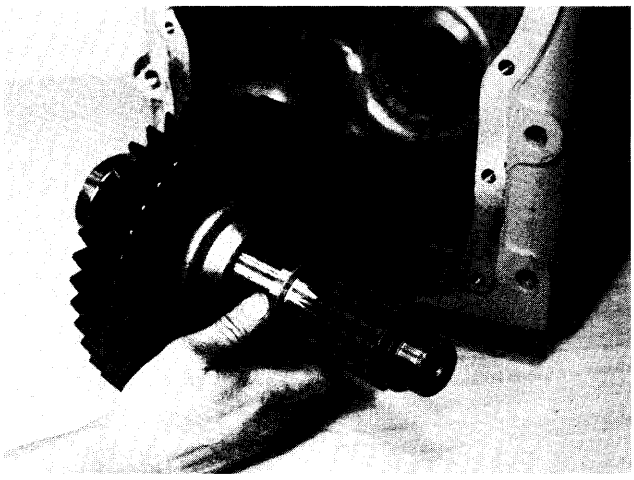


Figure 117
Press output gear on output shaft. Install output gear washer in undercut of gear. (3 speed shown).

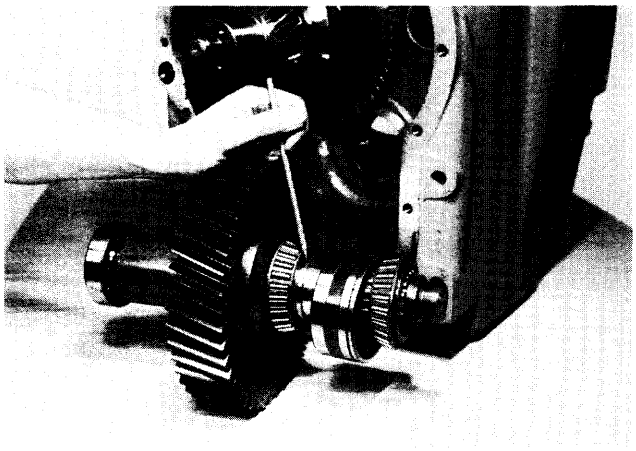


Figure 118
Press inner taper bearing on output shaft. Install double taper bearing spacer, double taper bearing cup and outer taper bearing. (3 speed shown).

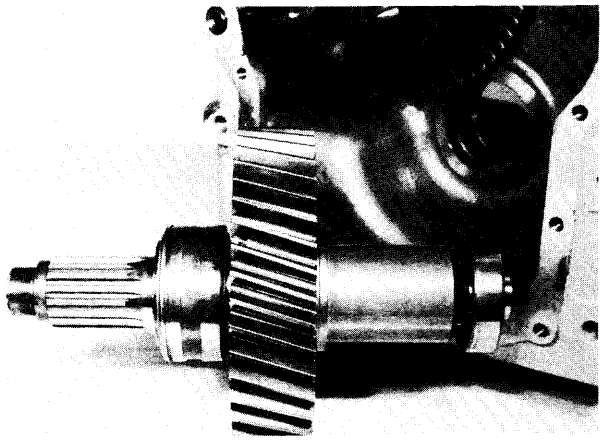


Figure 119
Output shaft assembly. (3 speed shown).

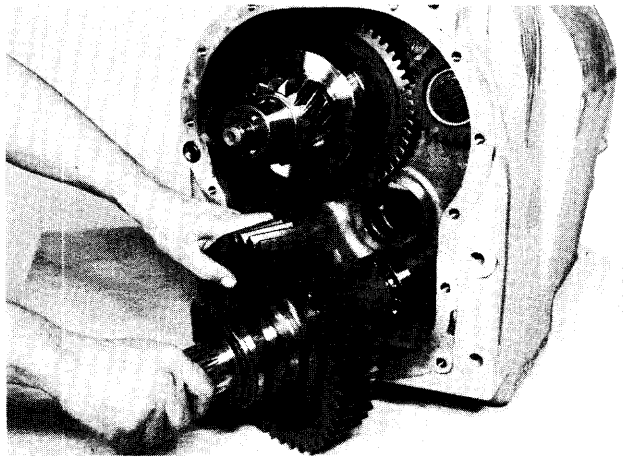


Figure 120
Install output shaft assembly in housing. (3 speed shown).

See caution in Figure 42.

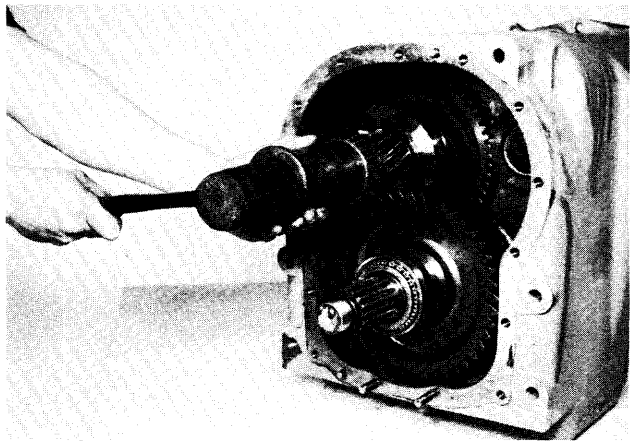


Figure 121
Install low clutch inner taper bearing. **NOTE:** Heat bearing in hot oil prior to installation.

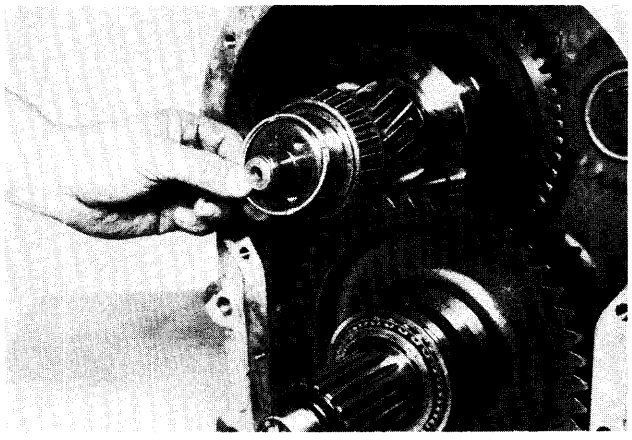


Figure 122
Install bearing spacer and double bearing cup.

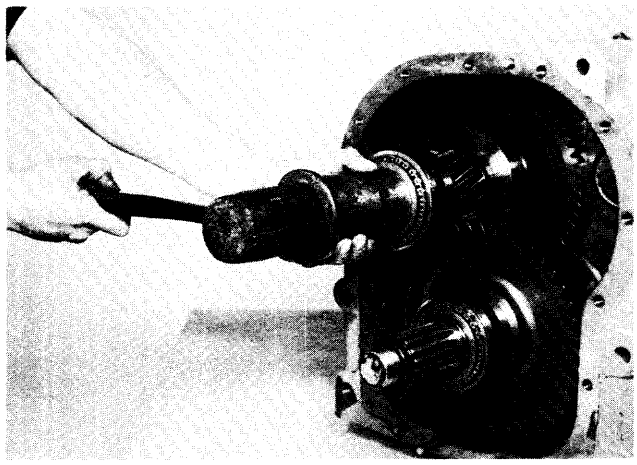


Figure 123
Install outer taper bearing. **NOTE:** Heat bearing in hot oil prior to installation.

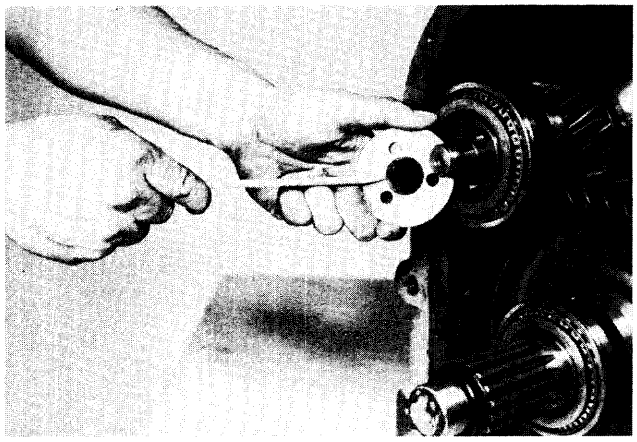


Figure 124
Install bearing retainer plate, inner diameter chamfer toward bearing.

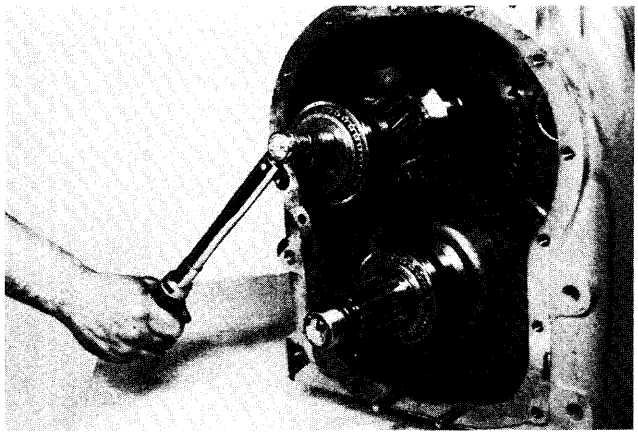


Figure 125
Install bolts, block gears to prevent turning. Tighten bolts to specified torque. Lockwire bolts to prevent loosening.

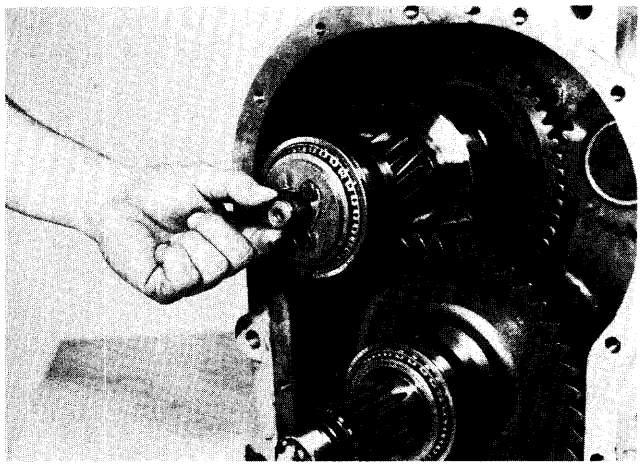


Figure 126
Install low clutch shaft oil sealing ring.

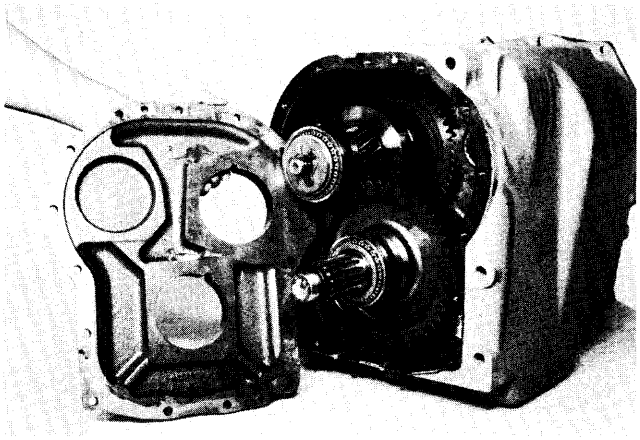


Figure 127
Install alignment studs and new gasket. Place lock balls in low shaft and idler shaft. A light coat of grease will hold lock balls in place. Position shafts so lock balls align with notches in rear cover.

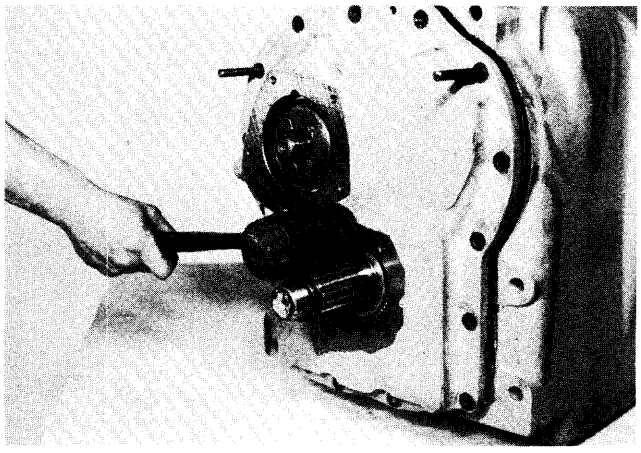


Figure 128
Tap cover in place and secure with bolts and lockwashers.

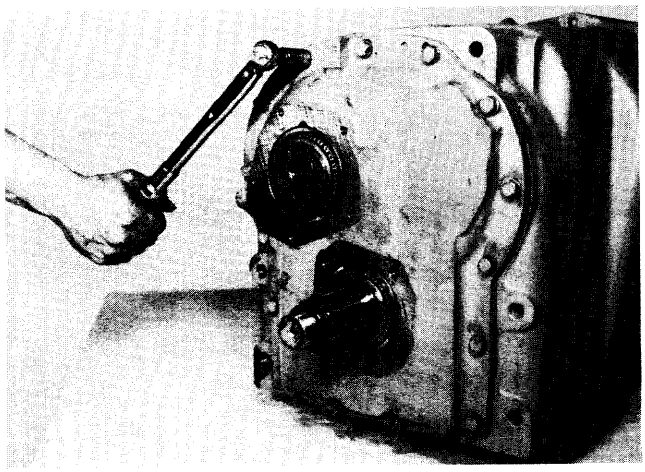


Figure 129
Tighten cover bolts to specified torque.

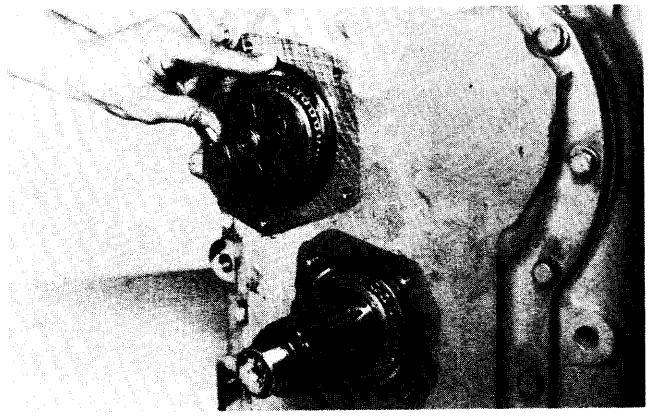


Figure 130
Install the output shaft and low clutch shaft rear bearing locating ring. Be certain ring is in full position in ring groove.

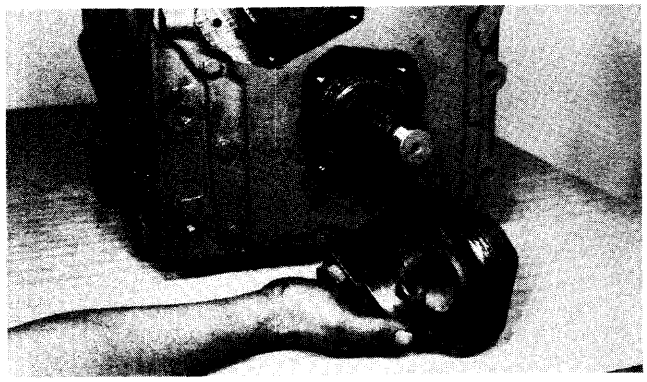


Figure 131
Coat outer diameter of oil seal with Permatex No. 2 and press seal in the output shaft bearing cap with lip of seal in. Position new gasket on bearing cap. Install bearing cap on transmission housing. Install bolts and lockwashers, tighten to specified torque.

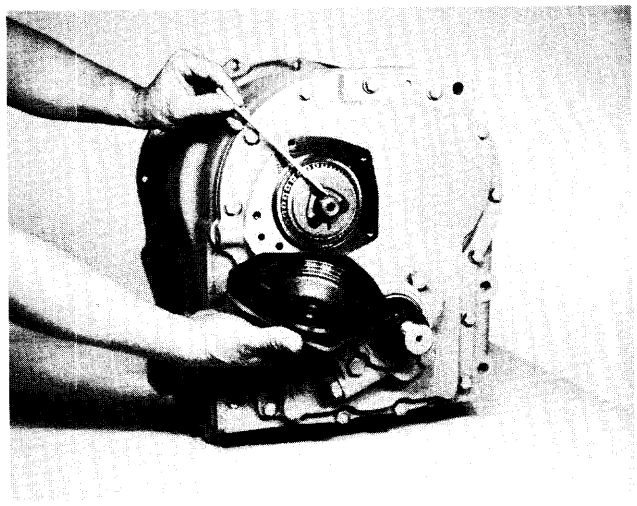


Figure 132
Install new "O" ring and gasket on low clutch bearing cap. Position cap over clutch shaft, use caution as not to damage oil sealing ring.

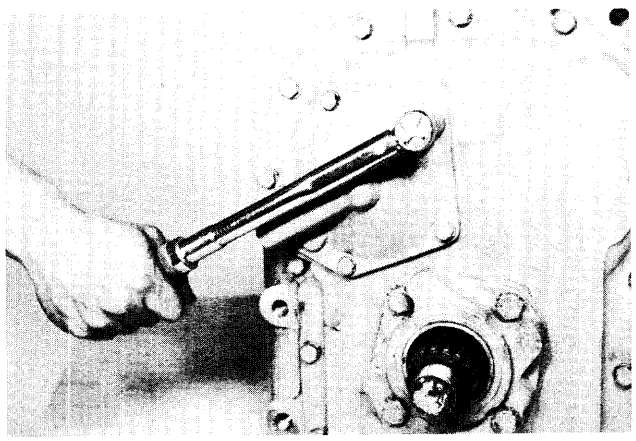


Figure 133
Install bolts and washers, tighten to specified torque.

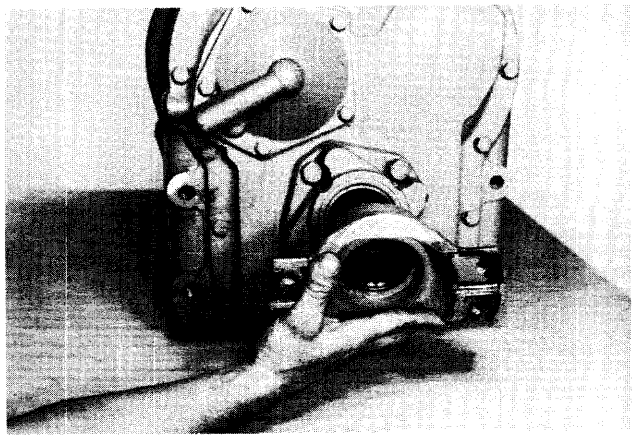


Figure 134
Install output flange on output shaft.

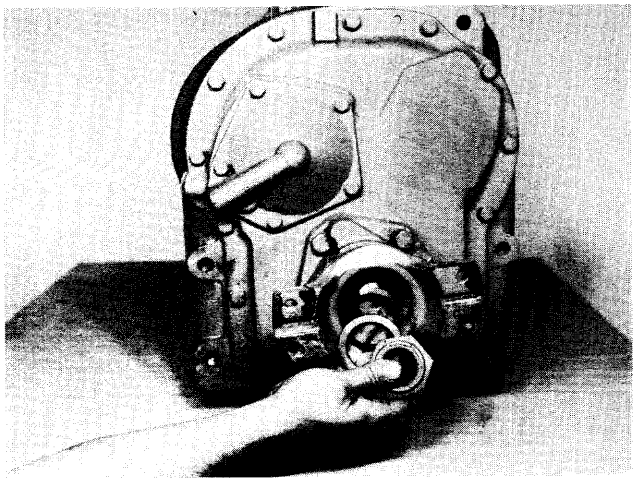


Figure 135

Install the output flange "O" ring, washer and flange nut. Block output flange to prevent from turning. **See elastic stop nut torque chart, Figure H.**

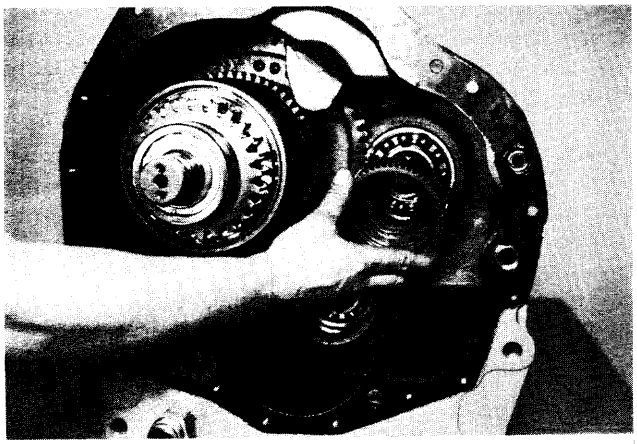


Figure 136

Install 2nd speed gear on low clutch shaft. **NOTE: The 4 speed transmission has a bearing end plate between the 2nd gear and bearing.**

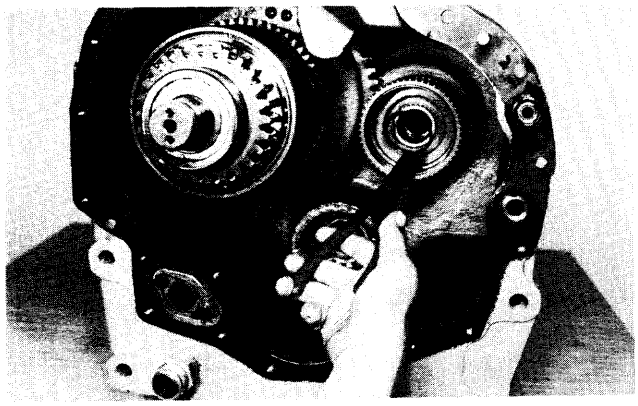


Figure 137

Install 2nd speed gear retainer ring.

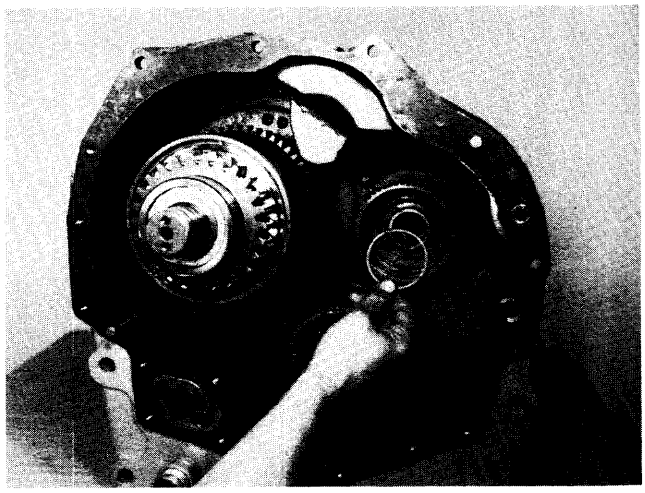


Figure 138

Install 2nd speed gear retaining ring retainer.

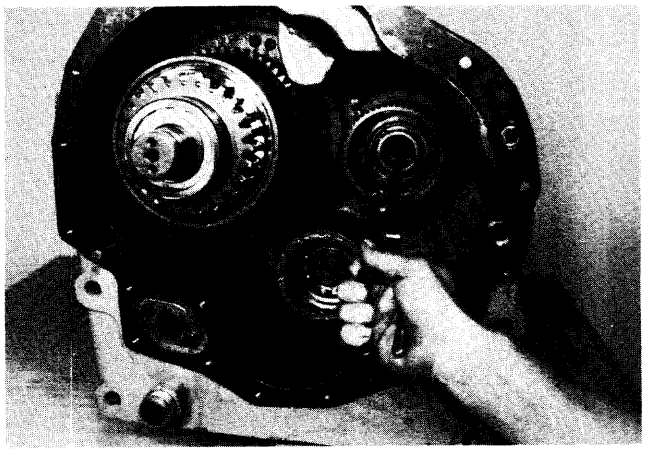


Figure 139

Install 2nd gear ring retainer snap ring.

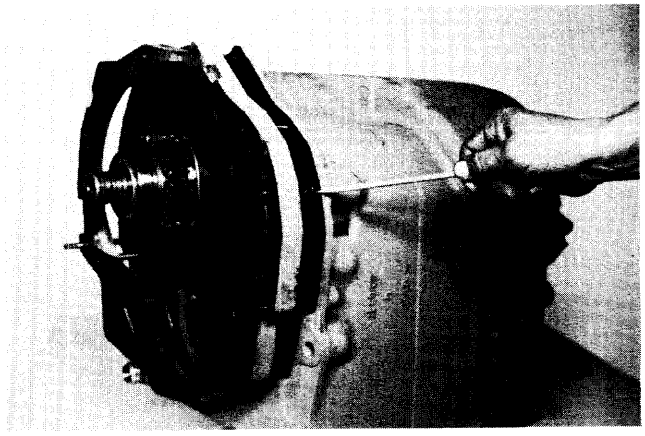


Figure 140

Install transmission case gasket and "O" rings. Install housing spacer. **NOTE:** Housing spacer is used with 12 plate clutch modulation only.

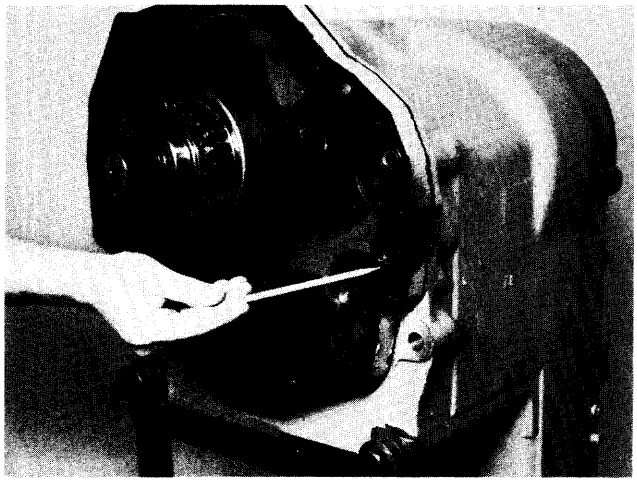


Figure 141
Install housing spacer gasket and "O" rings. See R-Model section for front cover installation.

