V8

18000 3 Speed ID
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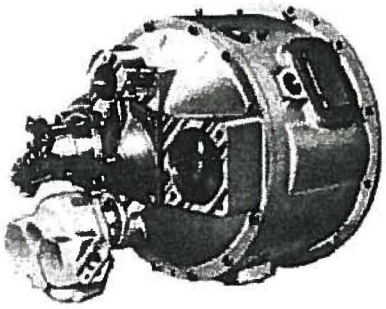
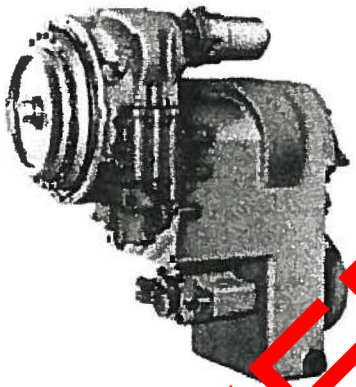
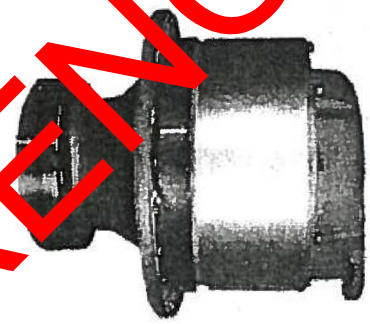






REFERENCE ONLY

SPICER OFF-HIGHWAY COMPONENTS

DANA

FOREWORD

This manual has been prepared to provide the customer and the maintenance personnel with information and instructions on the maintenance and repair of the **CLARK-HURTH COMPONENTS** product.

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

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

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

TABLE OF CONTENTS

NOTE: Metric Dimensions Shown in Brackets [ ].

HOW THE UNITS OPERATE

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:

SECTIONAL VIEWS AND PARTS IDENTIFICATION

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

The shift control valve assembly is mounted directly on the side of the converter housing. 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 by direct gearing. 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.

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 lubricating fitting on the transmission and 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.

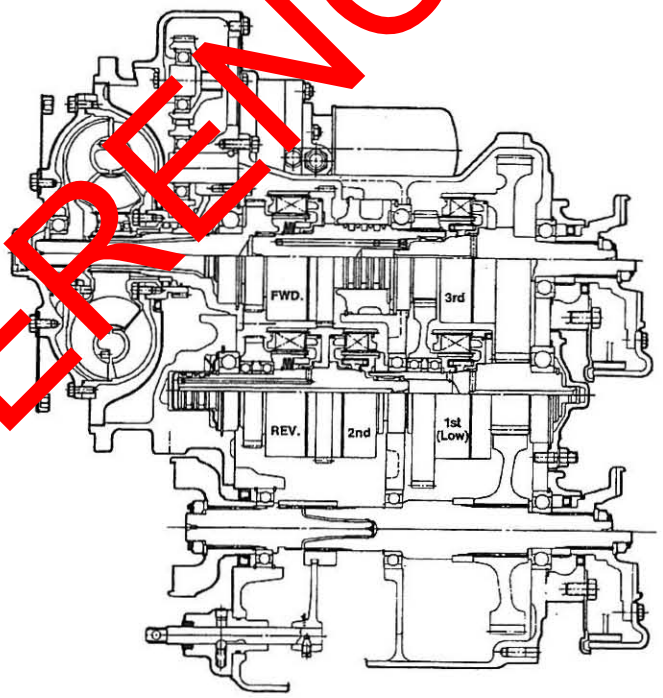
With the engine running and the directional control lever in neutral position, oil pressure from the regulating valve is blocked at the control valve, and the transmission is in neutral. Movement of the forward and reverse spool will direct oil, under pressure to either the forward or reverse direction 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 passageway, 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 or bleed orifices, depending upon the model, in the clutch piston which allow quick escape for oil when the pressure to the piston is released.



BASIC DESIGN
HR MODEL

Figure A

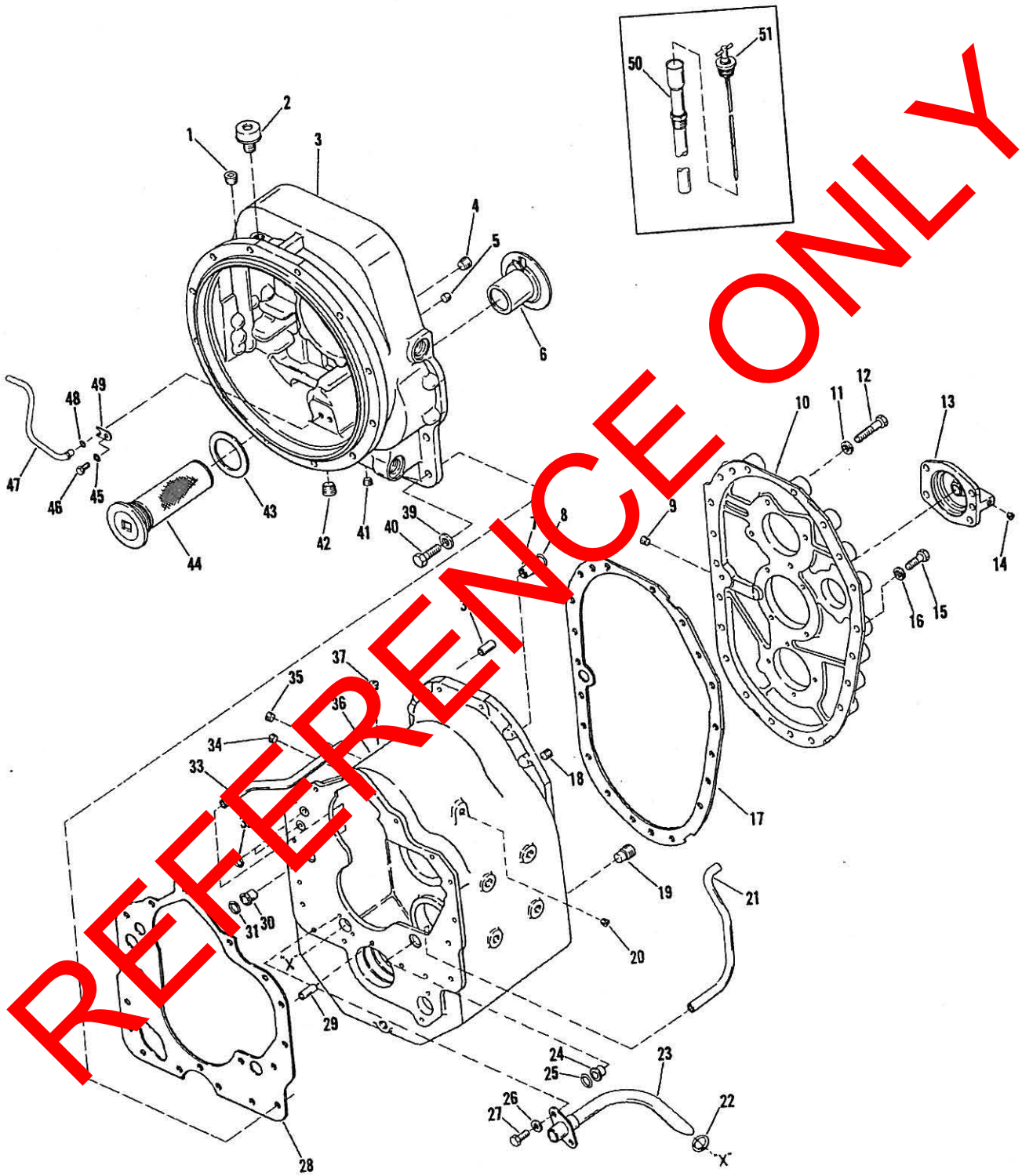


Figure B

18000 CONVERTER HOUSING, TRANSMISSION, CASE & REAR COVER GROUP

SEE PAGE 67 FOR R-MODEL FRONT COVER GROUP

ITEM	DESCRIPTION	QTY.
1	Pipe Plug	1
2	Air Breather	1
3	Converter Housing	1
4	Pipe Plug	1
5	Pipe Plug	1
6	Converter Housing Sleeve	1
7	Tube Sleeve	1
8	Pressure Tube "O" Ring	1
9	Cover Pipe Plug	1
10	Rear Cover	1
11	Rear Cover to Case Screw Lockwasher	10
12	Rear Cover to Case Screw	10
13	Low Shaft Rear Bearing Cap	1
14	Plug	1
15	Rear Cover to Case Screw	1
16	Rear Cover to Case Screw Lockwasher	10
17	Rear Cover to Case Gasket	1
18	Pipe Plug	1
19	Magnetic Drain Plug	2
20	Pipe Plug	1
21	Clutch Lube Tube	1
22	Suction Line "O" Ring	1
23	Suction Tube Assembly	1
24	Tube Sleeve	1
25	Pressure Tube "O" Ring	1
26	Retainer Screw Lockwasher	2
27	Suction Line Retainer Screw	2
28	Converter Housing to Trans. Case Gasket	1
29	Dowel Pin	1
30	Tube Sleeve	1
31	Pressure Tube "O" Ring	1
32	Clutch Pressure "O" Ring	2
33	Low Speed Clutch Pressure Tube	1
34	Pipe Plug	1
35	Pipe Plug	1
36	Transmission Case	1
37	Dipstick Hole Plug	1
38	Case to Cover Dowel Pin	2
39	Housing to Case Screw Lockwasher	16
40	Housing to Case Screw	16
41	Pipe Plug	1
42	Pipe Plug	1
43	Screen Assembly Gasket	1
44	Screen Assembly	1
45	Tube Clip Screw Lockwasher	1
46	Tube Clip Screw	1
47	Lube Bypass Tube	1
48	Tube "O" Ring	1
49	Tube Clip	1
50	Dipstick Tube Assembly	1
51	Dipstick	1

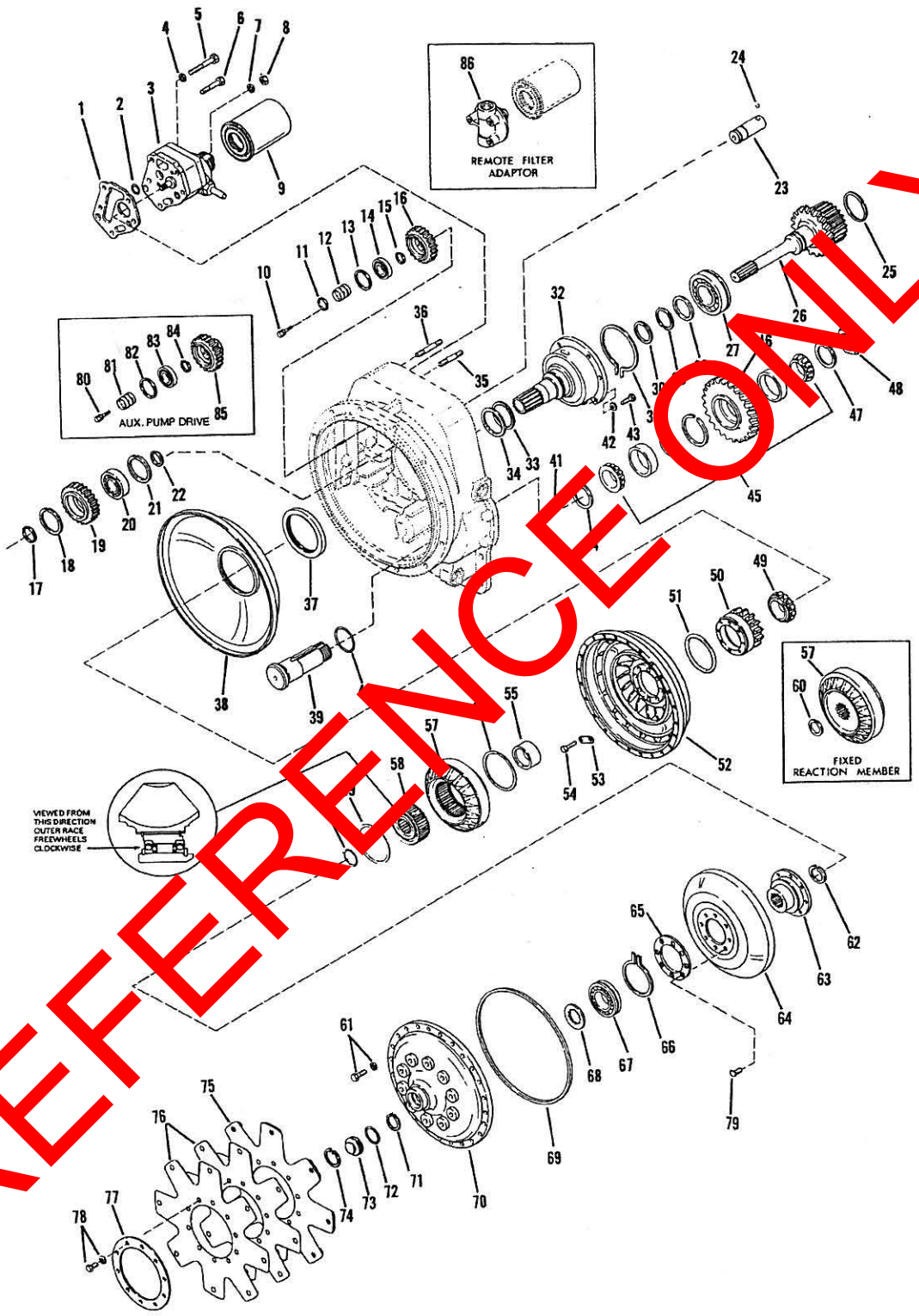


Figure C

HR18000 CONVERTER GROUP
HR MODEL ONLY

ITEM	DESCRIPTION	QTY
1	Pump to Housing Gasket	1
2	"O" Ring	1
3	Charging Pump Assembly	1
4	Pump Mounting Screw Lockwasher	3
5	Pump Mounting Screw	1
6	Pump Mounting Screw	2
7	Pump Mounting Stud Lockwasher	2
8	Pump Mounting Stud Nut	2
9	Filter Assembly	1
10	Bearing Support Screw	2
11	Bearing Locating Ring	1
12	Pump Drive Bearing Support	1
13	Bearing Retaining Ring	1
14	Pump Drive Gear Bearing	1
15	Bearing Locating Ring	1
16	Pump Drive Gear	1
17	Idler Gear Bearing Locating Ring	1
18	Idler Gear Bearing Retaining Ring	1
19	Pump Drive Idler Gear	1
20	Idler Stub Shaft Bearing	1
21	Bearing Retaining Ring	1
22	Bearing Locating Ring	1
23	Idler Gear Stub Shaft	1
24	Stub Shaft Lock Ball	1
25	Baffle Ring	1
26	Turbine Shaft & Disc Hub Assembly	1
27	Turbine Shaft Bearing	1
28	Bearing Locating Washer	1
29	Bearing Retaining Ring	1
30	Piston Ring	1
31	Bearing Snap Ring	1
32	Reaction Member Supp	1
33	Piston Ring Expander Spring	1
34	Piston Ring	1
35	Pump Mounting Stud	1
36	Pump Mounting Stud	1
37	Oil Seal	1
38	Oil Baffle Assembly	1
39	Reverse Idler Shaft	1
40	Reverse Idler Shaft "O" Ring	1
41	Reverse Idler Shaft Lock Ball	1
42	Support Screw Washer	6
43	Reaction Member Support Screw	6

ITEM	DESCRIPTION	QTY
44	Bearing Retainer Thrust Plate	1
45	Reverse Idler Gear Bearing Assembly	1
46	Reverse Idler Gear	1
47	Bearing Retaining Thrust Plate	1
48	Retaining Plate Nut	1
49	Impeller Hub Gear Bearing	1
50	Impeller Hub Gear	1
51	Impeller Hub "O" Ring	1
52	Impeller	1
53	Impeller to Hub Screw Lock	4
54	Impeller to Hub Screw	8
55	Reaction Member Spacer	1
56	Freewheel Outer Race Ring	1
57	Reaction Member	1
58	Freewheel Assembly	1
59	Freewheel Outer Race Snap Ring	1
60	Reaction Member Retainer Ring	1
61	Impeller Cover Screw and Lockwasher	18
62	Turbine Retaining Ring	1
63	Turbine Hub	1
64	Turbine	1
65	Turbine Backing Ring	1
66	Turbine Hub Bearing Locating Ring	1
67	Turbine Hub Bearing	1
68	Bearing Retaining Washer	1
69	Impeller to Cover "O" Ring	1
70	Impeller Cover	1
71	Turbine Retaining Ring	1
72	Impeller Cover Bore Plug "O" Ring	1
73	Bore Plug	1
74	Bore Plug Retaining Ring	1
75	Drive Plate Assembly	1
76	Drive Plate	2
77	Drive Plate Backing Ring	1
78	Drive Plate Mounting Screw & Lockwasher	10
79	Turbine Hub Screw	12
80	Bearing Support Screw & Lockwasher	2
81	Auxiliary Pump Drive Bearing Support	1
82	Bearing Retaining Ring	1
83	Pump Drive Gear Bearing	1
84	Bearing Locating Ring	1
85	Auxiliary Pump Drive Gear	1
86	Remote Filter Adaptor (Optional)	1

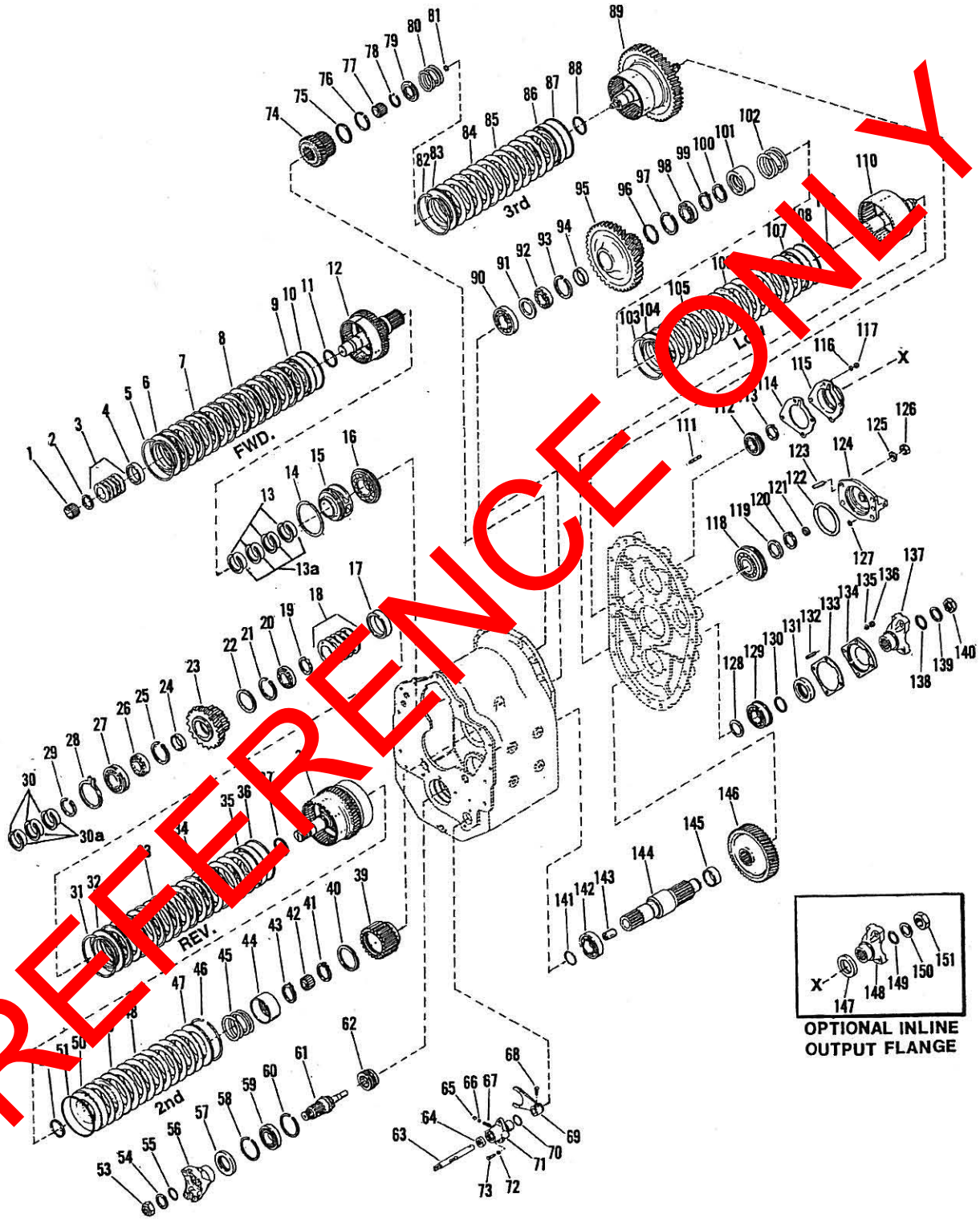


Figure D

18000 INTERMEDIATE DROP CLUTCH & GEAR GROUP

ITEM	DESCRIPTION	QTY
1	Forward Shaft Pilot Bearing	1
2	Spring Retaining Snap Ring	1
3	Piston Return Disc Spring	5
4	Piston Return Spring Spacer	1
5	Backing Plate Snap Ring	1
6	Clutch Disc Backing Plate	1
7	Clutch Inner Disc	8
8	Clutch Outer Disc	8
9	Clutch Piston	1
10	Clutch Piston Seal - Outer	1
11	Clutch Piston Seal - Inner	1
12	Forward Shaft Drum & Plug Assembly	1
13	Forward Shaft Piston Ring	4
13A	Piston Ring Expander Spring	4
14	Piston Ring Sleeve Retaining Ring	1
15	Piston Ring Sleeve	1
16	Forward Shaft Rear Bearing	1
17	Piston Return Spring Spacer	1
18	Piston Return Disc Spring	5
19	Spring Retainer Snap Ring	1
20	Clutch Driven Gear Bearing	1
21	Bearing Retaining Ring	1
22	Baffle Ring	1
23	Reverse Clutch Gear & Baffle Ring Assembly	1
24	Clutch Driven Gear Bearing Spacer	1
25	Bearing Retaining Ring	1
26	Clutch Driven Gear Bearing	1
27	Reverse & 2nd Shaft Front Bearing	1
28	Front Bearing Snap Ring	1
29	Front Bearing Retaining Ring	1
30	Reverse & 2nd Shaft Piston Ring	3
30A	Expander Spring	3
31	Backing Plate Snap Ring	1
32	Clutch Disc Backing Plate	1
33	Clutch Inner Disc	
34	Clutch Outer Disc	
35	Clutch Piston	1
36	Clutch Piston Seal - Outer	1
37	Clutch Piston Seal - Inner	
38	Reverse & 2nd Shaft, Drum & Plug Assembly	1
39	2nd Clutch Disc Hub	1
40	Baffle Ring	1
41	2nd Clutch Disc Hub Snap Ring	1
42	Reverse & 2nd Shaft Rear Bearing	1
43	Spring Retainer Snap Ring	1
44	Spring Retainer	1
45	Piston Return Spring	1
46	Backing Plate Snap Ring	1
47	Clutch Disc Backing Plate	1
48	Clutch Outer Disc	6
49	Clutch Inner Disc	6
50	Clutch Piston	1
51	Clutch Piston Seal - Outer	1
52	Clutch Piston Seal - Inner	1
53	Flange Nut	1
54	Flange Washer	1
55	Flange "O" Ring	1
56	Output Flange	1
57	Output Oil Seal	1
58	Bearing Retaining Ring	1
59	Bearing	1
60	Bearing Retainer Ring	1
61	Disconnect Shaft	1
62	Shift Hub	1
63	Shift Rail	1
64	Shift Rail Oil Seal	1
65	Disconnect Shift Rail Housing Detent Plug	1
66	Detent Ball	1
67	Detent Spring	1
68	Shift Fork Lockscrew	1
69	Shift Fork	1
70	Disconnect Shift Rail Housing "O" Ring	1
71	Disconnect Shift Rail Support	1
72	Disconnect Shift Rail Hsg. Lockwasher	2
73	Disconnect Shift Rail Hsg. Screw	2
74	3rd Gear & Hub Assembly	1
75	Baffle Ring	1

ITEM	DESCRIPTION	QTY
76	3rd Gear & Hub Retainer Ring	1
77	Pilot Bearing	1
78	Spring Retainer Snap Ring	1
79	Spring Retainer	1
80	Piston Return Spring	1
81	3rd Shaft Piston Ring	1
82	Backing Plate Snap Ring	1
83	Clutch Disc Backing Plate	1
84	Clutch Inner Disc	6
85	Clutch Outer Disc	
86	Clutch Piston Assembly	1
87	Clutch Piston Seal - Outer	1
88	Clutch Piston Seal - Inner	1
89	3rd Clutch Shaft, Drum & Hub Assem	1
90	Low Speed Shaft Front Bearing	1
91	Front Bearing Spacer	1
92	Low Speed Gear Bearing	1
93	Low Speed Gear Bearing Locati Ring	1
94	Low Speed Gear Sp	1
95	Low Shaft Gear & ub	1
96	Baffle Ring	1
97	Low Speed Gear earing Locati Ring	1
98	Low Speed Gear aring	1
99	Low Speed Gear B ing Retai ng Ring	1
100	Spring Retainer Snap	1
101	Spri Retainer	1
102	P on Return Spring	1
103	acking e Snap Ring	1
104	tch sc Backing Plate	1
105	Cl nner Dis	8
	Clut Outer sc	8
107	Clutch	1
108	Cl h Pi on Seal - Outer	1
109	Cl h Piston Seal - Inner	1
110	Lo Clutch Shaft Drum & Bleed Valve Ass'y.	1
11	3r Shaft Rear Bearing Cap Stud	4
	d Shaft Rear Bearing	1
113	3rd Shaft Rear Bearing Retaining Ring	1
114	3rd Shaft Bearing Cap Gasket	1
15	3rd Shaft Rear Bearing Cap	1
116	Bearing Cap Stud Lockwasher	4
117	Bearing Cap Stud Nut	4
118	Low Speed Shaft Rear Bearing	1
119	Rear Bearing Support Washer	1
120	Rear Bearing Retaining Ring	1
121	Low Shaft Piston Ring	1
122	Rear Bearing Cap "O" Ring	1
123	Bearing Cap Stud	4
124	Low Shaft Bearing Cap	1
125	Bearing Cap Stud Lockwasher	4
126	Bearing Cap Stud Nut	4
127	Bearing Cap "O" Ring	1
128	Gear Thrust Washer	1
129	Output Shaft Rear Bearing	1
130	Retaining Ring	1
131	Output Shaft Rear Bearing Cap Oil Seal	1
132	Bearing Cap Stud	4
133	Bearing Cap Gasket	1
134	Output Shaft Rear Bearing Cap	1
135	Bearing Cap Stud Lockwasher	4
136	Bearing Cap Stud Nut	4
137	Output Flange	1
138	Flange "O" Ring	1
139	Flange Washer	1
140	Flange Nut	1
141	Output Shaft Bearing Retaining Ring	1
142	Output Shaft Front Bearing	1
143	Output Shaft Bushing	1
144	Output Shaft	1
145	Output Gear Spacer	1
146	Output Shaft Gear	1
147	Oil Seal	1
148	Output Flange	1
149	Flange "O" Ring	1
150	Flange Washer	1
151	Flange Nut	1

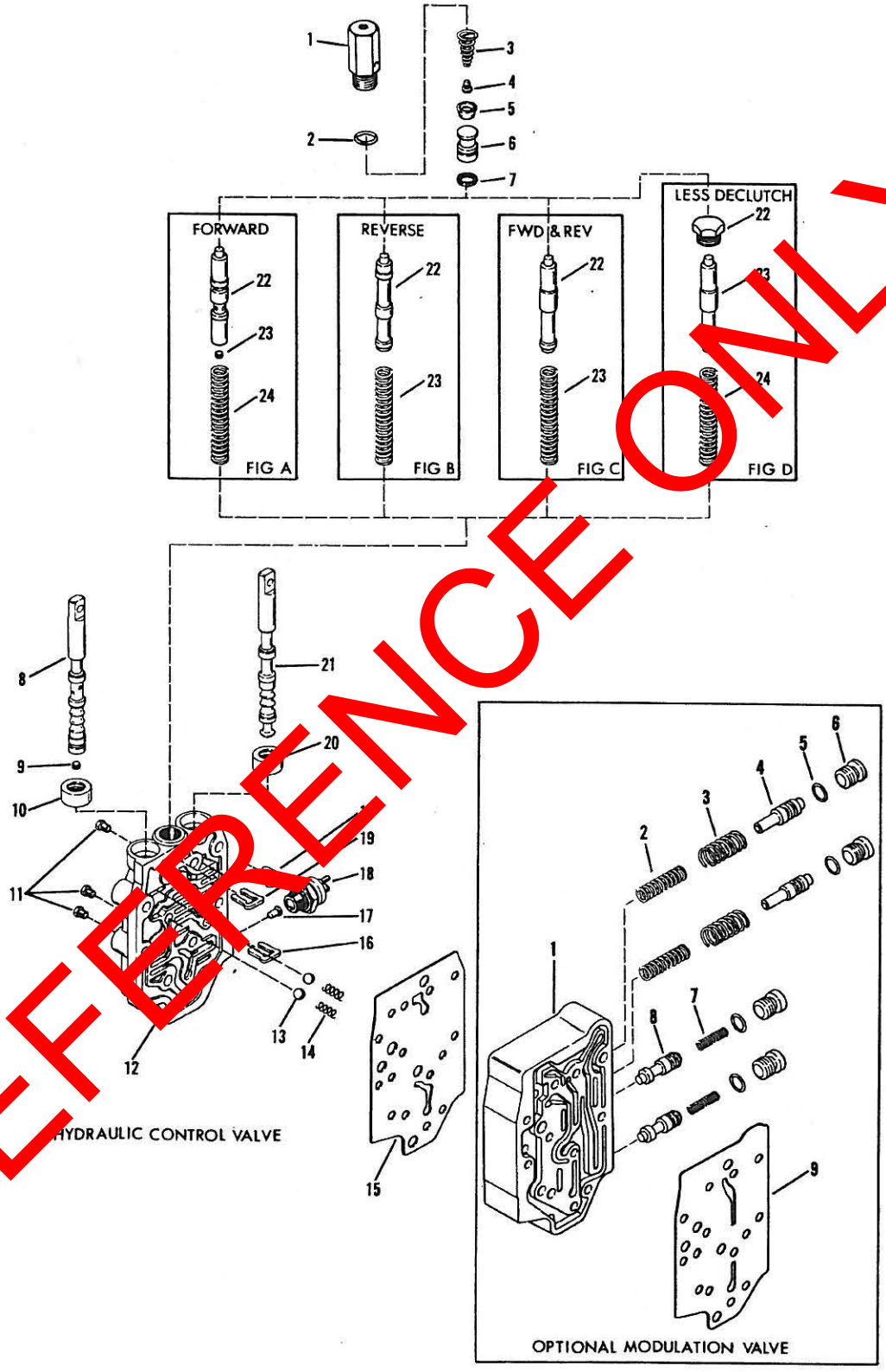


Figure E

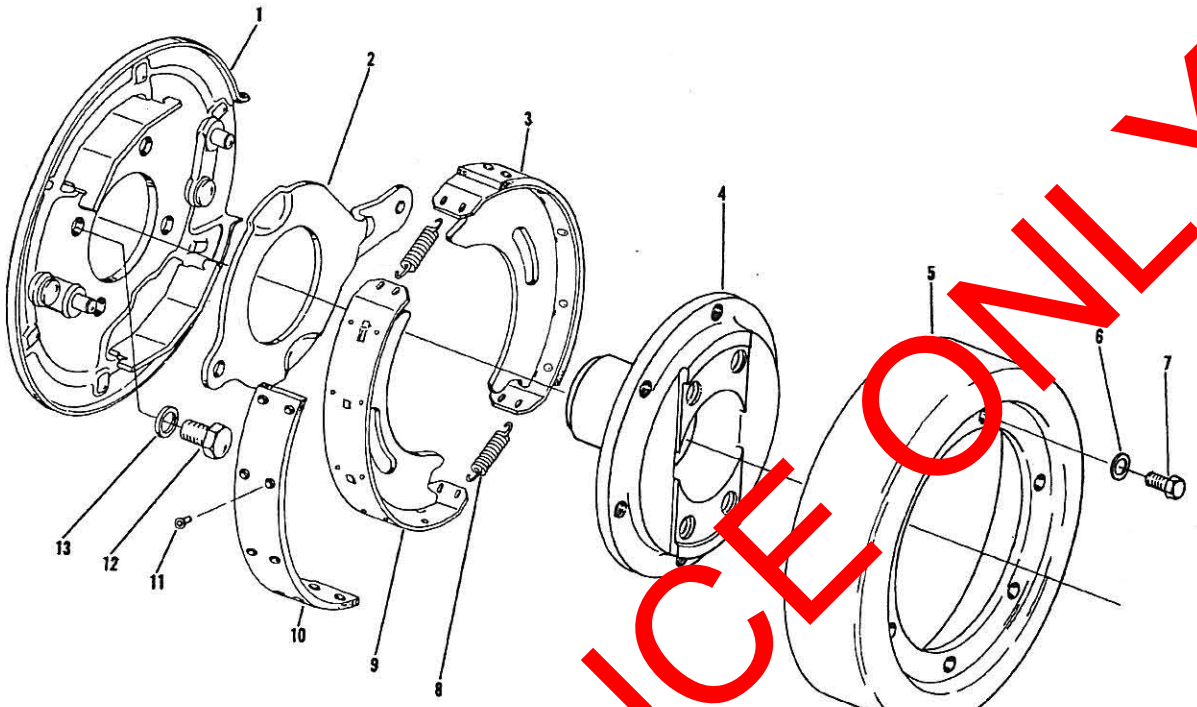
CONTROL VALVE ASSEMBLY

ITEM	DESCRIPTION	QTY.
1	Hydraulic Actuator Assembly	1
2	Piston Housing "O" Ring	1
3	Piston Balance Spring	1
4	Spring Retainer Pin	1
5	Piston Seal	1
6	Piston	1
7	Glyd Ring	1
8	Speed Selector Spool	1
9	Spool Plug	1
10	Oil Seal	1
11	Pipe Plug	3
12	Control Valve Housing	1
13	Detent Ball	2
14	Detent Spring	2
15	Control Valve Gasket	1
16	Valve Spool Stop	2
17	Neutral Switch Actuating Pin	1
18	Neutral Switch	1
19	Declutch Spool Stop	1
20	Oil Seal	1
21	Forward and Reverse Valve Spool	1

NOTE: Items 22 thru 24 are various declutch options.

MODULATOR VALVE ASSEMBLY
(Optional)

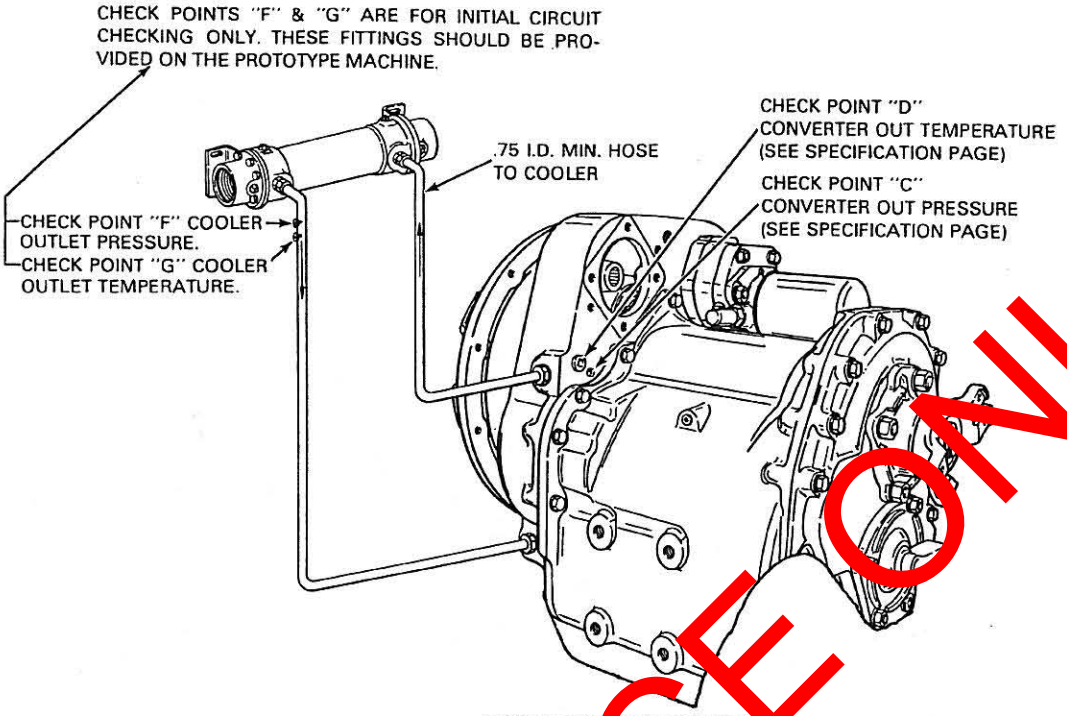
ITEM	DESCRIPTION	QTY.
1	Modulator Valve Housing	1
2	Accumulator Spring (Inner) Not Used on All Models	2
3	Accumulator Spring (Outer)	2
4	Accumulator Valve	2
5	Spool Stop Plug "O" Ring	4
6	Spool Stop Plug	4
7	Regulator Spring	2
8	Regulator Spool	2
9	Modulator Valve to Converter Housing Gasket	1



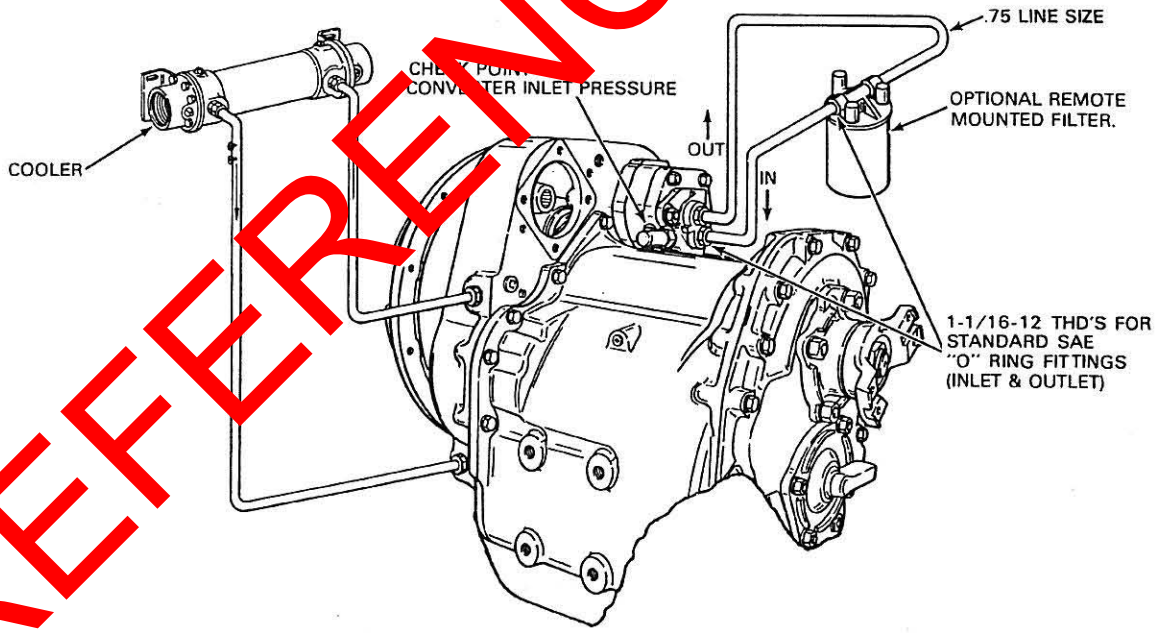
PARKING BRAKE GROUP

ITEM	DESCRIPTION	QTY.
1	Backing Plate Assembly	1
2	Actuating Lever	1
3	Brake Shoe and Lining	1
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	1
11	Brake Lining Rivet	20
12	Backing Plate Screw	4
13	Backing Plate Screw Lockwasher	4

Figure F



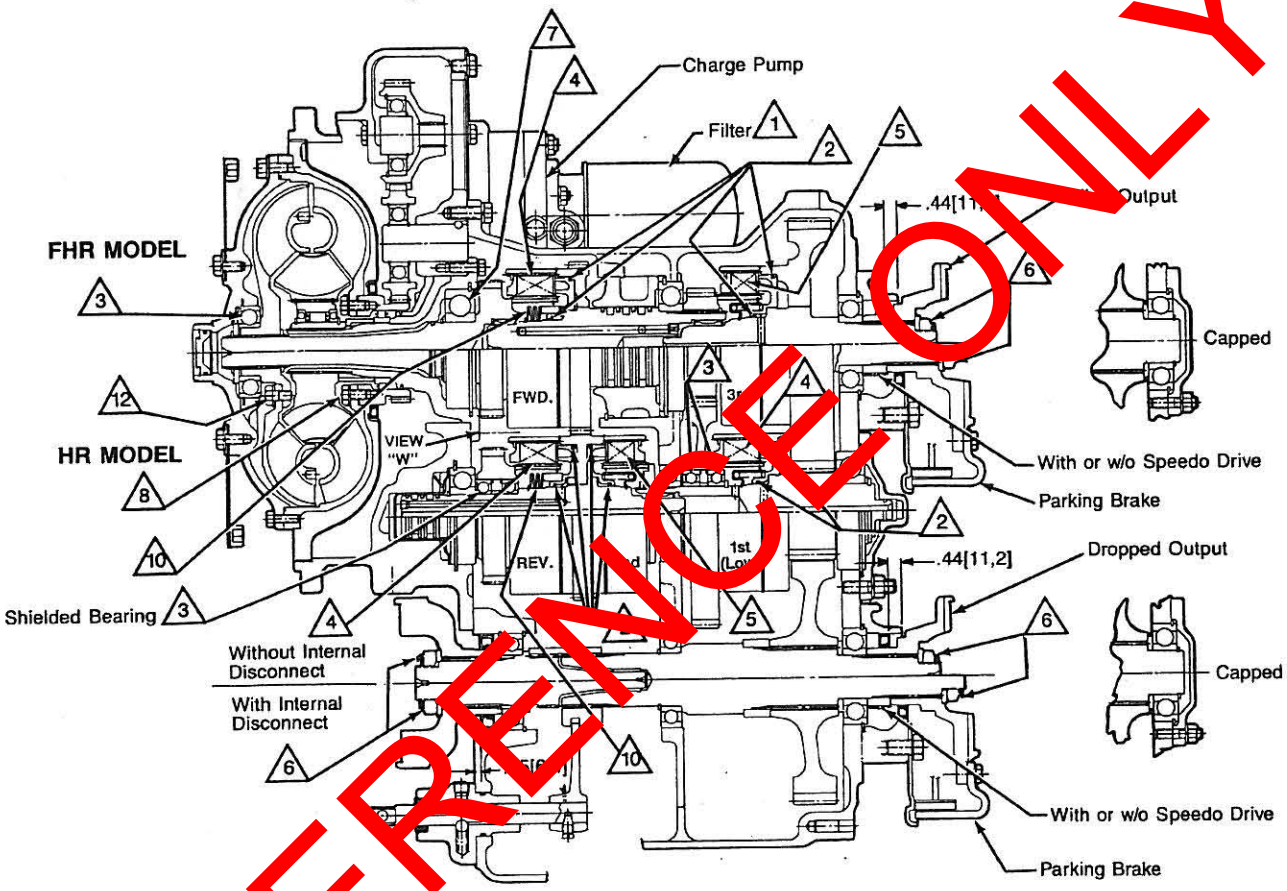
18000 PLUMBING DIAGRAM
3 SPEED INTERMEDIATE DROP



18000 PLUMBING DIAGRAM
3 SPEED INTERMEDIATE DROP
(WITH REMOTE FILTER)

See page 69 for R-Model plumbing

Figure G



ASSEMBLY INSTRUCTIONS

For R-Model Front End see page 68

Figure H

1. Assemble oil filter and tighten 20 to 25 Lbs.Ft. [27,2-33,8 N·m]
2. Teflon seals must be sized prior to ass'y.
3. Must be loose internal fit bearing with a No. 3 etched on the bearing.
4. 8-outer steel plates, 8-inner friction plates. Alternately assemble, starting with outer steel plate.
5. 6-outer steel plates, 6-inner friction plates. Alternately assemble, starting with outer steel plate.
6. Tighten 200 to 250 Lbs.Ft [271,2-338,9 N·m]
7. Special bearing loading notches opposite snap ring.
8. Bend lock tabs after tightening cap screws to proper torque.
9. Tighten oil screen assy. 10 to 15 Lbs.Ft. [13,6-20,3 N·m]
10. Forward and Reverse Clutch Piston Return Disc Springs Concave side of first Disc Spring to be placed against clutch piston. Remaining four springs of each clutch to be stacked alternately reversed as shown.
11. Tighten 200-250 Lbs.Ft. [271,2-338,9 N·m] and stake nut securely into shaft notch.
12. Clean mounting surfaces and tapped holes with solvent. Dry thoroughly, being certain tapped holes are dry and clean. See text for proper installation.
13. Front and rear output rotation same as input when Forward Clutch engaged.

