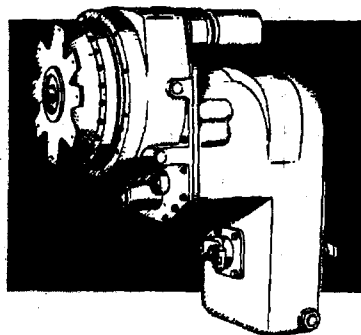
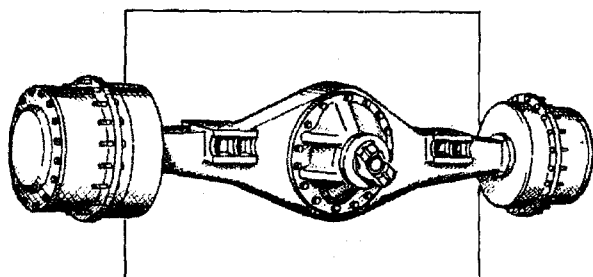
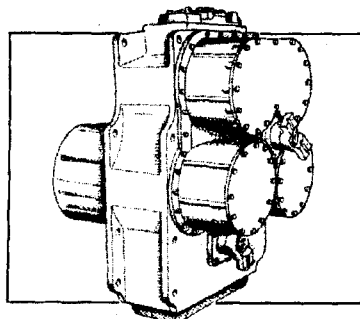
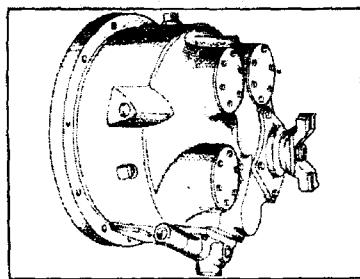




18000 Powershift Transmission

R & HR MODEL 3 & 6 SPEED
LONG DROP WITH RANGE SHIFT

CLARK-HURTH 
COMPONENTS

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.

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FOREWORD

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

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

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

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

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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:

- Basic Design
- Converter Group
- Converter and Transmission Case Group
- Three Speed Clutch and Gear Group
- Clutch Group
- Control Valve Assembly
- Parking Brake Group
- External Plumbing Diagram
- Assembly Instructions
- Rear View
- Three Speed Long Drop Power Flow
- Pressure Check Points
- Clutch and Gear Arrangement
- Transmission to Engine Installation Procedure

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

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

The shift control valve assembly is mounted directly on the side of the converter housing or front input cover. 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.

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

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.

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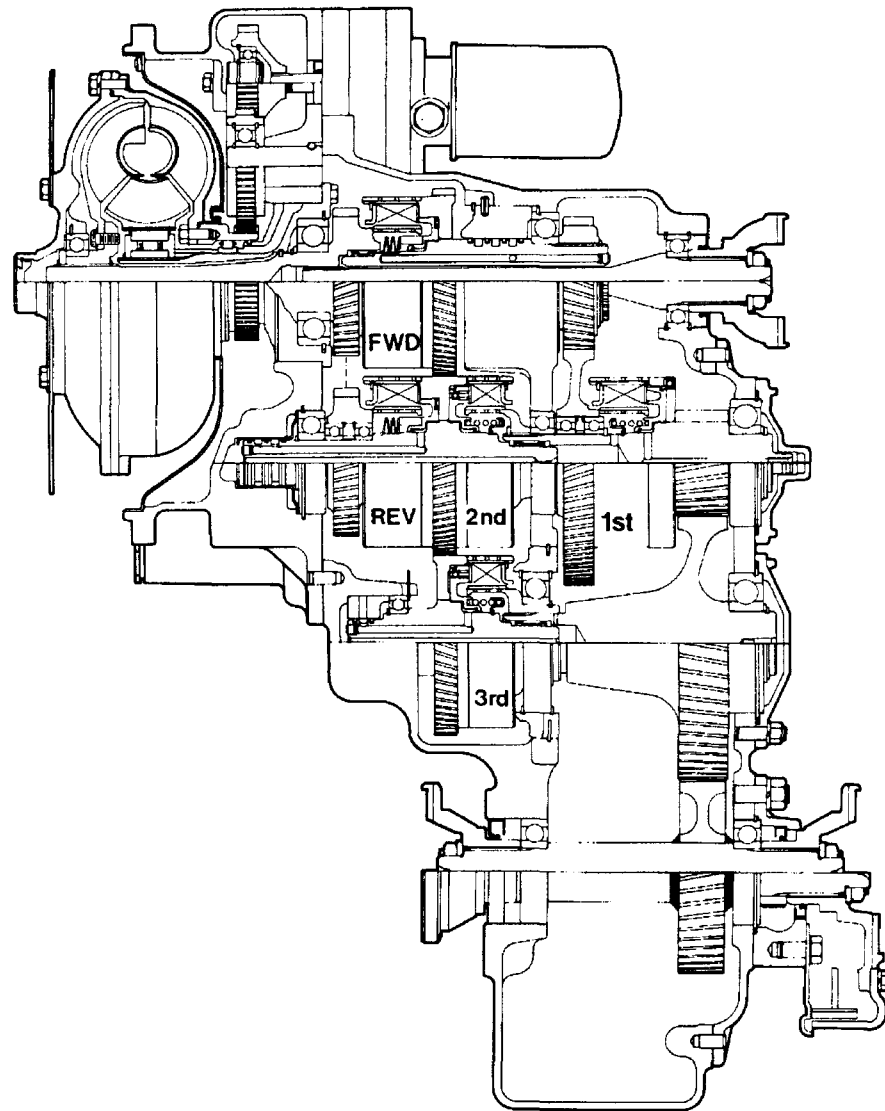
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To engage the clutch, as previously stated, the control valve is placed in the desired position. This allows oil under pressure to flow from the control valve, through a passageway, to a chosen clutch shaft. This shaft has a drilled passageway for 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.



HR MODEL BASIC DESIGN

Figure A

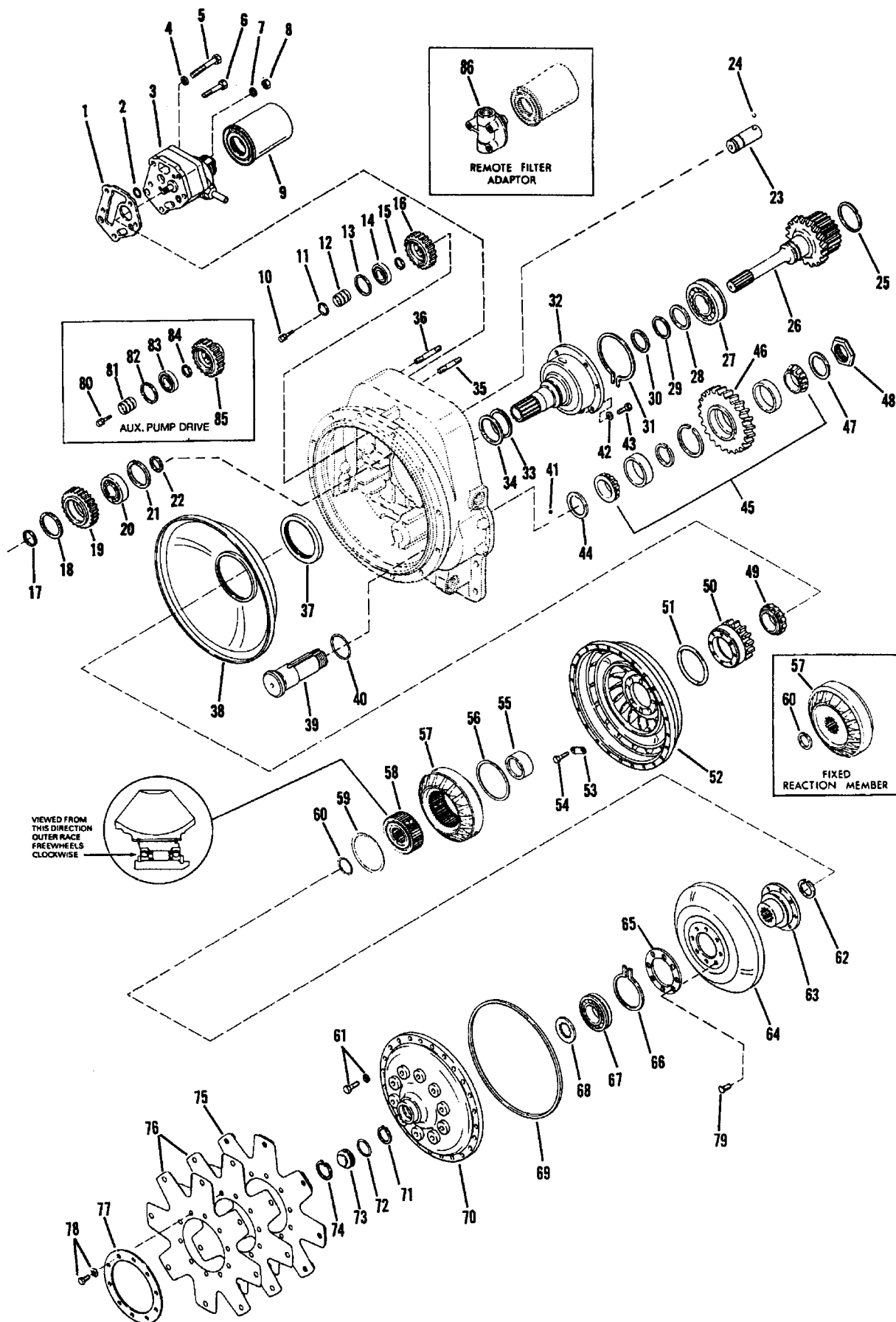


Figure B

HR18000 CONVERTER GROUP

ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY
1	Pump to Housing Gasket	1	44	Bearing Retainer Thrust Plate	1
2	"O" Ring	1	45	Reverse Idler Gear Bearing Assembly	1
3	Charging Pump Assembly	1	46	Reverse Idler Gear	1
4	Pump Mounting Screw Lockwasher	3	47	Bearing Retaining Thrust Plate	1
5	Pump Mounting Screw	1	48	Retaining Plate Nut	1
6	Pump Mounting Screw	2	49	Impeller Hub Gear Bearing	1
7	Pump Mounting Stud Lockwasher	2	50	Impeller Hub Gear	1
8	Pump Mounting Stud Nut	2	51	Impeller Hub "O" Ring	1
9	Filter Assembly	1	52	Impeller	1
10	Bearing Support Screw	2	53	Impeller to Hub Screw Lock Tab	4
11	Bearing Locating Ring	1	54	Impeller to Hub Screw	8
12	Pump Drive Bearing Support	1	55	Reaction Member Spacer	1
13	Bearing Retaining Ring	1	56	Freewheel Outer Race Snap Ring	1
14	Pump Drive Gear Bearing	1	57	Reaction Member	1
15	Bearing Locating Ring	1	58	Freewheel Assembly	1
16	Pump Drive Gear	1	59	Freewheel Outer Race Snap Ring	1
17	Idler Gear Bearing Locating Ring	1	60	Reaction Member Retainer Ring	1
18	Idler Gear Bearing Retaining Ring	1	61	Impeller to Cover Screw and Lockwasher	18
19	Pump Drive Idler Gear	1	62	Turbine Retaining Ring	1
20	Idler Stub Shaft Bearing	1	63	Turbine Hub	1
21	Bearing Retaining Ring	1	64	Turbine	1
22	Bearing Locating Ring	1	65	Turbine Backing Ring	1
23	Idler Gear Stub Shaft	1	66	Turbine Hub Bearing Locating Ring	1
24	Stub Shaft Lock Ball	1	67	Turbine Hub Bearing	1
25	Baffle Ring	1	68	Bearing Retaining Washer	1
26	Turbine Shaft & Disc Hub Assembly	1	69	Impeller to Cover "O" Ring	1
27	Turbine Shaft Bearing	1	70	Impeller Cover	1
28	Bearing Locating Washer	1	71	Turbine Retaining Ring	1
29	Bearing Retaining Ring	1	72	Impeller Cover Bore Plug "O" Ring	1
30	Piston Ring	1	73	Bore Plug	1
31	Bearing Snap Ring	1	74	Bore Plug Retaining Ring	1
32	Reaction Member Support	1	75	Drive Plate Assembly	1
33	Piston Ring Expander Spring	1	76	Drive Plate	2
34	Piston Ring	1	77	Drive Plate Backing Ring	1
35	Pump Mounting Stud	1	78	Drive Plate Mounting Screw & Lockwasher	10
36	Pump Mounting Stud	1	79	Turbine Hub Screw	12
37	Oil Seal	1	80	Bearing Support Screw & Lockwasher	2
38	Oil Baffle Assembly	1	81	Auxiliary Pump Drive Bearing Support	1
39	Reverse Idler Shaft	1	82	Bearing Retaining Ring	1
40	Reverse Idler Shaft "O" Ring	1	83	Pump Drive Gear Bearing	1
41	Reverse Idler Shaft Lock Ball	1	84	Bearing Locating Ring	1
42	Support Screw Washer	6	85	Auxiliary Pump Drive Gear	1
43	Reaction Member Support Screw	6	86	Remote Filter Adaptor (Optional)	1

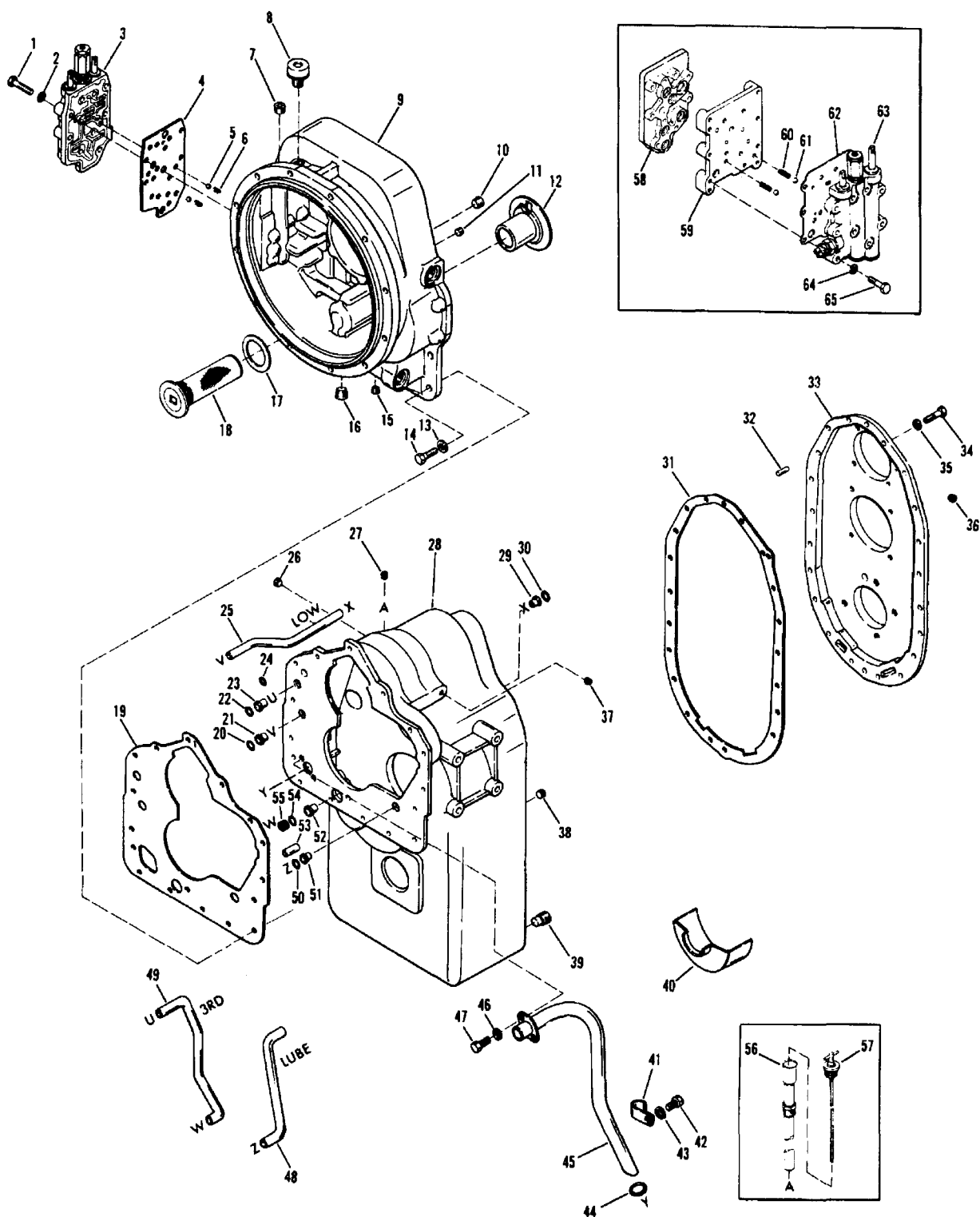


Figure C

HR18000 CONVERTER GROUP

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	Idle Gear Bearing Locating Ring	1
18	Idle Gear Bearing Retaining Ring	1
19	Pump Drive Idle Gear	1
20	Idle Stub Shaft Bearing	1
21	Bearing Retaining Ring	1
22	Bearing Locating Ring	1
23	Idle 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 Support	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 Tab	4
54	Impeller to Hub Screw	8
55	Reaction Member Spacer	1
56	Freewheel Outer Race Snap 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 to 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

HR 18000 LONG DROP CONVERTER AND TRANSMISSION CASE GROUP
SEE PAGE 52 FOR R MODEL (REMOTE MOUNTED) CASE & FRONT COVER GROUP.

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	Valve to Converter Housing Screw	9	35	Rear Cover to Case Screw	
2	Valve to Converter Housing Screw Lockwasher	9		Lockwasher	20
3	Control Valve Assembly	1	36	Pipe Plug	1
4	Control Valve Gasket	1	37	Pipe Plug	1
5	Detent Ball	2	38	Pipe Plug	1
6	Detent Spring	2	39	Magnetic Drain Plug	1
7	Pipe Plug	1	40	Oil Baffle	1
8	Air Breather	1	41	Suction Tube Clip	1
9	Converter Housing	1	42	Clip Retaining Screw	1
10	Pipe Plug	1	43	Clip Lockwasher	1
11	Pipe Plug	1	44	Suction Line "O" Ring	1
12	Converter Housing Sleeve	1	45	Suction Tube Assembly	1
13	Converter Housing to Transmission Case Screw Lockwasher	16	46	Suction Tube Retaining Screw Lockwasher	2
14	Converter Housing to Transmission Case Screw	16	47	Suction Tube Retaining Screw	2
15	Pipe Plug	1	48	Clutch Lube Tube	1
16	Pipe Plug	1	49	3rd Speed Tube	1
17	Screen Assembly Gasket	1	50	Pressure Tube "O" Ring	1
18	Screen Assembly	1	51	Tube Sleeve	1
19	Housing to Case Gasket	1	52	Tube Sleeve	1
20	Pressure Tube "O" Ring	1	53	Dowel Pin	1
21	Tube Sleeve	1	54	3rd Speed Pressure Plug "O" Ring	1
22	Pressure Tube "O" Ring	1	55	3rd Speed Pressure Plug	1
23	Tube Sleeve	1	56	Dipstick Tube Assembly	1
24	Clutch Pressure "O" Ring	1	57	Dipstick	1
25	Low Speed Clutch Pressure Tube	1	Optional Remote Mounted Control Valve Parts		
26	Pipe Plug	1	58	Remote Control Valve Adaptor Plate	1
27	Pipe Plug	1	59	Remote Control Valve Mounting Plate	1
28	Transmission Case Assembly	1	60	Detent Spring	2
29	Tube Sleeve	1	61	Detent Ball	2
30	Pressure Tube "O" Ring	1	62	Control Valve to Mounting Plate Gasket	1
31	Rear Cover to Case Gasket	1	63	Control Valve Assembly	1
32	Rear Cover to Case Dowel Pin	2	64	Valve to Mounting Plate Screw Lockwasher	9
33	Rear Cover	1	65	Valve to Mounting Plate Screw	9
34	Rear Cover to Case Screw	20			

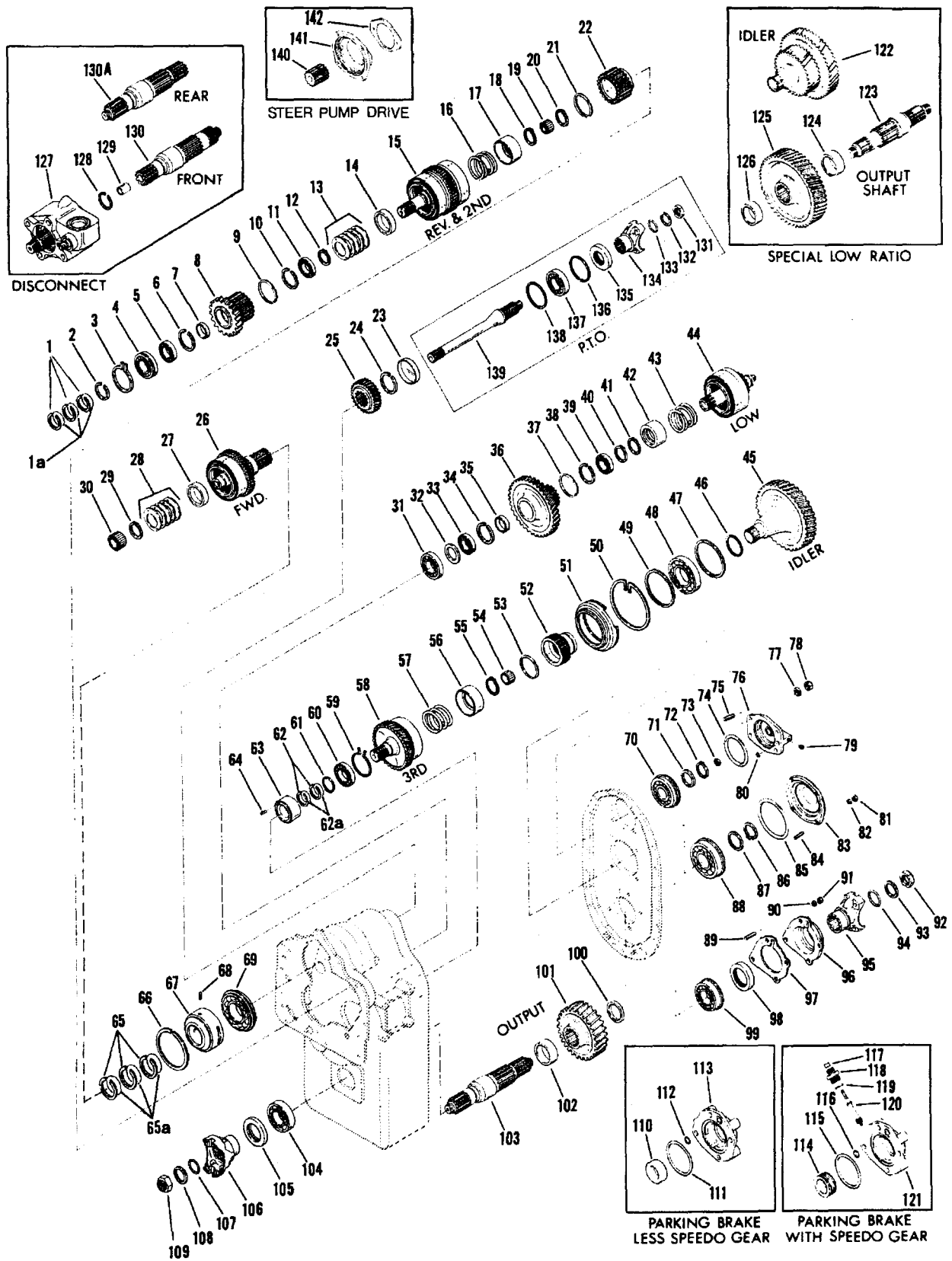
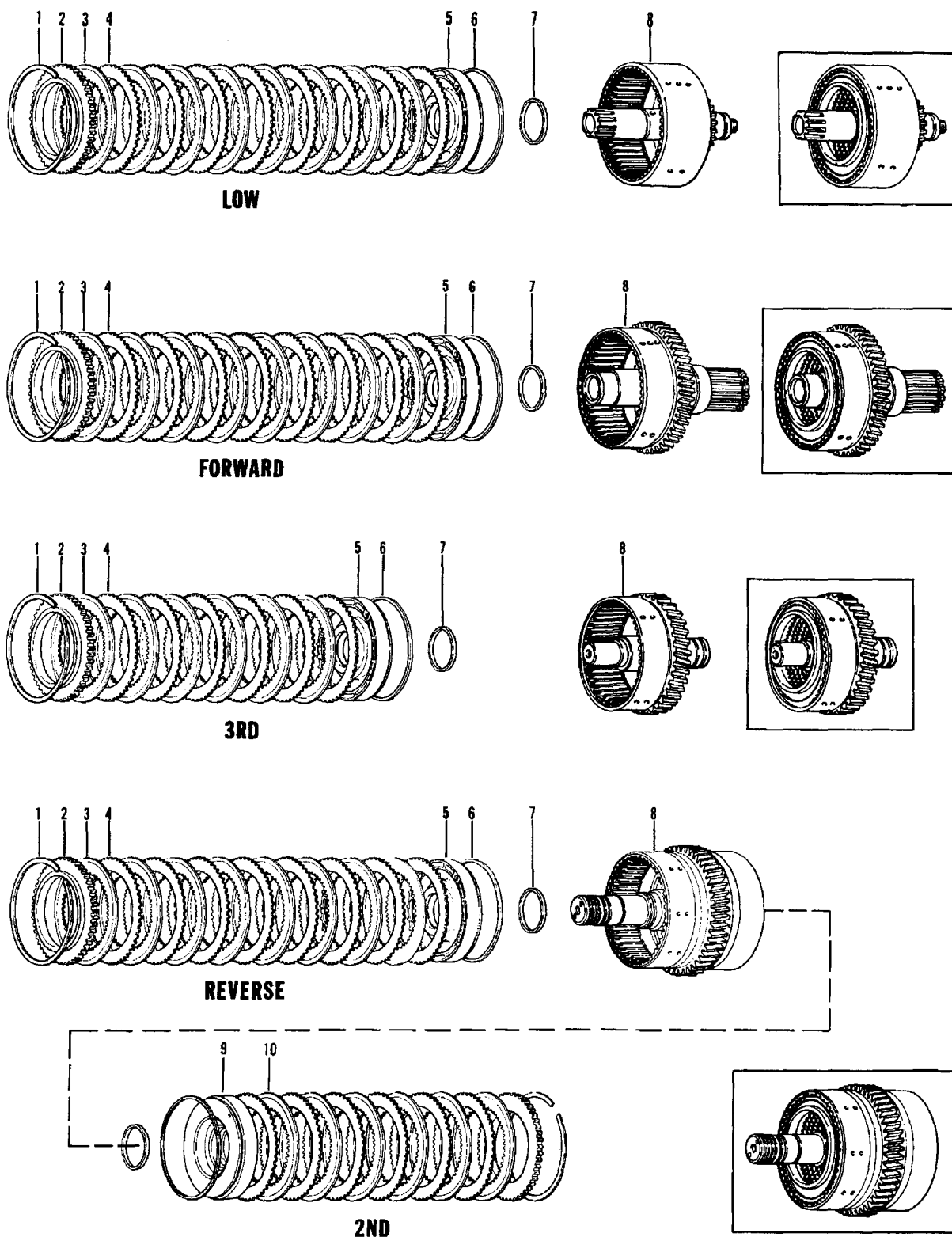


Figure D

R & HR 18000 THREE SPEED LONG DROP CLUTCH AND GEAR GROUP
SEE PAGE 71 FOR 6 SPEED CLUTCH & GEAR GROUP

ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY
1	Reverse and 2nd Shaft Piston Ring	3	57	Piston Ring Expander Spring	2
1A	Piston Ring Expander Spring	3	58	3rd Speed Clutch	1
2	Front Bearing Retaining Ring	1	59	3rd Speed Clutch Shaft Front Bearing	1
3	Front Bearing Snap Ring	1		Locating Ring	1
4	Reverse and 2nd Shaft Front Bearing	1	60	3rd Speed Clutch Shaft Front Bearing	1
5	Clutch Driven Gear Bearing	1	61	3rd Speed Clutch Shaft Front Bearing	1
6	Bearing Retaining Ring	1		Retaining Ring	1
7	Clutch Driven Gear Spacer	1	62	3rd Speed Clutch Shaft Piston Ring	2
8	Reverse Clutch Gear and Hub Assembly	1	62A	Piston Ring Expander Spring	2
9	Baffle Ring	1	63	Piston Ring Outer Race	1
10	Bearing Retaining Ring	1	64	Outer Race Roll Pin	1
11	Clutch Driven Gear Bearing	1	65	Forward Shaft Piston Ring	3
12	Spring Retainer Snap Ring	1	65A	Piston Ring Expander Spring	3
13	Piston Return Disc Spring Pack	5	66	Piston Ring Sleeve Retainer Ring	1
14	Piston Return Spring Spacer	1	67	Piston Ring Sleeve	1
15	Reverse and 2nd Clutch	1	68	Sleeve Roll Pin	1
16	Piston Return Spring	1	69	Forward Clutch Shaft Rear Bearing	1
17	Spring Retainer	1	70	Low Speed Clutch Shaft Rear Bearing	1
18	Spring Retainer Snap Ring	1	71	Rear Bearing Support Washer	1
19	Reverse and 2nd Clutch Shaft Rear Bearing	1	72	Rear Bearing Retaining Ring	1
20	2nd Clutch Disc Hub Snap Ring	1	73	Low Speed Clutch Shaft Piston Ring	1
21	Baffle Ring	1	74	Rear Bearing Cap "O" Ring	1
22	2nd Clutch Disc Hub	1	75	Bearing Cap Stud	4
23	Bore Plug	1	76	Low Speed Clutch Shaft Rear Bearing Cap	1
24	Gear Retainer Snap Ring	1	77	Bearing Cap Stud Lockwasher	4
25	Forward Shaft Gear	1	78	Bearing Cap Stud Nut	4
26	Forward Clutch	1	79	Bearing Cap Plug	1
27	Piston Return Spring Spacer	1	80	Bearing Cap "O" Ring	1
28	Piston Return Disc Spring Pack	5	81	Rear Bearing Cap Stud Nut	4
29	Spring Retainer Snap Ring	1	82	Rear Bearing Cap Stud Lockwasher	4
30	Forward Clutch Shaft Pilot Bearing	1	83	Idler Shaft Rear Bearing Cap	1
31	Low Speed Clutch Shaft Front Bearing	1	84	Rear Bearing Cap Stud	4
32	Front Bearing Spacer	1	85	Rear Bearing Cap "O" Ring	1
33	Low Speed Gear Bearing	1	86	Idler Shaft Rear Bearing Retainer Ring	1
34	Low Speed Gear Bearing Locating Ring	1	87	Rear Bearing Support Washer	1
35	Low Speed Gear Spacer	1	88	Idler Shaft Rear Bearing	1
36	Low Speed Gear and Hub Assembly	1	89	Bearing Cap Stud	4
37	Baffle Ring	1	90	Bearing Cap Stud Lockwasher	4
38	Low Speed Gear Bearing Locating Ring	1	91	Bearing Cap Stud Nut	4
39	Low Speed Gear Bearing	1	92	Flange Nut	1
40	Low Speed Gear Bearing Retaining Ring	1	93	Flange Washer	1
41	Spring Retainer Snap Ring	1	94	Flange "O" Ring	1
42	Spring Retainer	1	95	Output Flange	1
43	Piston Return Spring	1	96	Output Shaft Rear Bearing Cap	1
44	Low Speed Clutch	1	97	Bearing Cap Gasket	1
45	Idler Shaft and Gear	1	98	Rear Bearing Cap Oil Seal	1
46	Bearing Retaining Ring	1	99	Output Shaft Rear Bearing	1
47	Bearing Locating Ring	1	100	Output Shaft Rear Bearing Spacer	1
48	3rd Clutch Disc Hub Bearing	1	101	Output Gear	1
49	Bearing Locating Ring	1	102	Output Gear Spacer	1
50	Bearing Carrier Locating Ring	1	103	Output Shaft	1
51	Bearing Carrier	1	104	Output Shaft Front Bearing	1
52	3rd Speed Clutch Disc Hub	1	105	Front Oil Seal	1
53	Baffle Ring	1	106	Output Flange	1
54	3rd Speed Clutch Shaft Pilot Bearing	1	107	Flange "O" Ring	1
55	Spring Retainer Snap Ring	1	108	Flange Washer	1
56	Spring Retainer	1	109	Flange Nut	1
			110 thru 142	Various Options	



18000 SERIES 3 SPEED LONG DROP CLUTCH ASSEMBLY

Figure E

LOW CLUTCH GROUP

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

FORWARD CLUTCH GROUP

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	Backing Plate Snap Ring	1	5	Clutch Piston	1
2	Clutch Disc Backing Plate	1	6	Outer Clutch Piston Ring	1
3	Clutch Inner Disc	8	7	Inner Clutch Piston Seal	1
4	Clutch Outer Disc	8	8	Forward Clutch Shaft and Drum Assembly.....	1

3RD CLUTCH GROUP

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	Backing Plate Snap Ring	1	5	Clutch Piston Assembly	1
2	Clutch Disc Backing Plate	1	6	Outer Clutch Piston Seal	1
3	Clutch Inner Disc	6	7	Inner Clutch Piston Seal	1
4	Clutch Outer Disc	6	8	3rd Speed Clutch Shaft and Drum Assembly..	1

REVERSE AND 2ND CLUTCH GROUP

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	Backing Plate Snap Ring	2	6	Outer Clutch Piston Seal	2
2	Clutch Disc Backing Plate	2	7	Inner Clutch Piston Seal	2
3	Clutch Inner Disc	8	8	Reverse and 2nd Speed Clutch Shaft and Drum Assembly	1
4	Clutch Outer Disc	14	9	Clutch Piston	1
5	Clutch Piston	1	10	Clutch Inner Disc	6

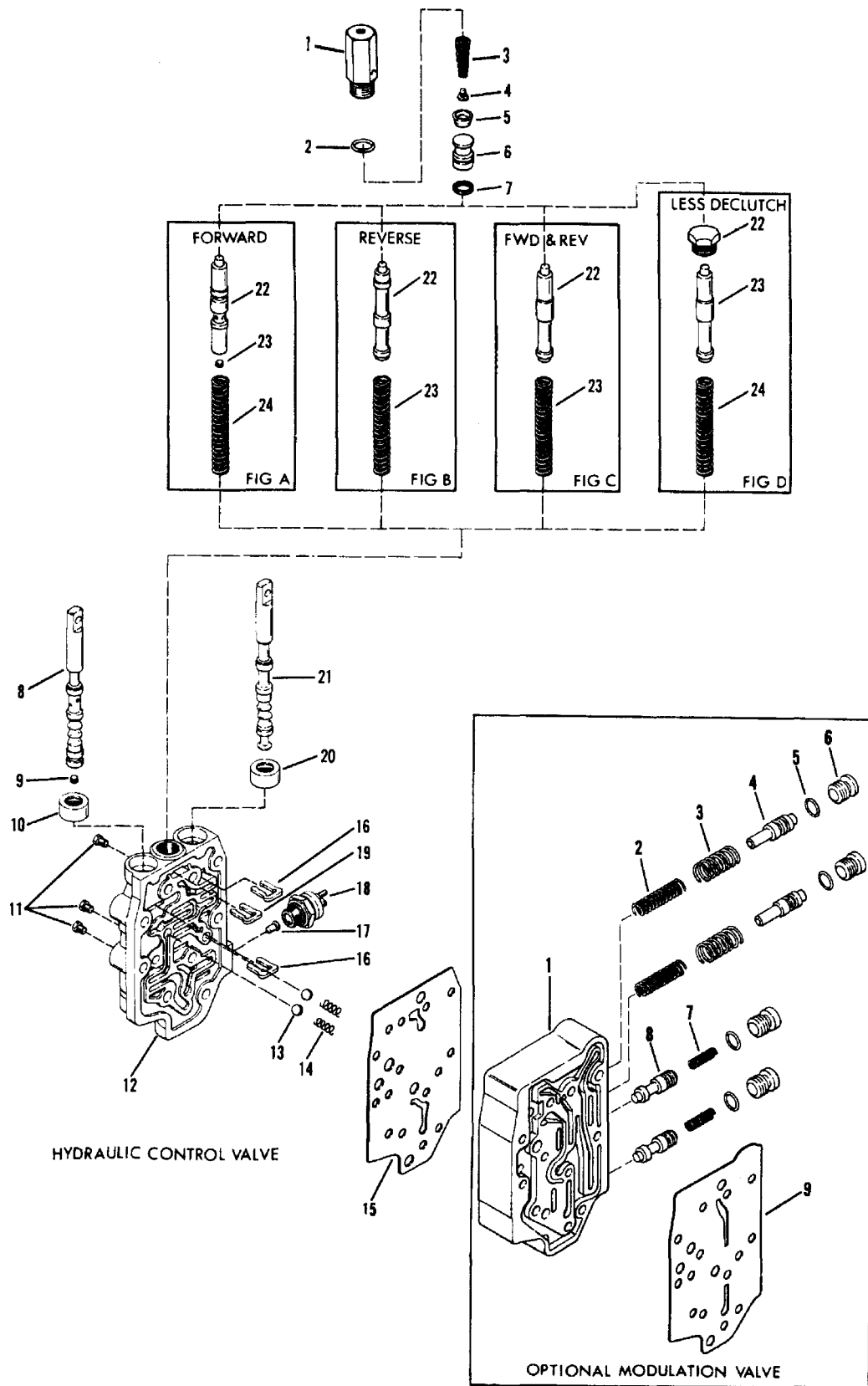


Figure F

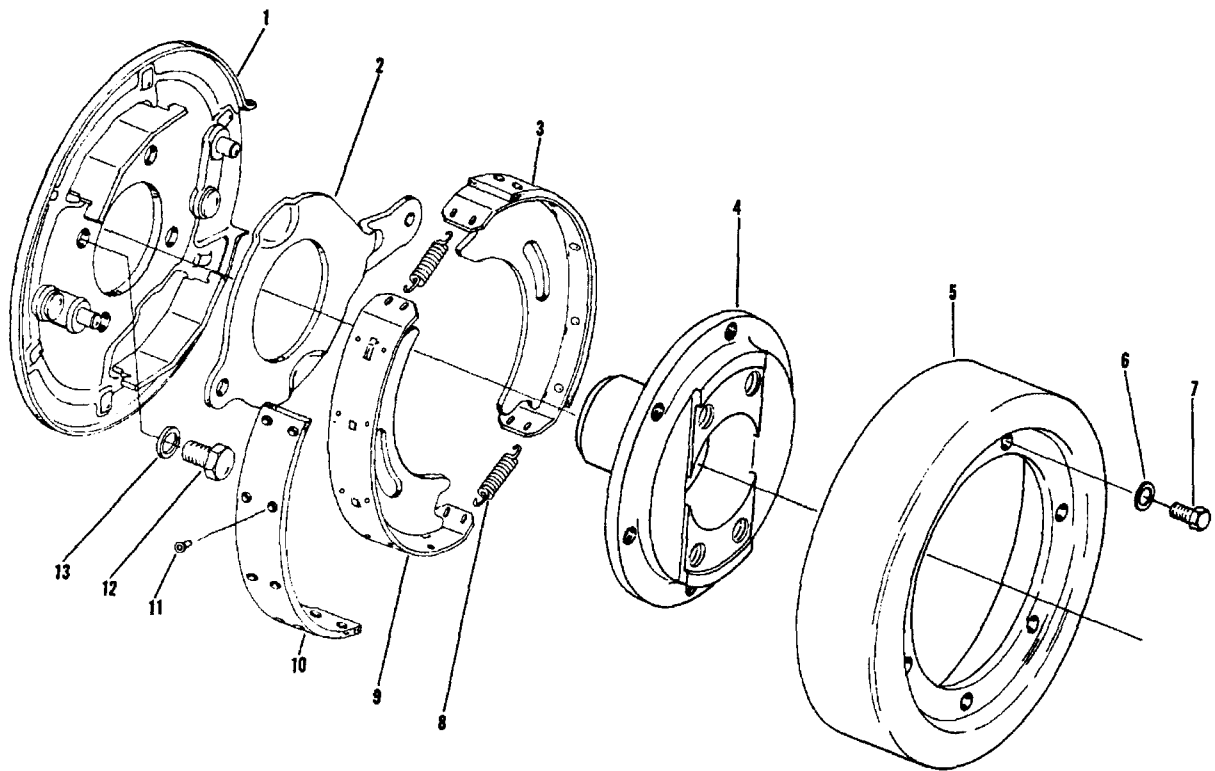
CONTROL VALVE ASSEMBLY

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)

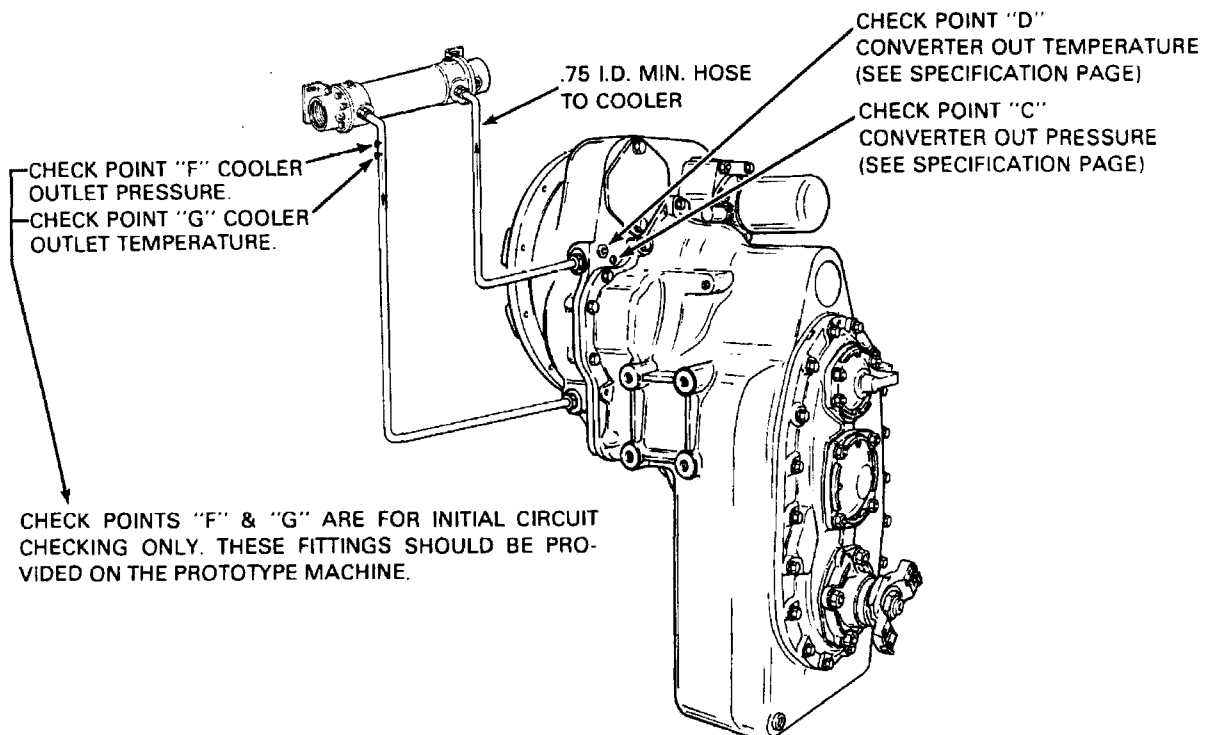
ITEM	DESCRIPTION	QTY.
1	Modulator Valve Housing	1
2	Accumulator Spring (Inner) Not Used on All Models	2
3	Accumulator Spring (Outer)	2
4	Accumulator Valve	2
5	Spool Stop Plug "O" Ring	4
6	Spool Stop Plug	4
7	Regulator Spring	2
8	Regulator Spool	2
9	Modulator Valve to Converter Housing Gasket	1



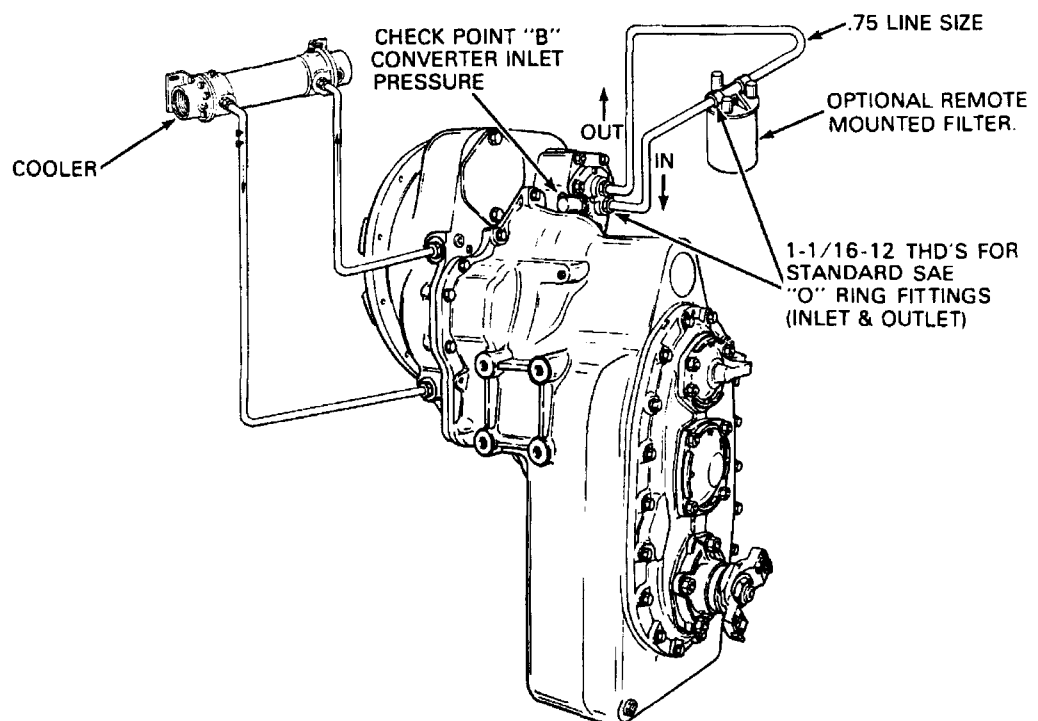
PARKING BRAKE GROUP

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

Figure G



**18000 PLUMBING DIAGRAM
3 SPEED LONG DROP**



**18000 PLUMBING DIAGRAM
3 SPEED LONG DROP
(WITH REMOTE FILTER)
SEE PAGE 55 FOR R MODEL PLUMBING DIAGRAM**

Figure H

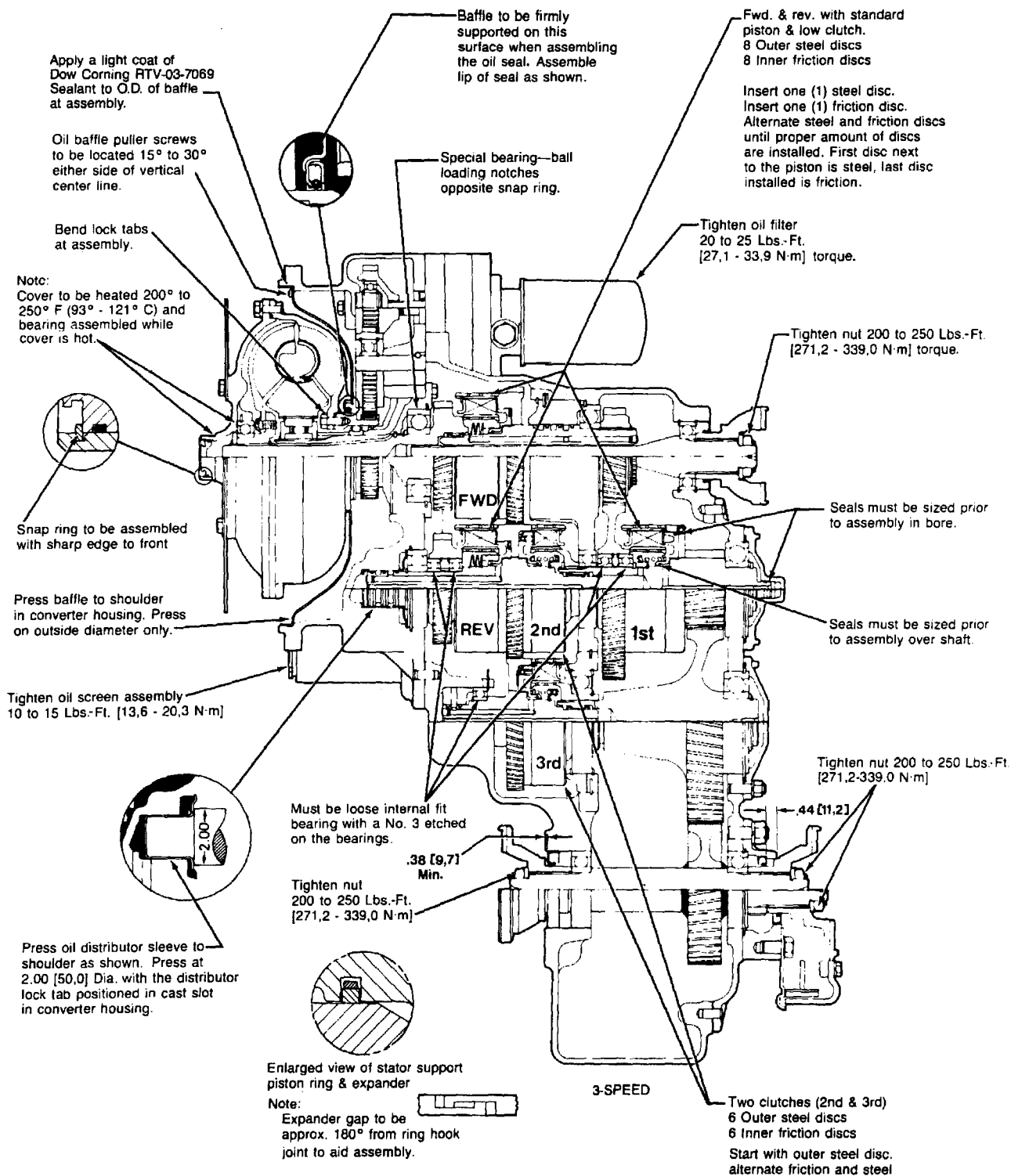
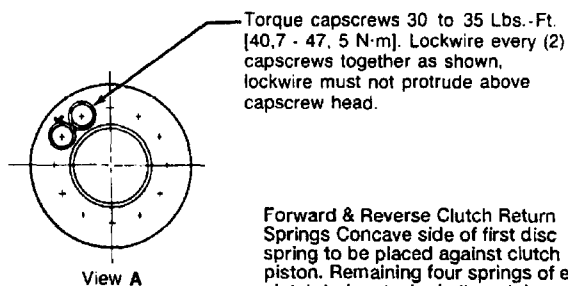


Figure 1

1. All lead in chamfers for oil seals, piston rings, and "O" rings must be smooth and free from burrs. Inspect at assembly.
2. Lubricate all piston ring grooves and "O" rings with oil before assembly.
3. Apply very light coat of Permatex No. 2 to O.D. of all oil seals before assembly.
4. After assembly of parts using Loctite or Permatex, there must not be any free or excess material that could enter the oil circuit.
5. Apply a light coat of #592 Loctite to all pipe plugs.
6. Apply a thin coating of grease between seal lips on lip type seals prior to assembly.
7. Apply a small bead of Dow Corning RTV-03-7069 Sealant around dowel hole to both sides of gasket.