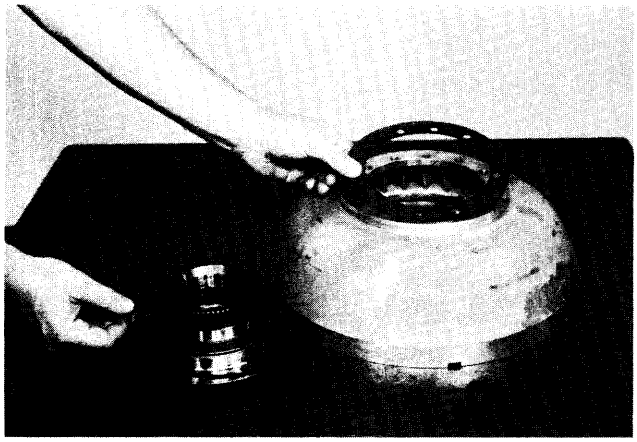


Figure 142
Clean impeller hub mounting surface and tapped holes with solvent. Dry thoroughly being certain tapped holes are dry and clean. Install new "O" ring on impeller hub. Position impeller hub screw backing ring.

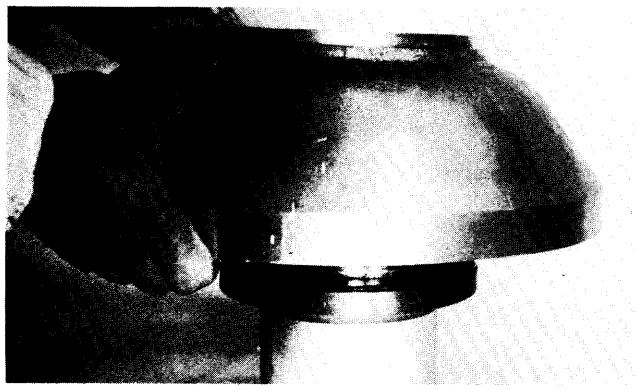


Figure 143
Align holes in impeller hub with holes in impeller and backing ring.

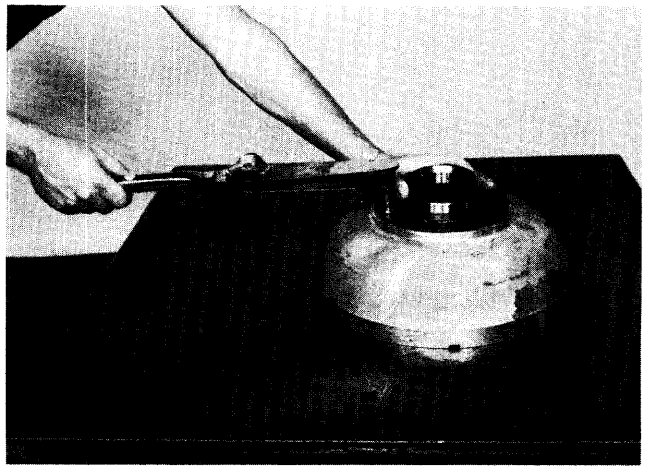


Figure 144
Install (12) impeller hub special screws to approximately .06 inch [1,5] of seated position. With a calibrated torque wrench, tighten screws to 40-45 lbs. ft. [54,3-61,0 N.m] torque. **NOTE:** Assembly of impeller to impeller hub must be completed within a fifteen minute period from start of screw installation. The screws are prepared with coating which begins to harden after installation in the impeller hub holes. If not tightened to proper torque within the fifteen minute period, insufficient screw clamping tension will result. The special screw is to be used for one installation only. If the screw is removed for any reason it must be replaced.
The compound left in the hub holes must be removed with the proper tap and cleaned with solvent. Dry hole thoroughly and use a new screw for reinstallation.

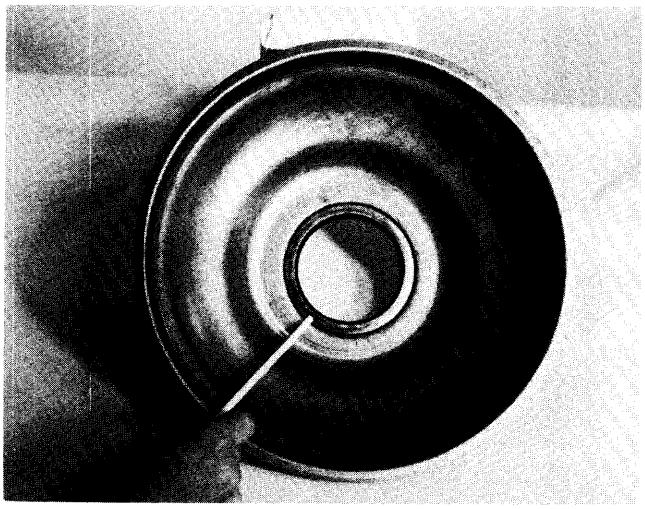


Figure 145
Apply a light coat of Permatex No. 2 on the outer diameter of the oil baffle seal. Press seal in oil baffle with lip of seal down. **(NOTE: When baffle is positioned on impeller, lip of oil seal will be up.)**

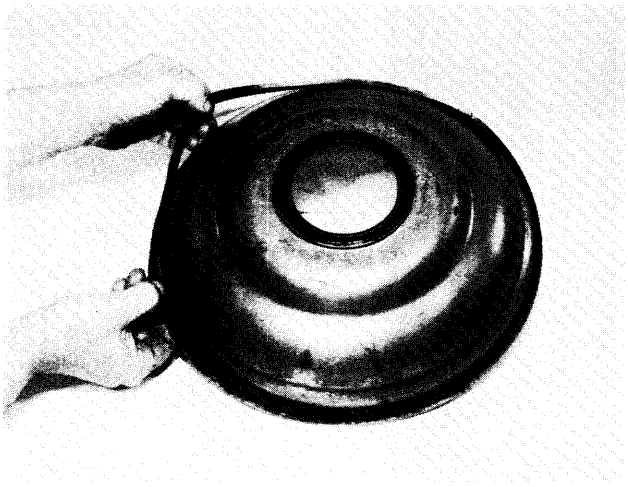


Figure 146
Install a new oil baffle seal ring.

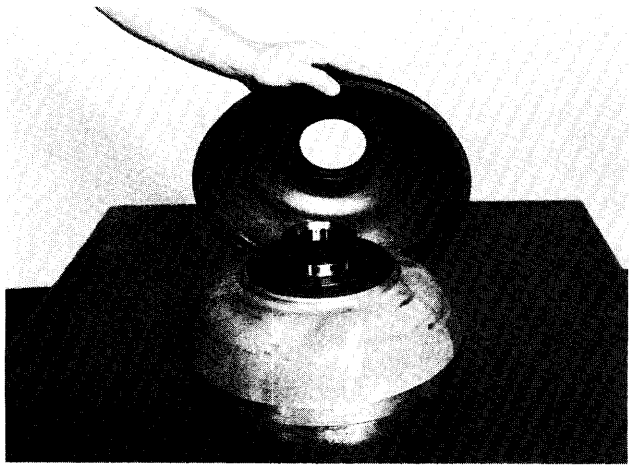


Figure 147
Install oil baffle on impeller assembly. See Note in Figure 145.

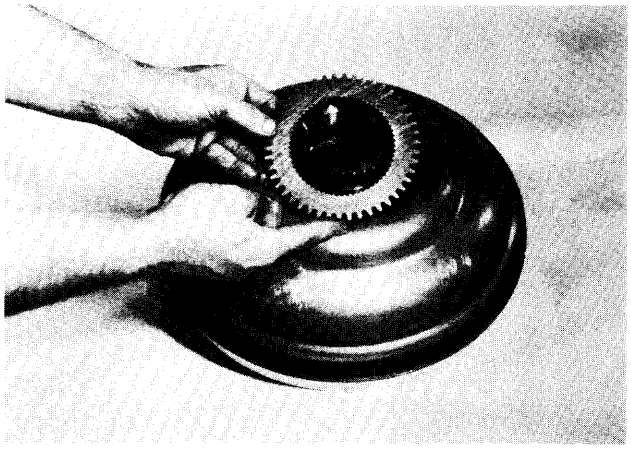


Figure 148
Install impeller hub gear.

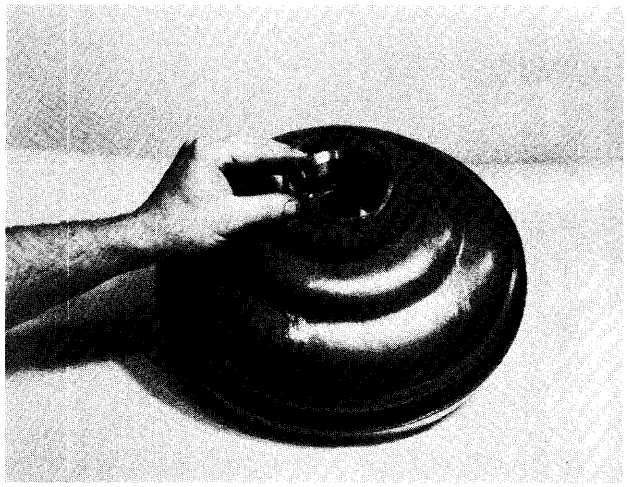


Figure 149
Secure impeller hub gear with retainer ring.

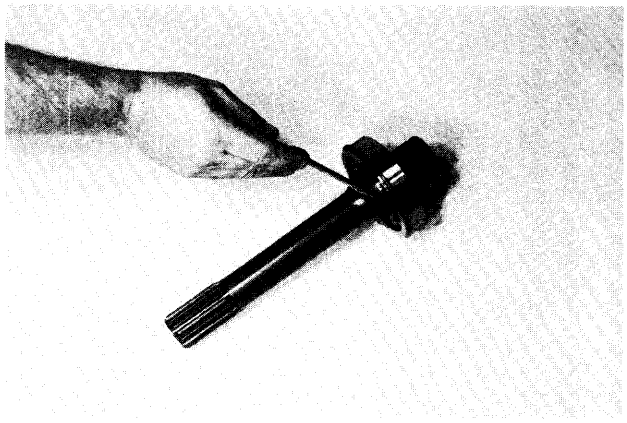


Figure 150
Install new turbine shaft piston ring.

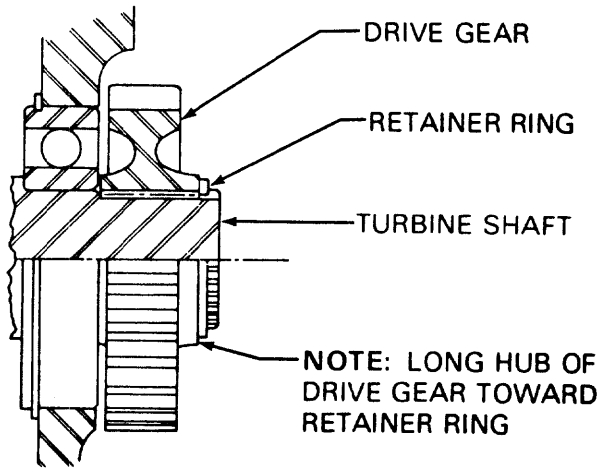


Figure 151
Tap turbine shaft and bearing assembly into converter housing from front. At the rear of the converter housing install turbine shaft gear and retainer ring as shown.

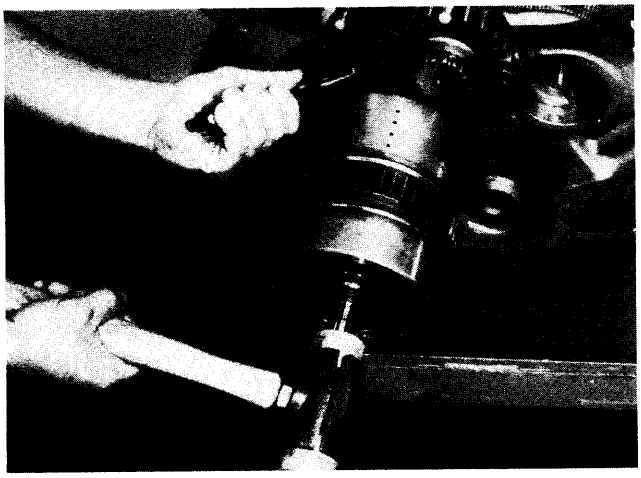


Figure 152

Support converter housing with chain fall. Spread forward clutch front bearing retainer ring and tap forward and 2nd clutch assembly into transmission case assembly. Be certain snap ring is in full position in ring groove.

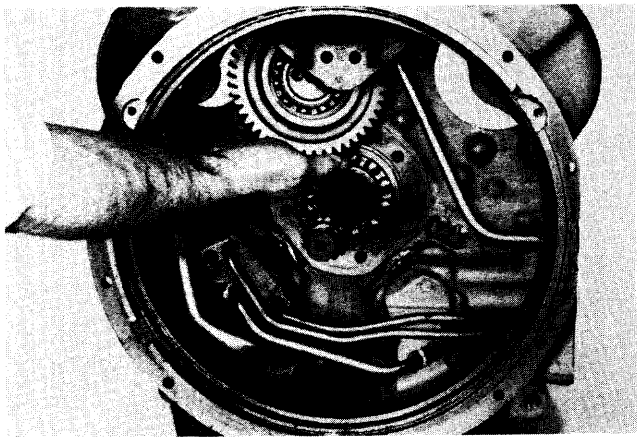


Figure 153

Position center pump drive gear.

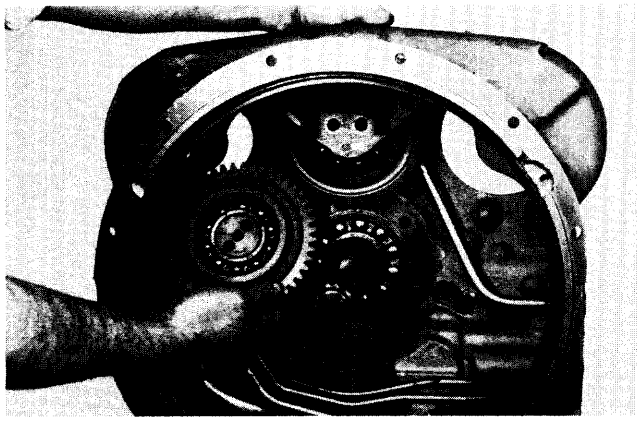


Figure 154

Install left pump drive gear.

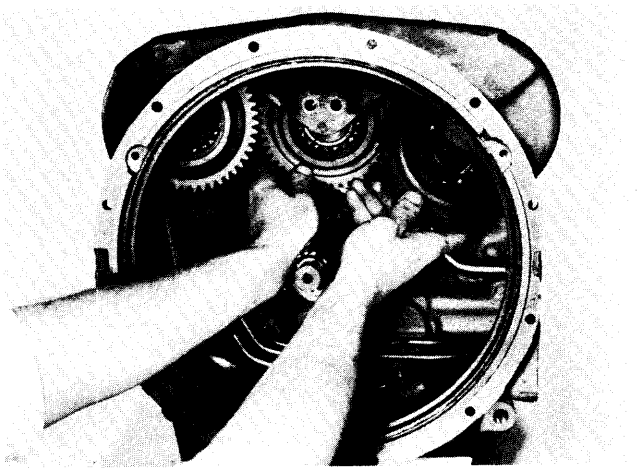


Figure 155

Install right pump drive gear.

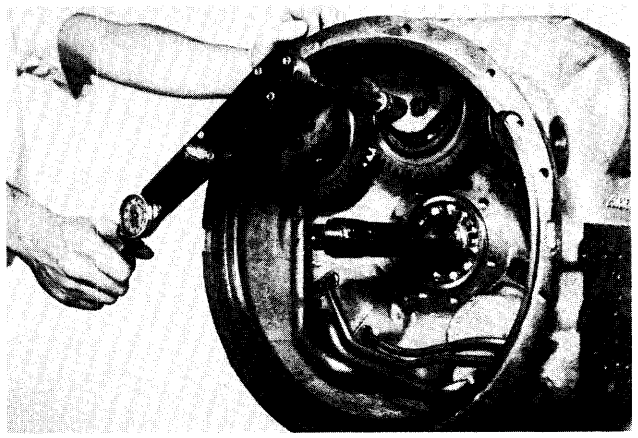


Figure 156

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

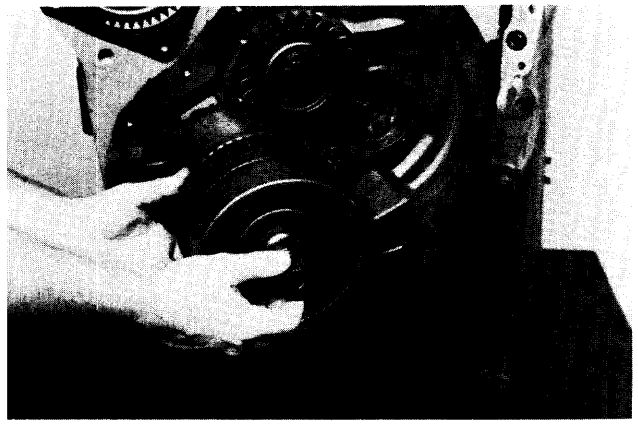


Figure 157

Install 2nd speed clutch pilot bearing.

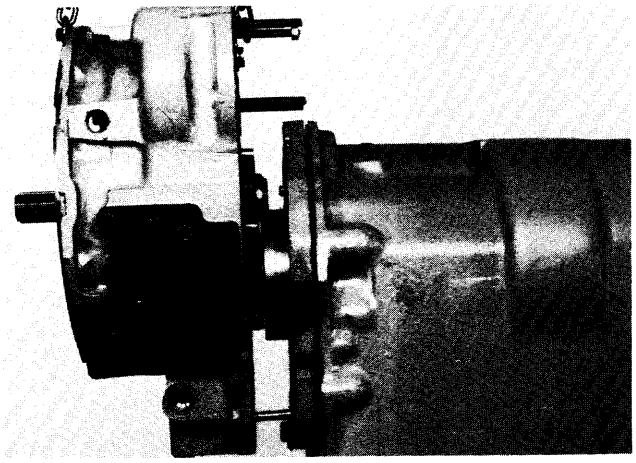


Figure 158

Install alignment studs and position converter housing on studs. **NOTE:** Turn output shaft to align clutch disc hub in clutch. **Do not force this operation.**

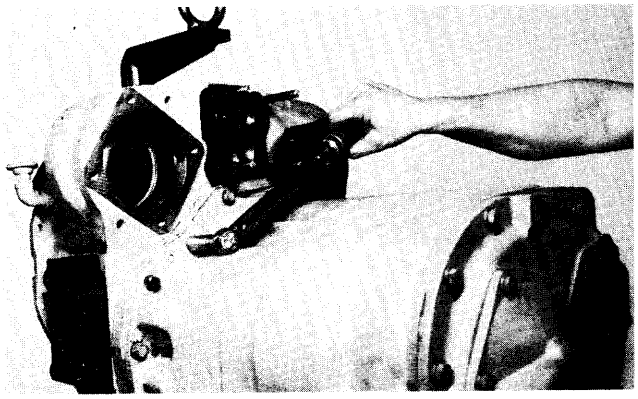


Figure 159

Install converter housing to transmission housing bolts and tighten to specified torque. **NOTE:** Bolts are not to be used to pull converter housing to transmission housing.

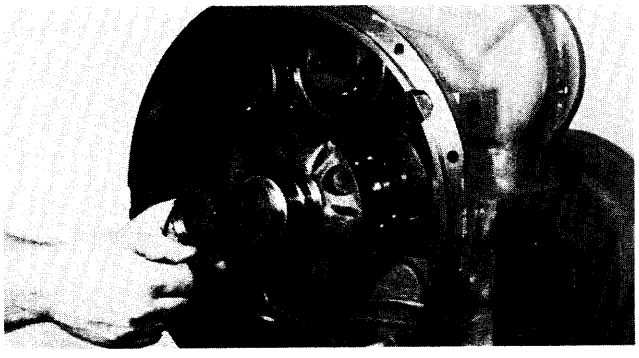


Figure 160

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

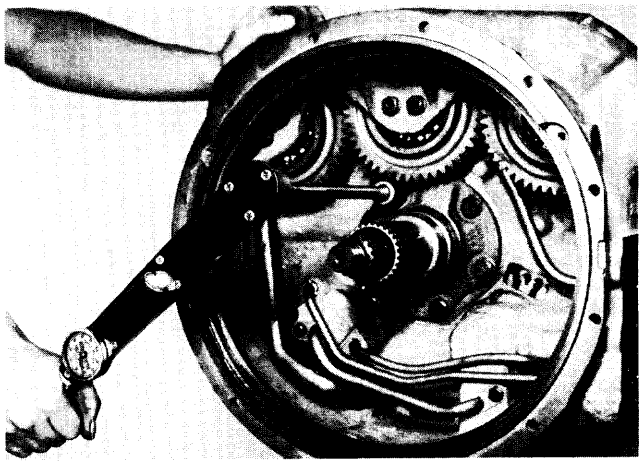


Figure 161

Install stator support bolts and tighten to specified torque.

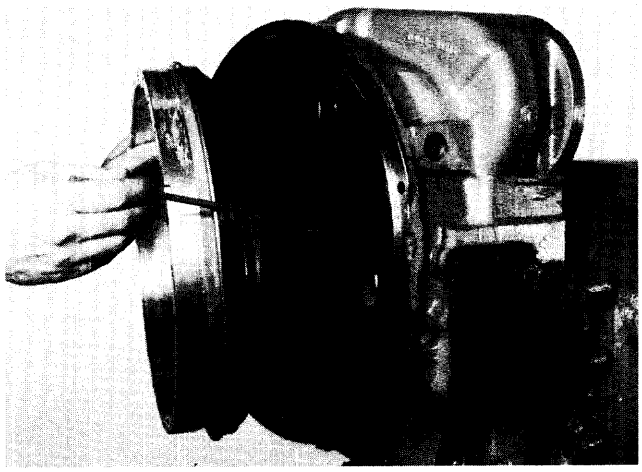


Figure 162

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

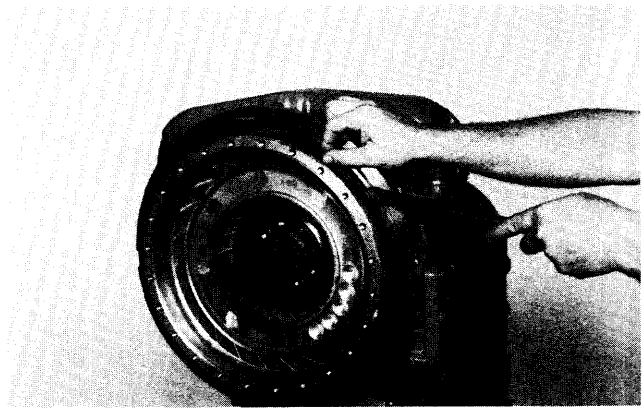


Figure 163

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

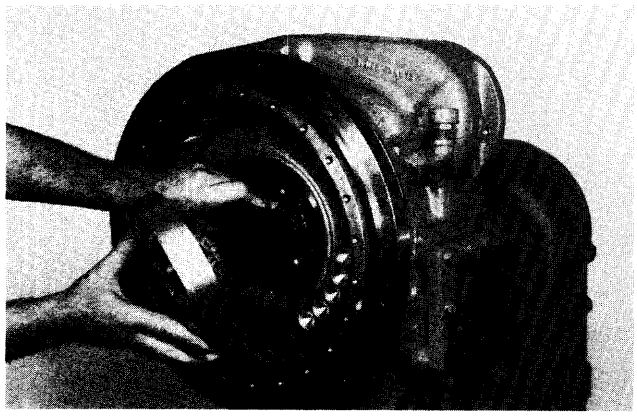


Figure 164
Install reaction member spacer with tang facing out. Install reaction member.

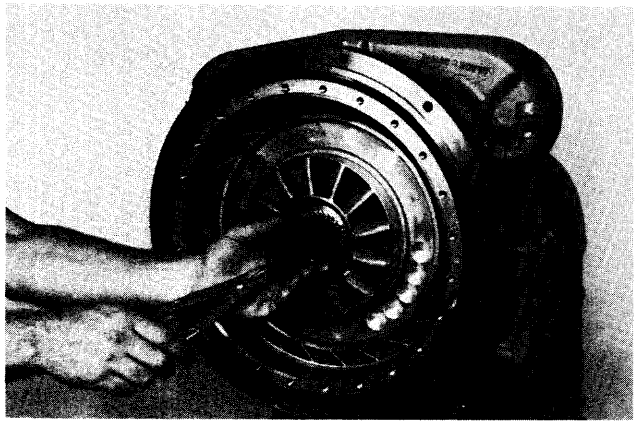


Figure 165
Install reaction member retainer ring.

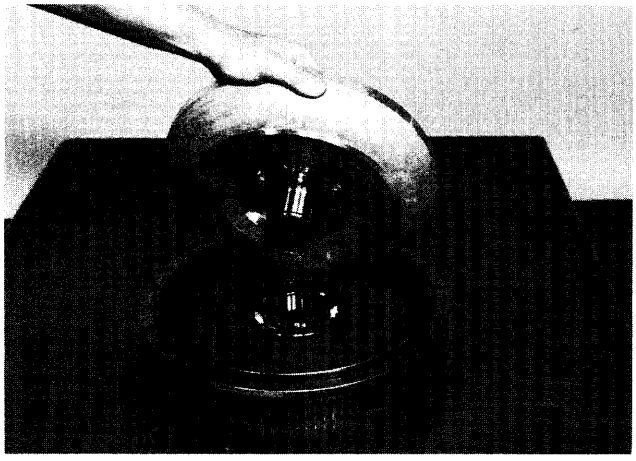


Figure 166
Position turbine in impeller cover.

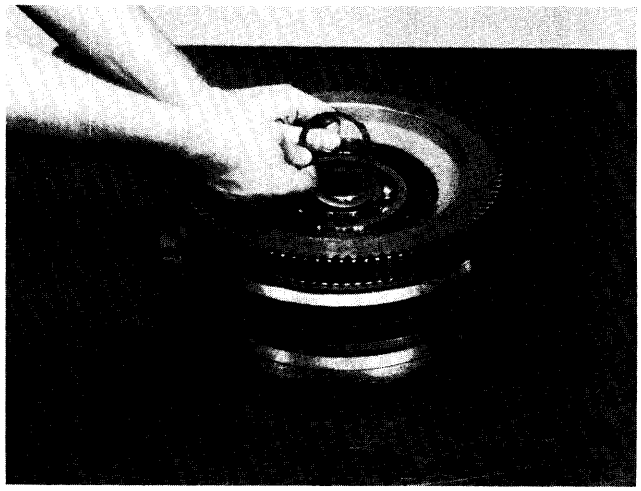


Figure 167
Install spacer and turbine to impeller cover bearing snap ring.