Notes

All lead in chamfers for oil seals, piston rings, and "O" rings must be smooth and free from burrs. Inspect at assembly.

Lubricate all piston ring grooves and "O" rings with oil before assembly.

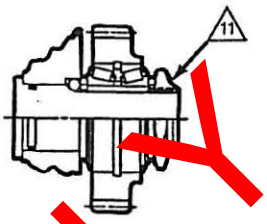
Apply a thin coating of grease between seal lips on lip type seals prior to assembly.

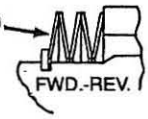
Apply a very light coat of Permatex No. 2 to O.D. of all oil seals and bore plugs before assy.

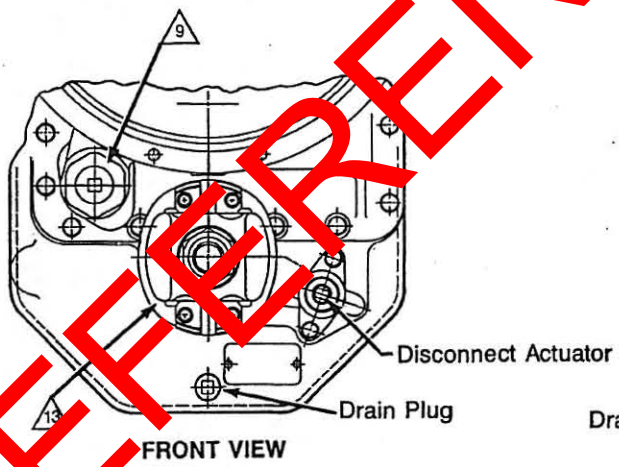
Apply a light coat of Loctite No. 592 to all plug threads.

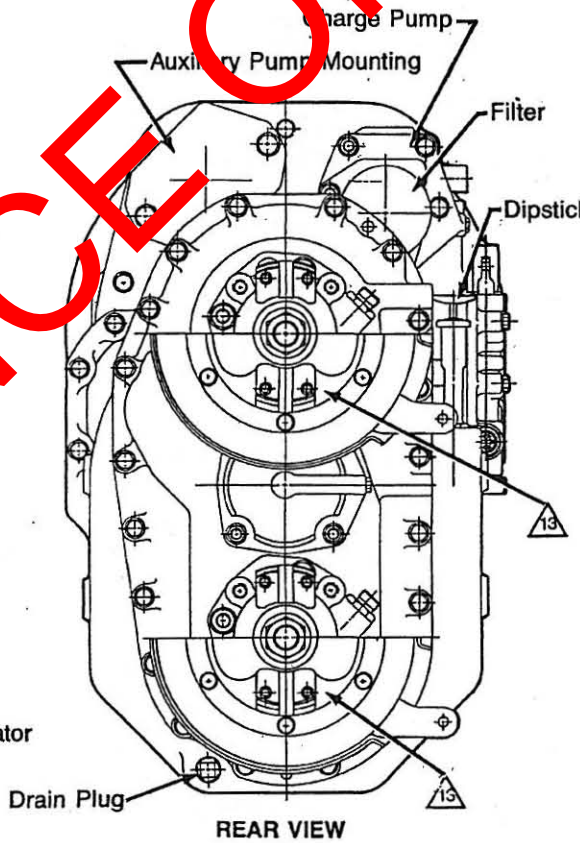
Apply a light coat of Permatex No. 2 to all thru hole stud threads.

After assembly of parts using Loctite or Permatex, there must not be any free or excess material which might enter the oil circuit.









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]
.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]
.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]
.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]
.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]
.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]
.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]
.6250	128 - 141	[173,5 - 191,2]	113 - 124	[153,2 - 168,1]	180 - 198	[224,0 - 268,5]	159 - 175	[215,6 - 237,3]
.7500	223 - 245	[302,3 - 332,2]	200 - 220	[271,2 - 298,3]	315 - 347	[427,1 - 470,5]	282 - 310	[382,3 - 420,3]

Figure H

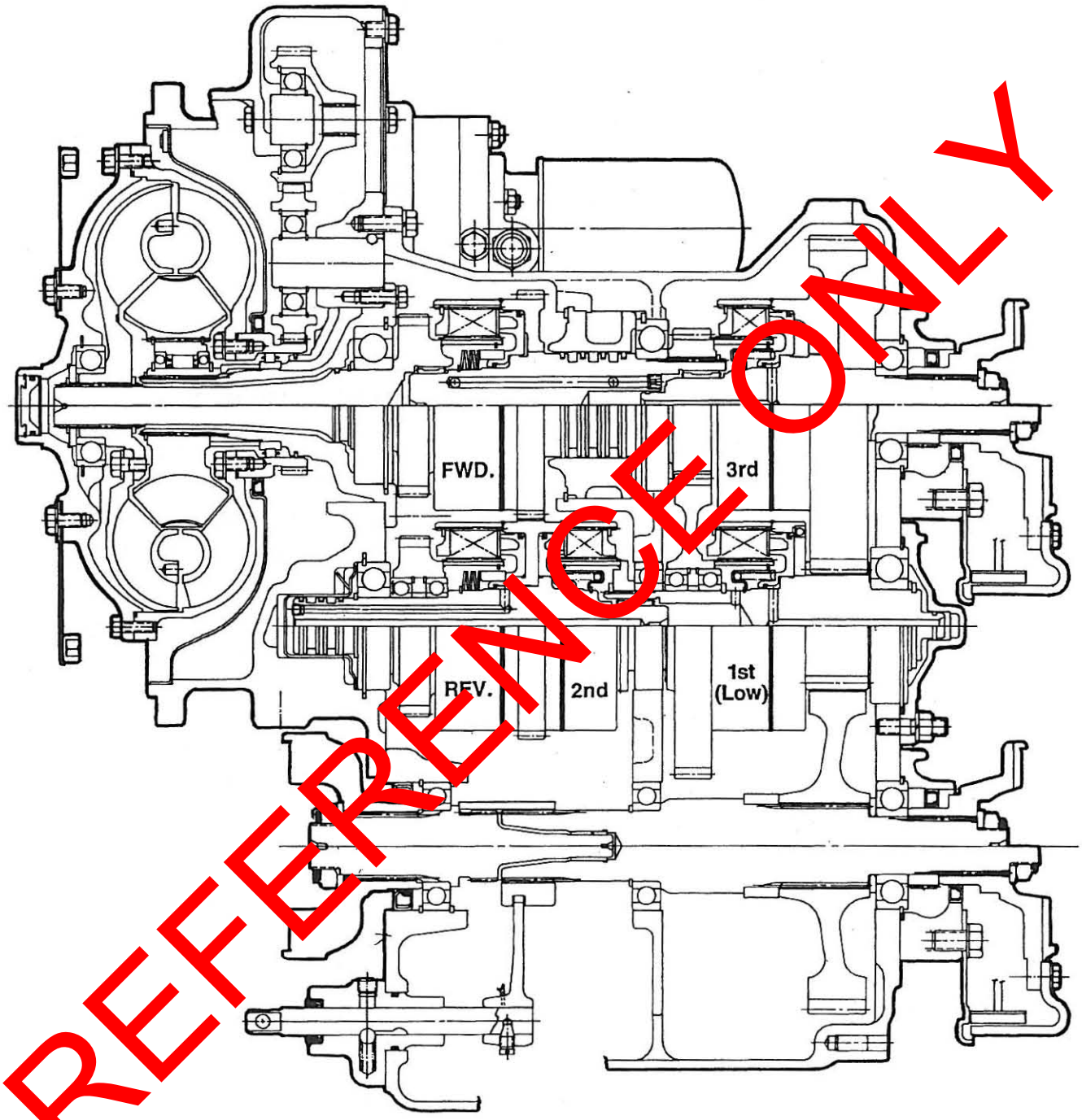


Figure I

MAINTENANCE AND SERVICE

The instructions contained herein cover the disassembly and reassembly of the transmission in a sequence that would normally be followed after the unit has been removed from the machine and is to be completely overhauled. It must also be understood that this is a basic 18000 transmission with many options. All 18000 transmissions 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. **NOTE: For R-Model (remote mounted) front cover removal, service and installation of transmission see page 71, Figure 305.**

DISASSEMBLY

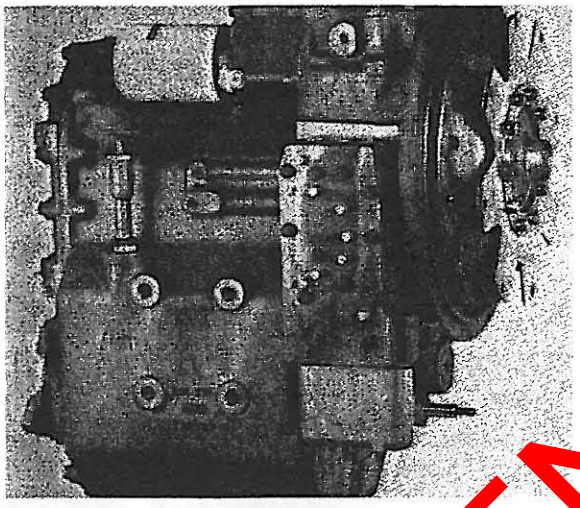


Figure 1
Side view of HR18000 Powershift transmission with a intermediate output.

Figure 3
Remove flexplate and backing ring.

Figure 2
Remove flexplate mounting screws and washers.

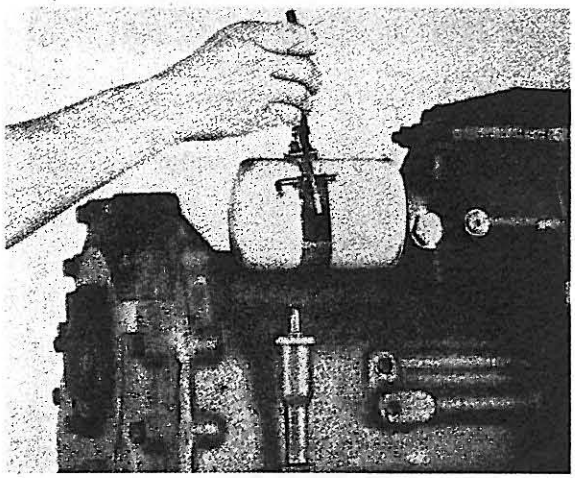


Figure 4
Loosen filter assembly. It is recommended a small pan be used to catch the oil left in the filter element. Remove filter assembly.

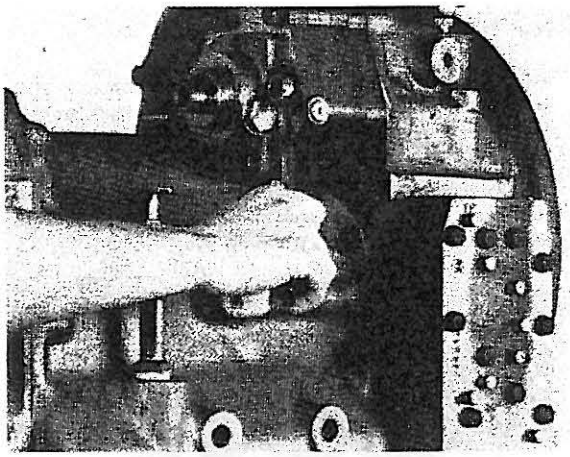


Figure 5
Remove pressure regulating valve and charging pump bolts and stud nuts.

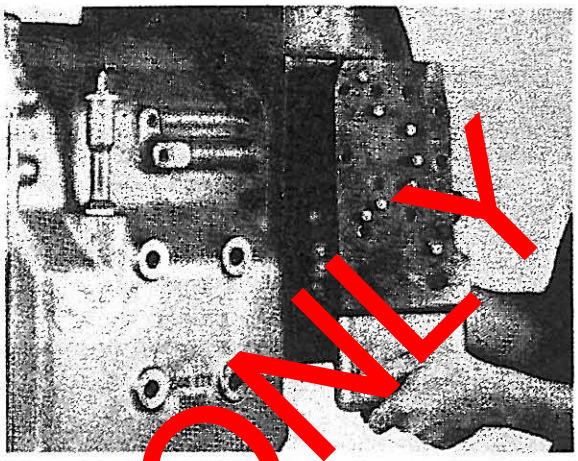


Figure 8
Remove valve assembly.

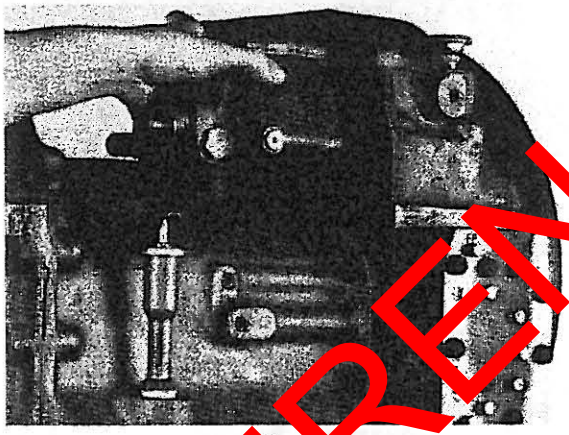


Figure
Remove pump and valve assembly.

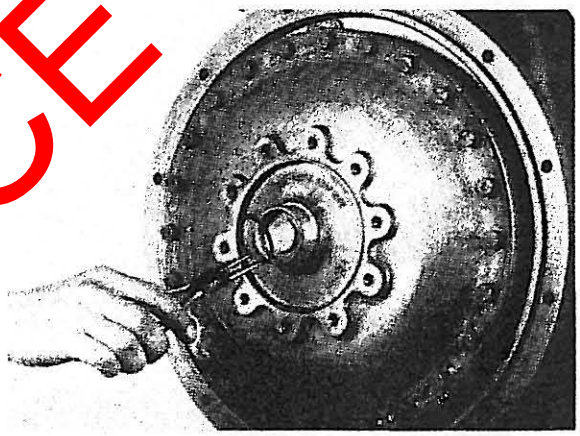


Figure 9
Remove impeller cover bore plug retainer ring.

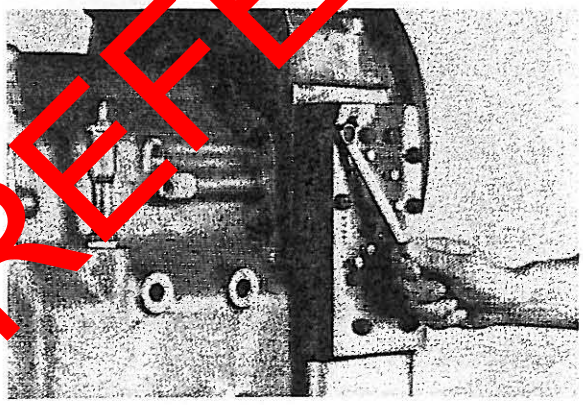


Figure 7
Remove control valve bolts and washers.

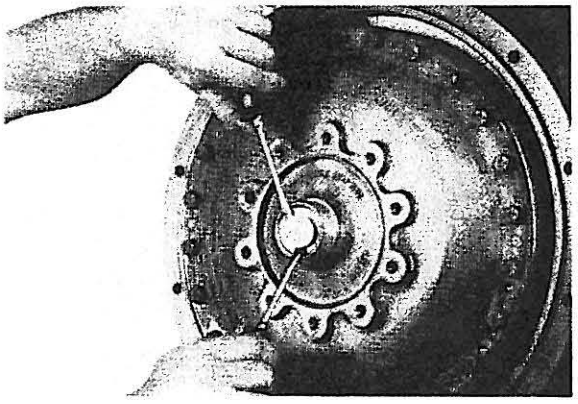


Figure 10
Using two small screwdrivers as shown, remove bore plug.

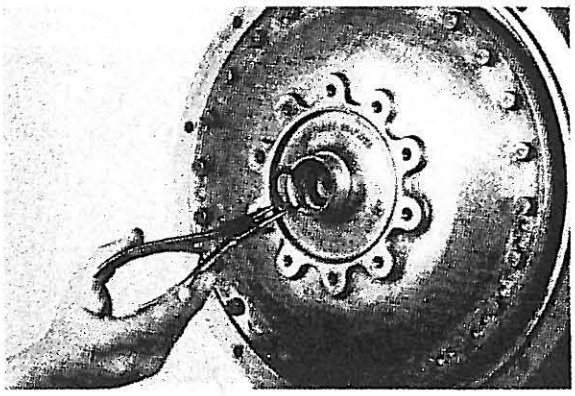


Figure 11
Through bore plug hole, remove turbine retaining ring. (See Figure 11-A)

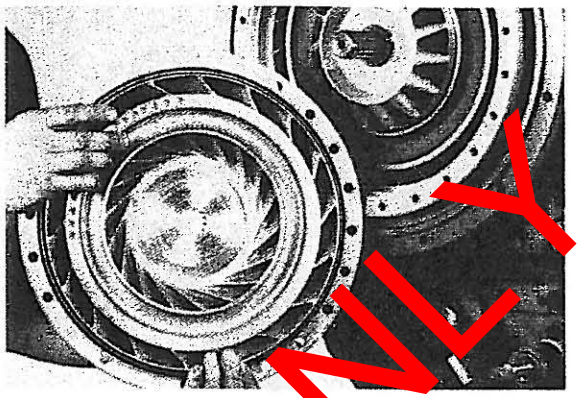


Figure 1
Remove impeller c er and t bine s an assembly.

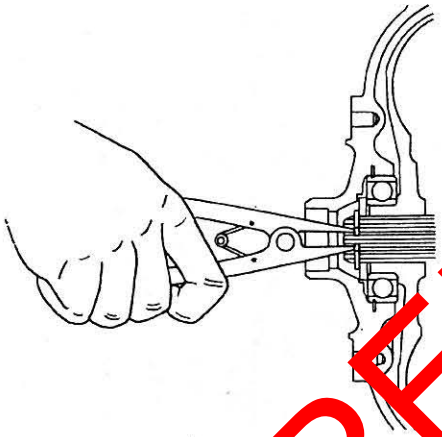


Figure 1 -A

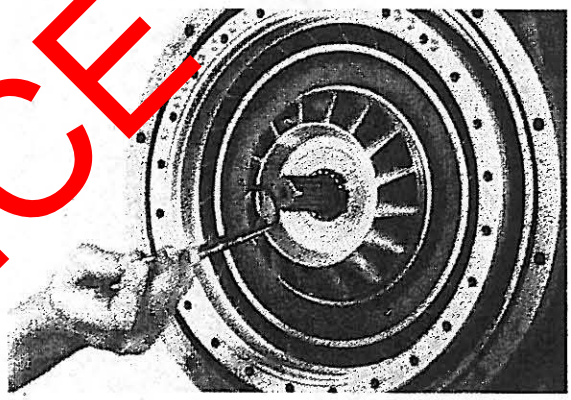


Figure 14
Remove turbine locating ring.

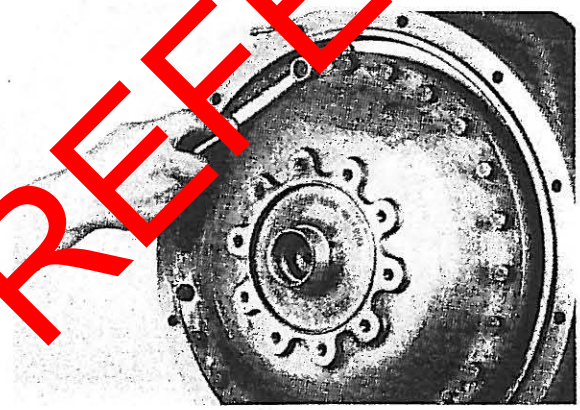


Figure 12
Remove impeller cover to impeller bolts.

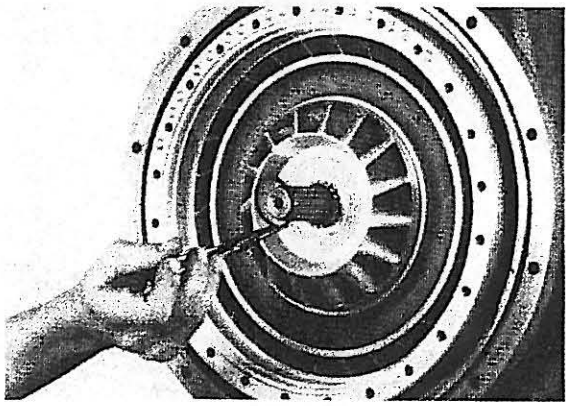


Figure 15
Remove reaction member retaining ring.

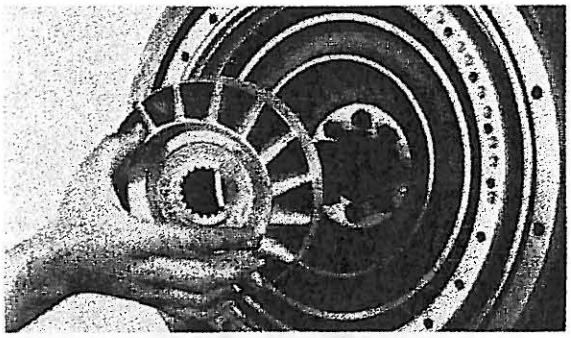


Figure 16

Remove reaction member. **Note:** Some units will have a fixed reaction member and some units will have a free wheeling reaction member. Remove reaction member and freewheeling unit as an assembly. The unit shown is a fixed reaction member.

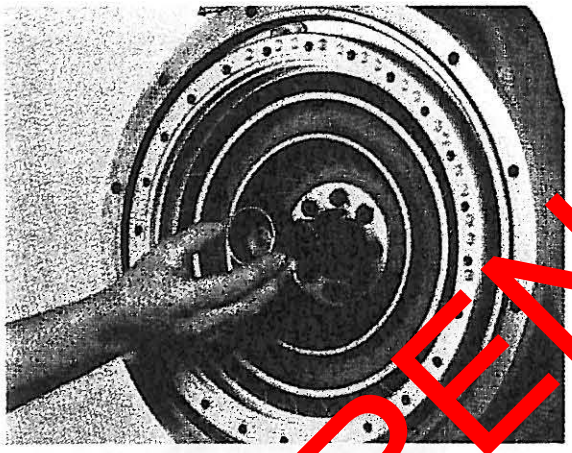


Figure 17

Remove reaction member spacer.

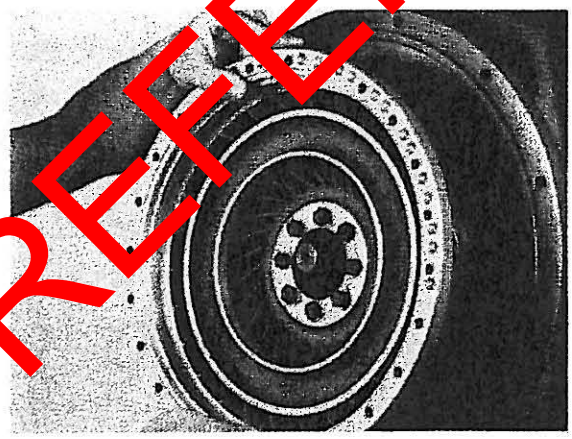


Figure 18

Remove impeller and hub assembly.

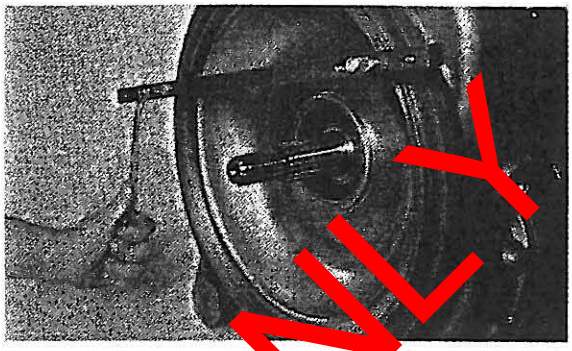


Figure 19

Using oil baffle puller rivets provided, remove oil baffle. **Note:** Puller tool like shown can be fabricated from diagram shown in figure 19-A.

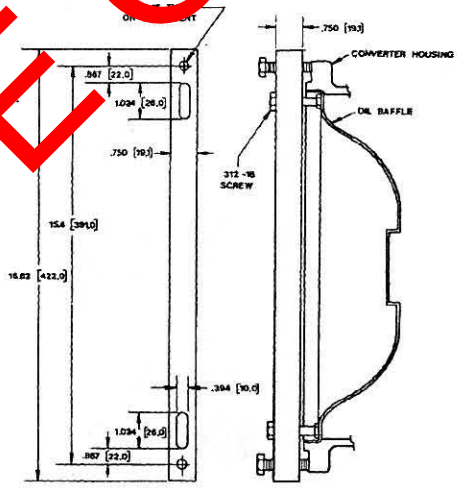


Figure 19-A

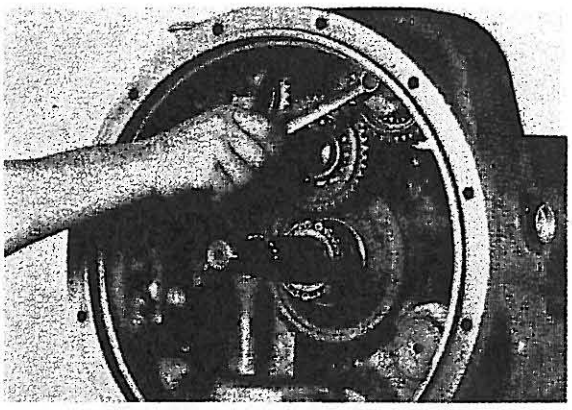


Figure 20

Remove pump drive bearing support screws and lock washers.

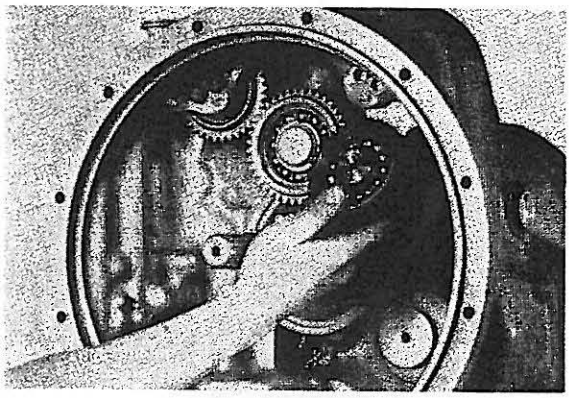
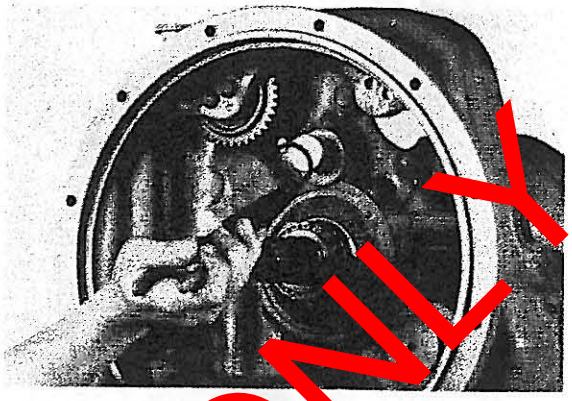


Figure 21
Remove pump drive gear assembly.



Remove idler gear locating ring.

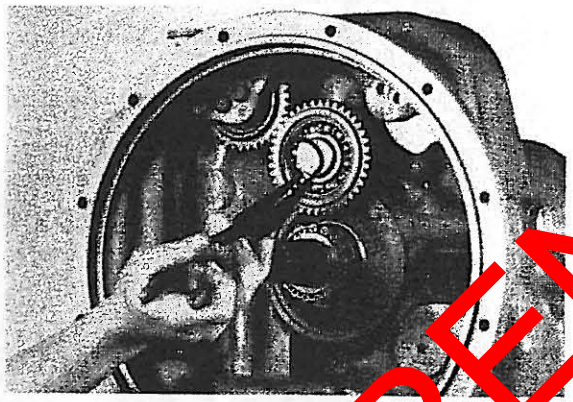


Figure 22
Remove idler gear retaining ring.

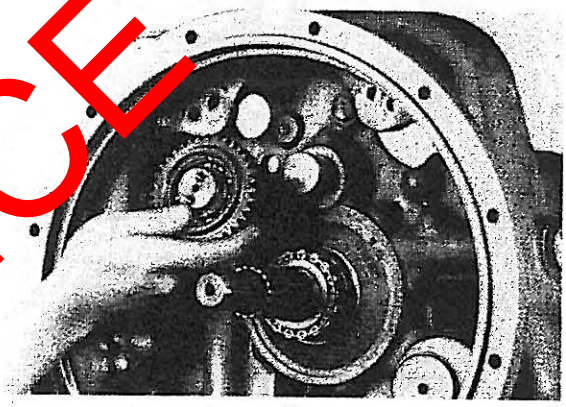


Figure 25
Remove charging pump drive gear and bearing assembly.

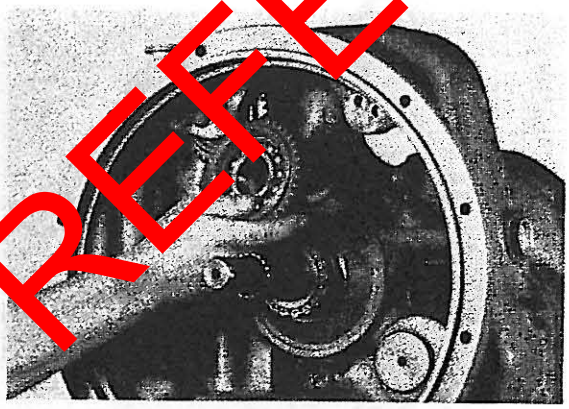


Figure 23
Remove gear and bearing assembly.

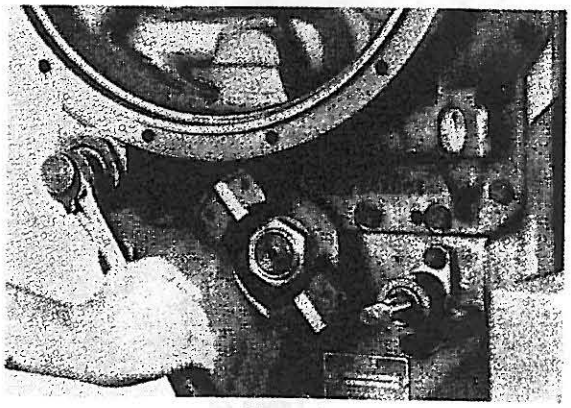


Figure 26
Remove sump screen assembly.

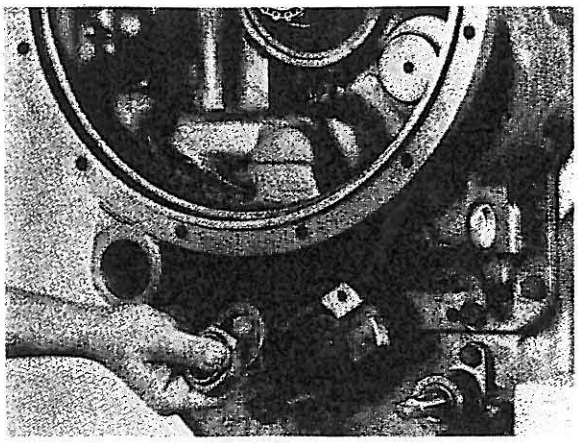


Figure 27
Remove front output flange nut, washer and "O" ring.

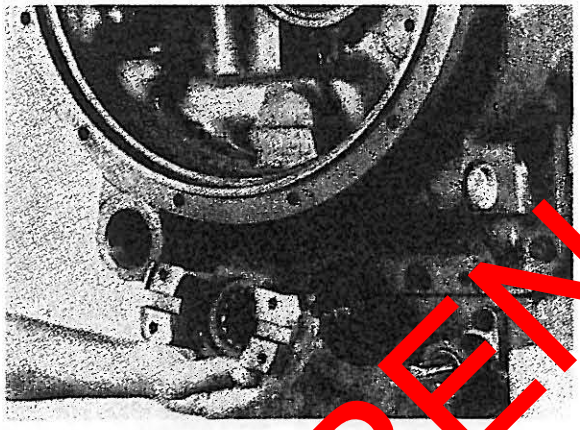


Figure 28
Remove front output flange.

Figure 29
Remove bolts securing transmission case to converter housing.

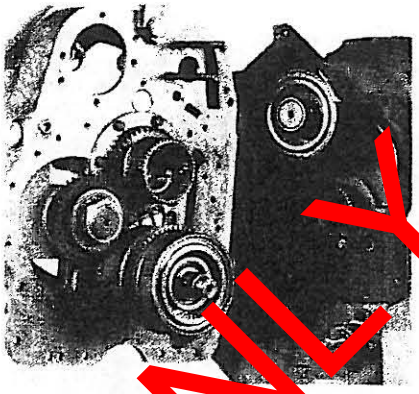


Figure 30
Support converter housing with a chain hoist. Separate converter housing from transmission case assembly. **Note:** Reverse and 2nd clutch will remain in converter housing.

FOR CONVERTER HOUSING DISASSEMBLY SEE FIGURE 235

FOR 4-MODEL FRONT COVER DISASSEMBLY SEE FIGURE 312

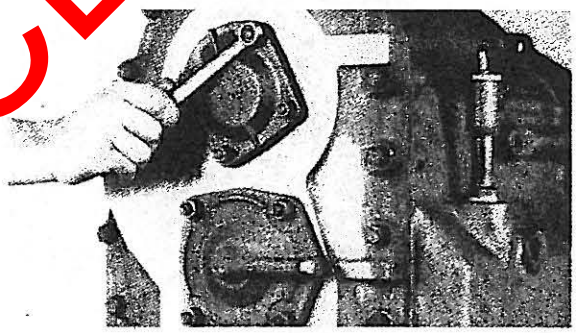


Figure 31
Remove 3rd speed clutch rear bearing cap stud nuts and washers.

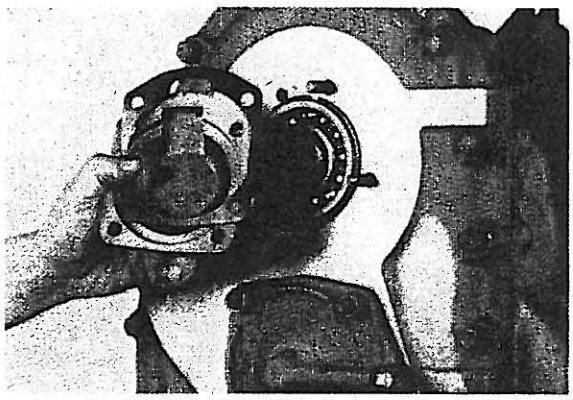


Figure 32
Remove bearing cap and gasket.

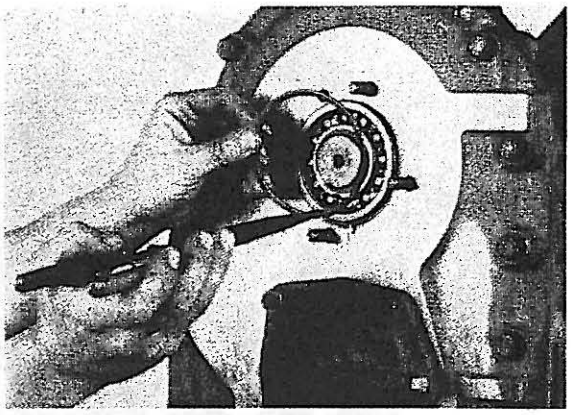


Figure 33
Remove rear bearing locating ring.

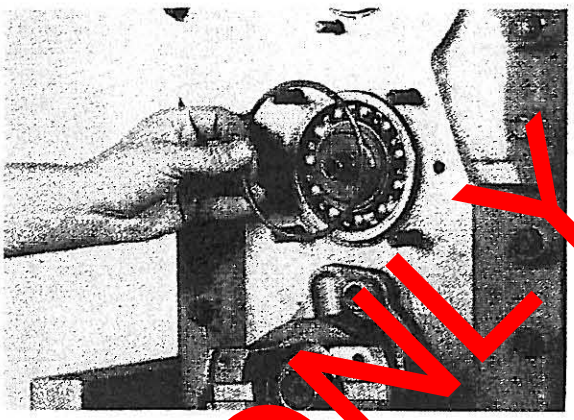


Figure 36
Remove low clutch rear bearing locating ring.

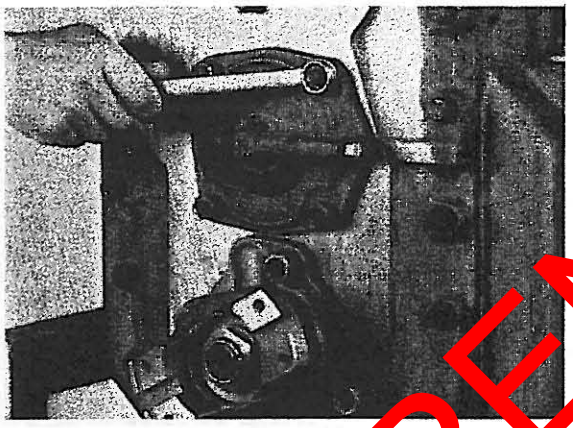


Figure 34
Remove low clutch rear bearing cap and washers.

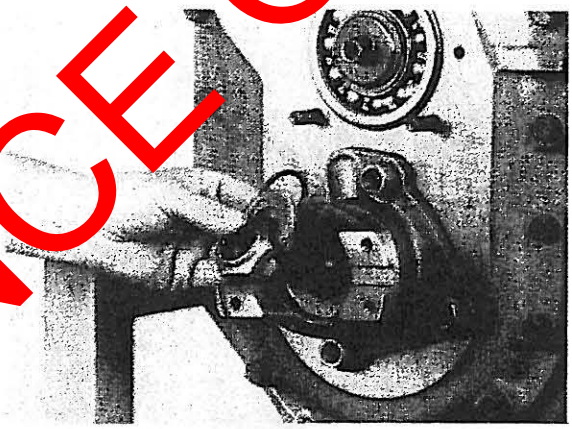


Figure 37
Remove output flange nut, washer and "O" ring.

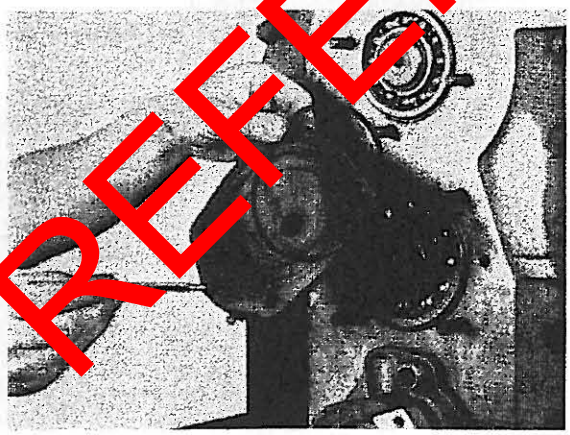


Figure 35
Remove bearing cap and "O" rings.

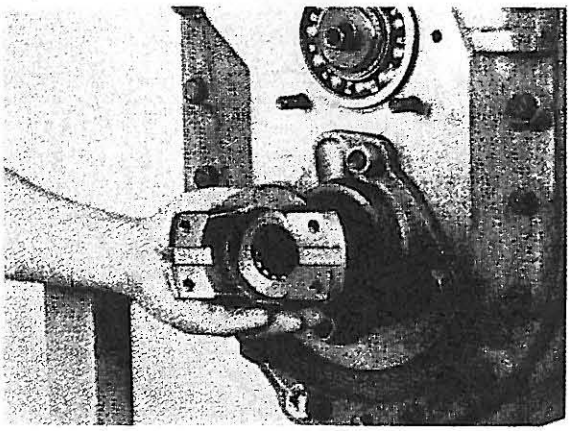


Figure 38
Remove output flange.

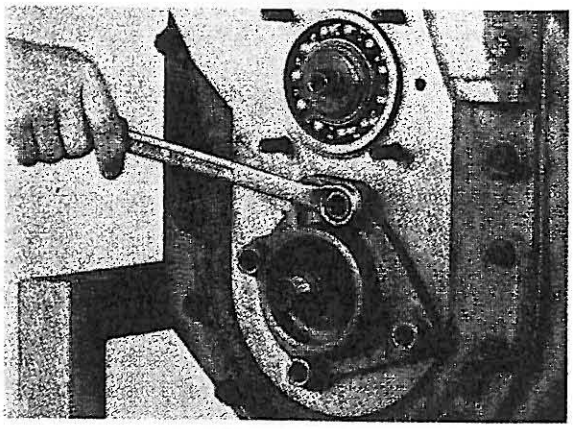


Figure 39
Remove rear output bearing cap stud nuts and washers.