Forward & Reverse Clutch Return 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.

Bearing part No. must be "OUT". Chamfer must be "IN".

Must be loose internal fit bearing with a No. 3 etched on the bearing.

Tighten Nut To 200-250 Lbs.-Ft. [271,2-338,9 N-m] and Stake Securely In Place

VIEW "B"
STANDARD IDLER GEAR

Special steel backing plate to be used with reduced size pistons only.
Forward and reverse clutches with reduced size pistons only.
1 Outer steel backing plate and disc assembly.
7 Outer steel discs.
8 Inner friction discs.
Start with outer steel backing plate next to piston, then (1) inner friction disc, then (1) outer steel disc. Alternate steel and friction discs until proper amount of discs are installed.

Grade 5

Torque Specification for Lubricated or Plated Screw Threads

Grade 8

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

Figure 1

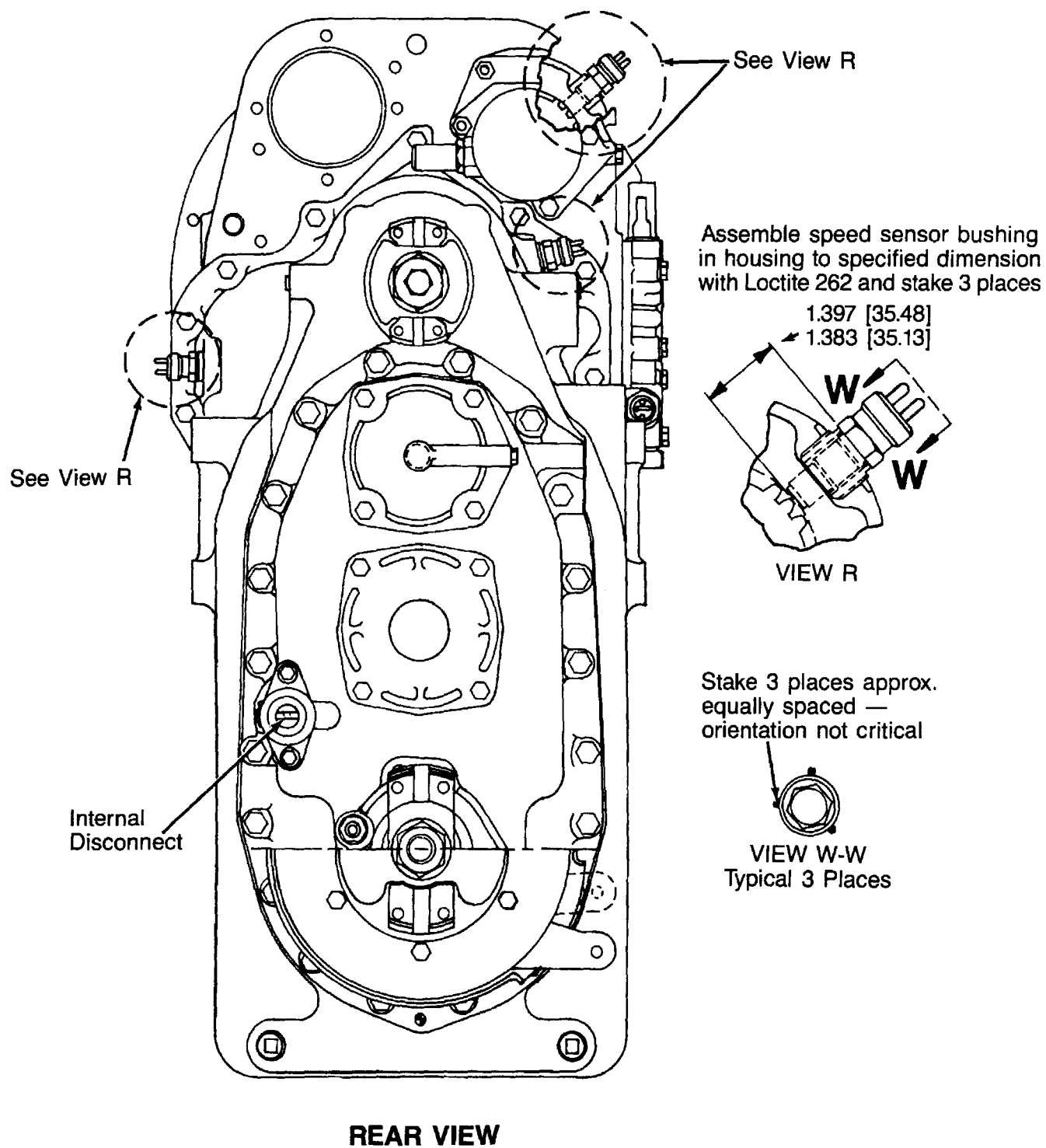


Figure J

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 transmission) front end removal, repair & installation see R-Model section page 57.

DISASSEMBLY

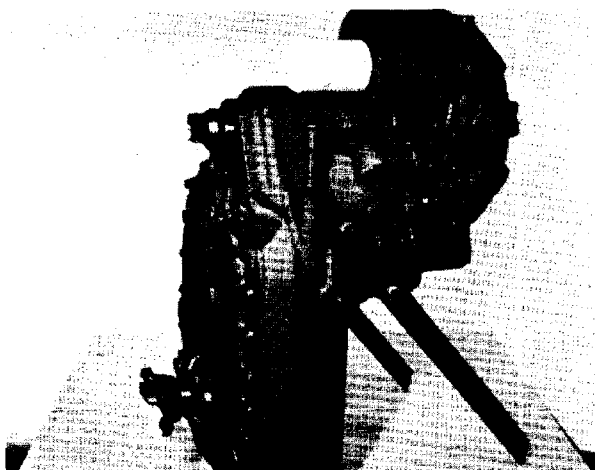


Figure 1

Side view of the 18000 series long drop transmission. The transmission being disassembled is a 3 speed.



Figure 2

Loosen filter assembly.

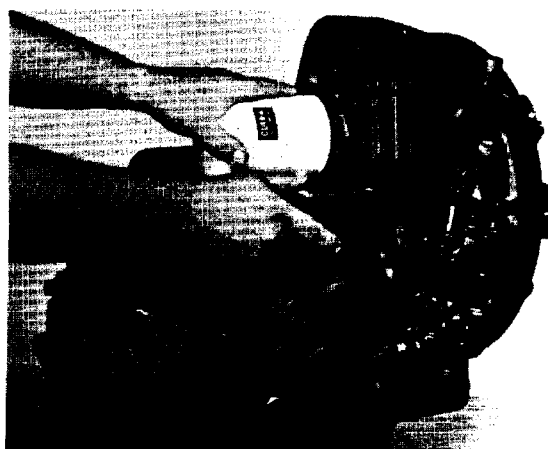


Figure 3

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

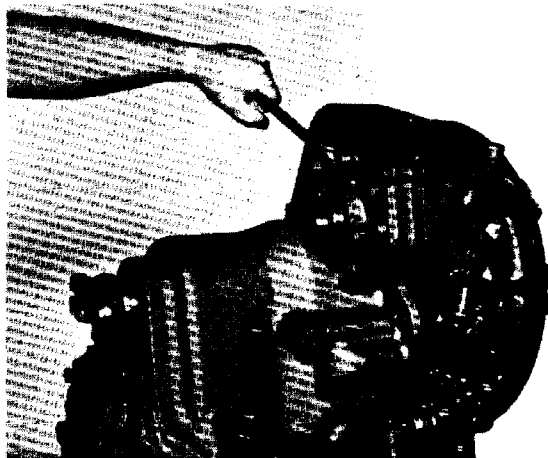


Figure 4

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

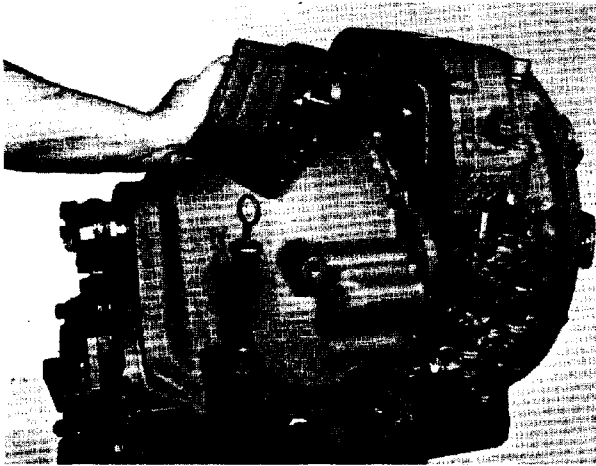


Figure 5
Remove valve and pump assembly.

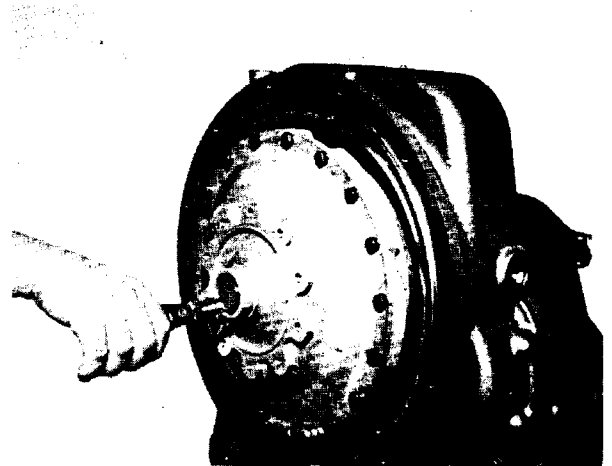


Figure 8
Remove impeller cover bore plug retainer ring.

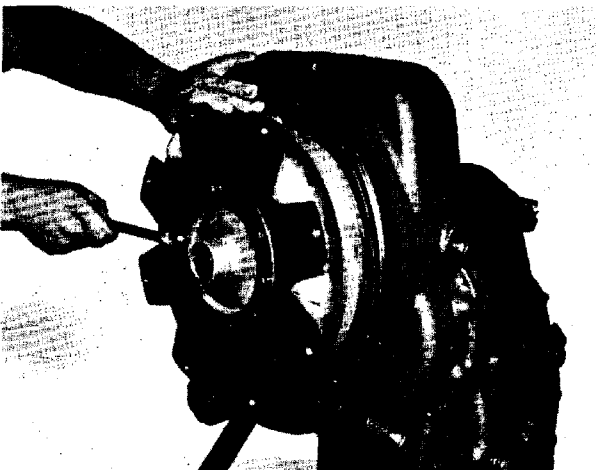


Figure 6
Remove drive plate mounting screws and washers.

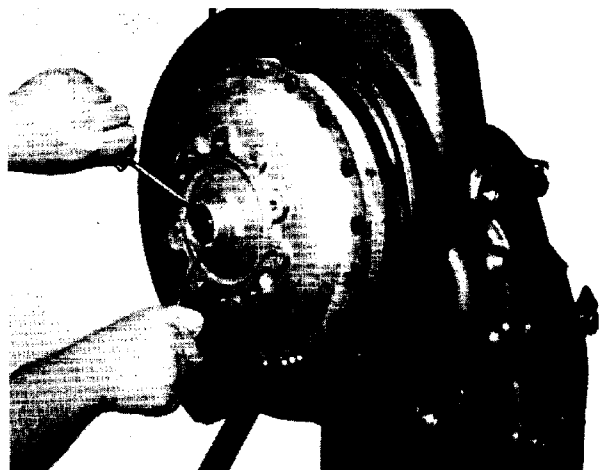


Figure 9
Using two small screw drivers as shown, remove bore plug.

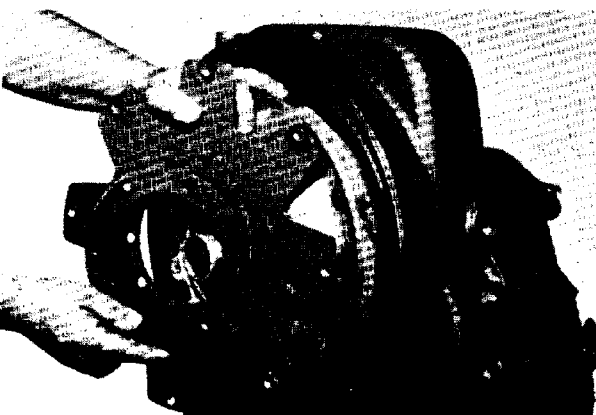


Figure 7
Remove Drive plate and backing ring.

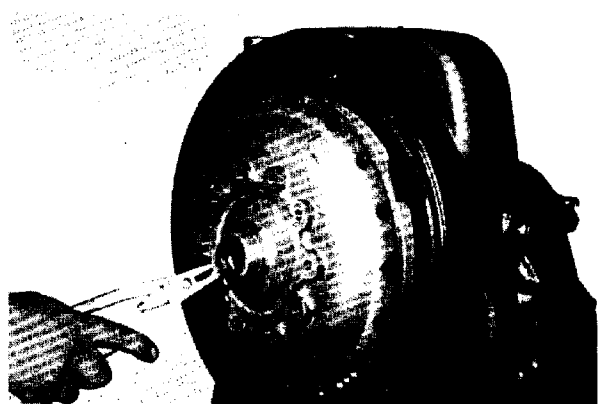


Figure 10
Through bore plug hole, remove turbine retaining ring. See Figure 10-A.

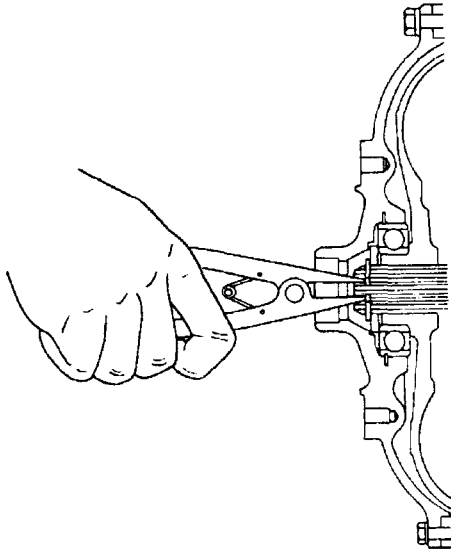


Figure 10-A

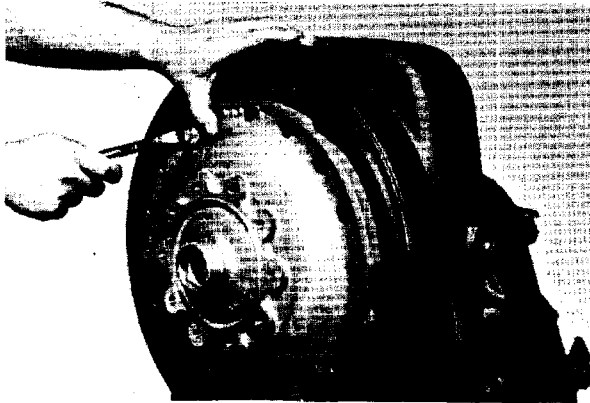


Figure 11

Remove impeller cover to impeller bolts.

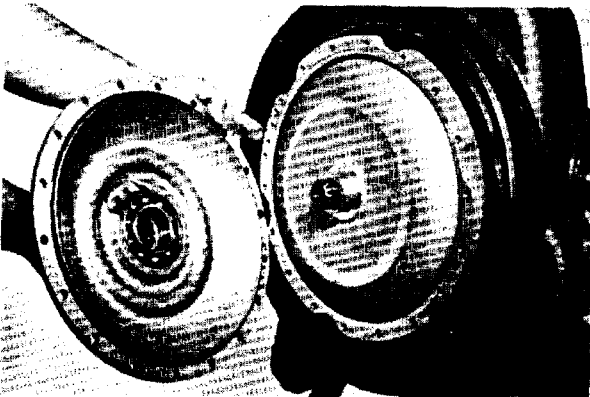


Figure 12

Remove impeller cover. **NOTE:** Turbine may remain in impeller cover bearing and will come off with impeller cover as shown in Figure 13.

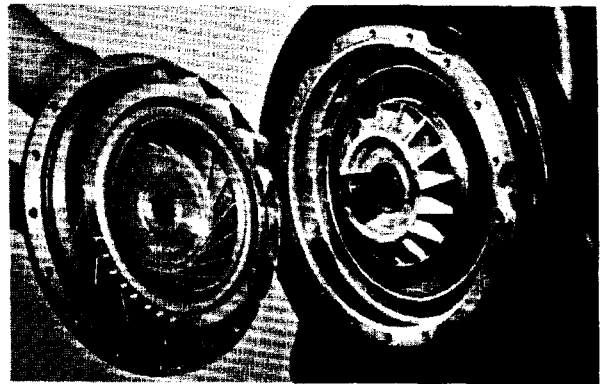


Figure 13

Impeller cover and turbine being removed as an assembly.

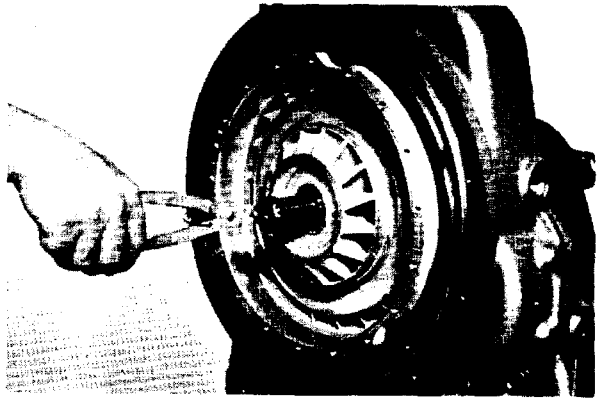


Figure 14

Remove turbine locating ring.

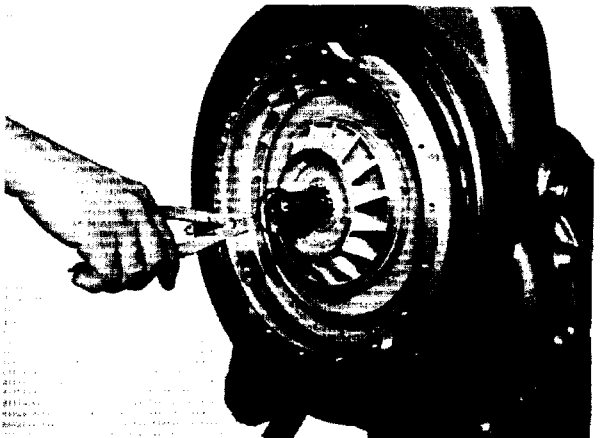


Figure 15

Remove reaction member retainer ring.

NOTE: Some units will have a fixed reaction member and some units will have a freewheeling reaction member. The fixed is a one piece and the freewheeling is an assembly. Remove as an assembly.

FREEWHEEL DISASSEMBLY

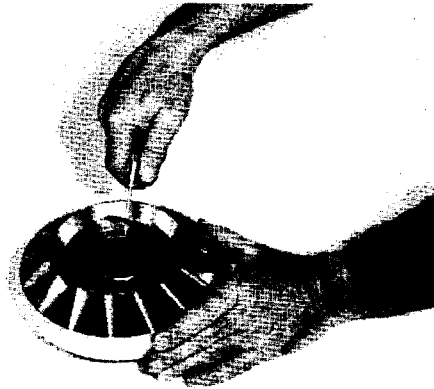


Figure 16

If either the reaction member or the freewheel assembly is to be replaced remove the front outer race to reaction member retainer ring.

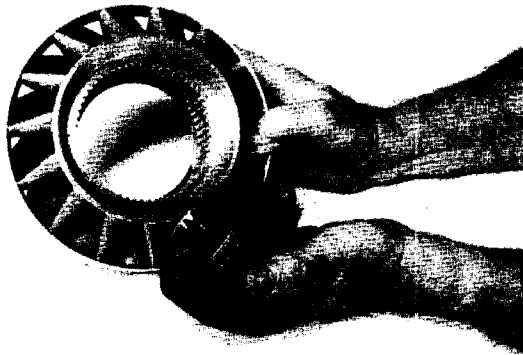


Figure 17

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

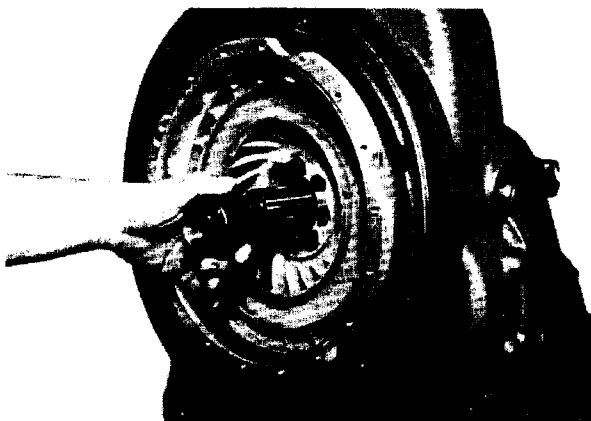


Figure 18

Remove reaction member spacer. Remove impeller and hub assembly.

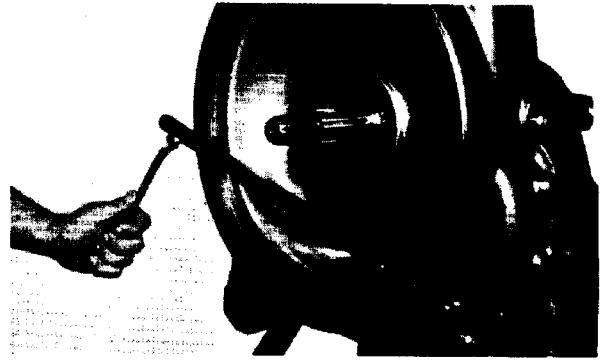


Figure 19

Using oil baffle puller holes provided, remove oil baffle.
NOTE: Puller tool like shown can be fabricated from diagram shown in Figure 19-A.

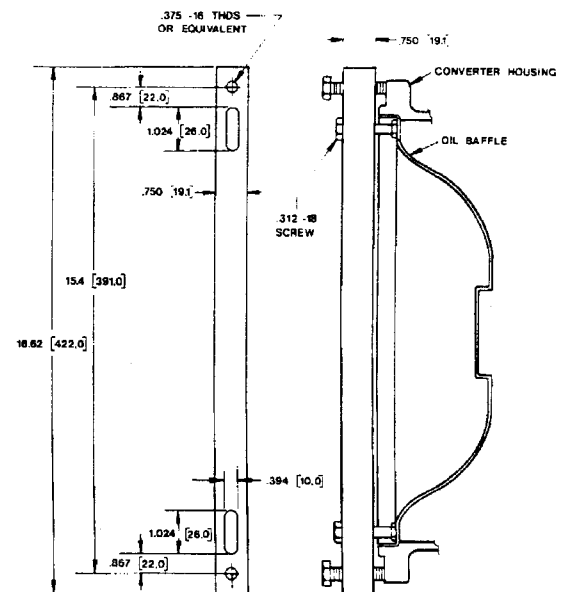


Figure 19-A

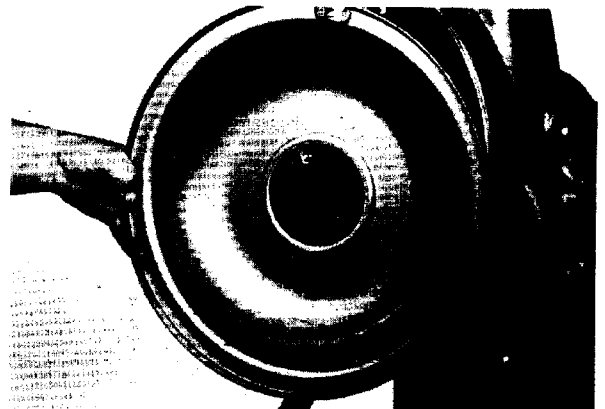


Figure 20

Oil baffle removed.



Figure 21
Remove pump drive idler gear retaining ring.



Figure 24
Using a soft hammer, tap pump drive gear and bearing support from housing.

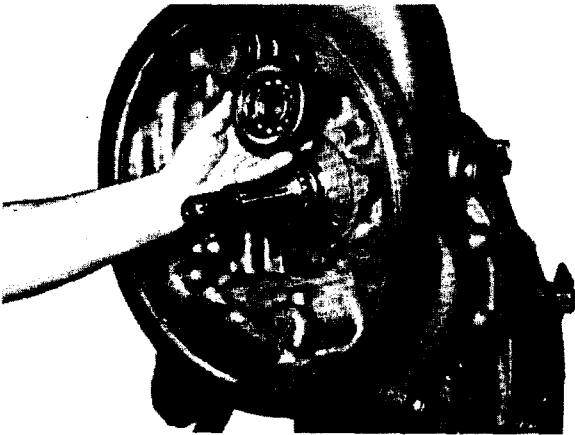


Figure 22
Remove idler gear and bearing assembly.

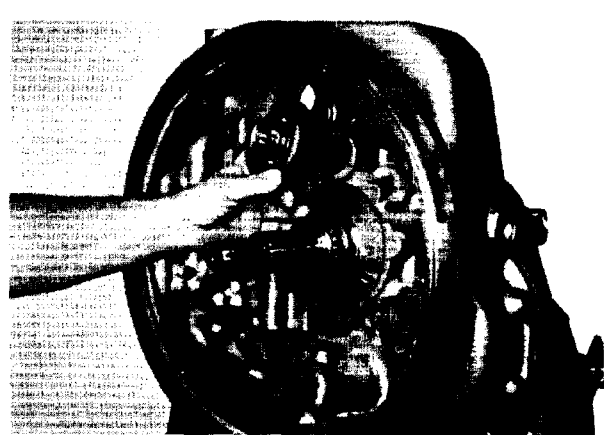


Figure 25
Remove gear and bearing assembly from housing.

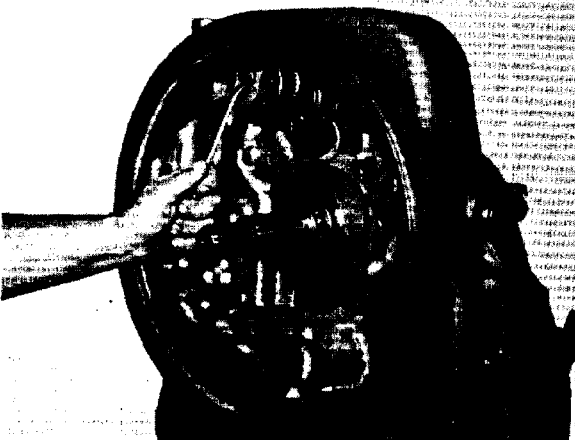


Figure 23
Remove pump drive bearing support screw and lock-washer.

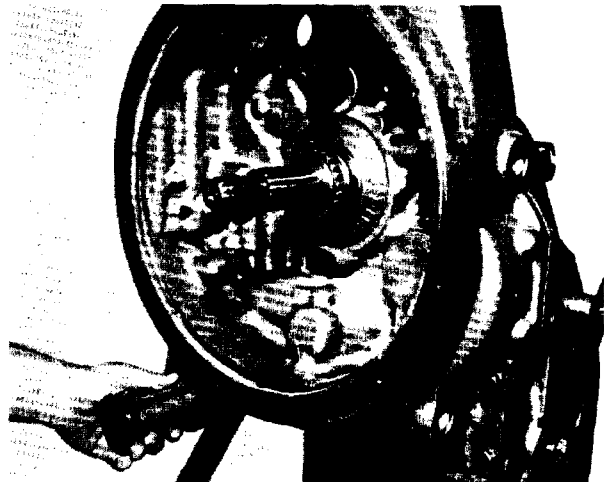


Figure 26
Remove sump screen assembly.

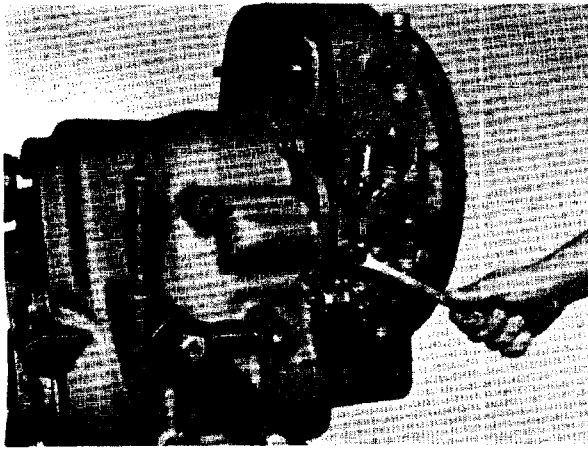


Figure 27
Remove control valve bolts and lockwashers.

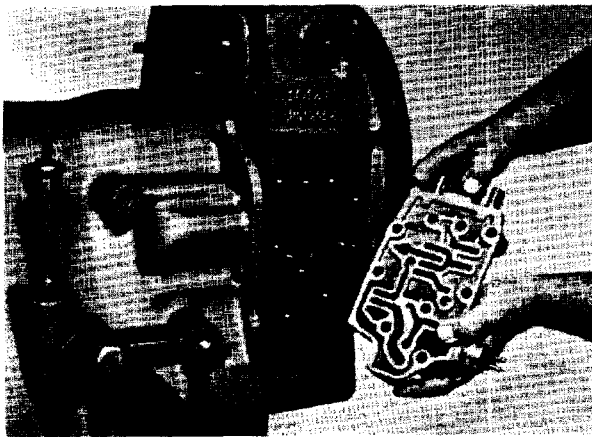


Figure 28
Remove control valve assembly. Use caution as not to lose detent springs and balls.



Figure 29
Remove all bolts but one securing transmission to converter housing.

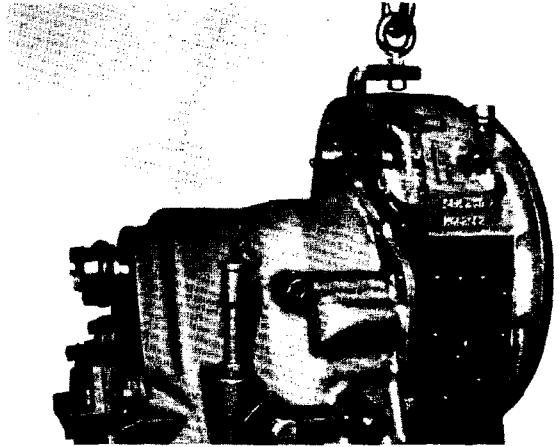


Figure 30
Support converter housing with a chain hoist. Remove remaining bolt.

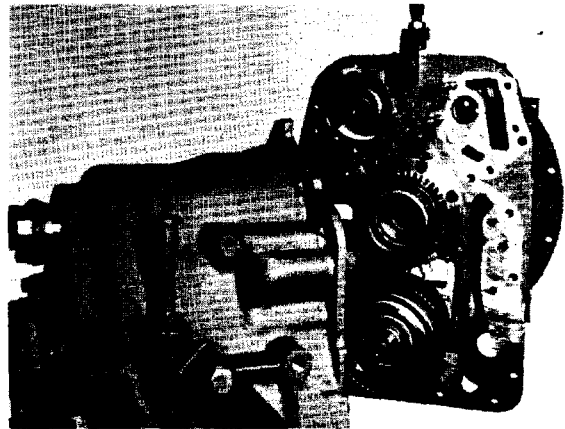


Figure 31
Separate converter housing from transmission case assembly. **NOTE:** Reverse and 2nd clutch will remain in converter housing.

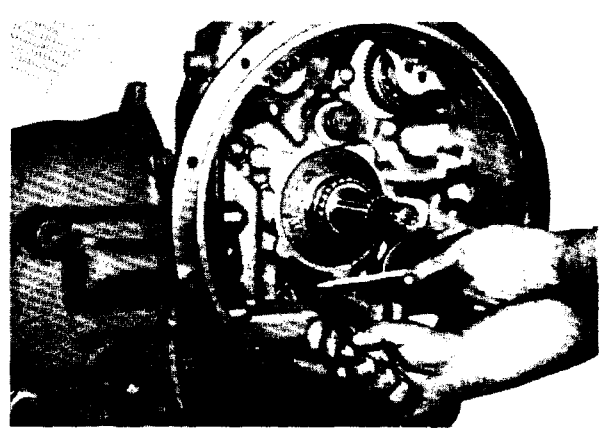


Figure 32
Using spreading type snap ring pliers, spread ears on the reverse clutch front bearing retaining ring.

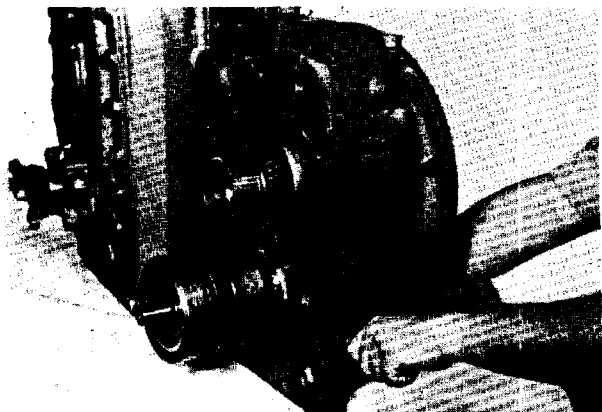


Figure 33

Holding snap ring open pry reverse and 2nd clutch assembly from converter housing.

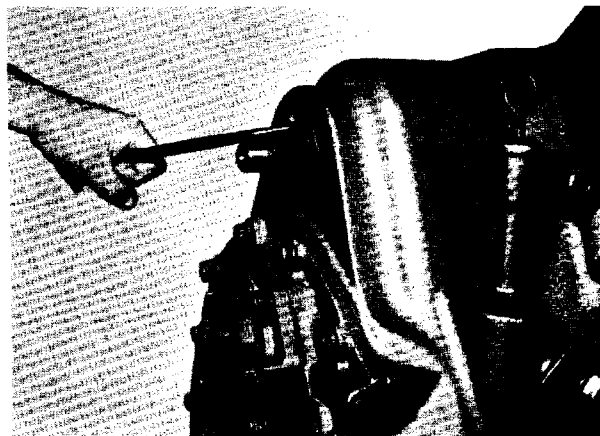


Figure 36

Using a pointed bar or screwdriver, pry oil seal from housing. Use caution as not to damage housing bore.

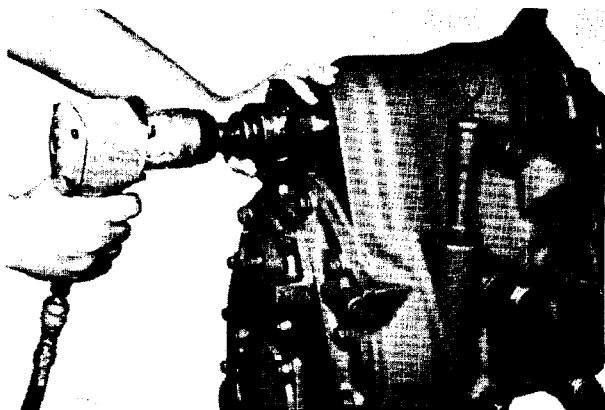


Figure 34

NOTE: P.T.O. is optional, if not used proceed to Figure 39. Using an impact wrench (if available), if not a flange retainer bar must be used to hold the companion flange from turning, loosen P.T.O. flange nut.

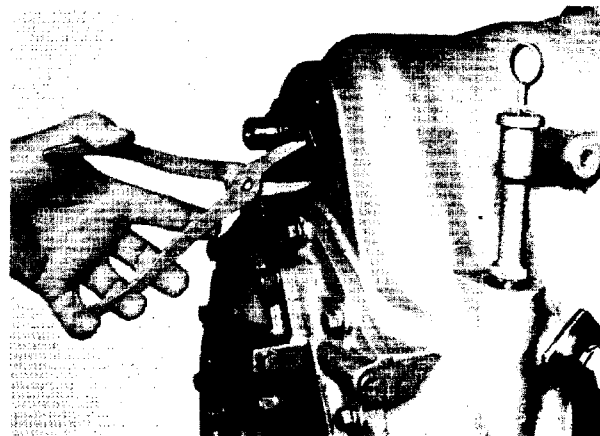


Figure 37

Remove P.T.O. bearing outer snap ring.

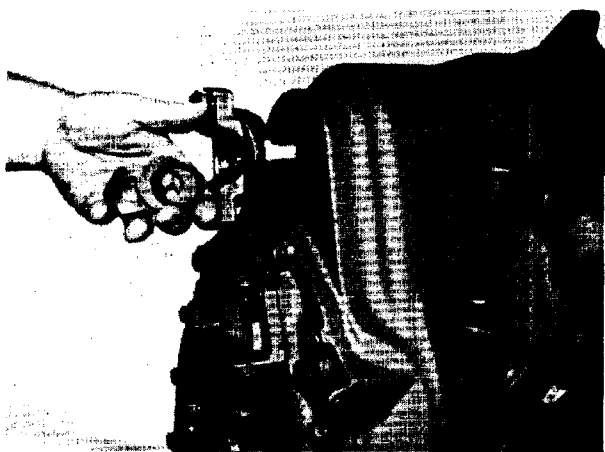


Figure 35

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

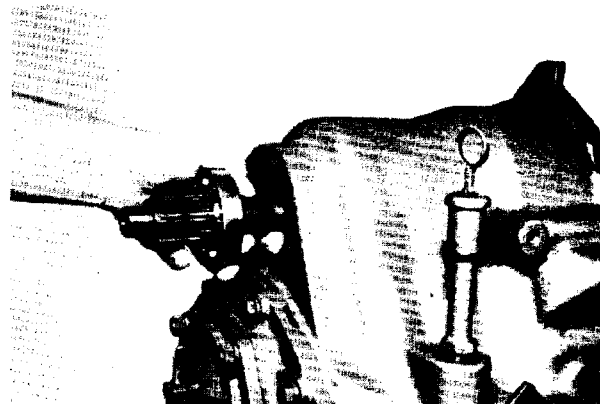


Figure 38

Remove P.T.O. shaft and bearing from housing. For 6 speed transmission disassembly and reassembly see 6 speed section starting on page 69.

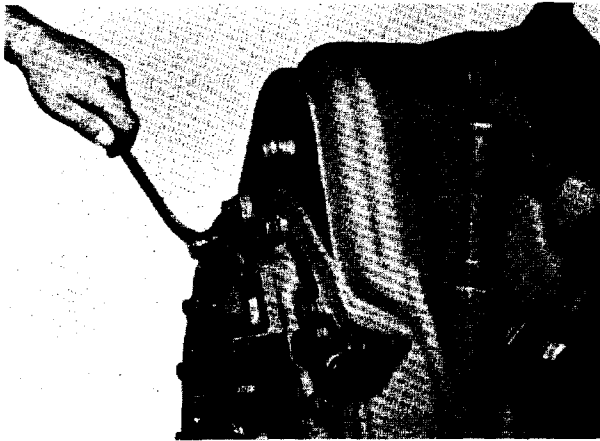


Figure 39

Remove low clutch rear bearing cap stud nuts and washers. Remove cap. For 6 speed transmission section see page 75.

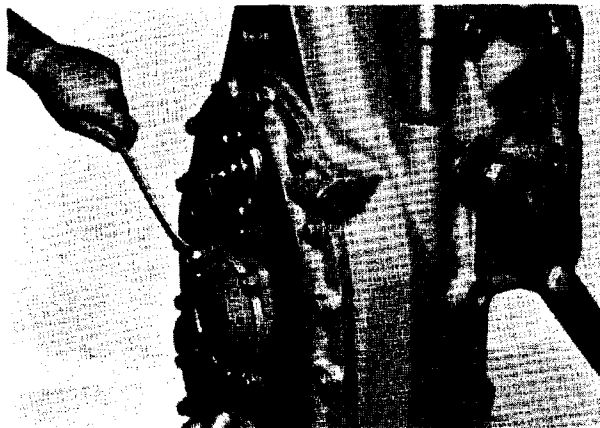


Figure 40

Remove idler shaft bearing cap stud nuts and washers.