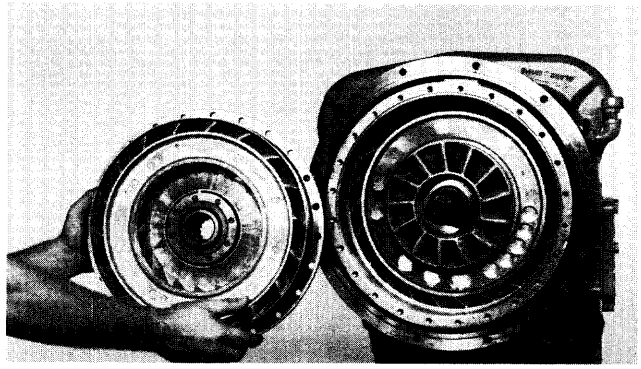


Figure 168
Position new impeller to impeller cover "O" ring on impeller. Install turbine and impeller cover.

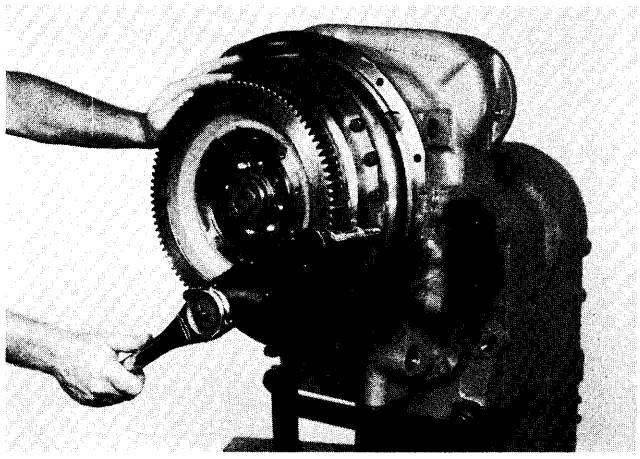


Figure 169
Install impeller cover bolts and torque to specifications.

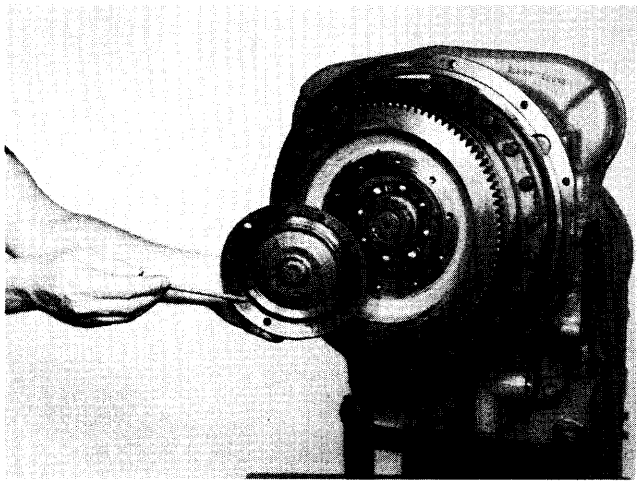


Figure 170
Install new "O" ring seal in impeller cover bearing cap.

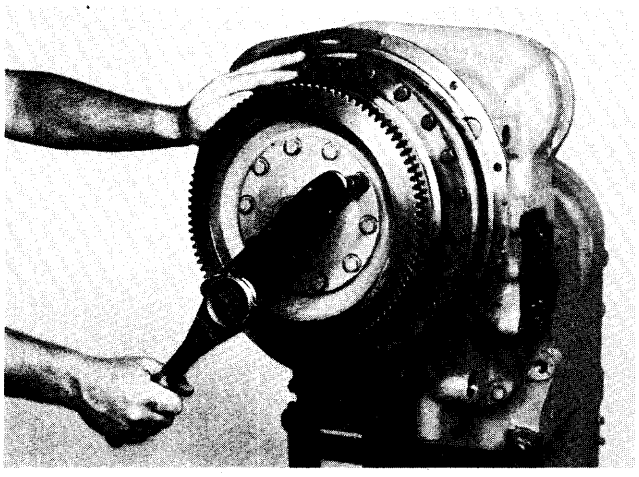


Figure 171
Install bearing cap and bolts, torque to specifications.

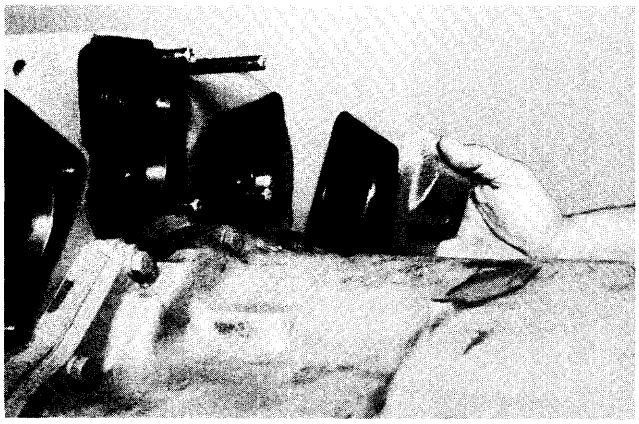


Figure 172
Position auxiliary pump adaptor on housing. Install adaptor bolts and washers, tighten to specified torque. (Adaptors may vary.)

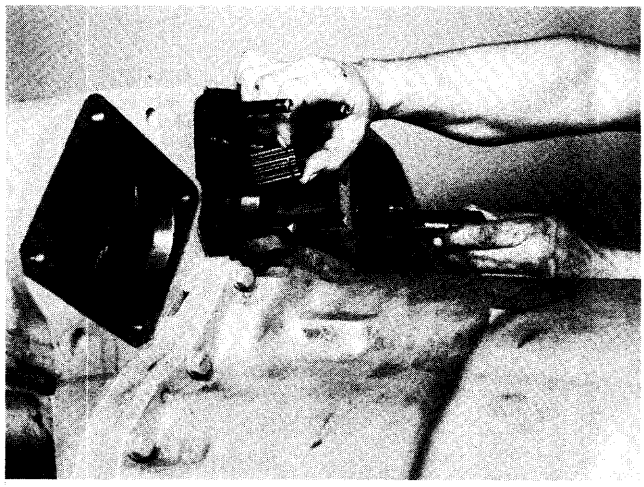


Figure 173
Install pump drive sleeves.

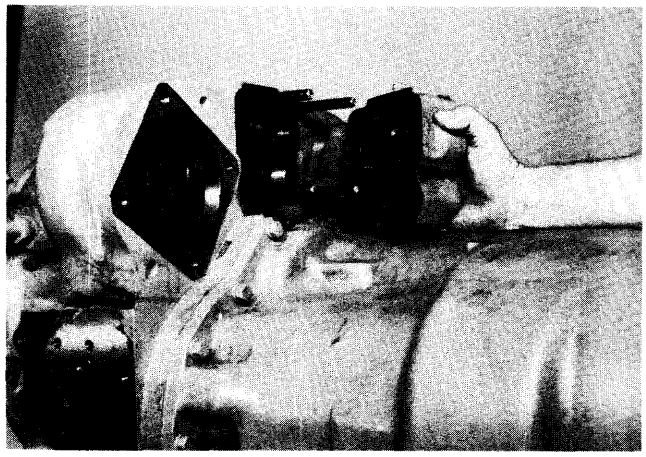


Figure 174
Position a new gasket and "O" rings on the pressure regulating valve. Install valve assembly on studs.

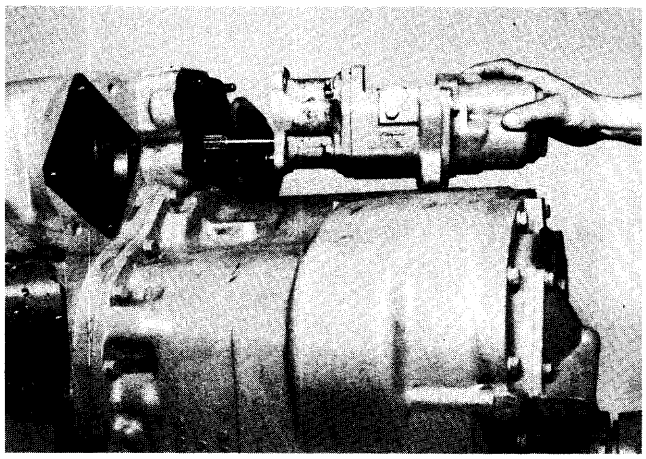


Figure 175
Install pump assembly on studs. **NOTE:** Pump assemblies may vary.

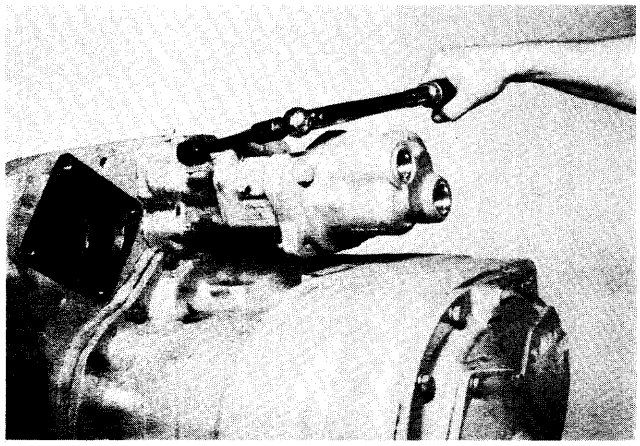


Figure 176
Tighten pump stud nuts to specified torque.

Control valve assemblies may vary. The one shown being assembled on converter housing is an electric valve with modulated shift.

The use of aligning studs will facilitate valve to housing assembly.

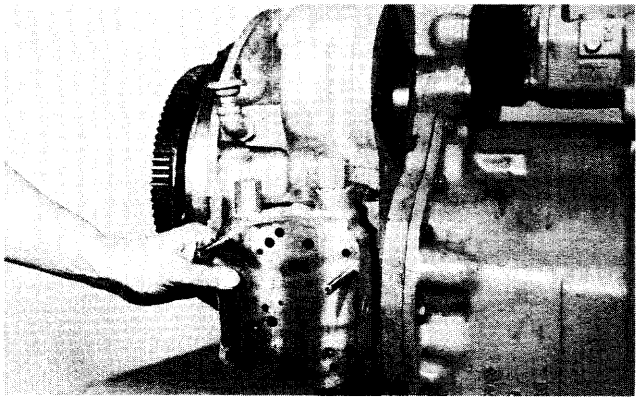


Figure 177
Position a new modulator to housing gasket and modulator valve assembly on aligning studs.

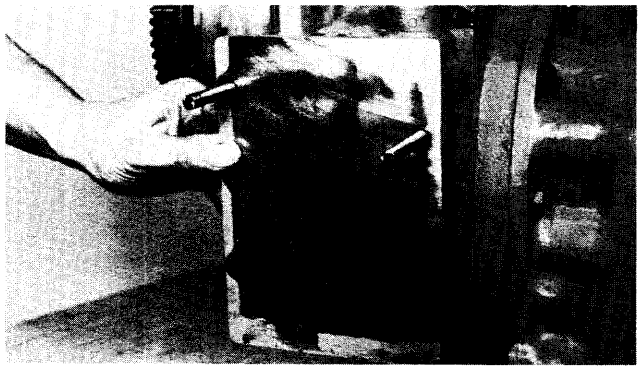


Figure 178
Position modulator valve opening plate gasket and plate on studs.

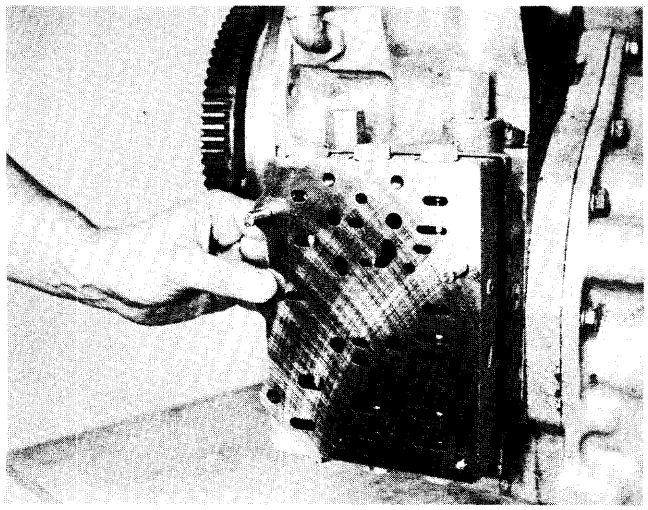


Figure 179
Position valve plate to control valve gasket and control valve on studs.

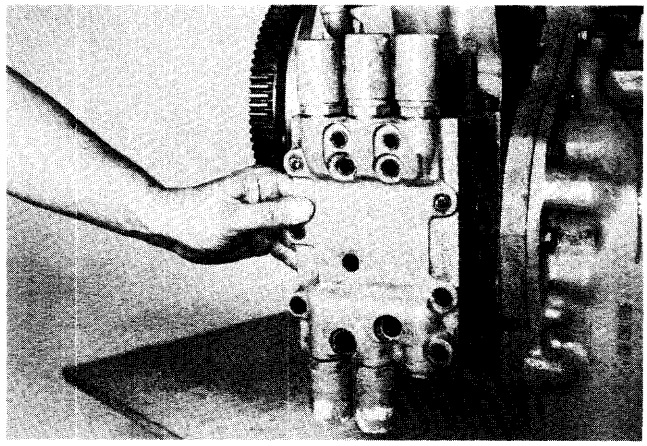


Figure 180
Position new control valve to solenoid valve housing gasket and solenoid housing on studs.

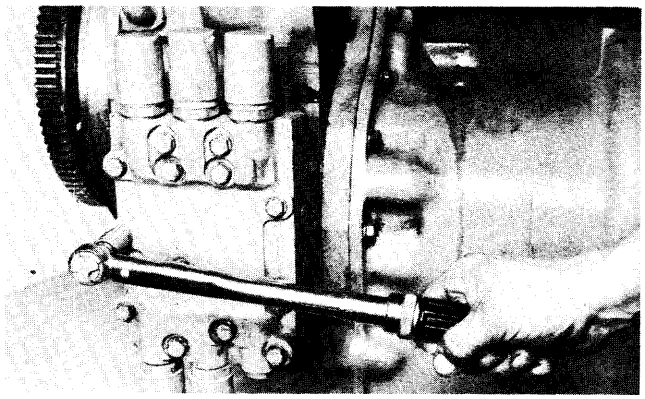


Figure 181
Install control valve assembly to converter housing bolts and washers. Tighten to specified torque.

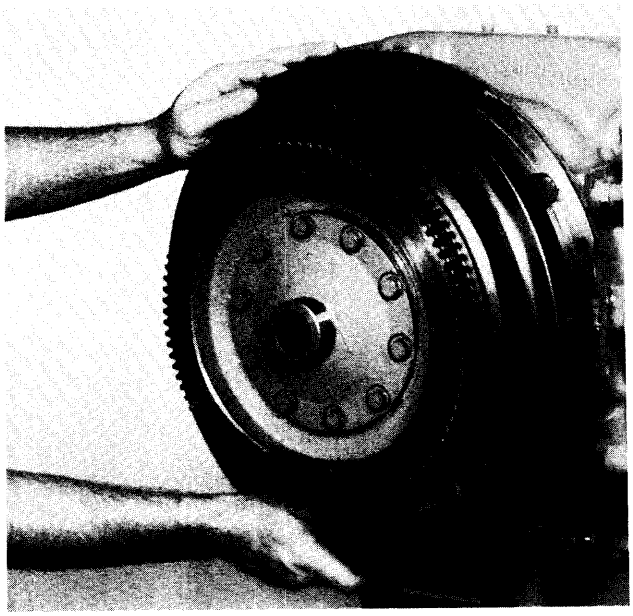


Figure 182
Install converter housing to engine flywheel housing spacer.

NOTE: IF TRANSMISSION HOUSING OR CONVERTER HOUSING WAS REPLACED SEE PAGE 55 FOR SPEED SENSOR BUSHING INSTALLATION.

NOTES

SPECIFICATIONS AND SERVICE DATA—POWER SHIFT TRANSMISSION AND TORQUE CONVERTER

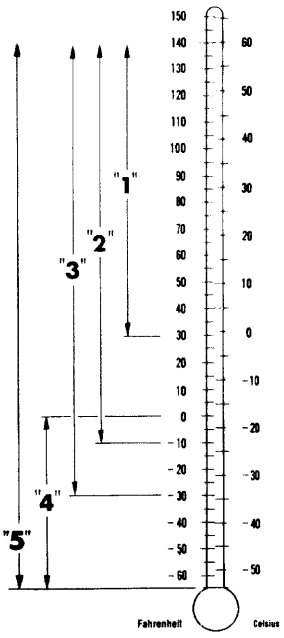
CONVERTER OUT PRESSURE	Converter outlet oil temp. 180° - 200° F. [82,3° - 93.3° C]. Transmission in **NEUTRAL.** Operating specifications: 25 P.S.I. [172,4 kPa] minimum pressure at 2000 R.P.M. engine speed **AND** a maximum of 70 P.S.I. [482,6 kPa] outlet pressure with engine operating at no-load governed 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	240 - 300 psi [1654,8 - 2068,4 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



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.

*Dexron is a registered trademark of General Motors Corporation.

*** 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.**

TROUBLE SHOOTING GUIDE

For The

R and HR Model, 32000 Transmission

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 lines as a complete system when running down the source of trouble since the proper operation of any unit therein depends greatly on the condition and operations of the others. By studying the principles of operation together with data in this section, it may be possible to correct any malfunction which may occur in the system.

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

MECHANICAL CHECKS

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

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

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

HYDRAULIC CHECKS

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

Check oil level in transmission. This should be done with oil temperatures of 180 to 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.

LOW CLUTCH PRESSURE

Cause	Remedy
1. Low oil level.	1. Fill to proper level.
2. Clutch pressure regulating valve spool stuck open.	2. Clean valve spool and housing.
3. Faulty charging pump.	3. Replace pump.
4. Broken or worn clutch shaft or piston sealing rings.	4. Replace sealing rings.
5. Clutch piston bleed valve stuck open.	5. Clean bleed valves thoroughly.

LOW CONVERTER CHARGING PUMP OUTPUT

1. Low oil level.	1. Fill to proper level.
2. Suction screen plugged.	2. Clean suction screen.
3. Air leaks at pump intake hose and connections or collapsed hose. (R-32000 only)	3. Tighten all connections or replace hose if necessary.
4. Defective oil pump.	4. Replace pump.

OVERHEATING

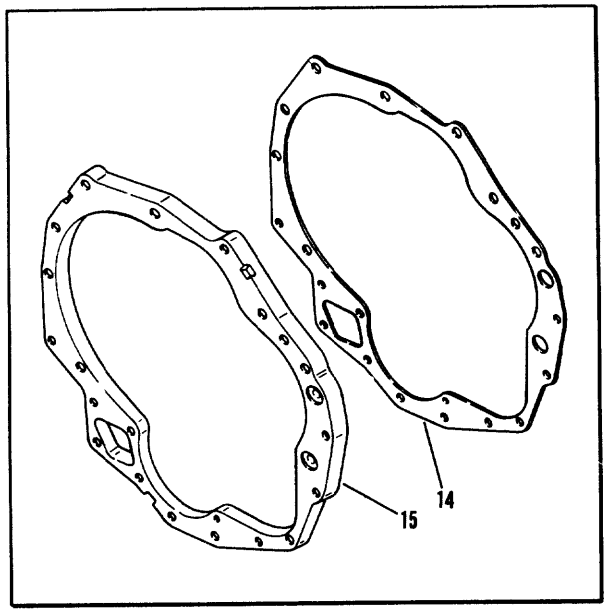
1. Worn oil sealing rings.	1. Remove, disassemble, and rebuild converter assembly.
2. Worn oil pump.	2. Replace.
3. Low oil level.	3. Fill to proper level.
4. Pump suction line taking air. (R-32000 only)	4. Check oil line connections and tighten securely.

NOISY CONVERTER

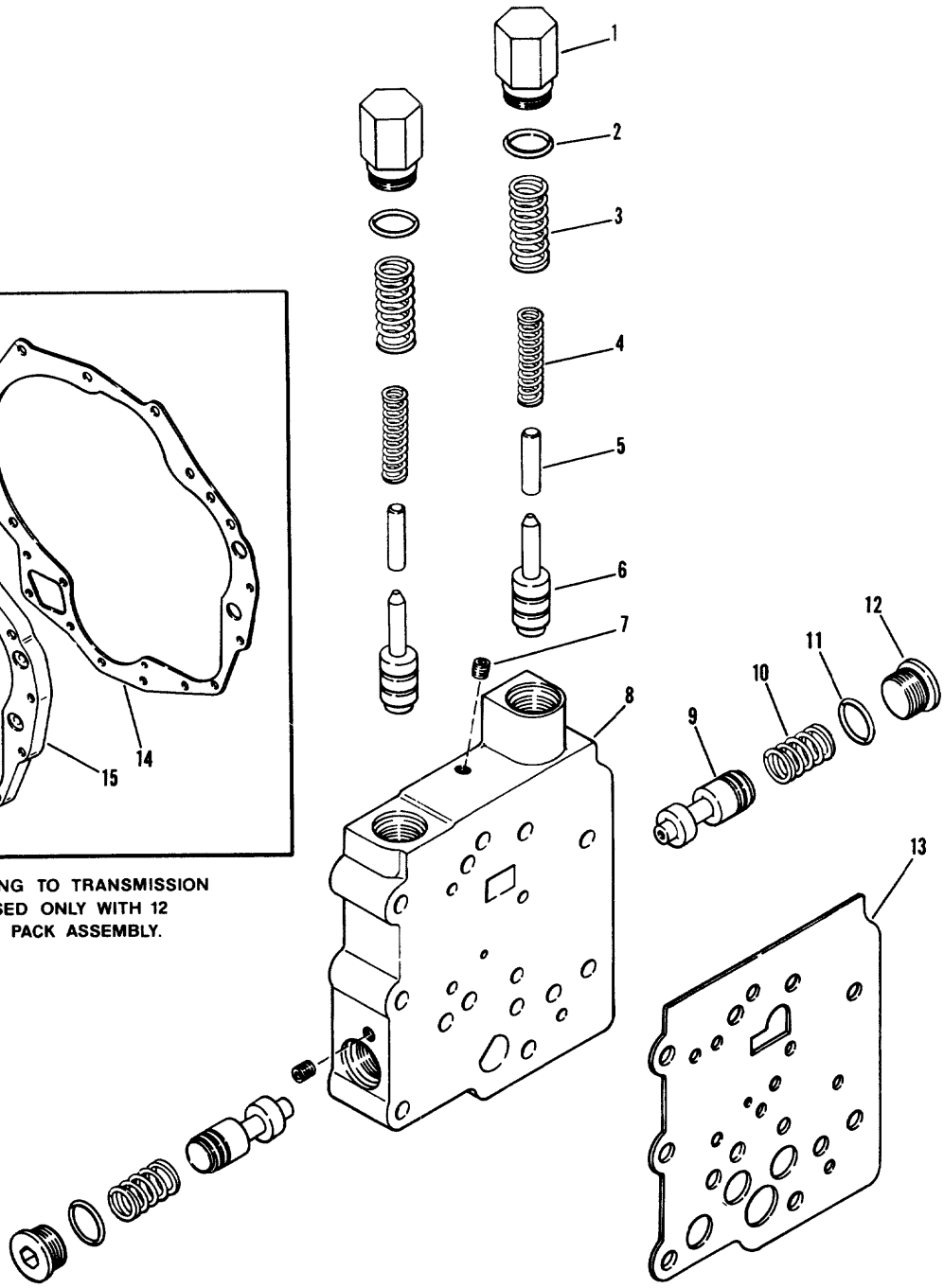
1. Worn coupling gears.	1. Replace.
2. Worn oil pump.	2. Replace.
3. Worn or damaged bearings.	3. A complete disassembly will be necessary to determine what bearing is faulty.

LACK OF POWER

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



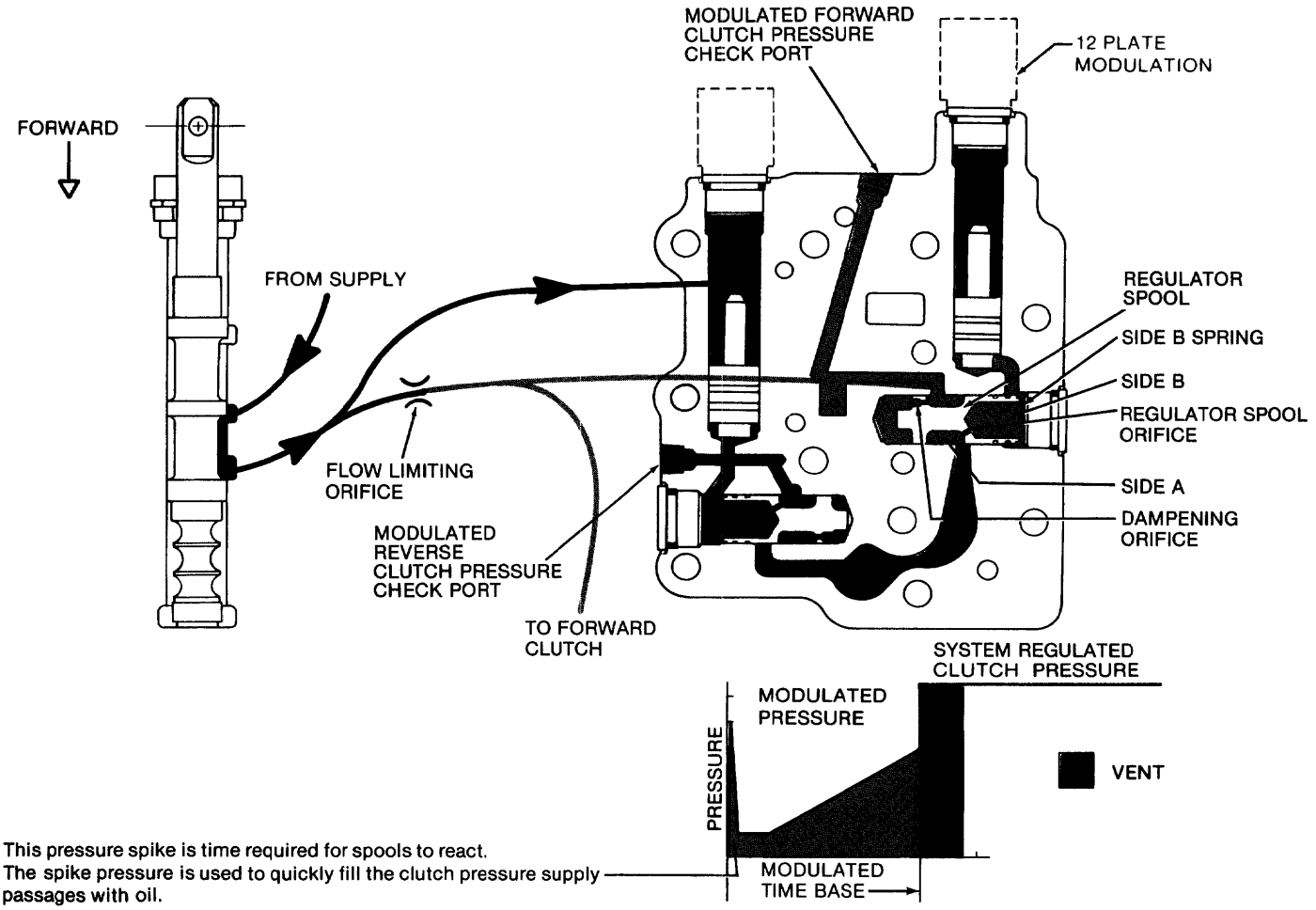
CONVERTER HOUSING TO TRANSMISSION CASE SPACER USED ONLY WITH 12 PLATE CLUTCH PACK ASSEMBLY.