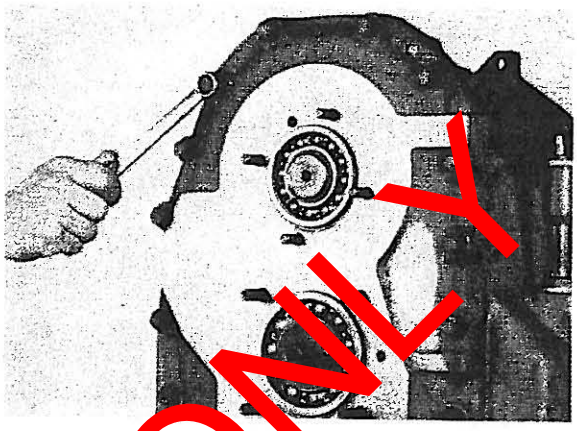


Figure 42
Remove rear cover bolts and washer.

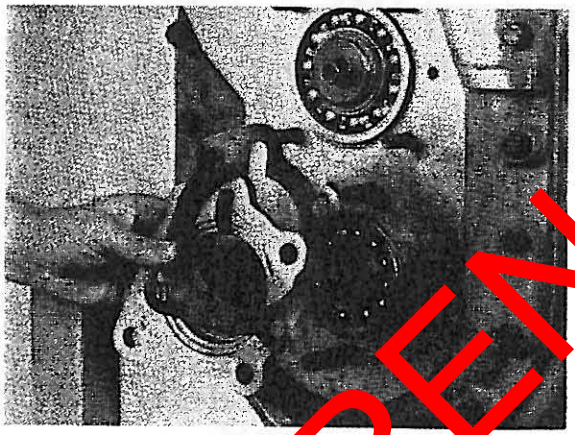


Figure 40
Remove output bearing cap and gasket.

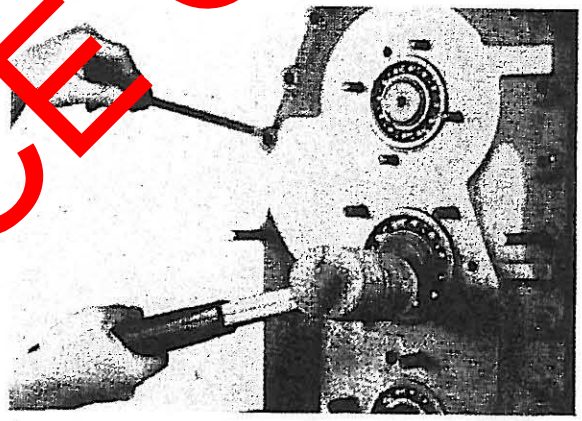


Figure 43
Using pry slots provided, pry cover from transmission housing, tapping on clutch and output shaft to allow cover to be removed without shaft binding.
NOTE: The use of alignment studs will facilitate cover removal.

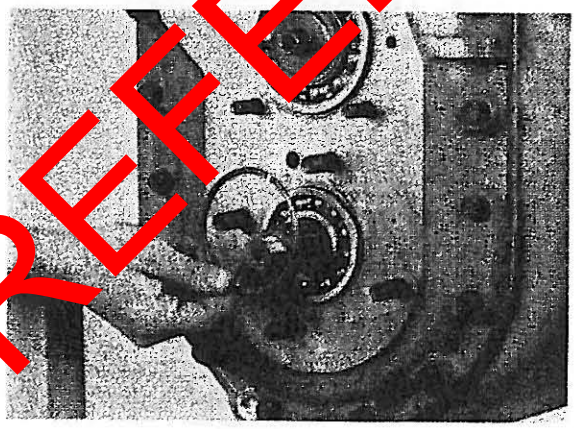


Figure 41
Remove output rear bearing locating ring.

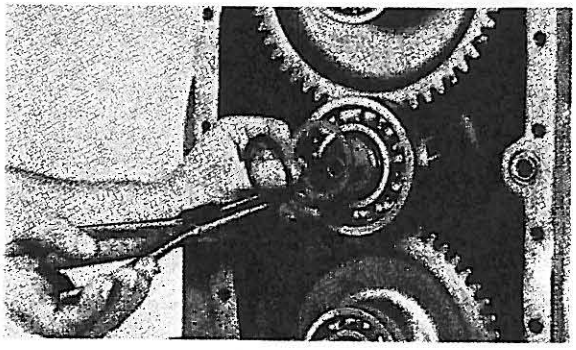


Figure 44
Remove low clutch rear bearing retainer ring.

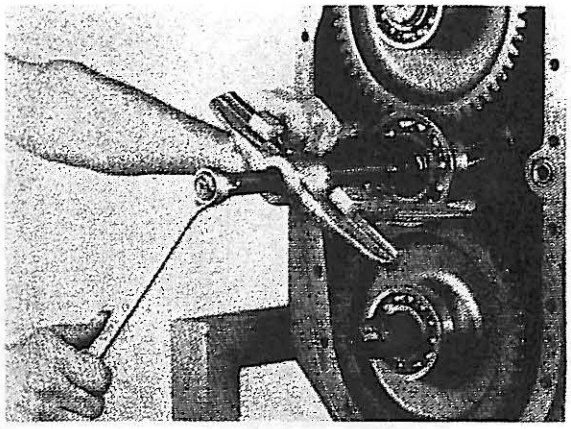


Figure 45

Remove rear bearing.

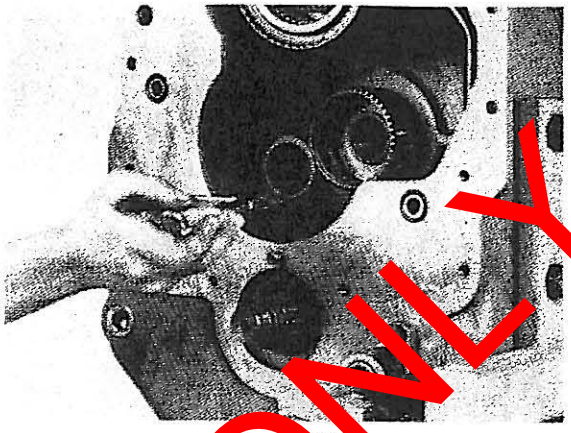


Figure 48

Remove low clutch disc hub retainer ring.

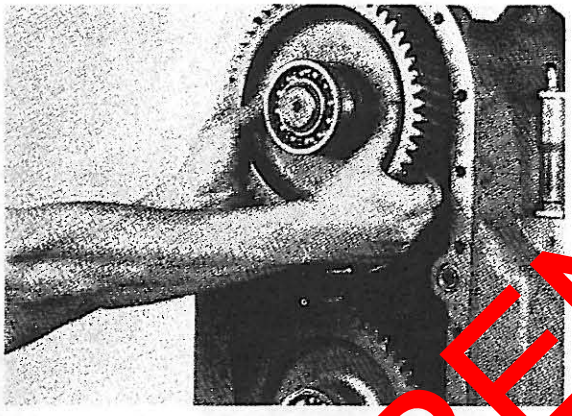


Figure 46

Remove 3rd speed clutch assembly.

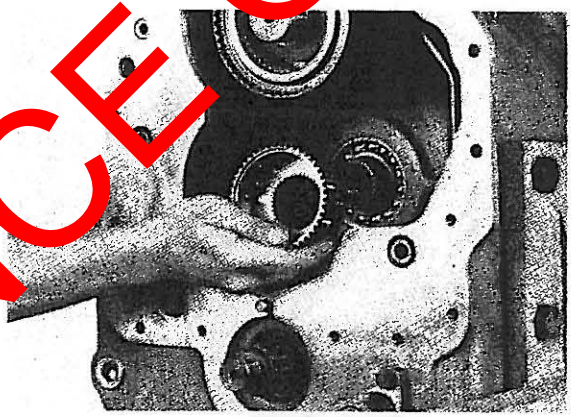


Figure 49

Remove clutch disc hub.

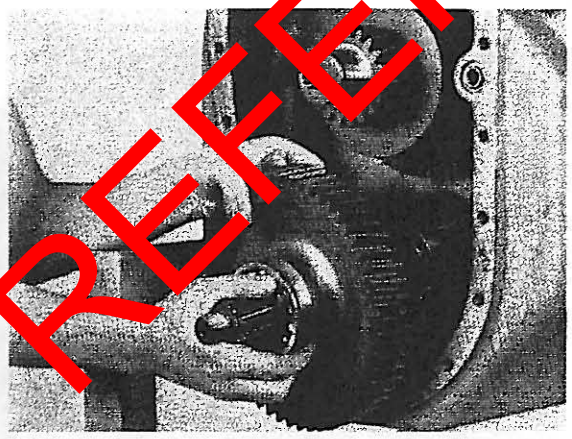


Figure 47

Remove output shaft and gear assembly.

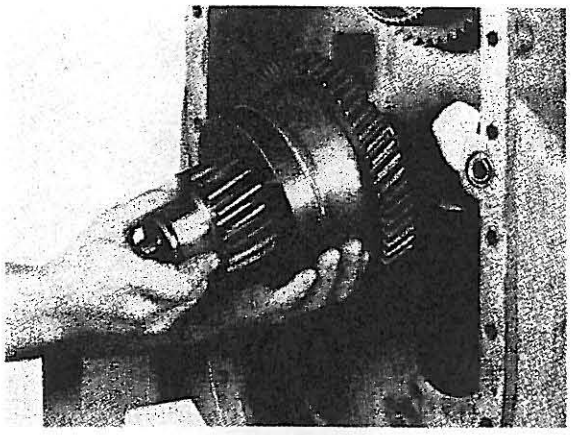


Figure 50

Remove low clutch assembly.

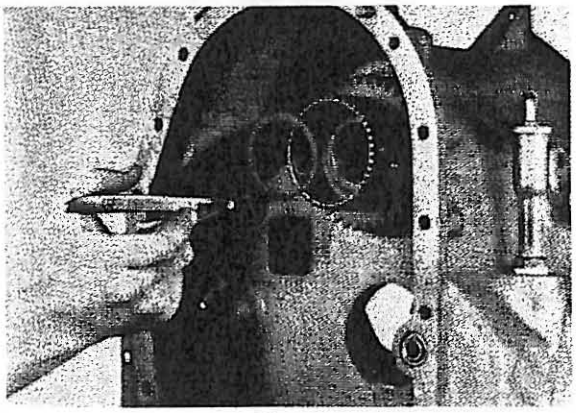


Figure 51
Remove 3rd speed clutch disc hub retainer ring.

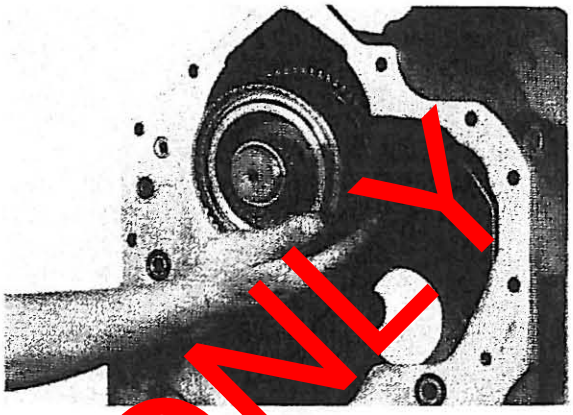


Figure 54
Remove forward clutch assembly.

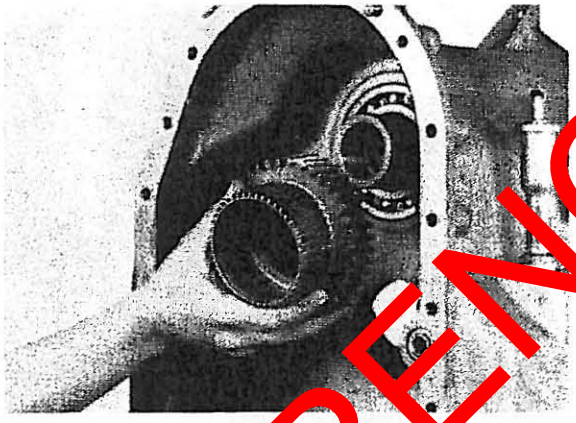


Figure 52
Remove clutch disc hub.

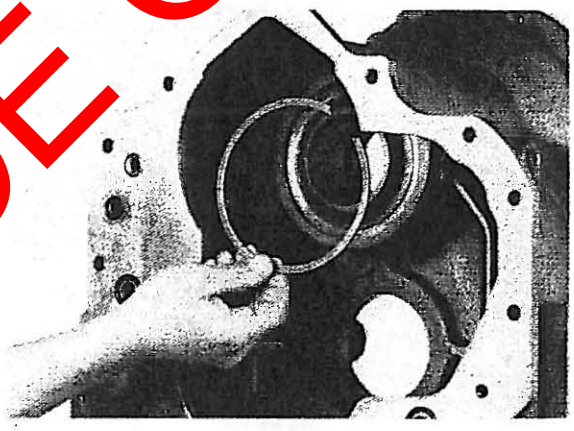


Figure 55
Remove forward clutch oil sealing ring sleeve retainer ring.

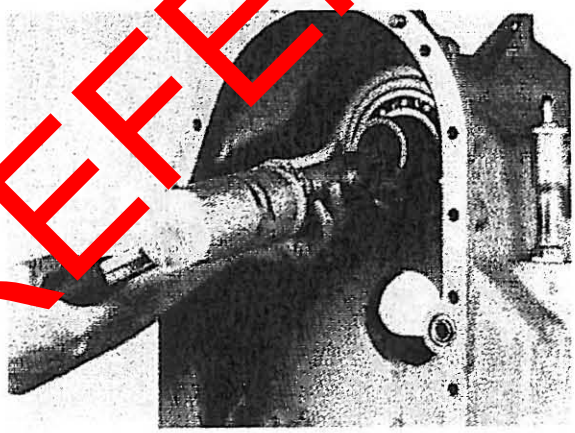


Figure 53
Tap forward clutch assembly from bearing.

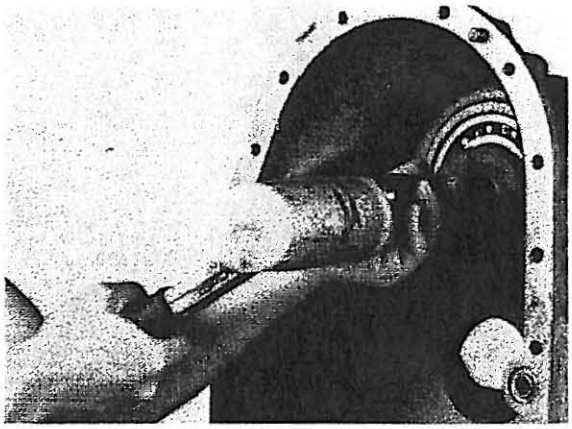


Figure 56
Tap forward clutch bearing and sleeve from housing.

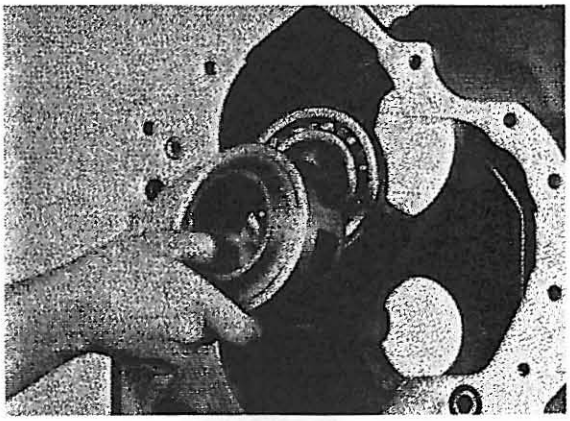


Figure 57
Sleeve and bearing removed.

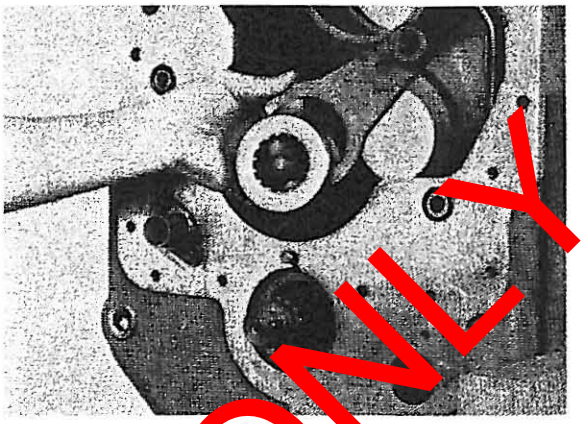


Figure 60
Remove shift hub and shift fork.

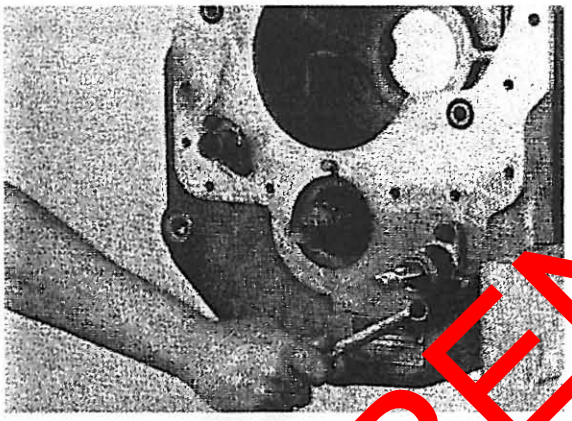


Figure 58
Remove disconnect shift rail housing screw and washer.

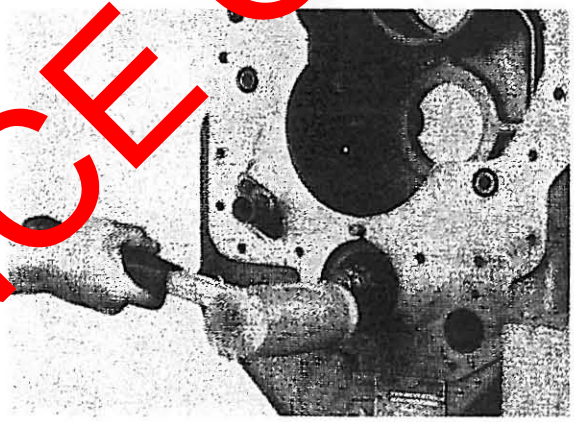


Figure 61
Tap front output shaft from housing.

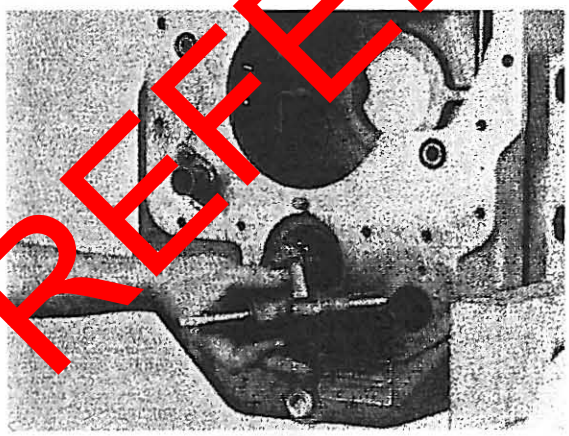


Figure 59
Remove shift rail and housing.

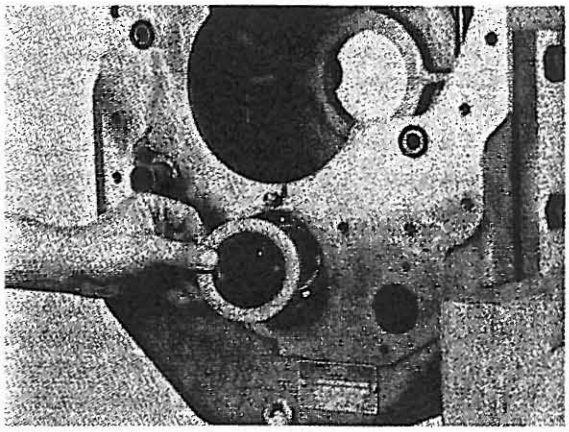


Figure 62
Remove front output shaft oil seal.

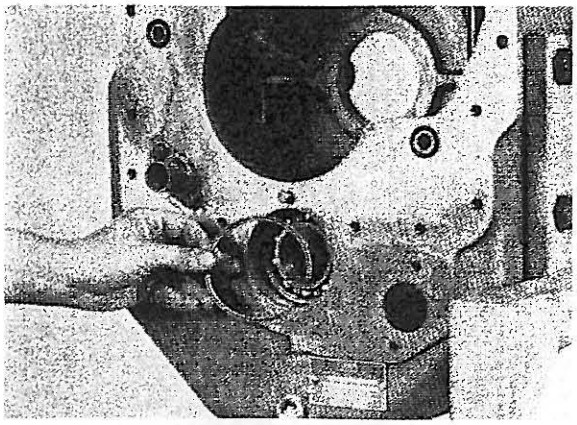


Figure 63
Remove front bearing retainer ring.

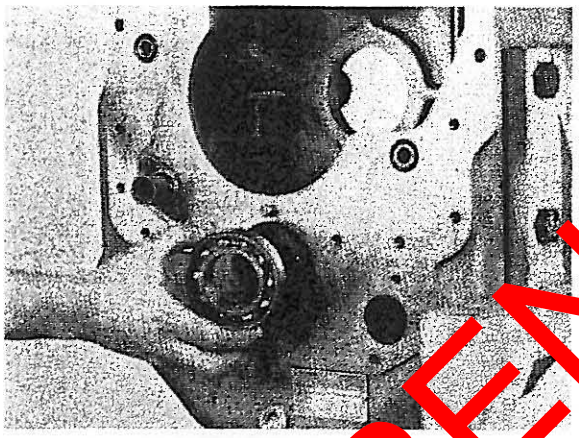


Figure 64
Remove front bearing. Remove bearing locating ring.

CLUTCH DISASSEMBLY

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 spring.

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.

Figure 65

DISASSEMBLY AND ASSEMBLY OF FORWARD CLUTCH

DISASSEMBLY

Figure 66
Remove forward shaft oil sealing rings and expander springs.

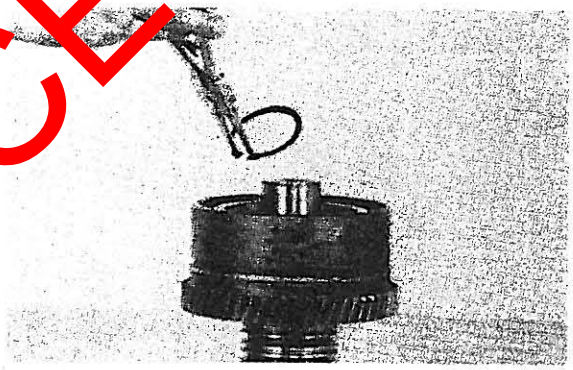


Figure 67
Remove piston return disc spring retainer ring.

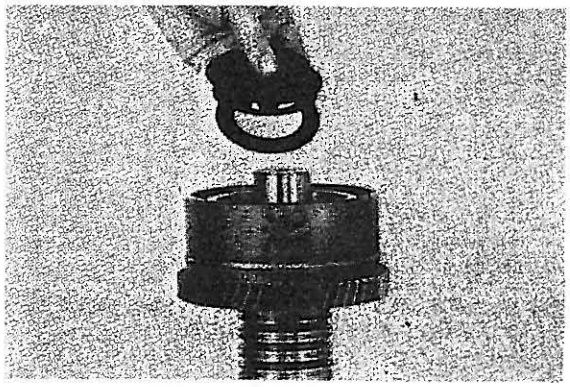


Figure 68
Remove disc springs (see Figure 65).

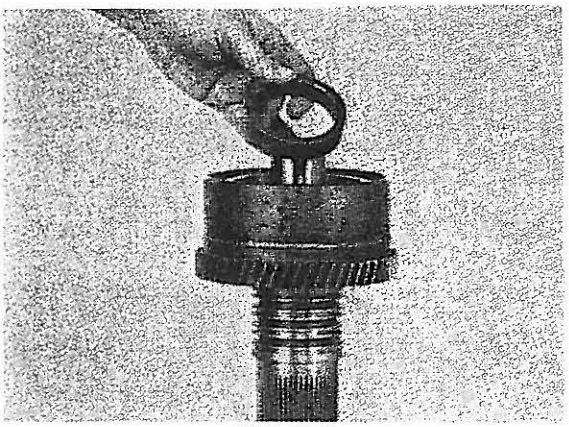


Figure 69

Remove piston return spring spacer.

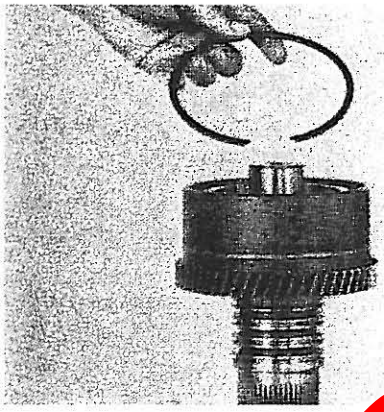


Figure 70

Remove end plate retainer ring.

Figure 71

Remove end plate.

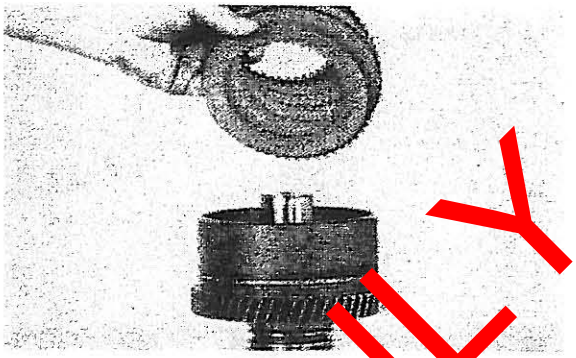


Figure 72

Remove inner and outer clutch discs. Turn clutch over and tap clutch pilot shaft against block of wood to remove clutch piston.

(See cleaning and inspection page.)

FORWARD CLUTCH REASSEMBLY

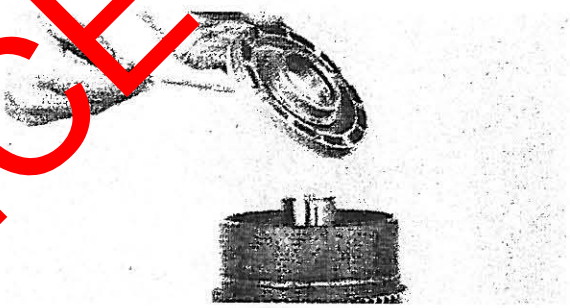


Figure 73

Install clutch piston outer seal ring. **NOTE:** Ring must be sized before installing in clutch drum. Sizing is best accomplished by rotating piston while holding a round object against the new seal ring. Rotate piston until seal ring is flush with outer diameter of piston.

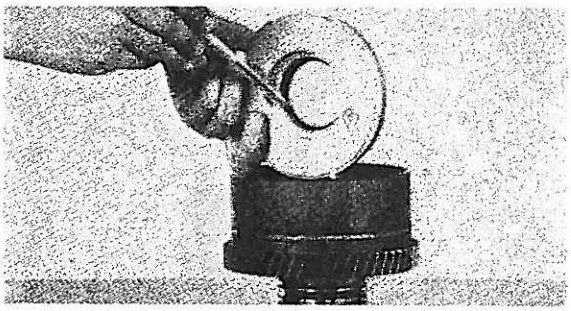


Figure 74

Install clutch piston inner seal ring and size as described in Figure 73. Position piston in clutch drum, use caution as not to damage inner and outer piston sealing rings.

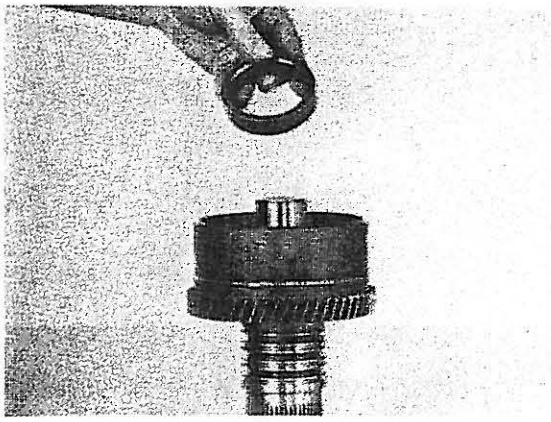


Figure 75
Install piston return spring spacer.
See Figure 65.

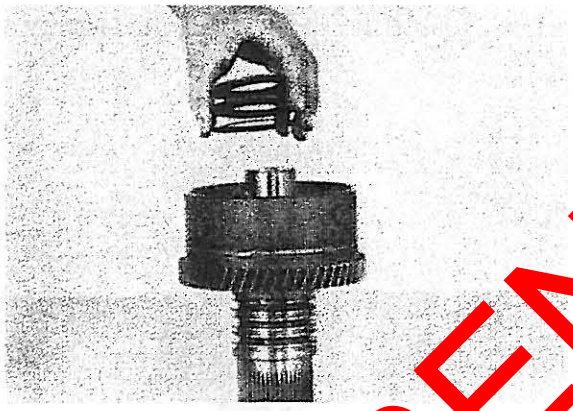


Figure 76
Install disc springs. First disc spring with large diameter or bevel toward spacer. Alternate five (5) disc springs (see Figure 78).

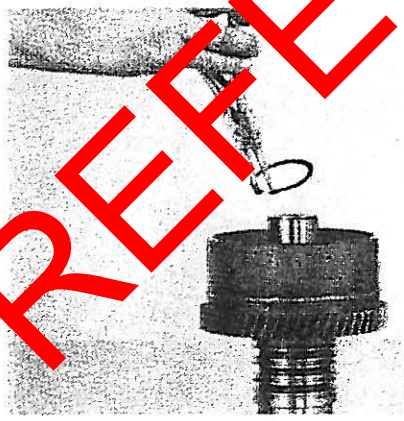


Figure 77
Install return spring retainer ring.

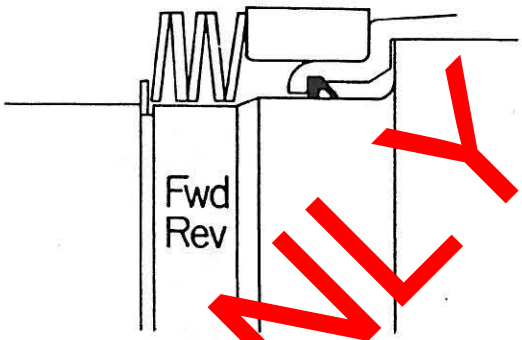


Figure 78

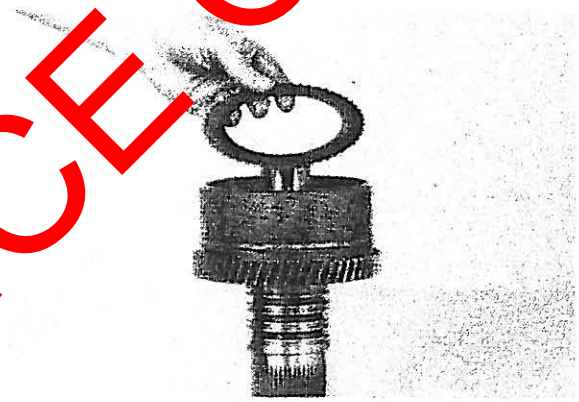


Figure 79
Install one steel disc.

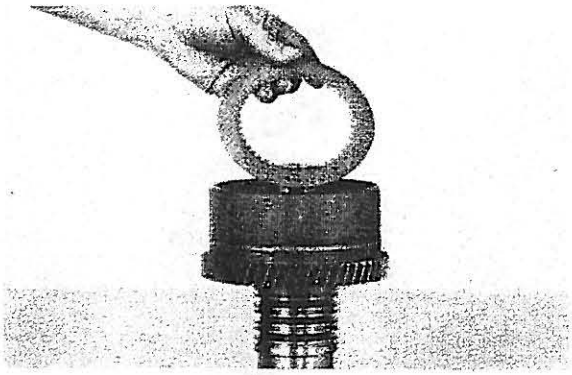


Figure 80
Install one friction disc. Alternate steel and friction discs until the proper amount of discs are installed. First disc next to the piston is steel, last disc installed is friction.

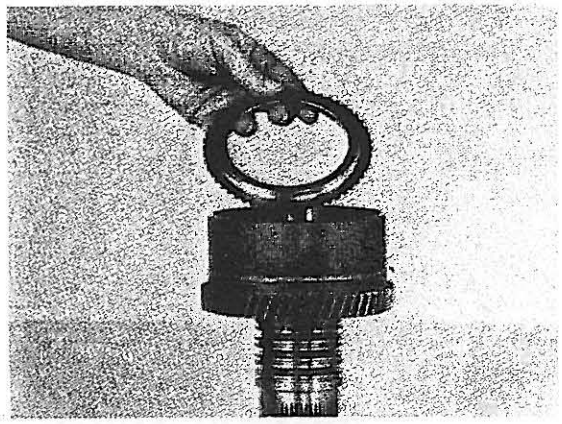


Figure 81

Install end plate.

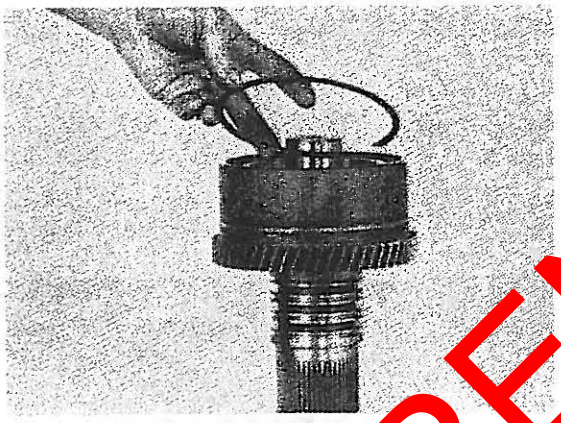


Figure 82

Install end plate retainer ring.

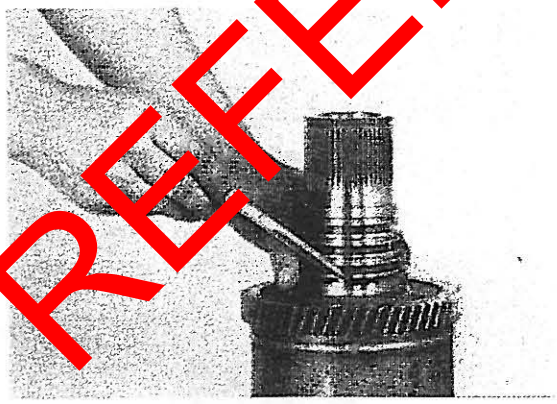


Figure 83

Install new clutch shaft piston rings and expander springs per instructions on Page 82.

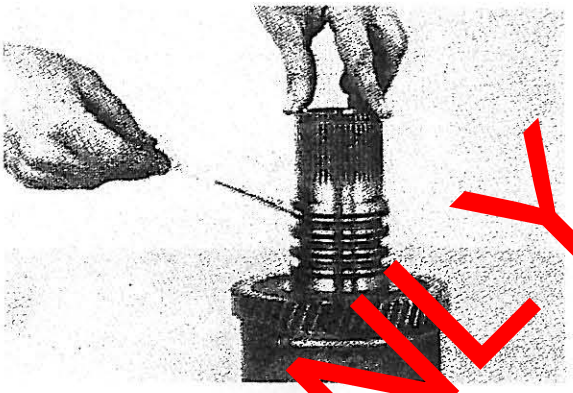


Figure 84

Four (4) oil sealing rings installed. Grease rings to facilitate reassembly into sleeve as explained on Page 82.

3RD SPEED CLUTCH DISASSEMBLY AND REASSEMBLY

DISASSEMBLY

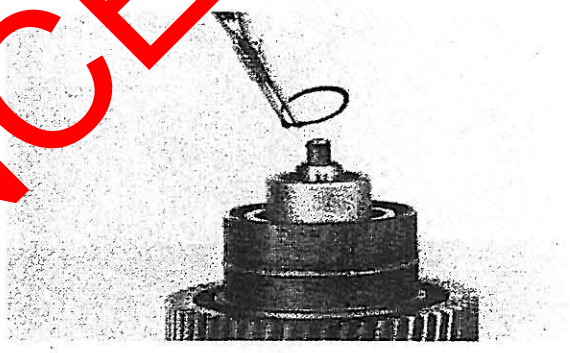


Figure 85

Remove return spring retainer ring.

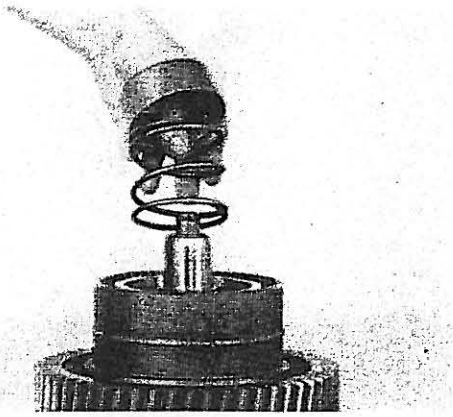


Figure 86

Remove return spring retainer and spring.

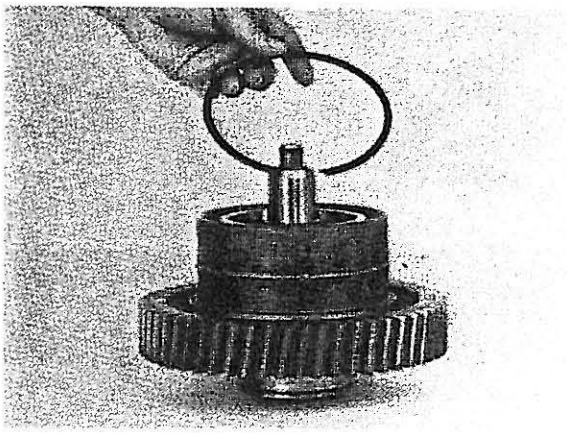


Figure 87.
Remove end plate retainer ring.

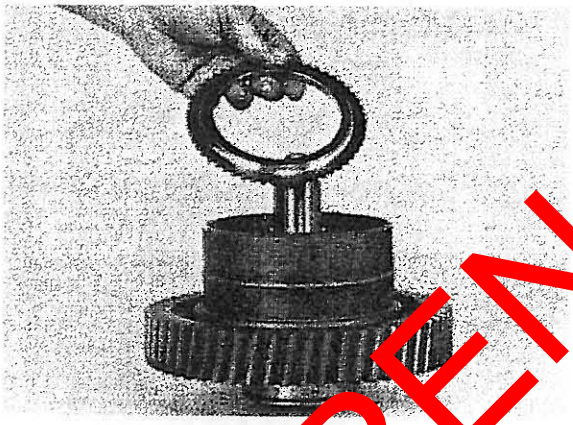


Figure 88
Remove end plate

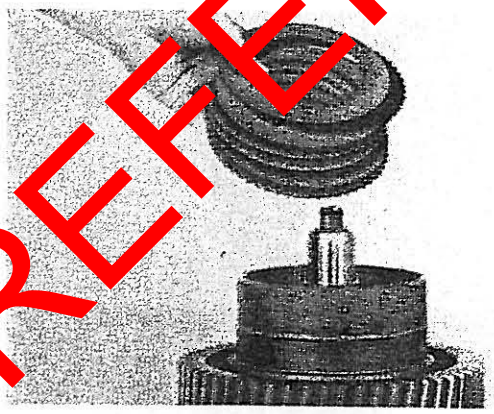


Figure 89
Remove inner and outer clutch discs. Remove clutch piston.

(See cleaning and inspection page.)

3rd SPEED CLUTCH REASSEMBLY

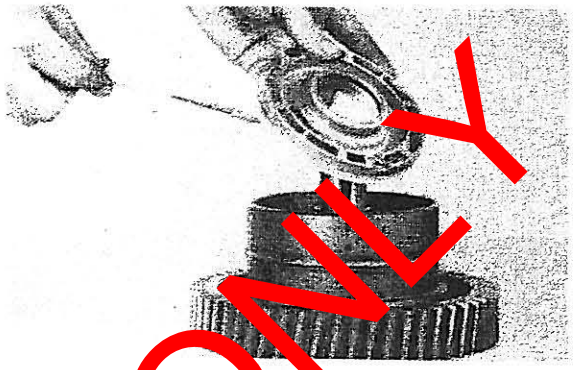


Figure 90
Install clutch piston inner and outer seal rings. Size as explained in Figure 73. Install clutch piston in clutch drum. Use caution as not to damage seal rings.

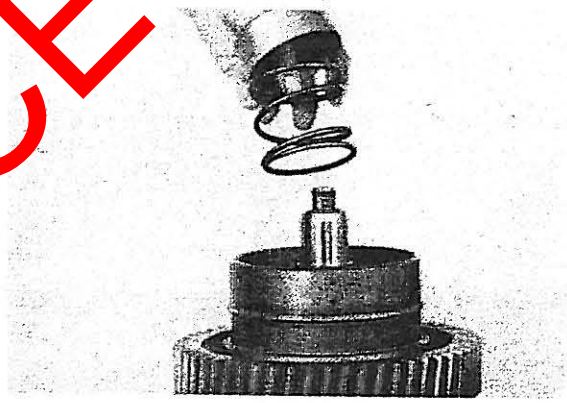


Figure 91
Position piston return spring and spring retainer on clutch shaft.

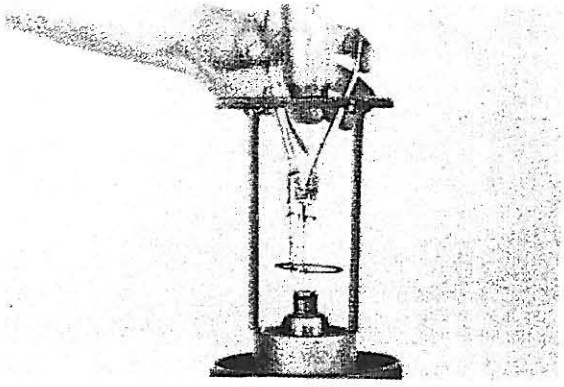


Figure 92
Compress return spring and install retainer ring.

MISSING PAGES 17-28 (FIGS 93-164)

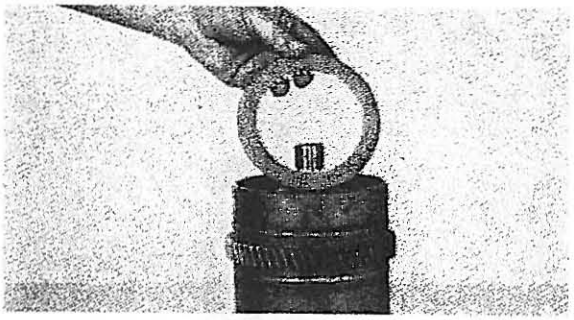


Figure 165

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

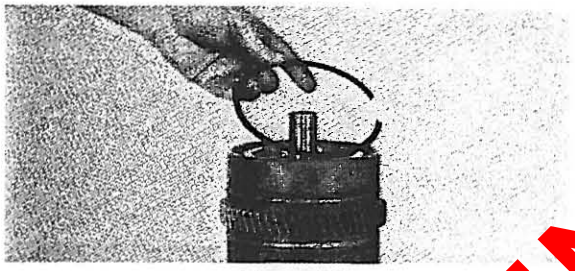


Figure 166

Install end plate and retainer ring.