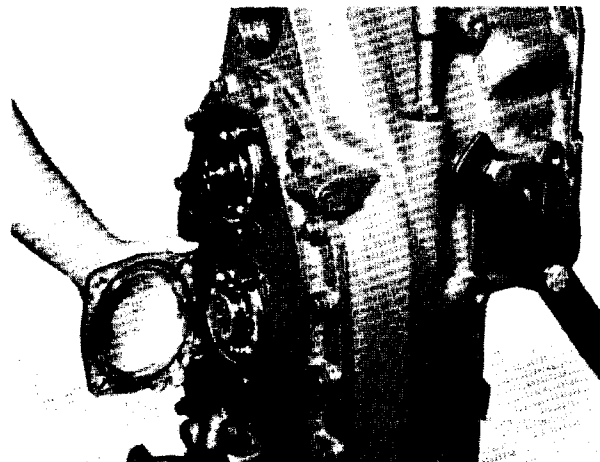


Figure 41

Remove bearing cap.

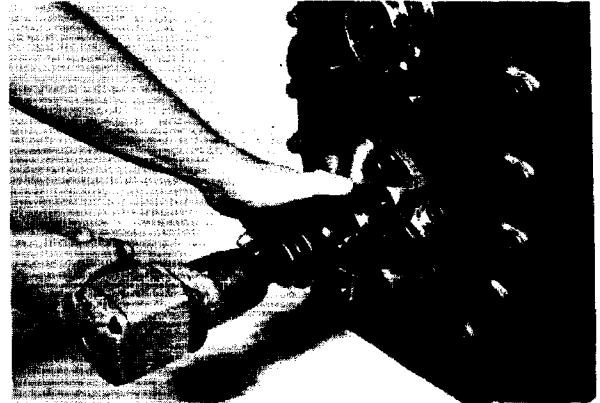


Figure 42

Using an impact wrench (if available), if not a flange retainer bar must be used to hold the companion flange from turning, loosen output flange nut.

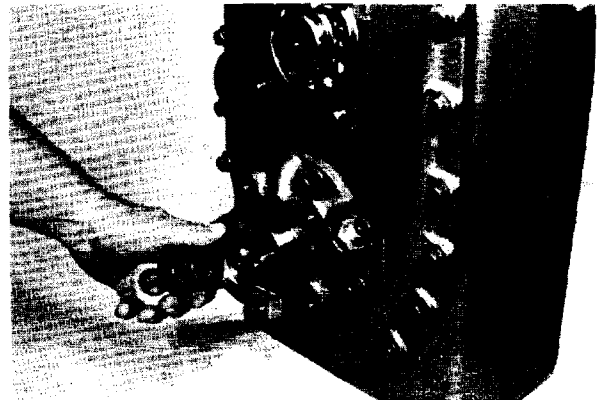


Figure 43

Remove flange nut, washer, "O" ring and flange. If a parking brake is used remove brake drum. Remove brake backing plate bolts and washers. Remove backing plate assembly.

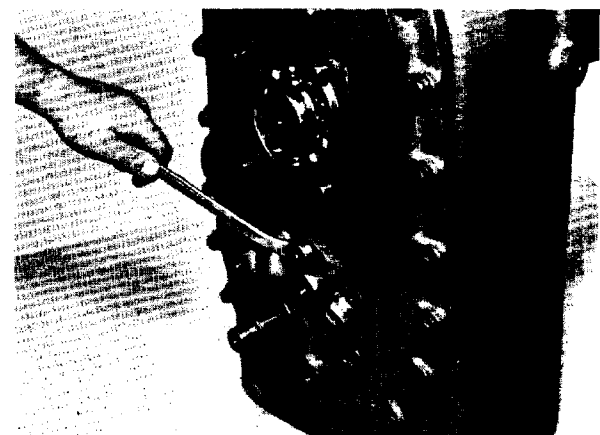


Figure 44

Remove output shaft bearing cap stud nuts and washers.

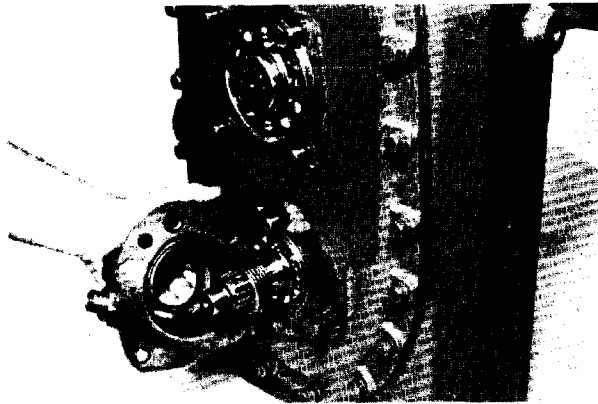


Figure 45

Remove output shaft bearing cap. Cap shown has optional speedometer gear. Remove speedometer drive gear from output shaft.

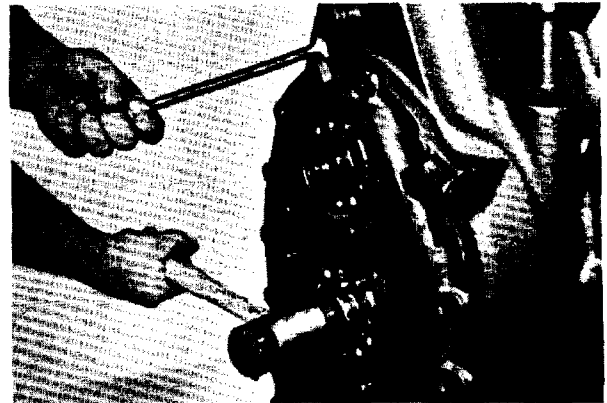


Figure 48

Using pry slots provided, pry cover from transmission housing. Using a soft hammer tap on low clutch, idler and output shafts to prevent cover from binding.

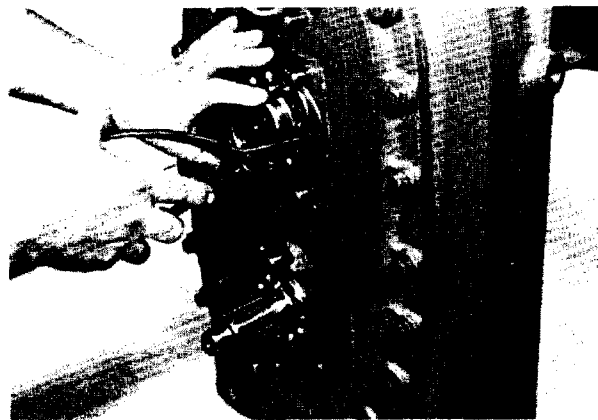


Figure 46

Remove low clutch, idler shaft and output shaft rear bearing locating rings.

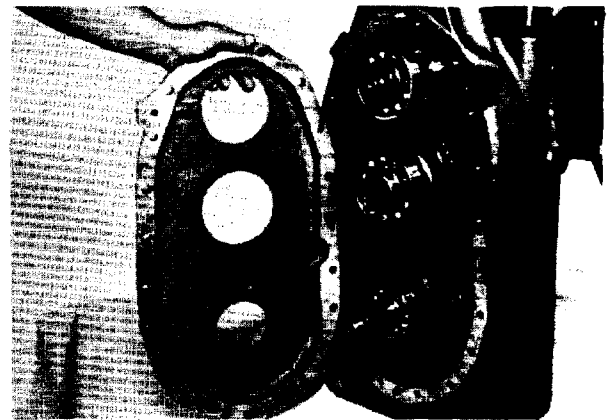


Figure 49

Rear cover removed

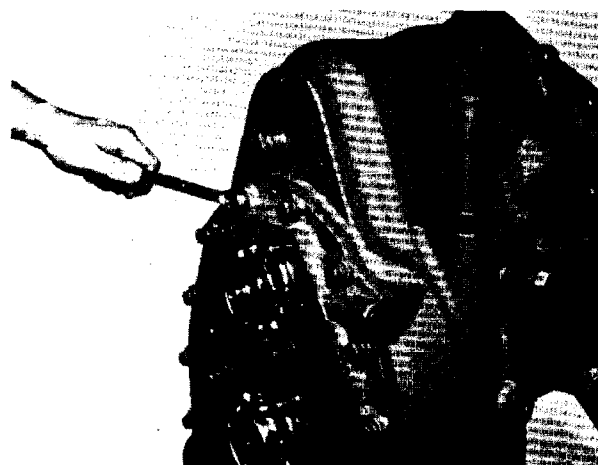


Figure 47

Remove rear cover bolts and washers.

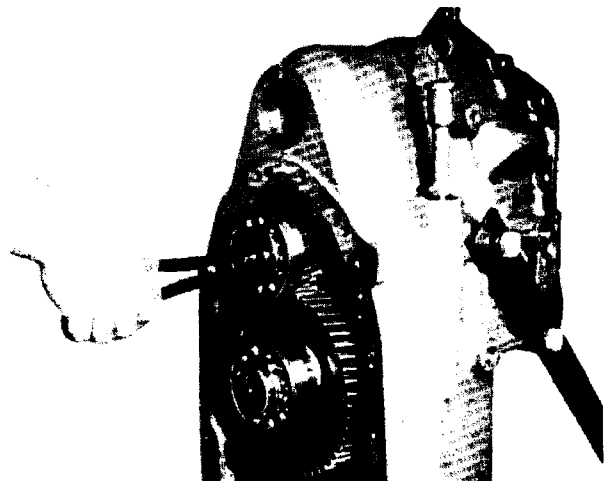


Figure 50

Remove low clutch rear bearing retainer ring.

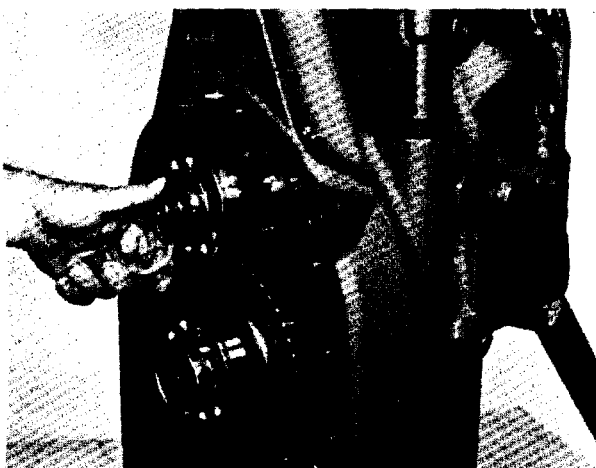


Figure 51
Low clutch rear bearing spacer and retainer ring.

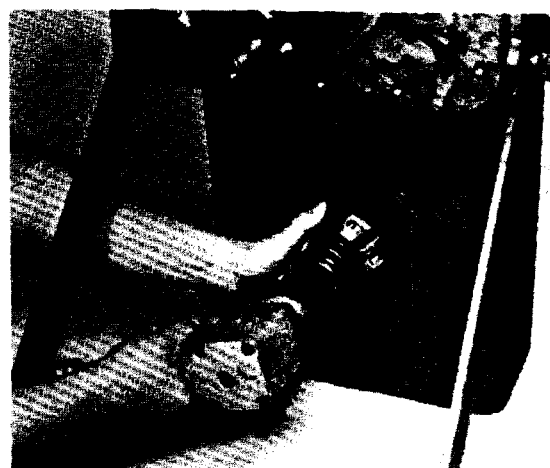


Figure 54
Remove output shaft front flange nut, washer, "O" ring and flange.

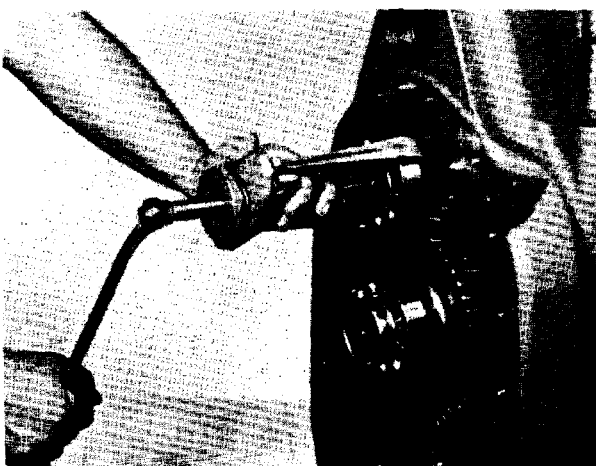


Figure 52
Remove low clutch rear bearing.

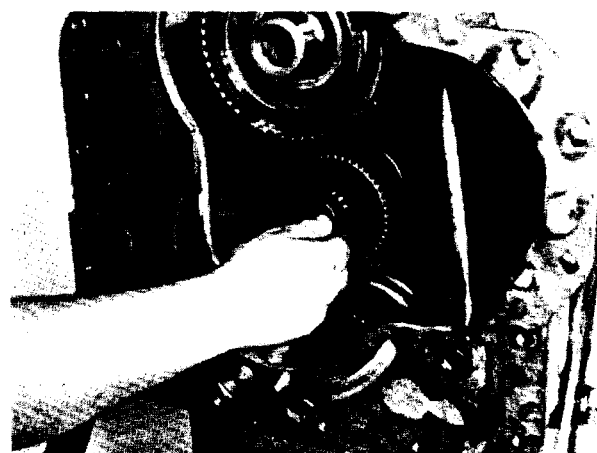


Figure 55
Remove reverse and 2nd clutch pilot bearing.

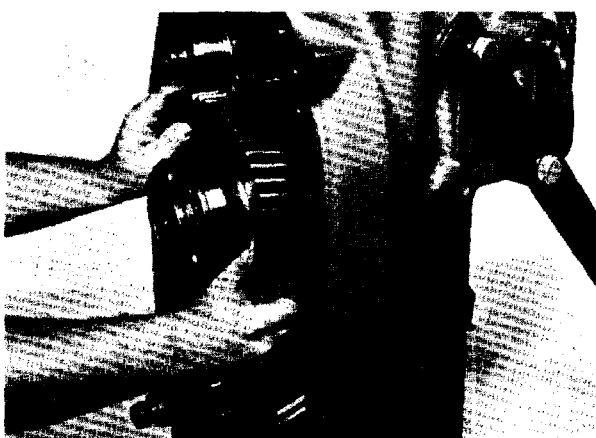


Figure 53
Remove idler gear and rear bearing as an assembly.

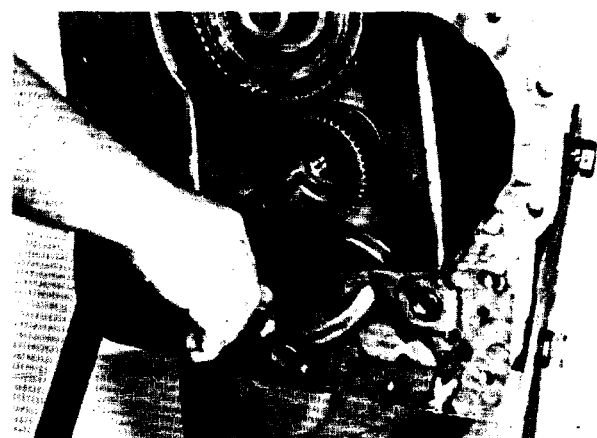


Figure 56
Remove 2nd clutch disc hub retainer ring.

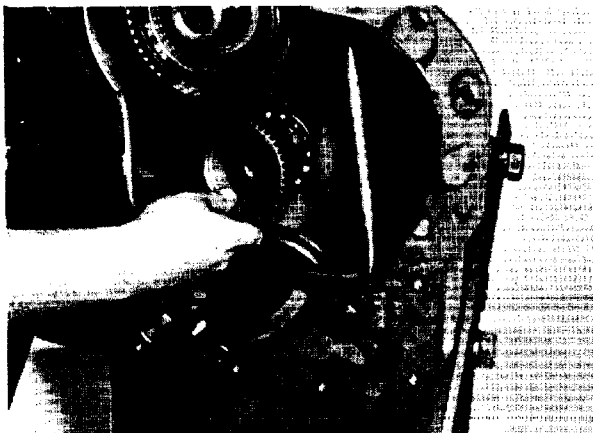


Figure 57
Remove disc hub.



Figure 58
Compress ears on 3rd clutch front bearing locating ring. Remove ring from ring groove. It is not necessary to remove ring from clutch, it will come out when clutch is removed. See Figure 58-A.

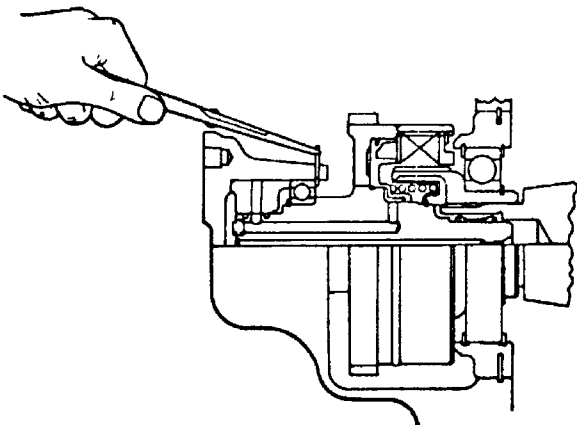


Figure 58-A



Figure 59
Tap low clutch assembly from housing. If possible it is recommended someone help in this operation to prevent the low clutch from dropping out of the case.



Figure 60
Using contracting type snap ring pliers as shown, contract 3rd clutch bearing carrier locating ring. Lock pliers to hold ring contracted.



Figure 61
From front of transmission and using a soft bar tap 3rd speed clutch assembly from housing. If clutch seems difficult to remove recheck front and rear snap rings being sure they are clear of the ring groove.

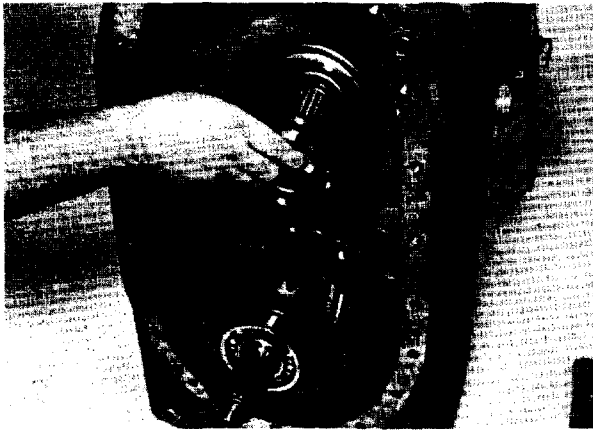


Figure 62

Remove bearing carrier, bearing and 3rd speed clutch disc hub.

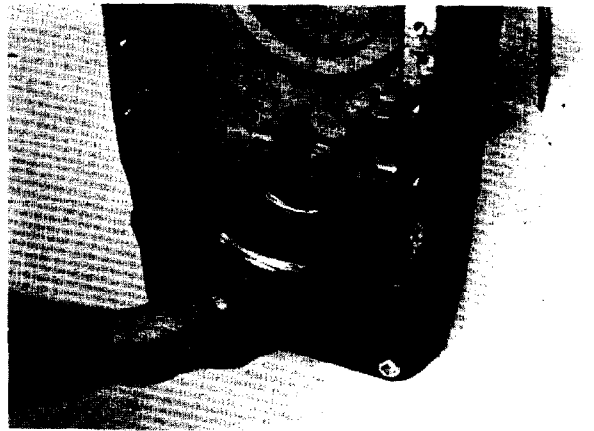


Figure 65

Remove oil sump oil baffle.



Figure 63

Remove 3rd speed clutch assembly.

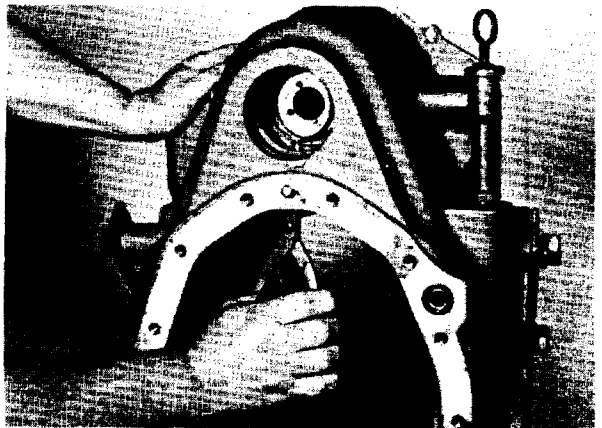


Figure 66

Remove forward clutch shaft drive gear retainer ring. See Figure 66-A.

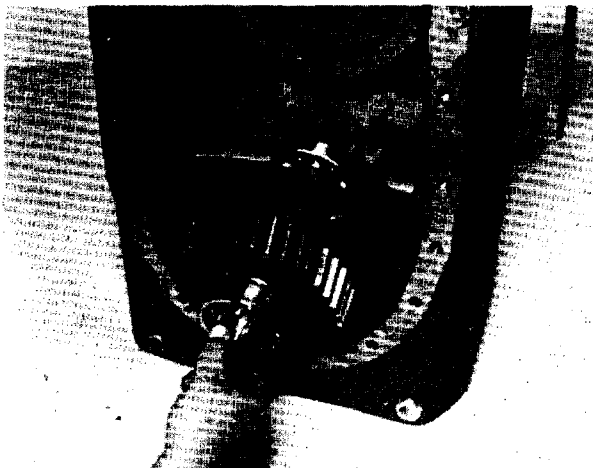


Figure 64

Remove output shaft and bearings as an assembly.

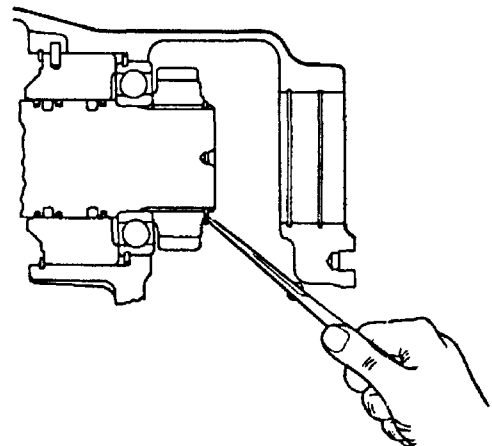


Figure 66-A

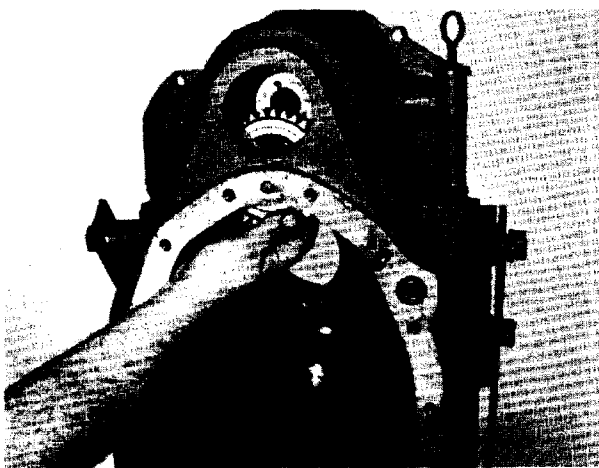


Figure 67
Remove forward clutch shaft drive gear.

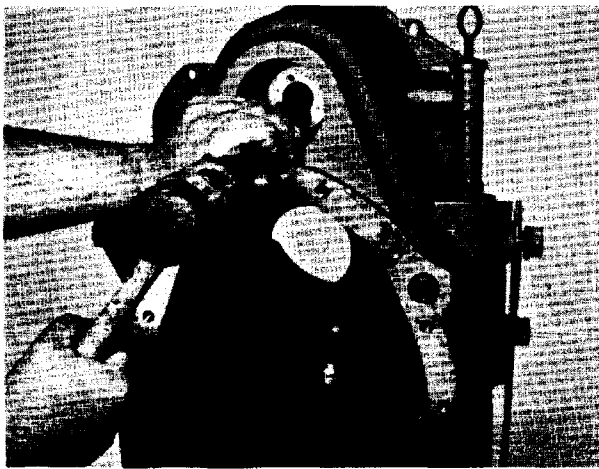


Figure 68
Tap forward clutch from rear bearing.

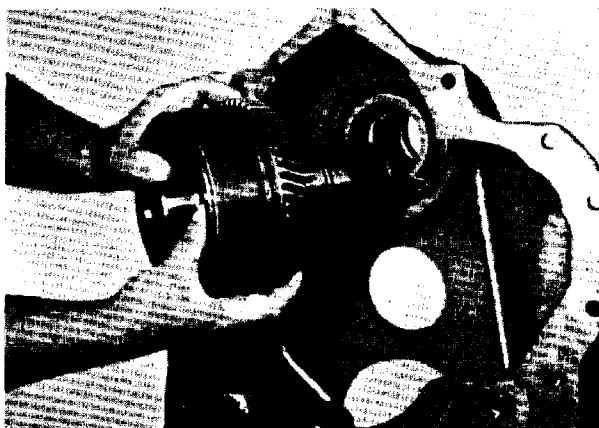


Figure 69
Remove forward clutch assembly.



Figure 70
Remove forward clutch piston ring sleeve retainer ring.



Figure 71
If piston ring sleeve or forward clutch rear bearing is to be replaced, tap bearing from rear of housing.

CLUTCH DISASSEMBLY Low Clutch

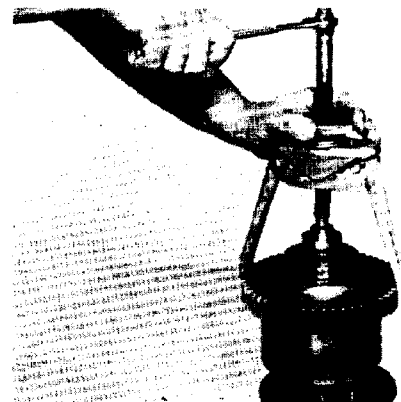


Figure 72
Remove low gear and hub, bearing spacer and low clutch front bearing.

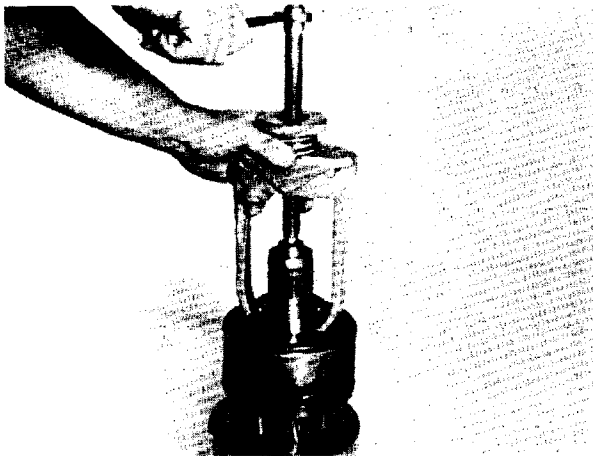


Figure 73
Remove low speed gear bearing.



Figure 74
Remove low gear bearing locating ring.

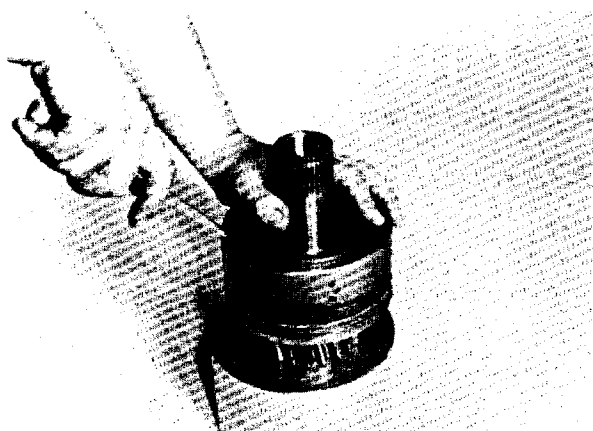


Figure 75
Remove end plate retainer ring.

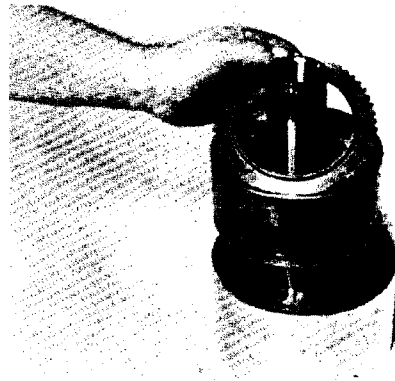


Figure 76
Remove end plate.

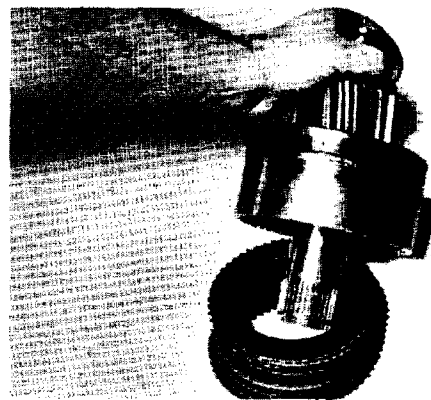


Figure 77
Turn clutch over. Remove inner and outer clutch discs. Do not mix low clutch friction discs with friction discs in other clutches.



Figure 78
Remove clutch piston return spring. A sleeve with a portion removed is recommended for removing the clutch piston return spring, washer, and retainer ring. Sleeve shown is a common pipe, with a 1-1/2 x 1 [39,0x26,0mm] opening. The pipe is 6 x 3-1/4 x 2-3/4 [155,0x85,0x78,0mm]. Compress spring retainer washer. Through opening remove spring retainer snap ring. Release tension on spring retainer.

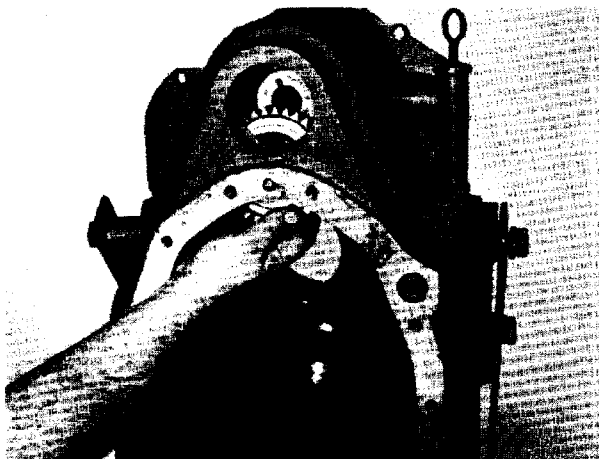


Figure 67
Remove forward clutch shaft drive gear.

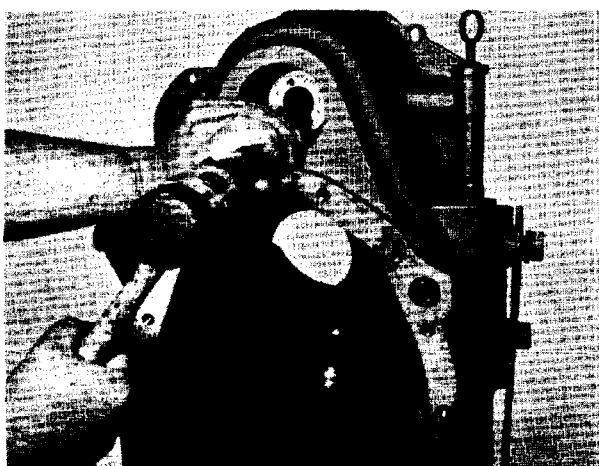


Figure 68
Tap forward clutch from rear bearing.

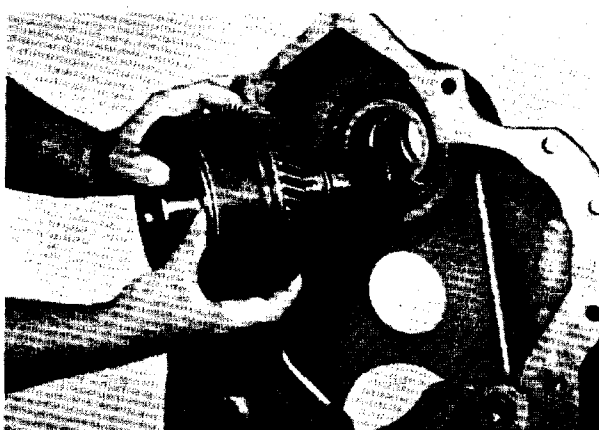


Figure 69
Remove forward clutch assembly.

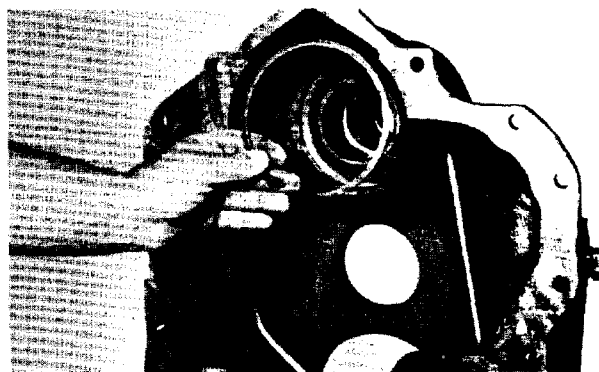


Figure 70
Remove forward clutch piston ring sleeve retainer ring.

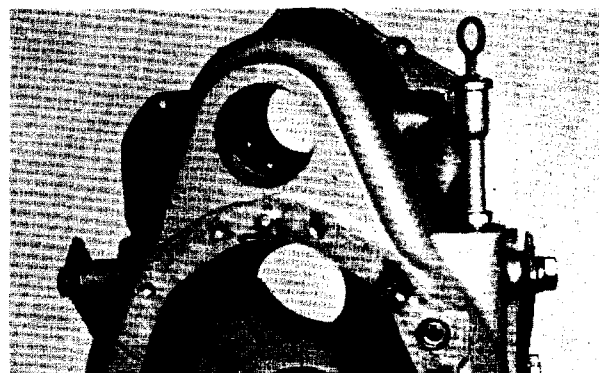


Figure 71
If piston ring sleeve or forward clutch rear bearing is to be replaced, tap bearing from rear of housing.

CLUTCH DISASSEMBLY Low Clutch

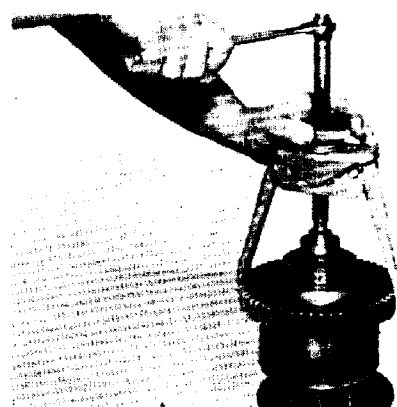


Figure 72
Remove low gear and hub, bearing spacer and low clutch front bearing.

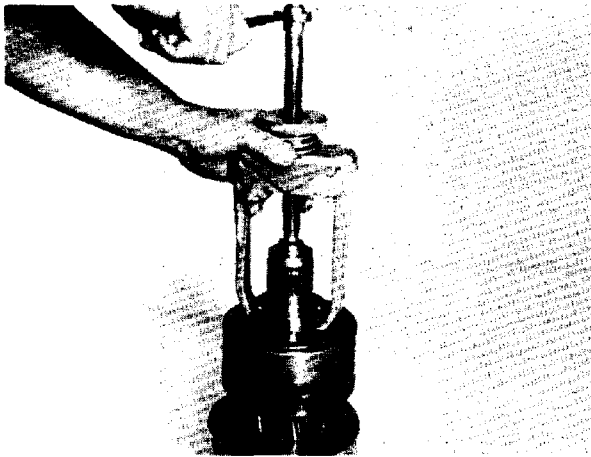


Figure 73
Remove low speed gear bearing.



Figure 74
Remove low gear bearing locating ring.

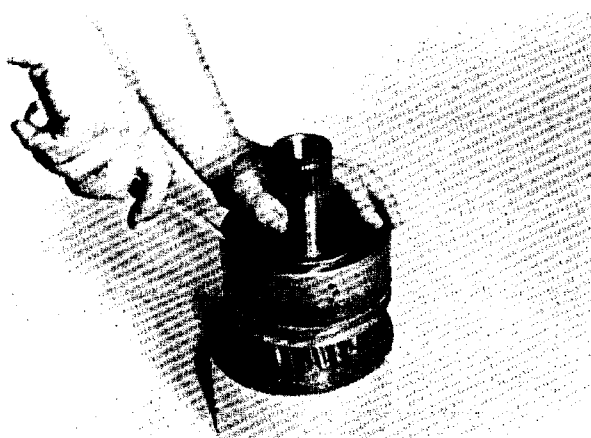


Figure 75
Remove end plate retainer ring.

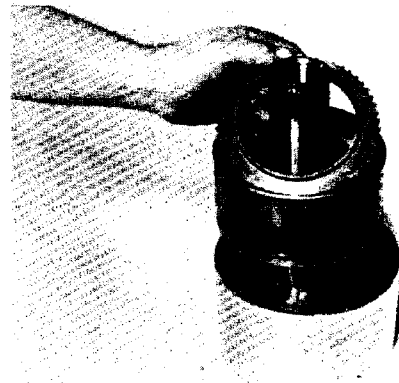


Figure 76
Remove end plate.

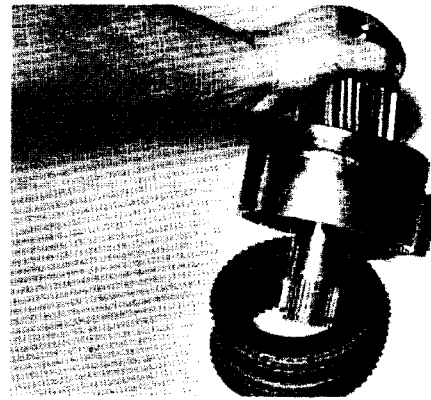


Figure 77
Turn clutch over. Remove inner and outer clutch discs. Do not mix low clutch friction discs with friction discs in other clutches.



Figure 78
Remove clutch piston return spring. A sleeve with a portion removed is recommended for removing the clutch piston return spring, washer, and retainer ring. Sleeve shown is a common pipe, with a 1-1/2 x 1 [39,0x26,0mm] opening. The pipe is 6 x 3-1/4 x 2-3/4 [155,0x85,0x78,0mm]. Compress spring retainer washer. Through opening remove spring retainer snap ring. Release tension on spring retainer.

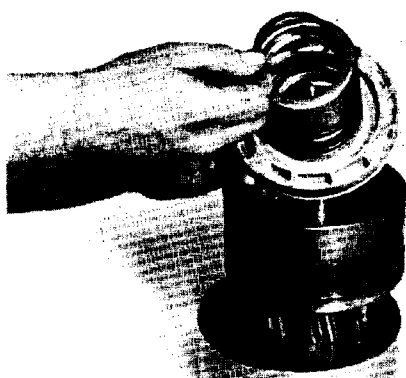


Figure 79

Remove spring retainer and spring. Turn clutch over and tap clutch shaft on a block of wood to remove clutch piston.

LOW CLUTCH REASSEMBLY



Figure 80

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 as shown. Rotate piston until seal ring is flush with outer diameter of piston.



Figure 81

Install clutch piston inner seal ring and size as described in Figure 80.



Figure 82

Position piston in low clutch drum as shown. Use caution as not to damage inner and outer piston sealing rings.

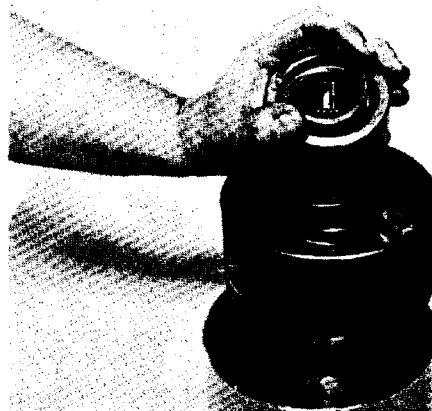


Figure 83

Position piston return spring, spring retainer, and snap ring in clutch drum.



Figure 84

Compress spring and retainer. Install retainer snap ring.



Figure 85

Install clutch inner bearing locating ring.

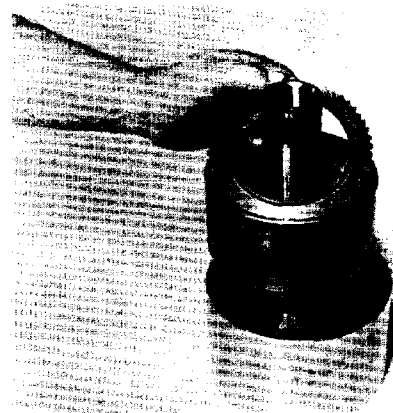


Figure 88

Install clutch disc end plate.



Figure 86

Install one steel disc.

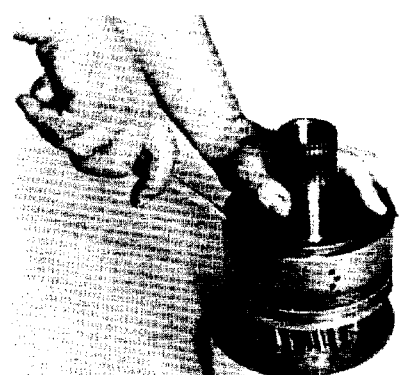


Figure 89

Install end plate retainer ring.

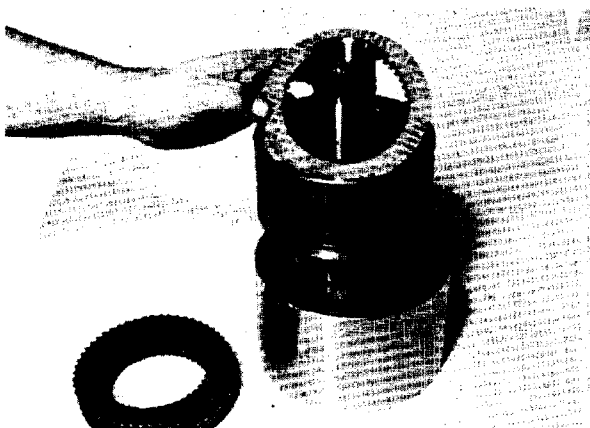


Figure 87

Install one friction disc. **NOTE:** The friction discs in the low clutch has a higher co-efficient rating than the friction discs in the other clutches therefore the discs must not be mixed. The low clutch friction disc has a yellow mark of nonsoluble paint on the outer diameter for permanent identification. 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.

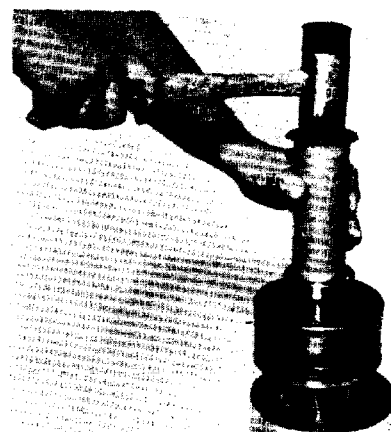


Figure 90

Install low speed gear inner bearing.

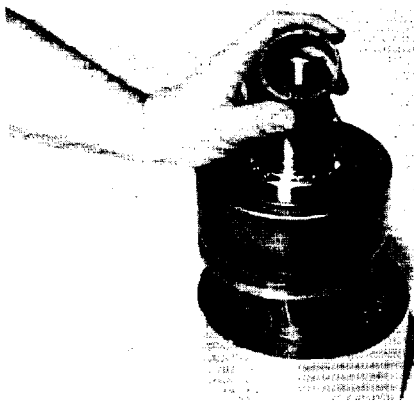


Figure 91
Install low speed gear bearing spacer.

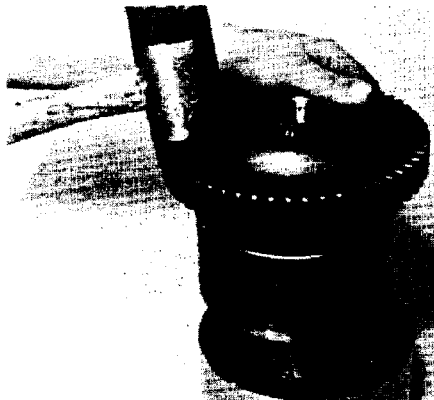


Figure 92
Install low clutch driven gear and hub into clutch drum. Align splines on clutch hub with internal teeth of friction discs. Tap gear into position. Do not force this operation. Gear splines must be in full position with internal teeth of all friction discs.

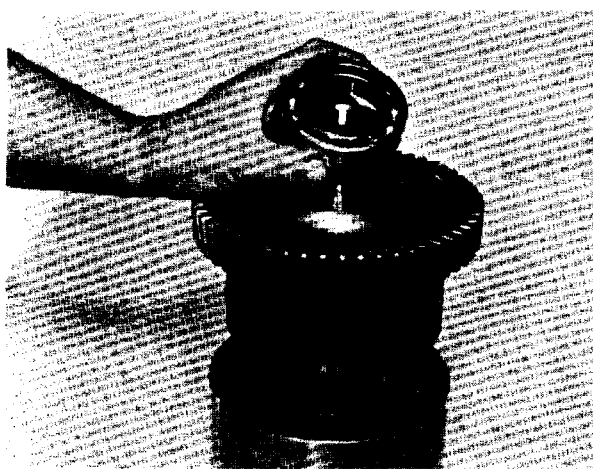


Figure 93
Install low speed gear outer bearing.

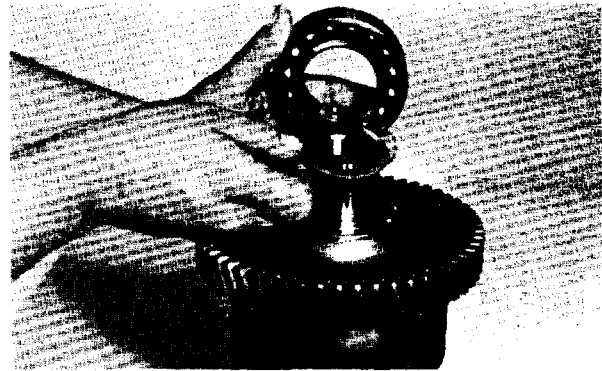


Figure 94
Position low gear front bearing spacer and bearing on clutch shaft.