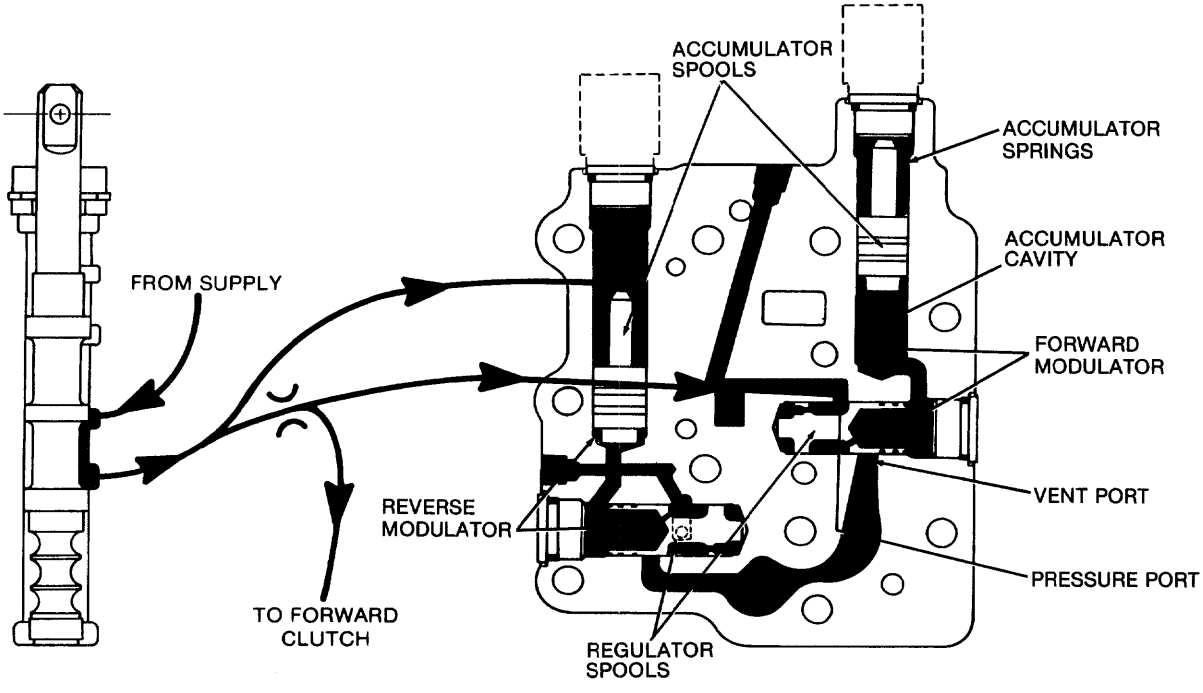
MODULATED VALVE ASSEMBLY

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

32000 SERIES MODULATION



This pressure spike is time required for spools to react.
The spike pressure is used to quickly fill the clutch pressure supply passages with oil.



THEORY OF OPERATION

TRANSMISSION MODULATOR VALVE OPERATIONAL DESCRIPTION

Both directional clutch assemblies are controlled by individual modulator valves. The pressure rise at side "A" of the regulator spool is the same as that applying the clutch piston. Supply flow to the clutch and modulator is limited by a flow limiting orifice. From this limited flow the regulator spool drains flow to the vent port. The regulator spool restricts flow through the vent port to build clutch pressure at a predetermined rate. Once the vent flow is shut off, only minimal flow passes through the flow limiting orifice to make up for normal spool and clutch leakages. Pressure on either side of the orifice is virtually identical and full regulated system pressure is applied at the clutch piston.

When forward direction is selected the oil under pressure enters the port on the "A" side of the regulator spool. This passes through the dampening orifice. The pressure force on the spool area shifts the spool to the right exposing the vent port. The time required to shift the regulator spool over to expose the vent port shows up as a pressure spike at the beginning of the pressure versus time chart.

The movement of the regulator spool is opposed by the regulator and accumulator springs. This provides an initial low pressure head of approximately 20 psi [137,9 Kpa] on the "A" side of the spool. This 20 psi [137,9 Kpa] is represented as a horizontal line on the pressure versus time chart immediately following the spike. Oil flows through the regulator spool orifice due to a pressure imbalance. Pressure at side "A" is constantly 10 psi [68,9 Kpa] higher than side "B" as a result of the added force of the side "B" spring.

The 10 psi [68,9 Kpa] supply through the regulator spool orifice gives a controlled flow rate. This controlled flow establishes the time it takes to fill the accumulated cavity.

As the accumulator cavity is filled, the accumulator spool is forced against the accumulator springs. As the springs compress their force increases causing the hydraulic pressure in the accumulator cavity and "B" side of the regulator spool to increase. Pressure on the "A" side of the regulator spool increases with the opposing force on the "B" side.

This causes the rising slope in the clutch pressure versus time chart. The rate of this rise is controlled by the accumulator spring force. Once the accumulator spool is stroked to its limit, pressure on "A" and "B" side of the regulator spool is balanced since no flow passes through the regulator spool orifice. The regulator spool spring pushes the regulator spool to the left shutting off the vent flow. The clutch and modulator pressure rapidly rise to the system regulated clutch supply pressure setting. This is the vertical line on the clutch pressure versus time chart.

The entire modulator sequence of events occurs in less than two seconds. The steady rise of clutch pressure increases the clutch driving torque which results in a smooth clutch application.

When forward direction is selected the reverse clutch and modulator are vented through the control valve to the transmission sump. The reverse accumulator cavity is vented back through the regulator spool orifice. To hasten the reset time of the accumulator, immediately preparing the transmission for a directional shift, full system regulated clutch supply pressure from the forward control valve is directed to the spring cavity of the reverse accumulator.

When reverse direction is selected the reverse clutch and modulator function through the same sequence of events as the forward clutch and modulator. This same sequence of events also applies to the lock-up modulators.

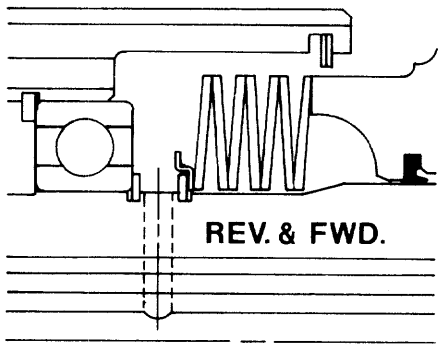
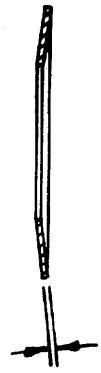


FIG. A



MODULATED FWD.
& REV. CLUTCHES

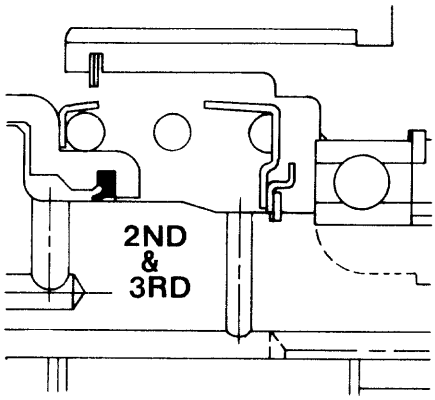


FIG. B

{ 2nd & 3rd & NON-MODULATED FORWARD & REVERSE CLUTCHES

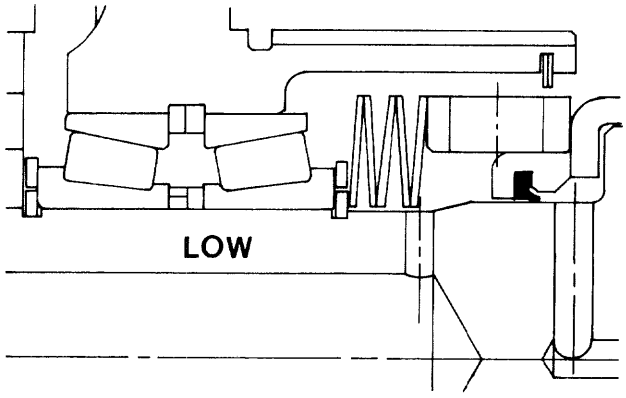


FIG. C

LOW (1st)
CLUTCH

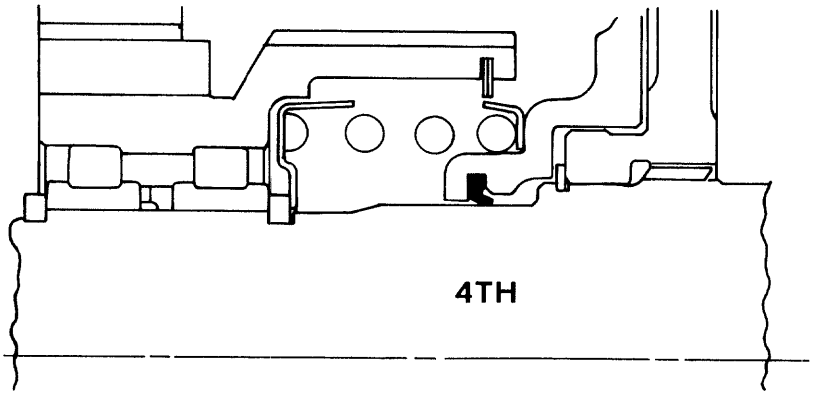


FIG. D
(4 SPEED ONLY)

16 SCREW RING GEAR INSTALLATION PROCEDURE
(Non-Asbestos Ring Gear)

1. Remove all burrs from flywheel mounting face and pilot bores. Clean the torque converter ring gear flywheel mounting surface and the ring gear screw tapped holes with solvent. Dry thoroughly, being certain ring gear screw holes are dry and clean.

2. Check engine flywheel and housing or housing adaptor for conformance to standard S.A.E. No. 3 — SAE J927 and J1033 tolerance specifications for pilot bores size, pilot bores eccentricities and mounting face deviations. Measure and record engine crankshaft end play.

3. Install torque converter ring gear as shown.

   NOTE: Assembly of the ring gear must be completed within a fifteen minute period from start of screw installation. The screws are prepared with an epoxy coating which begins to harden after installation in the flywheel mounting holes. If not tightened to proper torque within the fifteen minute period insufficient screw clamping tension will result.

4. Install backing ring and sixteen (16) special screws to approximately .06 inch [1,5 mm] of seated position. It is permissible to use a power wrench for this installation phase. With a calibrated torque wrench tighten screws 30 to 33 pounds feet of torque [40,7 - 44,7 N.m].

   To obtain maximum effectiveness of the special screw's locking feature, a minimum time period after screw installation of twelve (12) hours is suggested before engine start-up.

   The special screw is to be used for **ONE** installation only. If the screw is removed for any reason it **MUST BE REPLACED**. It is recommended that the epoxy left in the flywheel hole be removed with the proper tap and cleaned with solvent. Dry hole thoroughly and use a **NEW** screw for re-installation.

5. Assemble torque converter to engine flywheel by sliding converter into position by hand before fastening housing attachment screws. This may require more than one trial to match the drive gear teeth. Pulling the converter into position with housing attachment bolts is not recommended.

6. Measure engine crankshaft end play after assembly of torque converter. This value must be within one thousandth (.001) of an inch [0,0254mm] of end play recorded (in Paragraph #2) before assembly of torque converter.

802553 — 1.5 INCH [38,1] 16 SCREW RING GEAR KIT

1	249341	Torque Converter Ring Gear
16	236288	Ring Gear Screw 1.5 Inch [38,1]
1	802555	Installation Instruction Sheet

802554 — 1.5 INCH [38,1] 16 SCREW RING GEAR KIT

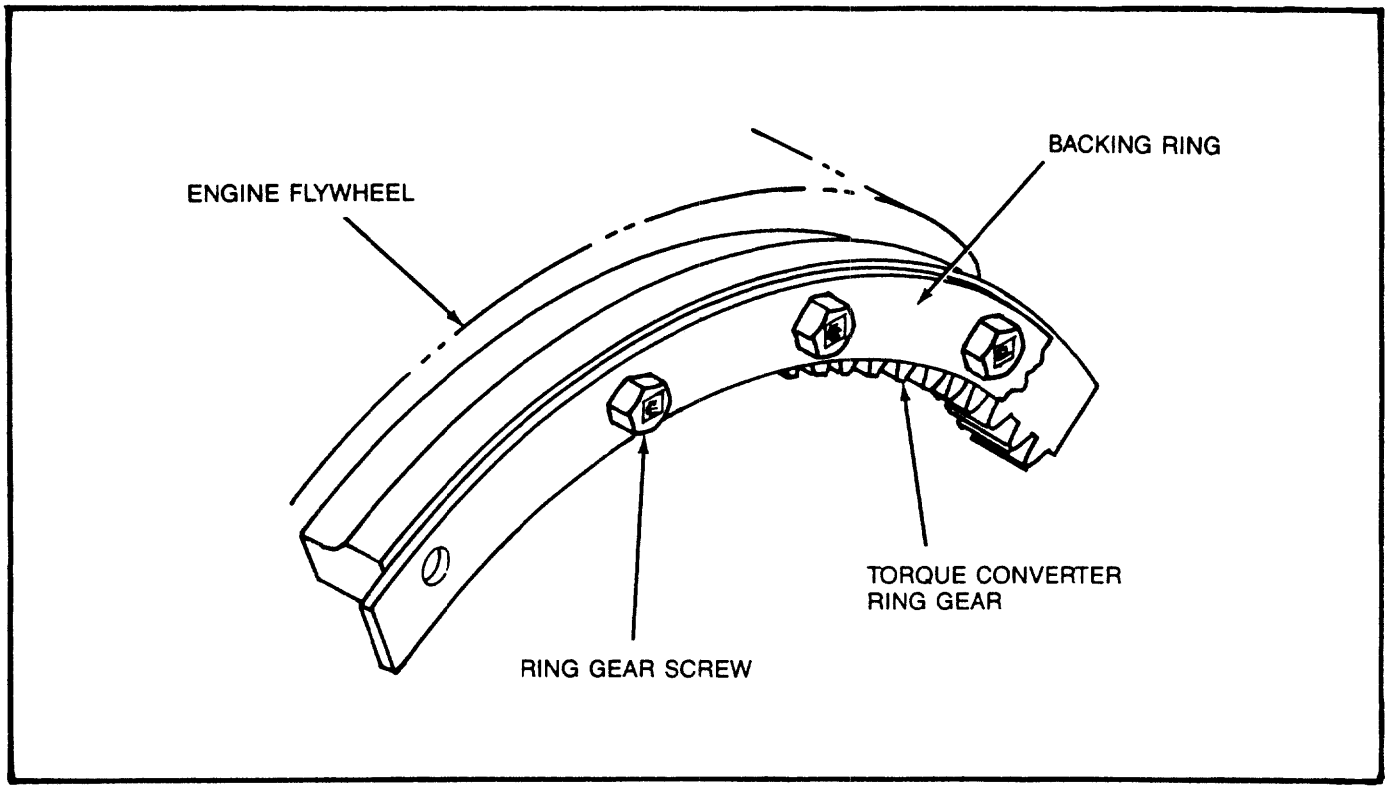
1	249341	Torque Converter Ring Gear
16	236288	Ring Gear Screw 1.5 Inch [38,1]
1	243767	Backing Ring
1	802555	Installation Instruction Sheet

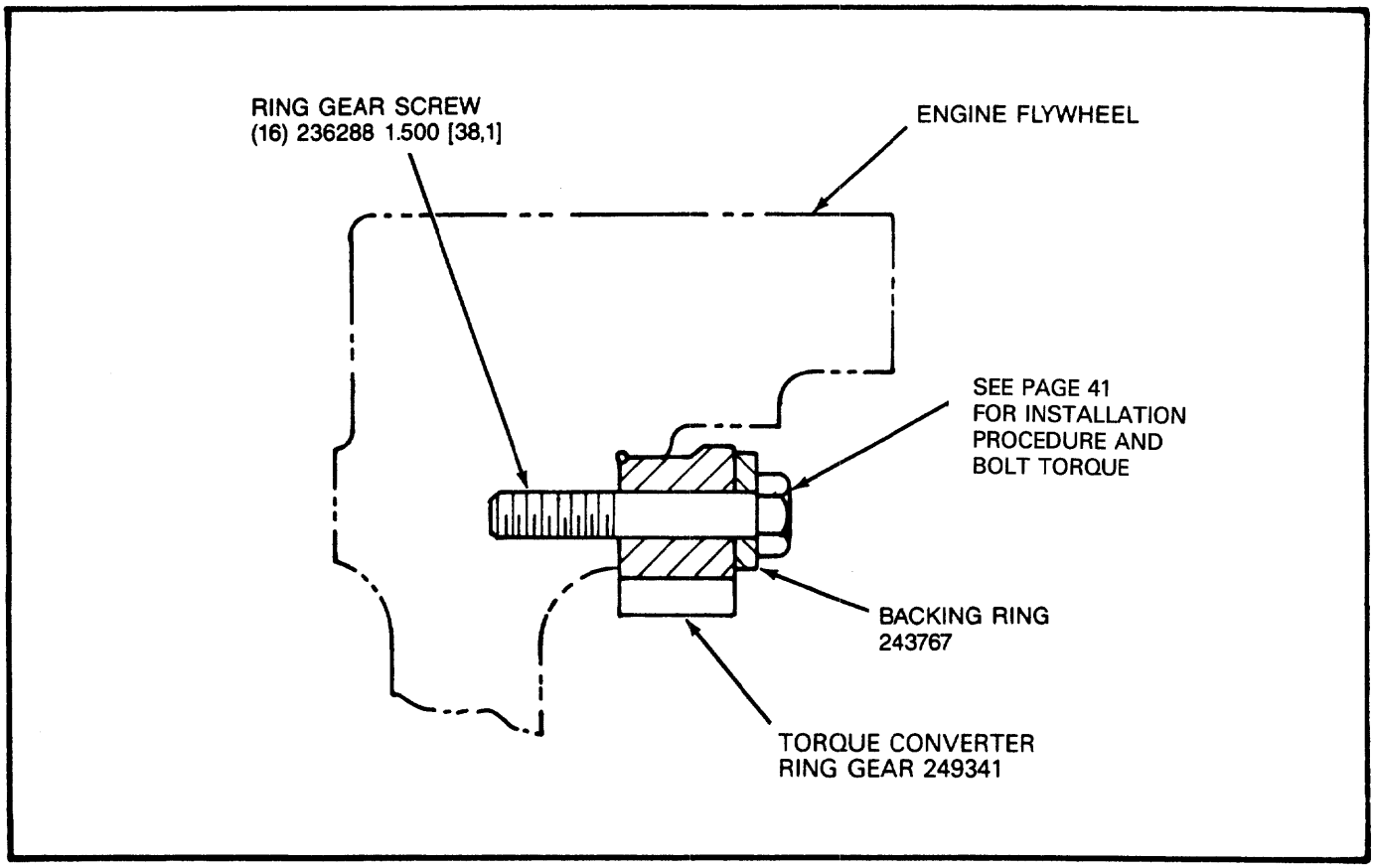
243767 Backing Ring not included in 802553 Ring Gear Kit. Must be Ordered Separately.

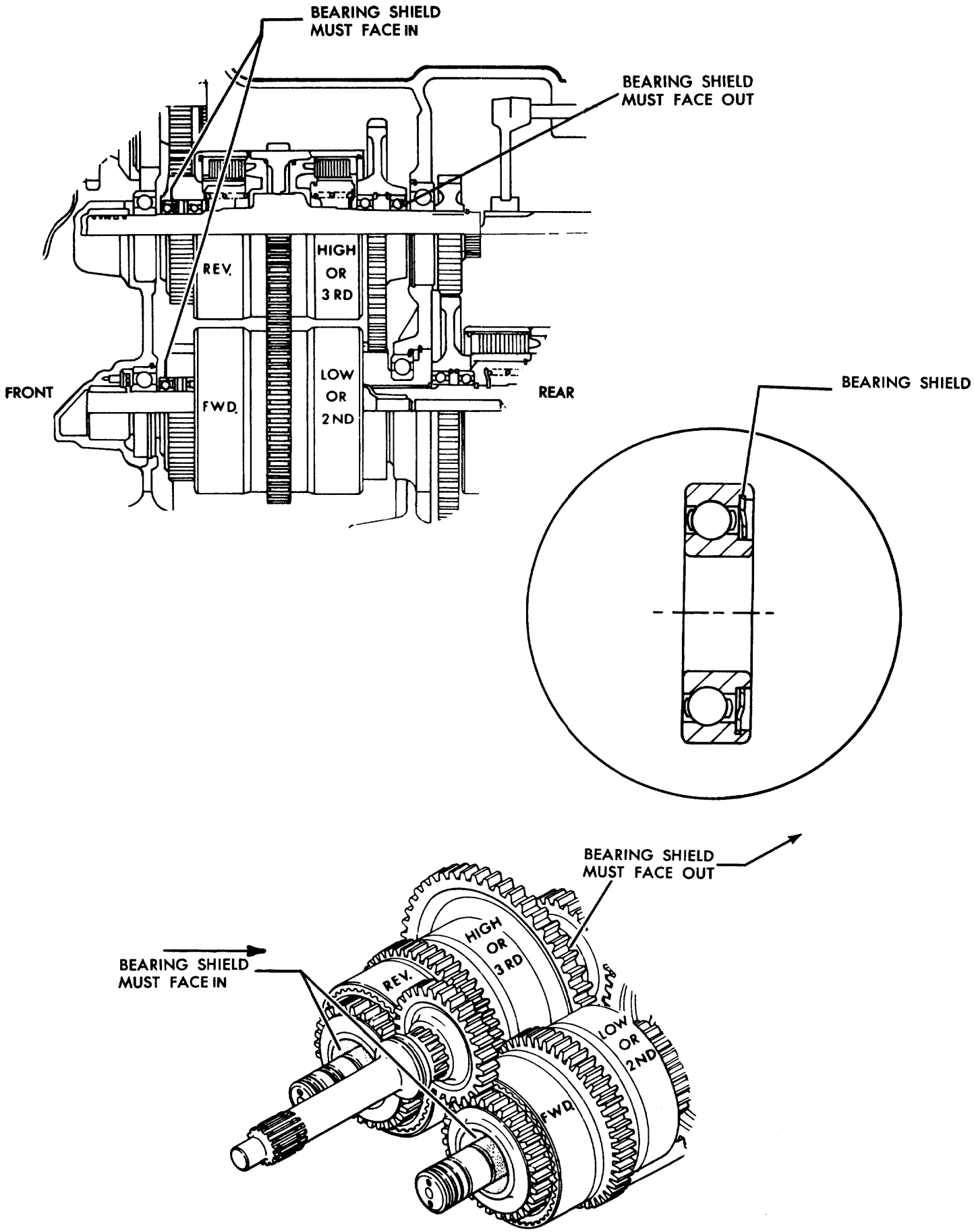
Dimensions are in inches — Dimensions in [ ] are mm.