DISASSEMBLY AND REASSEMBLY OF OUTPUT SHAFT

DISASSEMBLY

Figure 167

Remove the output shaft rear bearing.

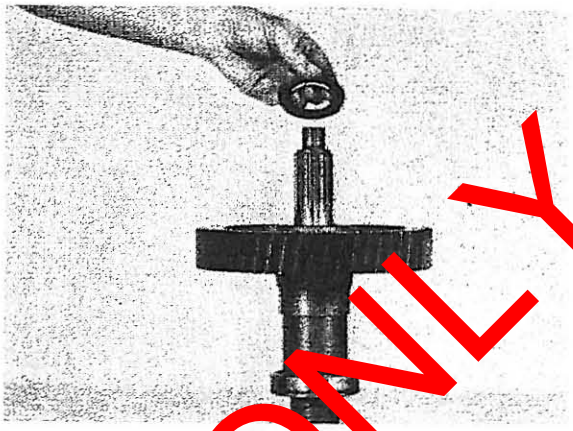


Figure 168

Remove bearing spacer.

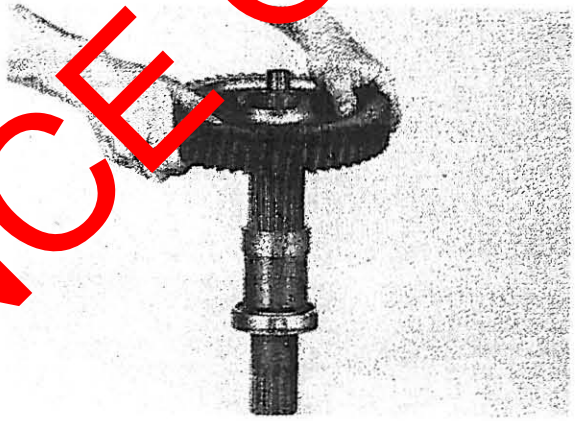


Figure 169

Remove output gear.

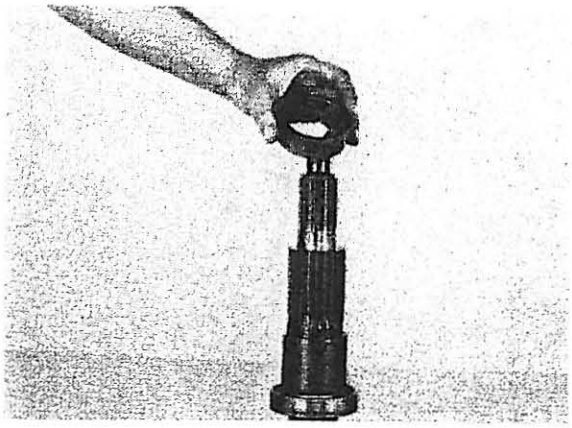


Figure 170

Remove gear spacer.

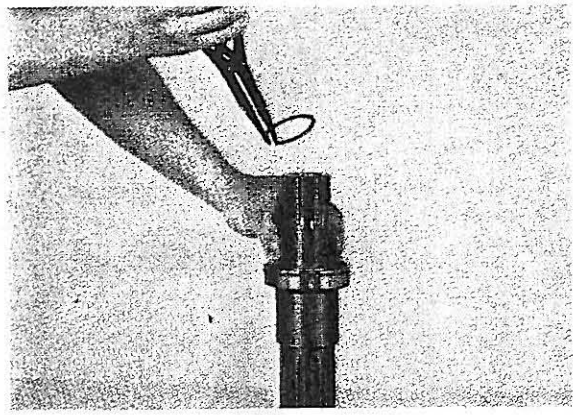
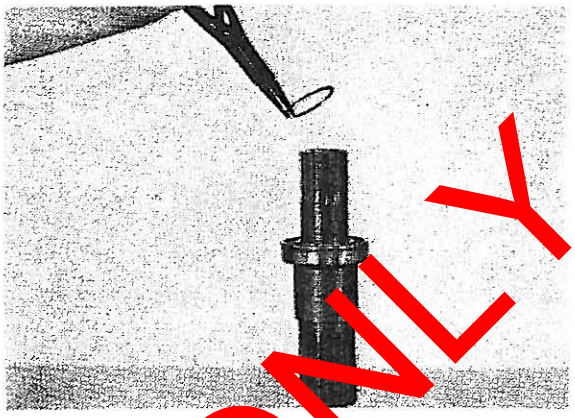


Figure 171
Remove rear bearing retainer ring.



Figu 17
Install bearing ret ner ring.

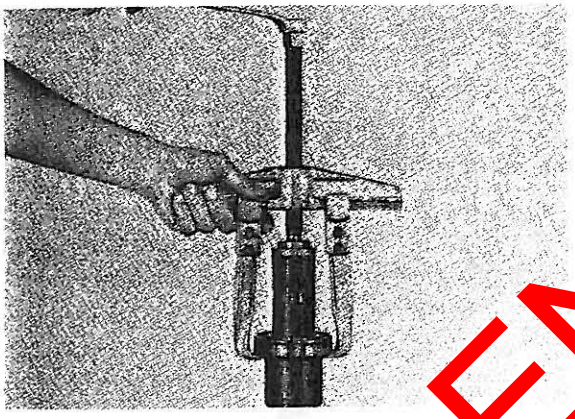


Figure 172
Remove bearing.

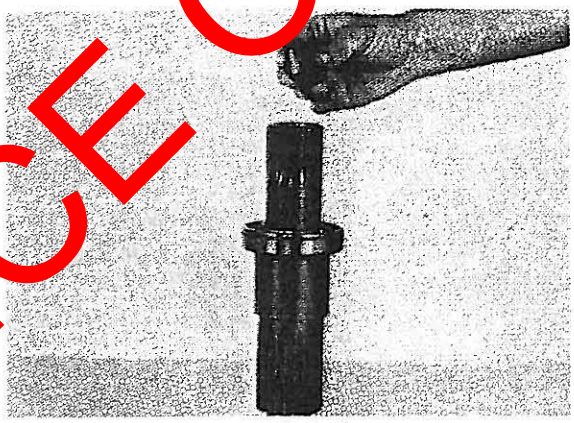


Figure 175
If the output shaft front bushing was changed, install a new bushing as shown in Figure 175-A.

(See cleaning a inspection page.)

R ASSEMBLY

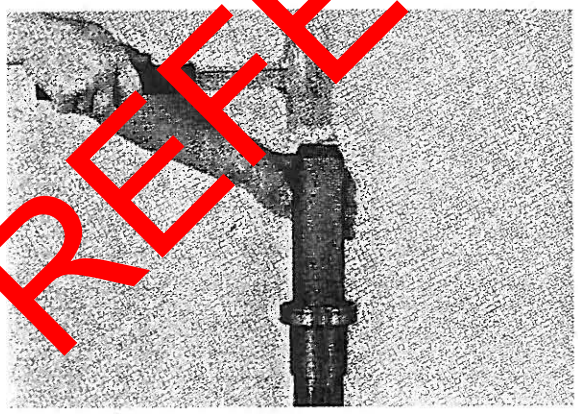


Figure 173
Install rear bearing.

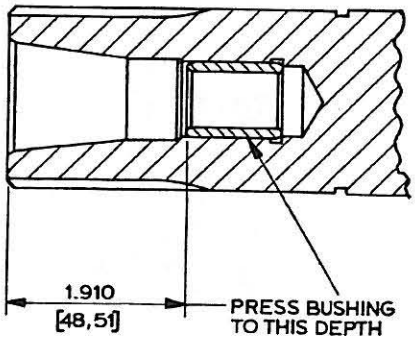


Figure 175-A

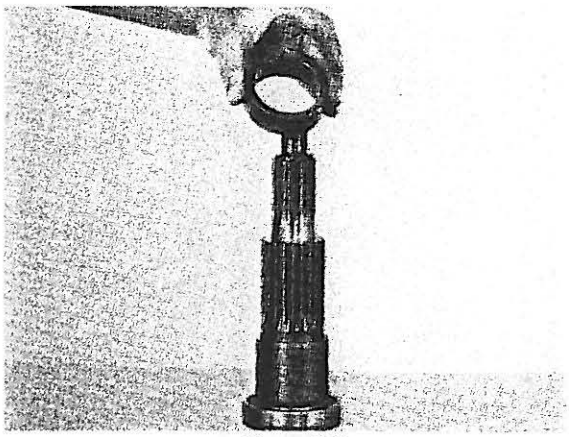


Figure 176

Position gear spacer on shaft.

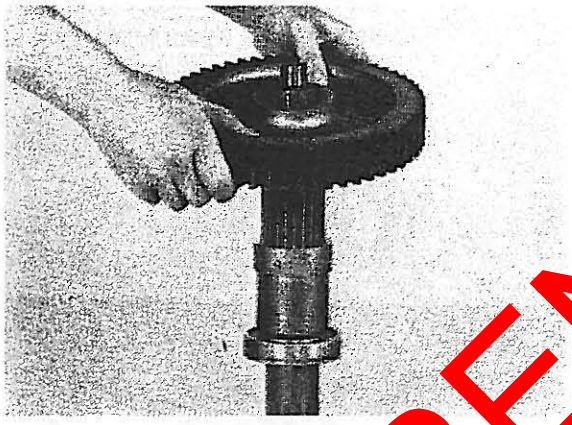


Figure 177

Position output gear on shaft with long hub of gear toward gear spacer.

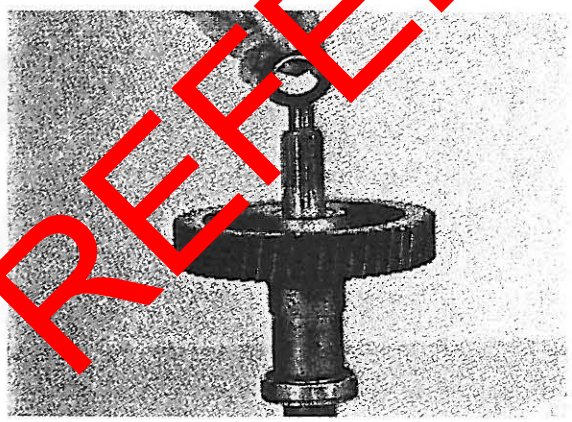


Figure 178

Position bearing spacer on shaft.

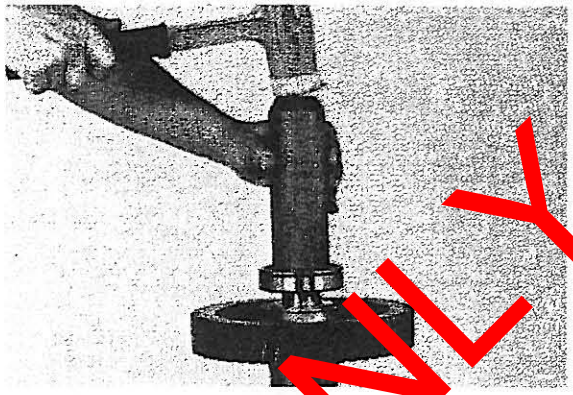


Figure 179

Install output rear bearing. NOTE: Rear bearing locating ring groove must be up.

DISASSEMBLY & REASSEMBLY OF INTERNAL DISCONNECT

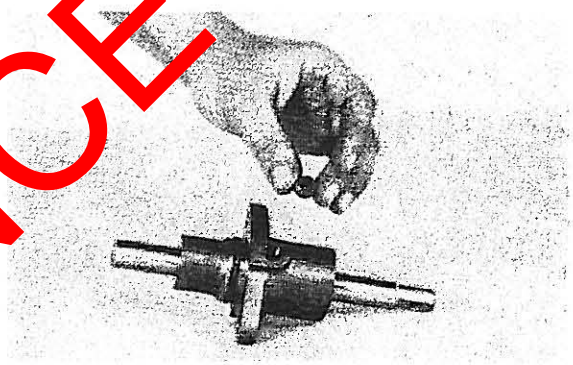


Figure 180

Remove detent plug.

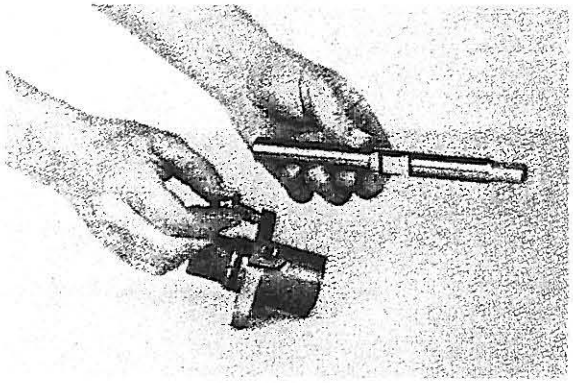


Figure 181

Remove shift rail and detent spring and ball. Remove shift rail oil seal.

(See cleaning and inspection page.)

REASSEMBLY

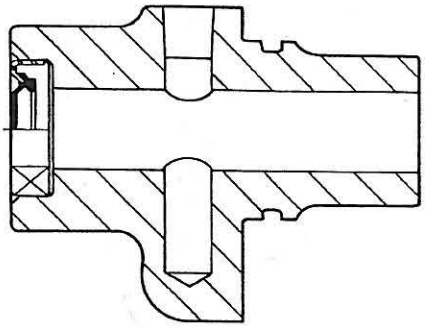


Figure 182

Apply a light coat of Permatex #2 to the outer diameter of the shift rail oil seal. Press seal in shift rail support with lip of seal in.

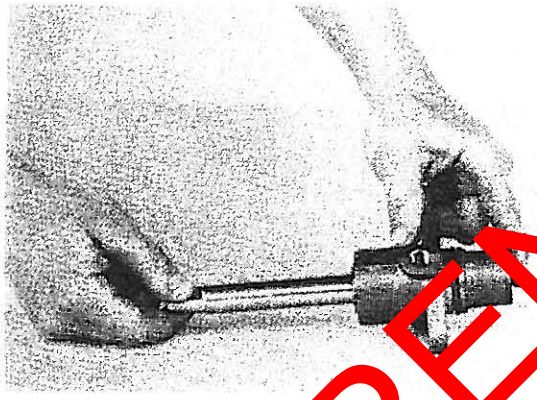


Figure 183

Position spring and ball in support. Compress ball and spring and install shift rail, use caution as not to damage oil seal.

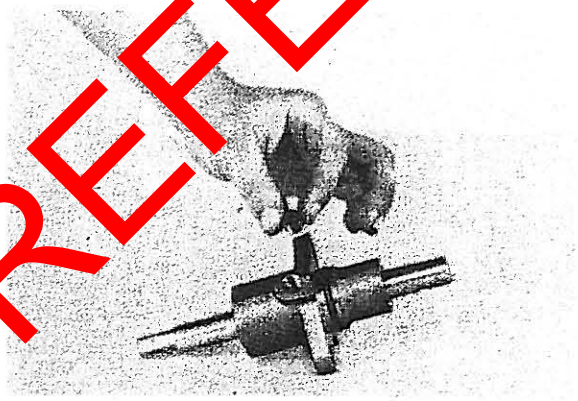


Figure 184

Install detent plug.

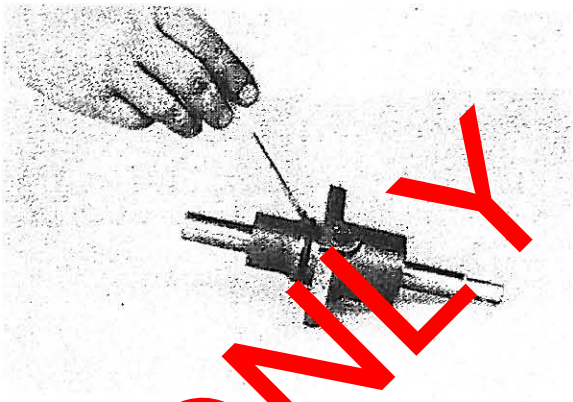


Figure 185

Install new support "O" ring.

(See cleaning and inspection page.)

TRANSMISSION REASSEMBLY

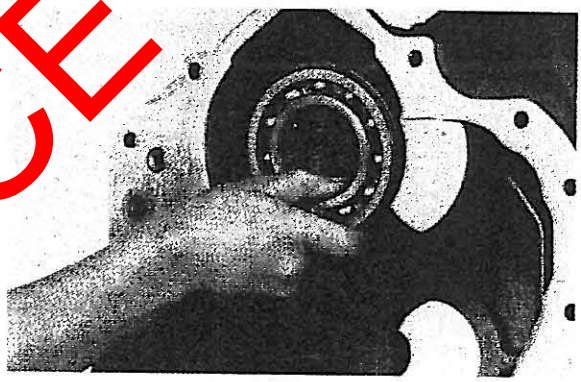


Figure 186

Install forward clutch rear bearing with bearing locating ring toward the front.

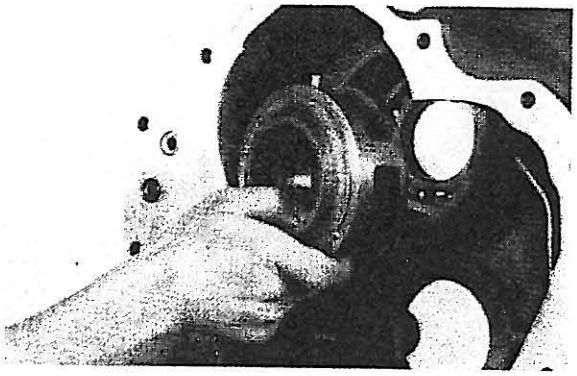


Figure 187

Align clutch oil sealing ring sleeve with notch in case. Tap sleeve into position.

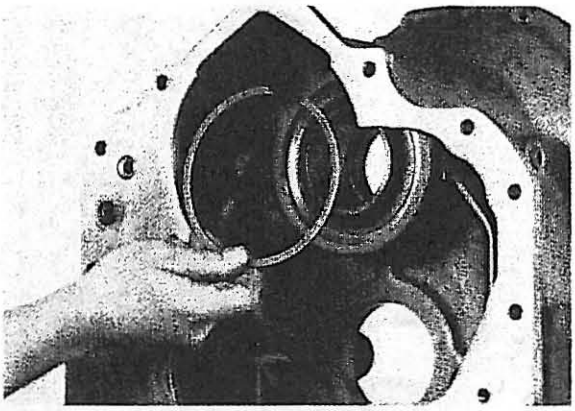


Figure 188
Install sleeve retainer ring.

Figure 191
Install disc hub retainer ring.

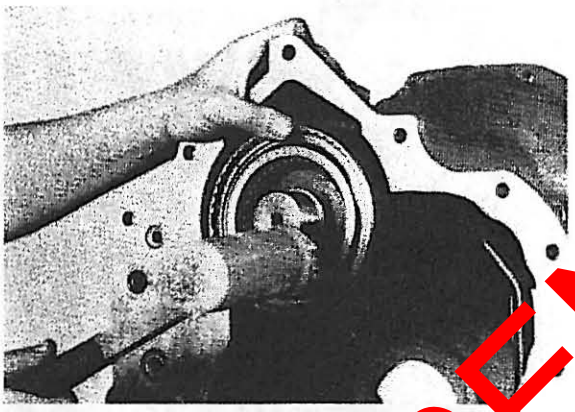


Figure 189
The use of heavy grease will help center the forward clutch shaft oil sealing rings in the ring grooves. Tap forward clutch into sleeve and rear bearing, use caution as not to damage sealing rings.

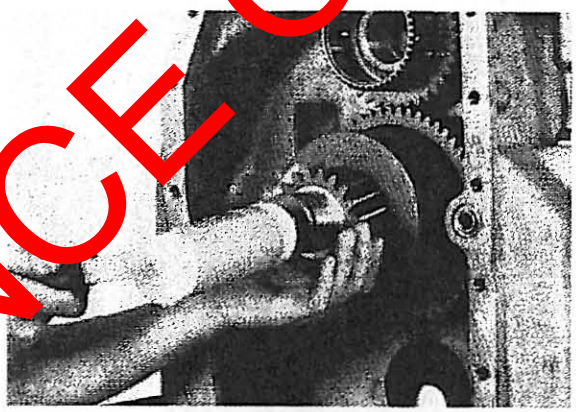


Figure 192
Tap low clutch assembly into position.

Figure 190
Install gear and 3rd clutch disc hub on forward clutch shaft.

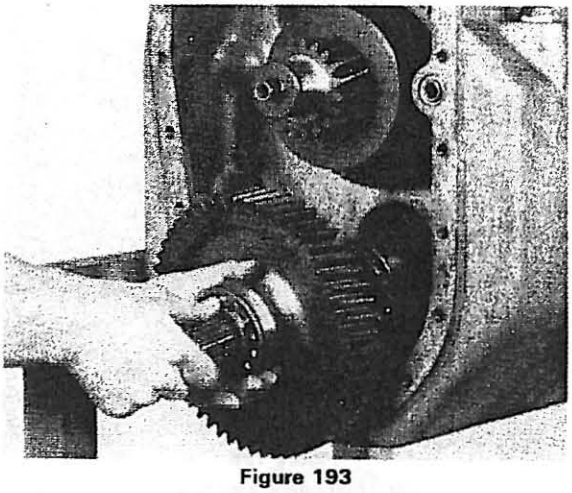


Figure 193
Position output shaft assemble in housing.

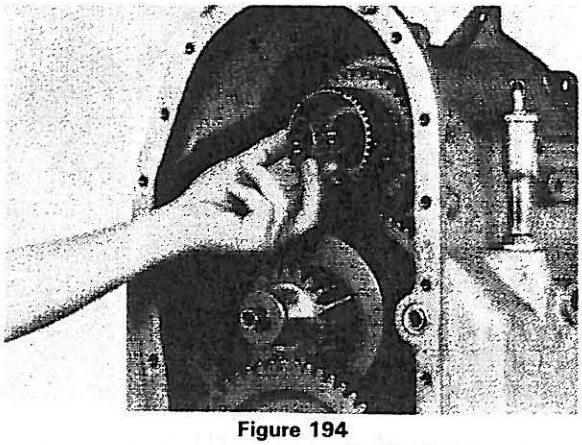


Figure 194
Position 3rd speed clutch front pilot bearing in forward clutch shaft.

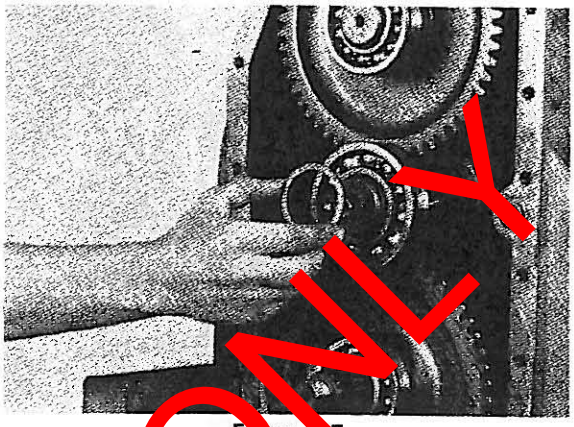


Figure 197
Position rear bearing washer on shaft.

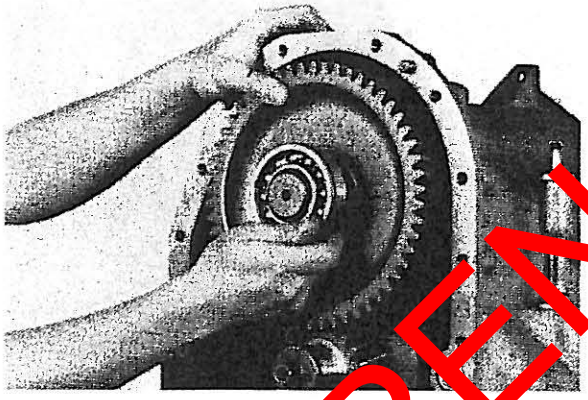


Figure 195
Position the 3rd speed clutch assembly in pilot bearing. Use caution as not to damage pilot bearing.

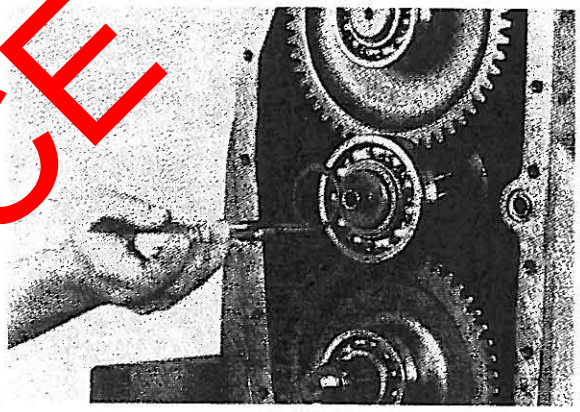


Figure 198
Install rear bearing retainer ring.

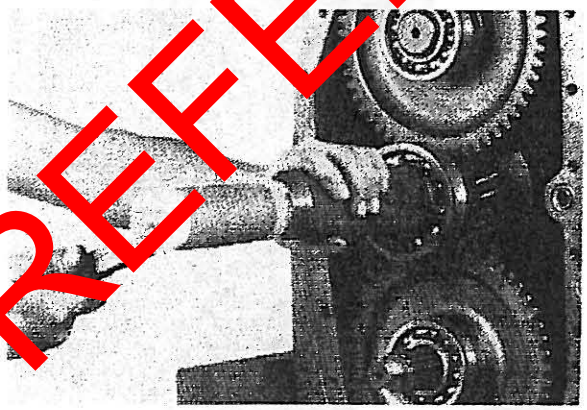


Figure 196
Install the low clutch rear bearing with the bearing locating ring groove to the rear.

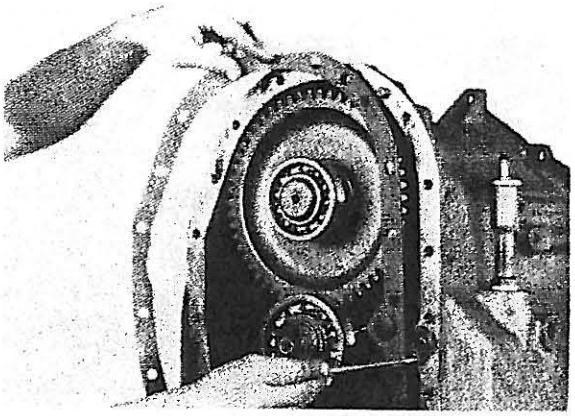


Figure 199
Position a new gasket and "O" ring on rear of case. A light coat of grease will hold gasket in place.

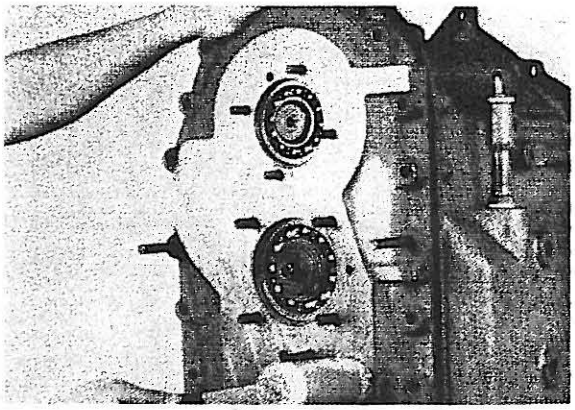


Figure 200

The use of aligning studs will facilitate rear cover installation. Tap cover in place.

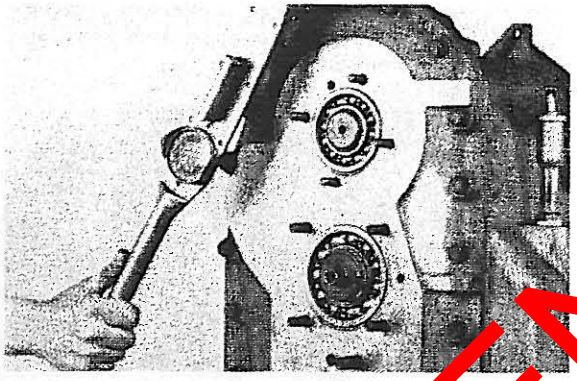


Figure 201

Install rear cover bolts and washers, tighten to specified torque. (See torque chart)

Figure 202

From the front, tap on the low clutch shaft. The low clutch drum will move to the rear and will hit the 3rd clutch gear and the output gear. Tap on low clutch until all three shaft rear bearing locating ring grooves are exposed. Install 3rd clutch rear bearing locating ring.

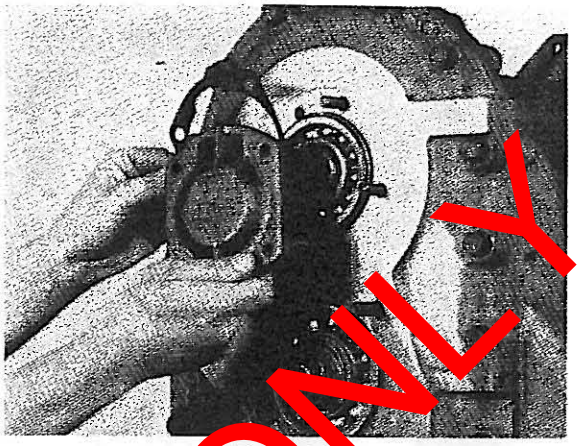


Figure 203

Install new gasket and 3rd clutch rear bearing cap.

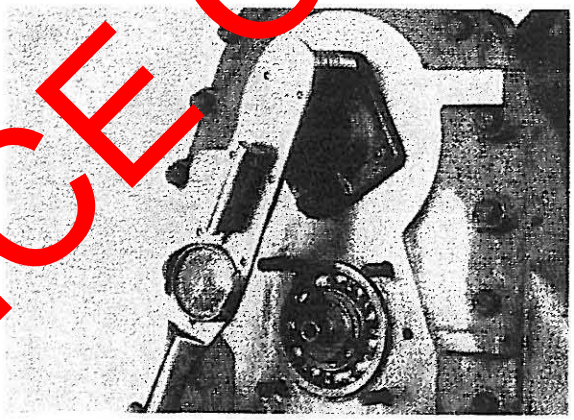


Figure 204

Install washers and stud nuts. Tighten to specified torque. (See torque chart)

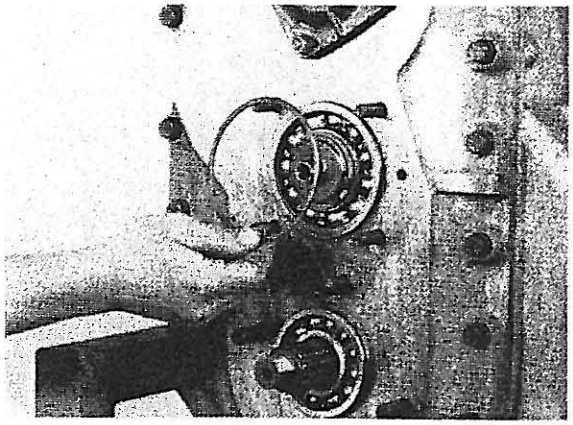


Figure 205

Install low clutch rear bearing locating ring.

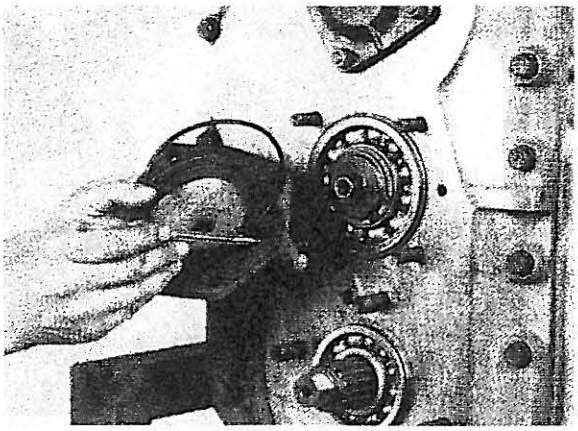


Figure 206
Position new "O" rings on the low clutch rear bearing cap.

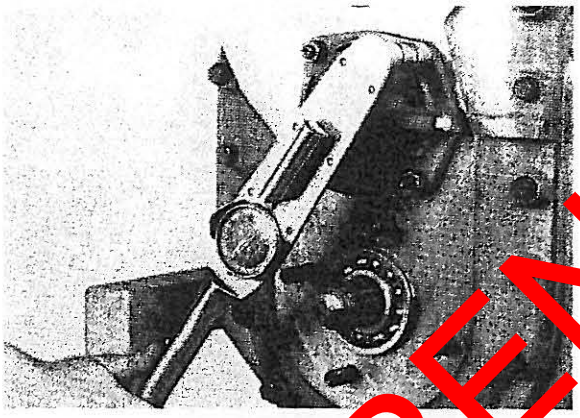


Figure 20
Install bearing cap, washers a stu Tighten to specified torque. (See torq chart)

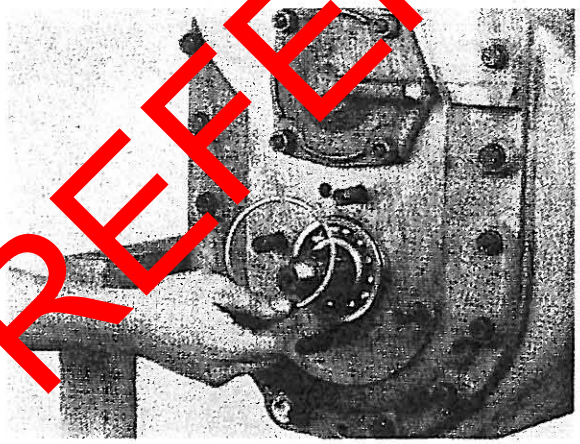


Figure 208
Install output shaft rear bearing locating ring.

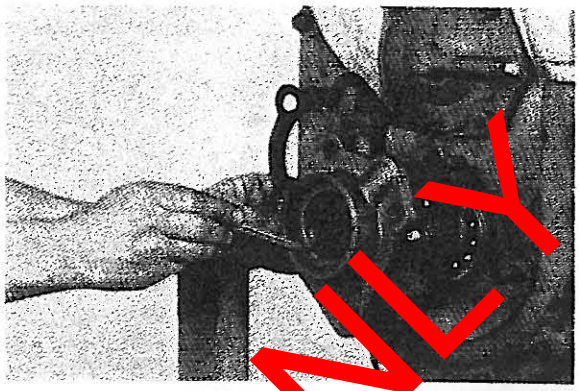


Figure 209
Apply a light coat f Perma x#2 to the outer diameter of the output shaft seal. With p of seal down, press seal in bearing cap to a pth of .44 1 1,2 mm] from outer face of cap. (See assembly tru ion page.) Install new gasket and b ring cap on studs.

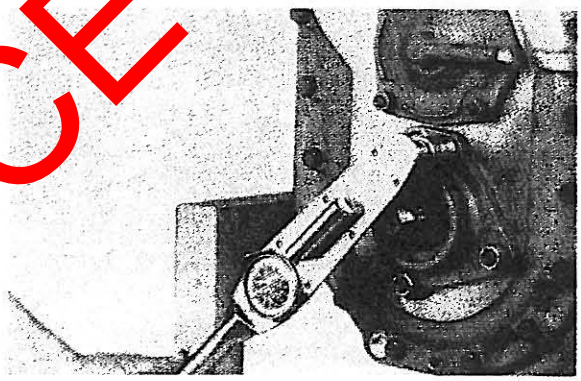


Figure 210
Install bearing cap washers and stud nuts. Tighten to specified torque. (See torque chart)

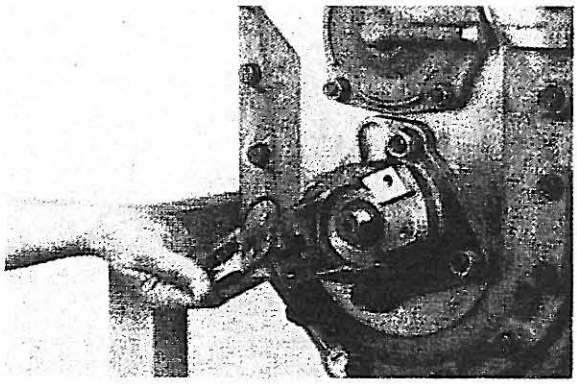


Figure 211
Position output flange on output shaft. Install "O" ring, washer and flange nut.

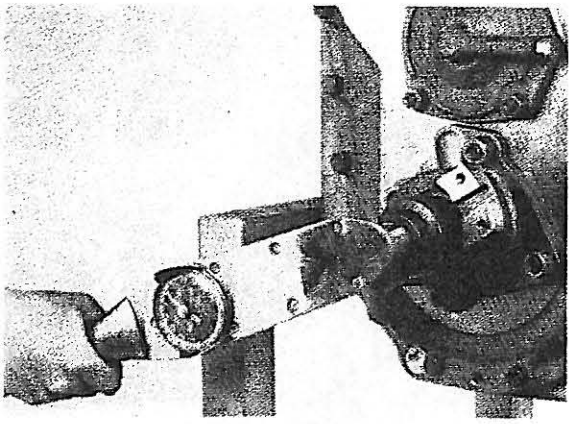


Figure 212

Using a flange retainer to prevent turning, tighten flange nut 200 TO 250 Ft. Lb. torque. [271,2-338,9N.m]

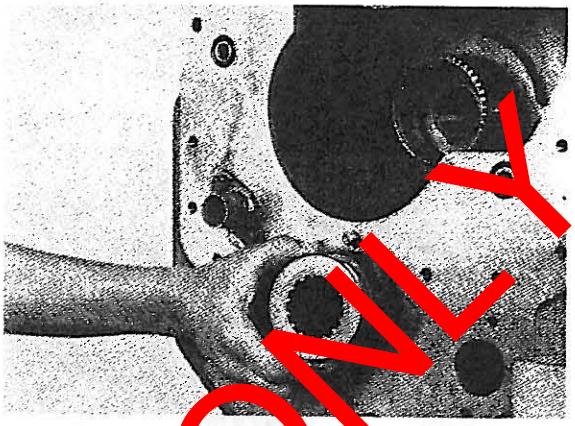


Figure 215

Position the front disconnect shift hub on the output shaft with the shift fork groove to the front.

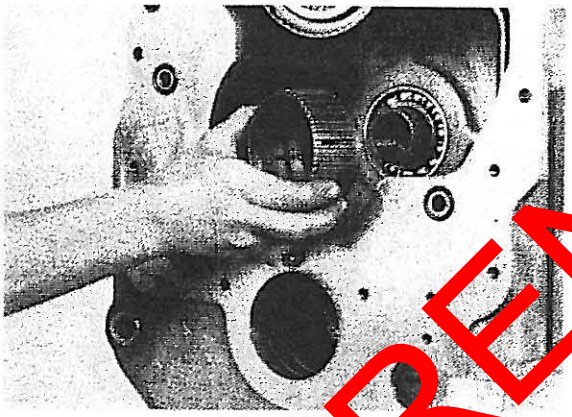


Figure 213

Position the 2nd clutch disc hub on the low clutch shaft.

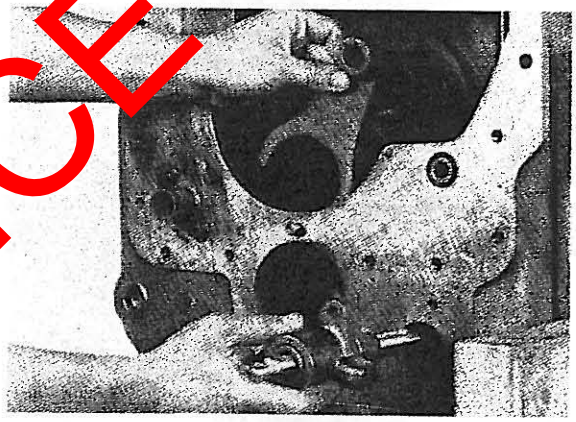


Figure 216

Position the shift fork in hub groove and align the shift rail and support with shift fork.

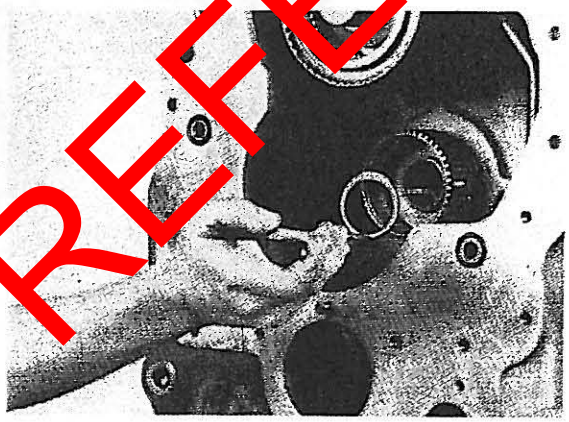


Figure 214

Install disc hub retainer ring.

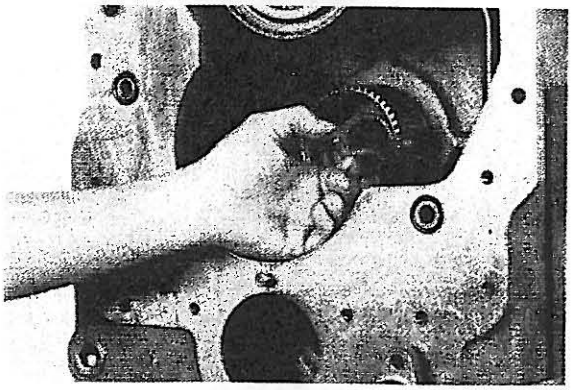


Figure 217

Install shift fork to rail lock screw. Tighten securely and lock wire to prevent loosening.

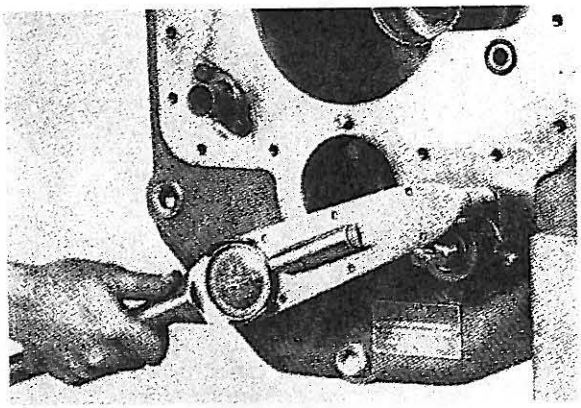


Figure 218

Tighten shift rail support bolts to specified torque. (See torque chart)

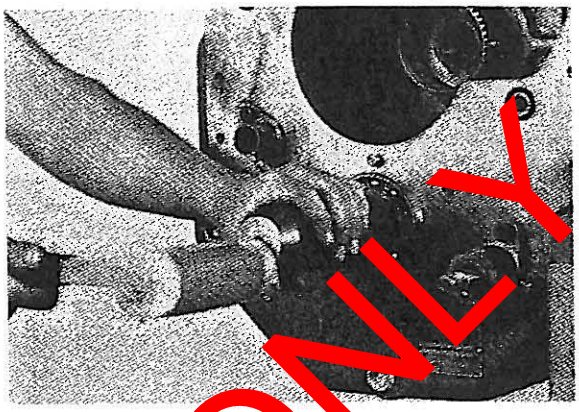


Figure 221

Install disconnect shaft bearing.