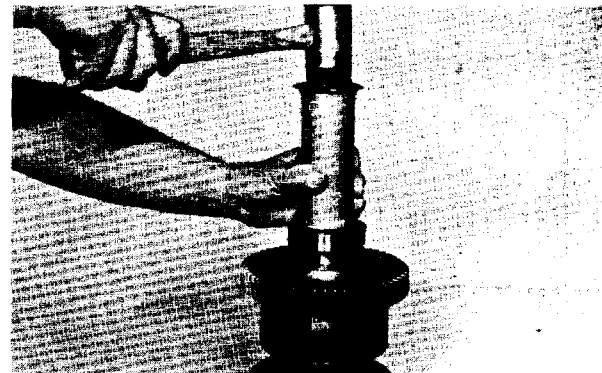


Figure 95
Tap bearing into position.

REVERSE AND 2nd CLUTCH DISASSEMBLY (Reverse being disassembled)



Figure 96
Remove clutch shaft piston rings and expander springs. **NOTE:** New piston rings and expander springs must be installed per instructions on page 85.

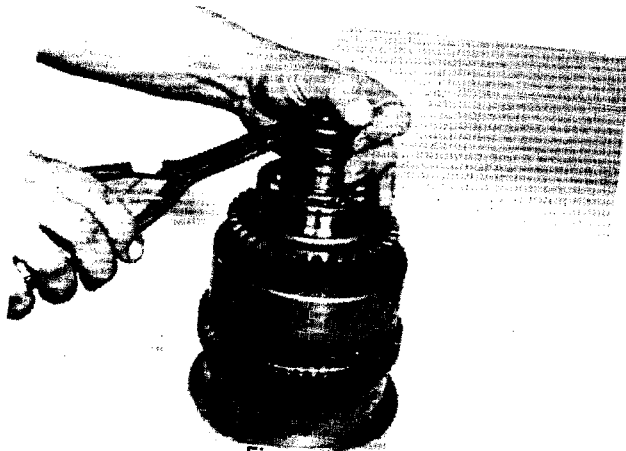


Figure 97
Remove front bearing retainer ring.

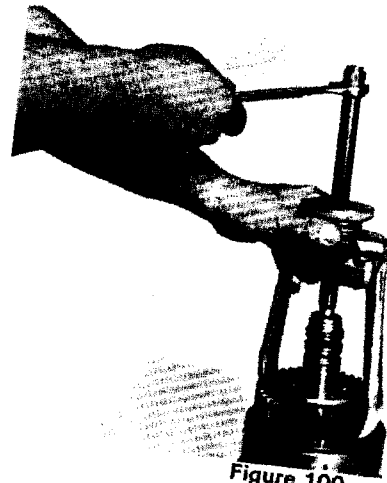


Figure 100
Remove gear as shown.

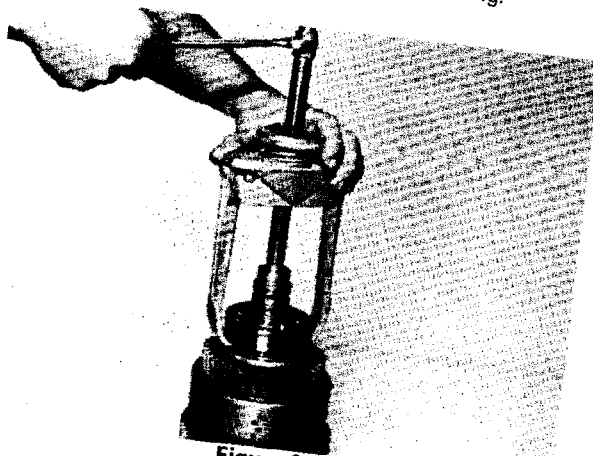


Figure 98
Remove front bearing.



Figure 101
Remove bearing spacer.



Figure 99
Pry reverse gear from clutch assembly far enough to use a gear puller.

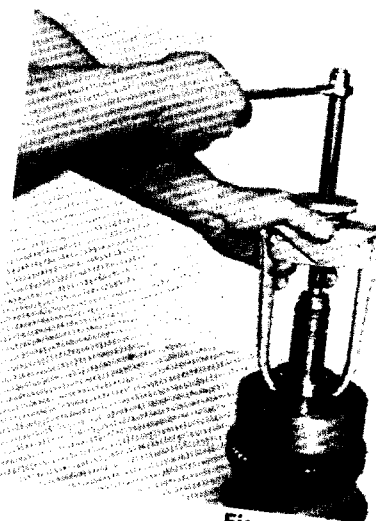


Figure 102
Remove inner bearing.

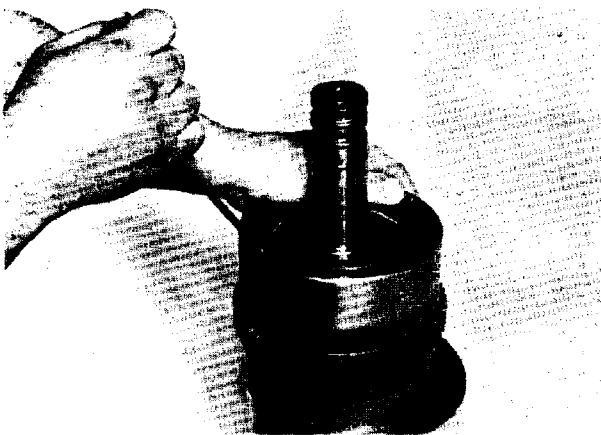


Figure 103
Remove end plate retainer ring.

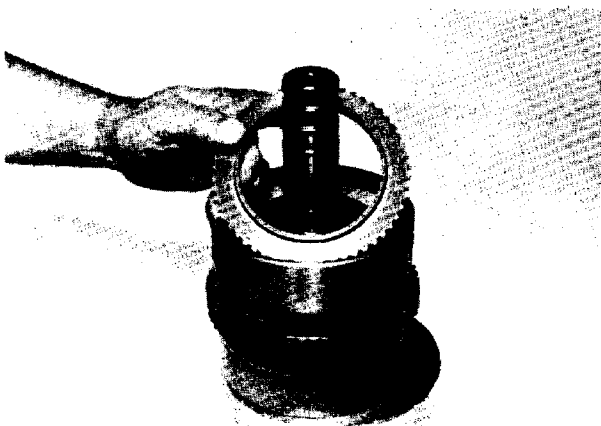


Figure 104
Remove end plate.



Figure 105
Remove clutch discs.

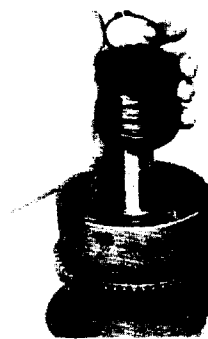


Figure 106

Refer to procedure shown in Figure 78 for removing return spring retainer ring. Remove ring, piston return disc spring pack and spacer. Turn clutch over and tap shaft on a block of wood to remove clutch piston. Repeat procedure for 2nd clutch disassembly. **NOTE:** 2nd clutch will have a spring for piston return. Do not mix piston return disc spring packs with any other spring packs. See note on page 86.

REVERSE AND 2ND CLUTCH REASSEMBLY (Reverse being assembled)



Figure 107

Install inner and outer clutch piston seal rings. Size rings as explained in Figure 80. Position piston in clutch drum.



Figure 108

Install piston return spring spacer, return disc spring pack and retainer ring. See note on page 86.

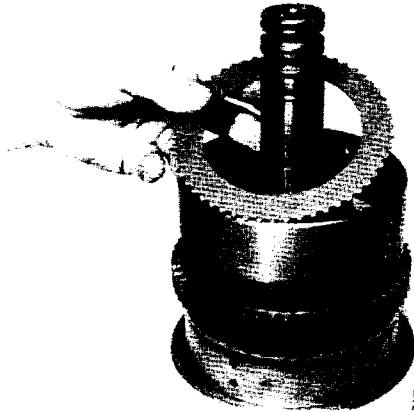


Figure 109
Install 1st steel disc.

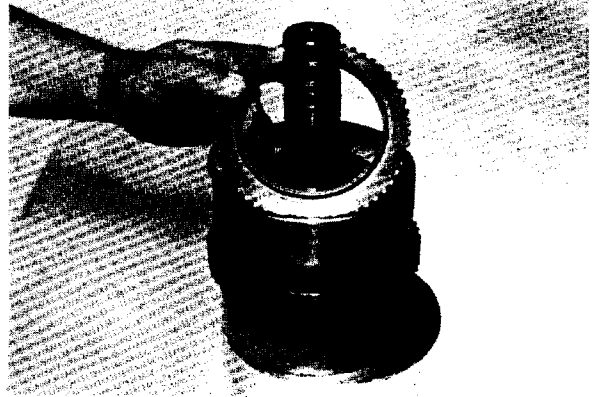


Figure 112
Install end plate.

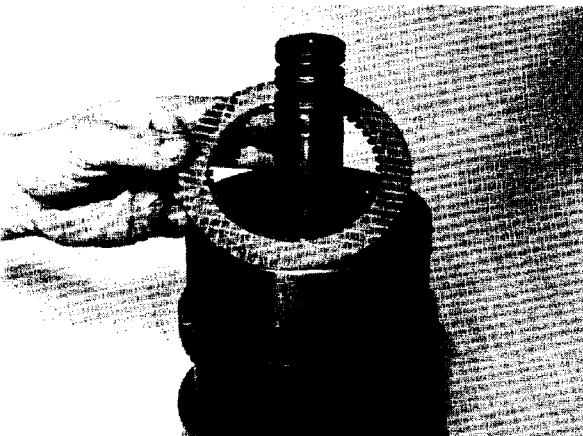


Figure 110
Install one friction disc.

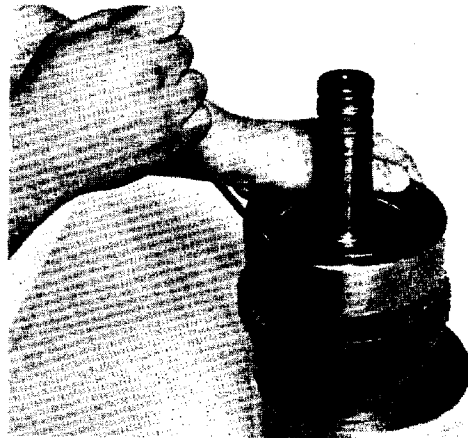


Figure 113
Install end plate retainer ring.

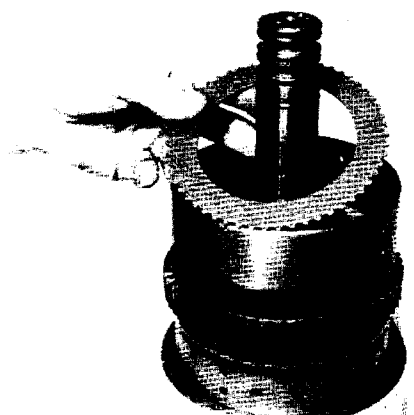


Figure 111
Install next steel disc. Alternate friction and steel discs until the proper amount of discs are installed. First disc next to the piston is steel, last disc installed is friction.

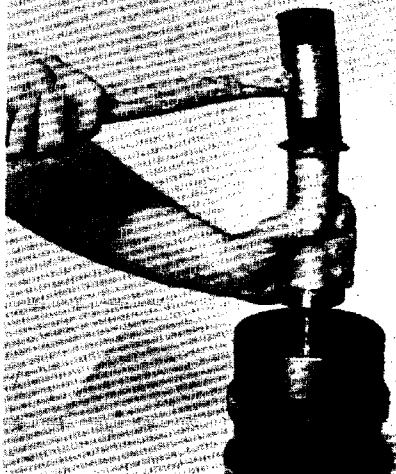


Figure 114
Install inner clutch driven gear bearing.

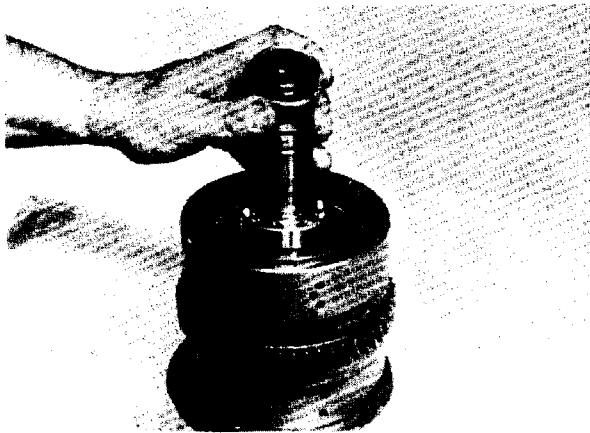


Figure 115
Install bearing spacer.

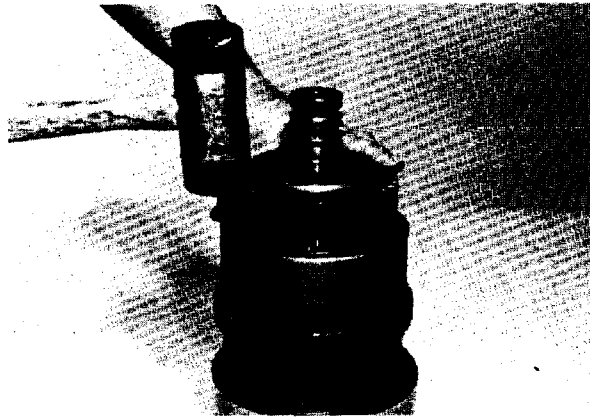


Figure 116
Install clutch driven gear into clutch drum. Align splines on clutch gear with internal teeth of friction discs. Tap gear into position. Do not force this operation. Gear splines must be in full position with internal teeth of all friction discs.

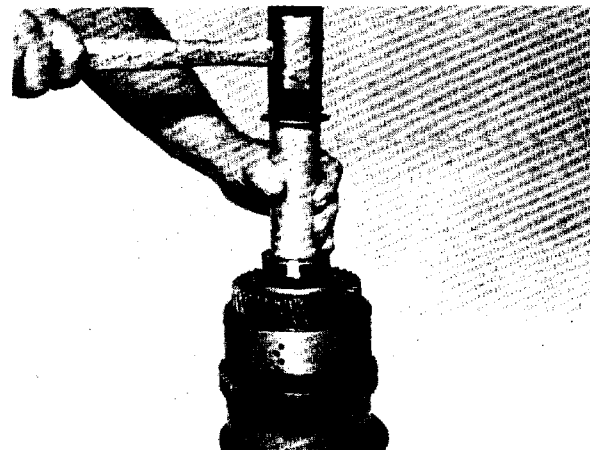


Figure 117
Install outer bearing.

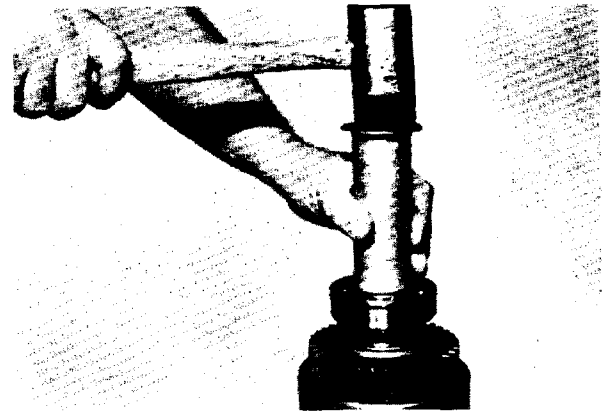


Figure 118
Install front bearing. **NOTE:** Snap ring groove in front bearing must be up.



Figure 119
Install front bearing retainer ring.



Figure 120
Install new clutch shaft piston rings and expander springs per instructions on page 85. **NOTE:** 2nd clutch uses a return spring and not a disc spring pack for piston return.

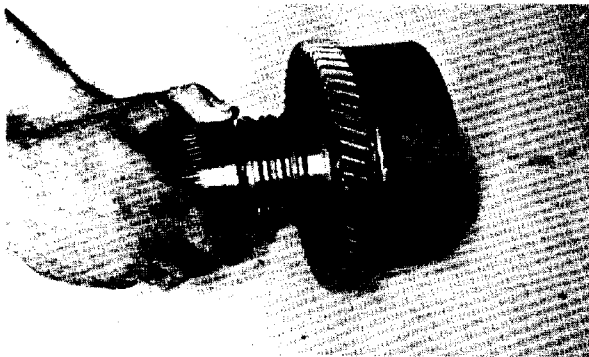


Figure 121

Forward clutch will disassemble and reassemble the same as the reverse clutch. Install new clutch shaft piston rings and expander springs per instructions on page 85.

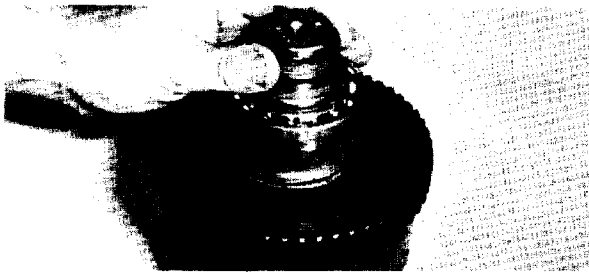


Figure 122

The 3rd speed clutch will disassemble and reassemble the same as the low clutch except for the friction discs. **See note in Figure 87.** Install new clutch shaft piston rings and expander springs per instructions on page 85.

CONVERTER HOUSING DISASSEMBLY

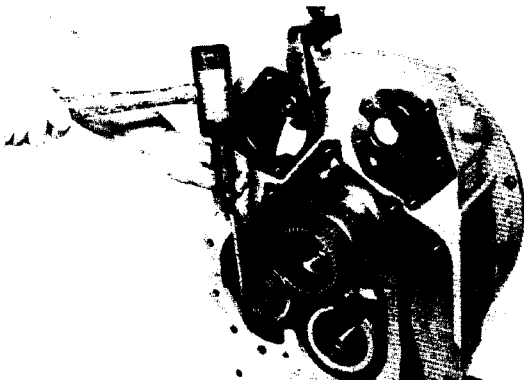


Figure 123

Straighten lockplate tabs from reverse idler capscrews. **NOTE:** Some units will have a lock nut type idler gear retention. Disassembly and reassembly of this type is explained in detail starting on page 47, Figure 221. For R-Model front end, see page 59, Figure 14.

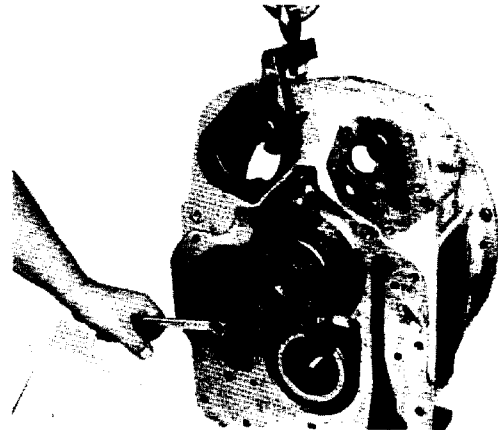


Figure 124

Remove reverse idler capscrews.

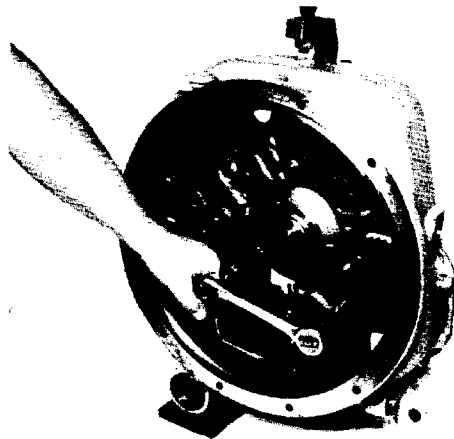


Figure 125

Remove reverse idler shaft front capscrews.



Figure 126

Remove reverse idler gear and bearing assembly.

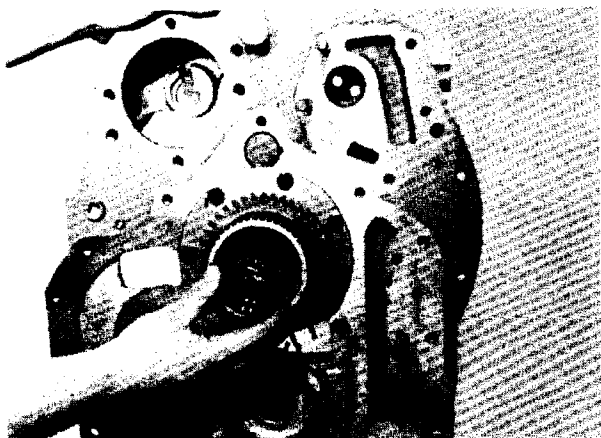


Figure 127
Remove forward shaft pilot bearing.

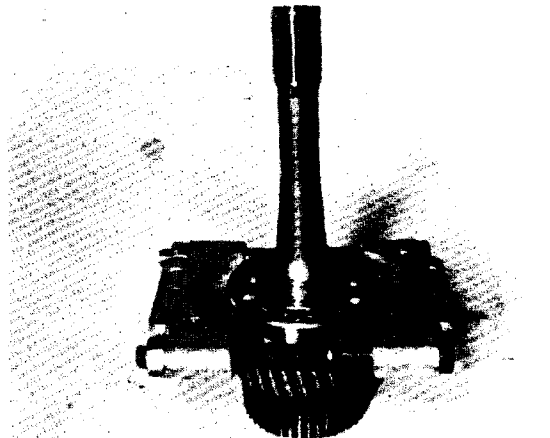


Figure 130
Recommended procedure for removing bearing.



Figure 128
Using spreader type snap ring pliers spread ears on the turbine shaft bearing snap ring. Tap turbine shaft from converter housing.



Figure 131
Remove reaction member support capscrews.

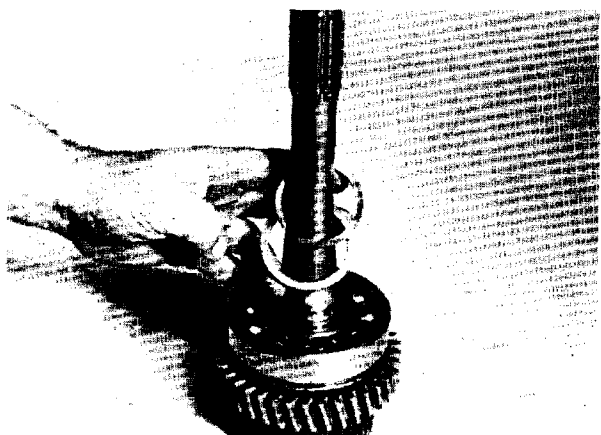


Figure 129
Remove oil sealing ring and turbine shaft bearing retainer ring and washer.

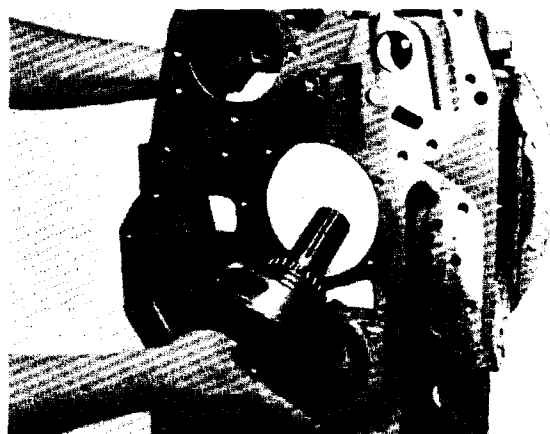


Figure 132
Tap reaction member support from housing.

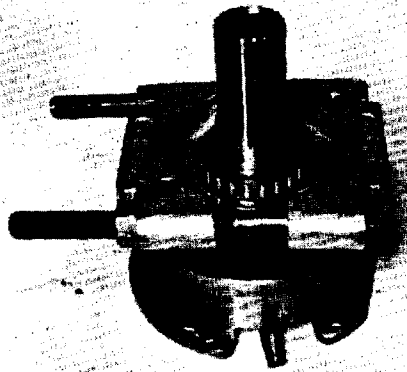


Figure 133

Remove bearing from support. Remove support oil sealing ring and sealing ring expander spring.

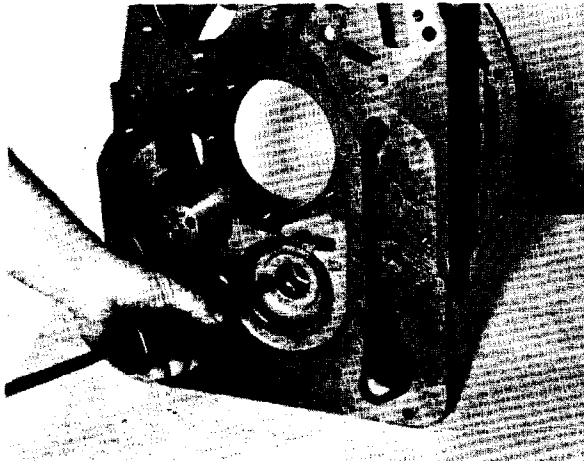


Figure 134

If reverse clutch piston ring sleeve is to be replaced, remove as shown.

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 larger side of cone flat against a block of wood to dislodge solidified particles of lubricant. Immerse again in cleaning

fluid to flush out particles. Repeat above operation until bearings are thoroughly clean. Dry bearings using moisture-free compressed air. Be careful to direct air stream across bearing to avoid spinning. Do not spin bearings when drying. Bearings may be rotated slowly by hand to facilitate drying process.

Housings

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

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

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

INSPECTION

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

Bearings

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

Oil Seals, Gaskets and Retaining Rings

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

Gears and Shafts

If magna-flux process is available, use process to check parts. Examine teeth on all gears carefully for wear, pitting,

chipping, nicks, cracks or scores. If gear teeth show spots where case hardening is worn through or cracked, replace with new gear. Small nicks may be removed with suitable hone. Inspect shafts and quills to make certain they are not sprung, bent, or splines twisted, and that shafts are true.

Housing, Covers, etc.

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

For converter housing with locknut type idler shaft, see Page 48 Figure 228.

REASSEMBLY (Converter Housing)

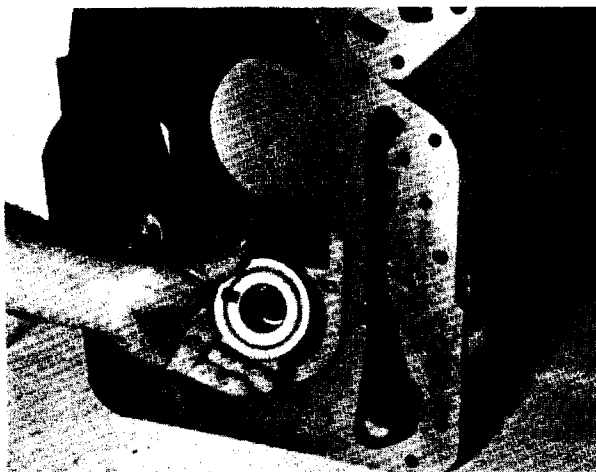


Figure 135

Install reverse clutch piston ring sleeve in housing.

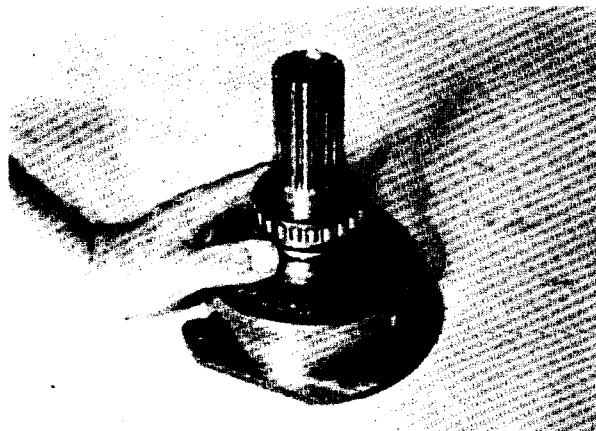


Figure 136

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.

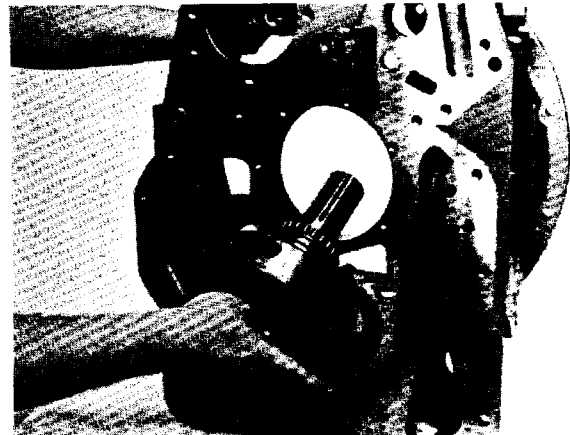


Figure 137

Position support in converter housing aligning holes of support with housing.

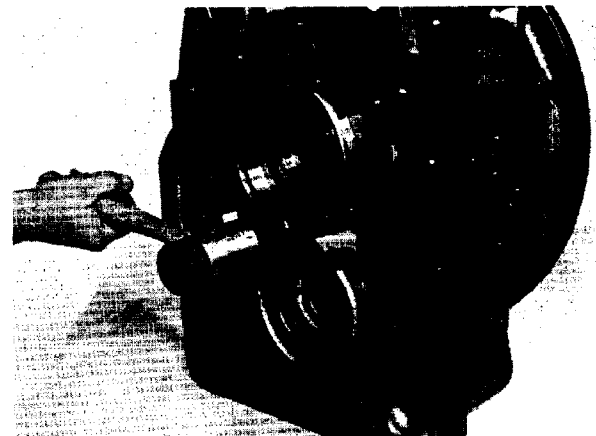


Figure 138

Tap support into position.



Figure 139

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

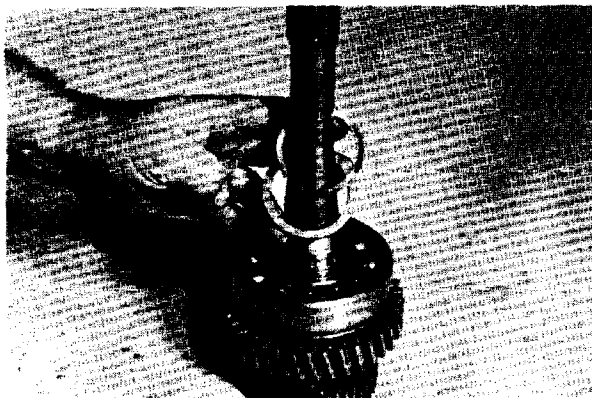


Figure 140

Press turbine shaft bearing into position. Install bearing washer and retainer ring. Install new turbine shaft oil sealing ring.

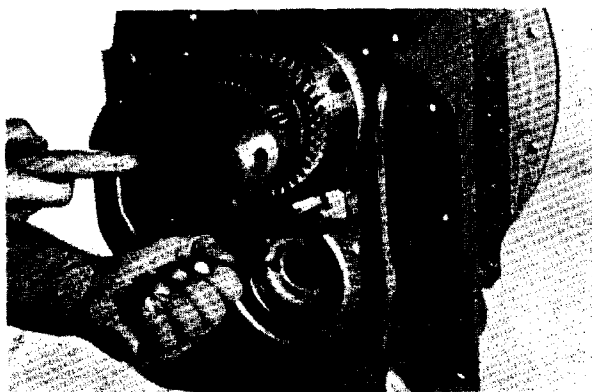


Figure 141

Spread ears on turbine shaft bearing retainer ring located in reaction member support. Tap turbine shaft into position.

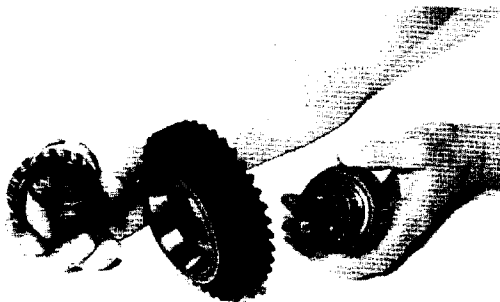


Figure 142

Press idler gear bearing on shaft. Install shaft and bearing in idler gear. Position spacer on shaft, press bearing on shaft into gear. **NOTE:** See Figure 228 for lock nut type idler shaft retention.



Figure 143

Position reverse idler and bearing assembly into converter housing. **NOTE:** Long hub of gear out.

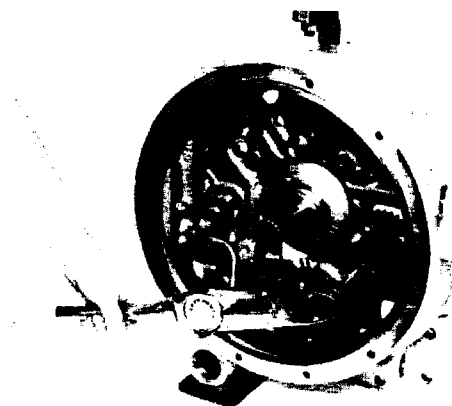


Figure 144

Install reverse idler shaft capscrews and lockwashers. Tighten 58 to 64 ft. lbs. torque [78,6 - 86,8 N.m.].

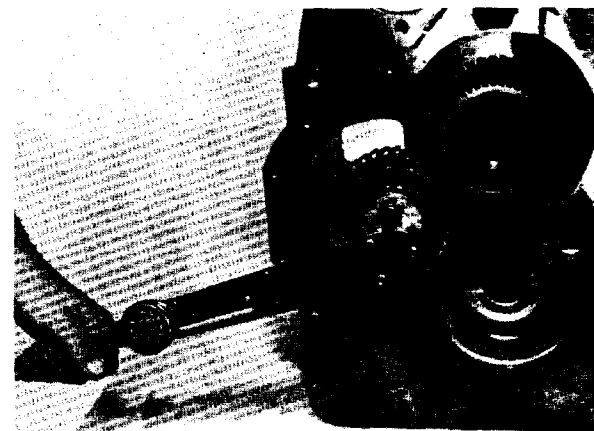


Figure 145

Install bearing retainer plate, lock plate and idler gear capscrews. Tighten capscrews 58 to 64 ft. lbs. torque [78,6 - 86,8 N.m.]. Bend lockplate tabs over capscrew heads to prevent loosening.

TRANSMISSION REASSEMBLY

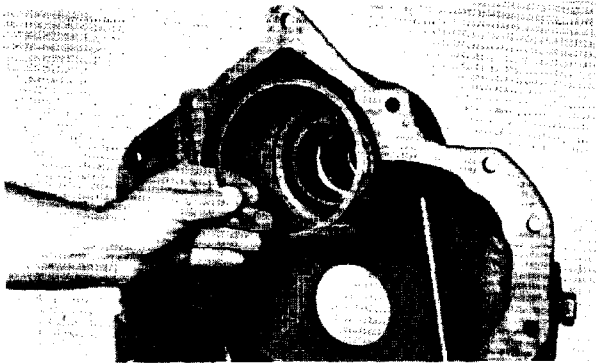


Figure 146

Tap forward clutch shaft rear bearing into bearing bore with bearing snap ring toward front of housing. Align roll pin in forward clutch shaft piston ring sleeve with groove in housing. Tap sleeve into position and secure with sleeve retainer ring.

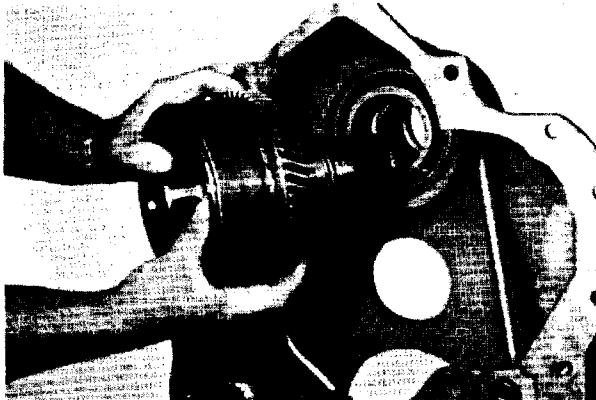


Figure 147

Position forward clutch assembly into transmission housing. Use caution as not to damage forward shaft piston rings.

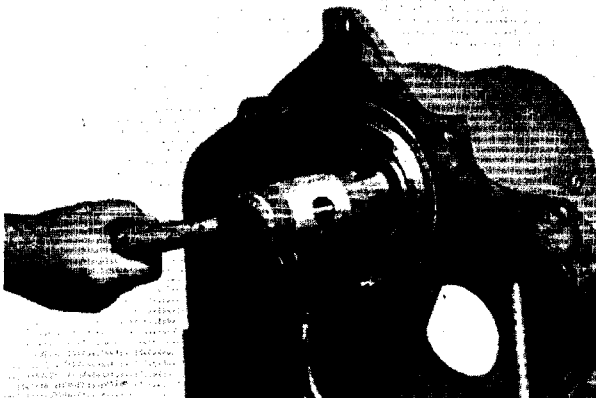


Figure 148

Tap clutch assembly into position.

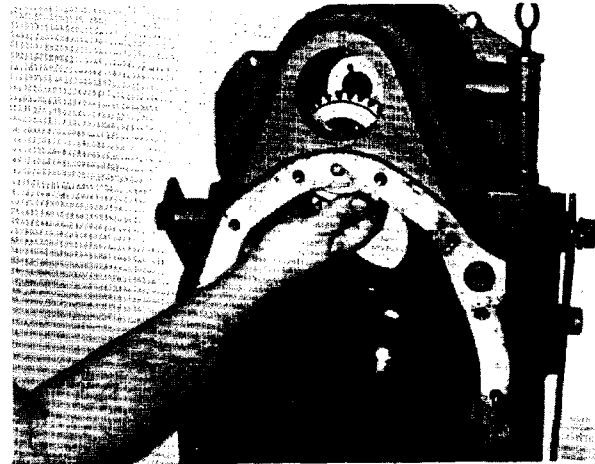


Figure 149

Position forward shaft gear on shaft.

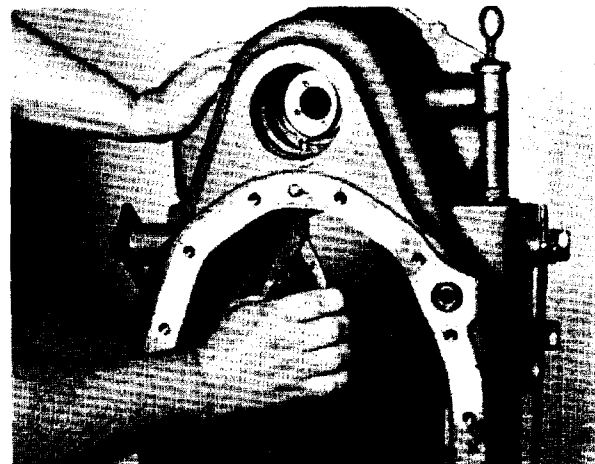


Figure 150

Install gear retainer ring. See Figure 150-A.

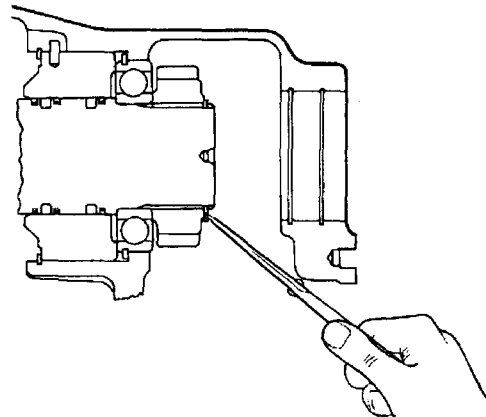


Figure 150-A



Figure 151

If 3rd speed clutch rear bearing carrier was disassembled press bearing into carrier against locating ring. Secure bearing with retainer ring. Press 3rd speed clutch disc hub into bearing and secure with retainer ring. Position disc hub and bearing carrier on 3rd speed clutch.

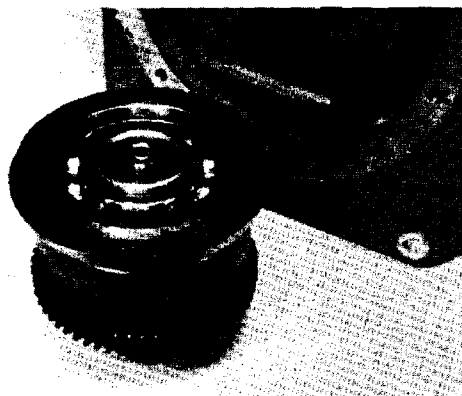


Figure 152

Align splines on disc hub with internal teeth of friction discs in clutch. Do not force this operation. Disc hub splines must be in full position with internal teeth of all friction discs.



Figure 153

Position the 3rd clutch front bearing locating ring on clutch assembly. Ring will be installed in housing ring groove later in the text.



Figure 154

Using contracting type snap ring pliers as shown, lock pliers to hold ring contracted. Tap 3rd speed clutch assembly and bearing carrier into housing until snap ring groove in housing is aligned with snap ring. Remove pliers being sure snap ring is in full position in snap ring groove.

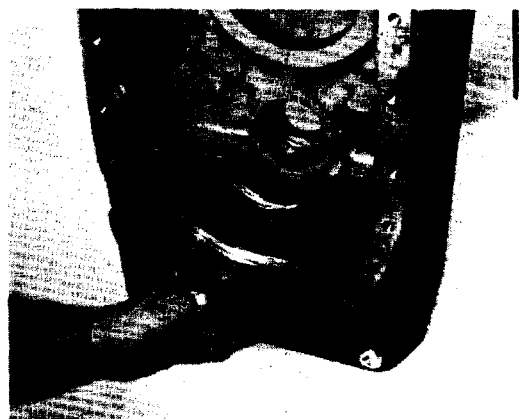


Figure 155

Position sump oil baffle in housing. See page 79 for 6 speed output installation.

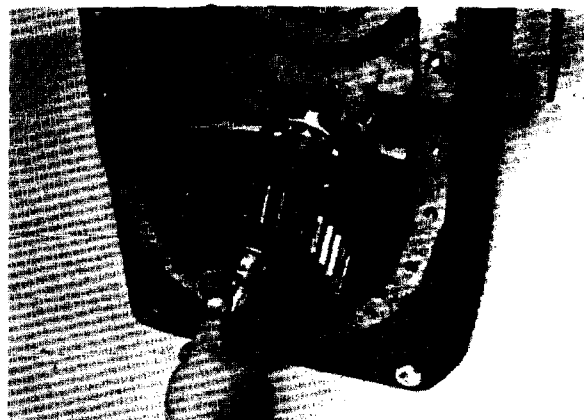


Figure 156

Install output shaft and bearing assembly in housing.

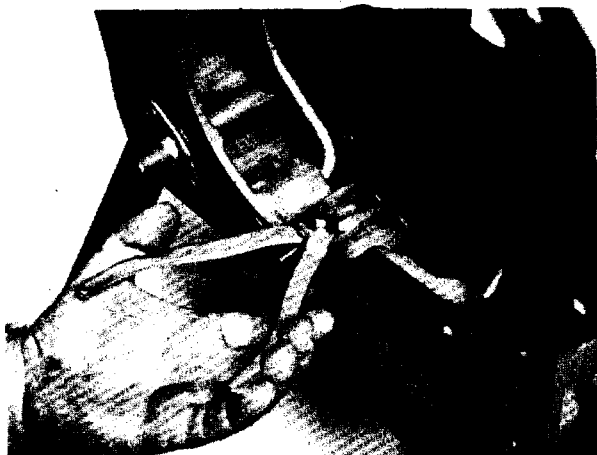


Figure 157

From front of housing install 3rd speed clutch front bearing retainer ring. **NOTE:** Be certain ring is in full position in ring groove.

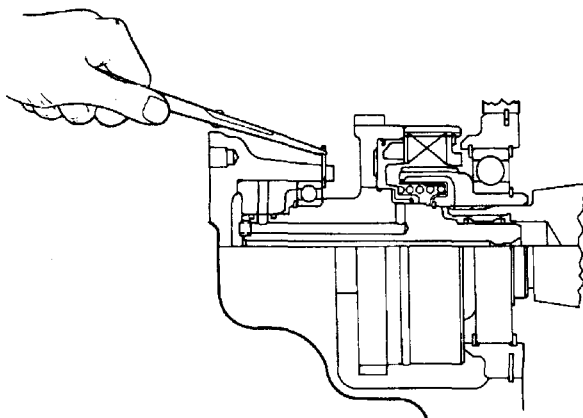


Figure 157-A

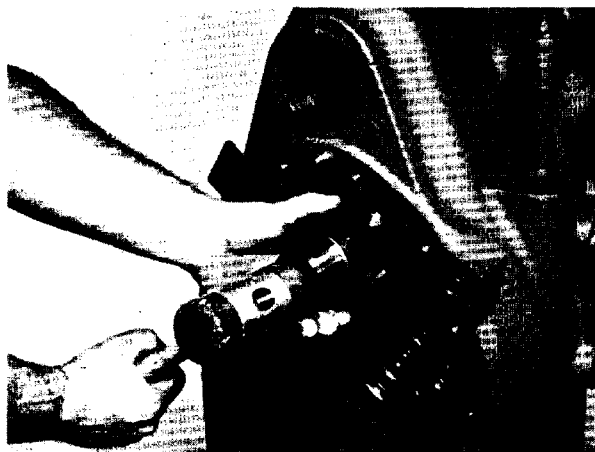


Figure 158

From rear of housing position low speed clutch in bearing bore. Tap clutch in place.

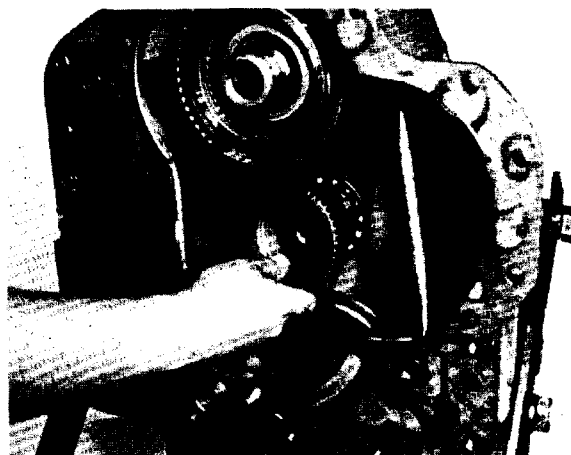


Figure 159

From front of housing install 2nd speed clutch disc hub on low clutch shaft.



Figure 160

Install disc hub retainer ring.