SEE PAGE 42 FOR INSTALLATION ILLUSTRATIONS

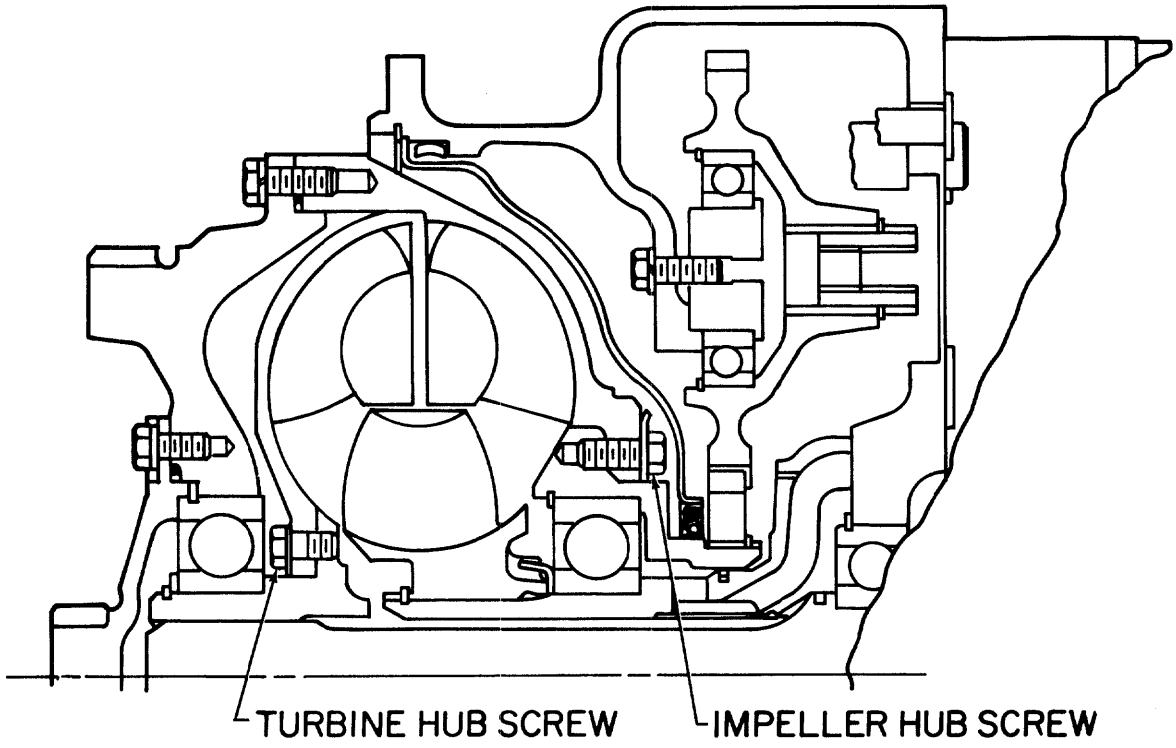
SEE PAGE 56 FOR 32 BOLT INSTALLATION


ENGINE FLYWHEEL
BACKING RING
TORQUE CONVERTER
RING GEAR
RING GEAR SCREW


RING GEAR SCREW
(16) 236288 1.500 [38,1]
ENGINE FLYWHEEL
SEE PAGE 41
FOR INSTALLATION
PROCEDURE AND
BOLT TORQUE
BACKING RING
243767
TORQUE CONVERTER
RING GEAR 249341



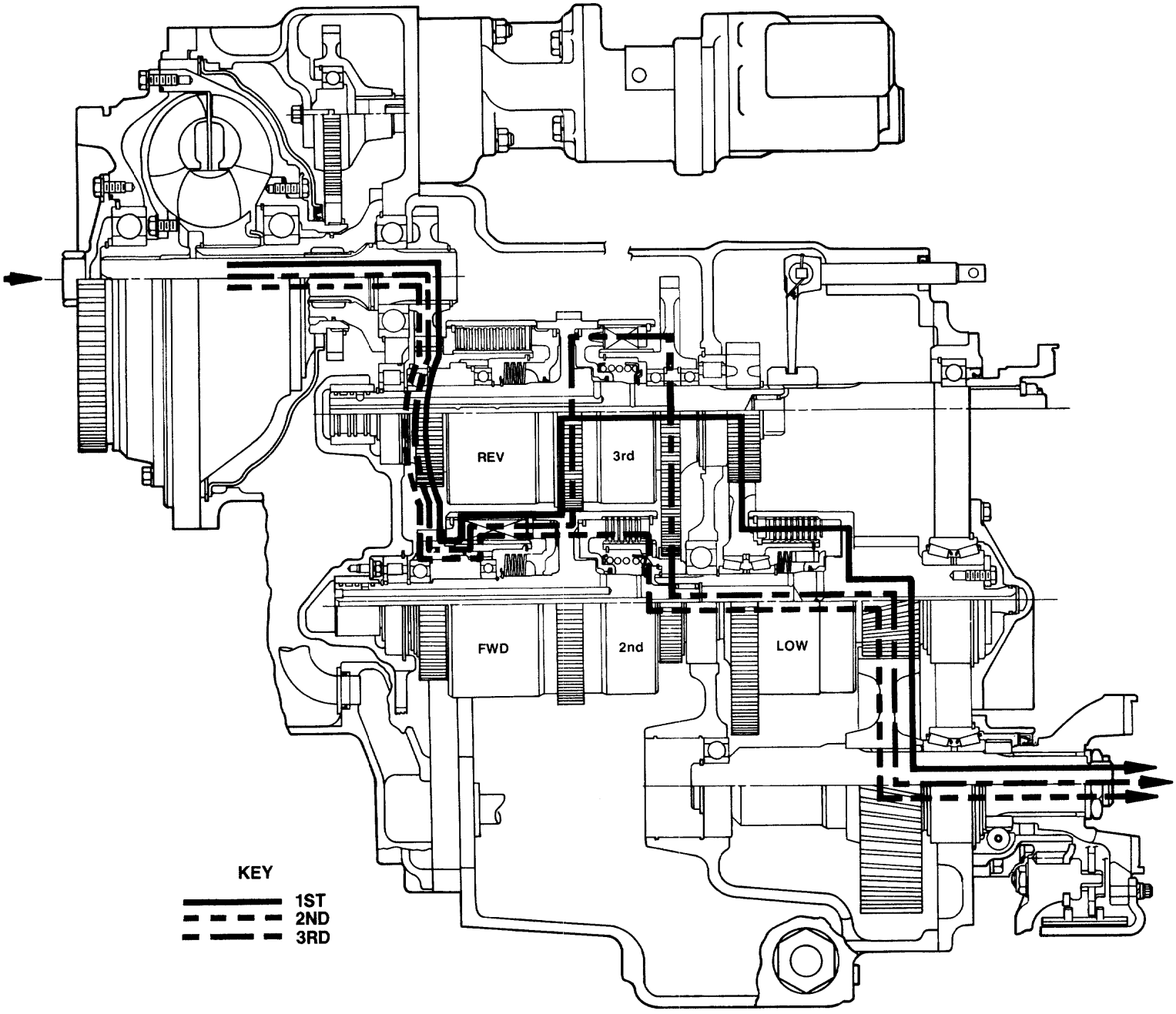
SHIELDED BEARING INSTALLATION



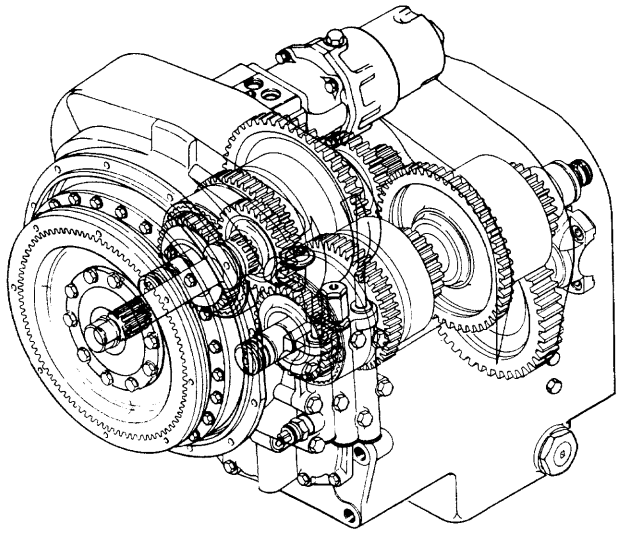
IMPELLER HUB & TURBINE HUB ASSEMBLY WITH BACKING RING AND SPECIAL SELF LOCKING SCREWS.

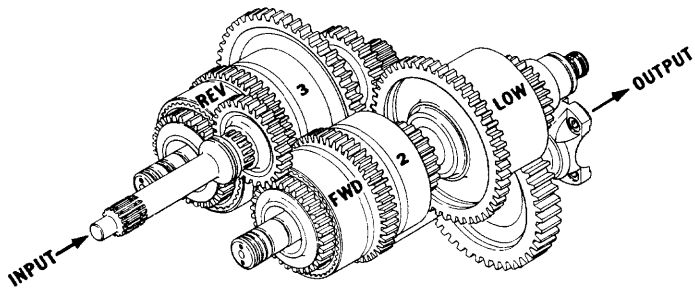
1. CLEAN HUB MOUNTING SURFACE AND TAPPED HOLES WITH SOLVENT. DRY THOROUGHLY BEING CERTAIN TAPPED HOLES ARE DRY AND CLEAN.

2. INSTALL BACKING RING AND SPECIAL SCREWS TO APPROXIMATELY .06 INCH [1,5] OF SEATED POSITION. WITH A CALIBRATED TORQUE WRENCH, TIGHTEN SCREWS 40 TO 45 LBS. FT. TORQUE [54,3-61,0 N.m]. NOTE: ASSEMBLY OF IMPELLER OR TURBINE HUB MUST BE COMPLETED WITHIN A FIFTEEN MINUTE PERIOD FROM START OF SCREW INSTALLATION. THE SCREWS ARE PREPARED WITH A COATING WHICH BEGINS TO HARDEN AFTER INSTALLATION IN THE HUB HOLES. IF NOT TIGHTENED TO PROPER TORQUE WITHIN THE FIFTEEN MINUTE PERIOD, INSUFFICIENT SCREW CLAMPING TENSION WILL RESULT. THE SPECIAL SCREW IS TO BE USED FOR ONE INSTALLATION ONLY. IF THE SCREW IS REMOVED FOR ANY REASON IT MUST BE REPLACED.
   THE COMPOUND LEFT IN THE HUB HOLES MUST BE REMOVED WITH THE PROPER TAP AND CLEANED WITH SOLVENT. DRY HOLE THOROUGHLY AND USE A NEW SCREW FOR REINSTALLATION.

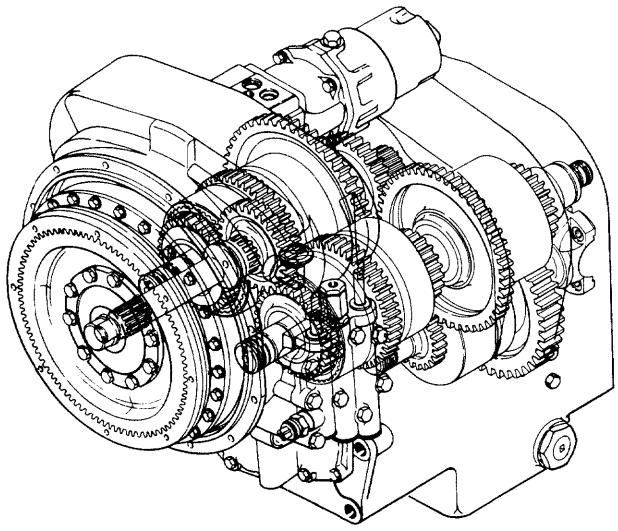


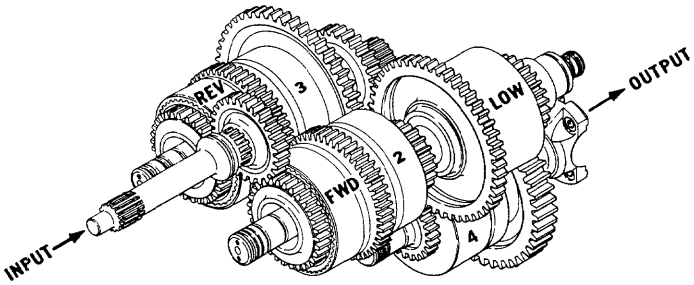
32000 3 SPEED TRANSMISSION





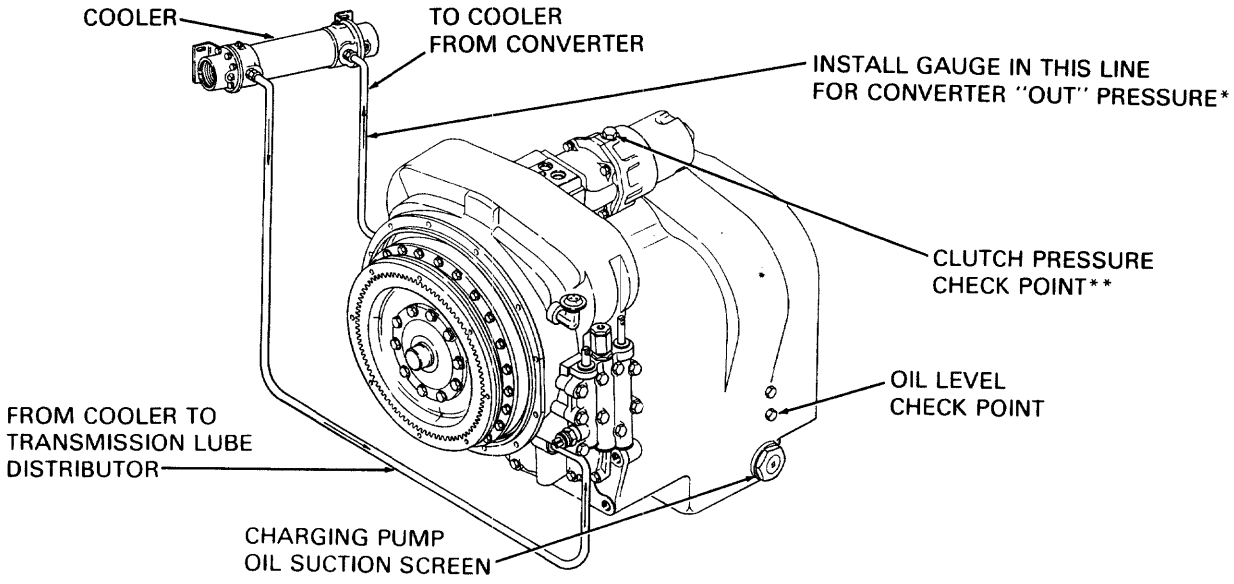
3 SPEED



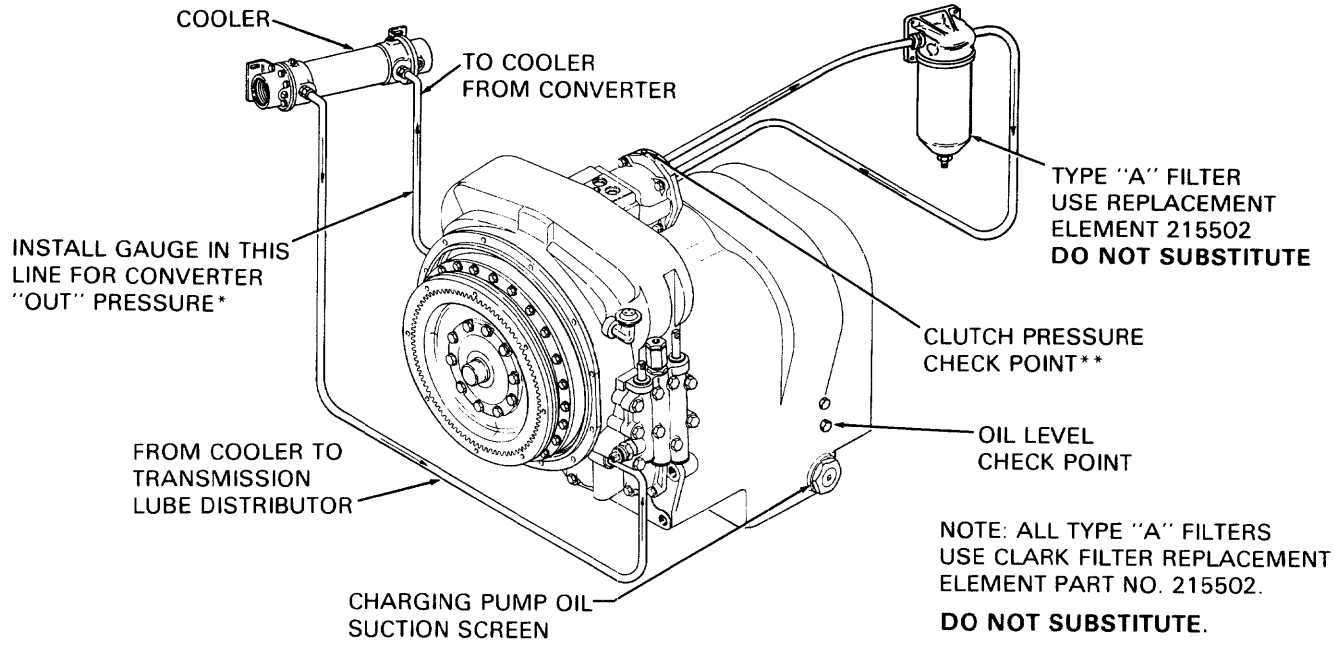


4 SPEED

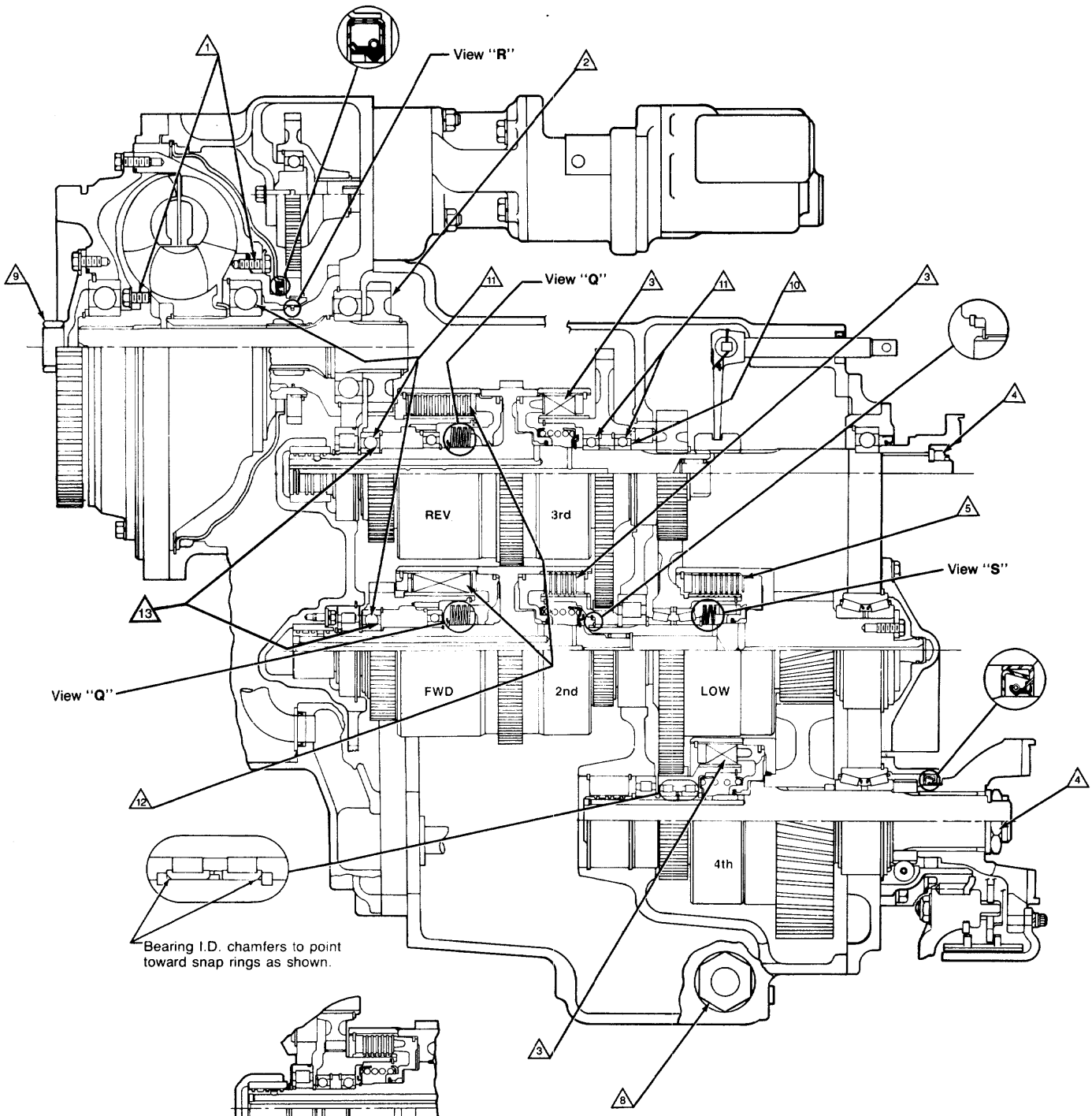
32000 SERIES - 3 AND 4 SPEED CLUTCH & GEAR ARRANGEMENT (SHORT DROP OUTPUT)

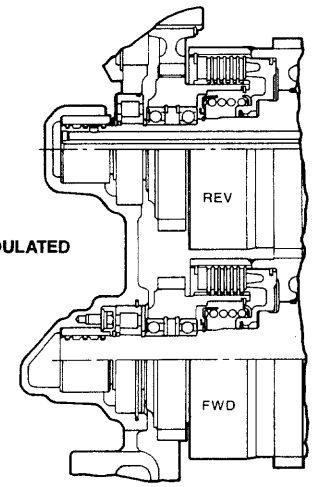


SHORT DROP
32000 SERIES PLUMBING DIAGRAM



SHORT DROP
32000 SERIES PLUMBING DIAGRAM
(WITH REMOTE FILTER)





NON-MODULATED

32000 4 SPEED TRANSMISSION

△1 Impeller Hub and Turbine Hub Assembly with Backing Ring and Special Self Locking Screws.
1. Clean hub mounting surface and tapped holes with solvent. Dry thoroughly being certain tapped holes are dry & clean.
2. Install backing ring and special self locking screws.
Tighten screws 40 to 45 Lbs. Ft. [54,3-61,0 N·m]
Note: Assembly of hub must be complete within a fifteen minute period from start of screw installation. The special screw is to be used for one installation only. If the screw is removed for any reason it must be replaced. The epoxy left in the hub holes must be removed with the proper tap and cleaned with solvent. Dry hole thoroughly and use a new screw for reinstallation.

△2 Gear to be assembled with long hub length to this side.

△3 Two clutches, 6-outer steel plates, 6-inner friction plates. Assemble alternately, starting with outer steel plate.

△4 See Elastic Stop Nut Torque Chart

△5 Low clutch,9-outer steel plates,9-inner friction plates. Assemble alternately, starting with outer steel plate.

△8 Tighten oil screen ass'y. 10 to 15 Lbs. Ft. [13,6-20,0 N·m]

△9 Heat nose bushing to 200° F° (93°C) before ass'y. of bushing to cover.

△10 Bearing shield out

△11 Must be loose internal fit bearings, No. "3" etched on bearing.

△12 (12 Plate Modulation) Two clutches,12-outer steel plates,12-inner friction plates.Assemble alternately, starting with outer steel plate.

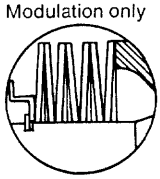
△13 **Bearing shield in**

Notes

A. - Use Permatex & Crane Sealer only where specified.
B. - All lead in chamfers for oil seals, piston rings & "O" rings must be smooth & free from burrs. Inspect at ass'y.
C. - Lubricate all piston ring grooves & "O" rings with oil before ass'y.
D. - Apply very light coat of Permatex No. 2 to O.D. of all oil seals before ass'y.
E. - After assembly of parts using Permatex or Crane sealer, there must not be any free or excess materiai that could enter the oil circuit.
F. - Apply light coat of Crane Sealer to all pipe plugs.
G. - Apply a thin coating of grease between seal lips on lip type seals prior to ass'y.
H. - Apply light coat of Permatex No. 2 to all thru hole stud threads.

NOTE: The friction discs in the low clutch has a higher co-efficient rating than the friction discs in the other clutches, therefore the discs must not be mixed. The low clutch inner disc can be identified by an "X" stamped on one side of the inner teeth. The low clutch inner disc also has a strip of non-soluble yellow paint sprayed on the outer edge of the disc.

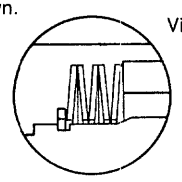
View "**Q**" 2 Places
Modulation only



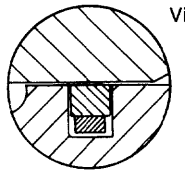
Forward & Reverse Clutch Return Springs. Concave side of first belleville washer to be placed against clutch piston. Remaining six washers of each clutch to be stacked alternately reversed as shown.

Low Clutch Return Springs.
Concave side of first belleville washer to be placed against clutch piston. Remaining four washers to be stacked alternately reversed as shown.

View "**S**"



View "**R**"



Enlarged view of Piston Ring & Expander
Note: Expander gap to be approx. 180° from ring hook joint to aid ring assembly.

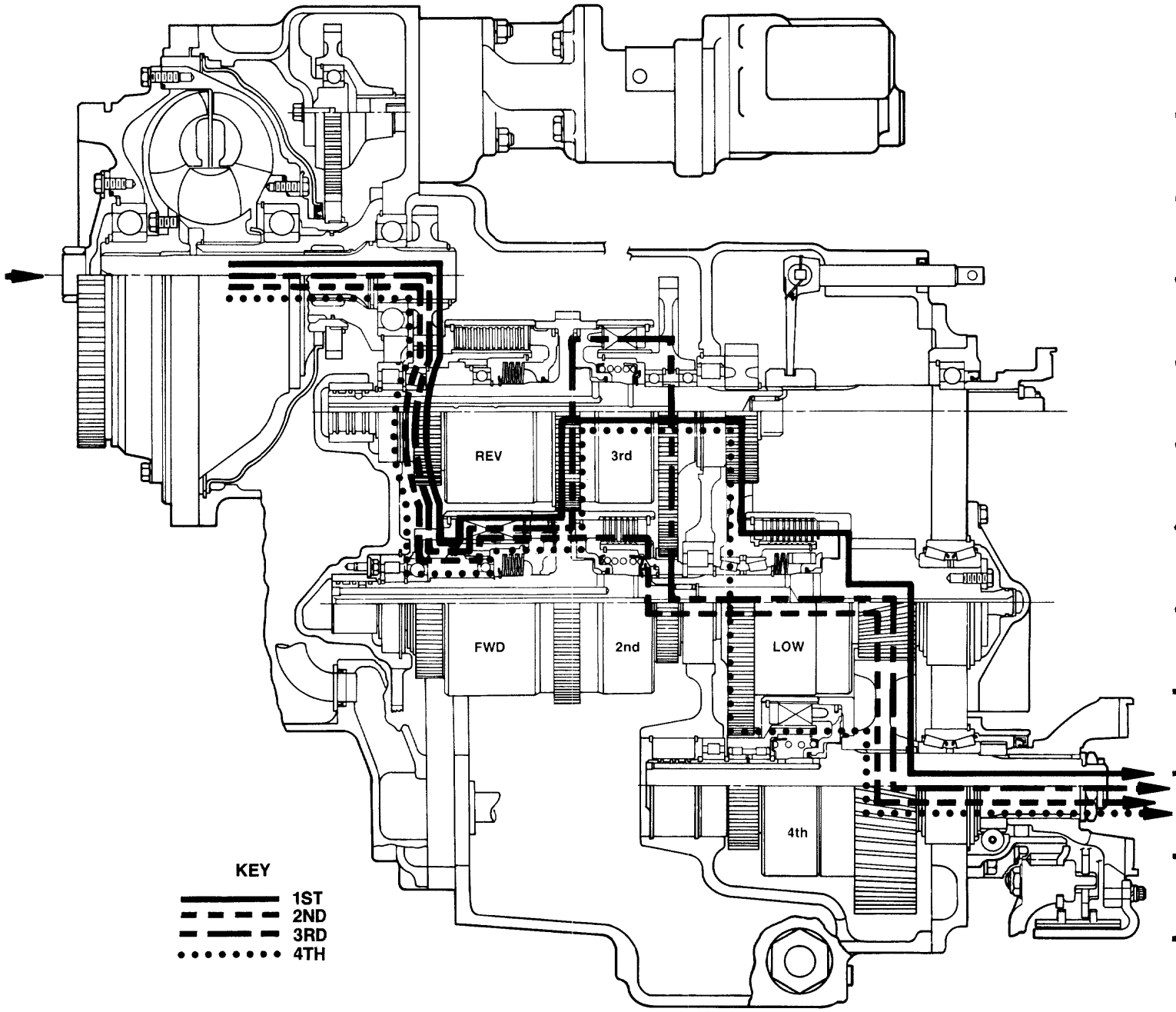
NOTE: Metric dimensions shown in brackets [ ].