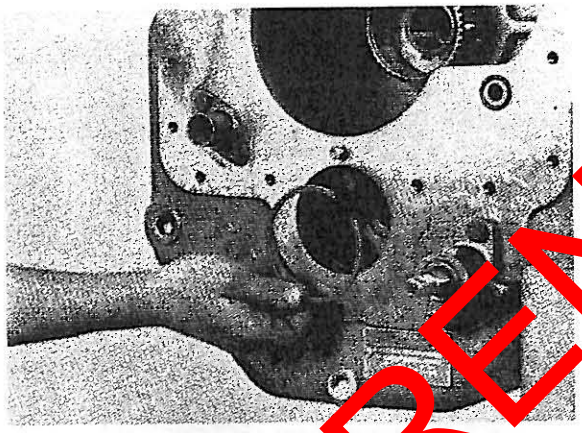


Figure 21

Install disconnect shaft bearing locating ring.

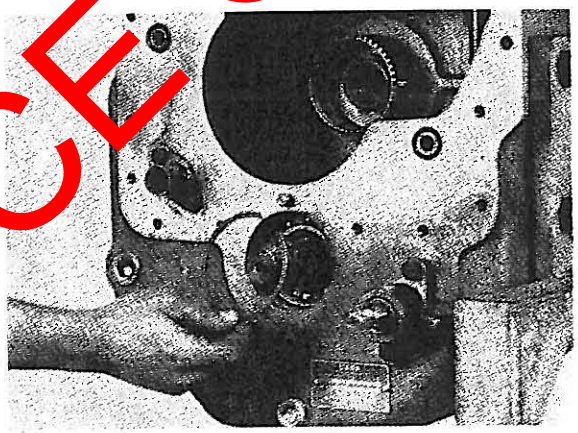


Figure 222

Install bearing retainer ring.

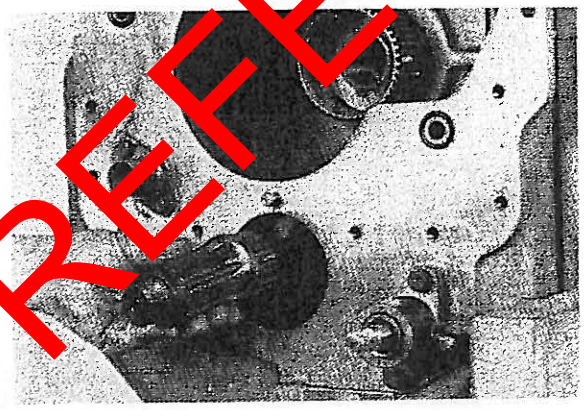


Figure 220

Position disconnect shaft into pocket in output shaft. Use caution as not to damage output shaft bushing.

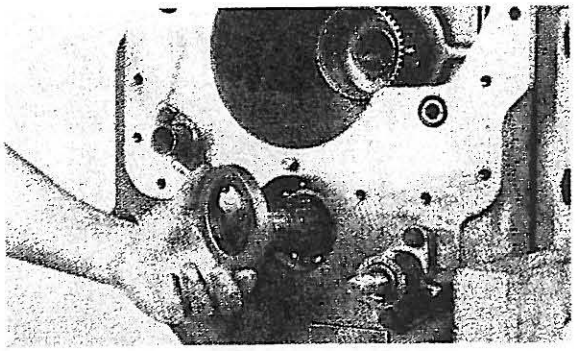


Figure 223

Apply a light coat of Permatex #2 to the outer diameter of the front output oil seal. Install the seal with the lip in to a depth of .25 [6,4mm]. (See assembly instruction page). For R-Model front end proceed to Figure 312.

IMPELLER
DISASSEMBLY AND REASSEMBLY

DISASSEMBLY

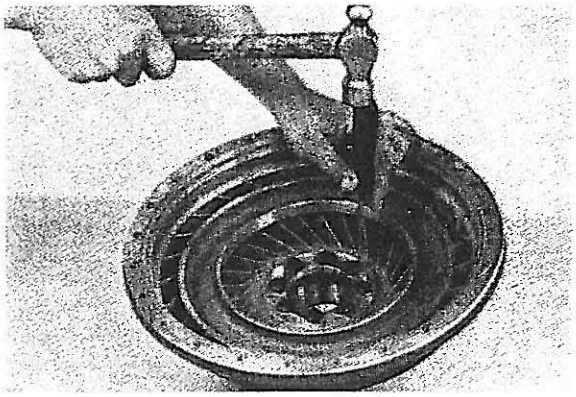


Figure 224
Straighten lock tab from bolt head.

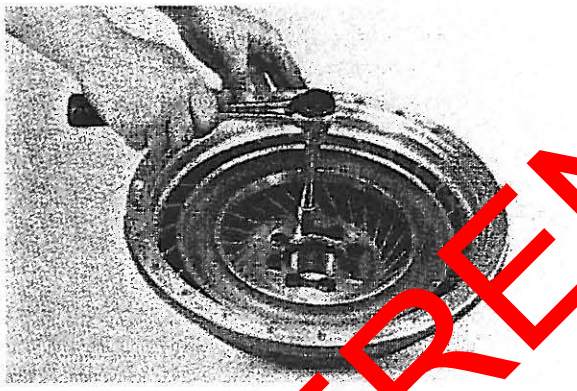


Figure 225
Remove impeller to impeller hub bolts.

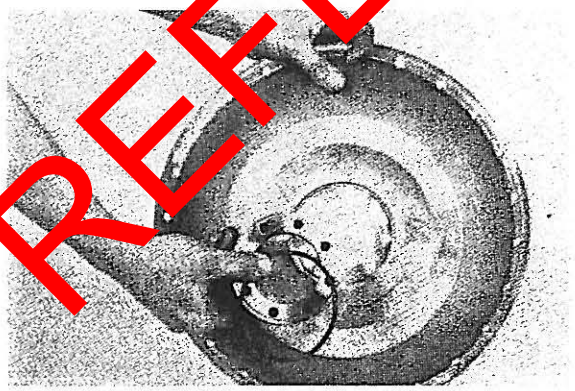


Figure 226
Remove impeller hub and "O" ring.

(See cleaning and inspection page.)

REASSEMBLY

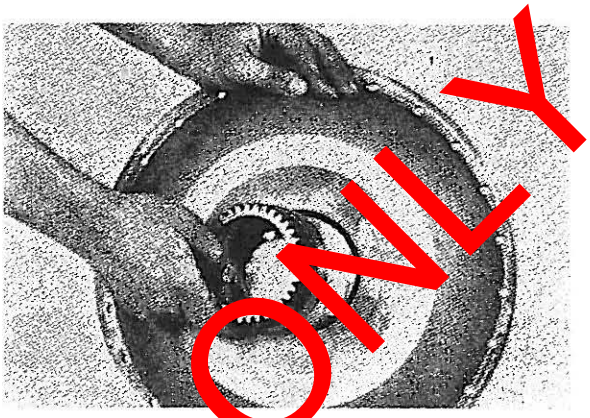


Figure 227
Position a new "O" ring on impeller. Align hub bolt holes with holes in impeller. Using new lock tabs, start bolts in impeller hub.

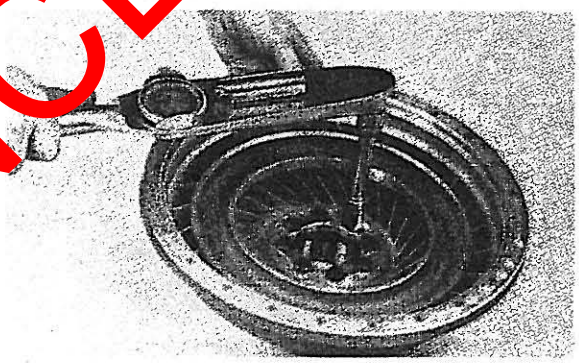


Figure 228
Tighten impeller hub bolts to specified torque. (See torque chart)

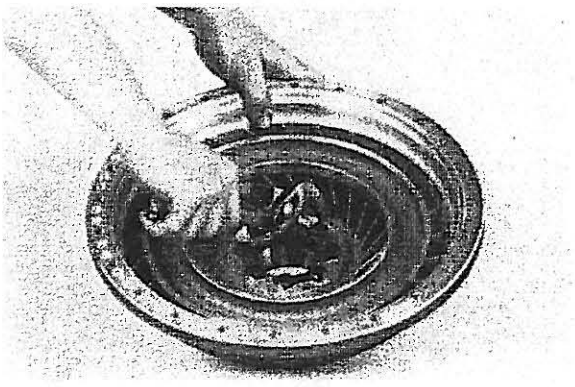


Figure 229
Bend lock tab corners over hub bolt heads.

TURBINE AND IMPELLER COVER DISASSEMBLY AND REASSEMBLY

DISASSEMBLY

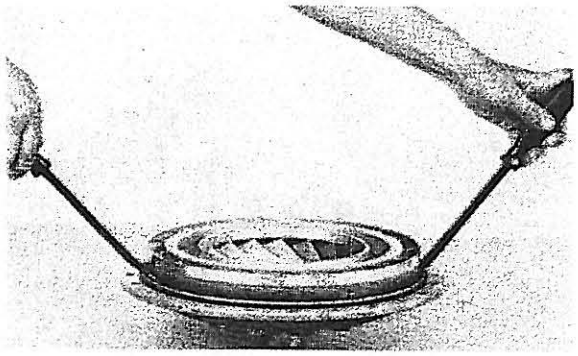


Figure 230

Pry turbine from impeller cover, use caution as not to damage face of impeller cover or turbine. **NOTE:** Some units have a bolted on turbine hub. If either the turbine or hub is replaced see page 66 for reassembly.

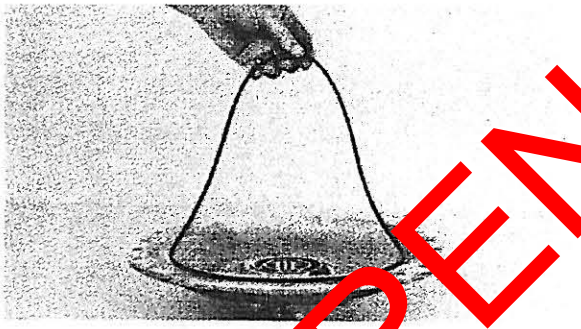


Figure 231

Remove impeller cover [illegible] impeller "O" ring.

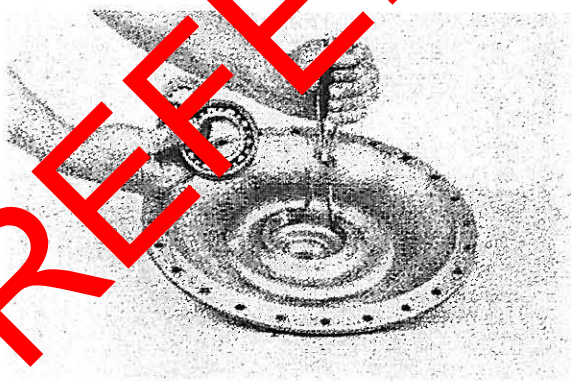


Figure 232

Spread impeller cover bearing retainer ring. Remove bearing and retainer washer.

(See cleaning and inspection page.)

REASSEMBLY

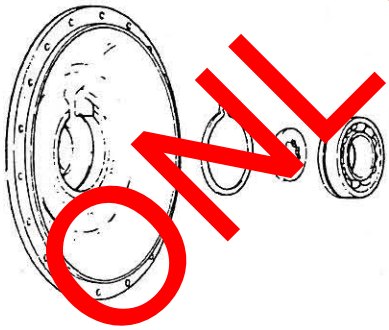


Figure 233

If the impeller cover bearing retaining washer or bearing was replaced use the following procedure for reassembly. Heat cover 200° to 250°F [93° - 121°C]. Position snap ring in groove. Place bearing retainer washer in cover. While cover is hot press bearing into position spreading ears on snap ring at the same time. Align snap ring groove in bearing with snap ring. Release snap ring. Check ring to be certain it is in full position in groove. Press turbine into bearing in impeller cover.

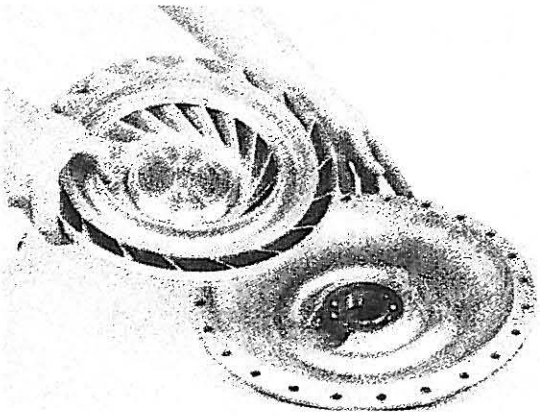


Figure 234

Position turbine in impeller cover and tap into place.

CONVERTER HOUSING DISASSEMBLY & REASSEMBLY

DISASSEMBLY

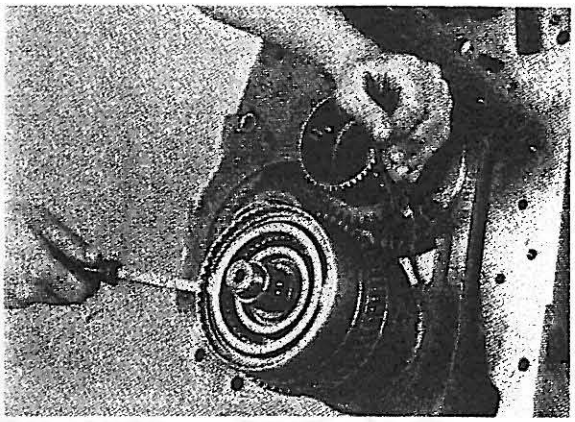


Figure 235

Spread reverse clutch front bearing locating ring. Pry reverse and 2nd clutch from housing.

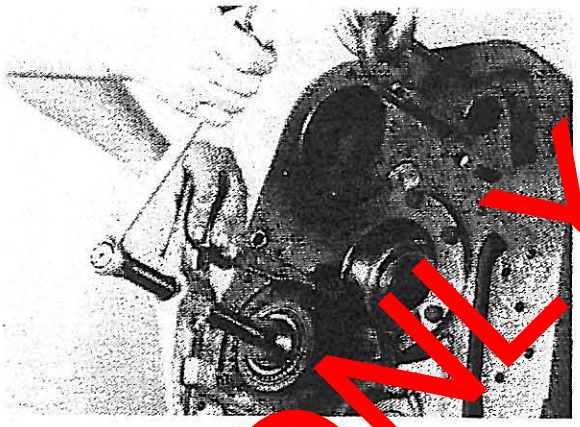


Figure 2

Remove idler gear and ...ter taper ...aring from idler shaft.

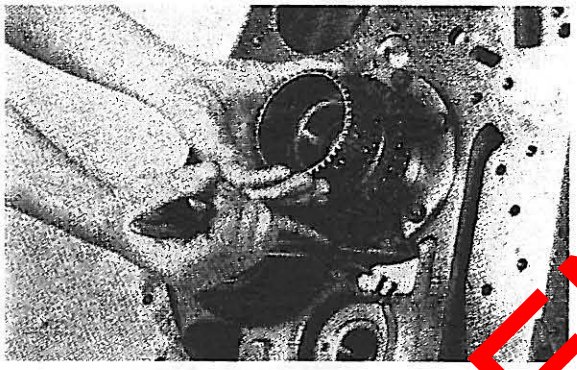


Figure 236

Using spreading type snap ring pliers, spr...d t...bine ...ft bearing locating ring. Tap turbine sha... and be...ring fro... stator support.

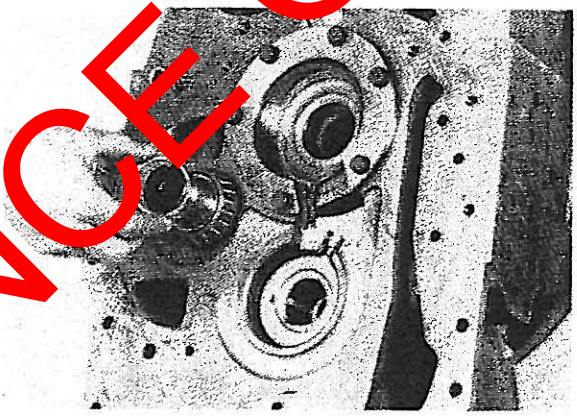


Figure 239

Remove bearing spacer.

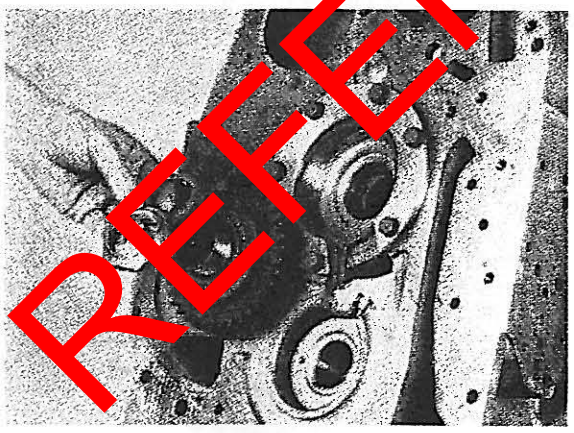


Figure 237

Unclinch lock nut by straightening upset metal in notch in idler shaft. Remove nut and spacer.

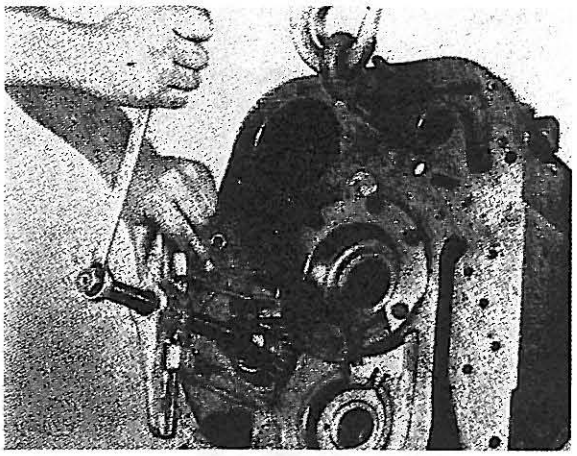


Figure 240

Remove inner taper bearing.

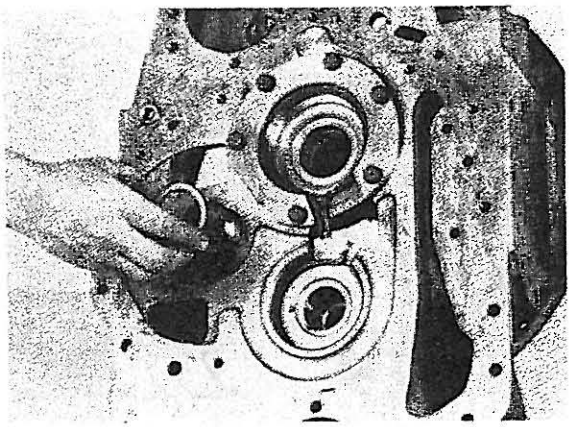


Figure 241

Remove inner spacer.

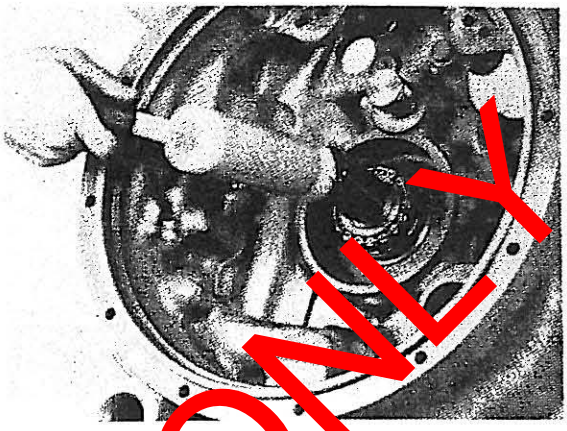


Figure 244

Tap stator support from housing.

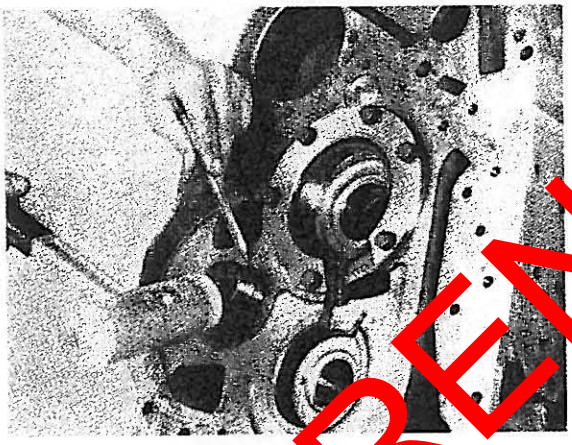


Figure 242

Tap idler shaft from housing, use caution as not to lose shaft lock ball.

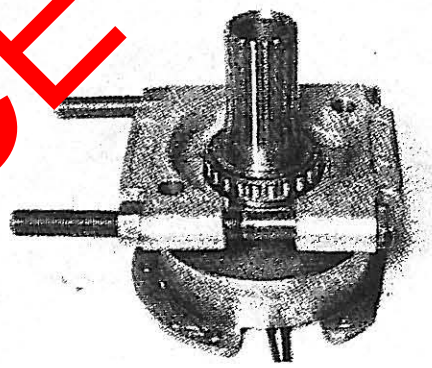


Figure 245

Remove impeller hub bearing from support as shown. Remove support oil sealing ring and ring expander spring.

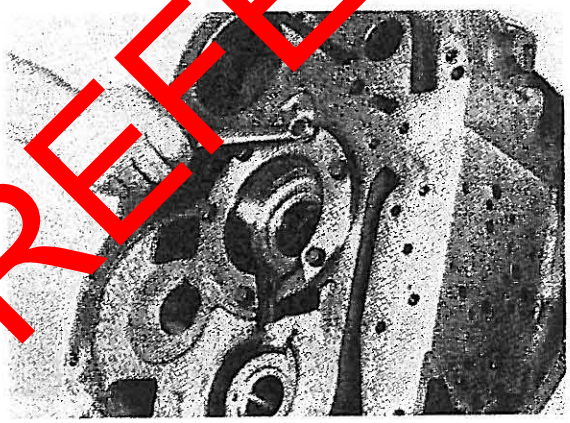


Figure 243

If stator support is to be removed, remove support bolts.

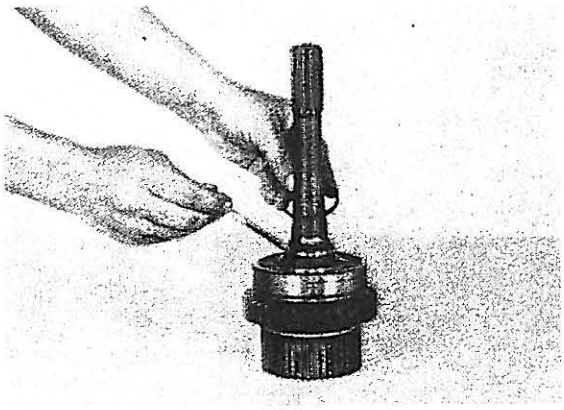


Figure 246

Remove turbine shaft oil sealing ring.

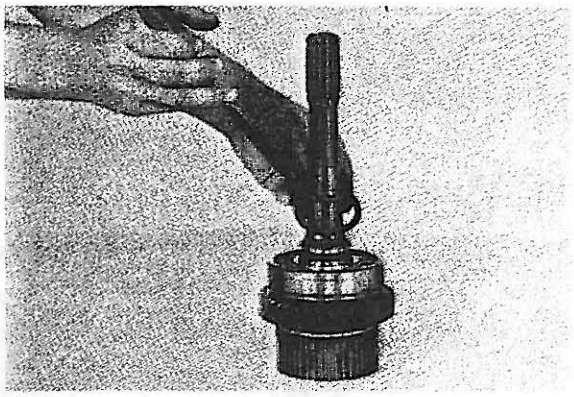


Figure 247
Remove bearing retainer ring and washer.

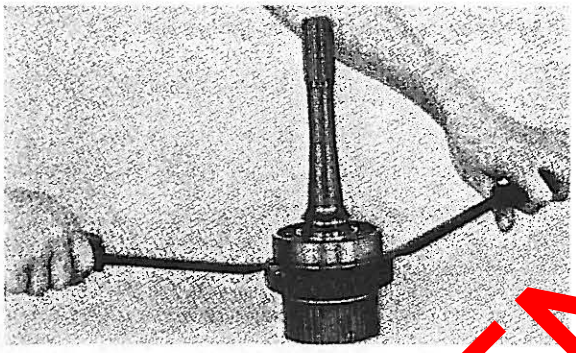


Figure 248
Pry bearing from turbine shaft.

(See cleaning and inspection page)

CONVERTER HOUSING REASSEMBLY

NOTE: If a new transmission case or converter housing is needed for reassembly see Page 81 for speed sensor bushing installation.

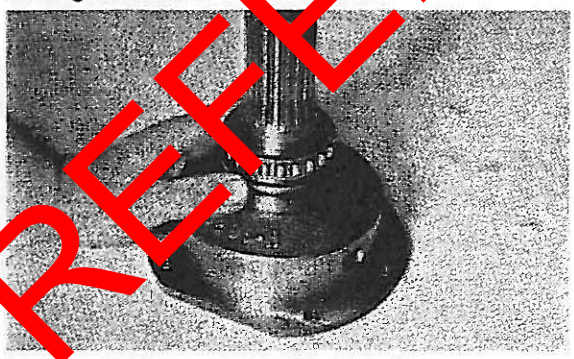


Figure 249
Install new sealing ring expander spring and oil sealing ring on support. Expander spring gap to be 180* from sealing ring hook joint. Press support bearing into position. **NOTE:** Bearing part number must be up.

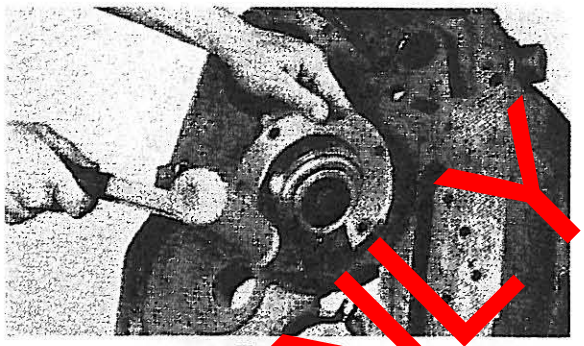


Figure 250
Position support in converter housing aligning holes in support with holes in housing. Tap support into position.

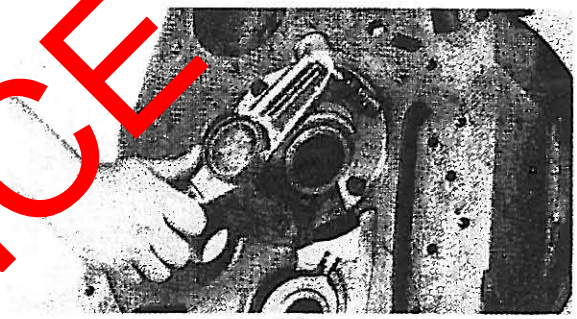


Figure 251
Install support washers and bolts. Tighten to specified torque. (See torque chart)

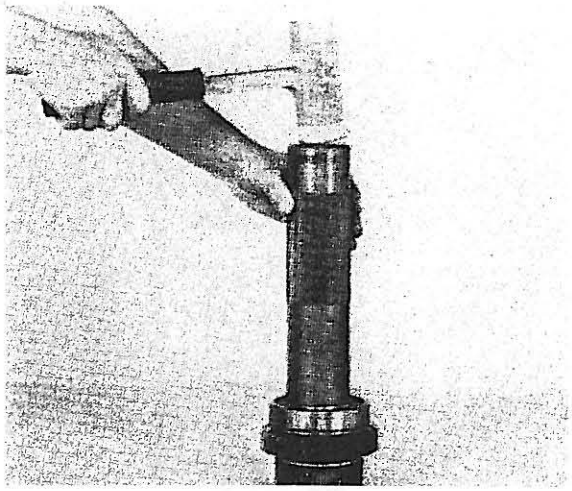


Figure 252
Install turbine shaft bearing on shaft. **NOTE:** Bearing locating ring groove must be down.

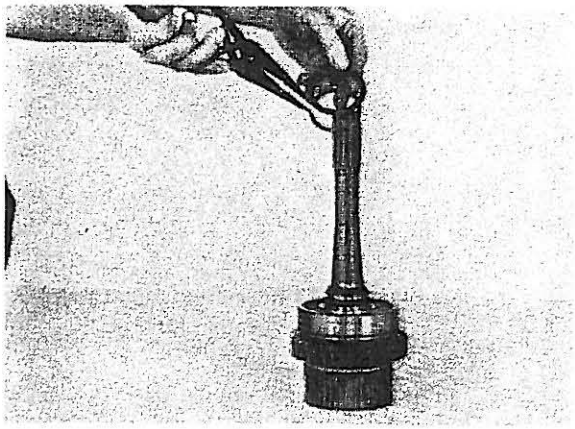


Figure 253
Install bearing washer and retainer ring.

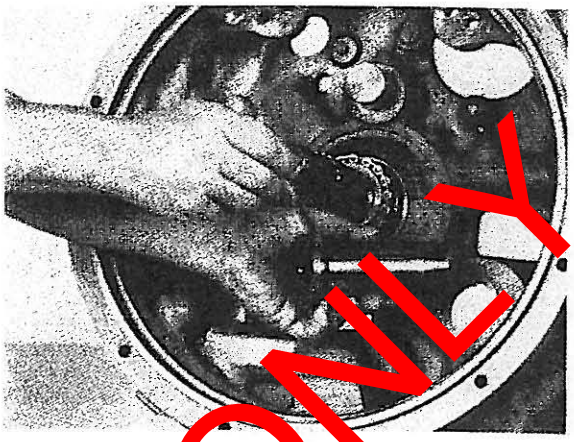


Figure 256
With new "O" ring on shaft, position idler shaft and lock ball in converter housing. Tap shaft into position.

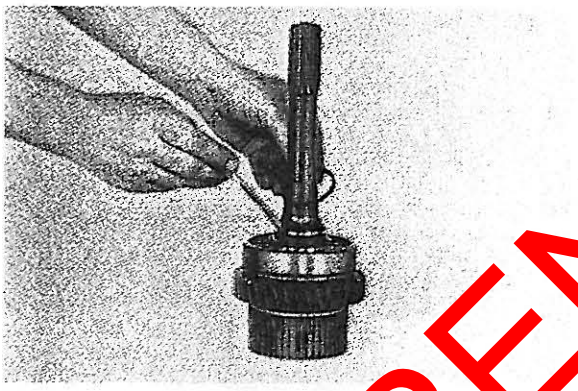


Figure 254
Install turbine shaft oil sealing ring.

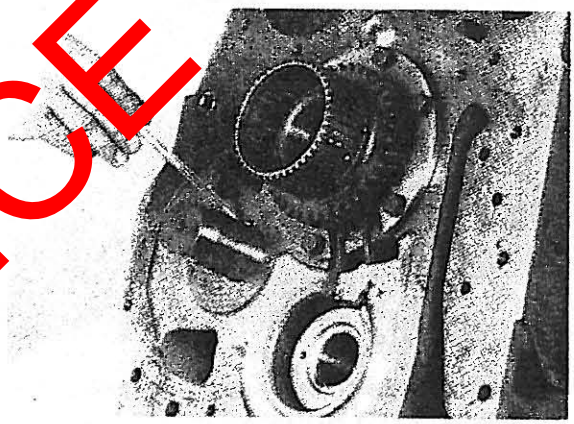


Figure 257
Position shaft lock ball in shaft.

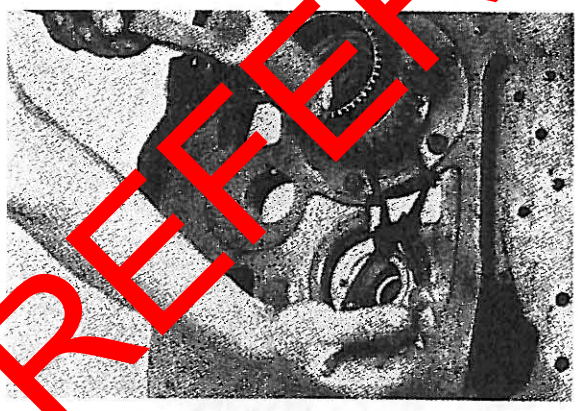


Figure 255
Spread ears on turbine shaft bearing retainer ring located in reaction member support. Tap turbine shaft and bearing into position, being certain bearing snap ring is in full position in snap ring groove.

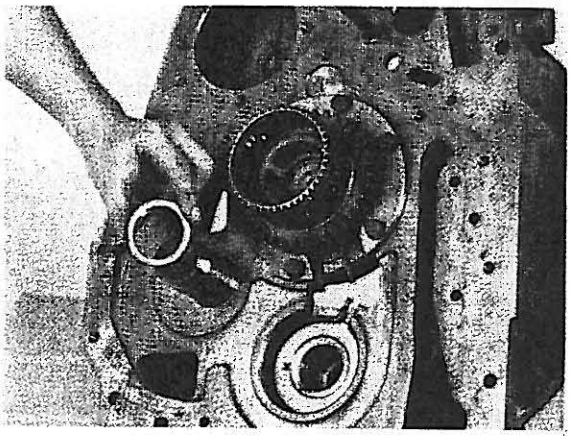


Figure 258
Place bearing spacer on shaft.

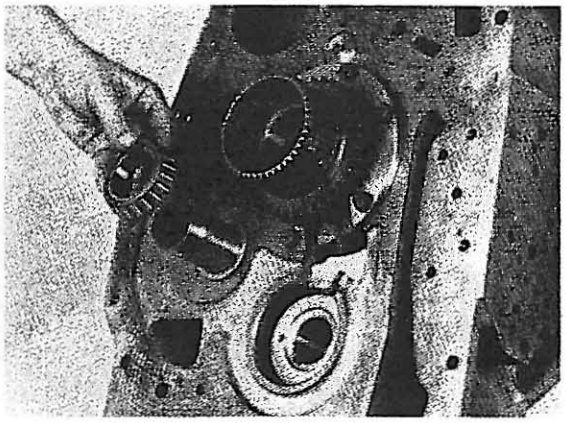


Figure 259
Install idler gear inner taper bearing on shaft with large diameter of taper down.

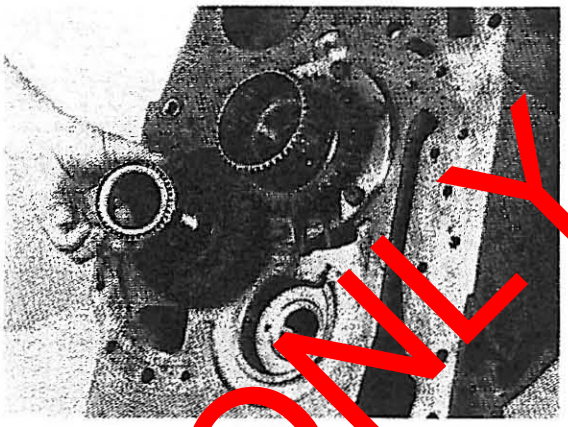


Figure 2[illegible]2
Install outer taper b[illegible]ring on sh[illegible]t with large diameter of taper out.

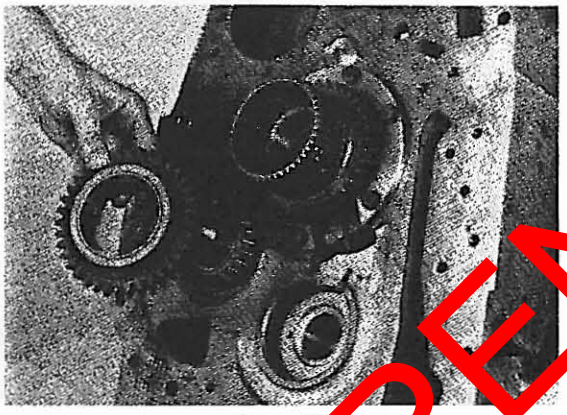


Figure 26[illegible]
Place idler gear and taper bea[illegible]g cu[illegible]sembly on bearing with hub of gear up.

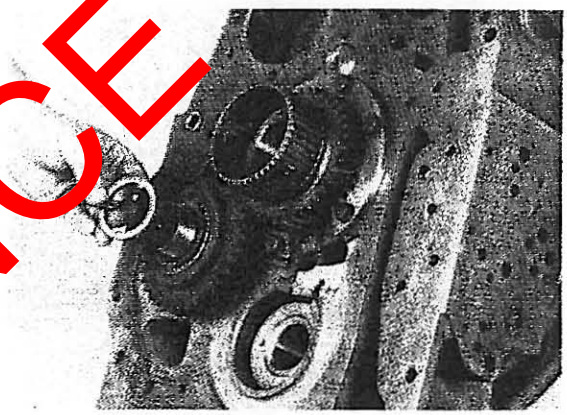


Figure 263
Place outer bearing spacer on shaft.

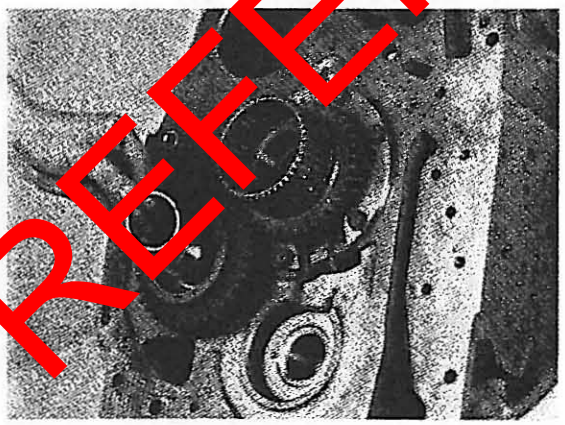


Figure 261
Position bearing spacer on shaft.

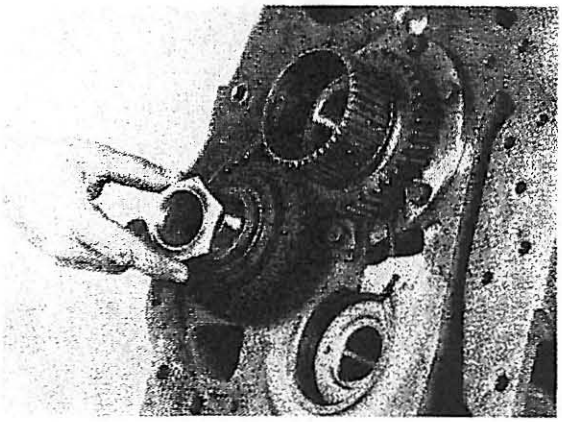


Figure 264
Install lock nut.

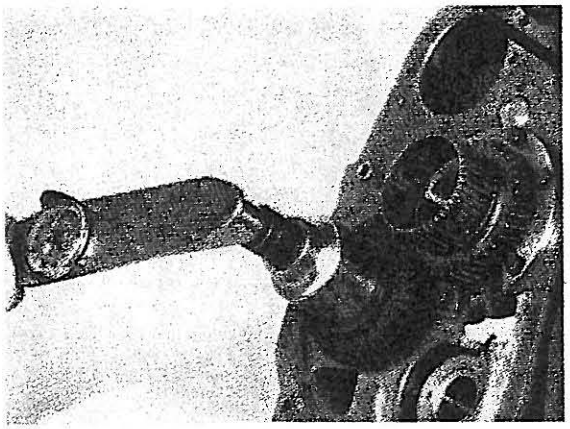


Figure 265
Tighten nut 200 to 250 Ft. Lbs. torque. [271,2-338,9N.m]

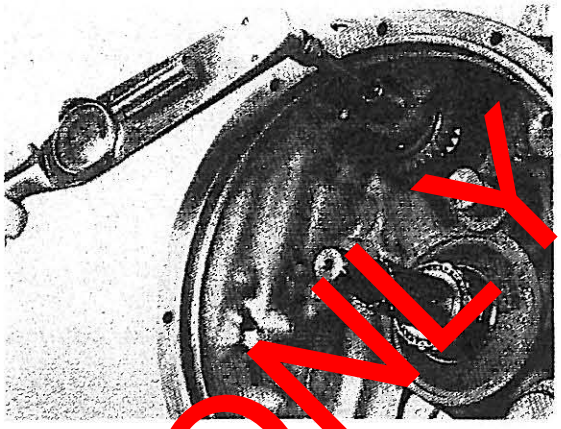


Figure 268
Tighten capscrews to specified torque. (See torque chart)

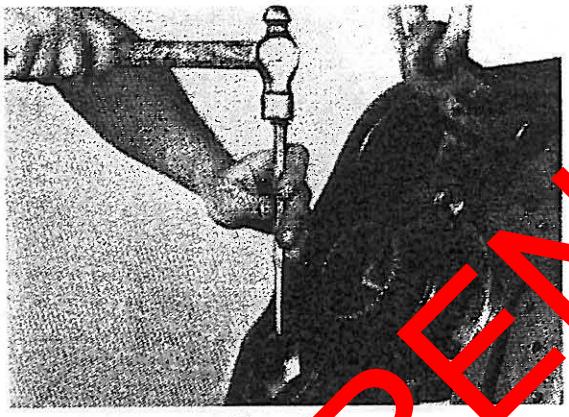


Figure 266
Stake nut securely in shaft notch.

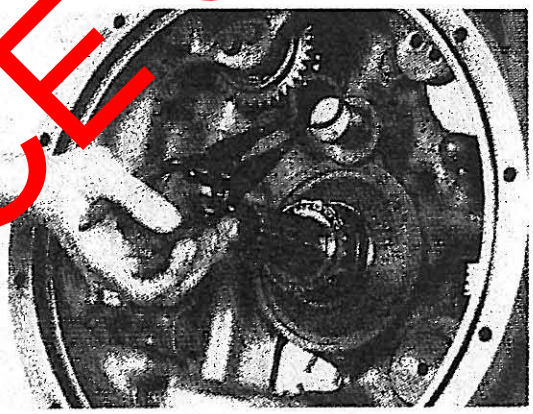


Figure 269
If pump idler gear locating ring was removed, install ring in inner ring groove.

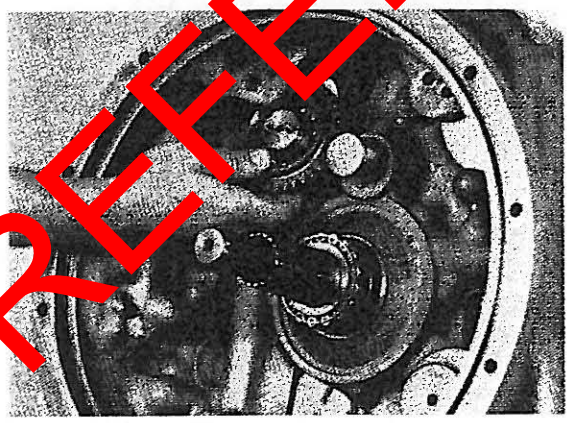


Figure 267
Position charging pump drive gear and install capscrews.