Figure 161

Install front output flange, new "O" ring, washer and nut. Tighten 200 to 250 ft. lbs. torque [271,2 - 339,0 N.m.]

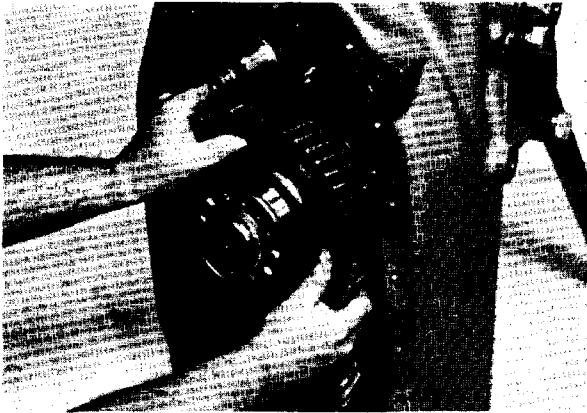


Figure 162

Position idler shaft and bearing assembly in end of 3rd speed clutch. **NOTE:** If special low ratio is incorporated, the idler shaft will have two gears on it. (Unit shown is a standard ratio).

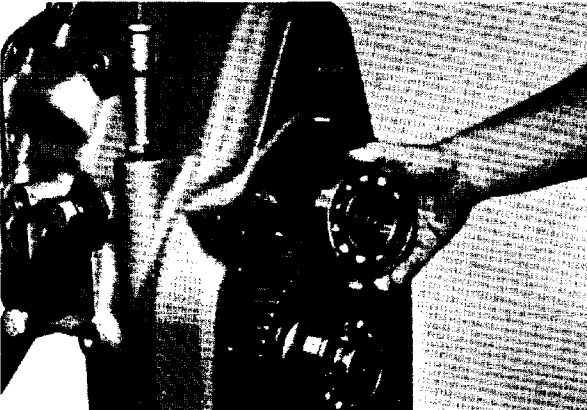


Figure 163

Position low clutch rear bearing on shaft, with snap ring groove out.

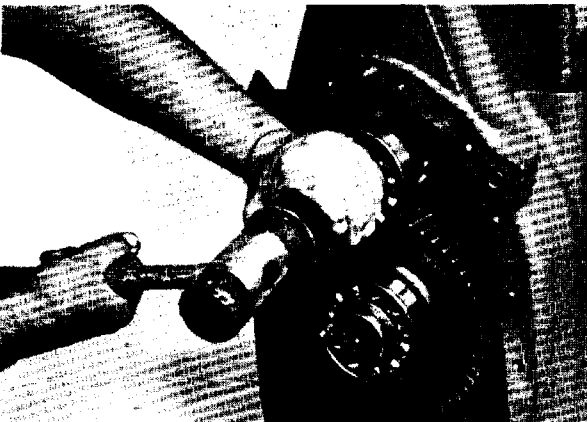


Figure 164

Tap bearing into position.

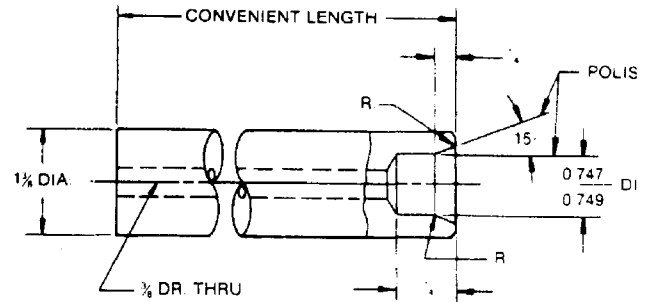


Figure 165

Low shaft oil sealing ring sizing tool.

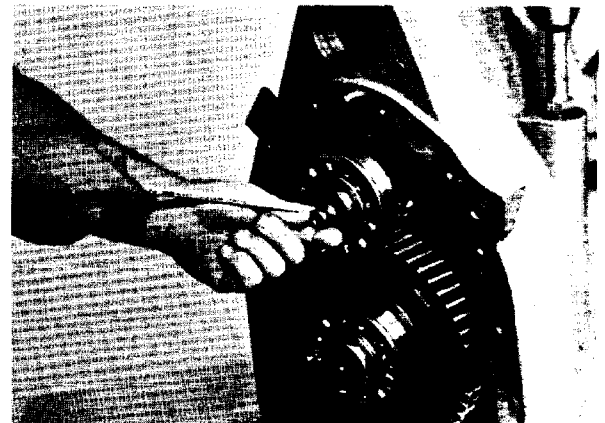


Figure 166

Install new oil sealing ring on low clutch shaft.

NOTE: New ring must be sized before installing low shaft bearing cap. To facilitate sizing, tool can be made from diagram in Figure 165.

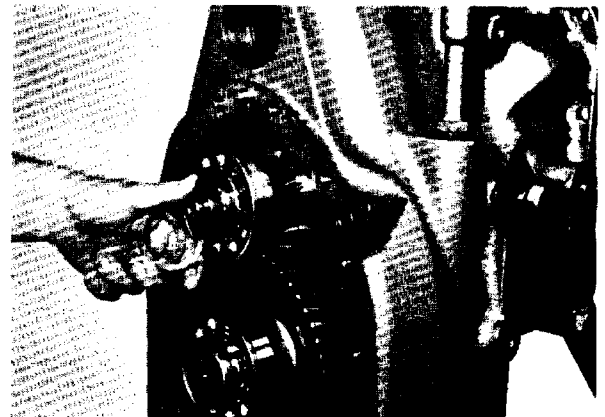


Figure 167

Install low shaft rear bearing spacer.

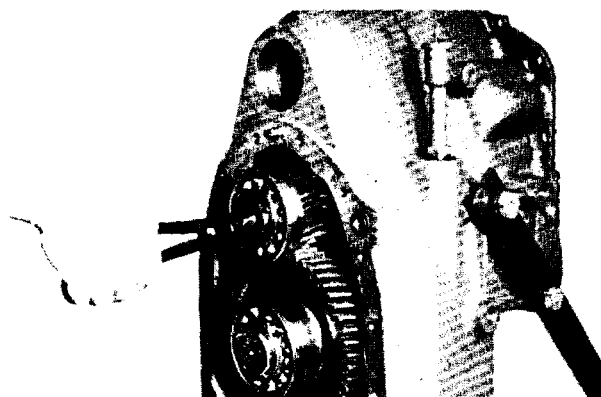


Figure 168
Install bearing retainer ring.

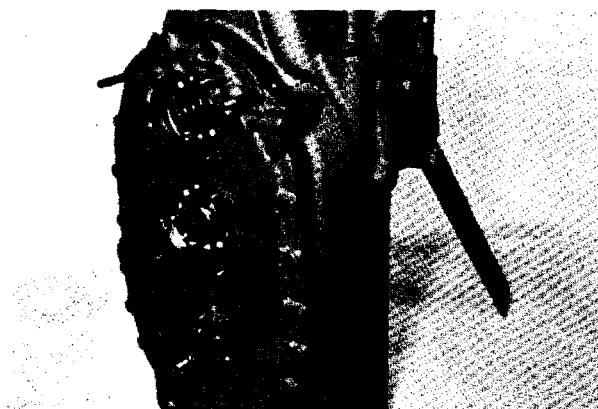


Figure 169
Position new gasket and "O" ring on rear of transmission housing. A thin coat of chassis grease will hold the gasket and "O" ring in place.

Install rear cover. Note two aligning studs to facilitate cover to housing assembly. Tap cover in place aligning shaft bearings with bearing bores. Remove studs and install cover bolts and lockwashers.



Figure 170
Tighten rear cover bolts 37 to 41 ft. lbs. torque [50,2 - 55,6 N.m.]

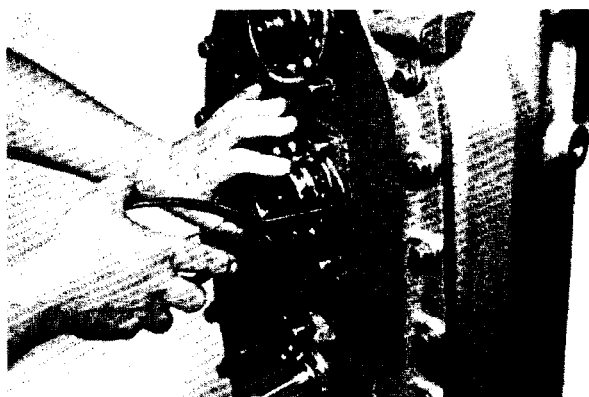


Figure 171
Install low, idler and output shaft rear bearing locating rings.

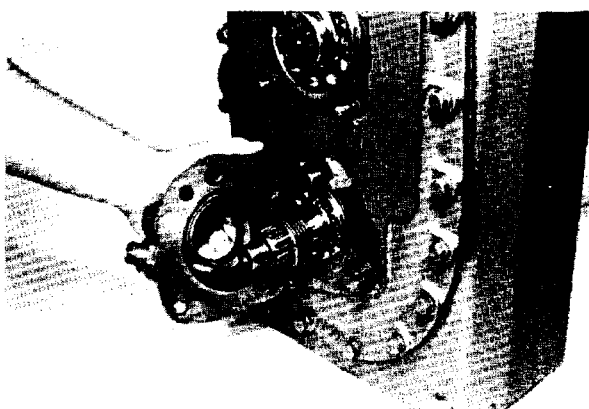


Figure 172
Apply a light coat of Permatex No. 2 to the outer diameter of the output oil seal. Press seal in bearing cap with lip of seal toward bearing side of bearing cap. Position new "O" rings on bearing cap. **NOTE:** Some units will have a gasket only between the cap and cover.

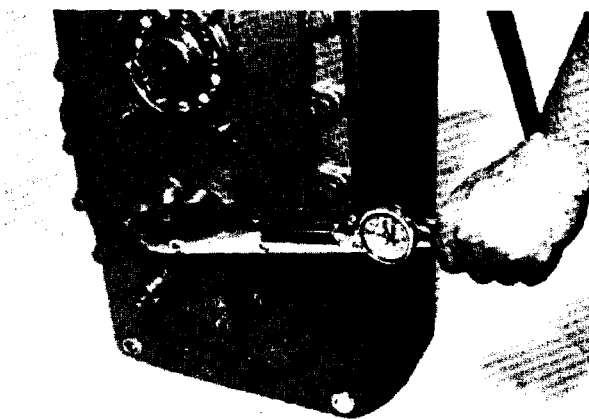


Figure 173
Install lockwashers and stud nuts. Tighten 91 to 100 ft. lbs. torque [123,4 - 135,6 N.m.]

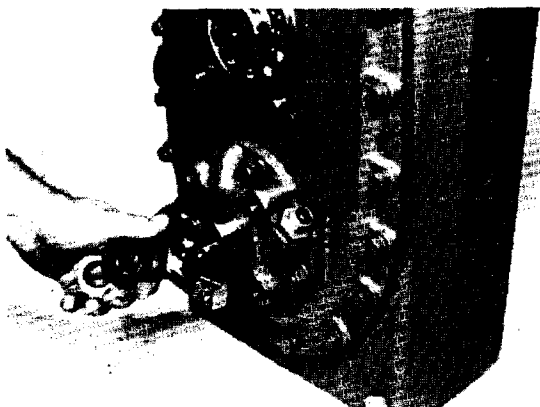


Figure 174

Install output flange, "O" ring, washer and flange nut. Block flange to prevent turning. Tighten flange nut 200 to 250 ft. lbs. torque [271,2 - 339,0 N.m.]

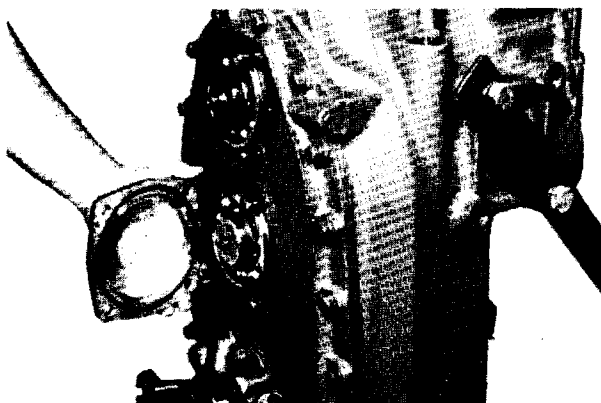


Figure 175

Position new "O" ring on idler shaft bearing cap. Install cap on studs and secure with lockwashers and nuts.

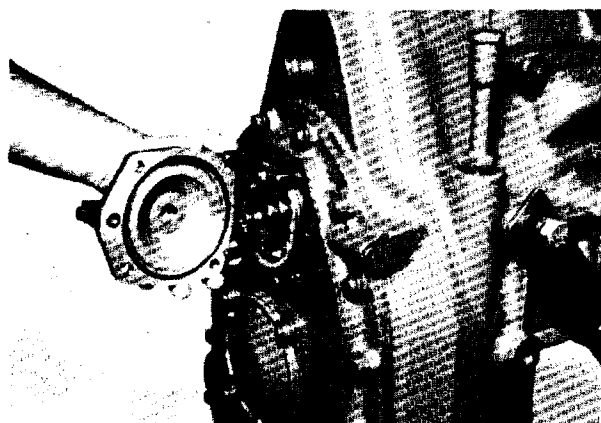


Figure 176

Install new bearing cap and low clutch pressure port "O" rings on low shaft bearing cap. Position bearing cap on low shaft. Install washers and stud nuts.

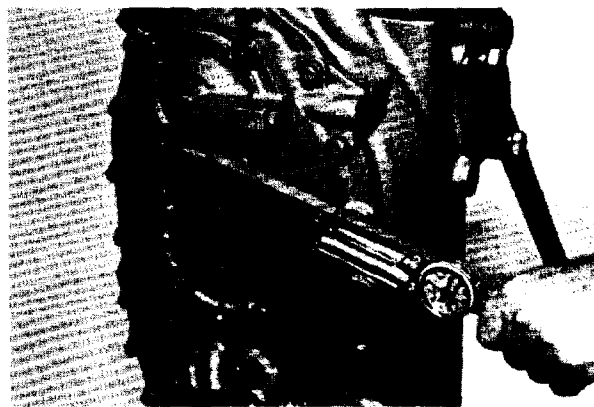


Figure 177

Tighten low shaft and idler shaft stud nuts 41 to 45 ft. lbs. torque [55,6 - 61,0 N.m.]

NOTE: P.T.O. is optional. If P.T.O. is not used, coat outer diameter of bore plug with Permatex No. 2. Tap bore plug in housing and proceed with Figure 182.

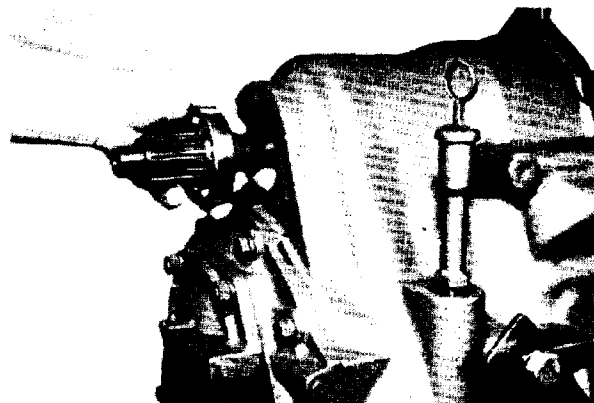


Figure 178

Position P.T.O. shaft and bearing in housing. Tap in place.

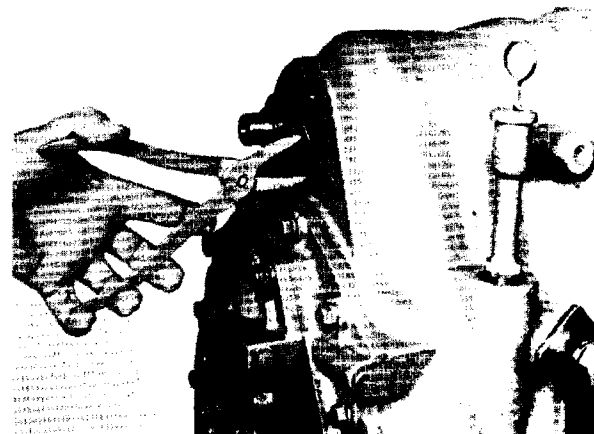


Figure 179

Install P.T.O. bearing retainer ring.

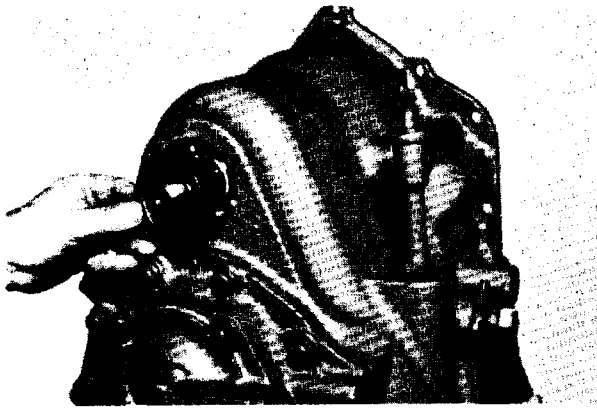


Figure 180

Coat outer diameter of P.T.O. seal with Permatex No.2. Install seal in housing with lip of seal toward the inside.

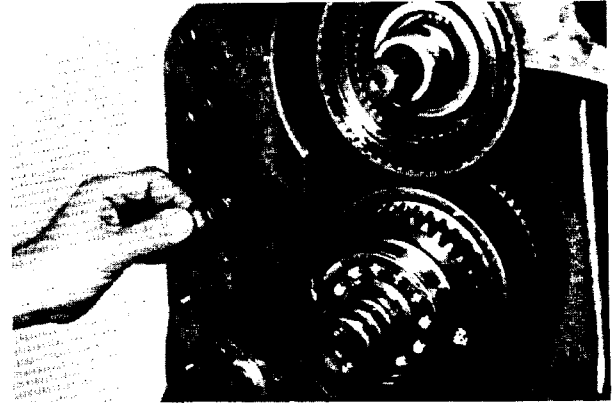


Figure 183

Install new "O" rings on front of transmission housing. A thin coat of chassis grease will hold "O" rings in place.

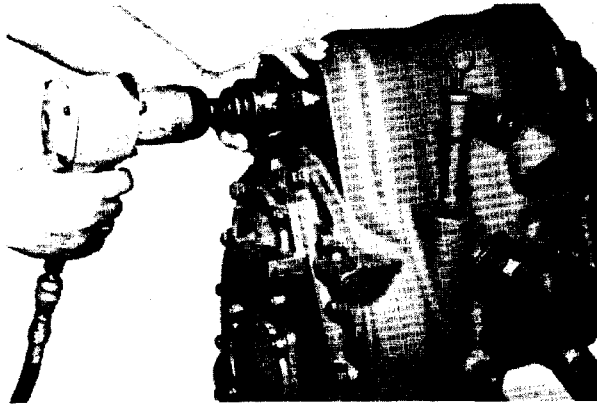


Figure 181

Install P.T.O. flange, new "O" ring, washer and nut. Tighten 200 to 250 ft. lbs. torque [271,2 - 339,0 N.m.]

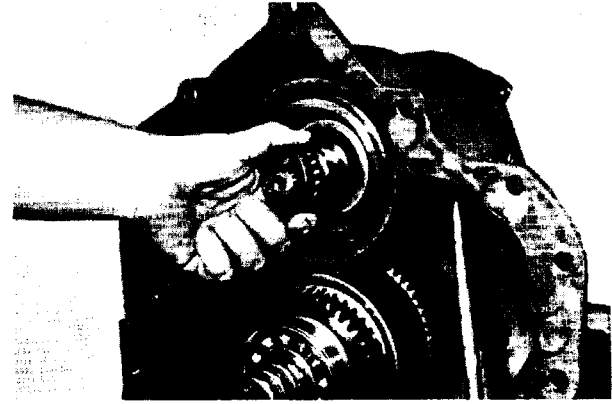


Figure 184

Install forward clutch pilot bearing. See page 65 Figure 49 for R-Model front cover installation.

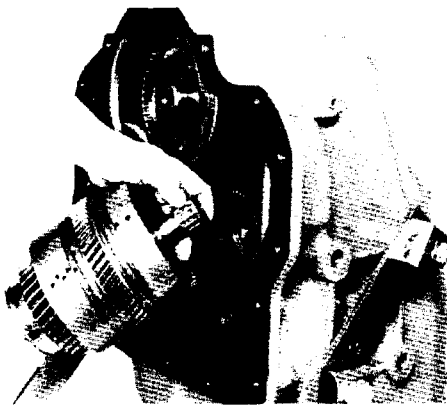


Figure 182

Install 2nd speed clutch shaft rear pilot bearing on shaft. 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.

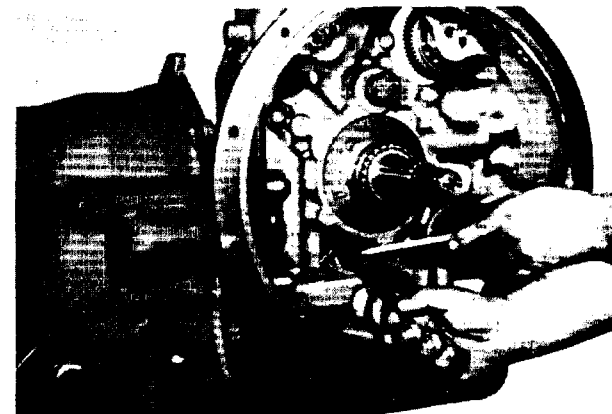


Figure 185

Position new gasket on front of transmission housing. A thin coat of chassis grease will hold gasket in place. Spread ears on the reverse clutch front bearing locating ring. Lock pliers open to hold snap ring open.

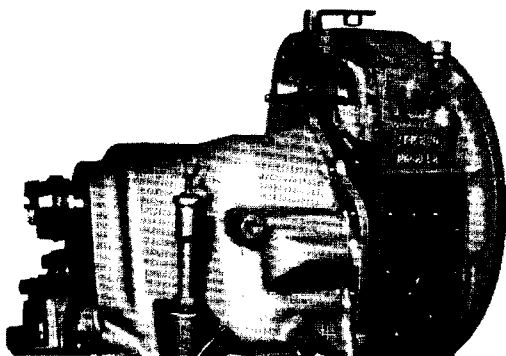


Figure 186

Position converter housing assembly on transmission case. Use caution as not to disturb housing "O" rings or gasket.

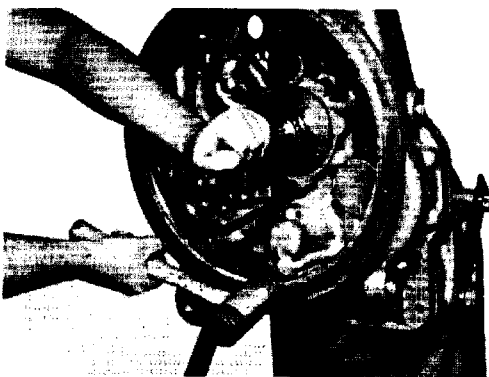


Figure 187

Tap converter housing in place. Use caution as not to damage reverse clutch front piston ring. Note aligning stud.

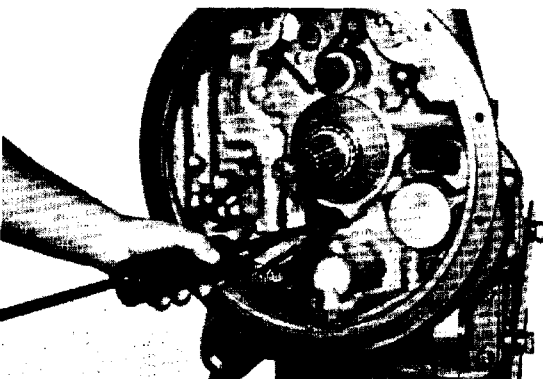


Figure 188

Install a cap screw 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.

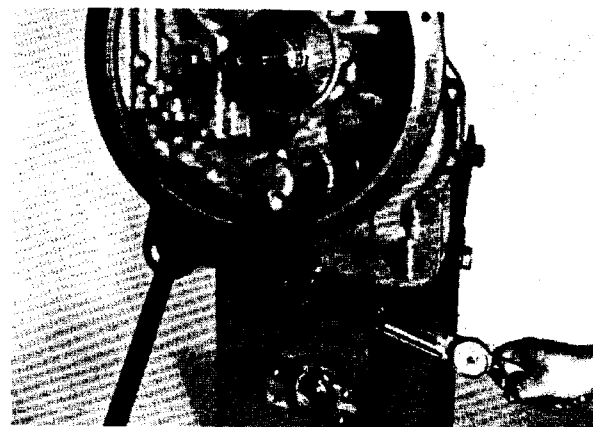


Figure 189

Remove converter housing aligning stud. Install converter housing and transmission housing capscrews. Tighten 37 to 41 ft. lbs. torque [50,2 - 55,6 N.m.].

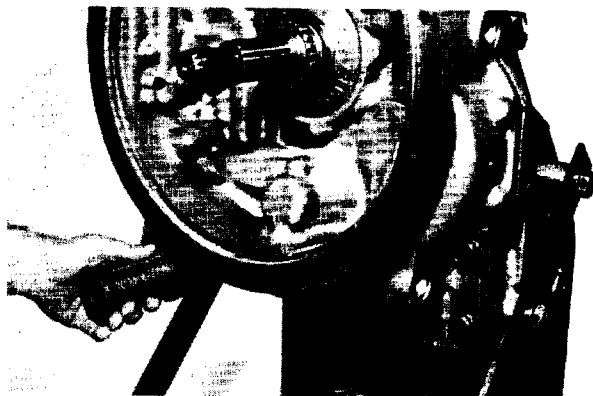


Figure 190

Position new gasket on sump screen, install screen assembly and tighten 10 to 15 ft. lbs. torque [13,6 - 20,3 N.m.].

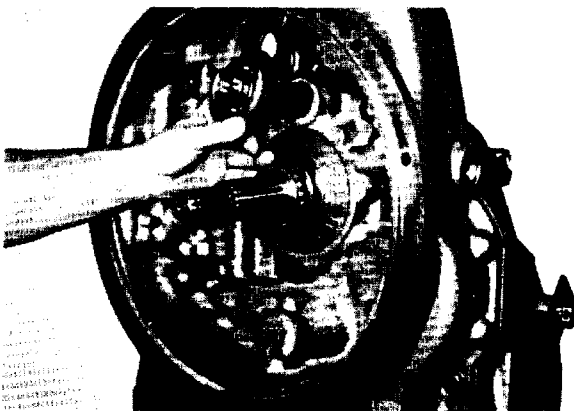


Figure 191

Install auxiliary and charging pump drive gear. Snug capscrews to hold gears in place.

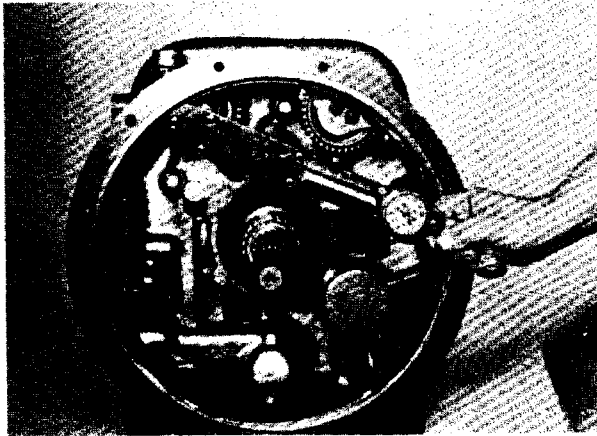


Figure 192

Tighten pump drive gear cap screws 23 to 25 ft. lbs. torque [31,2 - 33,9 N.m.].

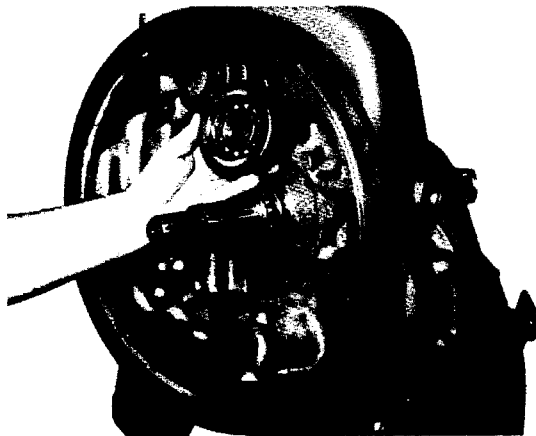


Figure 193

Position pump idler gear and bearing on stub shaft.

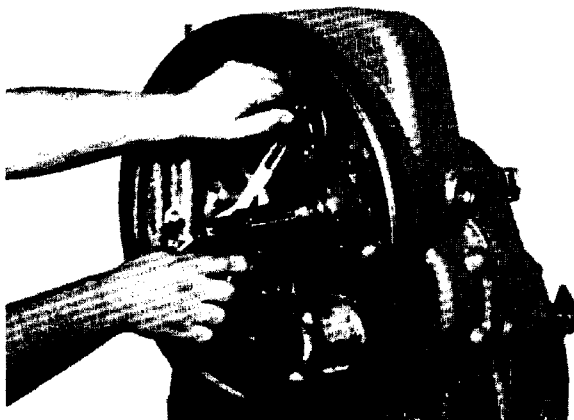


Figure 194

Install idler gear bearing locating ring.

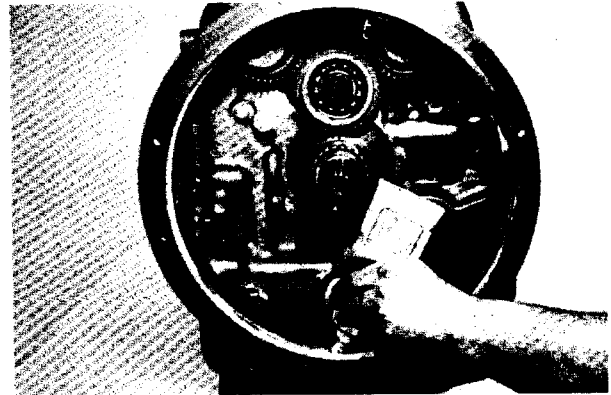


Figure 195

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.

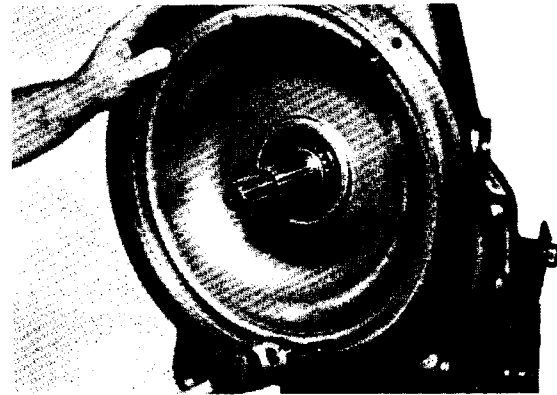


Figure 196

Assemble new oil baffle oil seal in baffle. Position oil baffle puller screw holes 15° to 30° either side of verticle center line. Tap baffle into position until baffle shoulders in converter housing.



Figure 197

Install impeller and hub assembly using caution as not to damage the oil baffle oil seal. **NOTE:** Use extreme caution as not to cut, break or unhook the oil sealing ring on the support.

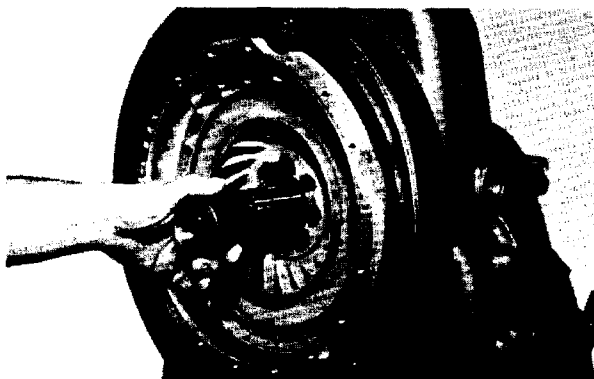


Figure 198

Position reaction member to impeller hub gear spacer on reaction member support. **NOTE:** If a fixed reaction member is used, install reaction member with thick side of blades out and retaining ring. Proceed to Figure 203.

FREEWHEEL REASSEMBLY

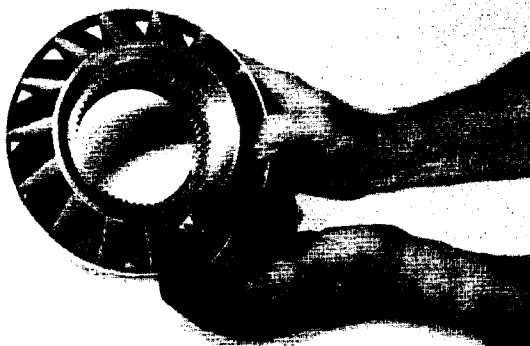


Figure 199

Install outer race and sprag assembly in reaction member. **NOTE:** Undercut shoulder of race must go toward the rear of the reaction member.

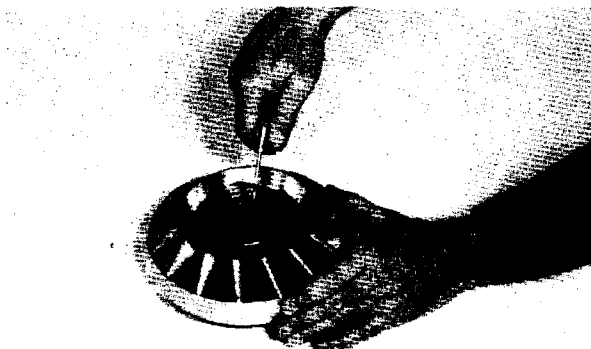


Figure 200

Install outer race to reaction member retainer ring.

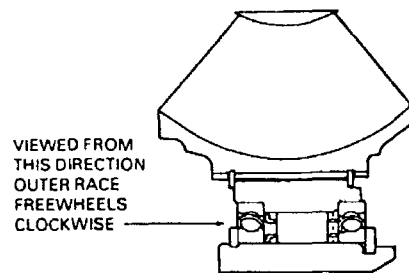


Figure 201

**MUST FREEWHEEL IN
CLOCKWISE ENGINE ROTATION**

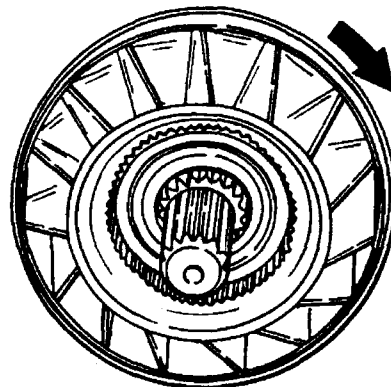


Figure 202

Install reaction member on support. Check rotation of freewheeling reaction member to be sure of proper freewheel assembly. Install reaction member retaining ring.

NOTE: Some units have a bolted on turbine hub. If either the turbine or hub is replaced see page 50 for reassembly.

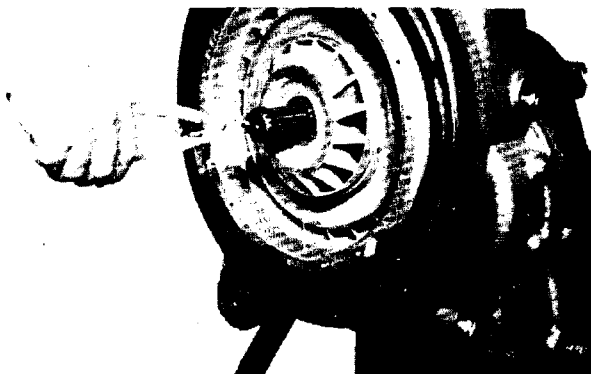


Figure 203

Position inner turbine locating ring on turbine shaft. Install turbine on shaft.

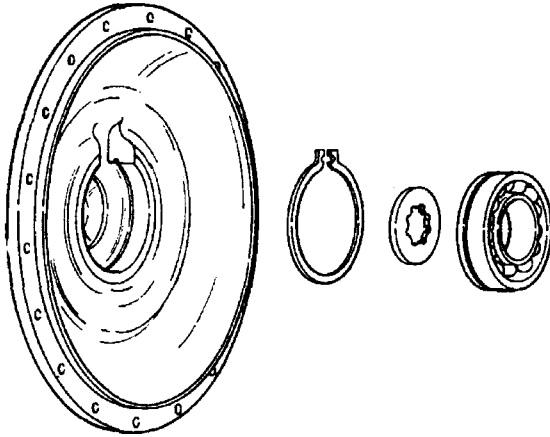


Figure 204

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.

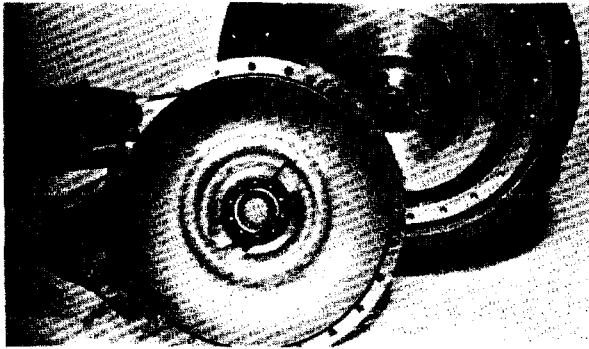


Figure 205

Position new "O" ring on impeller cover.

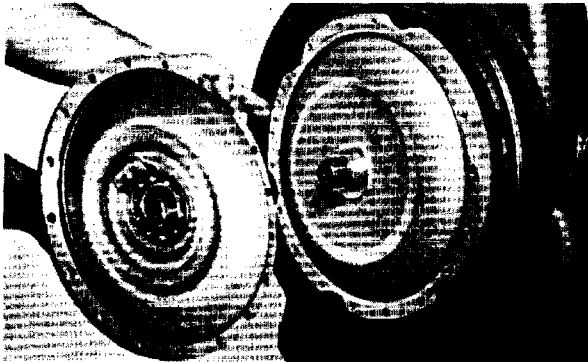


Figure 206

Install impeller cover assembly on impeller. Use caution as not to damage "O" ring. Bearing retainer plate must be aligned with the turbine shaft.

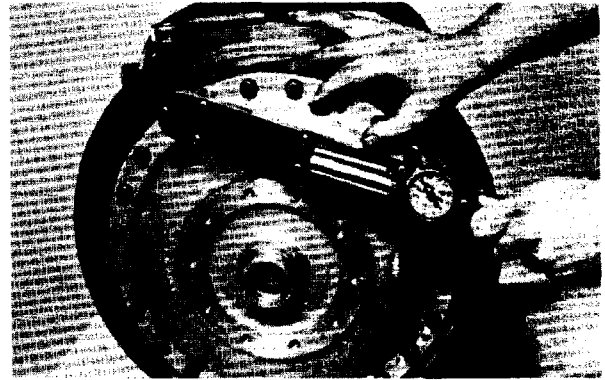


Figure 207

Install impeller cover to impeller capscrews and washers. Tighten 11" impeller cover capscrews 12 to 16 ft. lbs. torque [16,3 - 21,6 N.m.]. Tighten 12" impeller cover capscrews 23 to 25 ft. lbs. torque [31,2 - 33,9 N.m.].

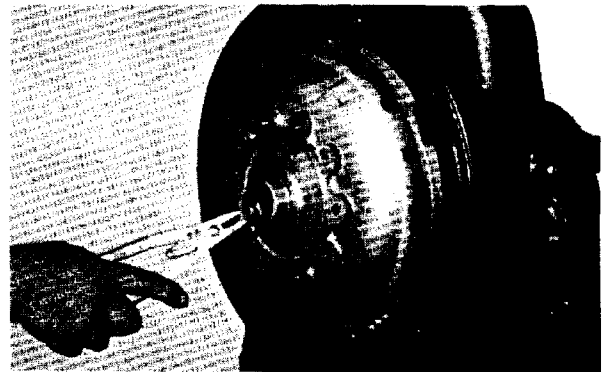


Figure 208

Install turbine retainer ring. See Figure 209

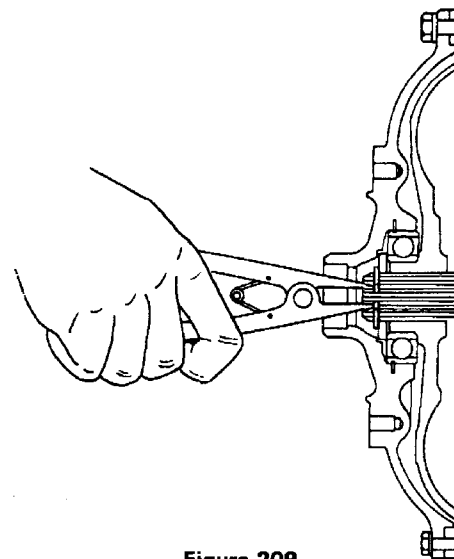


Figure 209

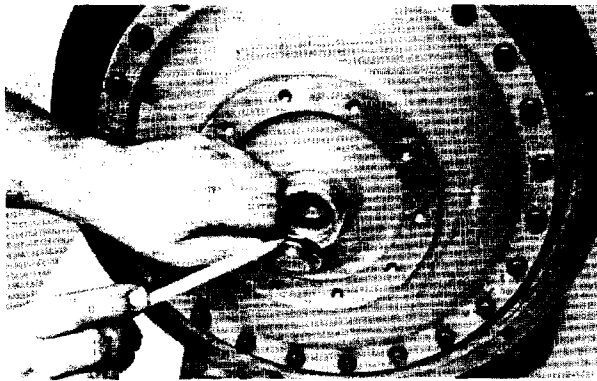


Figure 210

Position new "O" ring on impeller cover bore plug, lubricate ring to facilitate reassembly. Install plug in cover.

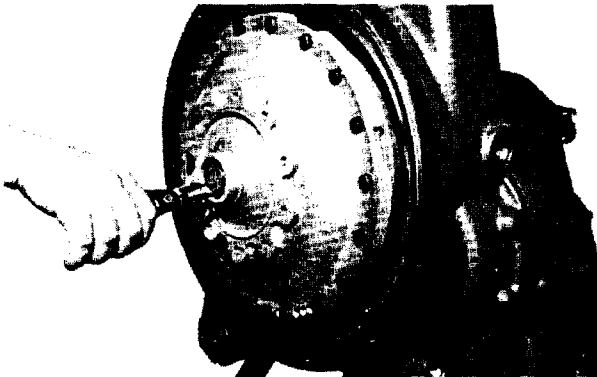


Figure 211

Install bore plug retainer ring.

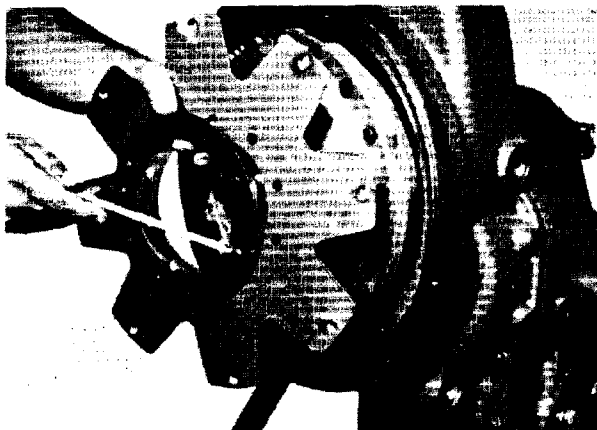


Figure 212

Position drive plate and weld nut assembly on impeller cover with weld nuts toward cover. Align intermediate drive plate and backing ring with holes in impeller cover. **NOTE:** Two dimples 180° apart in backing ring must be out (toward engine flywheel). Install capscrews and washers. See page 51 for drive plate kits.

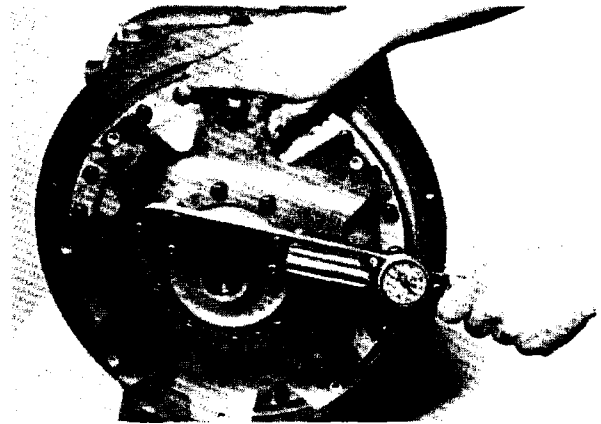


Figure 213

Tighten drive plate capscrews 23 to 25 ft. lbs. torque [31,2 - 33,9 N.m.].

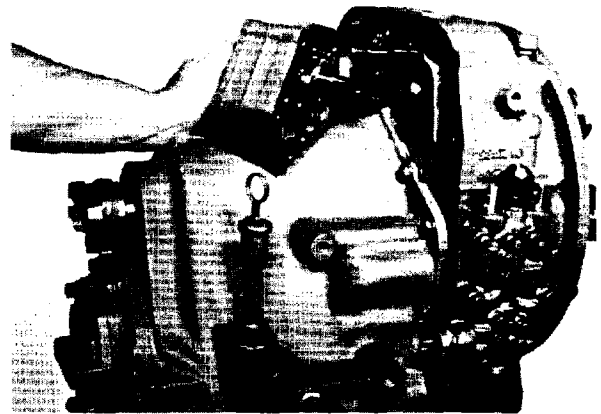


Figure 214

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

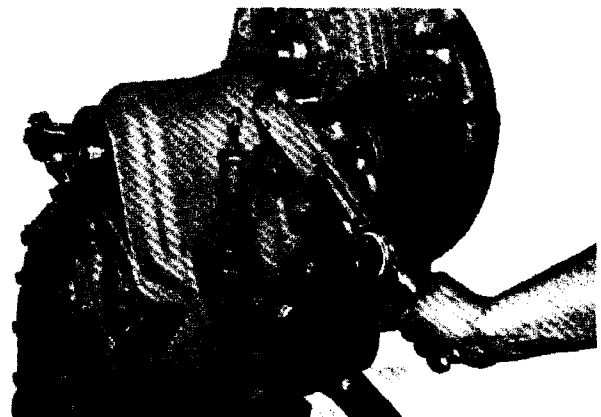


Figure 215

Tighten capscrews 37 to 41 ft. lbs. torque [50,2 - 55,6 N.m.]. Tighten stud nuts 41 - 45 ft. lbs. torque [55,6 - 61,0 N.m.].