ELASTIC STOP NUT TORQUE

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

TORQUE SPECIFICATION FOR LUBRICATED OR PLATED SCREWS AND NUTS

NOMINAL SIZE	GRADE 5				GRADE 8			
	FINE THREAD		COARSE THREAD		FINE THREAD		COARSE THREAD	
	lbf·ft	[N·m]	lbf·ft	[N·m]	lbf·ft	[N·m]	lbf·ft	[N·m]
.2500	9-11	[12-15]	8-10	[11-14]	11-13	[15-18]	9-11	[12-15]
.3125	16-20	[22-27]	12-16	[16-22]	28-32	[38-43]	26-30	[35-41]
.3750	26-29	[35-39]	23-25	[31-34]	37-41	[50-56]	33-36	[45-49]
.4375	41-45	[56-61]	37-41	[50-56]	58-64	[79-87]	52-57	[71-77]
.5000	64-70	[87-95]	57-63	[77-85]	90-99	[122-134]	80-88	[108-119]
.5625	91-100	[123-136]	82-90	[111-122]	128-141	[174-191]	115-127	[156-172]
.6250	128-141	[174-191]	113-124	[153-168]	180-198	[224-268]	159-175	[216-237]
.7500	223-245	[302-332]	200-220	[271-298]	315-347	[427-470]	282-310	[382-420]



32000 4 SPEED TRANSMISSION

4th SPEED CLUTCH DISASSEMBLY
(4 Speed Transmission Only)

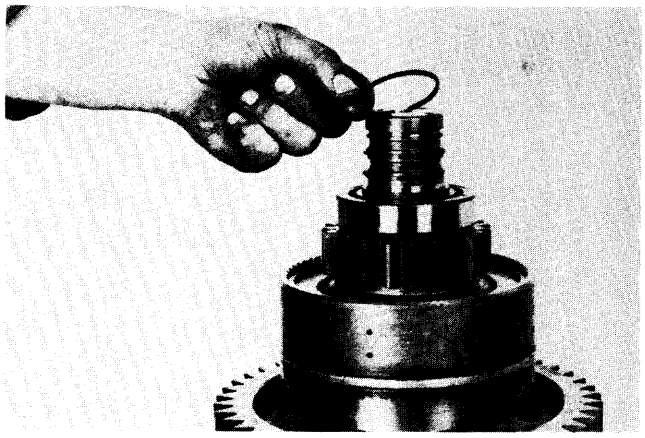


Figure 183
Remove clutch shaft oil sealing rings.

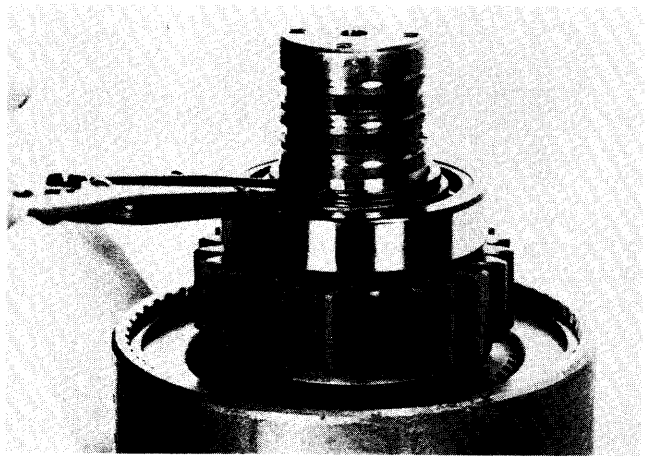


Figure 184
Remove front bearing retainer ring.

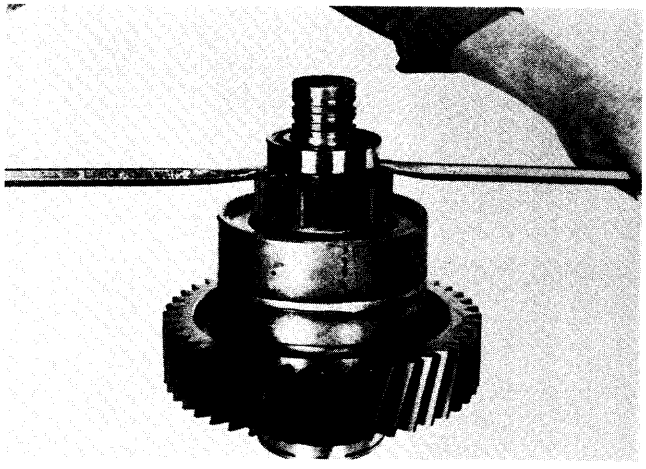


Figure 185
Pry front bearing to accommodate bearing puller.

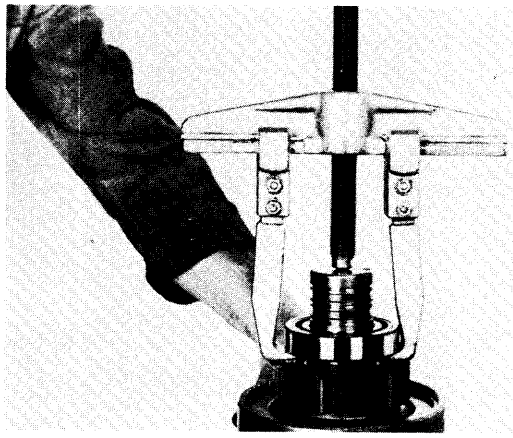


Figure 186
Remove outer bearing.

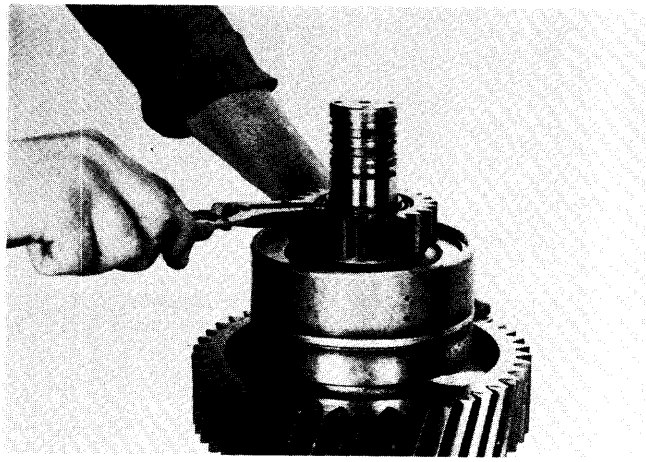


Figure 187
Remove 4th gear outer bearing retainer ring.

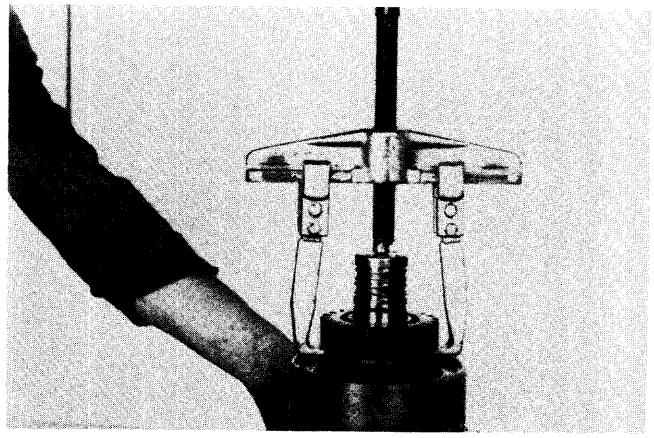


Figure 188
Pry 4th gear up to accommodate gear puller. Remove 4th gear.

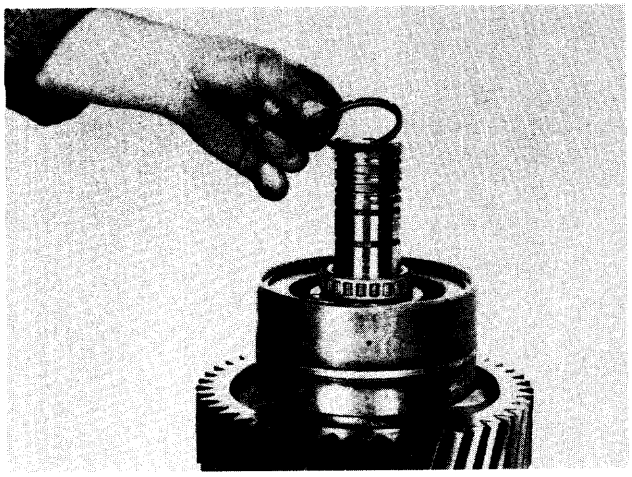


Figure 189

Remove bearing spacer.

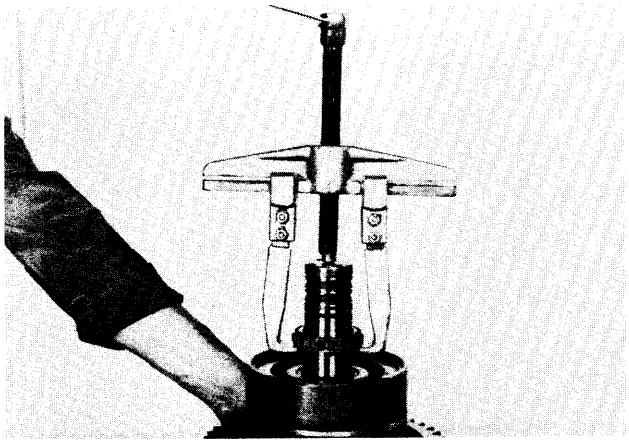


Figure 190

Remove 4th gear inner bearing. Remove end plate retainer ring and end plate. Remove inner and outer clutch discs. Compress spring retainer washer. Remove spring retainer snap ring. Release tension on spring retainer. Remove snap ring, spring retainer, return spring and clutch piston.

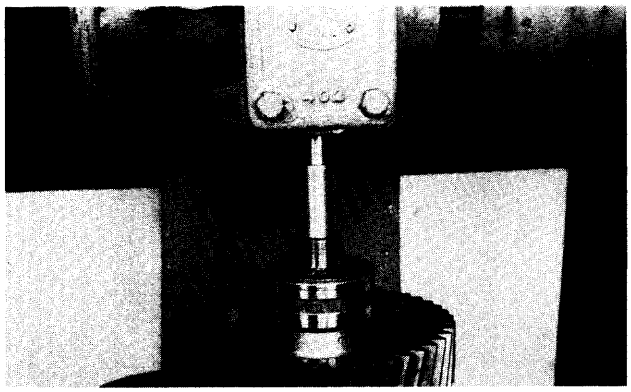


Figure 191

If rear bearing, shaft or output gear and clutch drum are to be replaced, press shaft from rear bearing and output gear.

4th SPEED CLUTCH REASSEMBLY

Press output gear and clutch drum assembly on output shaft. Press output shaft gear spacer in undercut in output gear.

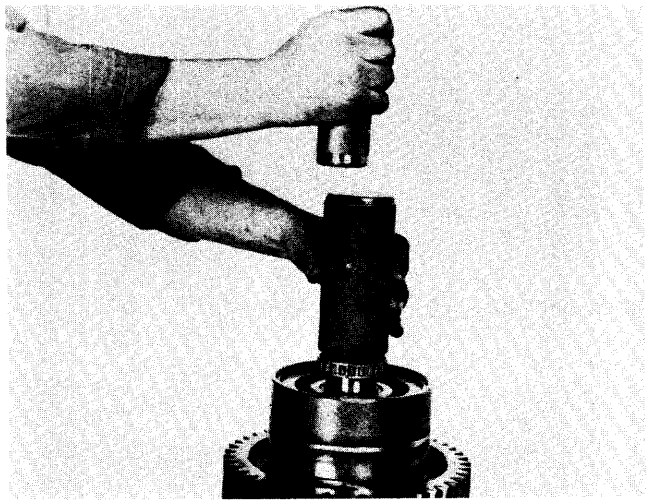


Figure 192

Install piston, and piston return spring. **See page 40, Fig. D.** Install inner and outer discs as explained in Fig. 87 & 88. Install 4th speed gear inner bearing. **NOTE:** Bearing Part Number must go down. See Figure 195.

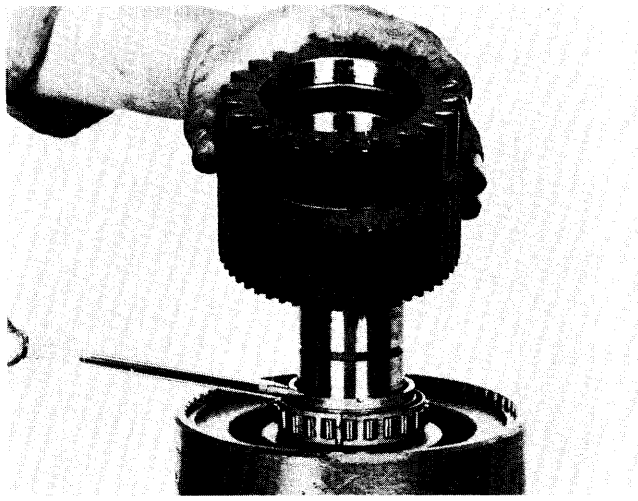


Figure 193

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

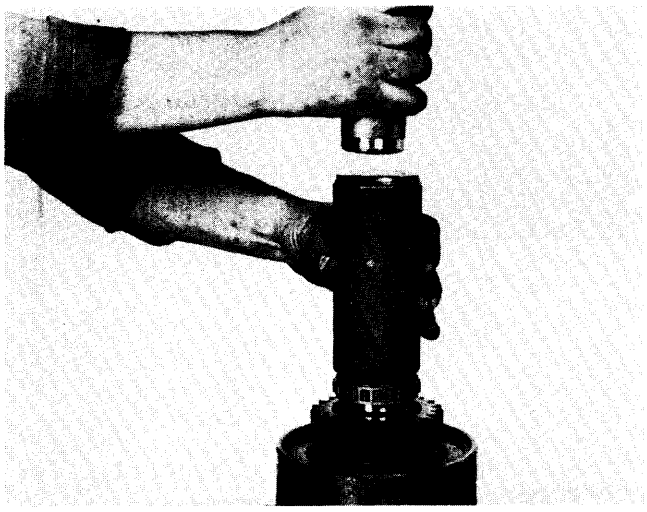


Figure 194

Install 4th speed gear outer bearing. **NOTE:** Bearing Part Number must go up. See Figure 195. It is recommended a rubber band be used to hold outer bearing rollers in position when installing bearing.

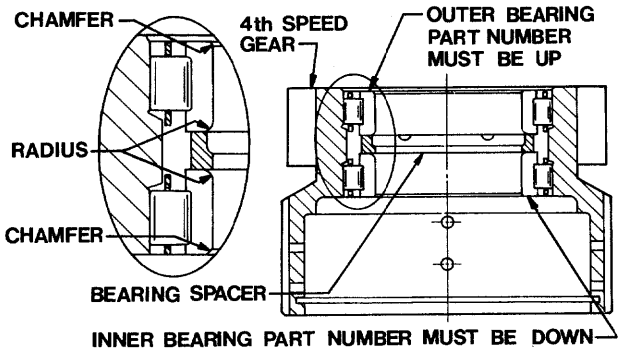


Figure 195

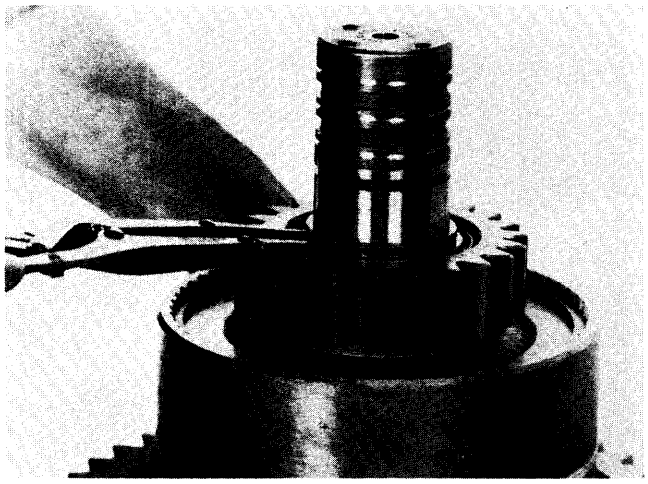


Figure 196

Install outer bearing retainer ring.

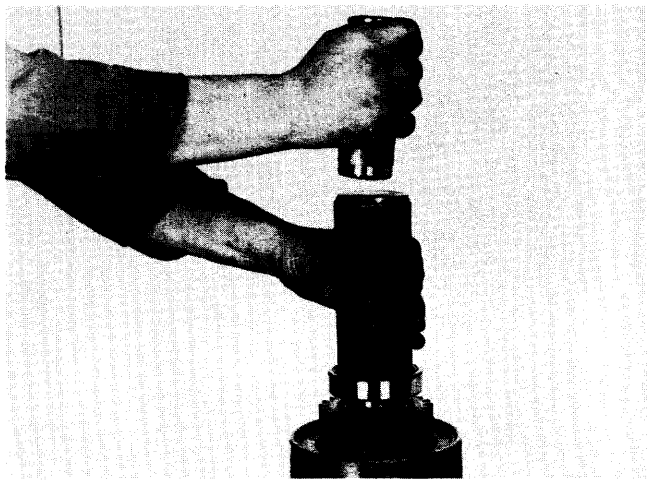


Figure 197

Install clutch shaft front bearing.

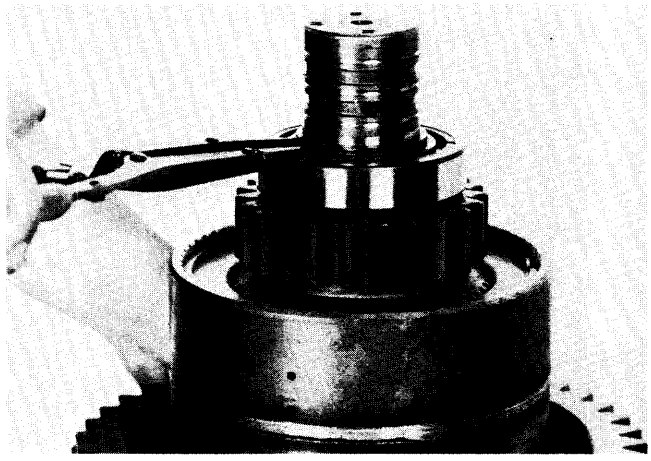


Figure 198

Install bearing retainer ring.

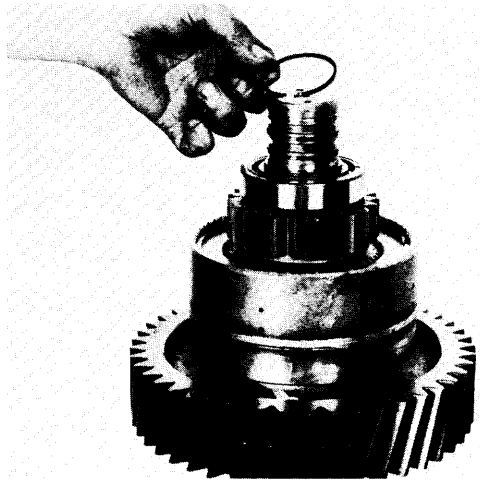


Figure 199

Install clutch shaft oil sealing rings.

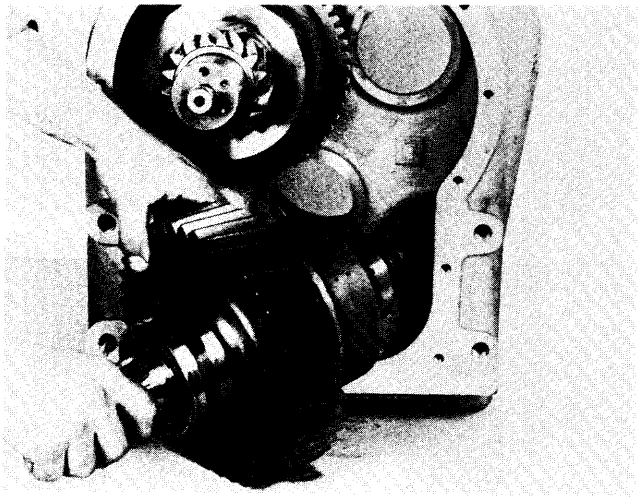
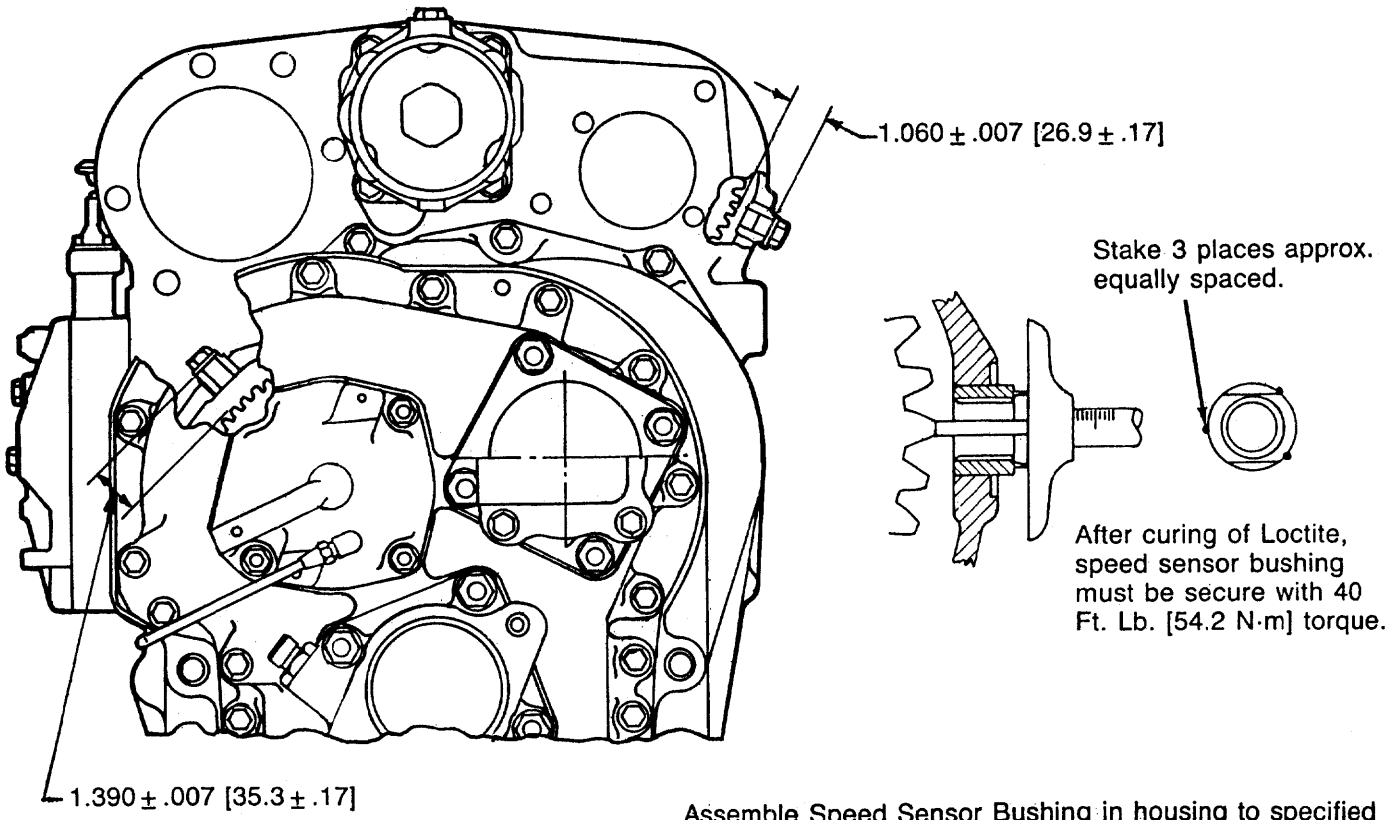


Figure 200

Install output shaft and 4th speed clutch assembly in transmission housing. Refer to Figure 121 for remainder of transmission reassembly.



Assemble Speed Sensor Bushing in housing to specified dimension with Loctite 262 and stake (3) three places.

SPEED SENSOR BUSHING INSTALLATION

32 SCREW RING GEAR INSTALLATION PROCEDURE
(Non-Asbestos Ring Gear)

1. Remove all burrs from flywheel mounting face and pilot bores. Clean the torque converter ring gear flywheel mounting surface and the ring gear screw tapped holes with solvent. Dry thoroughly, being certain ring gear screw holes are dry and clean.

2. Check engine flywheel and housing or housing adaptor for conformance to standard S.A.E. No. 3 – SAE J927 and J1033 tolerance specifications for pilot bores size, pilot bores eccentricities and mounting face deviations. Measure and record engine crankshaft end play.

3. Install torque converter ring gear as shown.

   NOTE: Assembly of the ring gear must be completed within a fifteen minute period from start of screw installation. The screws are prepared with an epoxy coating which begins to harden after installation in the flywheel mounting holes. If not tightened to proper torque within the fifteen minute period insufficient screw clamping tension will result.

4. Install backing ring and thirty-two (32) special screws to approximately .06 inch [1,5 mm] of seated position. It is permissible to use a power wrench for this installation phase. With a calibrated torque wrench tighten screws 23 to 25 pounds feet of torque [31,2 - 33,8 N.m].

   To obtain maximum effectiveness of the special screw's locking feature, a minimum time period after screw installation of twelve (12) hours is suggested before engine start-up.