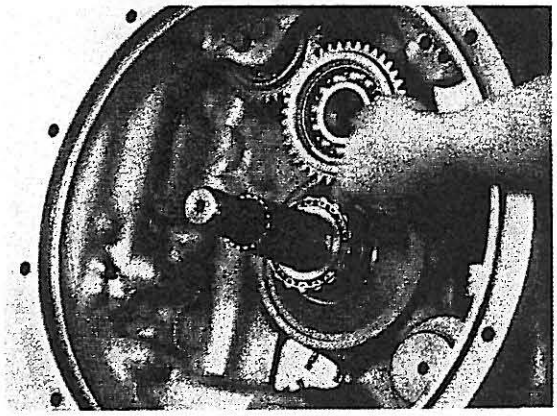


Figure 270
Position idler gear and bearing assembly on shaft.

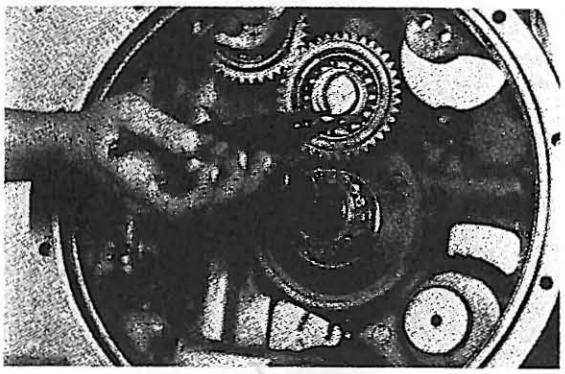


Figure 271
Install gear assembly retainer ring.

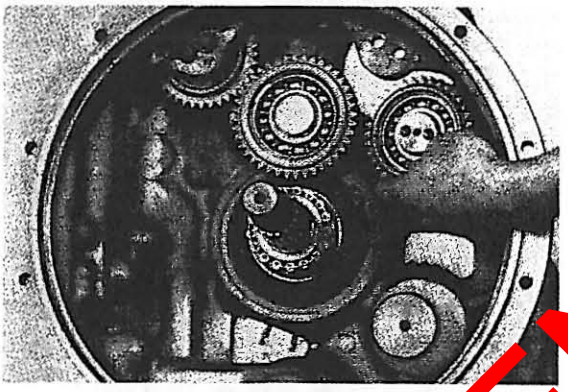
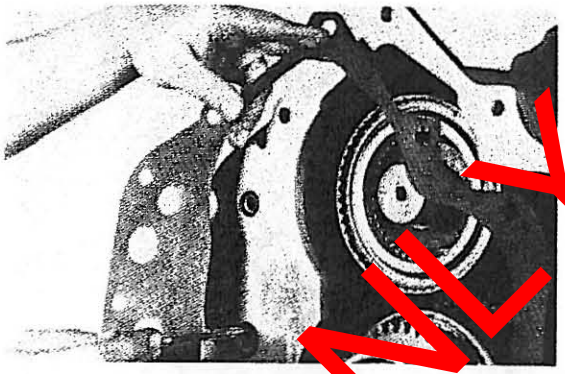


Figure 272
Position auxiliary pump drive gear and install ca[illegible]ews. Tighten to specified torque. (See torque [illegible])

Figure 273
Plac[illegible]ilot bearing on 2nd clutch shaft. A light coat of grease [illegible]ll hold bearing in place. Position reverse and 2nd speed clutch on disc hub aligning splines of disc hub with internal teeth of 2nd speed clutch friction discs. Disc hub must be in full position with friction discs. Do not force this operation.



Fi[illegible]74
Position new "O" rings [illegible]nd gaske[illegible]n fr[illegible]t of transmission housing. A light coat [illegible]chassis gre[illegible]se will hold "O" rings and gasket in place.

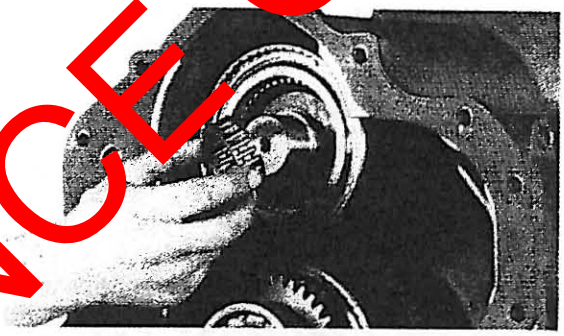


Figure 275
Position pilot bearing on forward clutch shaft.

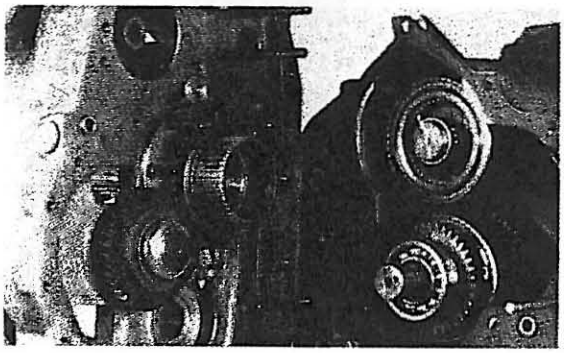


Figure 276
The use of two aligning studs will facilitate aligning the converter housing to the transmission housing. Install converter housing assembly to transmission assembly using extreme caution as to align the clutch pilots into the clutch disc hubs. As the clutch pilots enter the discs hubs, turn the turbine shaft and output shaft back and forth. This will help align all of the clutch inner discs with the disc hubs. **DO NOT FORCE THIS OPERATION.**

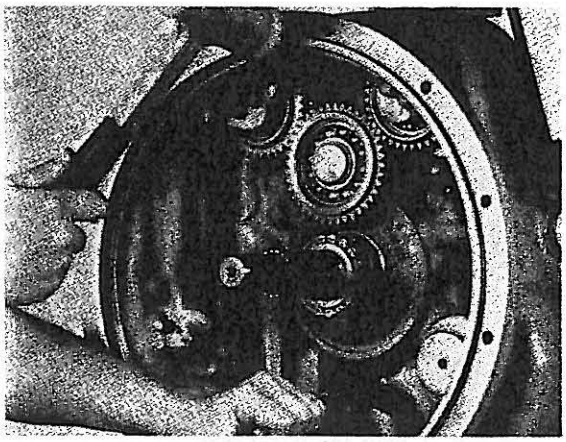


Figure 277

Spread ears on the reverse clutch front bearing snap ring. Lock pliers open to hold snap ring open. Tap converter housing in place. Use caution as not to damage reverse clutch front piston ring. Note aligning stud.

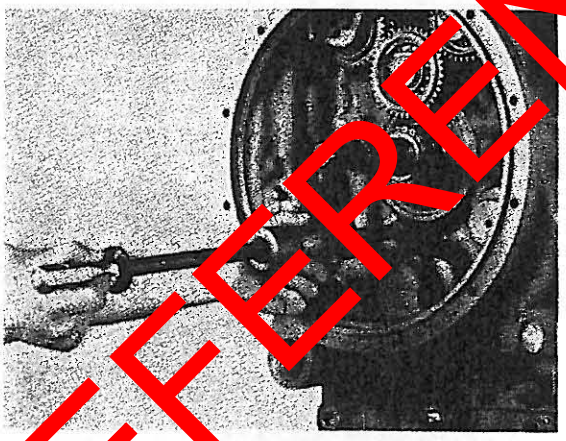
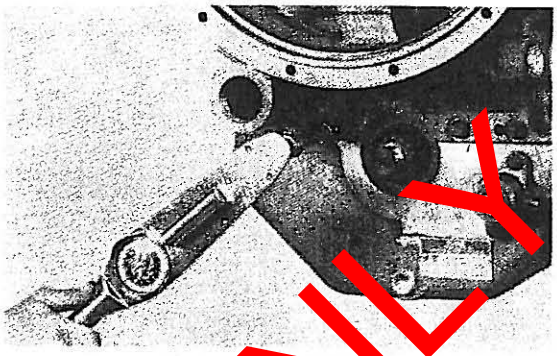


Figure 278

Install capscrew in the front and one in the rear of the converter housing and snug up but do not tighten. This will hold the converter housing to the transmission housing. Using a hook type hammer puller as shown pull the reverse clutch gear toward the front of the converter housing. This will move the reverse and 2nd clutch assembly forward to align the snap ring groove in the bearing with the snap ring in the housing. Being certain bearing snap ring is in full position in snap ring groove, remove pliers.



When all the clutches are properly aligned, the converter housing will be tight against the transmission housing. Install two housing to housing capscrews and lockwashers. Remove aligning studs. Install remaining capscrews and lockwashers. Tighten capscrews to specified torque. (See torque chart)

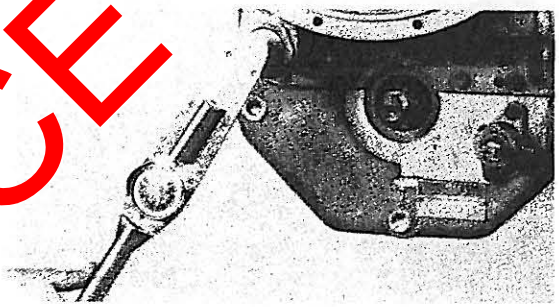


Figure 280

Install oil screen. Assemble and tighten 10 to 15 Ft. Lbs. torque. [13,6-20,3N.m]

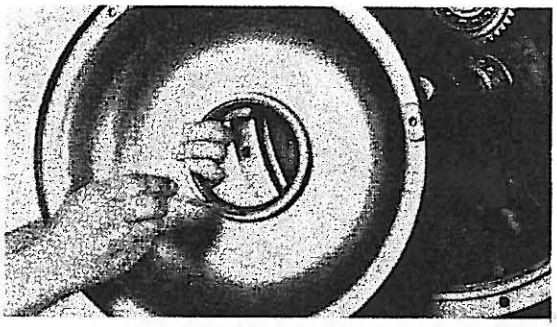


Figure 281

Apply a light coat of Dow Corning RTV-03-7069 sealant to O.D. of oil baffle or counter bore in converter housing. Remove immediately any excess sealant that could enter the oil circuit. Assemble new oil baffle oil seal in baffle. Position oil baffle puller screw holes 15° to 30° either side of vertical center line. Tap baffle into position until baffle shoulders in converter housing.

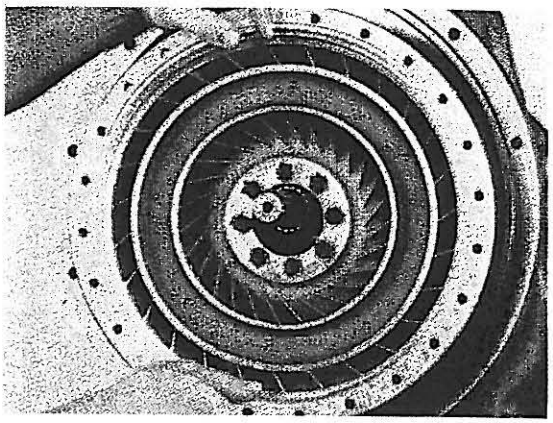


Figure 282

Install impeller and hub assembly using caution as not to damage the oil baffle oil seal.

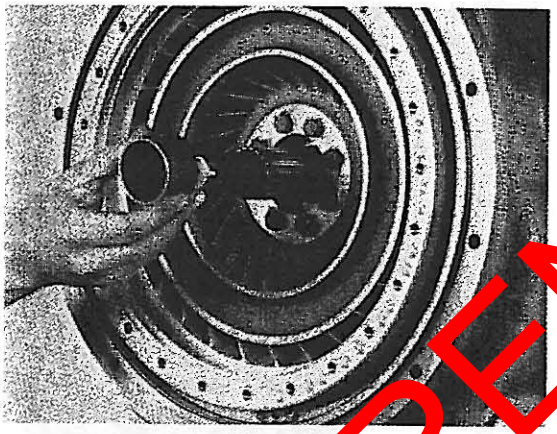


Figure 283

Position impeller hub bearing spacer on stator support.

Figure 284

Install fixed reaction member. For freewheel reaction member, see Figure 285.

FREEWHEEL ASSEMBLY

NOTE: The freewheel assembly cannot be serviced. If the freewheel is damaged it must be replaced as an assembly.

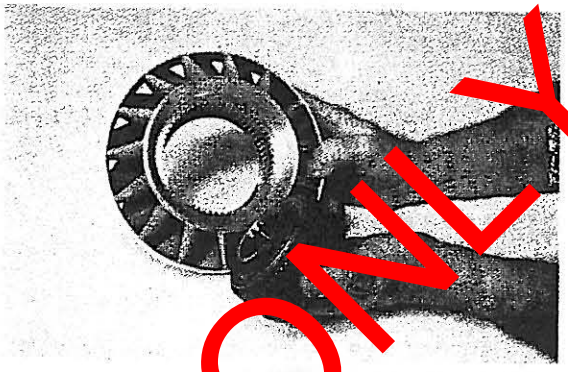


Figure 285

Install outer race and spring assembly in reaction member.

NOTE: Undercut shoulder of race must go toward the rear of the reaction member.

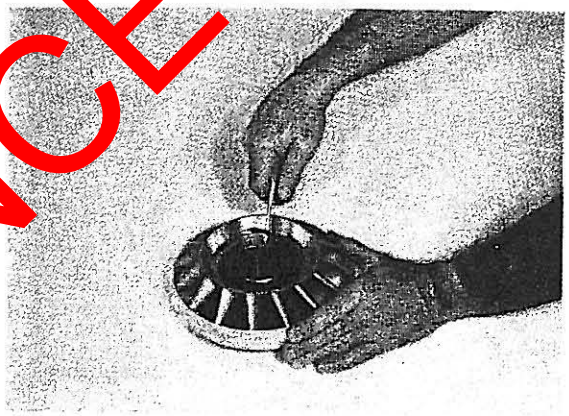


Figure 286

Install outer race to reaction member retainer ring.

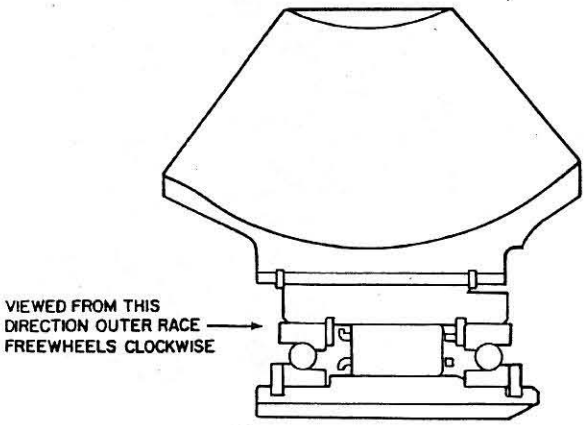


Figure 287

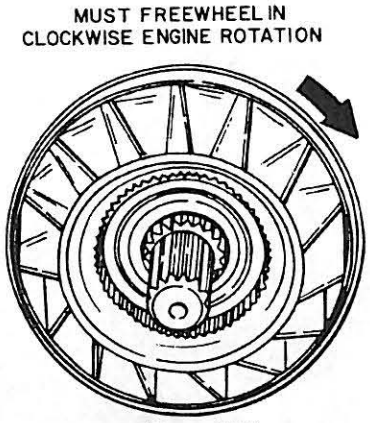


Figure 288

Position reaction member to impeller hub gear spacer on reaction member support. Install reaction member on support. Check rotation of freewheeling reaction member to be sure of proper freewheel assembly.

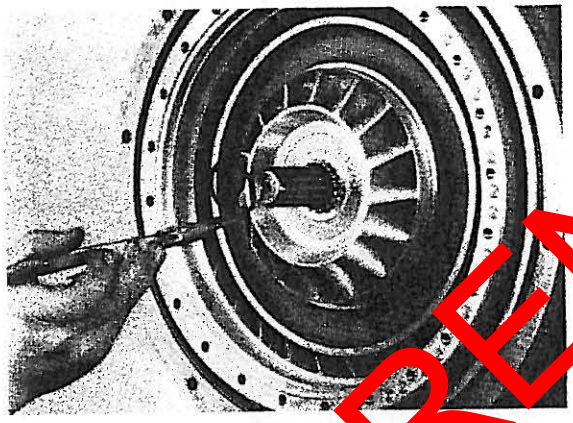


Figure 289

Install reaction member retainer ring.

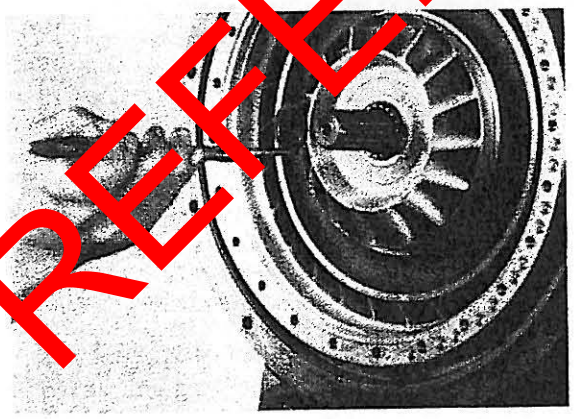


Figure 290

Install turbine locating ring.

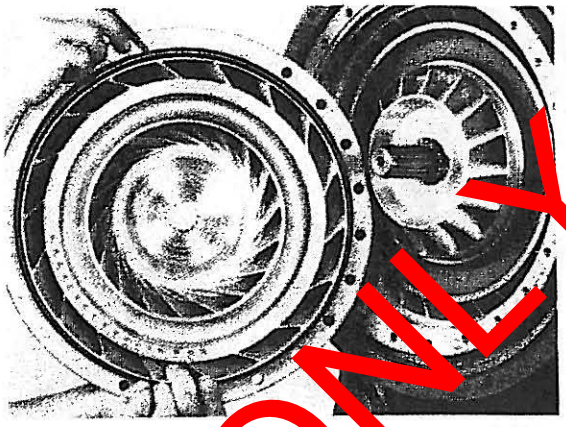


Figure 291

With a new impeller cover to impeller "O" ring in place, install turbine and impeller cover assembly on turbine shaft.

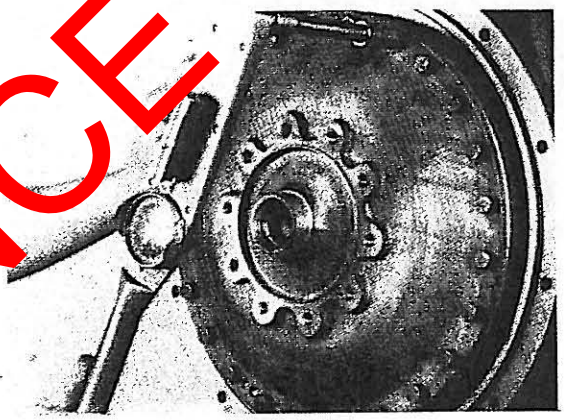


Figure 292

Install impeller cover to impeller washers and bolts. Tighten to specified torque. (See torque chart)

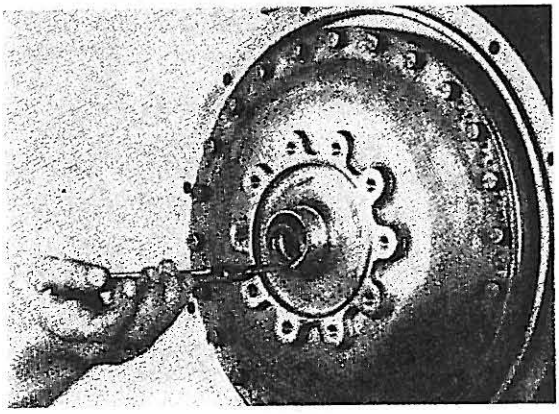


Figure 293

Install turbine retainer ring. See Figure 293-A.

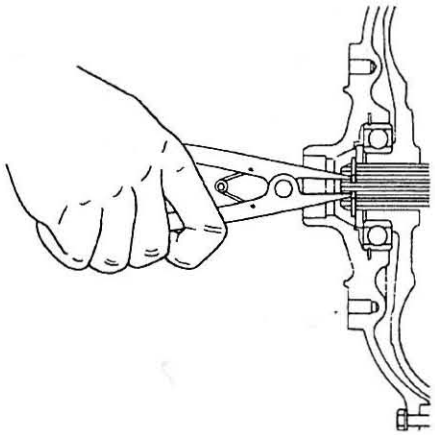


Figure 293-A

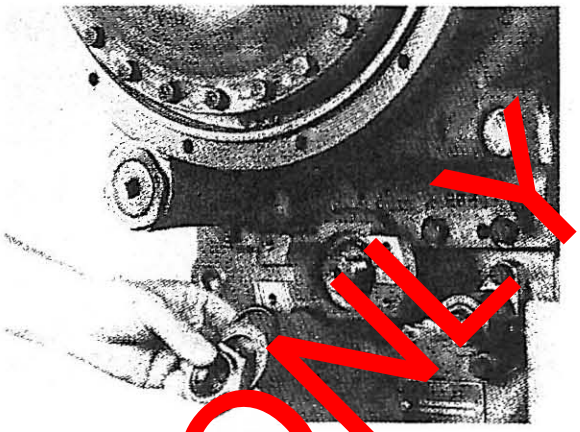


Figure 296

Place front output flange on shaft. Install "O" ring, washer and nut.

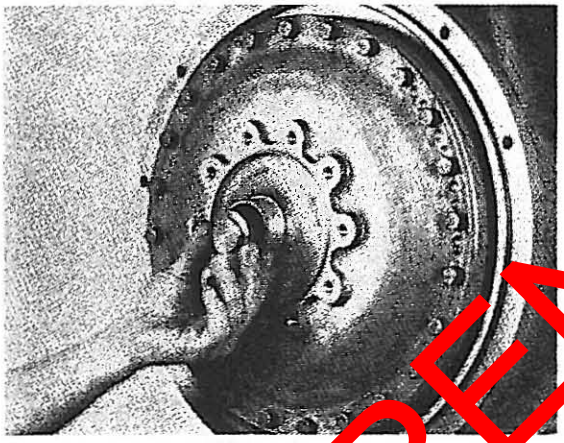


Figure 294

Position new "O" ring on impeller cover bore plug. Lubricate ring to facilitate assembly. Install plug in cover.

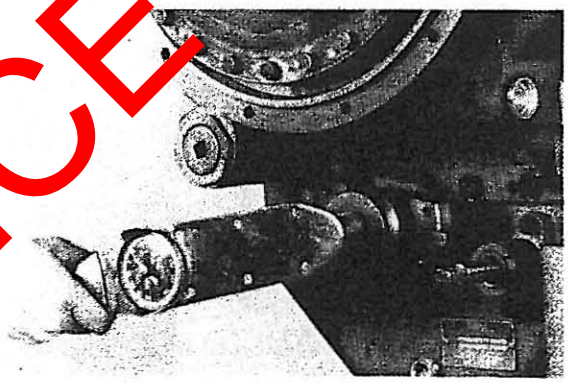


Figure 297

Use a flange retainer to prevent flange from turning and tighten nut 200 to 250 Ft. Lbs. torque. [271,2-338-9N.m]

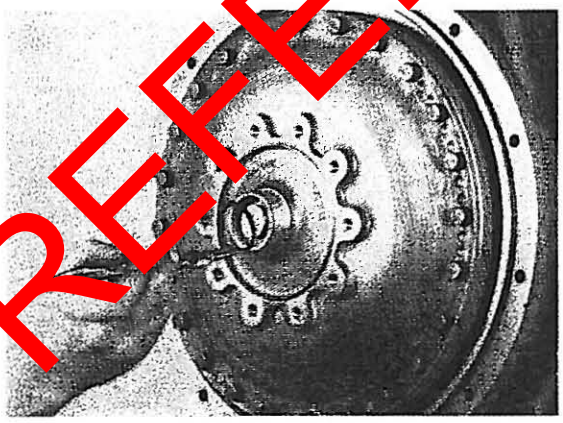


Figure 295

Install bore plug retainer ring.

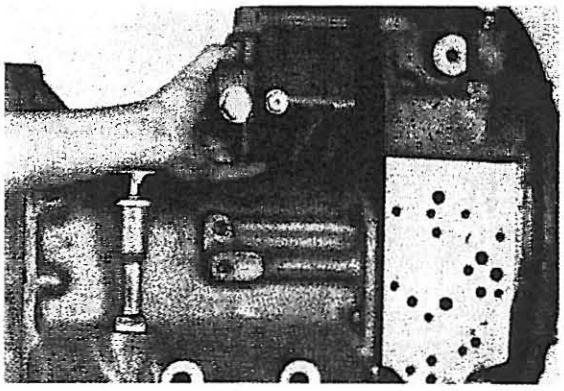


Figure 298

Using a new gasket and "O" ring, position charging pump assembly on studs. Install washers, nuts and capscrews.

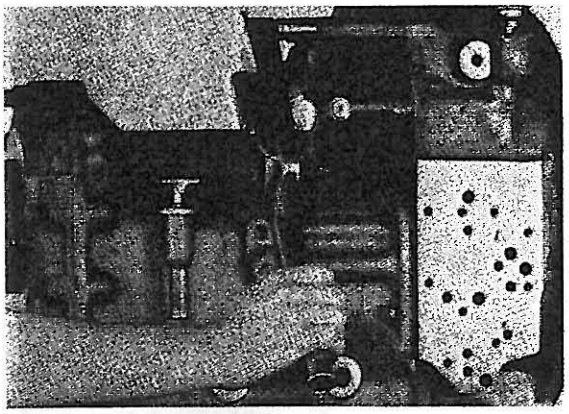


Figure 299

Tighten stud nuts and capscrews to specified torque. (See torque chart)

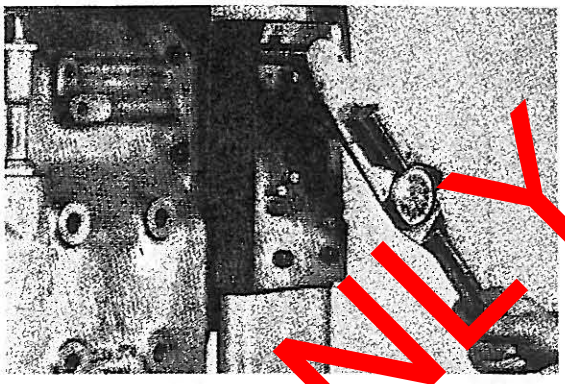


Figure 3

Position valve assembly [illegible] aligning studs. Install capscrews, remove aligning studs, install remaining capscews and tighten to specified torque (See torque chart)

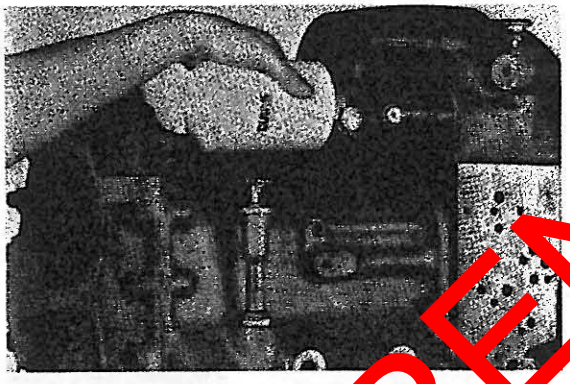


Figure 30

Install new oil filter cartridge. **NOTE:** It is recommended that the filter cartridge be changed after 50 and 100 hours of operation on new and rebuilt or replaced units.

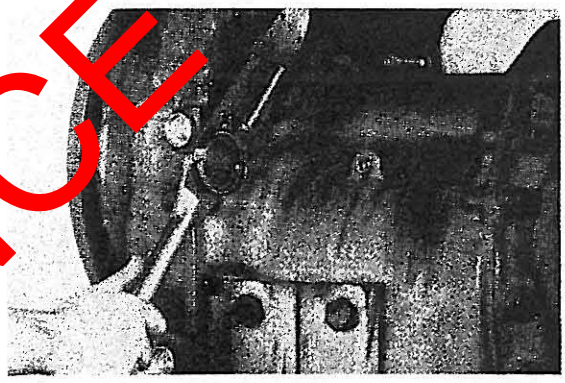


Figure 303

If auxiliary pump is not used, install gasket and pump hole cover. Install bolts and washers and tighted to specified torque. (See torque chart)

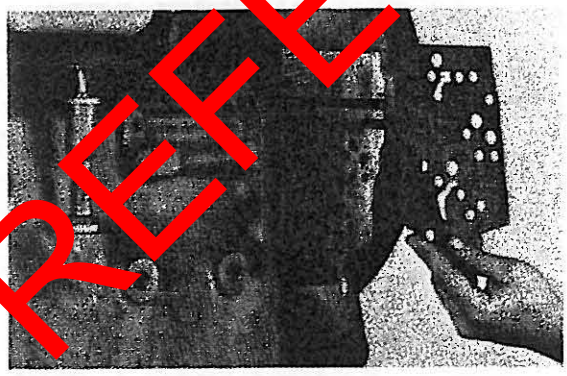


Figure 301

Place a new control valve gasket on housing. **NOTE:** The use of aligning studs will facilitate valve installation.

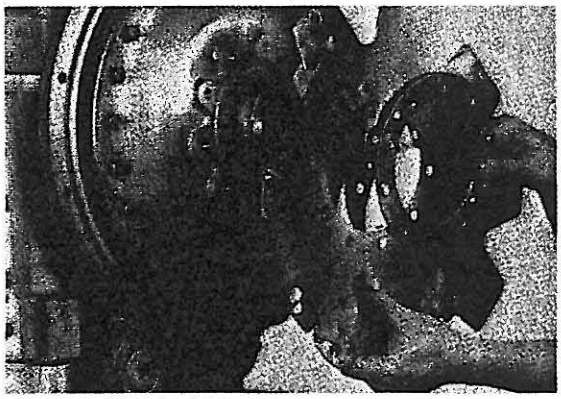


Figure 304

See special section on page 64 for drive plate installation.

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 solvent 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.

SERVICING MACHINE AFTER TRANSMISSION OVERHAUL

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

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

The following are considered the minimum steps to be taken:

1. Drain engine system thoroughly.

2. Disconnect and clean all hydraulic lines. Where feasible, hydraulic lines should be removed from machine for cleaning.

3. Replace oil filter elements, cleaning out filter cases thoroughly.

4. The oil cooler must be thoroughly cleaned. The cooler should be "back flushed" with oil and compressed air until all foreign material has been removed. Flushing in direction of normal oil flow will not adequately clean the cooler. If necessary, cooler assembly should be removed from machine for cleaning, using oil, compressed air and steam cleaner for that purpose. **DO NOT** use flushing compounds for cleaning purposes.

5. On remote mounted torque converters remove drain plug from torque converter and inspect interior of converter housing, gears, etc. If presence of considerable foreign material is noted, it will be necessary that converter be removed, disassembled and cleaned thoroughly. It is realized this entails extra labor; however, such labor is a minor cost compared to cost of difficulties which can result from presence of such foreign material in the system.

6. Reassemble all components and use only type oil recommended in lubrication section. Fill transmission through filler opening until fluid comes up to **LOW** mark on transmission dipstick.

   Run engine two minutes at 500-600 RPM to prime torque converter and hydraulic lines. Recheck level of fluid in transmission with engine running at idle (500-600 RPM).

   Add quantity necessary to bring fluid level to **LOW** mark on dipstick. Recheck with hot oil (180-200° F.) [82, 2-93, 3° C].

   Bring oil level to **FULL** mark on dipstick.

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

TOWING OR PUSH STARTING

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

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

SPECIFICATIONS AND SERVICE DATA—POWER SHIFT TRANSMISSION AND TORQUE CONVERTER

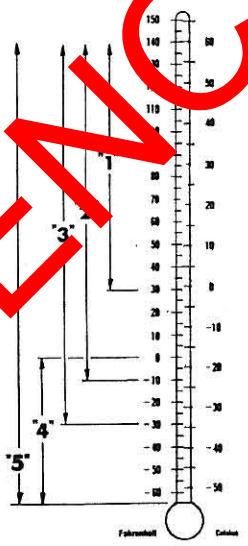
CONVERTER OUT PRESSURE	Converter outlet oil temp. 180° - 200° F. [82,3° - 93,3° C]. Transmission in **NEUTRAL.** Operating specifications: 25 P.S.I. [172,4 kPa] minimum pressure at 2000 R.P.M. engine speed **AND** a maximum of 70 P.S.I. [482,6 kPa] outlet pressure with engine operating at no-load governed 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	180-220 psi [1241,1 - 1516,8 kPa] — With parking brake set **(see note)** , oil temperature 180° - 200° F. [82,2° - 93,3° C], engine at idle (400 to 600 RPM), shift thru direction and speed clutches. All clutch pressure must be equal within 5 psi, [34,5 kPa]If ,clutch pressure varies in any one clutch more than 5 psi, [34,5 kPa] repair clutch. **NOTE: Never use service brake while making clutch pressure checks. Units using 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 elements. 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. (b) Drain oil filter, 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. 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 TRANSMISSIONS 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

*Dexron is a registered trademark of General Motors Corporation.

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, 15000 & 34000 series transmissions with modulated shift use only C-3 or temperature range 3 item (a) only *Dexron. Do **NOT** use *Dexron II D. **SEE CAUTION BELOW.**

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

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

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

TROUBLE SHOOTING GUIDE

For The

R & HR Model, 18000 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. If 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-18000 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-18000 only)	4. Check oil line connections and tighten securely.

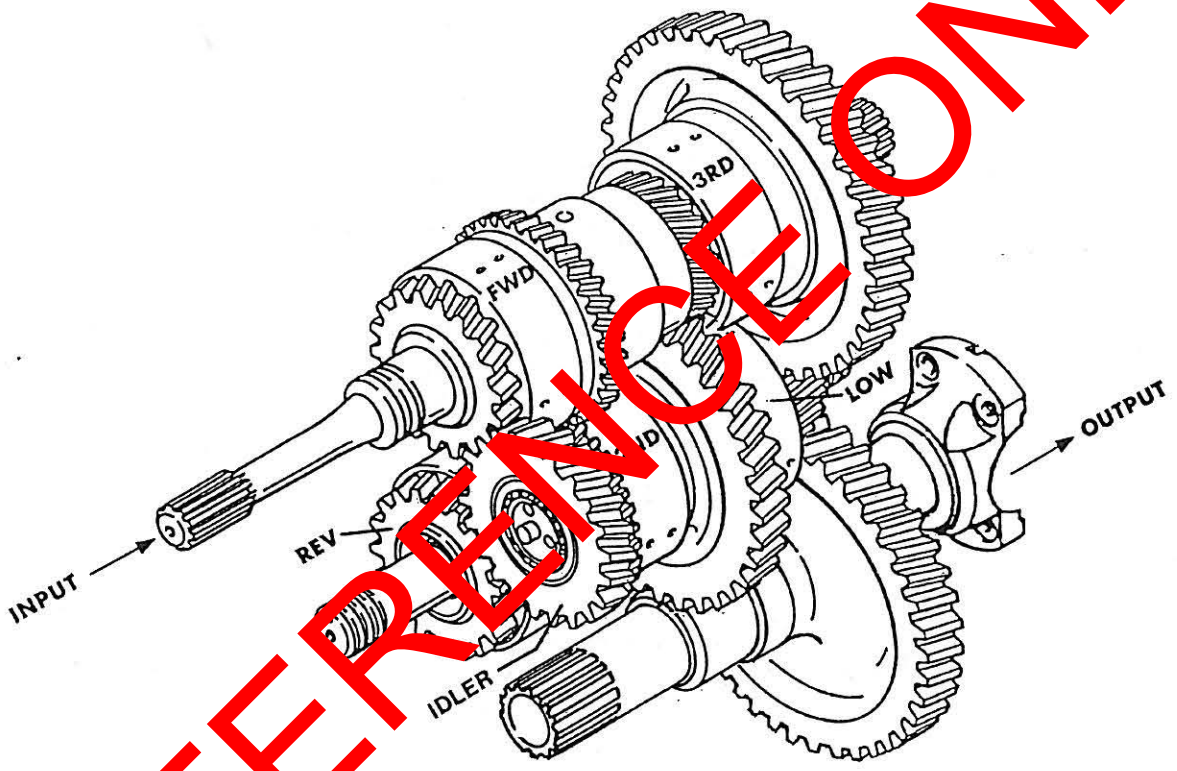
NOISY CONVERTER

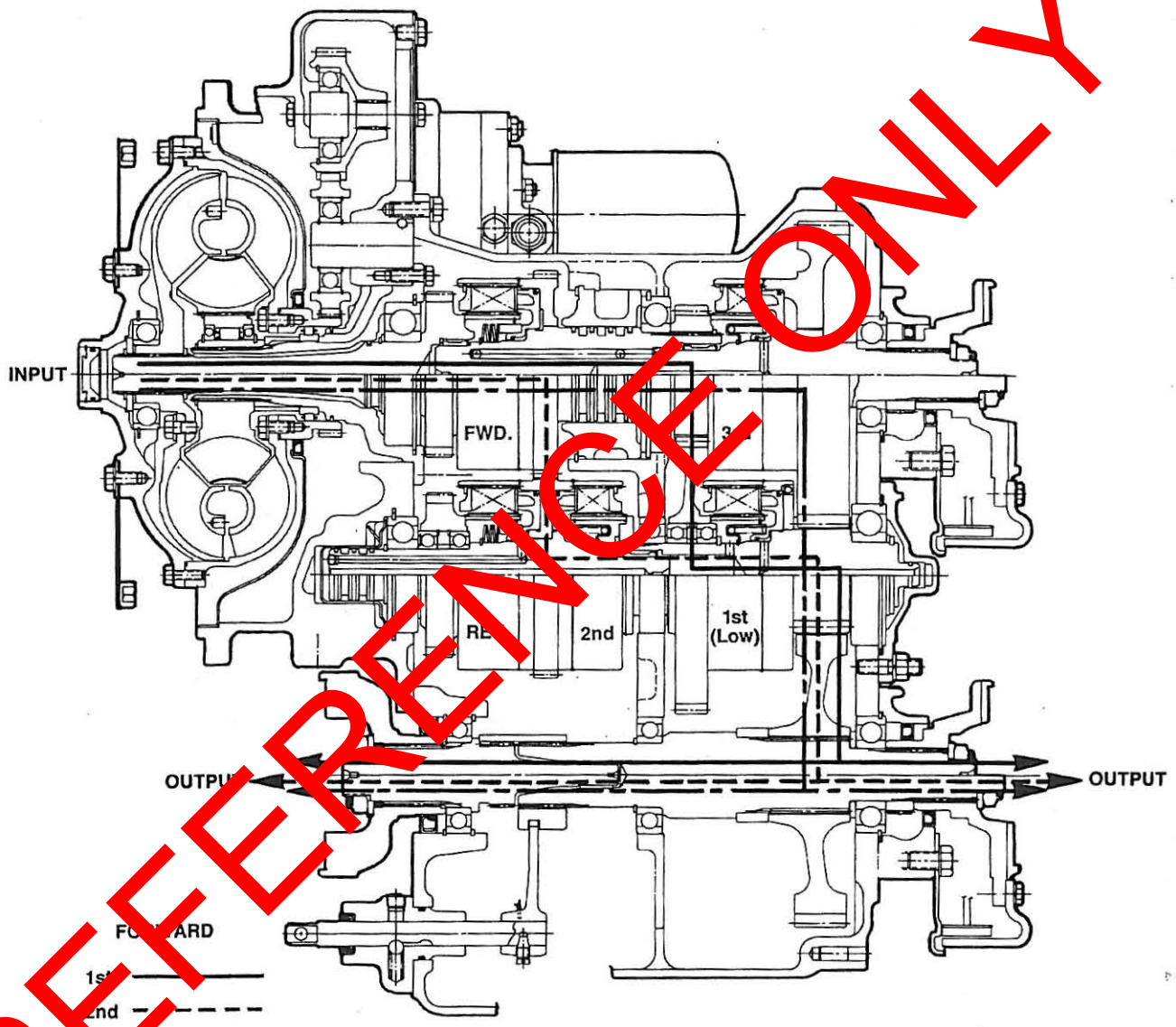
1. Worn oil pump.	1. Replace.
2. Worn or damaged bearings.	2. A complete disassembly will be necessary to determine what bearing is faulty.

LACK OF POWER

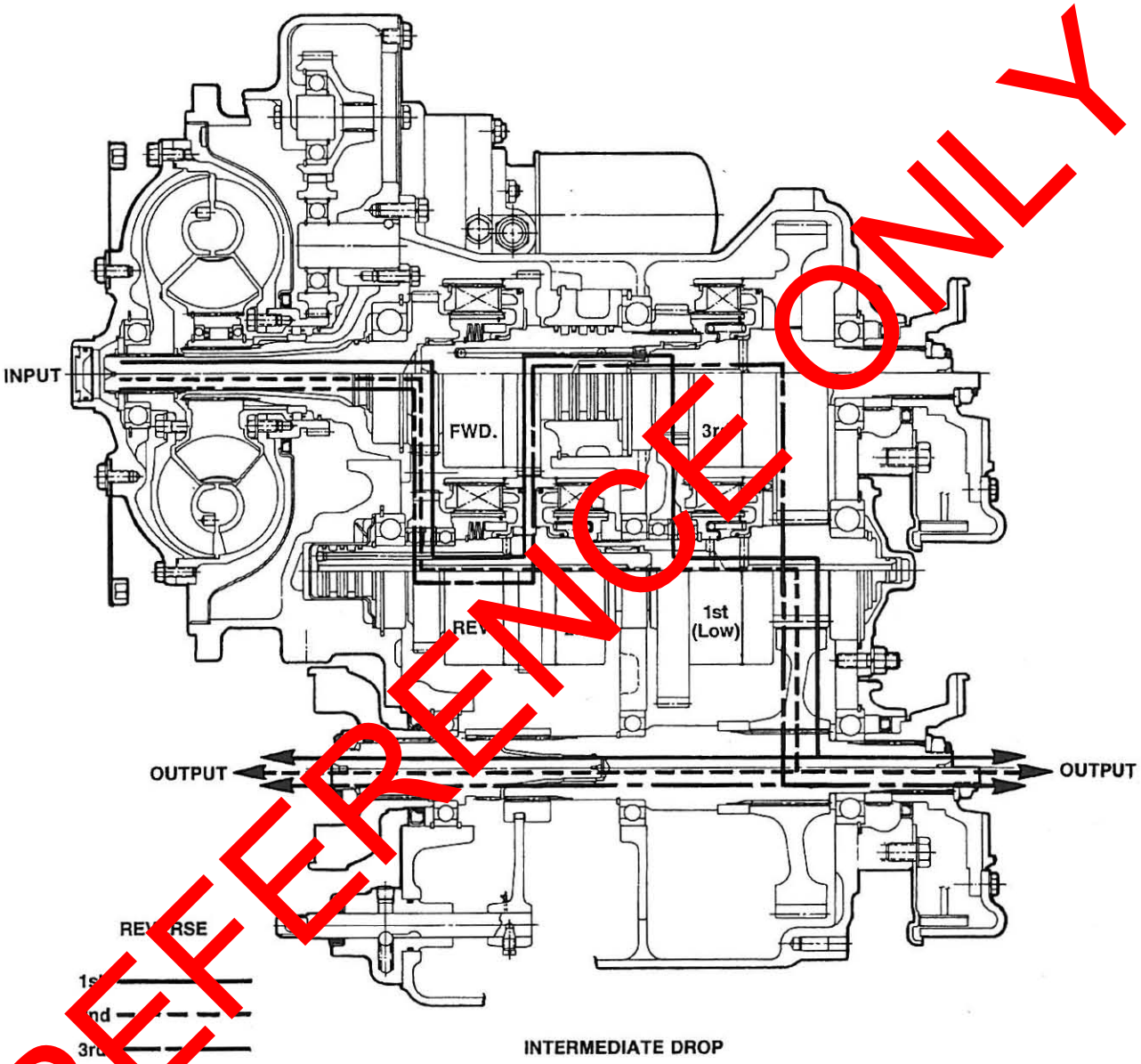
1. Low engine RPM at converter stall.	1. Tune engine check governor.
2. See "Overheating" and make same checks.	2. Make corrections as explained in "Overheating."