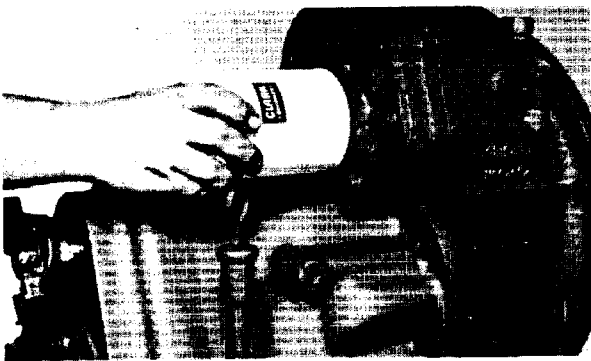


Figure 216

Install new oil filter. Tighten 20 to 25 ft. lbs. torque [27.1 - 33.9 N.m.].

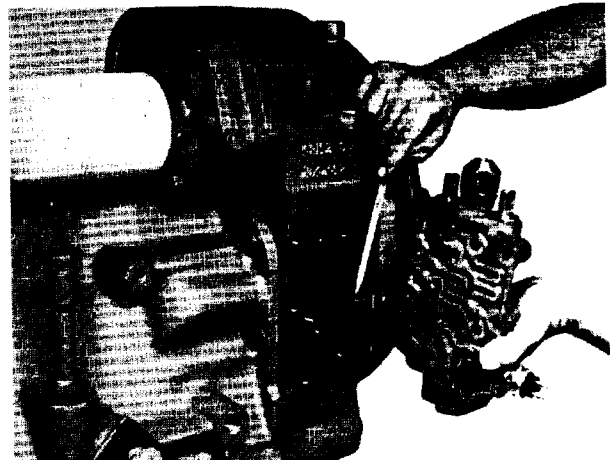


Figure 219

Position new gasket and detent springs on converter housing. Install control valve and valve to housing capscrews and washers.

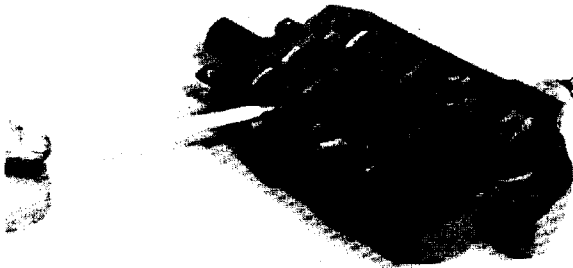


Figure 217

If the control cover valve spools are to be inspected or the spool oil seals changed, remove the valve spool stops as shown and pull spools out of oil seals. Always replace oil seals if valve spools are removed for inspection. Sharp edges on valve spool will cut lip of oil seal. When replacing oil seal, pick old seal out of housing using caution as not to damage oil seal bore.

Install new seal in control valve. **NOTE:** When installing speed and direction selector spools through oil seal use extreme caution as not to cut lip of oil seal.

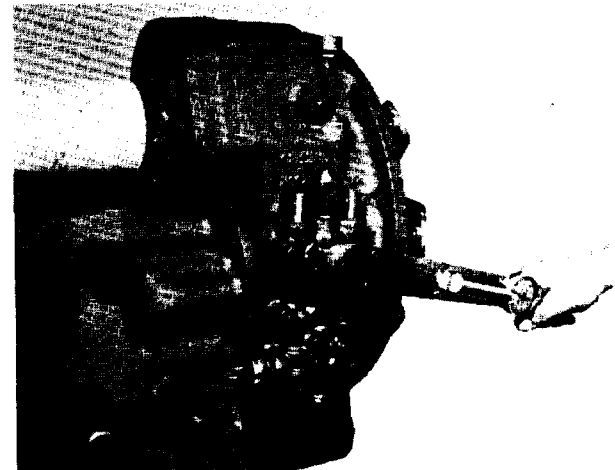


Figure 220

Tighten capscrews 23 to 25 ft. lbs. torque [31.2 - 33.9 N.m.].



Figure 218

Position detent balls in housing.

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 800 RPM), shift thru direction and speed clutches. All clutch pressure must be equal within 5 psi, [34,5 kPa]. If clutch pressure varies in any one clutch more than 5 psi, [34,5 kPa] repair clutch.

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

ALWAYS USE PARKING BRAKE WHEN MAKING CLUTCH PRESSURE CHECKS.

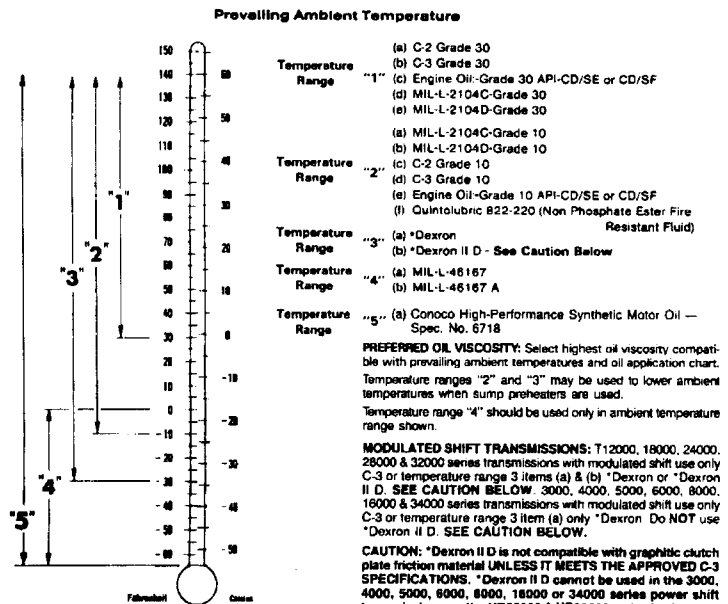
LUBRICATION

TYPE OF OIL	See Lube Chart.
CAPACITY	Consult Operator's Manual on applicable machine model for system capacity. Torque Converter, Transmission and allied hydraulic system must be considered as a whole to determine capacity.
CHECK PERIOD	Check oil level DAILY with engine running at 500-600 RPM and oil at 180° to 200° F. [82,2 - 93,3° C]. Maintain oil level to FULL mark.
NORMAL * DRAIN PERIOD	Every 500 hours, change oil filter element. Every 1000 hours, drain and refill system as follows: Drain with oil at 150° to 200° F. [65,6 - 93,3° C].

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

- Drain transmission and remove sump screen. Clean screen thoroughly and replace, using new gaskets.
- Drain oil filters, remove and discard filter elements. Clean filter shells and install new elements.
- Refill transmission to LOW mark.
- 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 TRANSMISSION AND TORQUE CONVERTERS



*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, 16000 & 34000 series transmissions with modulated shift use only C-3 or temperature range 3 item (a) only *Dexron. Do NOT use *Dexron II D. **SEE CAUTION BELOW.**

CAUTION: *Dexron II D is not compatible with graphite 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

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. Where the former means is impractical, the latter means should be employed as follows:

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

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

LOW CLUTCH PRESSURE

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

LOW CONVERTER CHARGING PUMP OUTPUT

1. Low oil level.	1. Fill to proper level.
2. Suction screen plugged.	2. Clean suction screen.
3. Defective oil pump.	3. Replace pump.

OVERHEATING

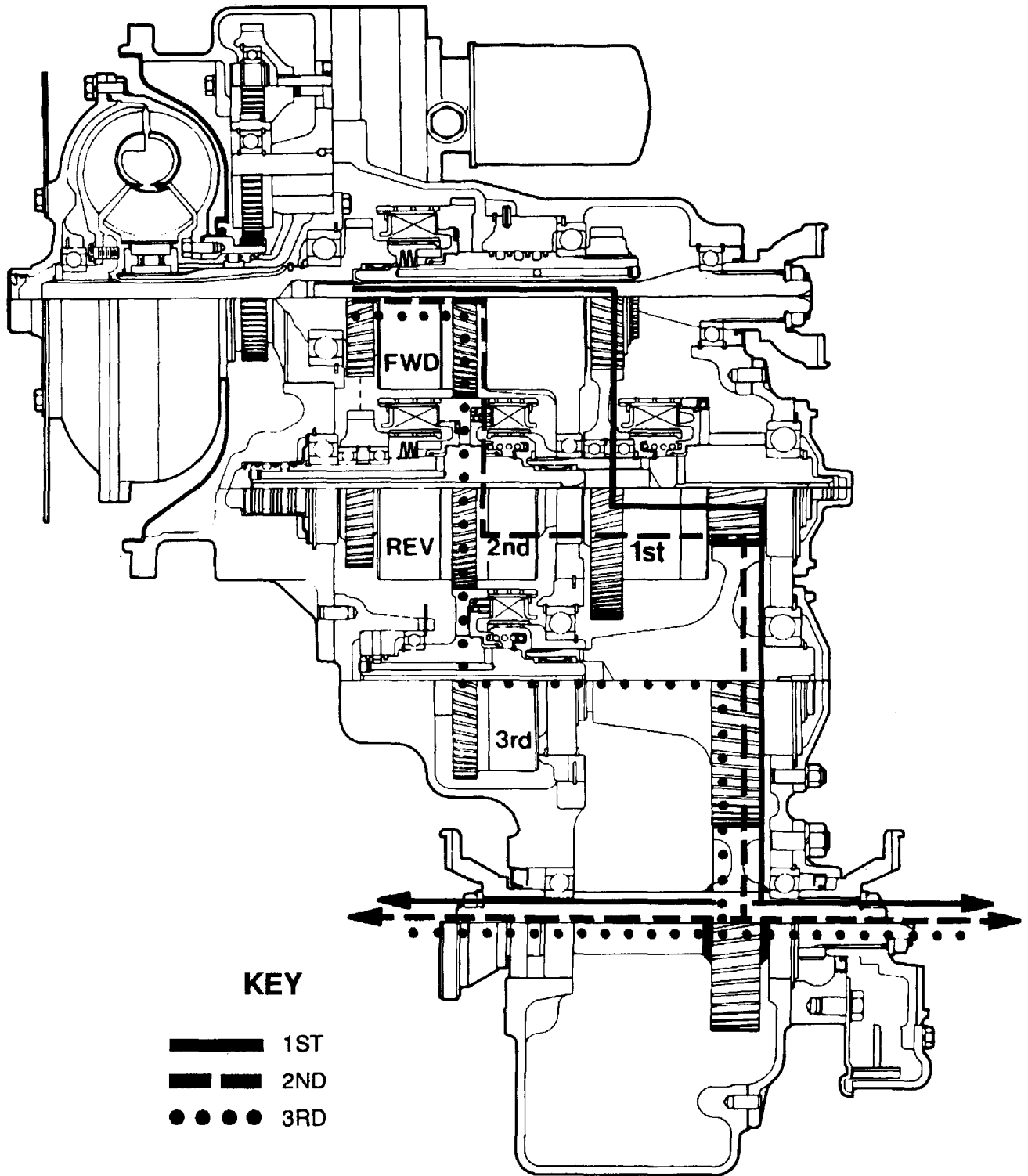
1. Worn oil sealing rings.	1. Remove, disassemble, and rebuild converter assembly.
2. Worn oil pump.	2. Replace.
3. Low oil level.	3. Fill to proper level.

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.

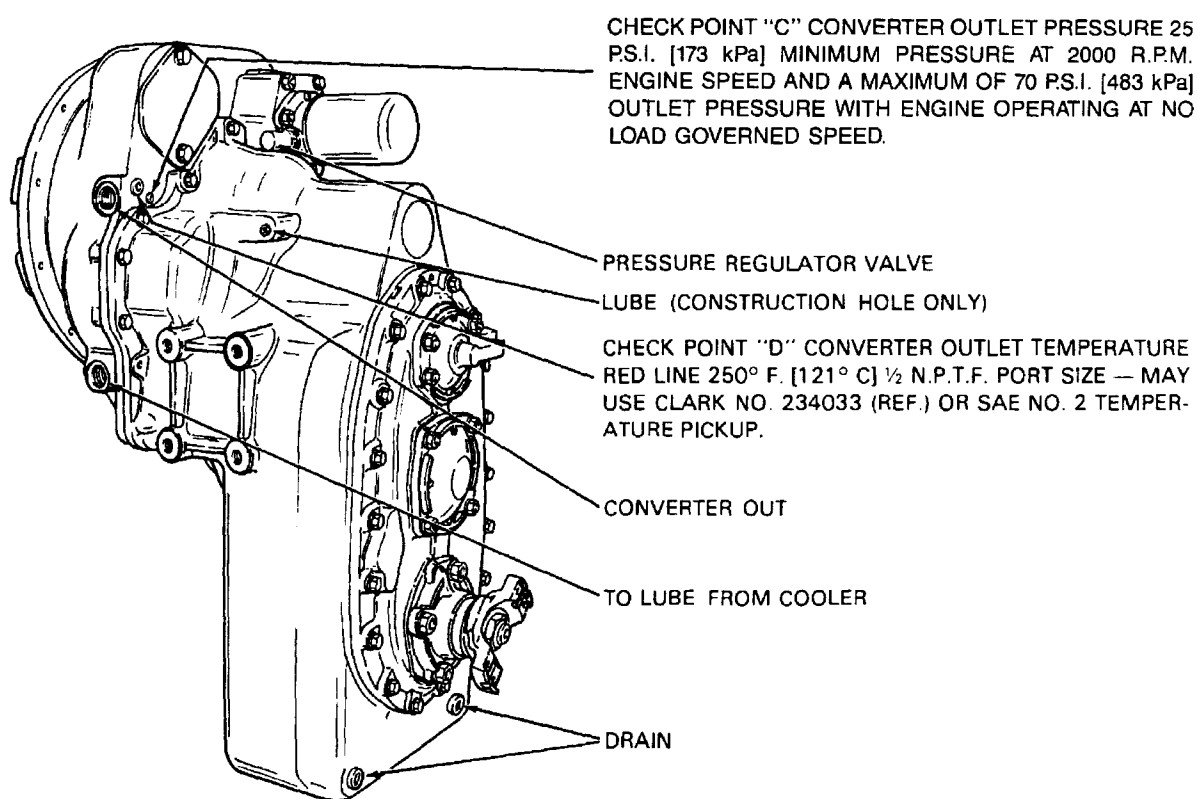
LACK OF POWER

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."

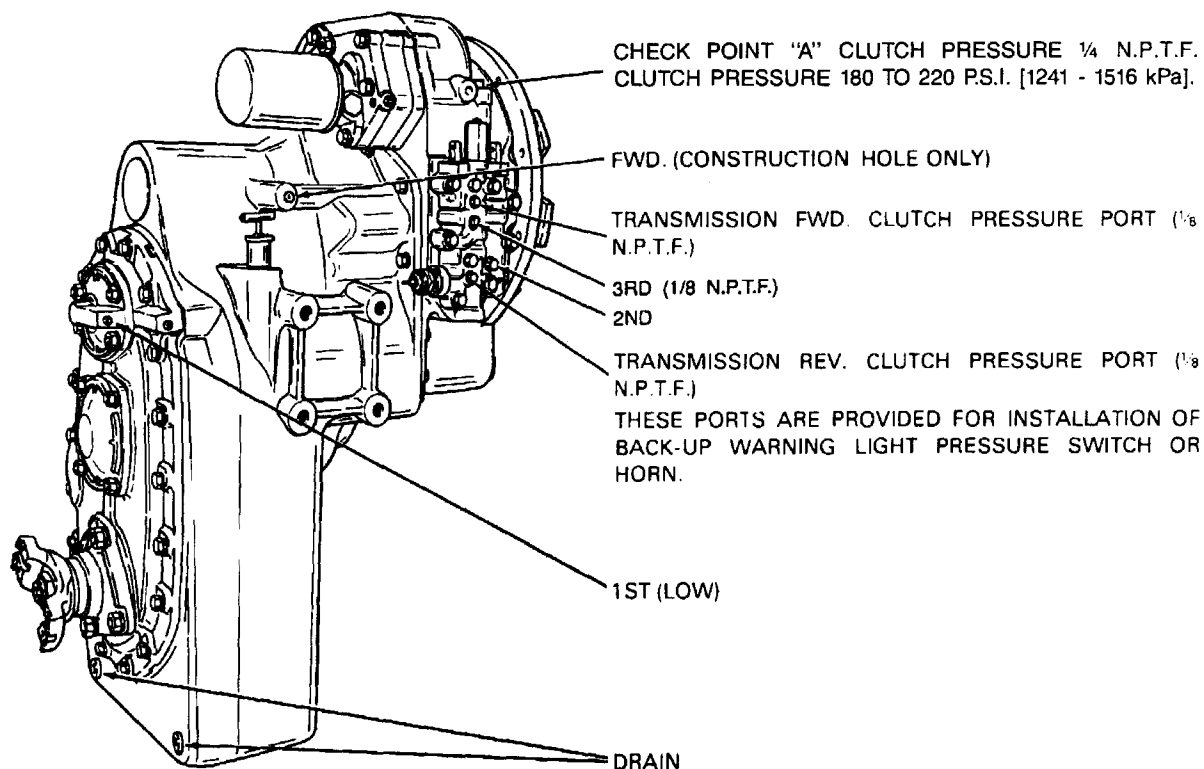


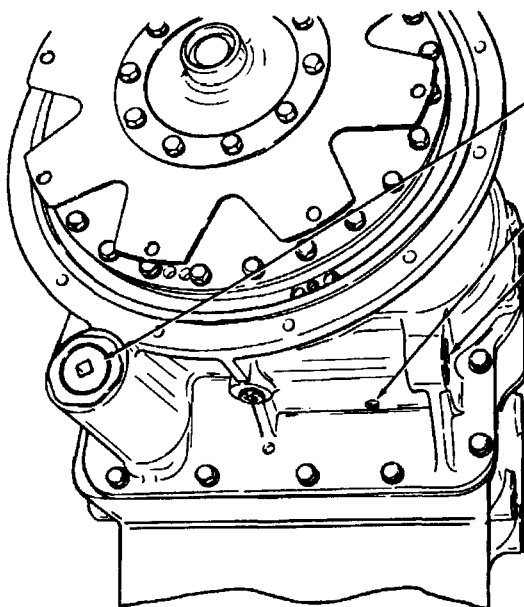
**18000 3 SPEED TRANSMISSION LONG DROP
POWER FLOW**

PRESSURE CHECK POINTS



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





SUMP SCREEN

CHECK POINT "H" LUBE PRESSURE $\frac{1}{8}$ 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:

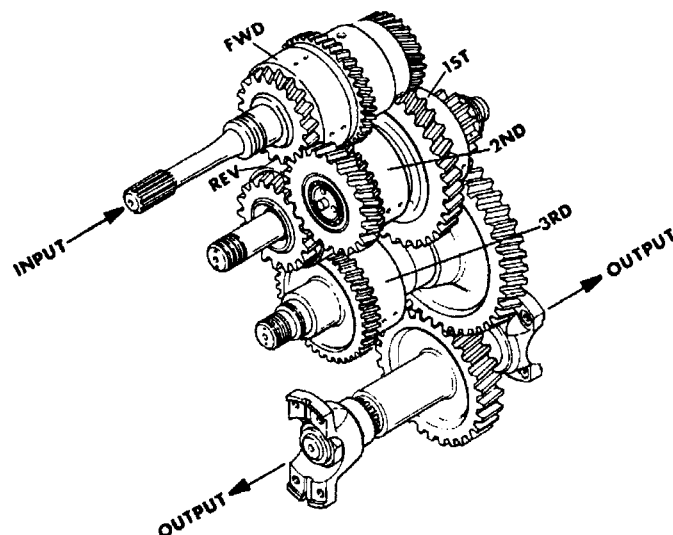
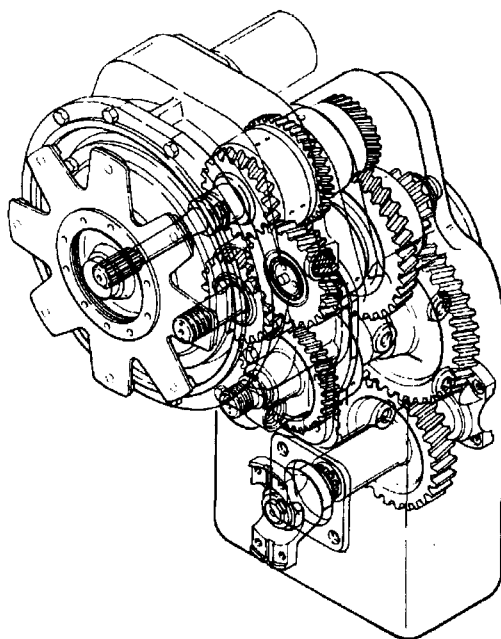
1. PRESSURE LINES:

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 CLARK DWG. NO. 236647 FOR CLARK RECOMMENDATIONS FOR USE IN TORQUE CONVERTERS & POWER SHIFT TRANSMISSIONS.

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.



18000 SERIES-3 SPEED LONG DROP CLUTCH AND GEAR ARRANGEMENT

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**. **NOTE:** Fig. 4 installation, install drive plate attaching washers and nuts. Tighten each nut 28 to 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 to drive plate attaching screws. Snug screws but do not tighten. After all eight (8) screws are installed torque each one 25 to 30 ft. lbs. torque [33,9 - 40,6 N.m]. This will require torquing each screw and rotating the engine flywheel until the full amount of eight (8) screws have been tightened.
8. Measure engine crankshaft end play after transmission has been completely installed on engine flywheel. This value must be within .001 [0,025mm] of the end play recorded in step No. 2.

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

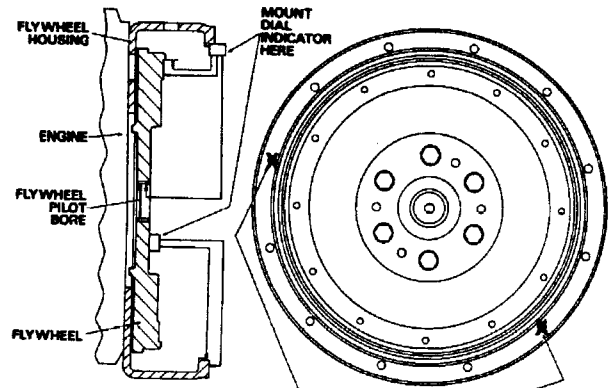


FIG 1

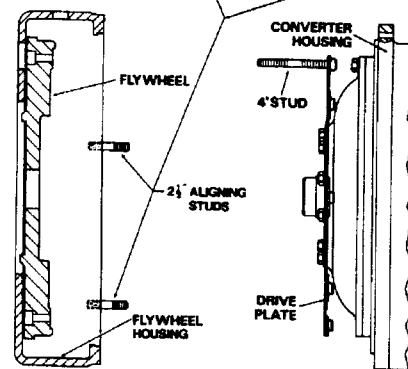


FIG 2

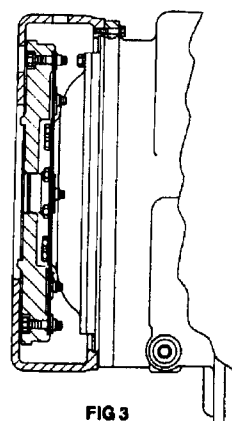


FIG 3

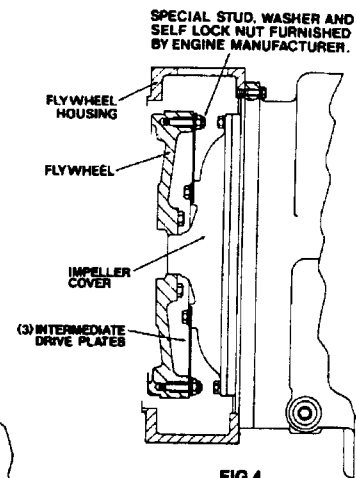
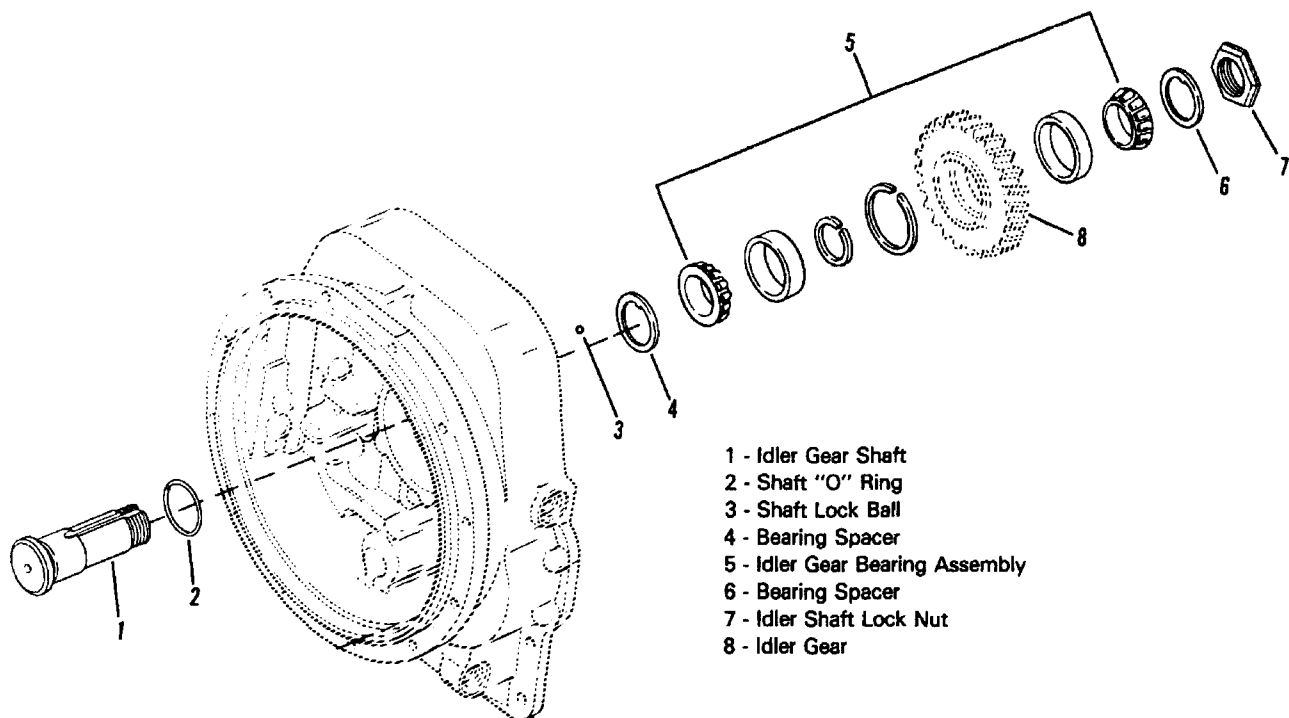


FIG 4



DISASSEMBLY AND REASSEMBLY OF LOCK NUT TYPE IDLER SHAFT

DISASSEMBLY

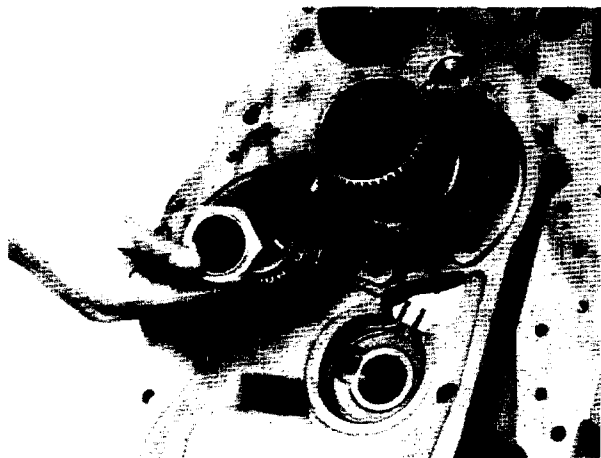


Figure 221

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



Figure 222

Remove nut spacer.

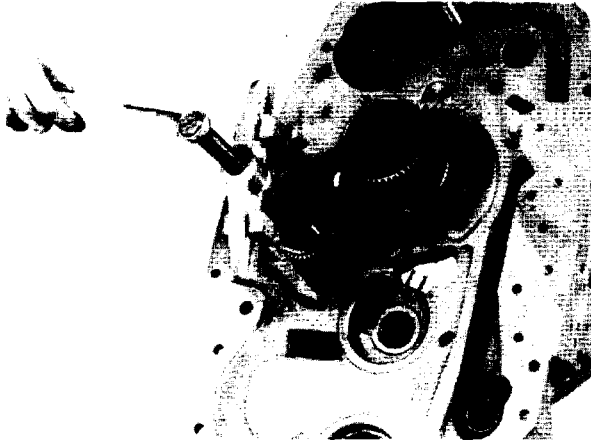


Figure 223
Remove idler gear and outer taper bearing from idler shaft.

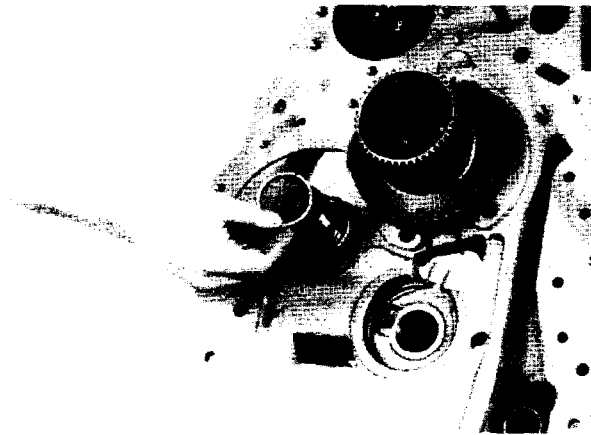


Figure 224
Remove bearing spacer.

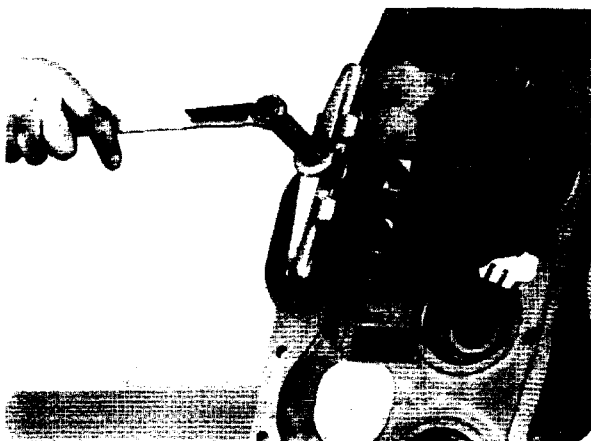


Figure 225
Remove inner taper bearing.

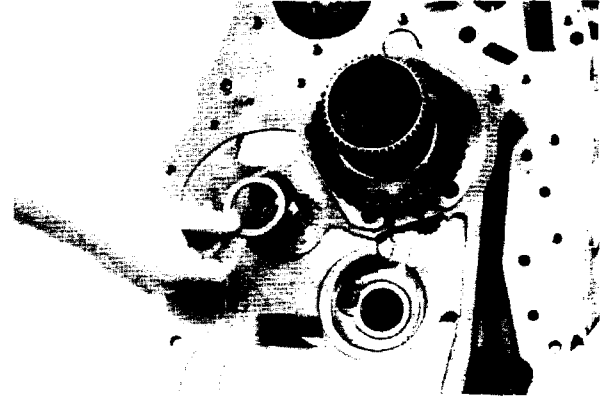


Figure 226
Remove bearing spacer.

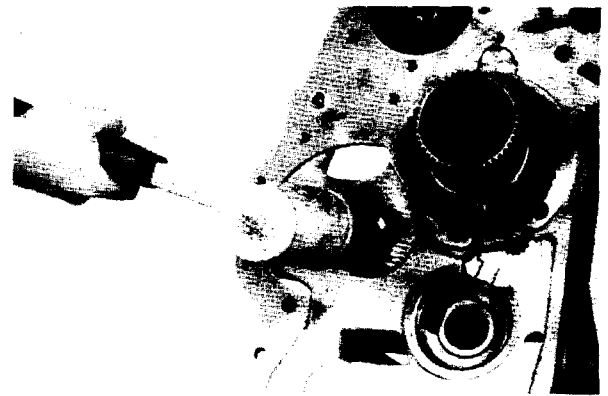


Figure 227
Remove idler shaft, use caution as not to lose shaft lock ball. Refer to page 23 for further disassembly.

REASSEMBLY OF LOCKNUT TYPE IDLER SHAFT



Figure 228
With new "O" ring on shaft, position idler shaft and lock ball in converter housing. Tap shaft into position. Note lock ball.

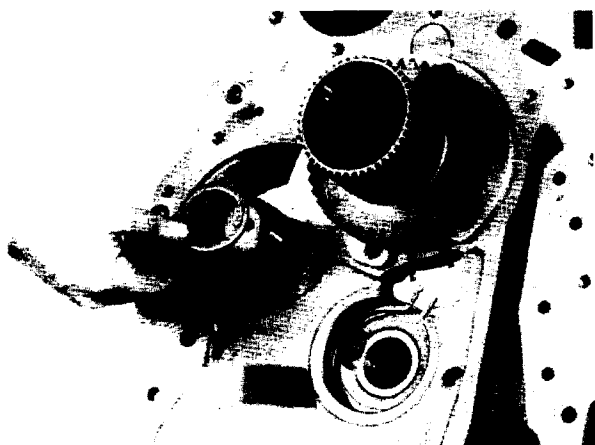


Figure 229
Install reverse idler shaft spacer.

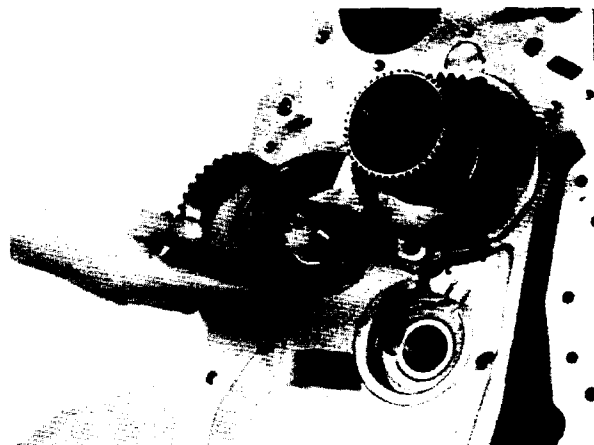


Figure 232
Position idler gear on bearing with hub of gear up.

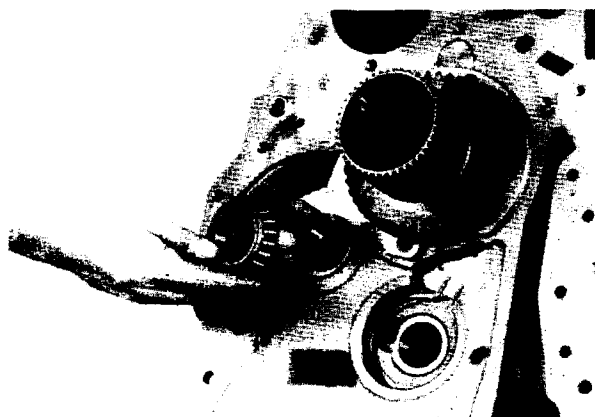


Figure 230
Install inner taper bearing on shaft with large diameter of taper down.



Figure 233
Install idler gear outer taper bearing with large diameter of taper up.



Figure 231
Position bearing spacer on shaft.

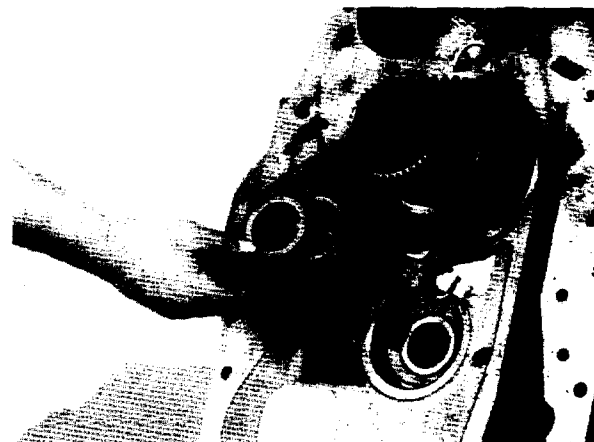


Figure 234
Position outer spacer on shaft.

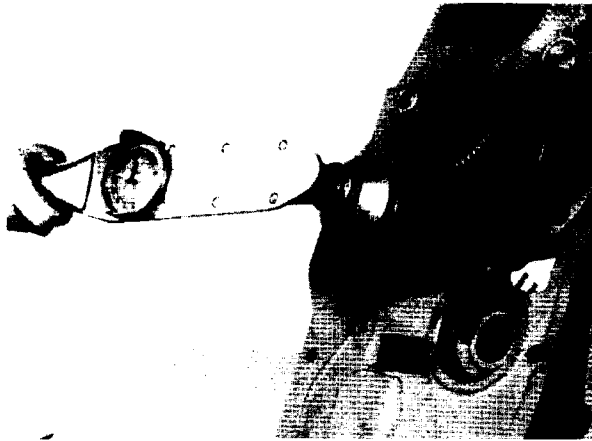


Figure 235

Install retainer nut and tighten nut 200 - 250 ft. lbs. torque [271,2 - 338,8 N.m].

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.

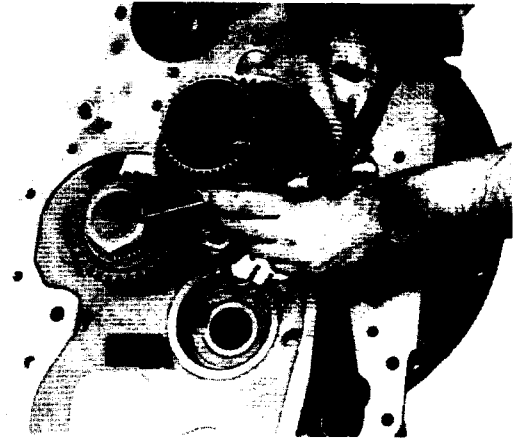


Figure 236

Stake nut securely in shaft notch.

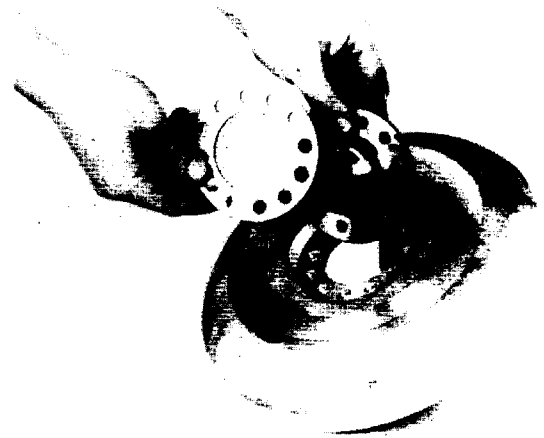


Figure B

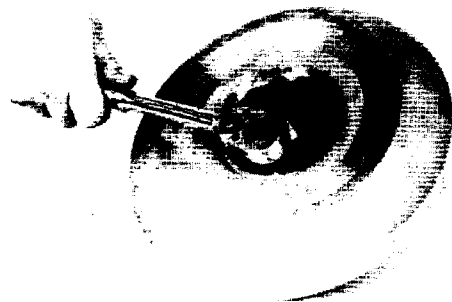


Figure A

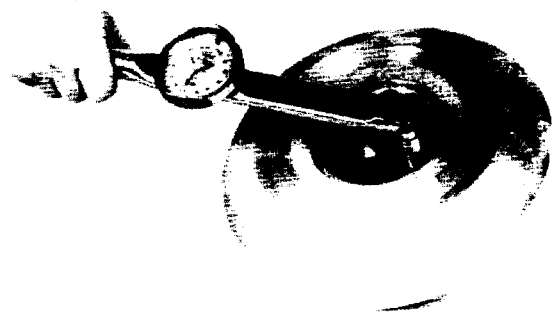


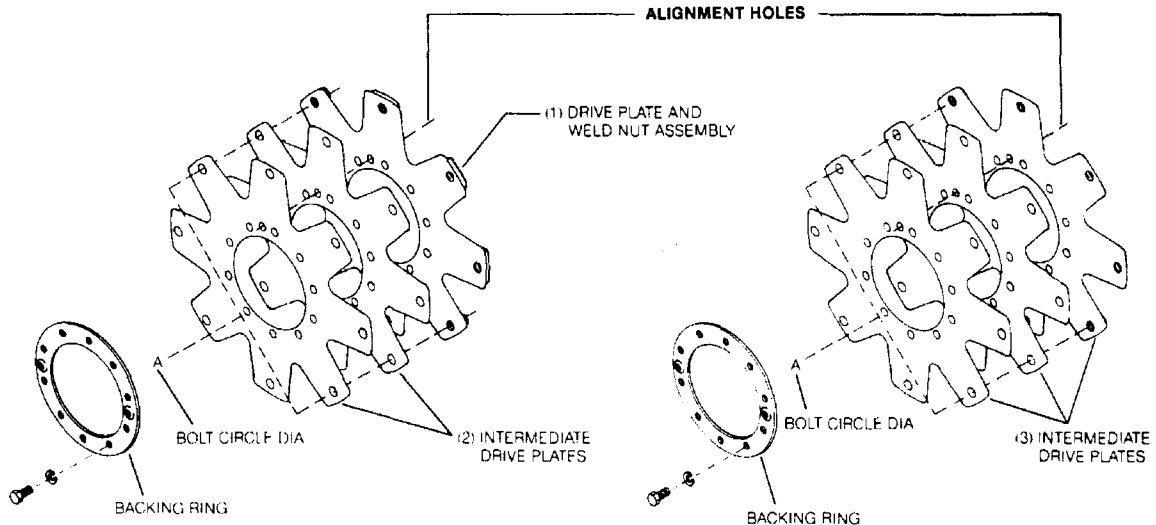
Figure C

18000 SERIES TRANSMISSION AND C2000 SERIES 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 following parts:

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

"A" Dimension (Bolt Circle Diameter)

11.38" [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:

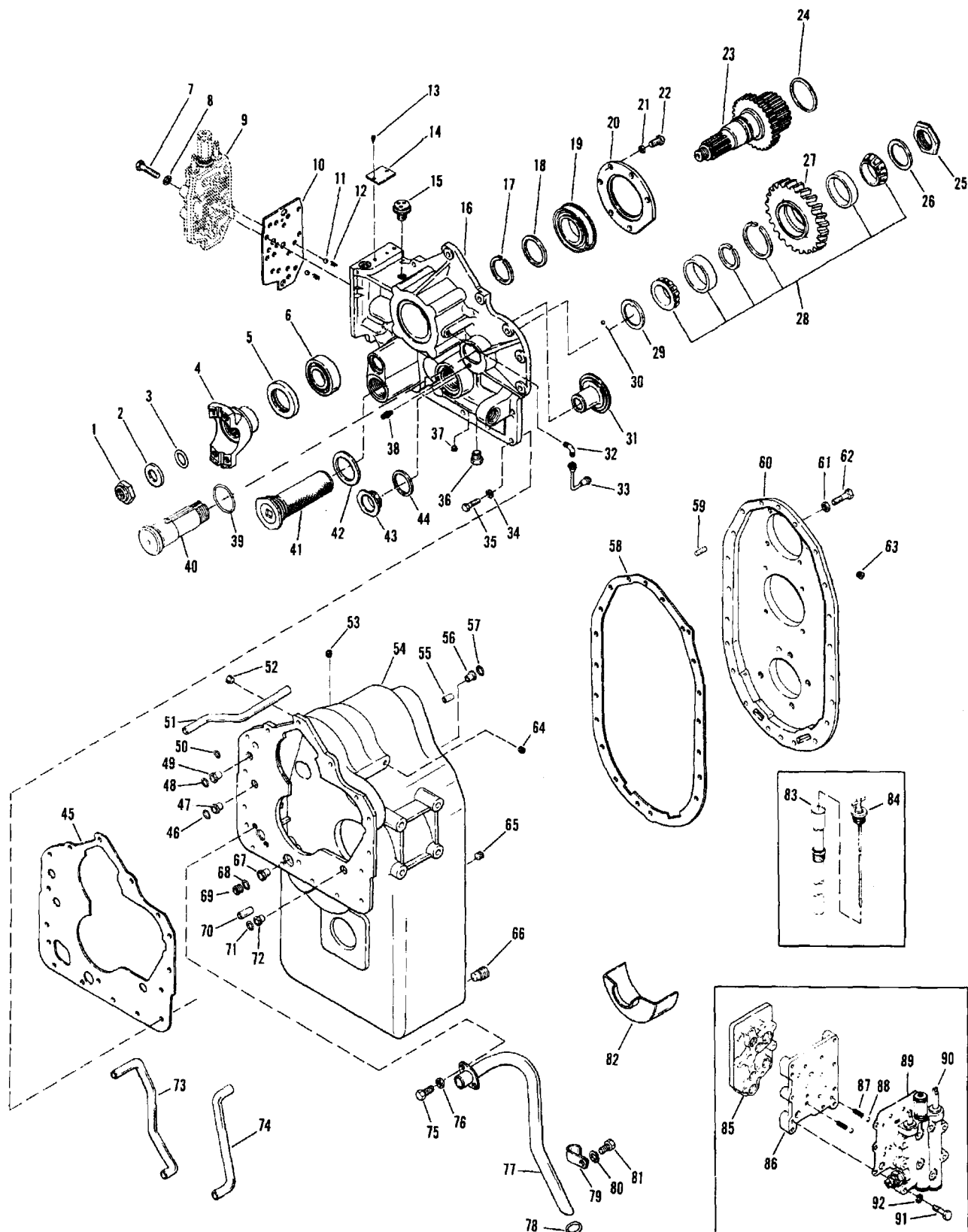
- 3 Intermediate Drive Plates.
- 1 Backing Ring.
- 10 Screw and Lockwasher Assembly.
- 1 Instruction Sheet.