   The special screw is to be used for **ONE** installation only. If the screw is removed for any reason it **MUST BE REPLACED.** It is recommended that the epoxy left in the flywheel hole be removed with the proper tap and cleaned with solvent. Dry hole thoroughly and use a **NEW** screw for re-installation.

5. Assemble torque converter to engine flywheel by sliding converter into position by hand before fastening housing attachment screws. This may require more than one trial to match the drive gear teeth. Pulling the converter into position with housing attachment bolts is not recommended.

6. Measure engine crankshaft end play after assembly of torque converter. This value must be within one thousandth (.001) of an inch [0,0254mm] of end play recorded (in Paragraph #2) before assembly of torque converter.

802544 – 1.5 INCH [38,1] 32 SCREW RING GEAR KIT

1	249265	Torque Converter Ring Gear
32	243970	Ring Gear Screw 1.5 Inch [38,1]
1	802550	Installation Instruction Sheet

802545 – 1.75 INCH [44,4] 32 SCREW RING GEAR KIT

1	249265	Torque Converter Ring Gear
32	244903	Ring Gear Screw 1.75 Inch [44,4]
1	802550	Installation Instruction Sheet

802546 – 2.0 INCH [50,8] 32 SCREW RING GEAR KIT

1	249265	Torque Converter Ring Gear
32	240318	Ring Gear Screw 2.0 Inch [50,8]
1	802550	Installation Instruction Sheet

802547 – 2.5 INCH [63,5] 32 SCREW RING GEAR KIT

1	249265	Torque Converter Ring Gear
32	237153	Ring Gear Screw 2.5 Inch [63,5]
1	802550	Installation Instruction Sheet

802548 – 3.0 INCH [76,2] 32 SCREW RING GEAR KIT

1	249265	Torque Converter Ring Gear
32	236938	Ring Gear Screw 3.0 Inch [76,2]
1	802550	Installation Instruction Sheet

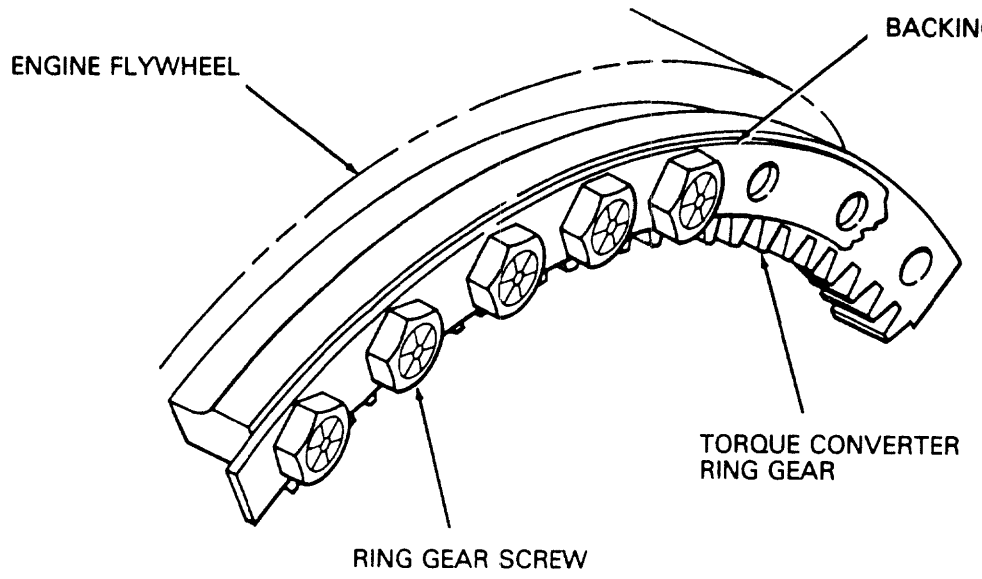
802549 – M8-32 SCREW RING GEAR KIT

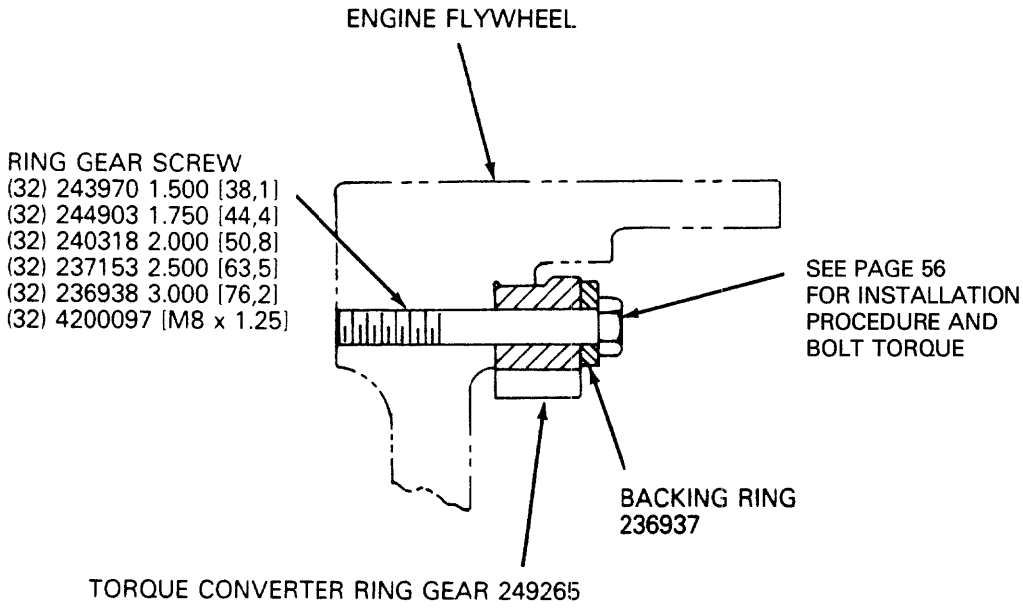
1	249265	Torque Converter Ring Gear
32	4200097	Ring Gear Screw [M8 x 1.25]
1	802550	Installation Instruction Sheet

236937 Backing Ring Not Included in Ring Gear Kit. Must be Ordered Separately.

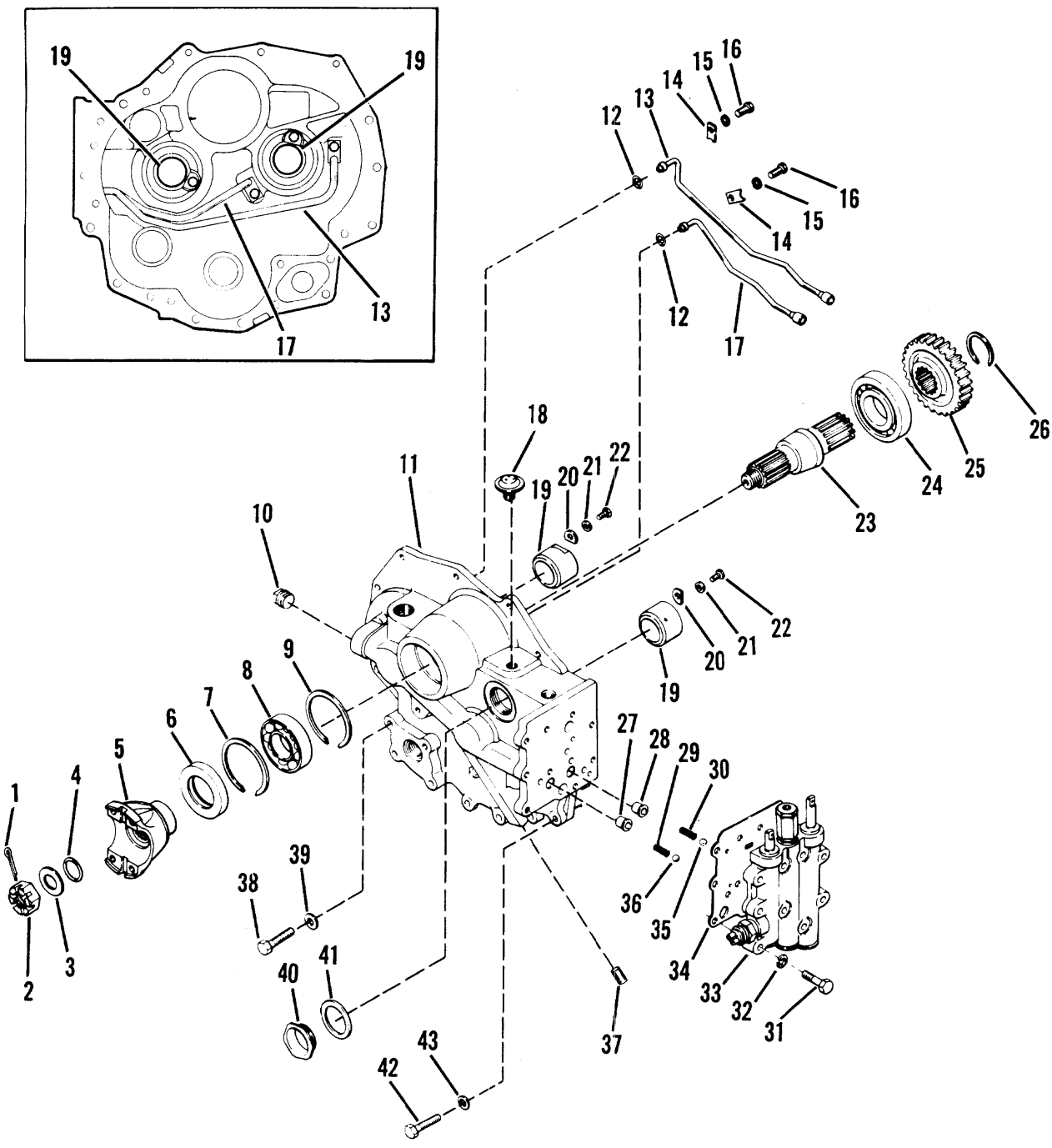
NOTE: The initial installation drive gear mounting kit includes a converter air breather. This breather is used on C & CL 270/C & CL 320 converters only and is not required for the HR & LHR 28000/HR & LHR 32000 applications.

SEE PAGE 57 FOR INSTALLATION ILLUSTRATIONS


ENGINE FLYWHEEL
BACKING RING
TORQUE CONVERTER
RING GEAR
RING GEAR SCREW


ENGINE FLYWHEEL
RING GEAR SCREW
(32) 243970 1.500 [38,1]
(32) 244903 1.750 [44,4]
(32) 240318 2.000 [50,8]
(32) 237153 2.500 [63,5]
(32) 236938 3.000 [76,2]
(32) 4200097 [M8 x 1.25]
SEE PAGE 56
FOR INSTALLATION
PROCEDURE AND
BOLT TORQUE
BACKING RING
236937
TORQUE CONVERTER RING GEAR 249265

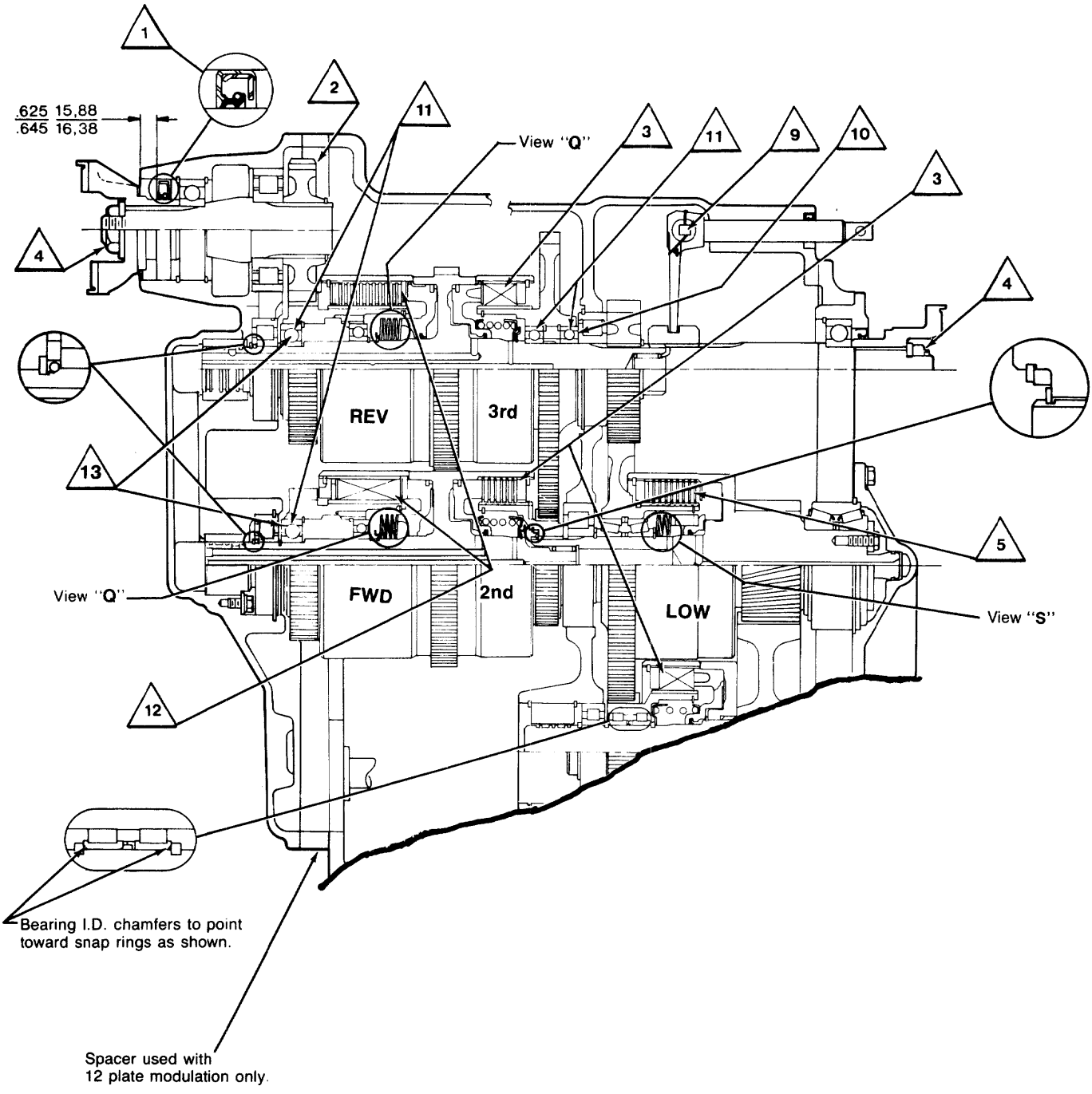
R-MODEL SECTION



R32000 FRONT COVER GROUP

ITEM	DESCRIPTION	QTY
1	Flange Nut Cotter	1
2	Flange Nut	1
3	Flange Nut Washer	1
4	Flange "O" Ring	1
5	Input Flange	1
6	Input Flange Oil Seal	1
7	Input Shaft Front Bearing Retaining Ring	1
8	Input Shaft Front Bearing	1
9	Input Shaft Front Bearing Retaining Ring	1
10	Pipe Plug	1
11	Front Cover & Tube Assembly	1
12	"O" Ring	2
13	3rd Speed Tube Assembly	1
14	Tube Clip	2
15	Tube Clip Screw Lockwasher	2
16	Tube Clip Screw	2
17	Reverse Tube Assembly	1
18	Breather	1
19	Front Cover Sleeve	2
20	Front Cover Sleeve Lock	2
21	Sleeve Lockscrew Lockwasher	2
22	Sleeve Lockscrew	2
23	Input Shaft	1
24	Input Shaft Rear Bearing	1
25	Input Shaft Gear	1
26	Input Shaft Gear Retaining Ring	1
27	Tube Sleeve	1
28	Tube Sleeve	1
29	Detent Spring	1
30	Detent Spring	1
31	Valve to Converter Housing Screw	9
32	Valve to Converter Housing Screw Lockwasher	9
33	Control Valve Assembly	1
34	Control Valve Gasket	1
35	Detent Ball	1
36	Detent Ball	1
37	Pipe Plug	1
38	Cover to Case Screw	4
39	Cover to Case Screw Lockwasher	4
40	Front Cover Plug	1
41	Front Cover Plug Gasket	1
42	Cover to Case Screw	4
43	Cover to Case Screw Lockwasher	4

R-32000
ASSEMBLY INSTRUCTION ILLUSTRATION



1. Apply very light coat of Permatex No. 2 to O.D. of all oil seals before ass'y.

2. Gear to be assembled with long hub length to this side.

3. Three clutches,6-outer steel plates,6-inner friction plates. Assemble alternately, starting with outer steel plate.

4. See Elastic Stop Nut Torque Chart

5. Low clutch,9-outer steel plates,9-inner friction plates. Assemble alternately, starting with outer steel plate.

9. Lockwire to prevent loosening

10. Bearing shield out

11. Must be loose internal fit bearings, No. "3" etched on bearing.

12. (12 Plate Modulation) Two clutches,12-outer steel plates,12-inner friction plates. Assemble alternately, starting with outer steel plate.

13. Bearing shield in.

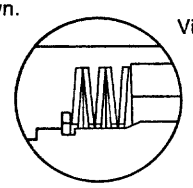
Notes

A. - Use Permatex & Crane Sealer only where specified.
B. - All lead in chamfers for oil seals, piston rings & "O" rings must be smooth & free from burrs. Inspect at ass'y.
C. - Lubricate all piston ring grooves & "O" rings with oil before ass'y.
D. - Apply very light coat of Permatex No. 2 to O.D. of all oil seals before ass'y.
E. - After assembly of parts using Permatex or Crane sealer, there must not be any free or excess material that could enter the oil circuit.
F. - Apply light coat of Crane Sealer to all pipe plugs.
G. - Apply a thin coating of grease between seal lips on lip type seals prior to ass'y.
H. - Apply light coat of Permatex No. 2 to all thru hole stud threads.

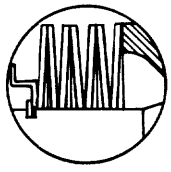
NOTE: Metric dimensions shown in brackets [ ].

Low Clutch Return Springs.
Concave side of first belleville washer to be placed against clutch piston. Remaining four washers to be stacked alternately reversed as shown.

View "S"



View "Q"
2 Places



Forward & Reverse Clutch Return Springs.
Concave side of first belleville washer to be placed against clutch piston. Remaining six washers of each clutch to be stacked alternately reversed as shown.

ELASTIC STOP NUT TORQUE

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

Torque Specification for Lubricated or Plated Screw Threads

NOM. SIZE	Grade 5 FINE THREAD LB-FT	[N·M]	Grade 5 COARSE THREAD LB-FT	[N·M]	Grade 8 FINE THREAD LB-FT	[N·M]	Grade 8 COARSE THREAD LB-FT	[N·M]
.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]

MAINTENANCE AND SERVICE

The instructions contained herein cover the disassembly and reassembly of the transmission in a sequence that would normally be followed after the unit has been removed from the machine and is to be completely overhauled. It must also be understood that this is a basic 32000 transmission with many options. Companion flanges and output shafts with and without disconnect assemblies may vary on specific models. The units are very similar to trouble shoot, disassemble, repair and reassemble.

CAUTION: Cleanliness is of extreme importance and an 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

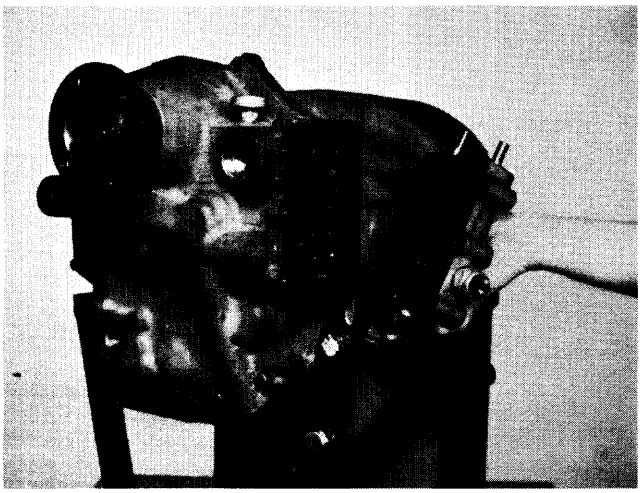


Figure 1
Remove control valve bolts and washers. Remove control valve. Use caution as not to lose detent springs and balls.

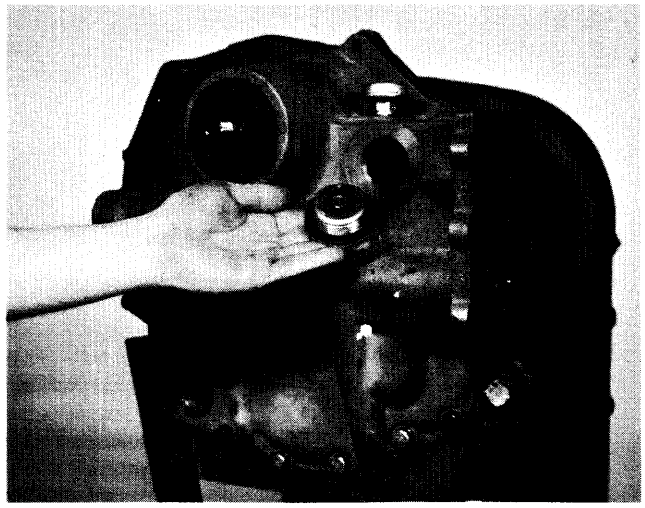


Figure 3
Remove front cover plug.

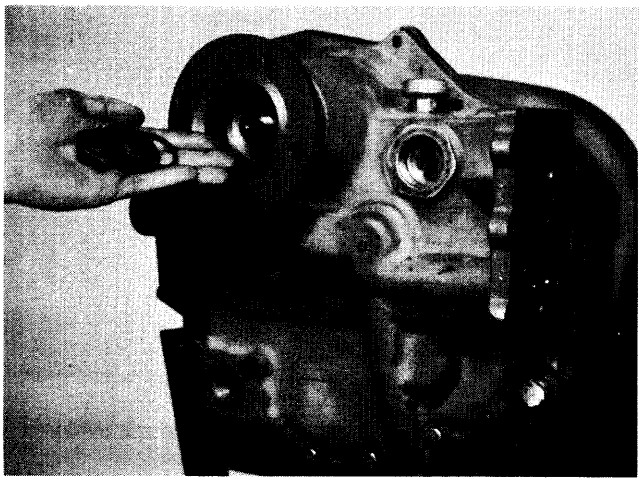


Figure 2
Remove companion flange nut, washer and "O" ring.

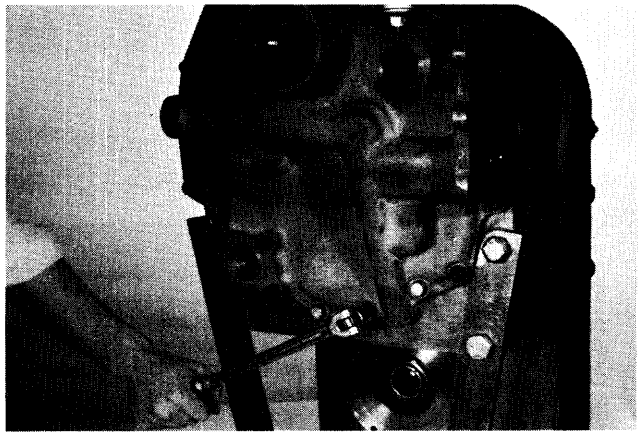


Figure 4
Remove bolts securing front cover to transmission housing.

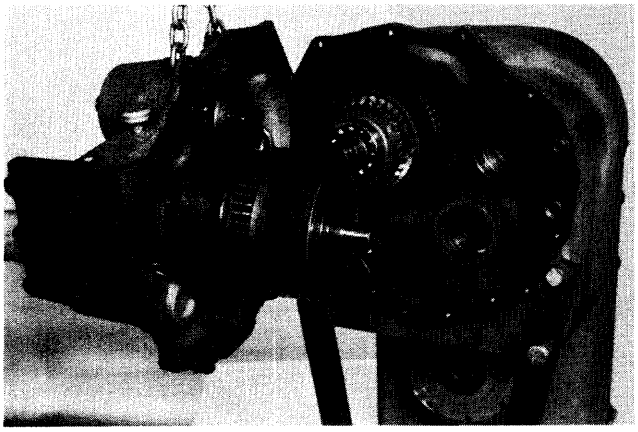


Figure 5
Remove front cover and forward and 2nd clutch.

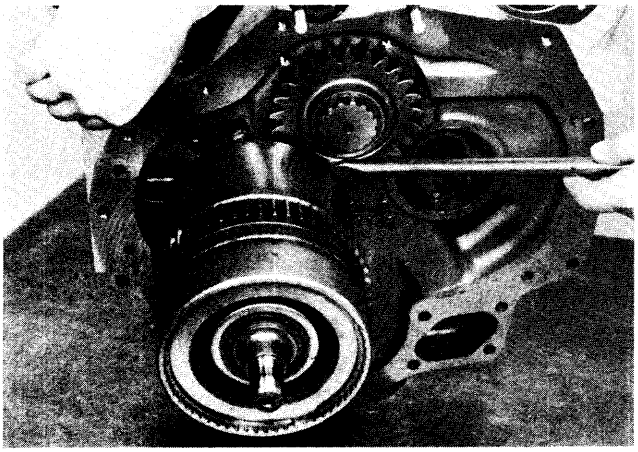


Figure 6
Use a spreading type snap ring pliers to spread the ears on forward clutch front bearing retainer ring. Remove forward clutch with pry bar.

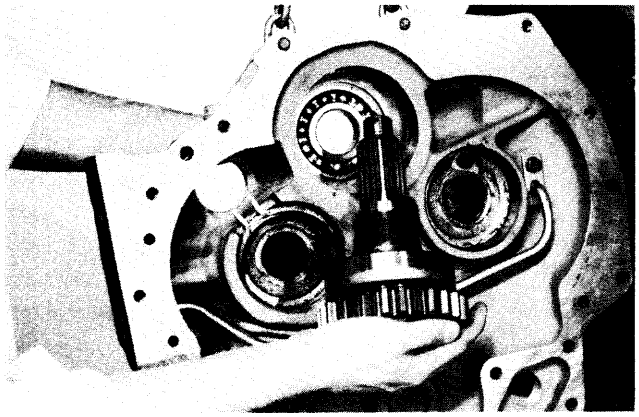


Figure 7
If input shaft is to be removed, tap on threaded end of shaft, remove input shaft, gear and bearing.