18000 3 SPEED INTERMEDIATE DROP CLUTCH AND GEAR ARRANGEMENT

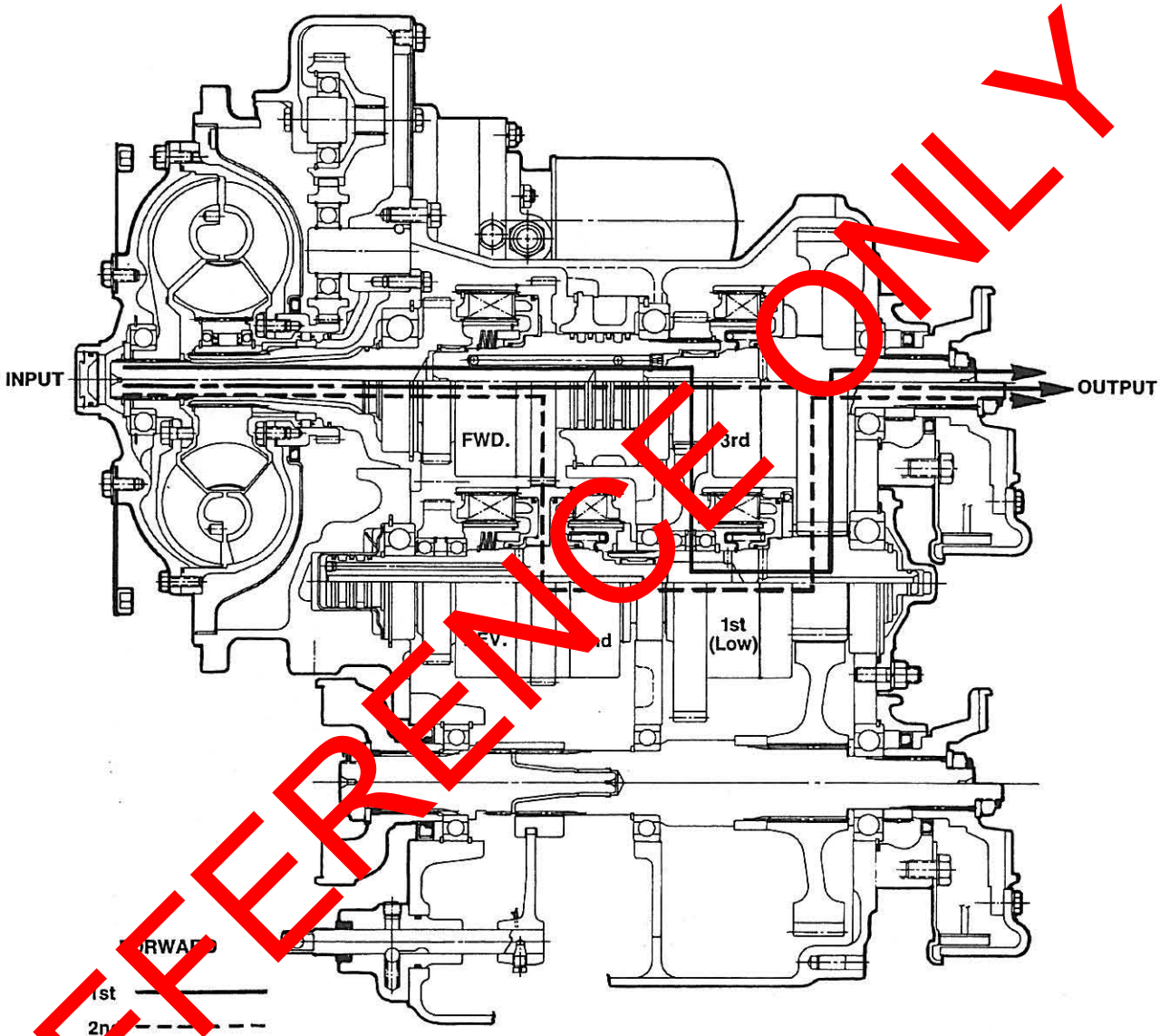




INTERMEDIATE DROP



INTERMEDIATE DROP



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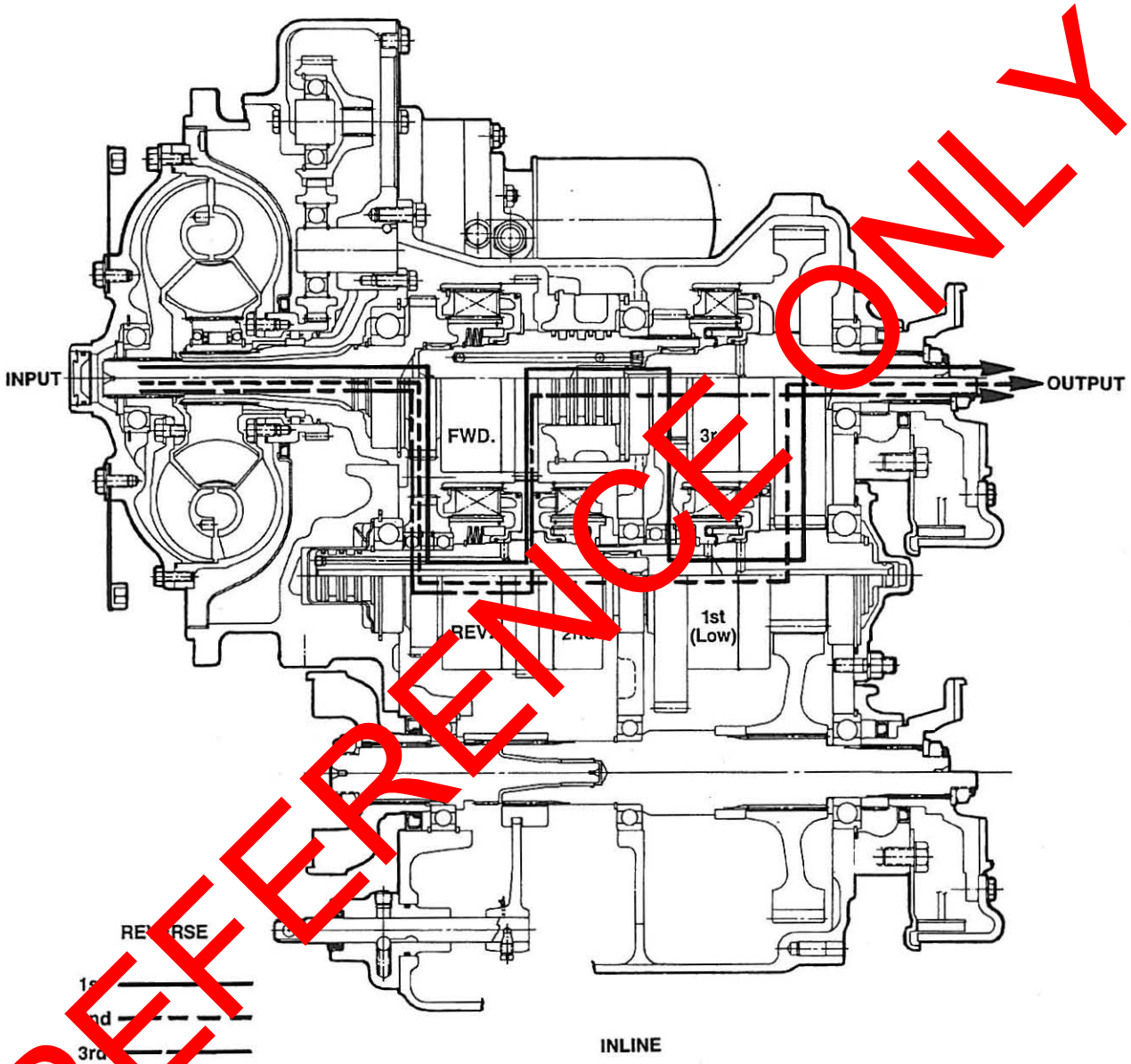

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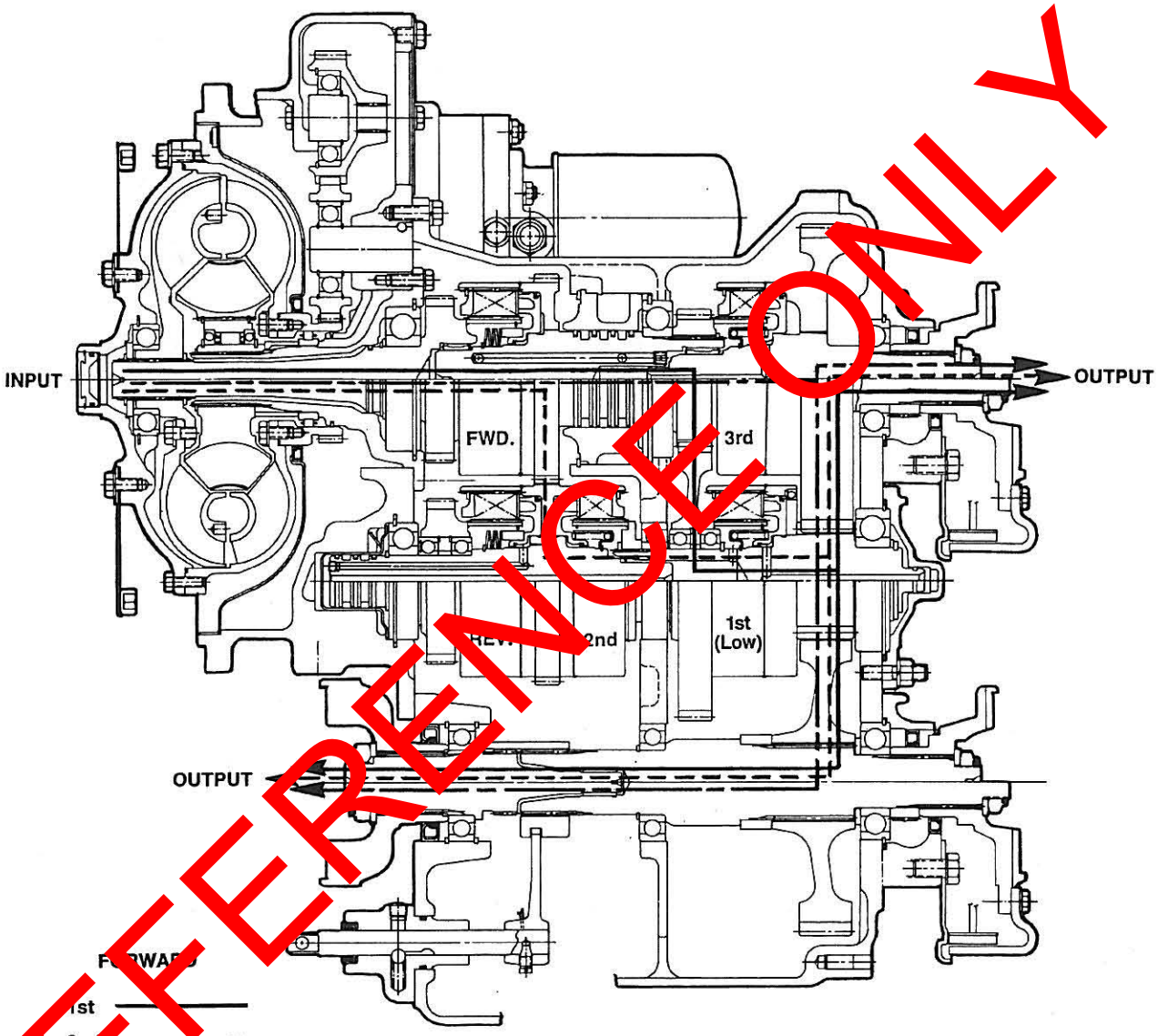
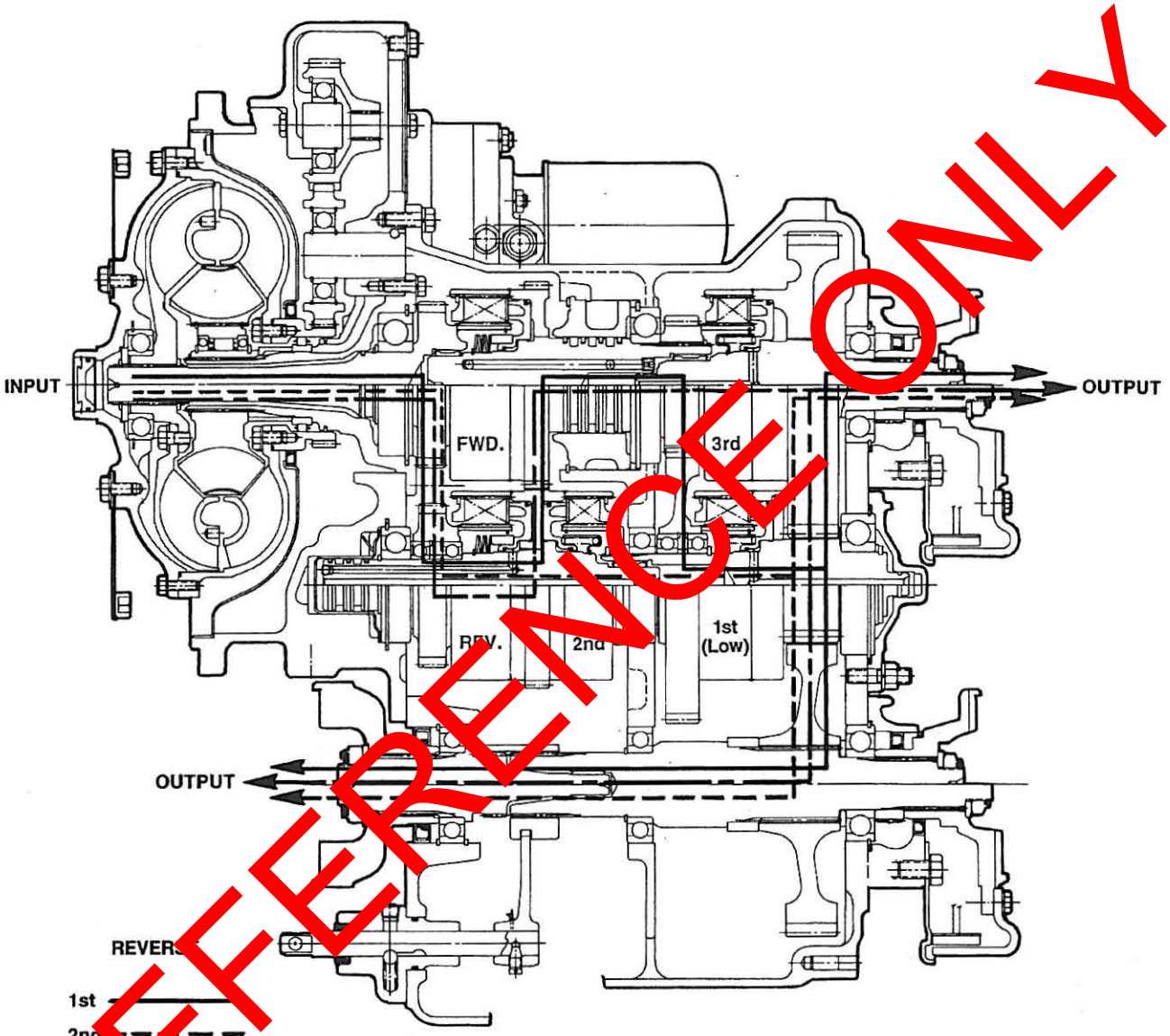


INLINE—FRONT DISCONNECT



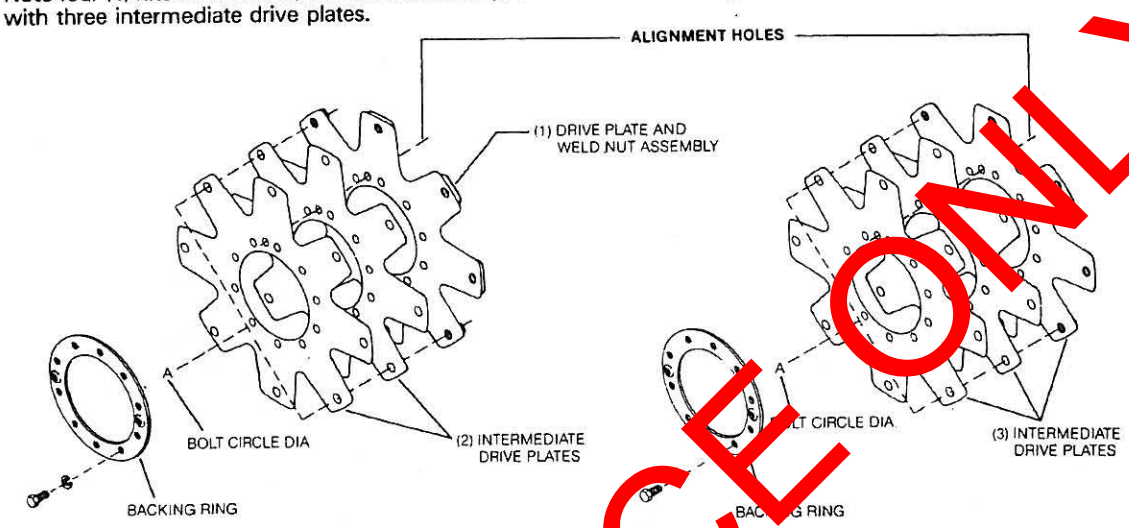
INLINE—FRONT DISCONNECT

18000 SERIES TRANSMISSION CONVERTER DRIVE PLATE KITS

Proper Identification by Bolt Circle Diameter

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

Note four (4) kits have two (2) intermediate drive plates and one (1) drive plate and weld nut assembly. Two (2) kits with three intermediate drive plates.



"A" Dimension (Bolt Circle Diameter)

11.38" [288,900 mm] Diameter
Kit No. 802229

13.12" [333,375 mm] Diameter
Kit No. 802230

13.50" [342,900 mm] Diameter
Kit No. 802231

17.00" [431.800 mm] Diameter
Kit No. 802356

Each Kit will include the fo wi pa

2 Intermediate Dri Plates.
1 Drive Plate an Weld Nut As mbly.
1 Backing Ring
10 Screw an Loc her As mbly.
1 Instruct n Sheet.

"A" Dim nsion (Bolt Circle Diameter)

[288,900 mm] Diameter
Kit No. 802494

13.12" [333,375 mm] Diameter
Kit No. 802393

13.50" [342,900 mm] Diameter
Kit No. 802232

Each Kit will include the following parts:

3 Intermediate Drive Plates.
1 Backing Ring.
10 Screw and Lockwasher Assembly.
1 Instruction Sheet.

NOTE: Some drive plates and backing rings will have fourteen (14) mounting holes. Only ten (10) mounting holes will be used.

TO F ILITA ASSEMBLY, ALIGN SMALL HOLES IN DRIVE PLATES — SEE ILLUSTRATION ABOVE.

P ition d e plat nd weld nut assembly on impeller cover with weld nuts toward cover. Align intermediate drive pl a an backing ring with holes in impeller cover. **NOTE**: Two dimples 180° apart in backing ring must be out (tow engin lywheel). Install capscrews and washers. Tighten 23 to 25 lbf·ft torque [31,2 - 33,8 N·m.].

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 2.50 [63, 50 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. **NOTE:** Fig. 4 installation, align drive plate holes with flywheel studs.

   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. NOT**[illegible]g. 4 installation, install drive plate att[illegible]g w[illegible]hers and nuts. Tighten each nut 28 [illegible] 30 ft. lbs. torque [38,0 - 40,6 N.m]. 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 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[illegible] - 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 [0,025mm] of the end play recorded in step No. 2.

* Does not apply to units having 3 intermediate drive plates. See Fig. 4.

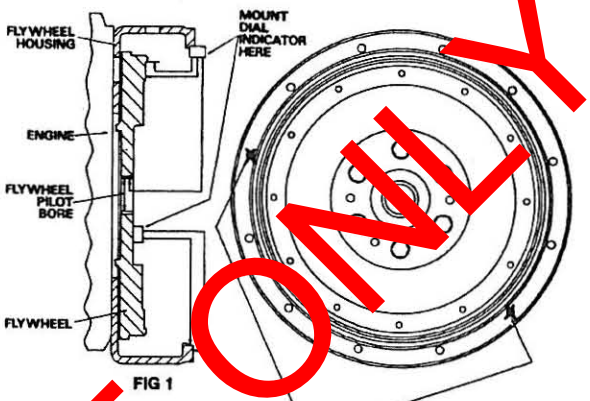


FIG 1

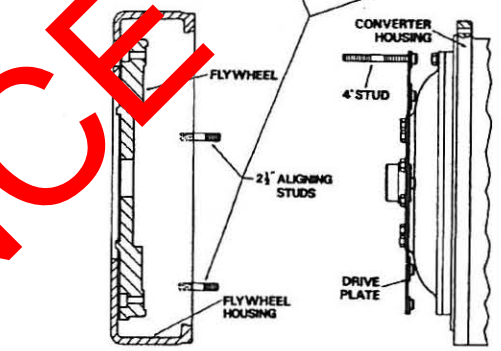


FIG 2

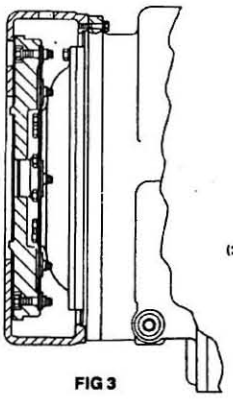


FIG 3

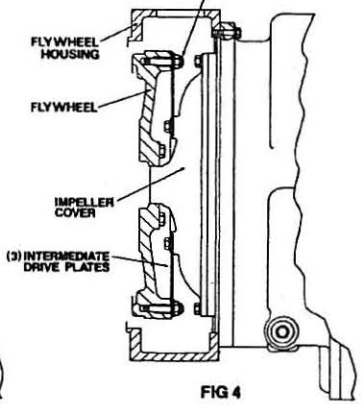


FIG 4

If the turbine or turbine hub was replaced or disassembled, this procedure must be used for reassembly.

TURBINE HUB ASSEMBLY WITH BACKING RING AND SPECIAL SELF LOCKING SCREWS

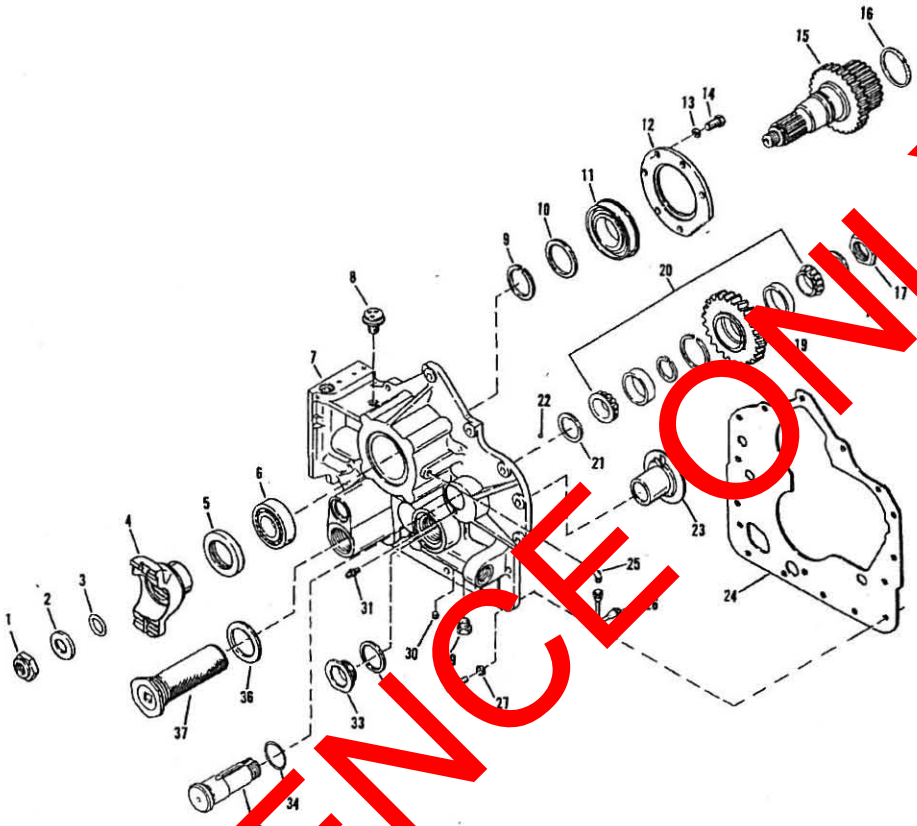
1. Clean hub mounting surface and tapped holes with solvent. Dry thoroughly being certain tapped holes are dry and clean.

2. Install backing ring and special screws to approximately .06 [1,5] of seated position. With a calibrated torque wrench, tighten screws 37 to 41 lbs. ft. torque [50,2 - 55,6 N·m]. **NOTE:** Assembly of 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.

Figure B

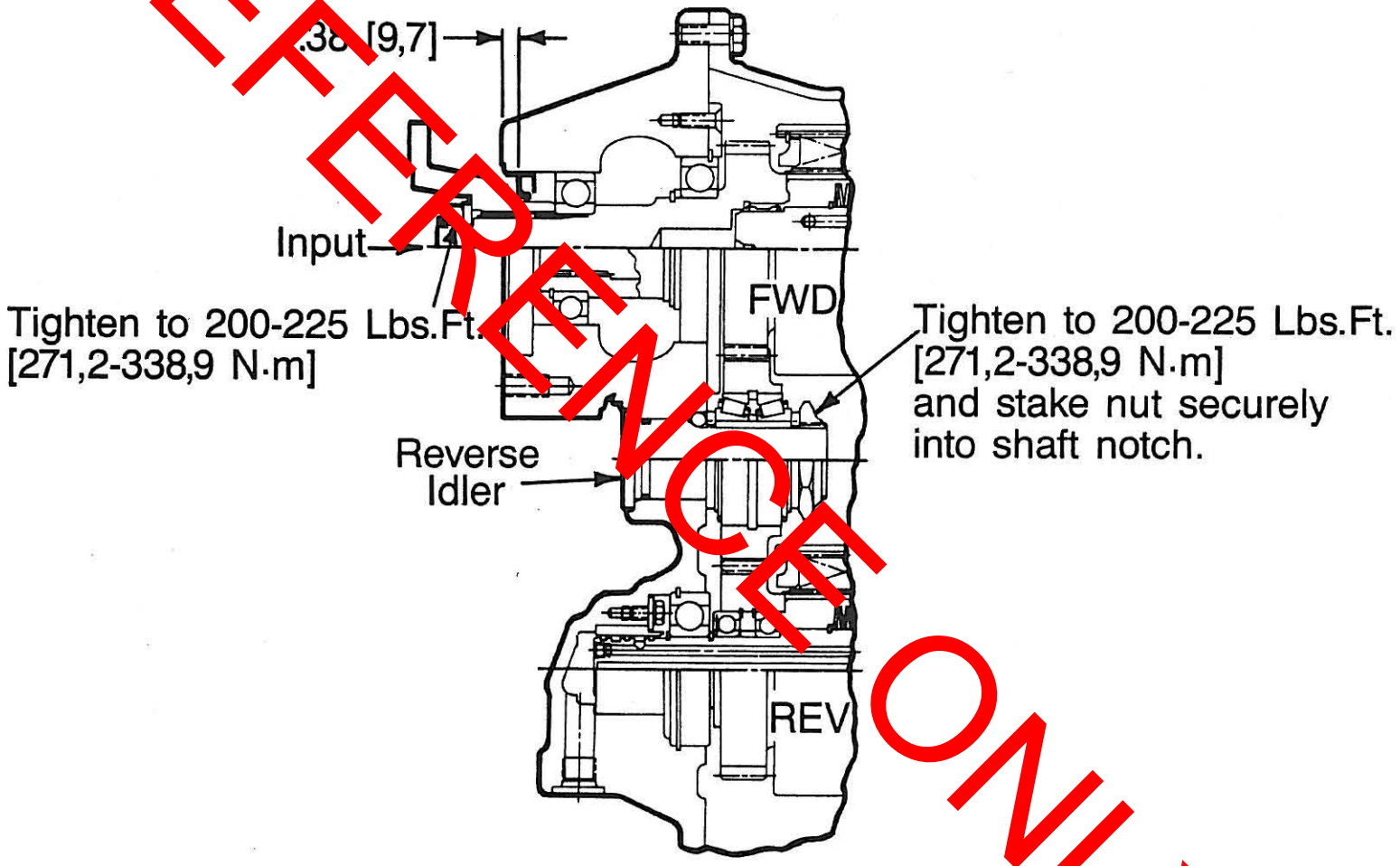
Figure C

R MODEL FRONT COVER GROUP



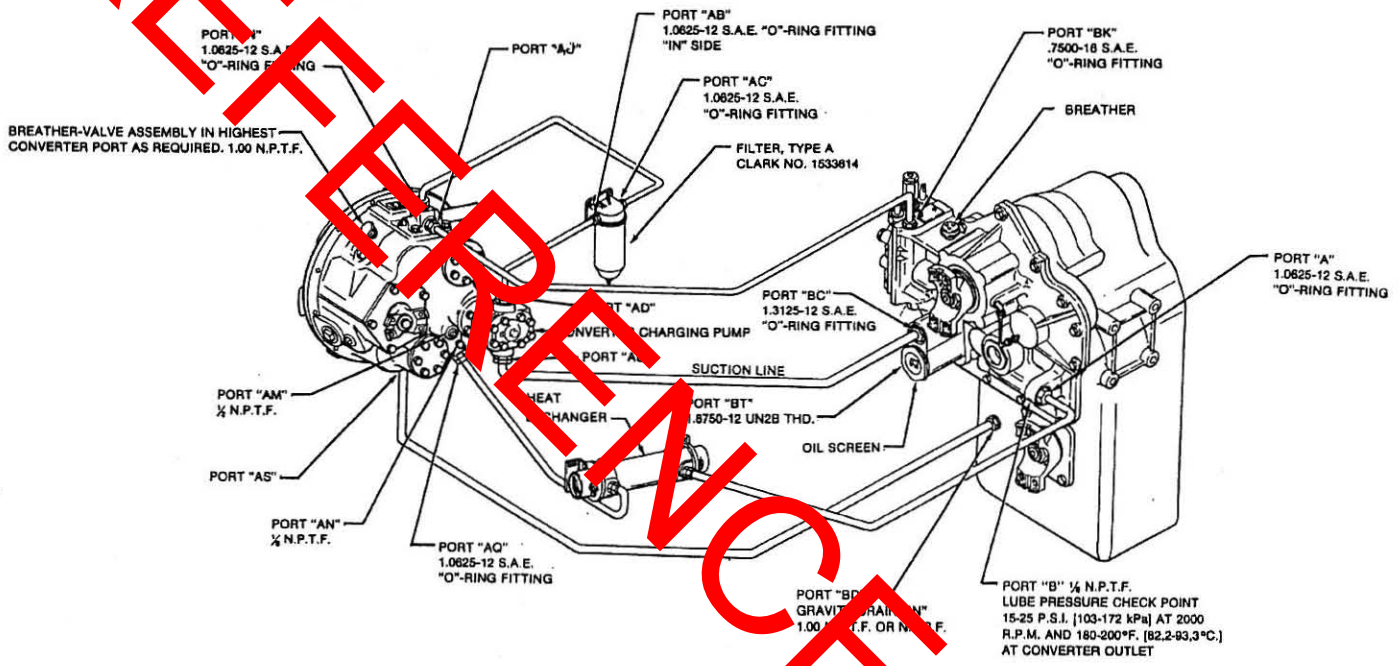
ITEM	DESCRIPTION	QTY
1	Input Flange Nut	1
2	Input Flange Washer	1
3	Input Flange "O" Ring	1
4	Input Flange	1
5	Input Flange Oil Seal	1
6	Input Shaft Front Bearing	1
7	Front Cover	1
8	Breather	1
9	Rear Bearing Snap Ring	1
10	Rear Bearing Washer	1
11	Input Shaft Rear Bearing	1
12	Rear Bearing Retaining Plate	1
13	Retaining Plate Screw Lockwasher	6
14	Retaining Plate Screw	6
15	Input Shaft & Hub Assembly	1
16	Baffle Ring	1
17	Bearing Retainer Plate Nut	1
18	Reverse Idler Thrust Plate	1
19	Reverse Idler Gear	1

ITEM	DESCRIPTION	QTY
20	Reverse Idler Gear Bearing Assembly	1
21	Reverse Idler Thrust Plate	1
22	Idler Shaft Lockball	1
23	Clutch Shaft Oil Sealing Ring Sleeve	1
24	Front Cover to Transmission Case Gasket	1
25	Lube Tube Fitting	1
26	Lube Tube Assembly	1
27	Front Cover to Case Screw Lockwasher	16
28	Front Cover to Case Screw	16
29	Lube Plug	1
30	Lube Plug	1
31	Lube Tube Fitting	1
32	Front Cover Plug Gasket	1
33	Front Cover Plug	1
34	Reverse Idler Shaft "O" Ring	1
35	Reverse Idler Shaft	1
36	Screen Assembly Gasket	1
37	Suction Screen Assembly	1



R-MODEL

PLUMBING DIAGRAM
R-18000 SERIES TRANSMISSION



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 P.S.I. [2068 kPa] CONTINUOUS PRESSURE WITH 600 P.S.I. [4136 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.

PORT "AS" — CONVERTER DRAIN

SELECT LOWEST OF PORTS NOTED FOR GRAVITY DRAIN TO TRANSMISSION. LINE MUST HAVE CONTINUOUS SLOPE FROM CONVERTER TO TRANSMISSION. IF VEHICLE CONFIGURATION WILL NOT ALLOW SLOPE OF DRAIN LINE UNDER ALL OPERATING CONDITIONS. A SCAVENGER PUMP MUST BE PROVIDED.

PORT "AM" — CONVERTER OUTLET TEMPERATURE

PORT IS TO BE USED FOR CONVERTER OUTLET TEMP. PICK-UP. GAUGE IS TO BE LOCATED IN THE OPERATOR COMPARTMENT. SEE OIL TEMP. GAUGE SPECIFICATIONS.

PORT "AN" — CONVERTER OUTLET PRESSURE

CONVERTER OUTLET PRESSURE EQUALS THE TOTAL PRESSURE DROP OF THE HEAT EXCHANGER, HEAT EXCHANGER LINES AND BACK PRESSURE VALVE IN THE TRANSMISSION LUBRICATION SYSTEM. CONVERTER OUTLET OIL TEMP. 180°-220°F. [82,2°-93,3°C.]. TRANSMISSION IN NEUTRAL.

OPERATING SPECIFICATIONS:

25 P.S.I. [172 kPa] MIMIMUM PRESSURE AT 2000 R.P.M. ENGINE AND MAXIMUM OF 70 P.S.I. [482 kPa] OUTLET PRESSURE WITH ENGINE AT NO-LOAD GOVERNED SPEED.

CLUTCH PRESSURE

180-220 P.S.I. [1241-1516 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 WITH 5 P.S.I. [34 kPa]. IF CLUTCH PRESSURE VARIES IN ANY ONE CLUTCH MORE THAN 5 P.S.I. [34 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.

HOSE LINE SIZE			
FROM PORT	TO PORT	LINE I.D.	REMARKS
BC	AE	1.00 [25,4]	SUCTION LINE
AD	AB	.75 [19,0]	
AC	N	.75 [19,0]	
A	BK	.50 [12,7]	
AO	HEAT EXCHANGER	.75 [19,0]	
HEAT EXCHANGER	A	.75 [19,0]	
AS	BD	1.00 [25,4]	DRAIN LINE
HEAT EXCHANGER	AD	.75 [19,0]	
	A	.75 [19,0]	

NOTES

18000 3 SPEED INTERMEDIATE DROP OUTPUT

R-Model (remote mounted) transmission front cover removal, disassembly, reassembly and installation on transmission

CAUTION: Cleanliness is of extreme importance 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.

FRONT COVER REMOVAL

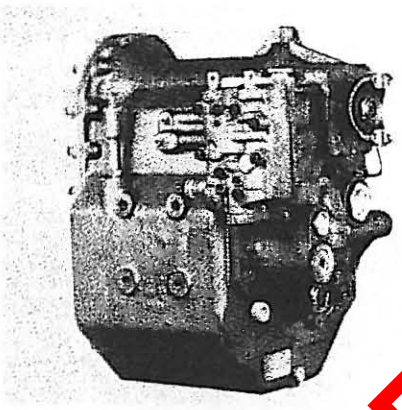


Figure 305
Side view of R-18000 with mechanical control valve.

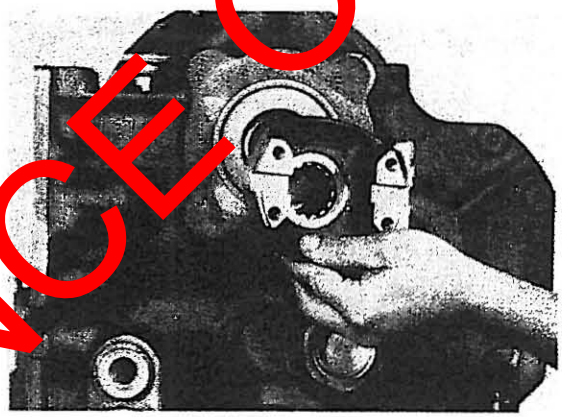


Figure 307
Remove input flange.

Figure 306
Remove control valve bolts and washers, remove control valve, use caution as not to lose detent balls and springs. Remove input flange nut, washer and "O" ring.

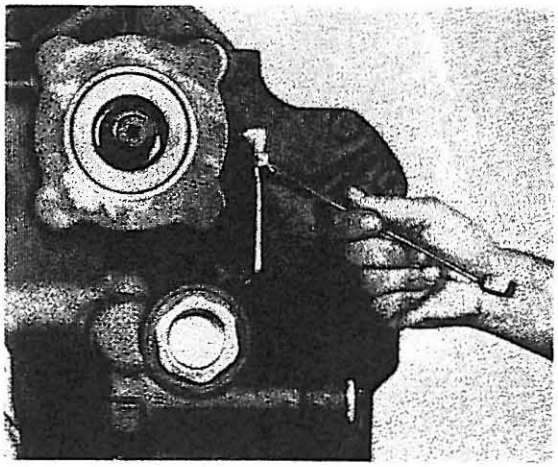


Figure 308
Loosen lube tube fitting nut.

FRONT COVER DISASSEMBLY

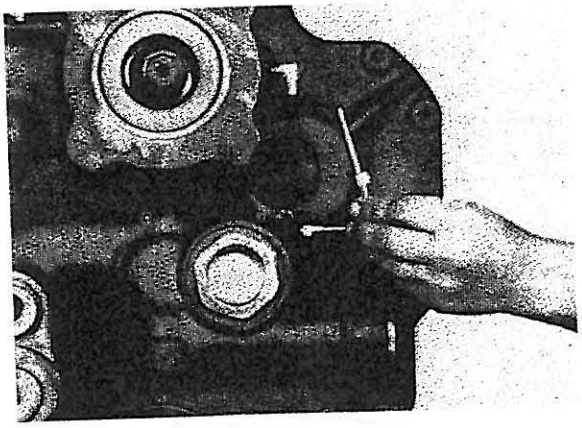


Figure 309
Remove lube tube and fittings for cleaning or replacing.

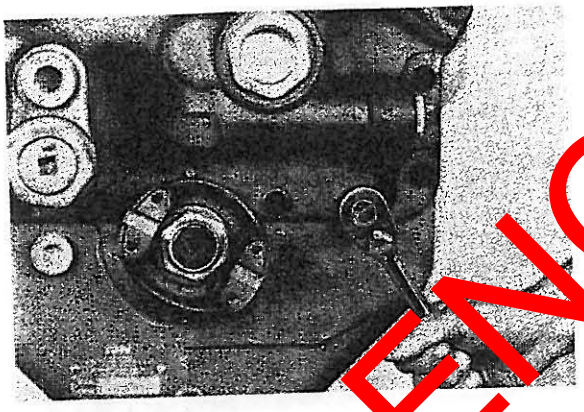


Figure 310
Support front cover with a main hoist. Remove front cover to transmission case bolts and washers.

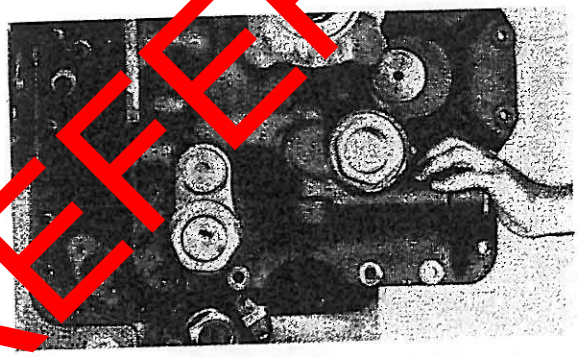


Figure 311
Separate front cover from transmission case assembly. **NOTE:** Reverse and 2nd clutch will come out with front cover.

See Figure 31 for Transmission Disassembly

Figure 312
Spread reverse clutch front bearing locating ring out of bearing ring groove. Pry reverse and 2nd clutch from front cover.

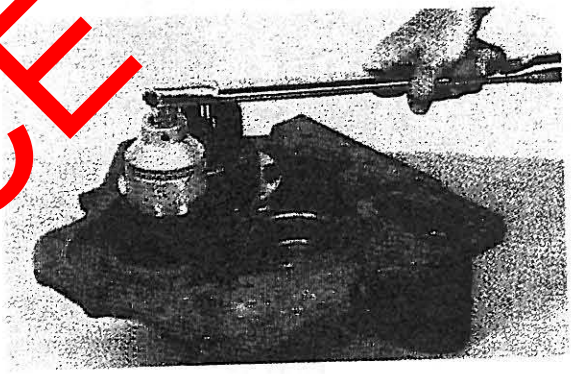


Figure 313
Unclinch lock nut by straightening upset metal in notch in idler shaft. Remove idler shaft nut.