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

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

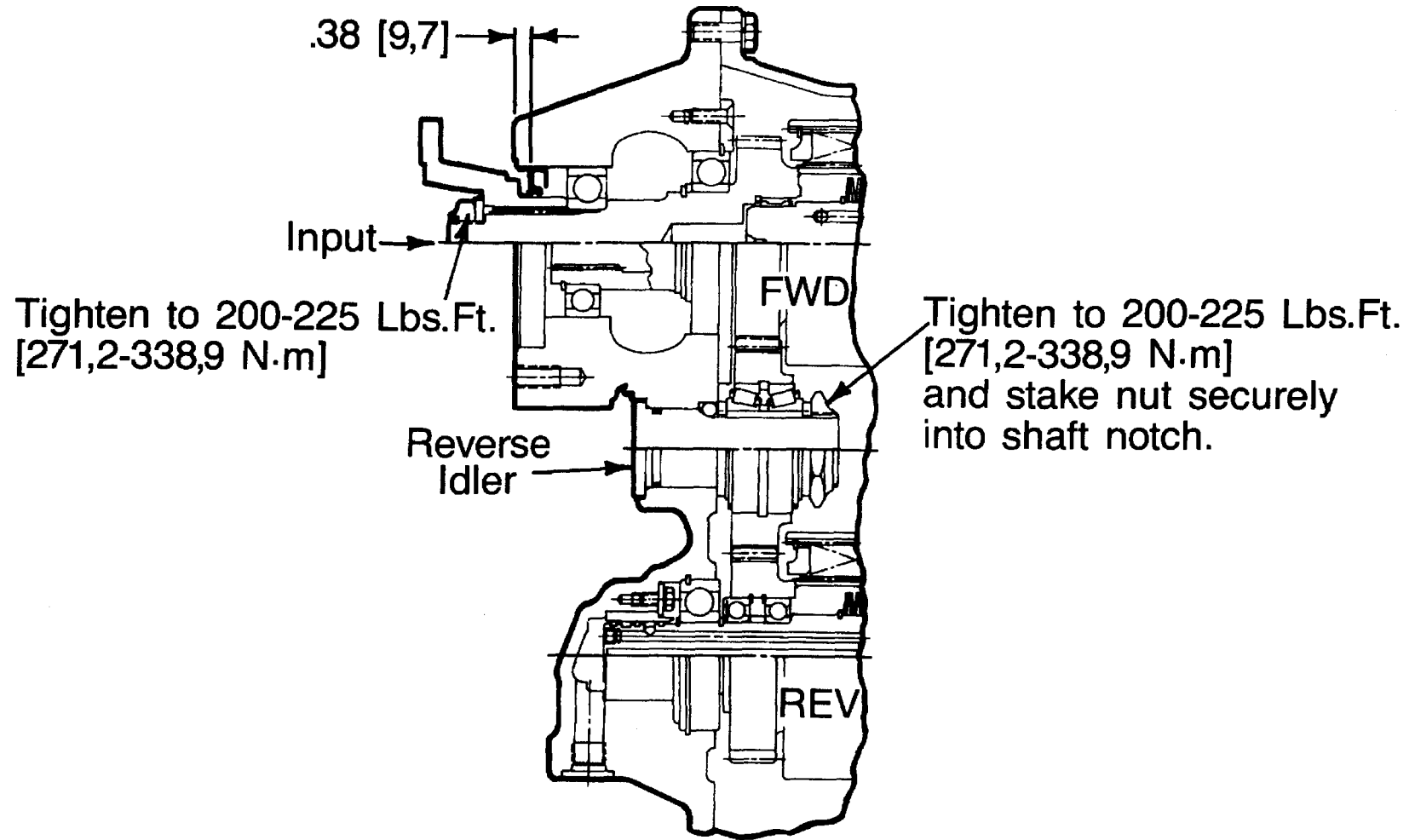
Position drive plate and weld nut assembly on impeller cover with weld nuts toward cover. Align intermediate drive plate and backing ring with holes in impeller cover. **NOTE:** Two dimples 180° apart in backing ring must be out (toward engine flywheel). Install capscrews and washers. Tighten 23 to 25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

See page 46 for transmission to engine installation procedure.



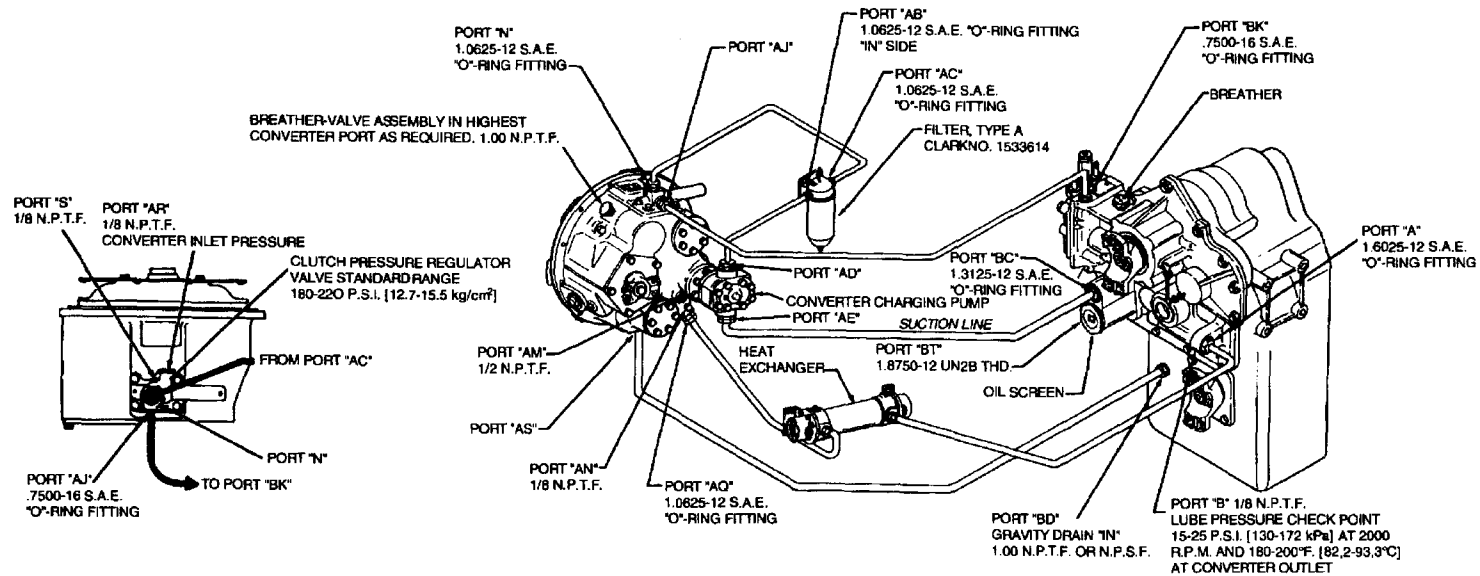
R-18000 CASE AND FRONT COVER GROUP

ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY.
1	Input Flange Nut	1	43	Front Cover Plug	1
2	Input Flange Washer	1	44	Front Cover Plug Gasket	1
3	Input Flange "O" Ring	1	45	Front Cover Gasket	1
4	Input Flange	1	46	Clutch Pressure Tube "O" Ring	1
5	Input Flange Oil Seal	1	47	Tube Sleeve	1
6	Input Shaft Front Bearing	1	48	Clutch Pressure Tube "O" Ring	1
7	Valve to Converter Housing Screw	9	49	Tube Sleeve	1
8	Valve to Converter Housing Screw Lockwasher	9	50	Clutch Pressure Tube "O" Ring	1
9	Control Valve Assembly	1	51	Low Speed Clutch Pressure Tube	1
10	Control Valve Gasket	1	52	Pipe Plug	1
11	Detent Ball	2	53	Pipe Plug (Not used with Dipstick)	1
12	Detent Spring	2	54	Transmission Case Assembly	1
13	Name Plate Screw	2	55	Case to Rear Cover Dowel Pin	1
14	Name Plate	1	56	Tube Sleeve	1
15	Breather	1	57	Clutch Pressure Tube "O" Ring	1
16	Front Cover	1	58	Rear Cover to Case Gasket	1
17	Rear Bearing Snap Ring	1	59	Case to Rear Cover Dowel Pin	1
18	Rear Bearing Washer	1	60	Rear Cover Assembly	1
19	Input Shaft Rear Bearing	1	61	Rear Cover to Case Screw Lockwasher	20
20	Rear Bearing Retaining Plate	1	62	Rear Cover to Case Screw	20
21	Retaining Plate Screw Lockwasher	6	63	Pipe Plug	1
22	Retaining Plate Screw	6	64	Pipe Plug	1
23	Input Shaft and Hub Assembly	1	65	Pipe Plug	1
24	Baffle Ring	1	66	Magnetic Drain Plug	2
25	Idler Shaft Lock Nut	1	67	Tube Sleeve	1
26	Thrust Washer	1	68	3rd Speed Pressure Plug "O" Ring	1
27	Reverse Idler Gear	1	69	3rd Speed Pressure Plug	1
28	Reverse Idler Gear Bearing Assembly	1	70	Front Cover to Case Dowel Pin	2
29	Thrust Washer	1	71	Clutch Pressure Tube "O" Ring	1
30	Reverse Idler Shaft Lockball	1	72	Tube Sleeve	1
31	Front Cover Sleeve	1	73	3rd Speed Tube	1
32	Lube Tube Fitting	1	74	Clutch Lube Tube	1
33	Lube Tube Assembly	1	75	Suction Line Retainer Screw	2
34	Front Cover to Case Screw Lockwasher	16	76	Suction Line Retainer Screw Lockwasher	2
35	Front Cover to Case Screw	16	77	Suction Tube Assembly	1
36	Lube Plug	1	78	Suction Tube "O" Ring	1
37	Lube Plug	1	79	Suction Tube Clip	1
38	Tube Connector	1	80	Clip Lockwasher	1
39	Reverse Idler Shaft "O" Ring	1	81	Clip Retainer Screw	1
40	Reverse Idler Shaft	1	82	Oil Baffle	1
41	Suction Screen Assembly	1	83	Dipstick Tube Assembly	1
42	Screen Assembly Gasket	1	84	Dipstick	1
			85 thru 92	Optional Remote Mounted Control Valve Parts	



R-MODEL

PLUMBING DIAGRAM R-18000 SERIES TRANSMISSION



NOTES

HOSE LINE OPERATING REQUIREMENTS

- 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.
- SUCTION LINE TO BE PROTECTED FROM COLLAPSE BY INTERWOVEN STEEL WIRE. REF. S.A.E. NO. J517,100R4 HYDRAULIC HOSE SPECIFICATION. SUITABLE FOR OPERATION FROM AMBIENT TO 250°F. [121,1°C.] CONTINUOUS OPERATING TEMPERATURE.
- 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.
- 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 OF 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] MINIMUM PRESSURE AT 2000 R.P.M. ENGINE AND A MAXIMUM OF 70 P.S.I. [482 kPa] OUTLET PRESSURE WITH ENGINE AT NO-LOAD GOVERNED SPEED.

PORT 'S' - CLUTCH PRESSURE

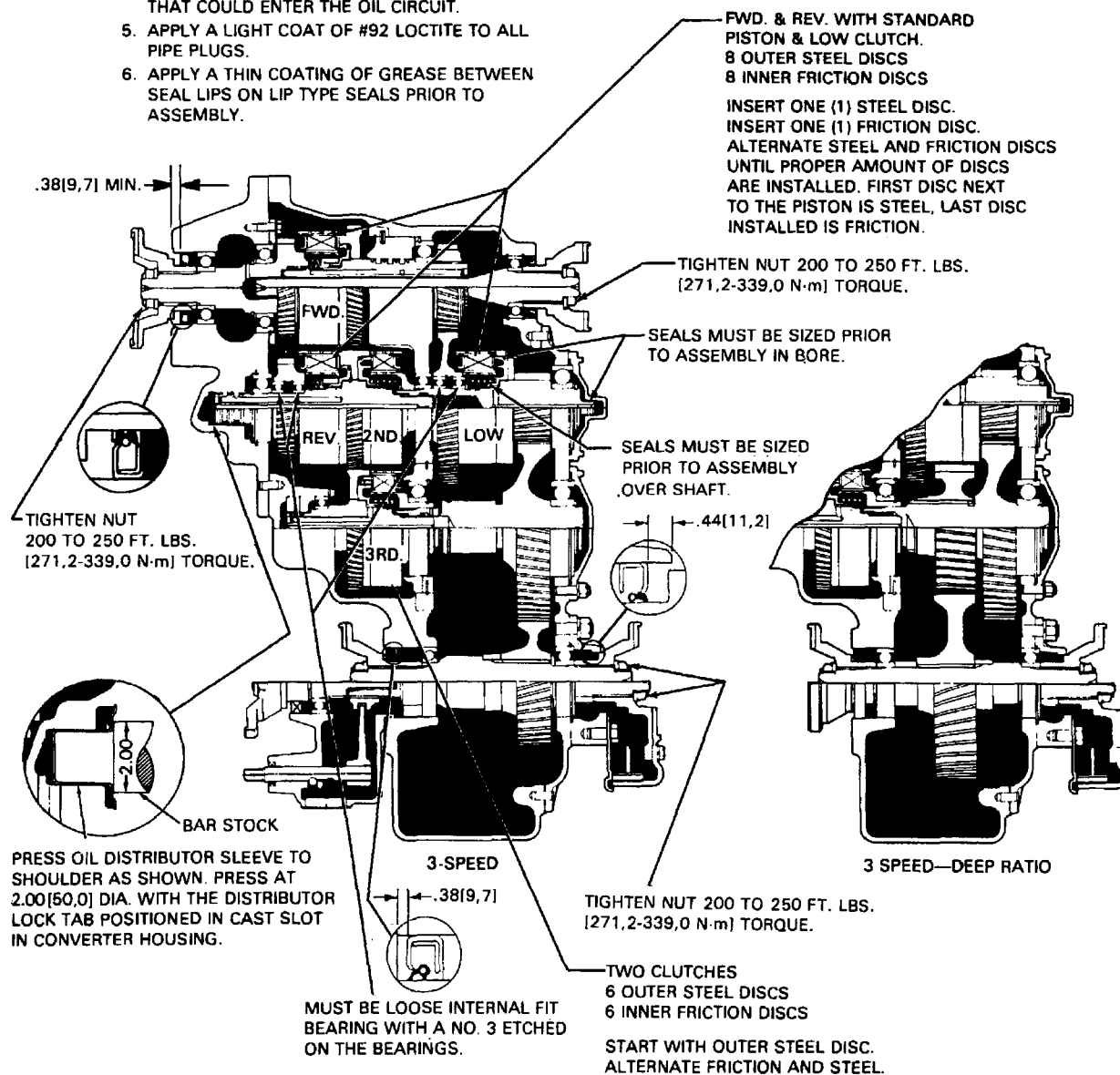
180-220 P.S.I. [1241-1516 kPa] WITH PARKING BRAKE SET (SEE NOTE), OIL TEMPERATURE 180-200°F. [82,2-93,3°C], ENGINE AT IDLE (400 TO 900 RPM), SHIFT THRU DIRECTION AND SPEED CLUTCH PRESSURE MUST BE EQUAL WITH 5 P.S.I. [34 kPa]. IF CLUTCH PRESSURE VARIES IN ANY ONE CLUTCH MORE THAN 5 P.S.I. [34 kPa] REPAIR 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
AD	AB	.75[19,0]	
AC	N	.75[19,0]	
AJ	BK	.50[12,7]	
AQ	HEAT EXCHANGER	.75[19,0]	
HEAT EXCHANGER	A	.75[19,0]	
AS	BD	1.00[25,4]	
HEAT EXCHANGER	D	.75[19,0]	
BR	A	.75[19,0]	
BC	AE	1.00[25,4]	SUCTION LINE FROM 15 GPM [58,5 L/MIN.] PUMP
BC	AE	1.25[31,8]	SUCTION LINE FROM 21 GPM [79,5 L/MIN.] PUMP

1. ALL LEAD IN CHAMFERS FOR OIL SEALS, PISTON RINGS, & "O" RINGS MUST BE SMOOTH AND FREE FROM BURRS. INSPECT AT ASSEMBLY.
2. LUBRICATE ALL PISTON RING GROOVES & "O" RINGS WITH OIL BEFORE ASSEMBLY.
3. APPLY VERY LIGHT COAT OF PERMATEX NO. 2 TO O.D. OF ALL OIL SEALS BEFORE ASSEMBLY.
4. AFTER ASSEMBLY OF PARTS USING LOCTITE OR PERMATEX THERE MUST NOT BE ANY FREE OR EXCESS MATERIAL THAT COULD ENTER THE OIL CIRCUIT.
5. APPLY A LIGHT COAT OF #92 LOCTITE TO ALL PIPE PLUGS.
6. APPLY A THIN COATING OF GREASE BETWEEN SEAL LIPS ON LIP TYPE SEALS PRIOR TO ASSEMBLY.



Grade 5

Torque Specification for Lubricated or Plated Screw Threads

Grade 8

NOM. SIZE	FINE THREAD		COARSE THREAD		FINE THREAD		COARSE THREAD	
	LB-FT	[N·m]	LB-FT	[N·m]	LB-FT	[N·m]	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]

**18000 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 1
Side view of R-18000 transmission

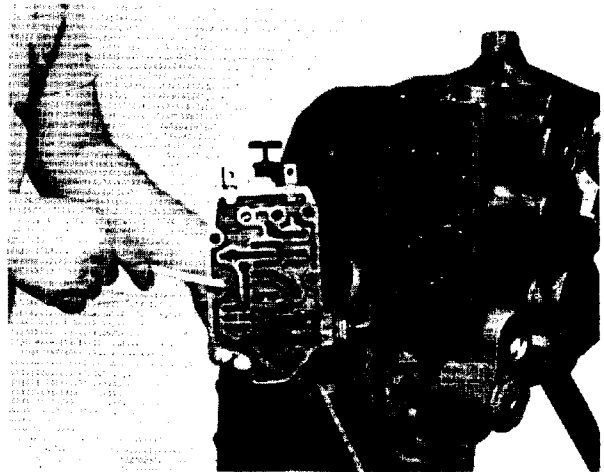


Figure 3
Remove control valve assembly. Use caution as not to lose detent springs and balls.

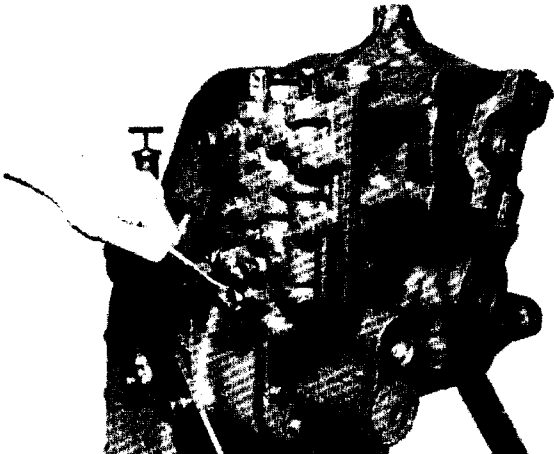


Figure 2
Remove control valve bolts and washers.

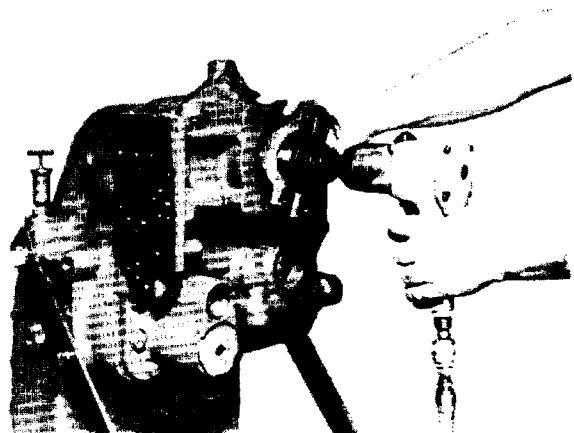


Figure 4
Remove input flange nut, washer, "O" ring and flange.

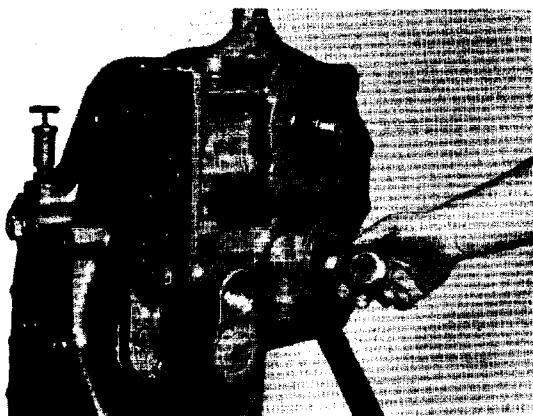


Figure 5
Remove front cover plug.

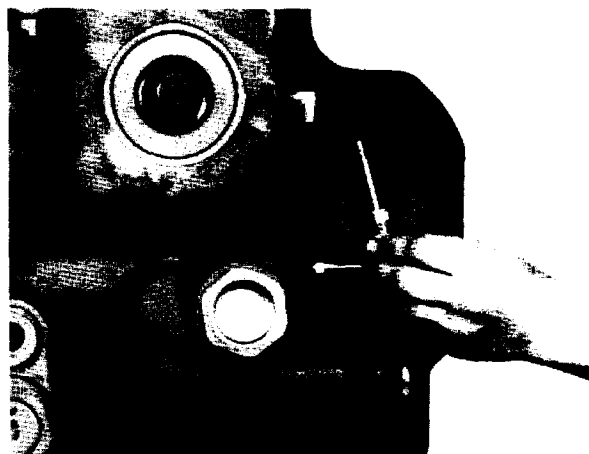


Figure 8
Remove lube tube and fittings for cleaning or replacing.

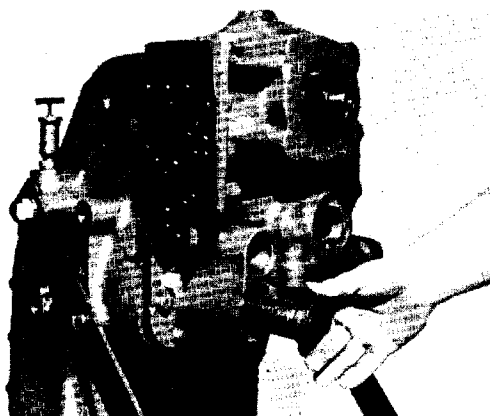


Figure 6
Remove suction screen assembly.

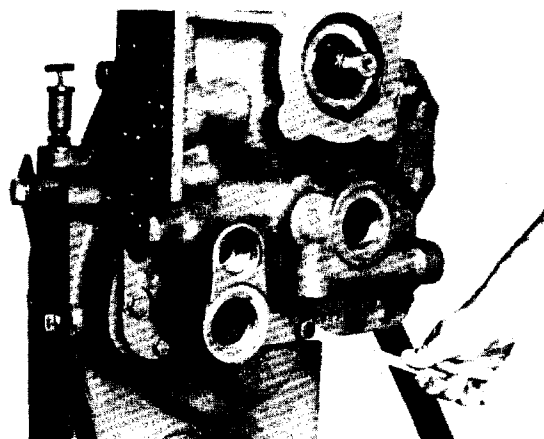


Figure 9
Remove front cover bolts and washers.

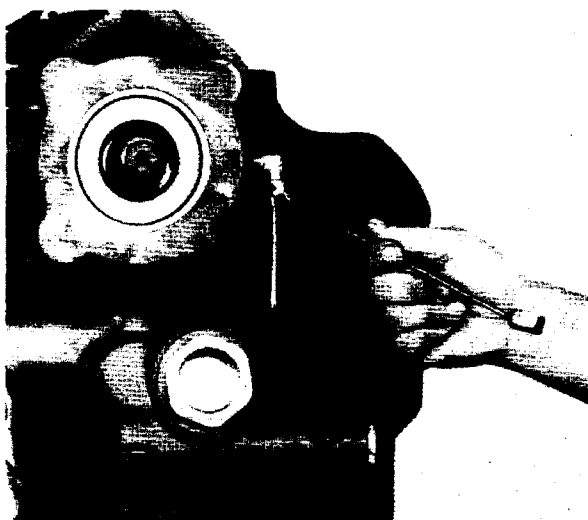


Figure 7
Loosen lube tube fitting nut.

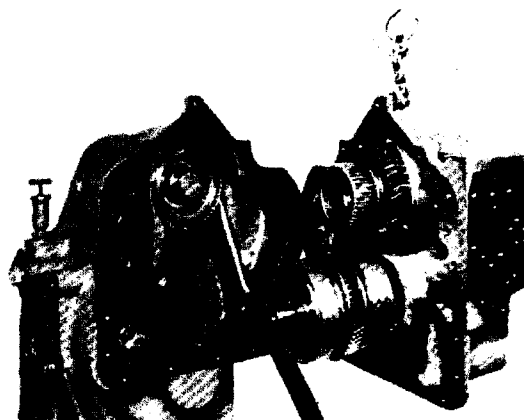


Figure 10
Support front cover with a chain fall. Pry front cover and reverse and 2nd clutch assembly from transmission housing. See page 7 Figure 34 for complete transmission disassembly.

FRONT COVER DISASSEMBLY

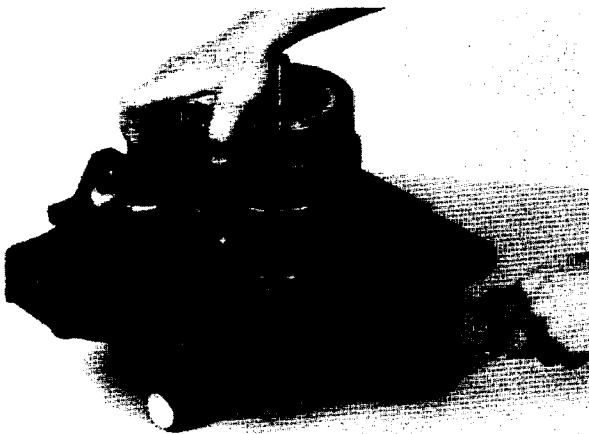


Figure 14

Remove idler gear and outer taper bearing.

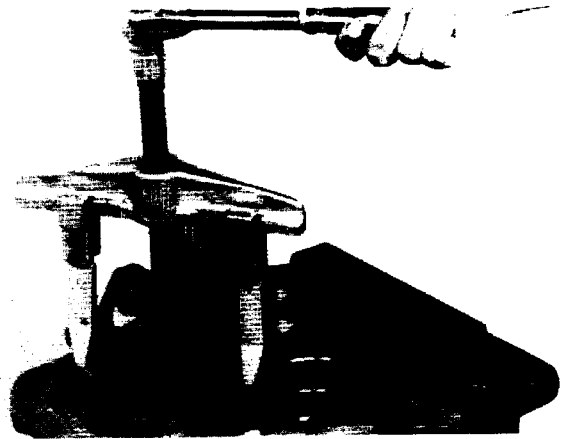


Figure 11

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

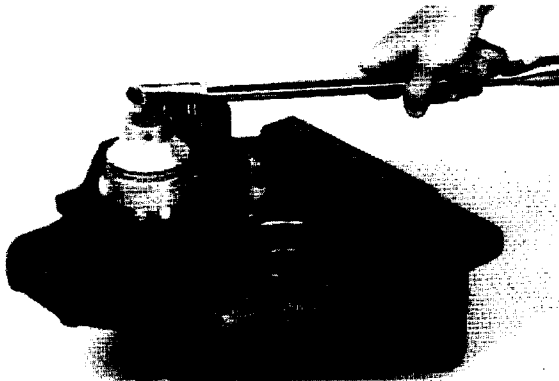


Figure 15

Remove taper bearing spacer.

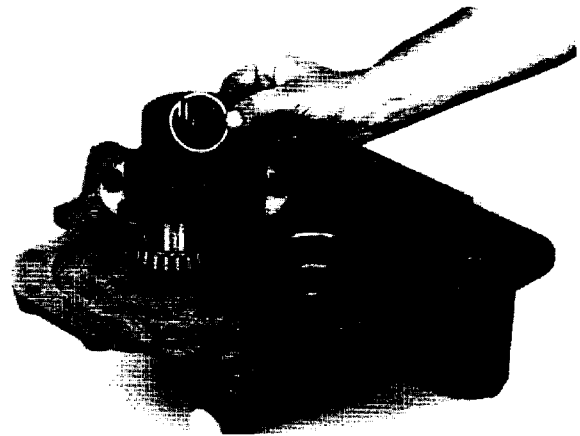


Figure 12

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

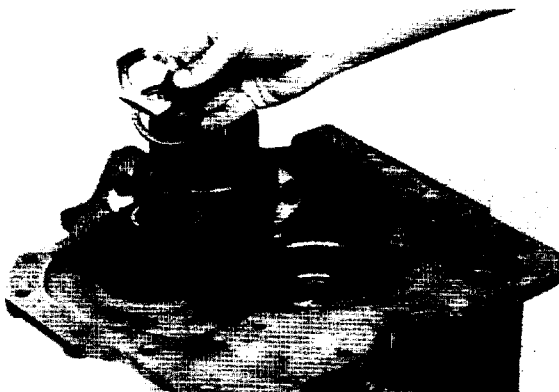


Figure 16

Remove inner taper bearing.

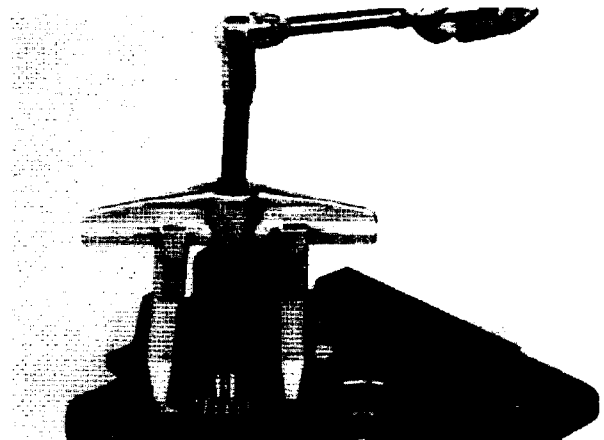


Figure 13

Remove nut and spacer.



Figure 17
Remove inner bearing spacer.



Figure 20
Remove idler shaft "O" ring.

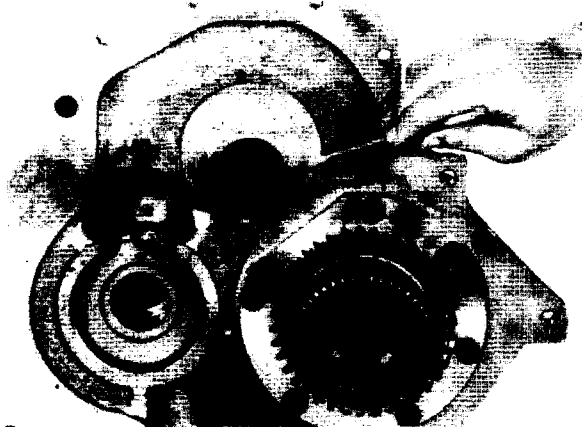


Figure 18
Note idler shaft lock ball.

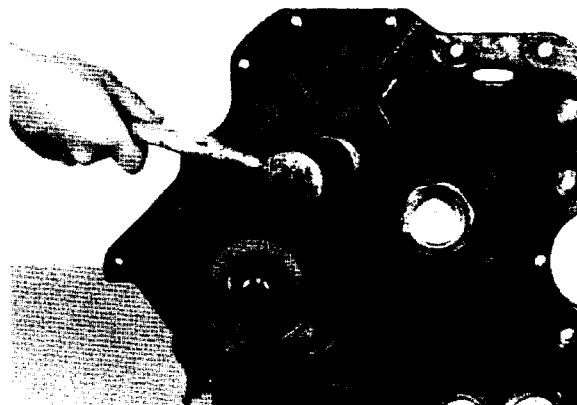


Figure 21
Remove input shaft retainer plate cap screws and washers.

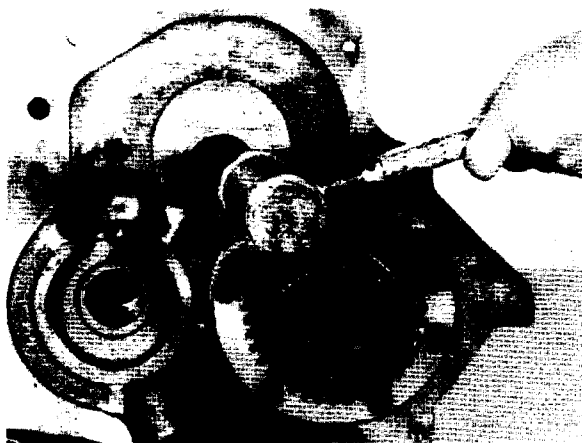


Figure 19
Tap idler shaft from cover, use caution as not to lose lock ball.



Figure 22
Tap input shaft from cover.

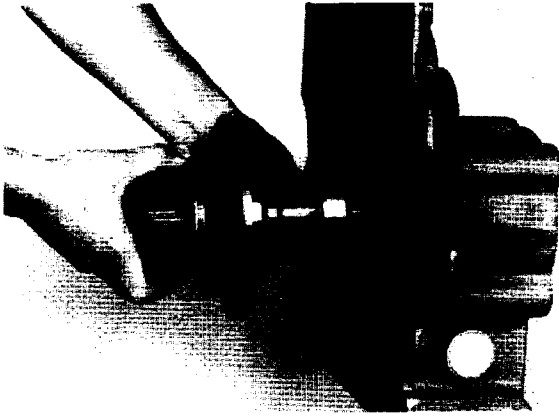


Figure 23

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.

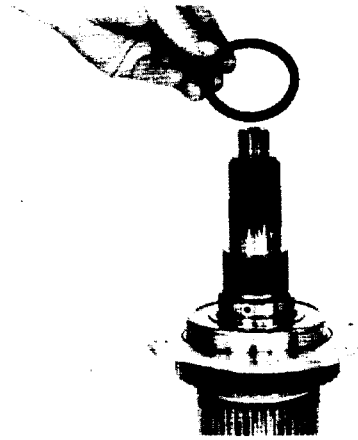


Figure 26

Remove bearing washer.

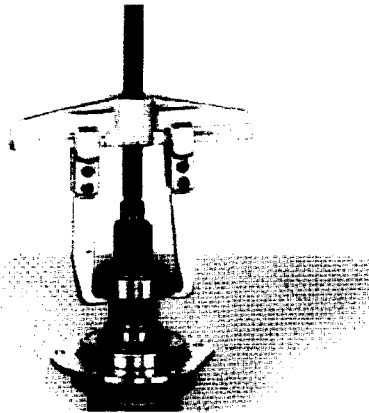


Figure 24

Remove input shaft front bearing.



Figure 27

Remove retainer plate and rear bearing.

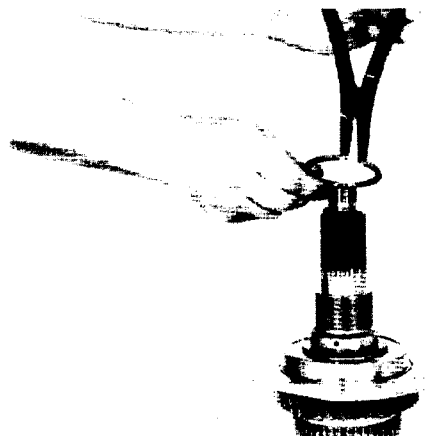


Figure 25

Remove input shaft near bearing retainer ring.

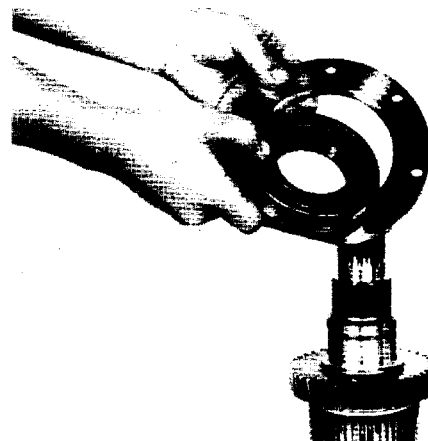


Figure 28

Plate and bearing removed.

FRONT COVER REASSEMBLY

(See cleaning and inspection page.)

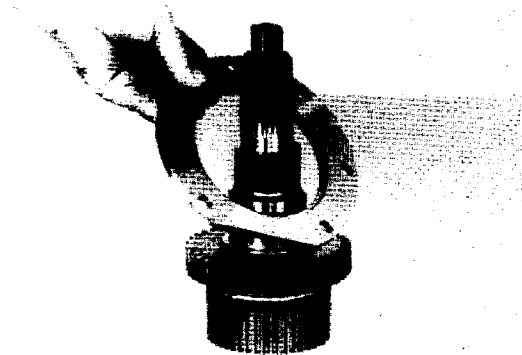


Figure 29

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

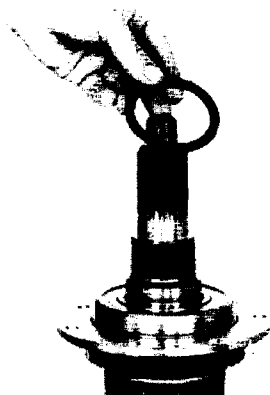


Figure 30

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.

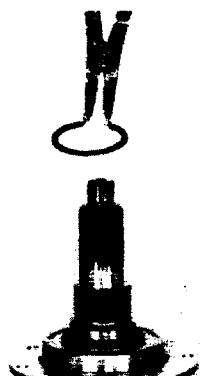


Figure 31

Install bearing retainer ring.

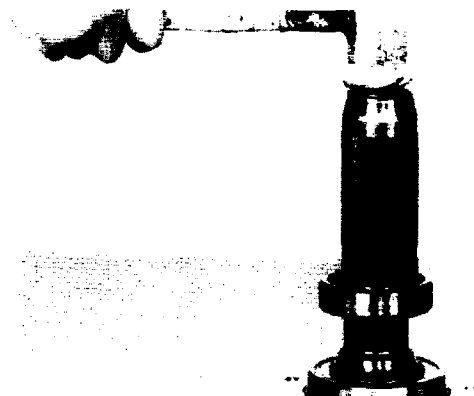


Figure 32

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).

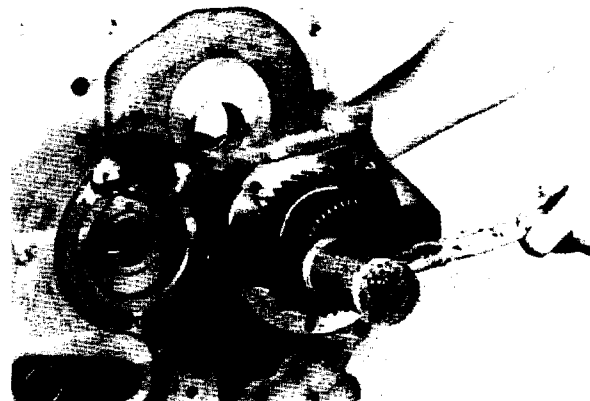


Figure 33

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



Figure 34

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

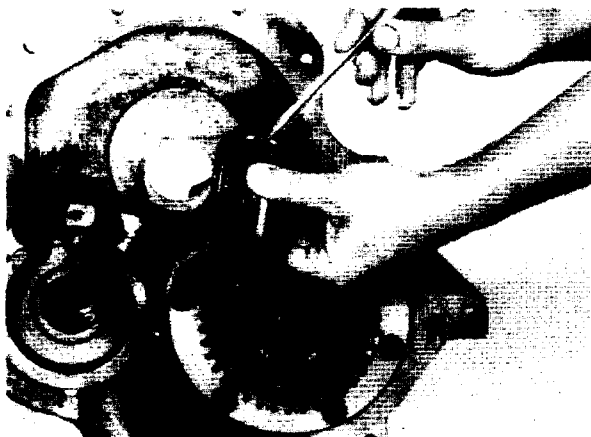


Figure 35
Install new "O" ring on idler shaft.



Figure 38
Install idler shaft inner taper bearing spacer on shaft.

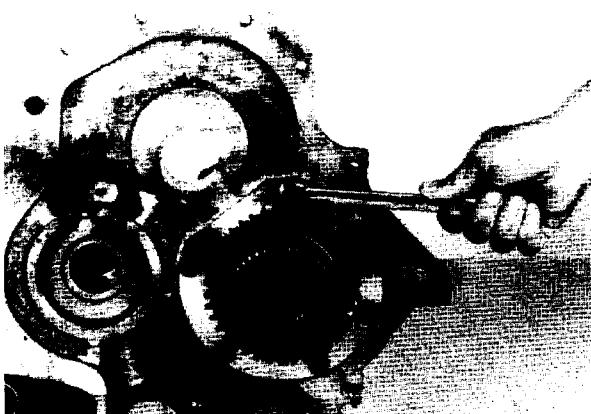


Figure 36
Align slot in idler shaft with lock ball notch in cover. Tap shaft into position.

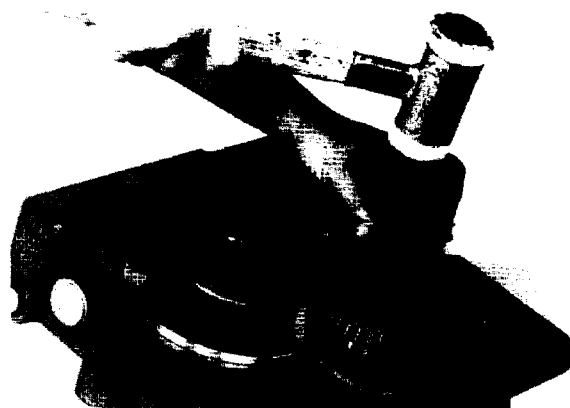


Figure 39
Install inner taper bearing on shaft with large diameter of taper down.

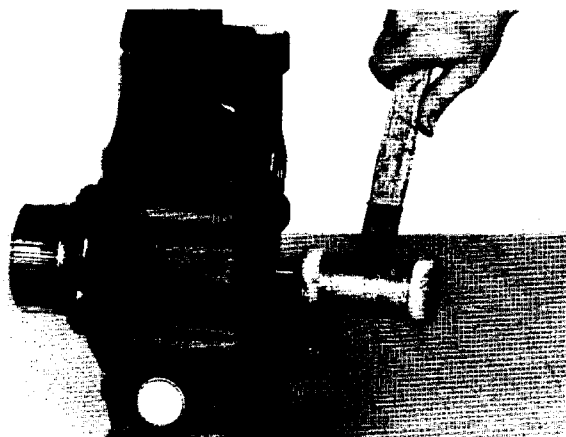


Figure 37
Install lock ball in idler shaft and notch.



Figure 40
Position bearing spacer on shaft.

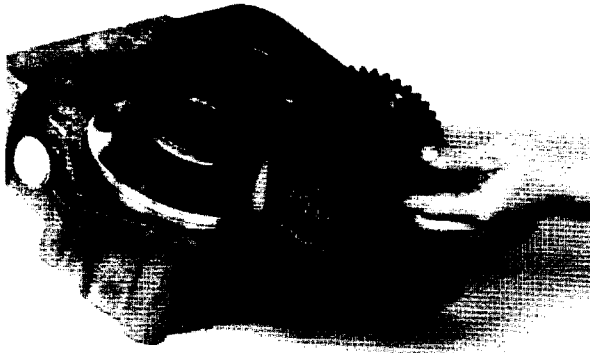


Figure 41
Position idler gear on shaft with long hub of gear up.



Figure 44
Install outer bearing spacer on shaft.



Figure 42
Position outer taper bearing on shaft with large diameter of taper up.



Figure 45
Install retainer nut.



Figure 43
Tap bearing into position in idler gear.



Figure 46
Tighten nut 200 to 250 lbf-ft torque [271,2-338,8 Nm].

FRONT COVER ASSEMBLY

Installation on Transmission Case

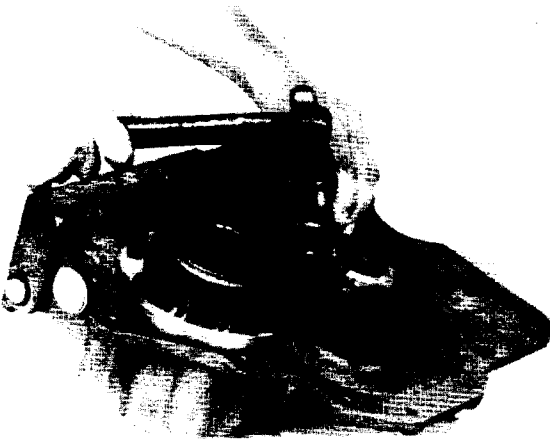


Figure 47

Stake nut securely in shaft notch.

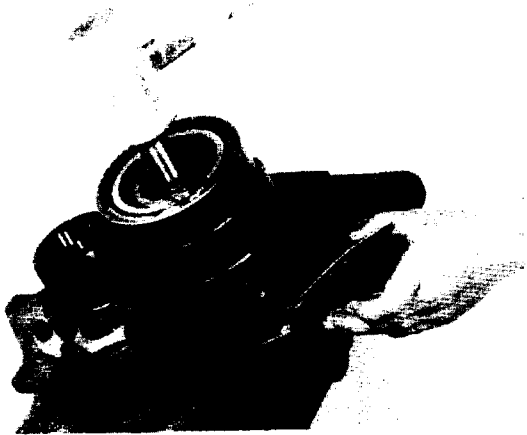


Figure 48

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.