See cleaning and inspection page.

INSTALL INPUT SHAFT OIL SEAL IN FRONT COVER AS SHOWN ON PAGE 60.

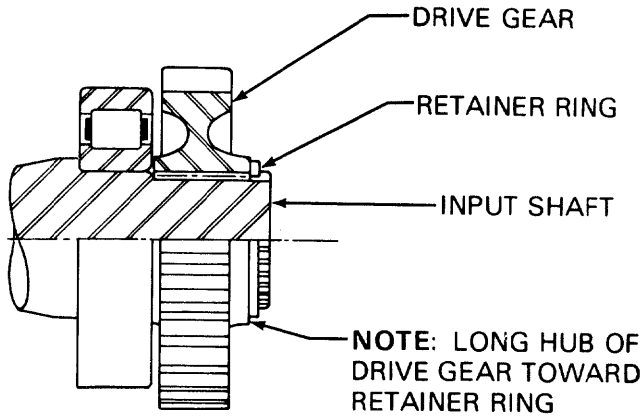


Figure 8
Input shaft, rear bearing, drive gear and snap ring.

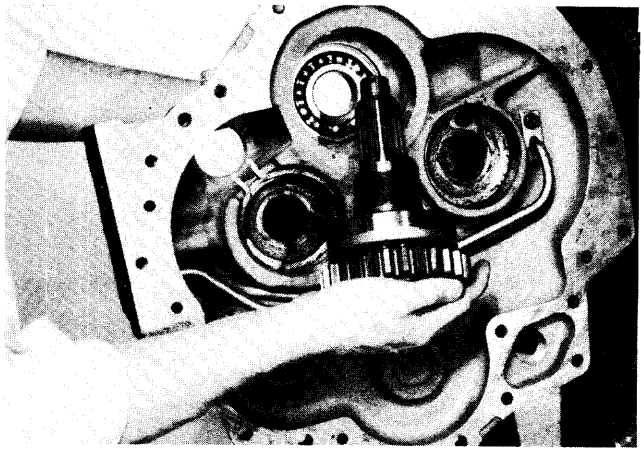


Figure 9
Install input shaft into front bearing.

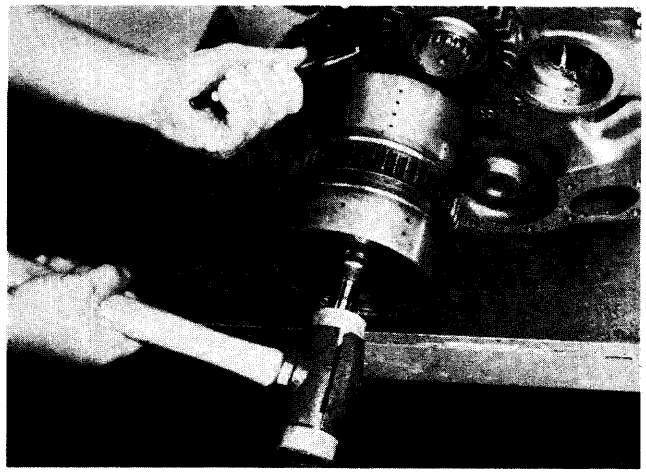


Figure 10
Support converter housing with chain fall. Spread forward clutch front bearing retainer ring and tap forward and 2nd clutch assembly into transmission case assembly. Be certain snap ring is in full position in ring groove.

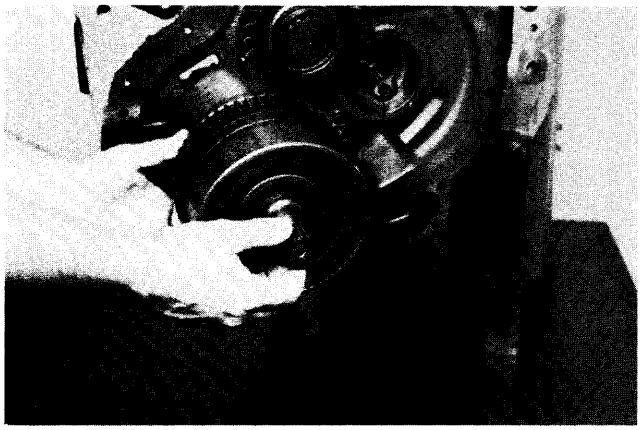


Figure 11
Install 2nd speed clutch pilot bearing.

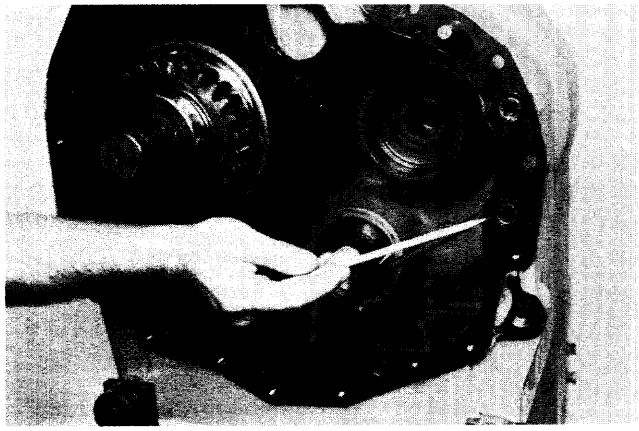


Figure 12
Install transmission case gasket and "O" ring seals.

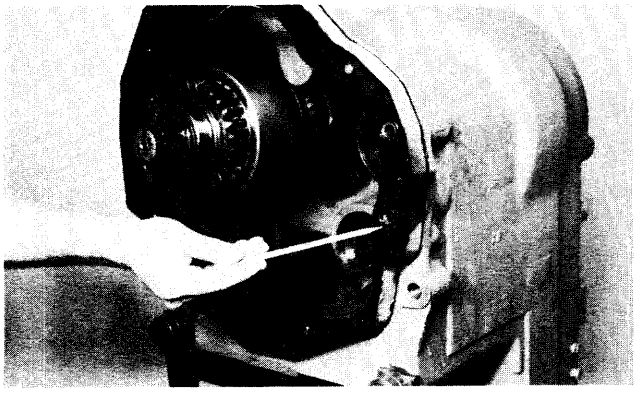


Figure 13
Install housing spacer, gasket and "O" ring seals. **NOTE:** Housing spacer is used with 12 plate clutch modulation only.

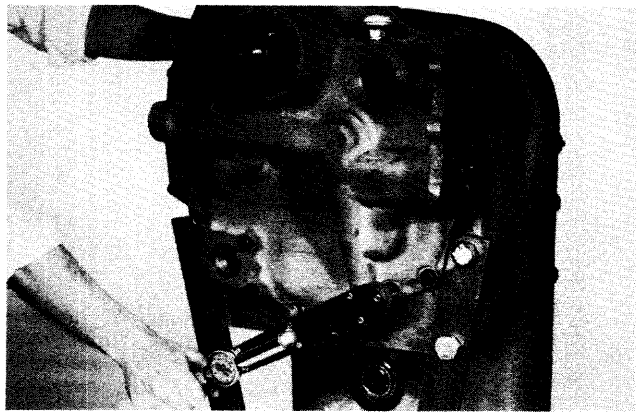


Figure 14
Support front cover with a chain fall. Install alignment studs in transmission case. Position front cover assembly on aligning studs. Turn output flange to align clutch disc hub in clutch. Do not force this operation. With front cover in position against the transmission case install cover to case bolts. Tighten to specified torque.

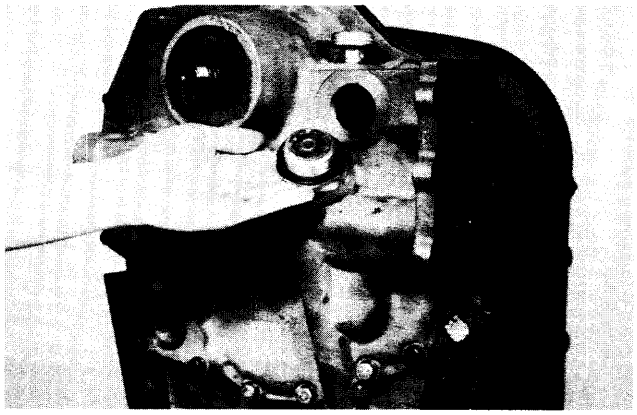


Figure 15
Install front cover plug.

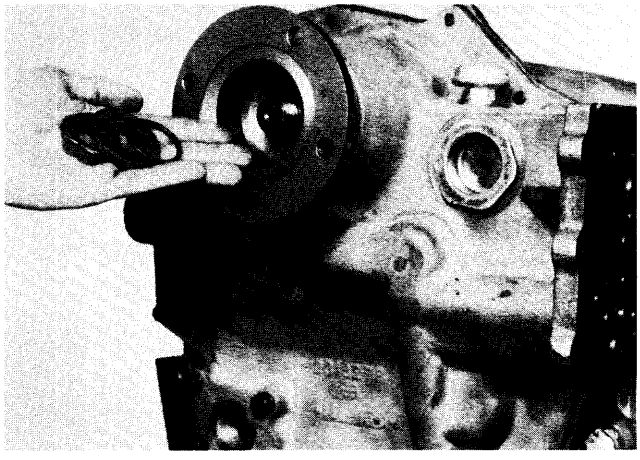


Figure 16
Install companion flange, flange "O" ring, washer and nut. Torque nut to specified torque. (See elastic stop nut torque chart).

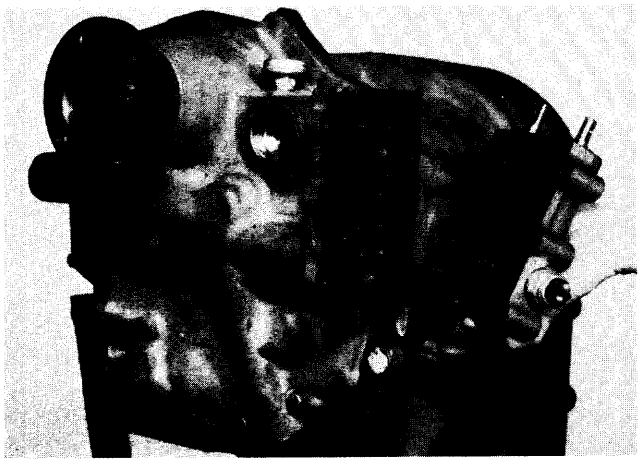
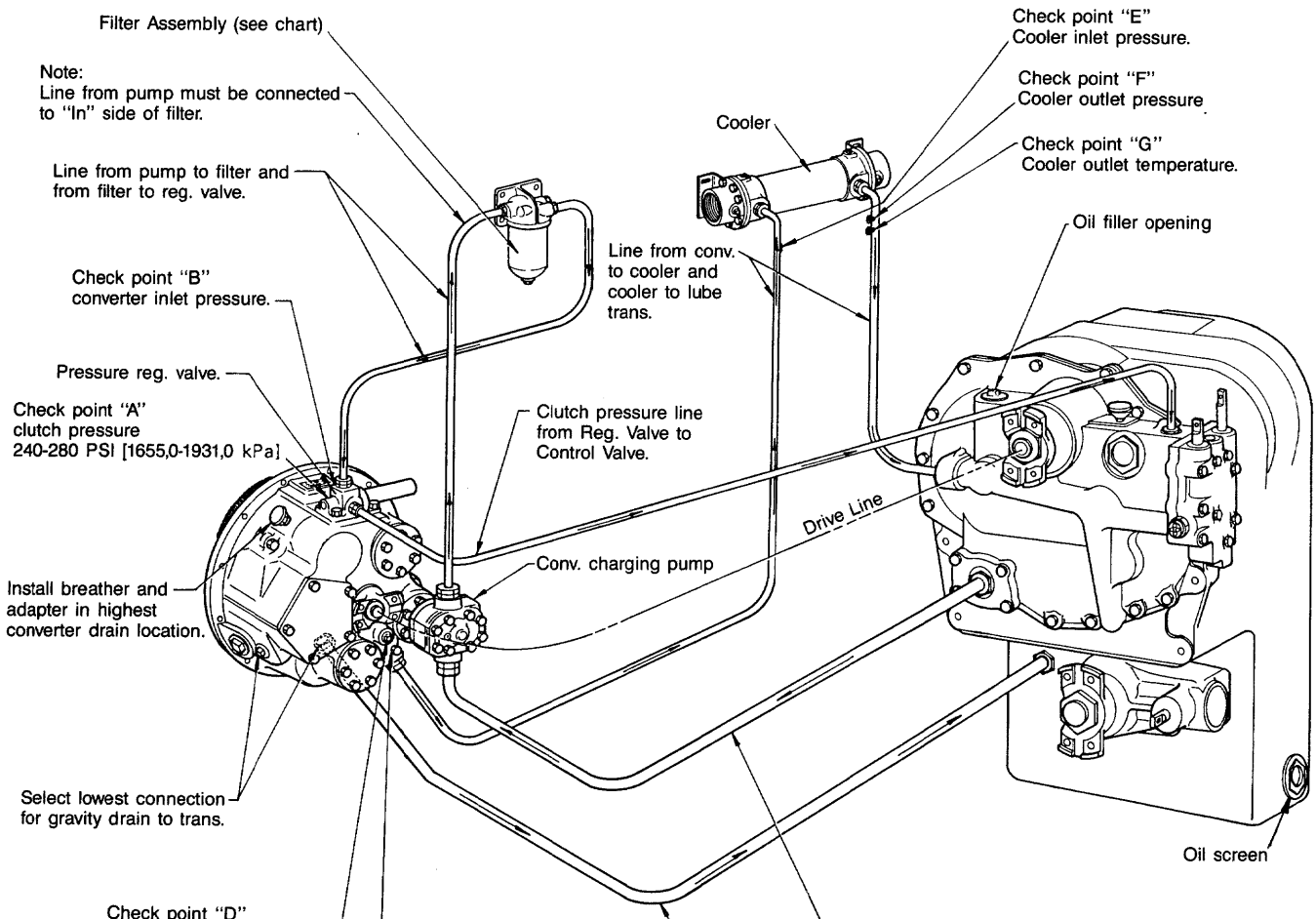


Figure 17

Locate detent balls and springs in control valve. Position new gasket. Secure valve with bolts and washers. Tighten to specified torque.

R32000 - C270/C320 EXTERNAL PLUMBING DIAGRAM



Metric dimensions shown in brackets [ ].

Note: Do not deviate any line size.

FILTER ASSEMBLY CHART

Filter Type	Assembly No.	Cartridge No.	Spin-on Type	
			Assembly No.	Element
A	1533614 Single Can	215502	247055 Single Element	247052
B	234777 Dual Can	215502	246787 Dual Element	243622

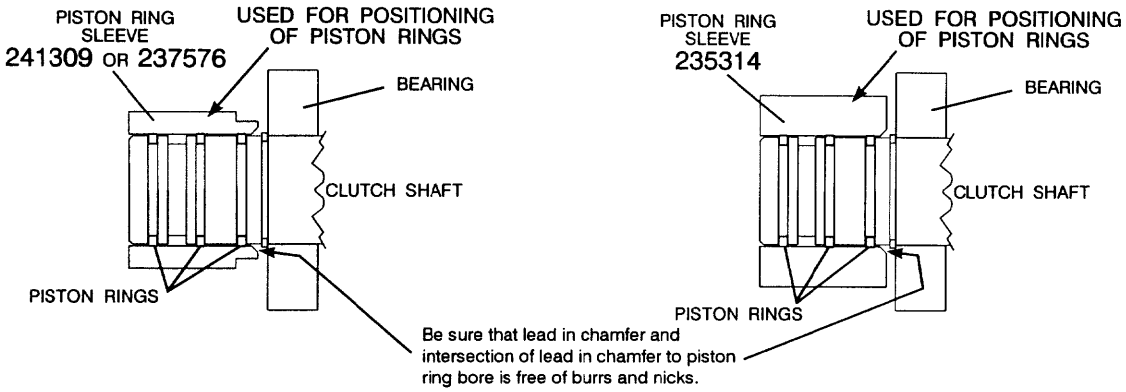
Notes:
Hose line operating requirements.

1. **Pressure Lines**—Suitable for operation from ambient to 250°F. [121,1°C] continuous operating temperature. Must withstand 300 PSI [2068 kPa] continuous pressure with 600 PSI [4137 kPa] intermittent surges. Ref. S.A.E. Spec. No. J517,100R1 Hydraulic Hose Specification.
2. **Suction Line**—To be protected from collapse by interwoven steel wire. Ref. S.A.E. Spec. No. J517,100R4 Hydraulic Hose Specification. Suitable for operation from ambient to 250°F. [121,1°C]. Continuous operating temperature.
3. **Gravity Drain Line**—Suitable for operation from ambient to 250°F. [121,1°C] continuous operating temperature. Ref. S.A.E. Spec. No. J517,100R1 Hydraulic Hose Specification.
4. **All Hose Lines** used must conform to S.A.E. Spec. No. J1019 Test Procedure for High Temp. Transmission Oil Hose.
5. See Lubrication Specifications.

PROPER INSTALLATION OF TEFLON PISTON RING AND PISTON RING EXPANDER SPRINGS

NOTE: NOT ALL TRANSMISSIONS WILL HAVE TEFLON PISTON RINGS AND EXPANDER SPRINGS

1. Fill the oil sealing ring grooves with a good grade of grease, this will help stabilize the teflon ring and expander spring in the ring groove for installation
2. Position the expander spring in the inner groove of the new piston ring, with the expander spring gap 180° from the hook joint gap of the piston ring.
3. Carefully position the piston ring and expander spring on the clutch shaft in the inner most ring groove. Hook the piston piston ring joint.
4. Repeat steps 1, 2 and 3 for the remaining ring or rings making certain all hook joints are fastened securely.
5. Apply a heavy coat of grease to the outer diameter of the rings and clutch shaft. Center the piston ring's in the ring groove.
6. Before installing the clutch assembly in the transmission case it is recommended a piston ring sleeve P/N's 241309, 237576, or 235314 be used to center all of the piston rings in their respective ring grooves. Use extreme caution to not damage piston ring when installing the clutch shaft in the transmission case, or when installing the converter housing or front cover on the clutch shafts.

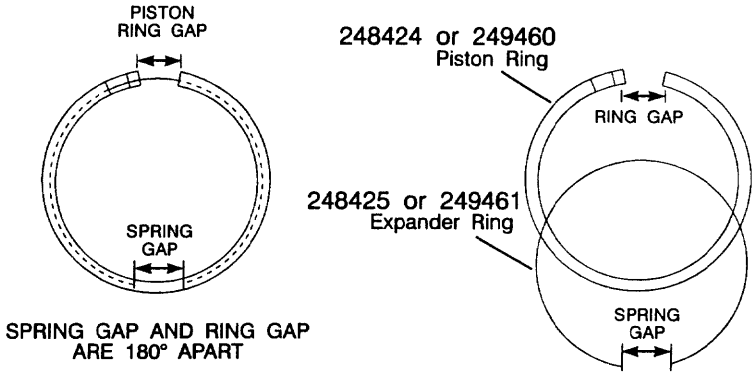


28000, 32000 SERIES

248424 - Piston Ring
248425 - Expander Spring

28000, 32000 SERIES 4TH CLUTCH SHAFT

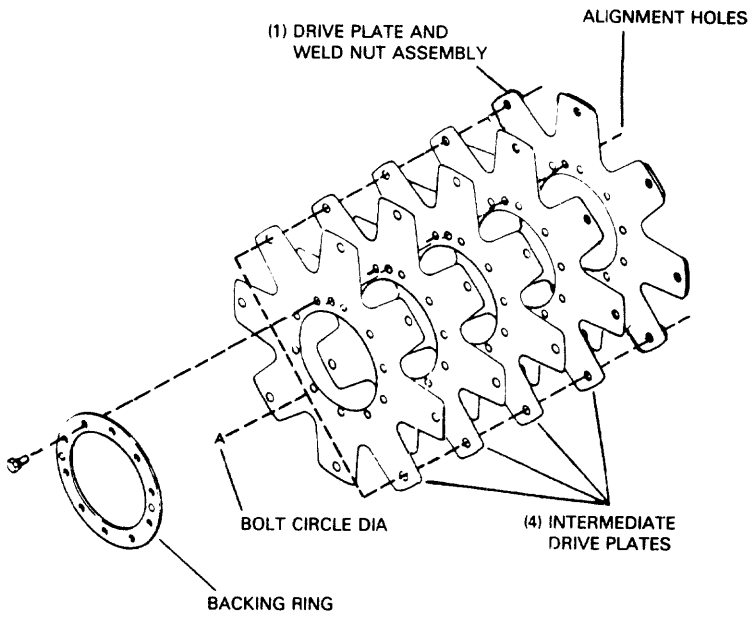
249460 - Piston Ring
249461 - Expander Spring



SPRING GAP AND RING GAP ARE 180° APART

32000 DRIVE PLATE INSTALLATION

Measure the "A" dimension (Bolt Circle diameter) and order Drive Plate Kit listed below.



"A" Dimension (Bolt Circle Diameter)

13.125" [333,375 mm] Diameter
Kit No. 802335

13.50" [342,900 mm] Diameter
Kit No. 802333

17.00" [431,800 mm] Diameter
Kit No. 802454

Each kit will include the following parts:

- 4 Intermediate Drive Plates
- 1 Drive Plate and Weld Nut Assembly.
- 1 Backing Ring.
- 10 Screw and Lockwasher Assembly.
- 1 Instruction Sheet.

TO FACILITATE ASSEMBLY, ALIGN SMALL HOLES IN DRIVE PLATES – SEE ILLUSTRATION ABOVE.

Position drive plate and weld nut assembly on impeller cover with weld nuts toward cover. Align intermediate drive plate and backing ring with holes in impeller cover. **NOTE:** Two dimples 180° apart in backing ring must be out (toward engine flywheel). Install capscrews and washers. Tighten 23 to 25 ft. lbs. torque [31,2 - 33,8 N.m].

SEE PAGE 69 FOR TRANSMISSION TO ENGINE INSTALLATION PROCEDURE

TRANSMISSION TO ENGINE INSTALLATION PROCEDURE

1. Remove all burrs from flywheel mounting face and nose pilot bore. Clean drive plate surface with solvent.
2. Check engine flywheel and housing for conformance to standard S.A.E. #3 - S.A.E. J-927 tolerance specifications for pilot bore size, pilot bore runout and mounting face flatness. Measure and record engine crankshaft end play.
3. Install two 3.50 [88,90 mm] long transmission to flywheel housing guide studs in the engine flywheel housing as shown. Rotate the engine flywheel to align a drive plate mounting screw hole with the flywheel housing access hole.
4. Install a 4.00 [101,60 mm] long drive plate locating stud .3750-24 fine thread in a drive plate nut. Align the locating stud in the drive plate with the flywheel drive plate mounting screw hole positioned in step No. 3.
5. Locate transmission on flywheel housing aligning drive plate to flywheel and transmission to flywheel housing.

   Install transmission to flywheel housing screws. Tighten screws to specified torque. Remove transmission to engine guide studs. Install remaining screws and tighten to specified torque.
6. Remove drive plate locating stud.
7. Install drive plate attaching screw and washer. Snug screw but **do not tighten**. Some engine flywheel housings have a hole located on the flywheel housing circumference in line with the drive plate screw access hole. A screwdriver or pry bar used to hold the drive plate against the flywheel will facilitate installation of the drive plate screws. Rotate the engine flywheel and install the remaining seven (7) flywheel to drive plate attaching screws. Snug screws but do not tighten. After all eight (8) screws are installed torque each one 25 to 30 ft. lbs. torque [33,9 - 40,6 N.m.]. This will require torquing each screw and rotating the engine flywheel until the full amount of eight (8) screws have been tightened.
8. Measure engine crankshaft end play after transmission has been completely installed on engine flywheel. This value must be within .001 [0,025 mm] of the end play recorded in step No. 2.

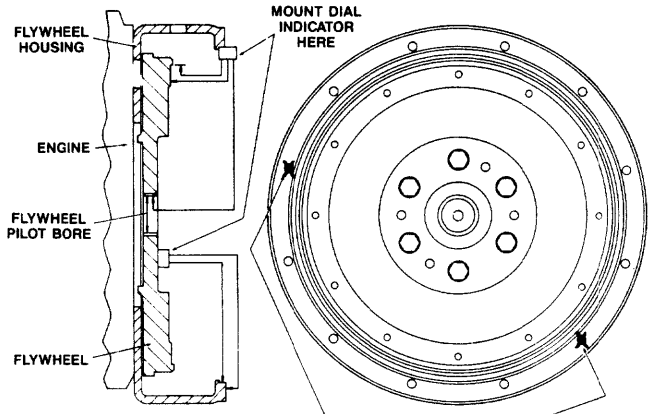


FIG 1

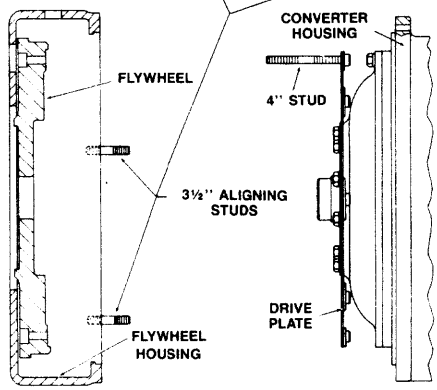


FIG 2

SPECIAL STUD, WASHER AND SELF LOCK NUT FURNISHED BY MACHINE MANUFACTURER.

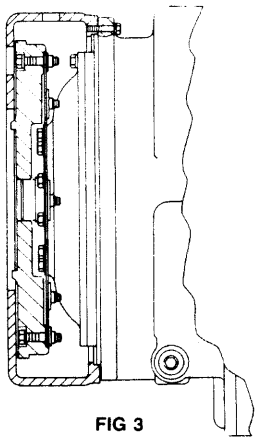


FIG 3

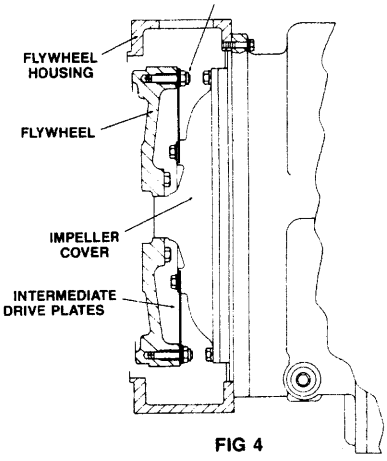


FIG 4