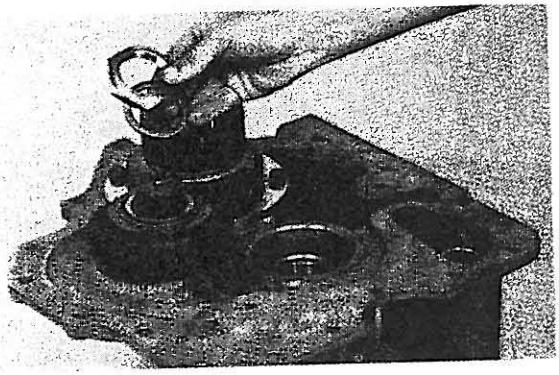


Figure 314
Remove nut and spacer.

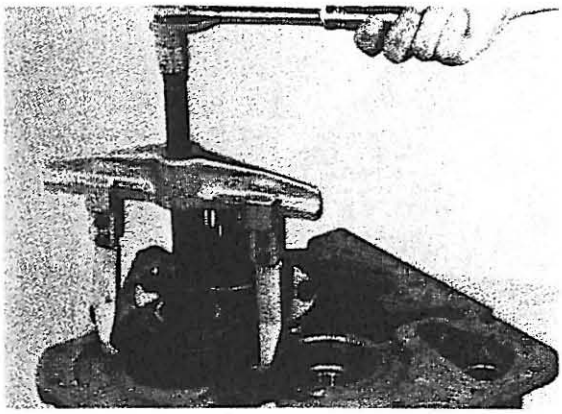


Figure 315
Remove idler gear and outer taper bearing.

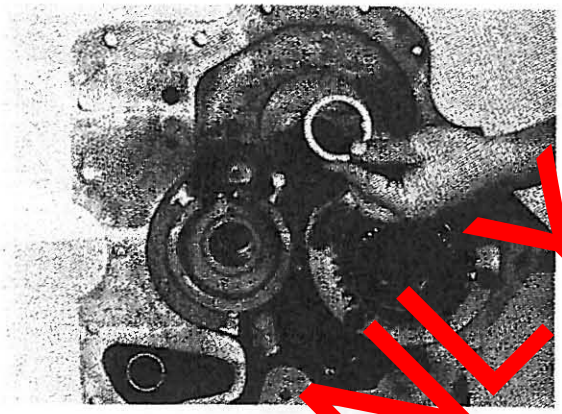


Figure 318
Remove inner bearing spacer.

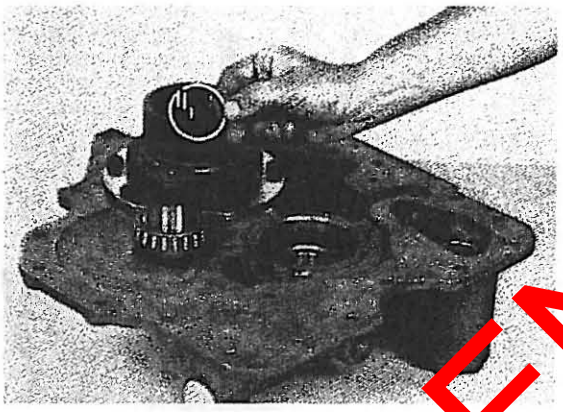


Figure 316
Remove taper bearing spacer.

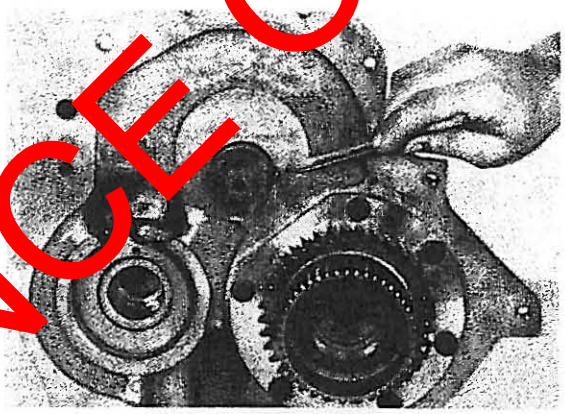


Figure 319
Note idler shaft lock ball.

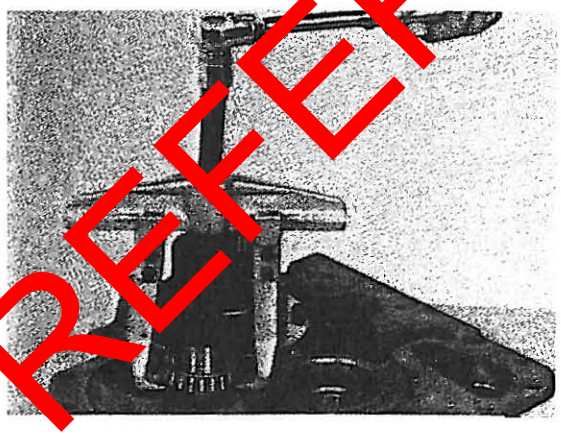


Figure 317
Remove inner taper bearing.

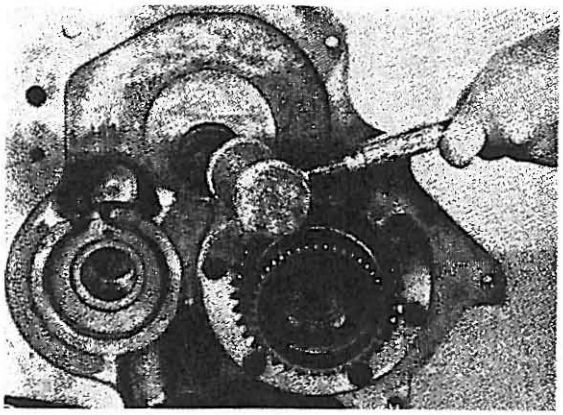


Figure 320
Tap idler shaft from cover, use caution as not to lose lock ball.

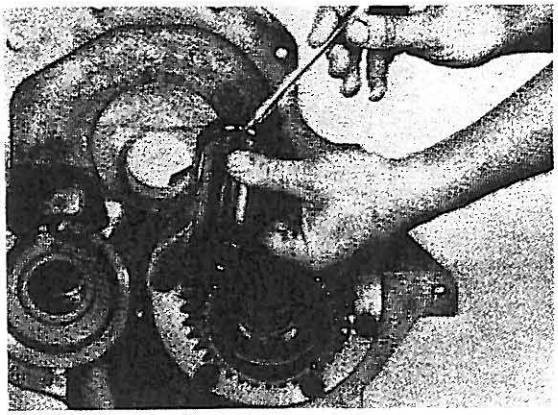


Figure 321
Remove idler shaft "O" ring.

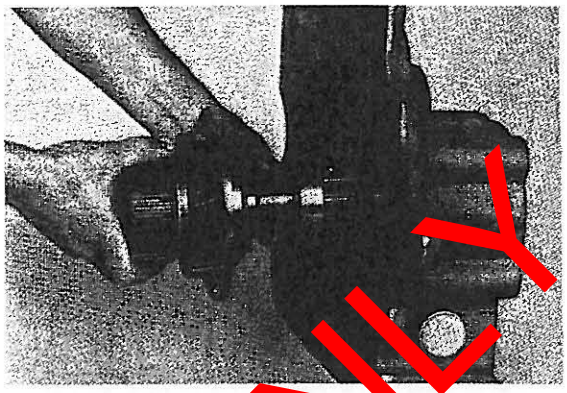


Figure 324
Remove input shaft and bearing assembly. **NOTE:** If the oil suction screen was not removed, remove and clean separately from front cover. Remove input shaft oil seal from cover.

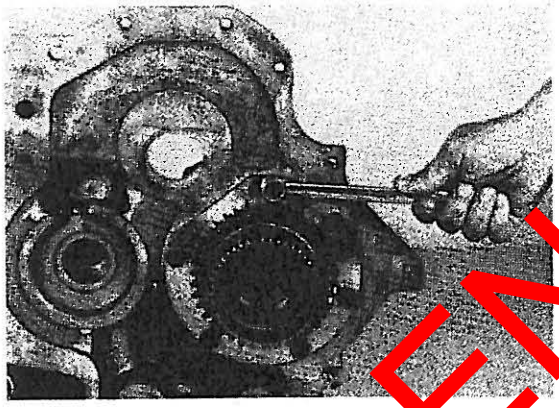


Figure 32
Remove input shaft retainer plate capscrews and washers.

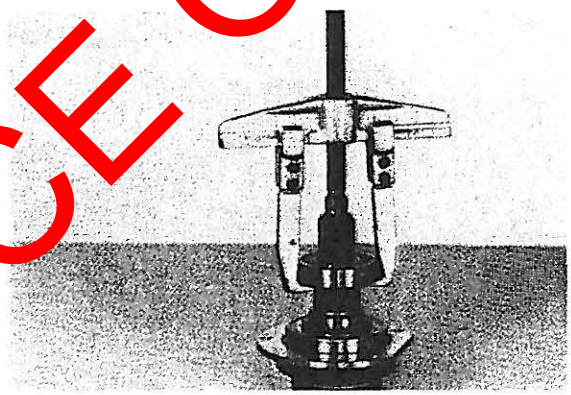


Figure 325
Remove input shaft front bearing.

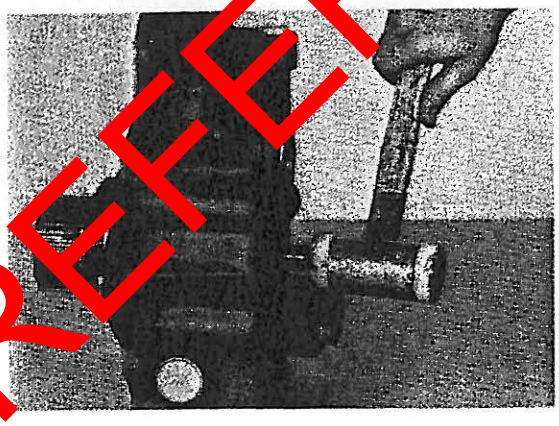


Figure 323
Tap input shaft from cover.

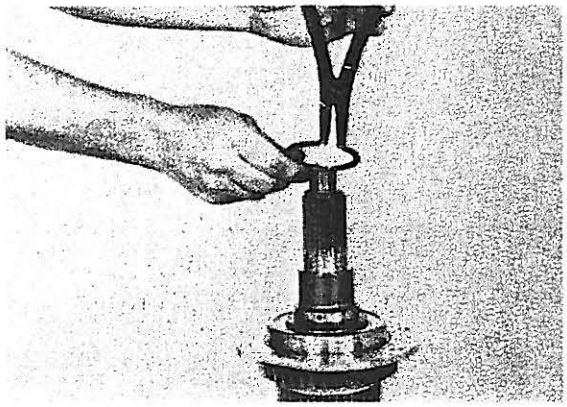


Figure 326
Remove input shaft rear bearing retainer ring.

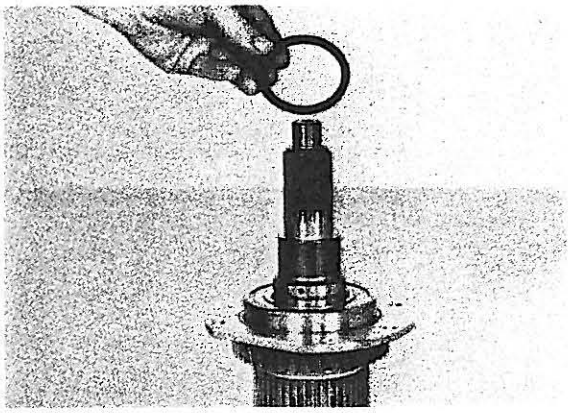


Figure 327
Remove bearing washer.

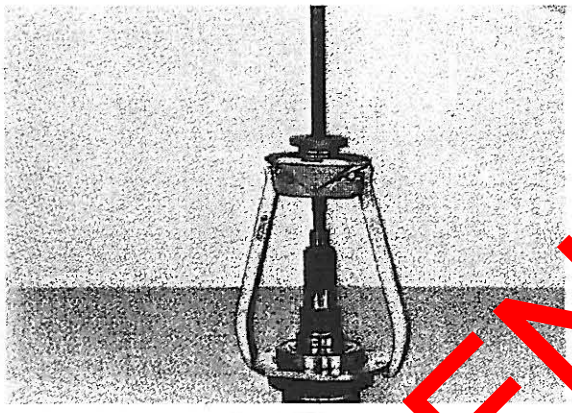


Figure 328
Remove retainer plate and rear bearing.

Figure 329
Plate and bearing removed.

FRONT COVER REASSEMBLY

(See cleaning and inspection page.)

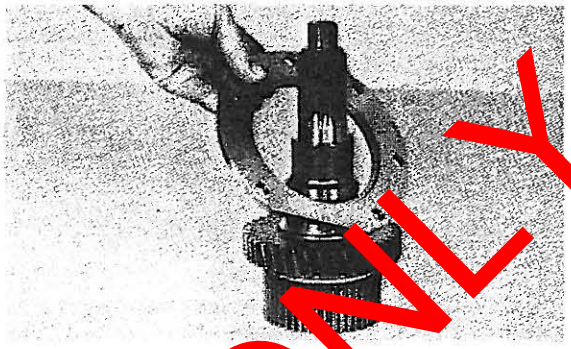


Figure 330
Position bearing retainer plate on input shaft with bearing snap ring groove up.

Figure 331
Press rear bearing on input shaft with snap ring down and into ring groove of retainer plate, bearing shield will be up. Position bearing washer on shaft.

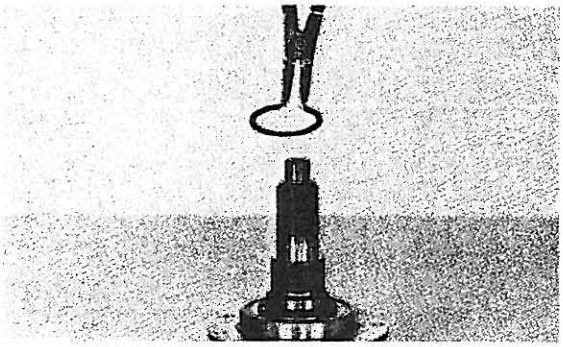


Figure 332
Install bearing retainer ring.

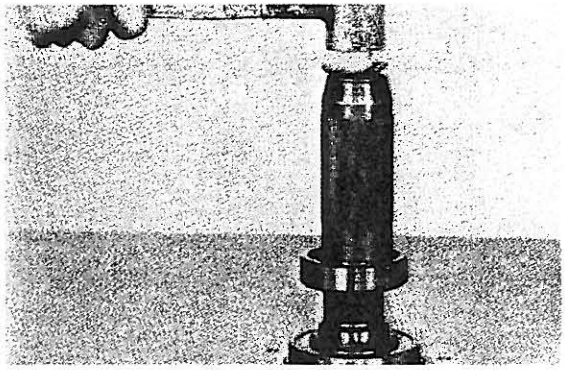


Figure 333
Install front bearing on input shaft. Coat outer diameter of input shaft oil seal with a light coat of Permatex #2. Press seal into front cover with lip of seal in and to a dimension of .360 [9,2 mm] to .390 [9,9 mm] from the outer surface of the cover. (See assembly instruction drawing).

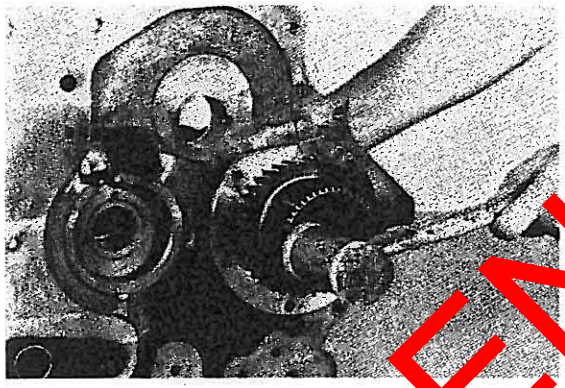


Figure 334
Tap input shaft assembly in front cover aligning holes in retainer plate with holes in cover. Install capscrews and washers.

Figure 335
Tighten capscrews to specified torque. (See torque chart).

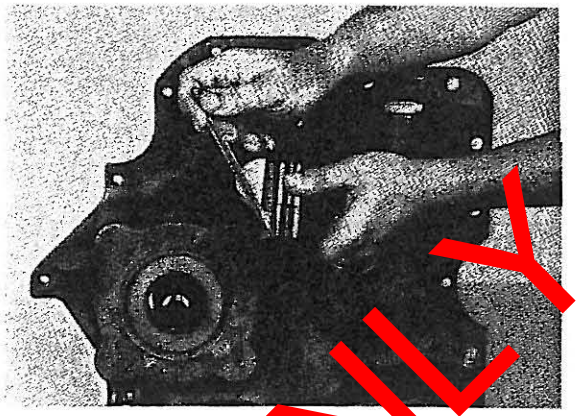


Figure 336
Install new "O" ring on idler shaft.

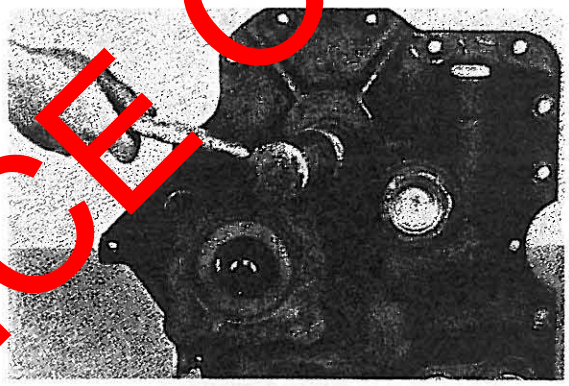


Figure 337
Align slot in idler shaft with lock ball notch in cover. Tap shaft into position.

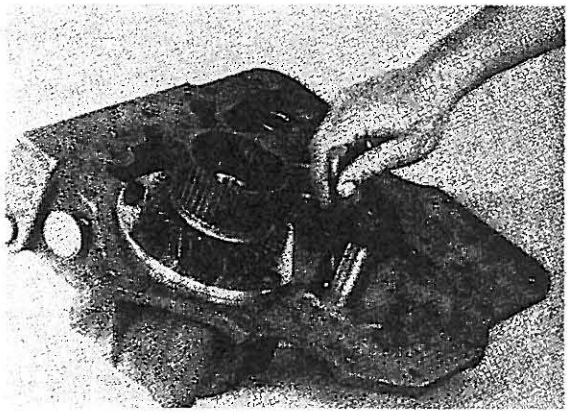


Figure 338
Install lock ball in idler shaft and notch.

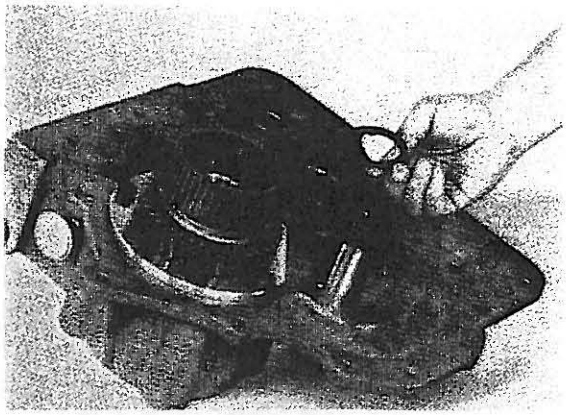


Figure 339
Install idler shaft inner taper bearing spacer on shaft.

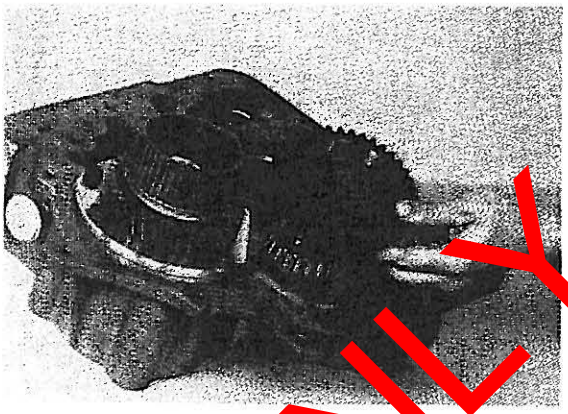


Figure 342
Position idler gear on shaft with long hub of gear up.

Figure 340
Install inner taper bearing on shaft with large diameter of taper down.

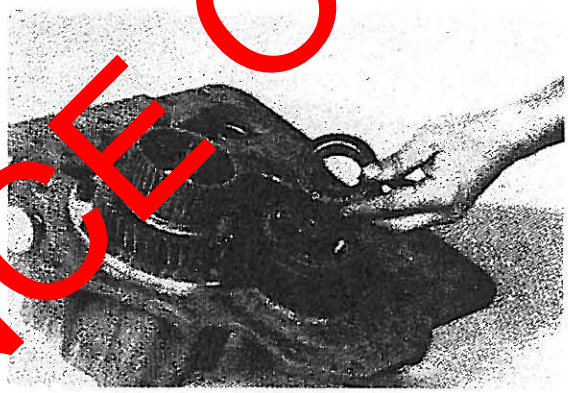


Figure 343
Position outer taper bearing on shaft with large diameter of taper up.

Figure 341
Position bearing spacer on shaft.

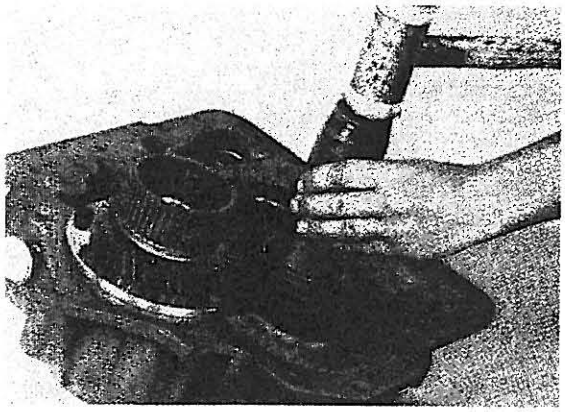


Figure 344
Tap bearing into position in idler gear.

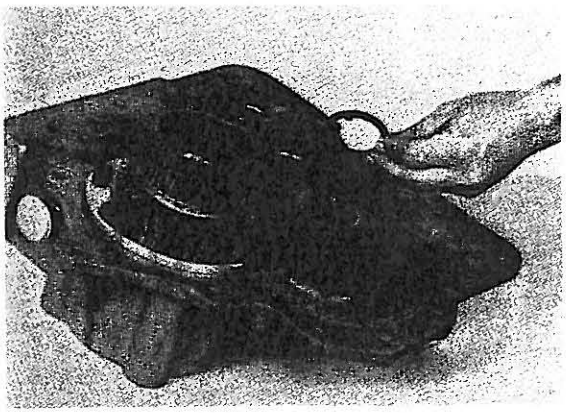


Figure 345
Install outer bearing spacer on shaft.

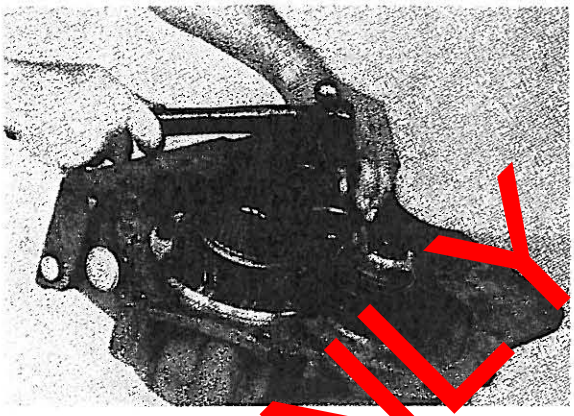


Figure 348
Stake nut securely in shaft notch.

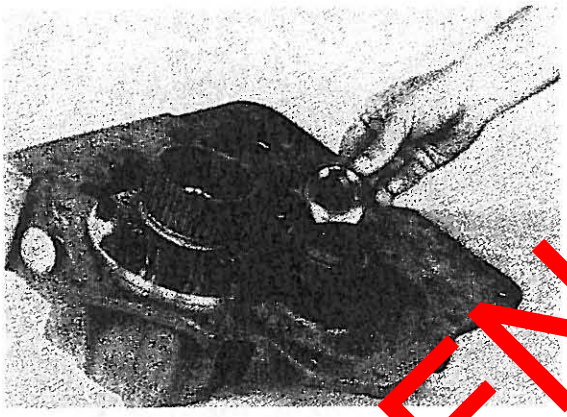


Figure 346
Install retainer nut.

Figure 349
Spread reverse clutch front bearing locating ring. Position reverse and 2nd clutch in cover and tap into place. Align bearing snap ring groove with snap ring, release snap ring in groove being sure snap ring is in full position in ring groove. Position the 2nd speed clutch shaft pilot bearing on clutch shaft, a light coat of good quality grease will hold bearing in position on shaft. Install pilot bearing on forward clutch shaft. (See Figure 275).

Figure 347
Tighten nut 200 to 250 lbf·ft torque [271,2-338,8 N·m].

FRONT COVER ASSEMBLY
Installation on Transmission Case

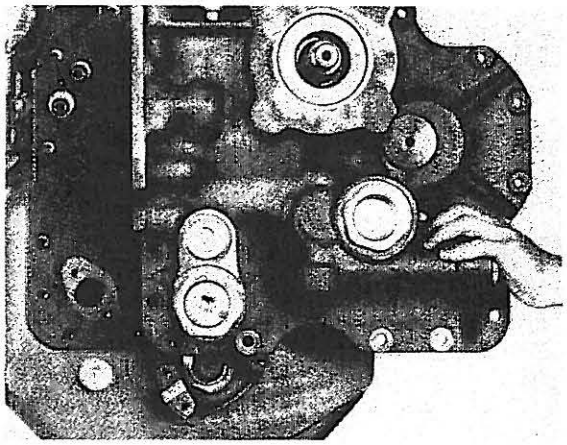


Figure 350

Position new gasket and "O" rings on front of transmission housing. A light coat of chassis grease will hold gasket in place. Locate front cover on tranmsission housing. **NOTE:** The use of aligning studs will facilitate alignment and front cover installation. Use extreme caution as to align the clutch pilots into the clutch disc hubs. As the clutch pilots enter the discs hubs, turn the input shaft and output shaft back and forth. This will help align all of the clutch inner discs with the disc hubs. **DO NOT FORCE THIS OPERATION.**

When the clutches are properly aligned, the front cover will [illegible] tight against the transmission case. Install front cover to transmission case bolts and washers. **DO NOT USE BOLTS TO PULL CASE AND COVER TOGETHER.**

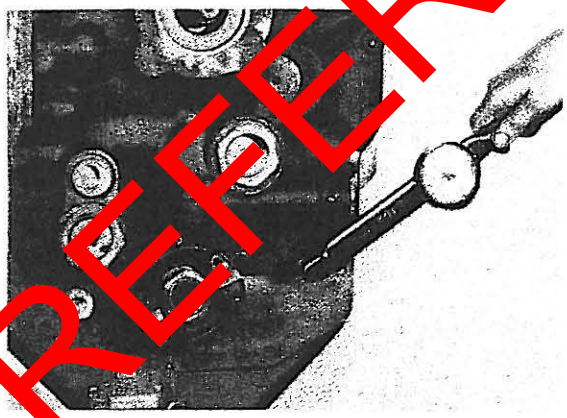


Figure 351

Tighten bolts to specified torque (See torque chart).

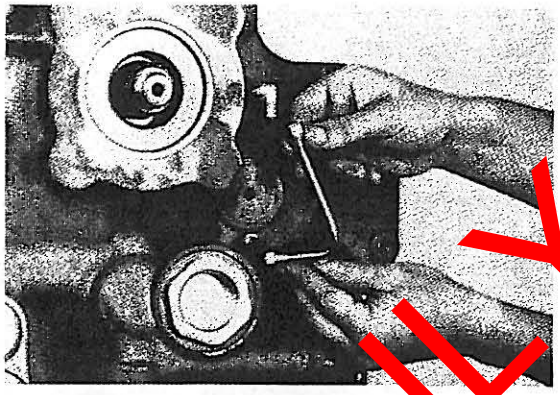


Figure 3[illegible]

If lube fittings were removed for clean[illegible]g, install fittings. Install lube tube on fittings and tighten [illegible]e nuts securely.

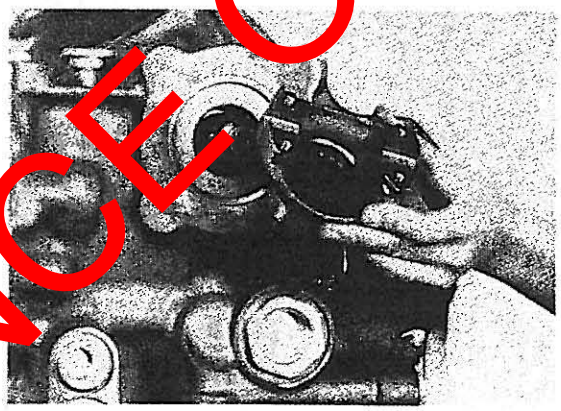


Figure 353

Position input flange on input shaft.

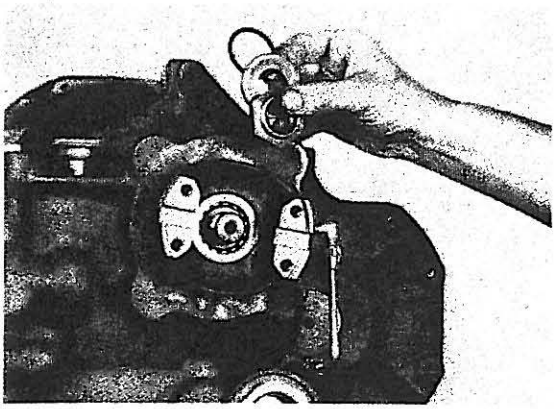


Figure 354

Install flange "O" ring, washer and flange nut.

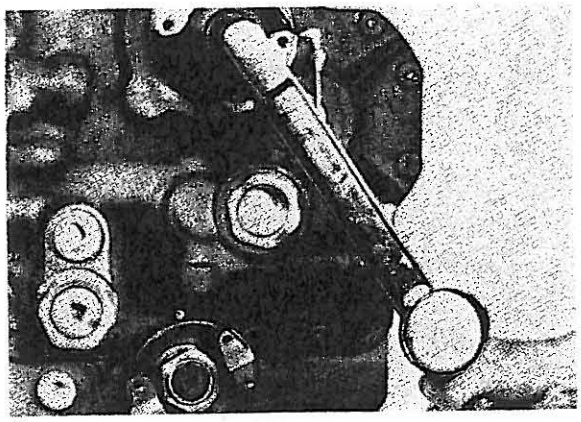
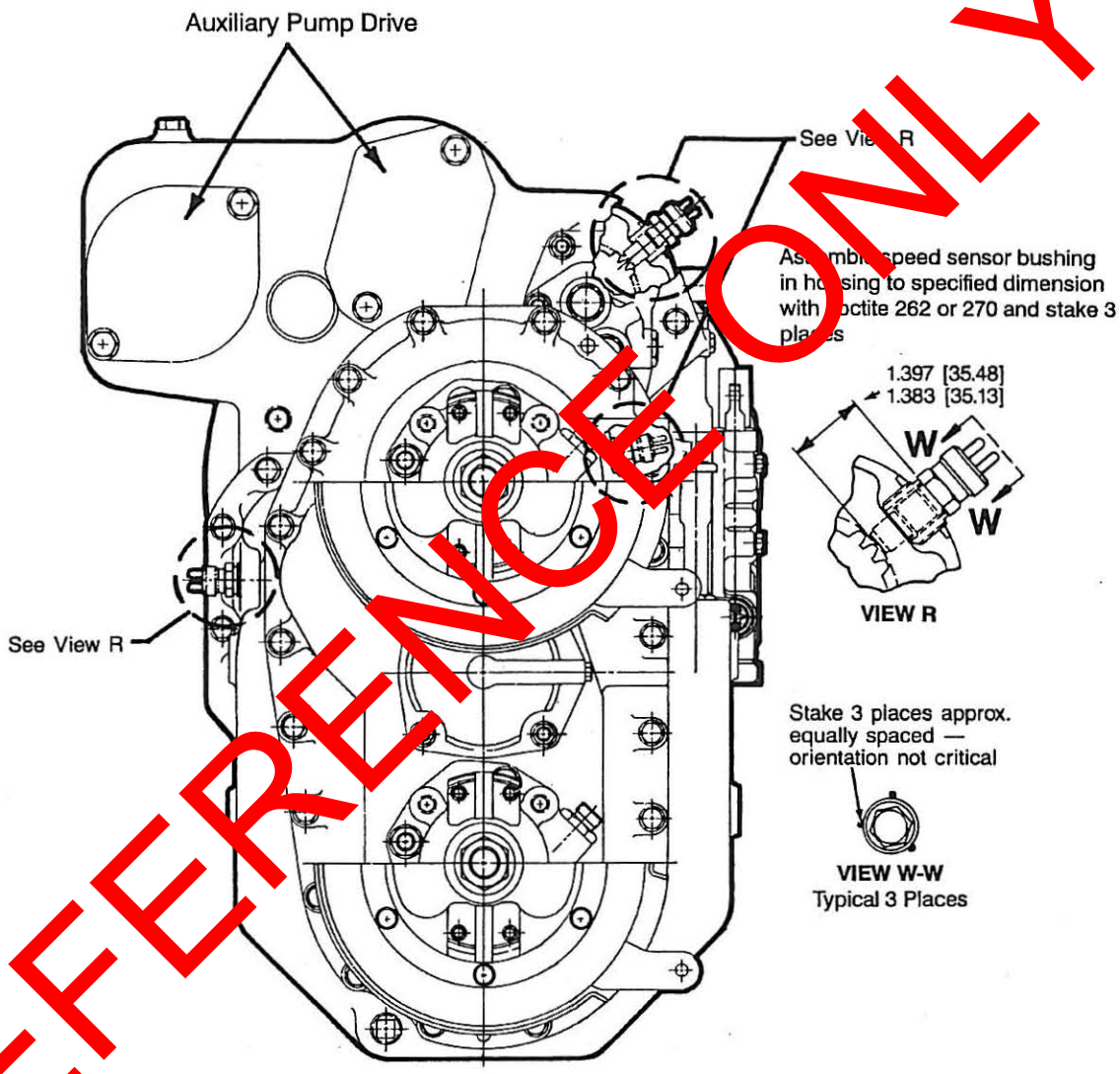


Figure 355
Secure input flange to prevent turning and tighten flange nut 200 to 250 lbf·ft [271,2-338.9 N·m].

SPEED SENSOR INSTALLATION



REAR VIEW

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.

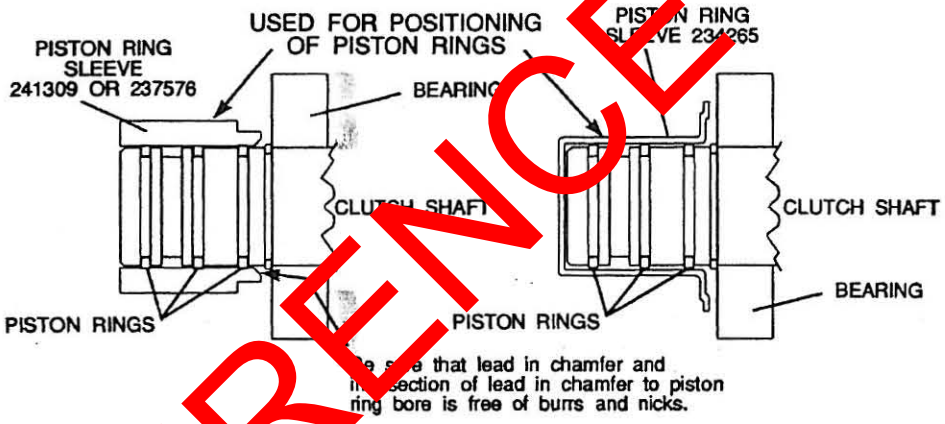
2. Position the expander spring in the inner groove of the new piston ring, with the expander spring gap 180° from the hook joint gap of the piston ring.

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.

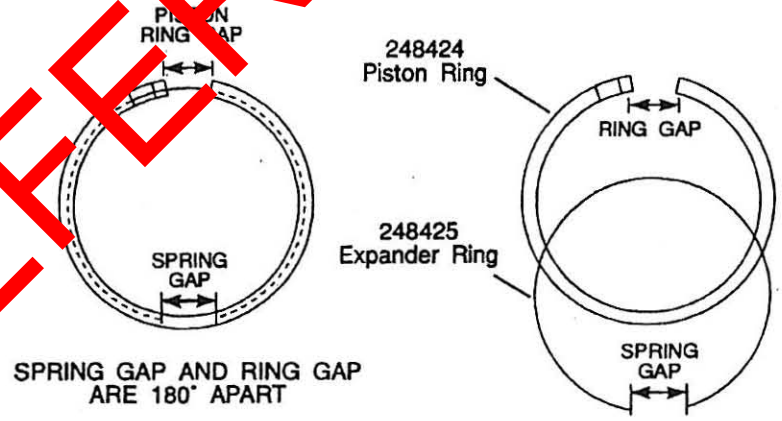
4. Repeat steps 1, 2 and 3 for the remaining ring or rings making certain all hook joints are fastened securely.

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 front cover or converter housing it is recommended a piston ring sleeve P/N's 241309, 237576 or 234265 be used to center all of the piston rings in their respective ring groove. Use extreme caution to not damage piston rings when installing the clutch shaft in the front trasnmission cover or converter housing.

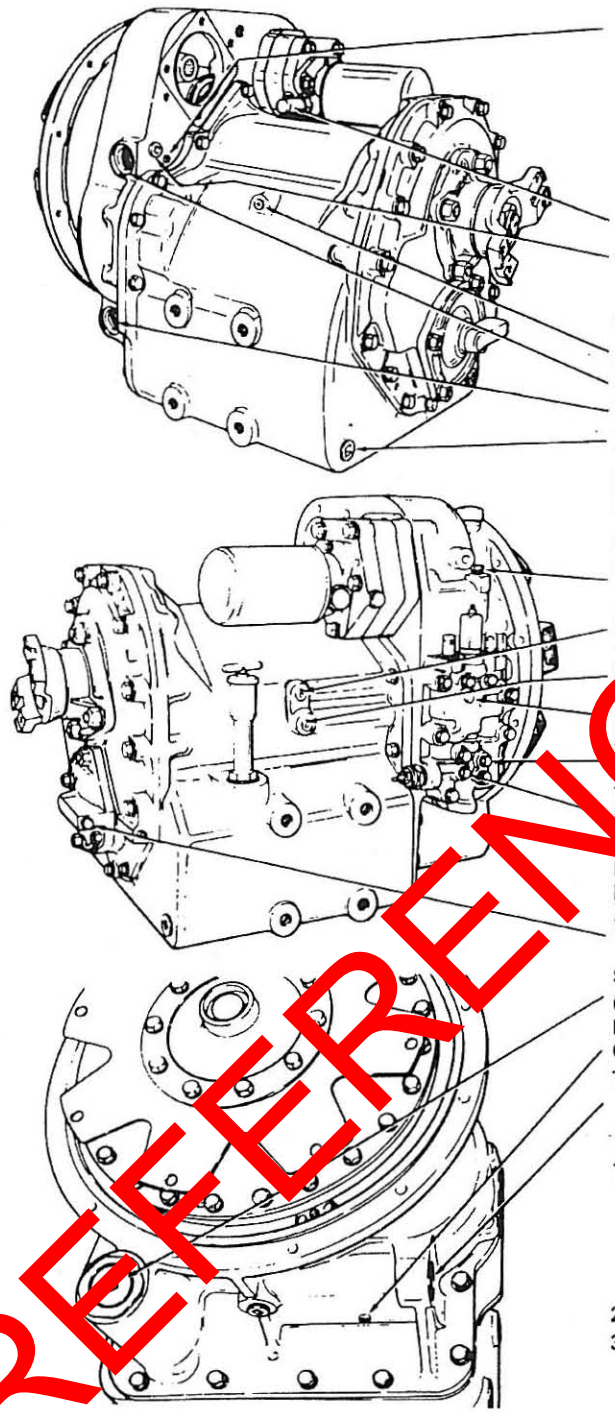


Be sure that lead in chamfer and intersection of lead in chamfer to piston ring bore is free of burrs and nicks.



SPRING GAP AND RING GAP ARE 180° APART

PRESSURE CHECK POINTS



CHECK POINT "C" CONVERTER OUTLET PRESSURE 25 P.S.I. [173 kPa] MINIMUM PRESSURE AT 2000 R.P.M. ENGINE SPEED AND A MAXIMUM OF 70 P.S.I. [483 kPa] OUTLET PRESSURE WITH ENGINE OPERATING AT NO LOAD GOVERNED SPEED.

PRESSURE REGULATOR VALVE

CHECK POINT "D" CONVERTER OUTLET TEMPERATURE RED LINE 250° F. [121° C] ½ N.P.T.F. PORT SIZE – MAY USE CLARK NO. 234033 (REF.) OR SAE NO. 2 TEMPERATURE PICKUP.

LUBE (CONSTRUCTION HOLE ONLY)

CONVERTER OUT

TO LUBE FROM COOLER

DRAIN

CHECK POINTS A & D SHOULD BE MONITORED BY GAUGES LOCATED IN OPERATOR'S COMPARTMENT.

CHECK POINT "A" CLUTCH PRESSURE ¼ N.P.T.F. CLUTCH PRESSURE 180 to 220 P.S.I. [1241-1516 kPa].

CHECK POINT FOR FORWARD MODULATED CLUTCH PRESSURE 180 to 220 P.S.I. [1241-1516 kPa]

3RD

TRANSMISSION FWD. CLUTCH PRESSURE PORT (⅛ N.P.T.F.)

2ND

TRANSMISSION REV. CLUTCH PRESSURE PORT (⅛ N.P.T.F.)

THESE PORTS ARE PROVIDED FOR INSTALLATION OF BACK-UP WARNING LIGHT PRESSURE SWITCH OR HORN.

1ST (LOW)

SUMP SCREEN

CHECK POINT "H" LUBE PRESSURE ⅛ N.P.T.F. 15-25 P.S.I. [103-172 kPa] @ 2000 RPM & 180°-200° F. [82,2-93,3° C] AT CONVERTER OUTLET.

TO LUBE FROM COOLER

HOSE LINE OPERATING REQUIREMENTS:

1. PRESSURE LINES:
   AMBIENT TO 250° F [121° C] FOR CONTINUOUS OPERATION. MUST WITHSTAND 300 P.S.I. [2068 kPa] CONTINUOUS OPERATION WITH 600 P.S.I. [4137 kPa] SURGE PRESSURE REF. SAE 100RI HYDRAULIC HOSE.
2. OIL SPECIFICATIONS: SEE LUBRICATION SECTION.
3. ALL HOSE LINES USED MUST CONFORM TO SAE SPEC NO. SAE J1019 TESTS & PROCEDURES FOR HIGH-TEMPERATURE TRANSMISSION OIL HOSE, LUBRICATING OIL HOSE & HOSE ASSEMBLIES.

NOTES

APPLICATION POLICY

Capability ratings, features and specifications vary depending upon the model and type of service. Applications approvals must be obtained from Spicer Off-Highway Products Division. We reserve the right to change or modify our product specifications, configurations, or dimensions at any time without notice.

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