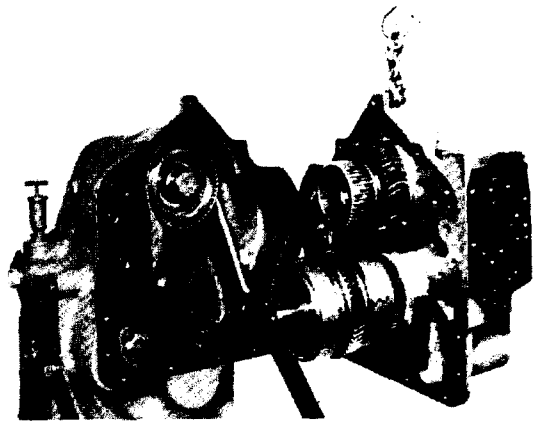


Figure 49

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 transmission 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 be tight against the transmission case. Install front cover to transmission case bolts and washers. **DO NOT USE BOLTS TO PULL CASE AND COVER TOGETHER.**

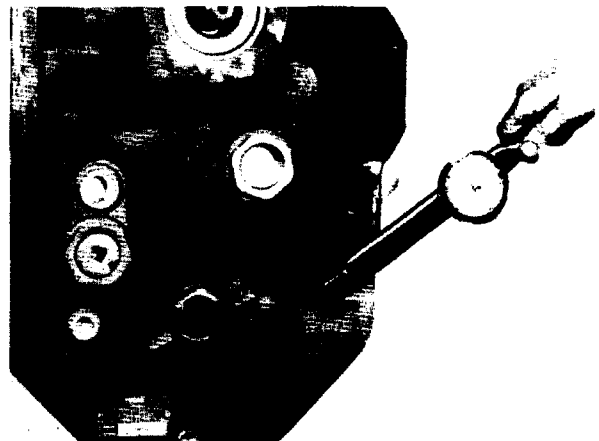


Figure 50

Tighten bolts to specified torque (See torque chart).

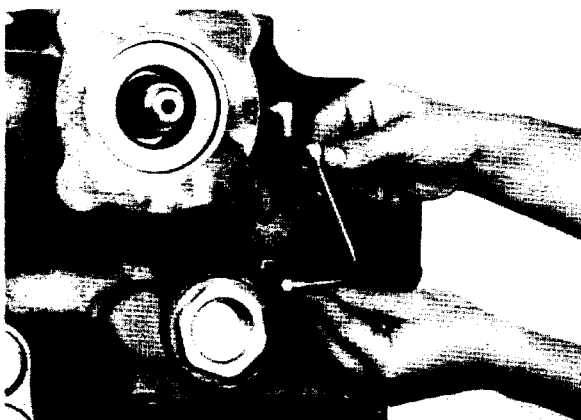


Figure 51

If lube fittings were removed for cleaning, install fittings. Install lube tube on fittings and tighten tube nuts securely.

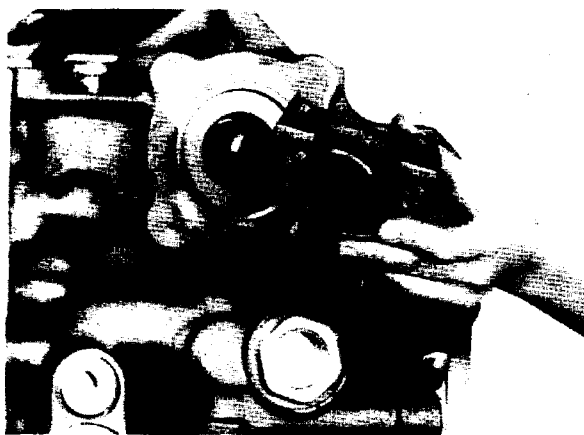


Figure 52

Position input flange on input shaft.

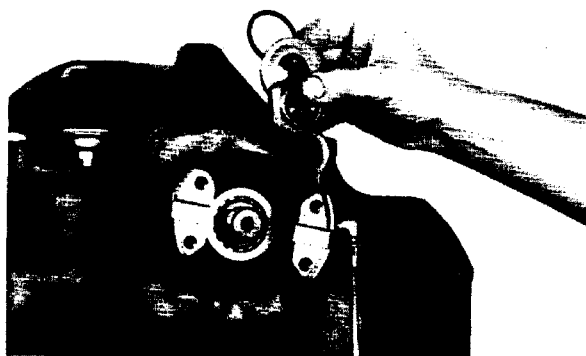
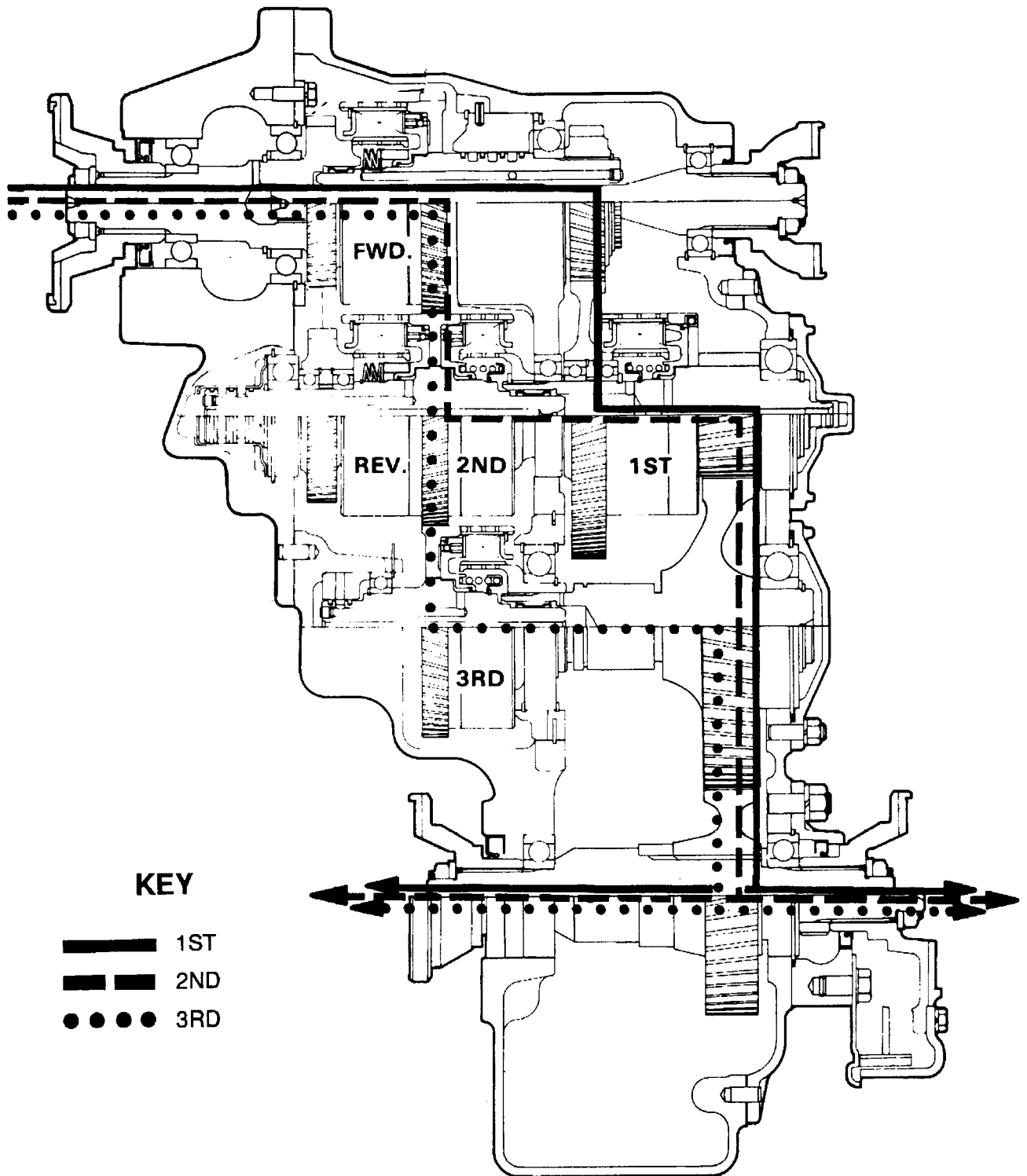


Figure 53

Install flange "O" ring, washer and flange nut. Tighten nut 200 to 250 lbf ft [271,2-338,9 N-m]. See page 39 Figure 217 for control valve installation.



**3 SPEED LONG DROP TRANSMISSION
R MODEL POWER FLOW**

NOTES

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

6 SPEED SECTION

TABLE OF CONTENTS

SIX-SPEED CLUTCH AND GEAR GROUP

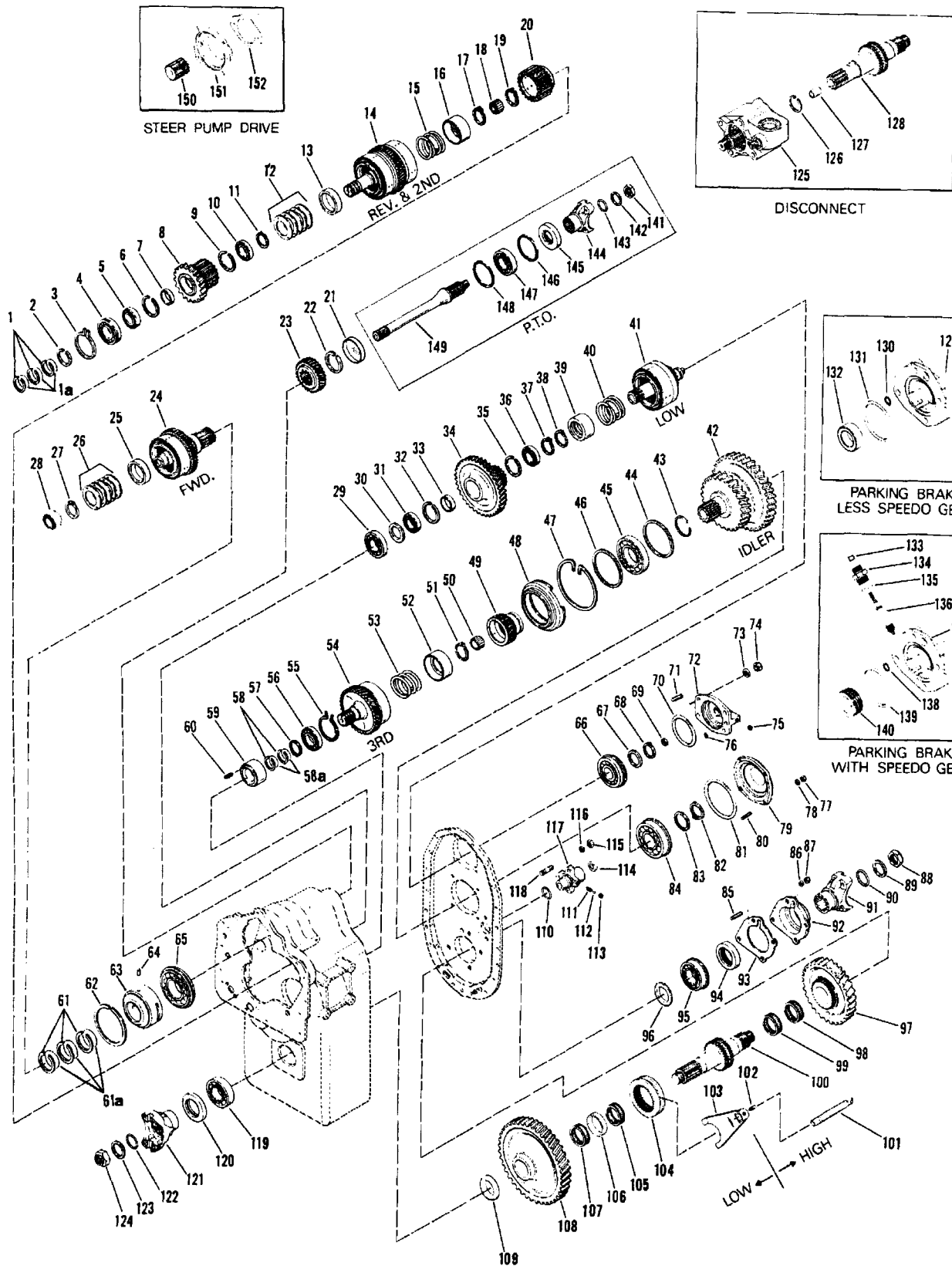
TYPICAL SIX-SPEED LOW POWER FLOW

TYPICAL SIX-SPEED HI POWER FLOW

TYPICAL 18,000 SIX-SPEED ASSEMBLY INSTRUCTION SHEET

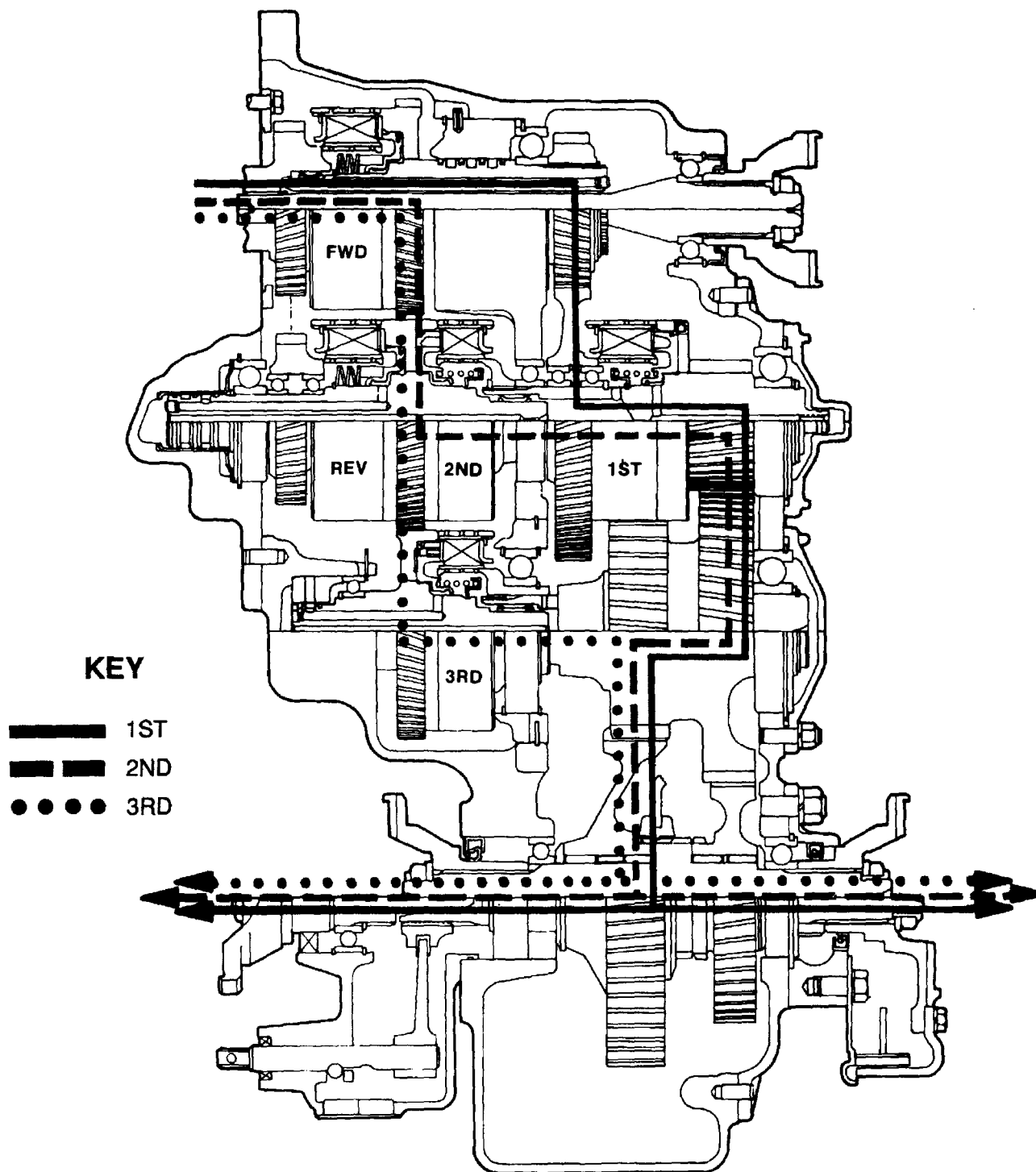
DISASSEMBLY

18,000 SERIES SIX-SPEED CLUTCH AND GEAR ARRANGEMENT

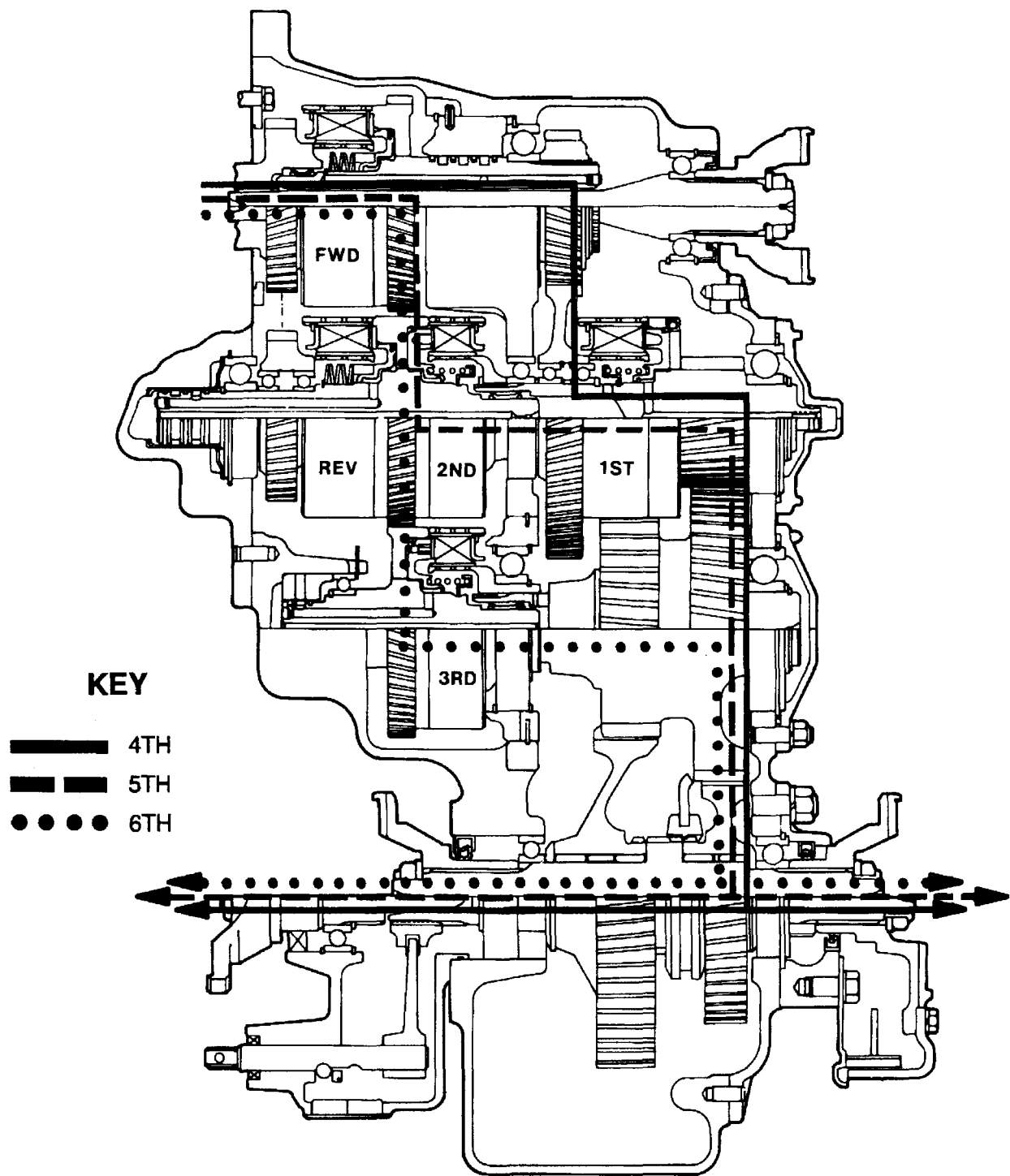


6 SPEED CLUTCH AND GEAR GROUP

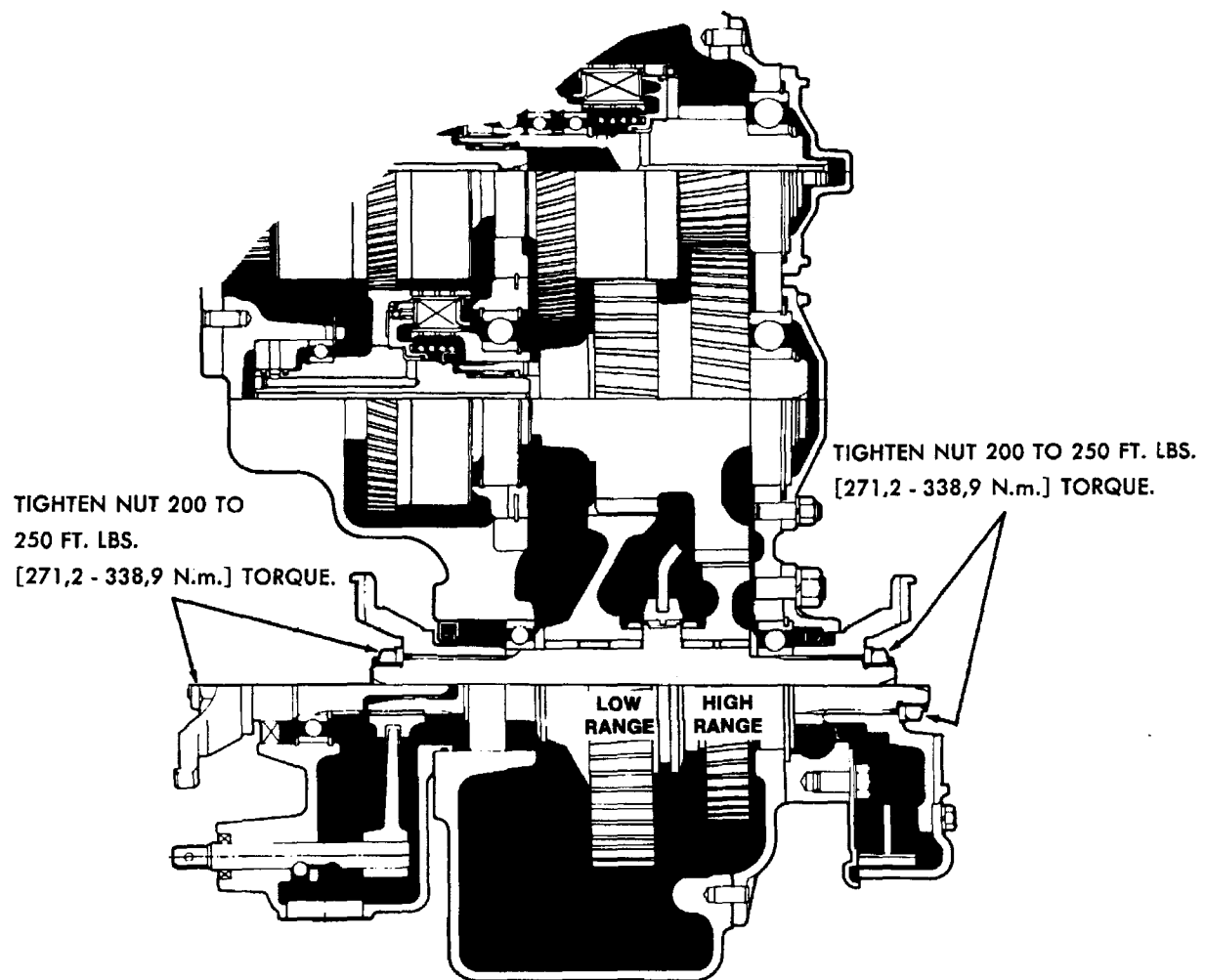
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY
1	Reverse and 2nd Shaft Piston Rings	3	62	Piston Ring Sleeve Retaining Ring	1
1A	Piston Ring Expander Springs	3	63	Piston Ring Sleeve	1
2	Front Bearing Retaining Ring	1	64	Sleeve Roll Pin	1
3	Front Bearing Snap Ring	1	65	Forward Shaft Rear Bearing	1
4	Reverse and 2nd Shaft Front Bearing	1	66	Low Speed Shaft Rear Bearing	1
5	Clutch Driven Gear Bearing	1	67	Rear Bearing Support Washer	1
6	Bearing Retaining Ring	1	68	Rear Bearing Retaining Ring	1
7	Clutch Driven Gear Bearing Spacer	1	69	Low Shaft Piston Ring	1
8	Reverse Clutch Gear and Hub Assembly	1	70	Rear Bearing Cap "O" Ring	1
9	Bearing Retaining Ring	1	71	Bearing Cap Stud	4
10	Clutch Driven Gear Bearing	1	72	Low Shaft Rear Bearing Cap	1
11	Spring Retainer Snap Ring	1	73	Bearing Cap Stud Lockwasher	4
12	Piston Return Disc Spring Pack	5	74	Bearing Cap Stud Nut	4
13	Piston Return Spring Spacer	1	75	Bearing Cap Plug	1
14	Reverse and 2nd Shaft, and Clutch Drum Assembly	1	76	Bearing Cap "O" Ring	1
15	Piston Return Spring	1	77	Rear Bearing Cap Stud Nut	4
16	Spring Retainer	1	78	Rear Bearing Cap Stud Lockwasher	4
17	Spring Retainer Snap Ring	1	79	Idle Shaft Rear Bearing Cap	1
18	Reverse and 2nd Shaft Rear Bearing	1	80	Rear Bearing Cap Stud	4
19	2nd Clutch Disc Hub Snap Ring	1	81	Rear Bearing Cap "O" Ring	1
20	2nd Clutch Disc Hub	1	82	Idle Shaft Rear Bearing Retainer Ring	1
21	Bore Plug	1	83	Rear Bearing Support Washer	1
22	Gear Retaining Ring	1	84	Idle Shaft Rear Bearing	1
23	Forward Shaft Gear	1	85	Bearing Cap Stud	4
24	Forward Shaft and Clutch Drum Assembly	1	86	Bearing Cap Stud Lockwasher	4
25	Piston Return Spring Spacer	1	87	Bearing Cap Stud Nut	4
26	Piston Return Disc Spring Pack	5	88	Flange Nut	1
27	Spring Retainer Snap Ring	1	89	Flange Washer	1
28	Forward Shaft Pilot Bearing	1	90	Flange "O" Ring	1
29	Low Speed Clutch Shaft Front Bearing	1	91	Output Flange	1
30	Front Bearing Spacer	1	92	Rear Bearing Cap	1
31	Low Speed Gear Bearing	1	93	Bearing Cap Gasket	1
32	Low Speed Gear Bearing Locating Ring	1	94	Rear Bearing Cap Oil Seal	1
33	Low Speed Gear Spacer	1	95	Output Shaft Rear Bearing	1
34	Low Shaft Gear and Hub Assembly	1	96	Gear Thrust Washer	1
35	Low Speed Gear Bearing Locating Ring	1	97	High Range Gear	1
36	Low Speed Gear Bearing	1	98	High Gear Bearing	1
37	Low Gear Bearing Retaining Ring	1	99	High Gear Bearing	1
38	Spring Retainer Snap Ring	1	100	Output Shaft	1
39	Spring Retainer	1	101	Hi and Low Shift Rail	1
40	Piston Return Spring	1	102	High and Low Shift Rail Lockscrew	1
41	Low Clutch Shaft Drum Assembly	1	103	High and Low Shift Fork	1
42	Idle Shaft	1	104	Range Shift Hub	1
43	Bearing Retaining Ring	1	105	Low Gear Bearing	1
44	Bearing Locating Ring	1	106	Bearing Spacer	1
45	3rd Clutch Disc Hub Bearing	1	107	Low Gear Bearing	1
46	Bearing Locating Ring	1	108	Low Range Gear	1
47	Bearing Carrier Locating Ring	1	109	Gear Thrust Washer	1
48	Bearing Carrier	1	110	Range Shift Rail Housing "O" Ring	1
49	3rd Clutch Disc Hub	1	111	Mesh Lock Spring	1
50	3rd Clutch Shaft Pilot Bearing	1	112	Mesh Lock Ball	1
51	Spring Retainer Snap Ring	1	113	Housing Detent Plug	1
52	Spring Retainer	1	114	Shift Rail Oil Seal	1
53	Piston Return Spring	1	115	Housing Stud Nut	2
54	3rd Clutch Shaft and Drum Assembly	1	116	Housing Stud Nut Lockwasher	2
55	3rd Clutch Shaft Front Bearing Locating Ring	1	117	Hi and Low Shift Rail Support	1
56	3rd Clutch Shaft Front Bearing	1	118	Range Shift Rail Housing Stud	2
57	3rd Clutch Shaft Front Bearing Retaining Ring	1	119	Output Shaft Front Bearing	1
58	3rd Clutch Shaft Piston Rings	2	120	Output Oil Seal	1
58A	Piston Ring Expander Springs	2	121	Output Flange	1
59	Piston Ring Outer Race	1	122	Flange "O" Ring	1
60	Outer Race Roll Pin	1	123	Flange Washer	1
61	Forward Shaft Piston Rings	3	124	Flange Nut	1
61A	Piston Ring Expander Springs	3	125 thru 149	Various Options	



**6 SPEED 18000 TRANSMISSION POWER FLOW
LOW RANGE**



**6 SPEED 18000 TRANSMISSION POWER FLOW
HIGH RANGE**



REFER TO R OR HR 3 SPEED
SECTIONS FOR
OTHER ASSEMBLY INSTRUCTIONS

18000 SERIES 6 SPEED

To be used in conjunction with the 18000 3 Speed Service information.

The 6-speed transmission has 3 working range shifts and 3 travel range shifts. Gear ratio determines working and travel ranges. They are as follows: 1st—2nd and 4th working ratio. 3rd—5th and 6th travel ratio.

NOTE: Range shift from low to high must be made with machine stopped.

DISASSEMBLY

Use the information in the 3-speed Long Drop section up to removing the low clutch rear bearing cap.



Figure 1

Remove low clutch rear bearing cap stud nuts and washers. Remove cap.

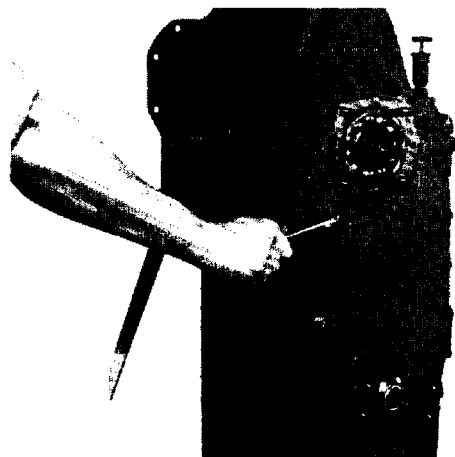


Figure 2

Remove idler shaft bearing cap stud nuts and washers.

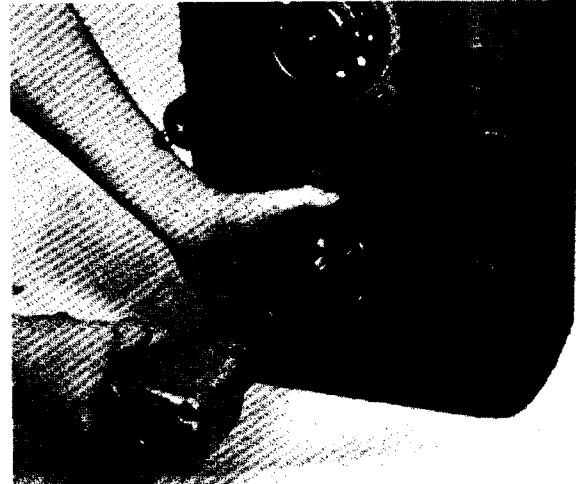


Figure 3

Using an impact wrench (if available), if not a flange retainer bar must be used to hold the companion flange from turning, loosen output flange nut.

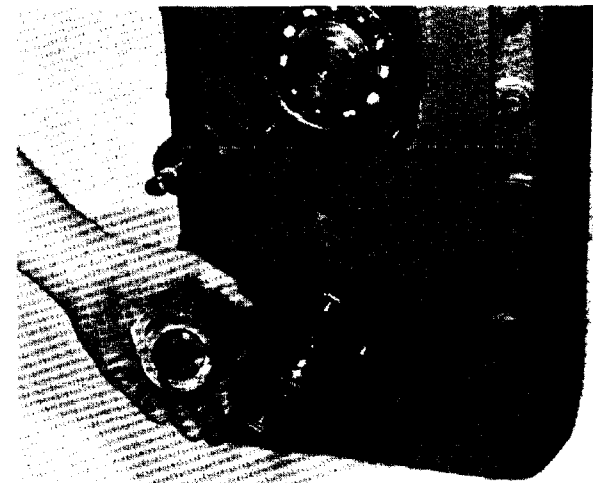


Figure 4

Remove flange nut, washer, "O" ring and flange. If a parking brake is used remove brake drum. Remove brake backing plate bolts and washers. Remove backing plate assembly.

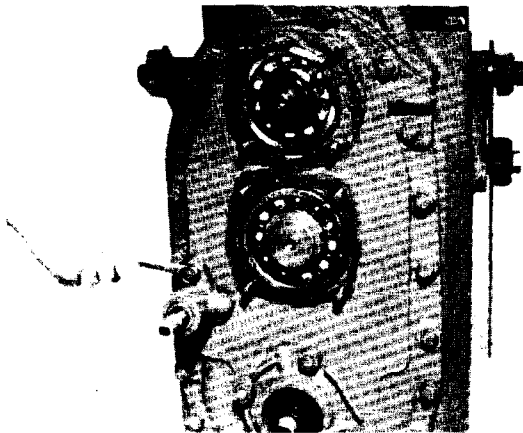


Figure 5
Remove range shift rail support stud nuts and washers.

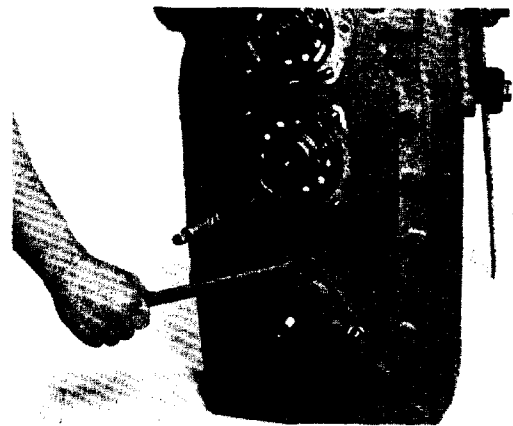


Figure 8
Remove output shaft bearing cap stud nuts and washers. Remove bearing cap.

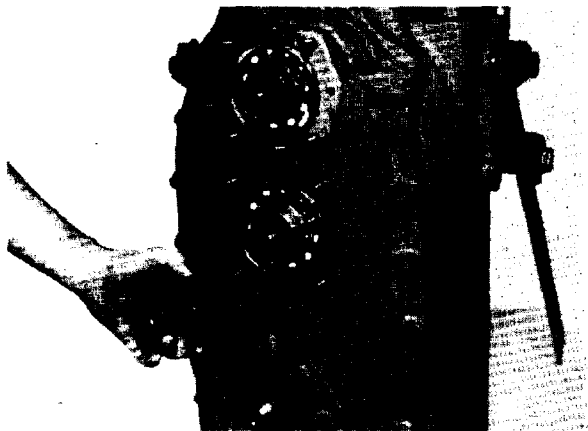


Figure 6
Slide rail support from rail. Use caution as not to lose shift rail detent ball.

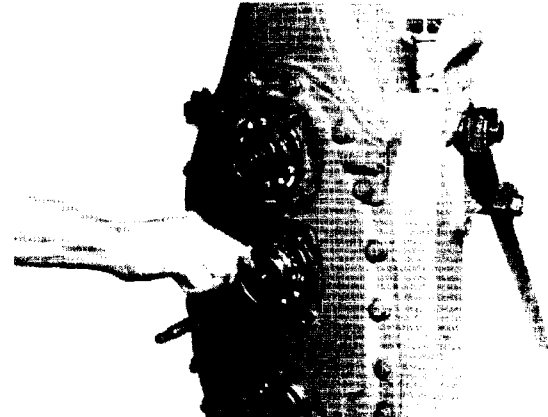


Figure 9
Remove low clutch, idler shaft and output shaft rear bearing locating rings.

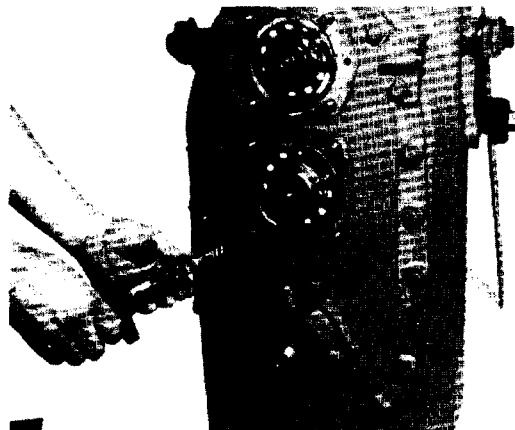


Figure 7
Support and detent ball removed.

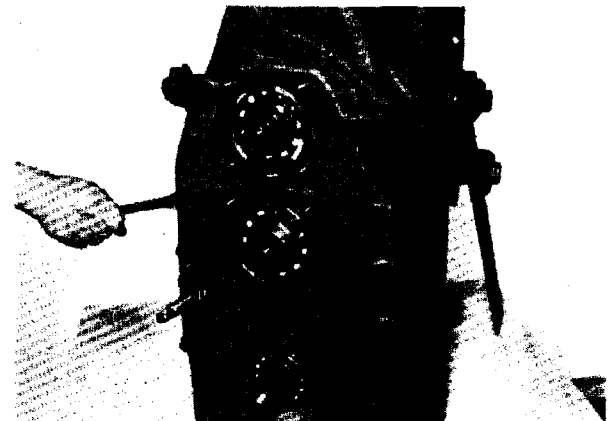


Figure 10
Remove rear cover bolts and washers.

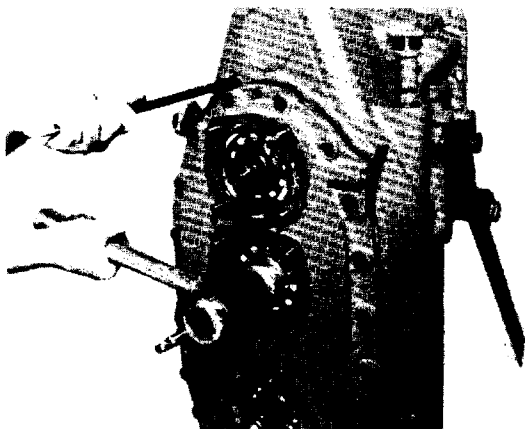


Figure 11

Using pry slots provided, pry cover from transmission housing. Using a soft hammer tap on low clutch, idler and output shafts to prevent cover from binding.

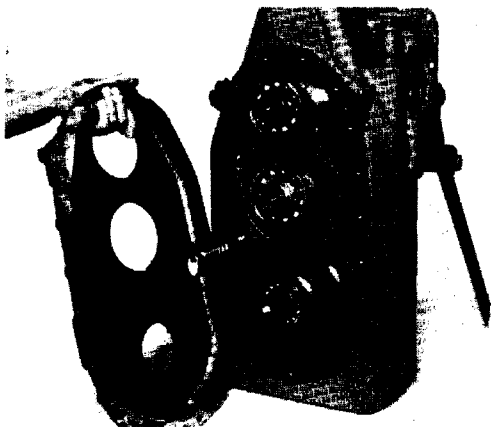


Figure 12

Rear cover removed.

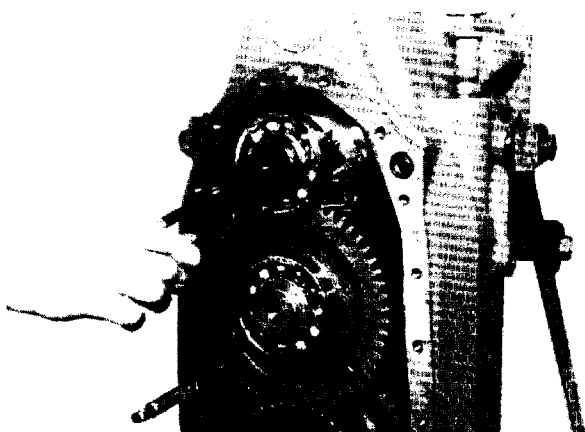


Figure 13

Remove low clutch rear bearing retainer ring.

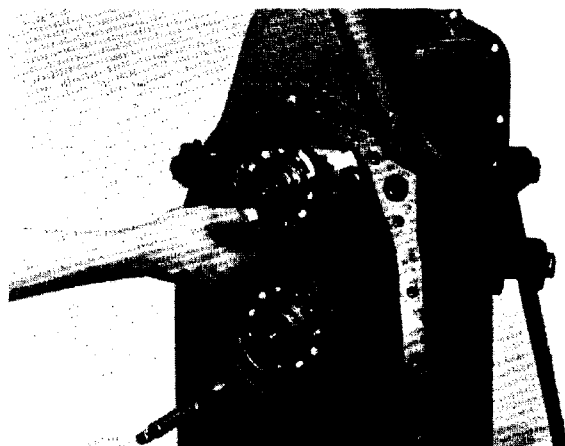


Figure 14

Remove bearing spacer.

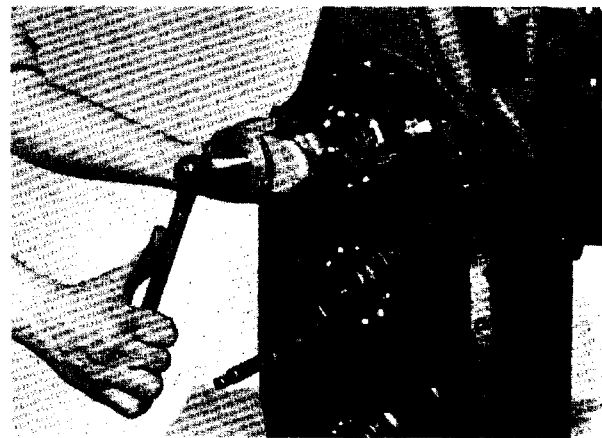


Figure 15

Remove low clutch rear bearing.



Figure 16

Remove idler shaft and gear assembly.

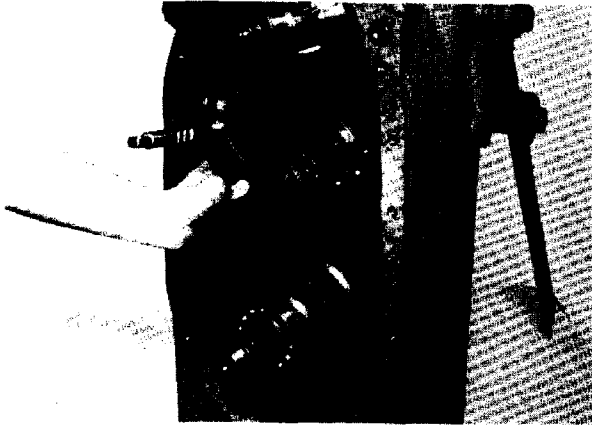


Figure 17
Remove range shift fork and rail from housing.

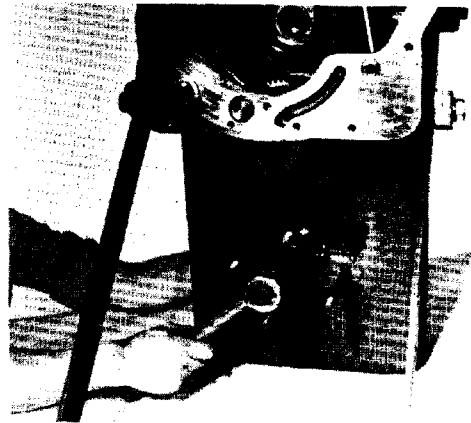


Figure 20
Tap output shaft to remove output shaft front bearing from bearing bore.

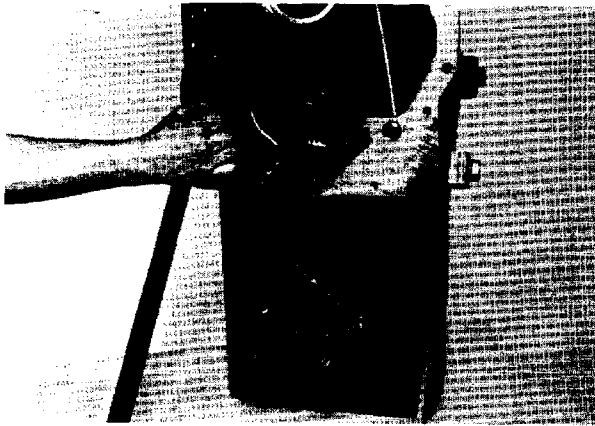


Figure 18
Remove axle disconnect stud nuts and washers.
NOTE: If disconnect is not used, remove output shaft front flange nut, washer, "O" ring and flange.

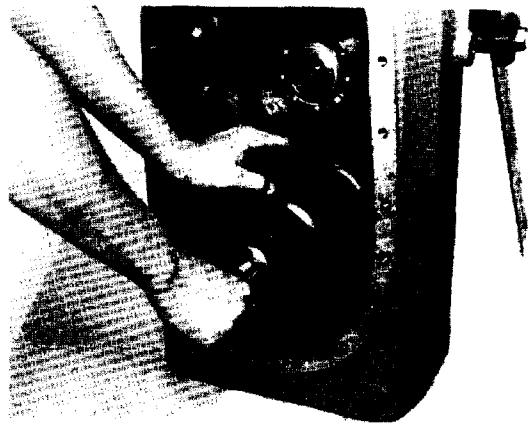


Figure 21
Remove output shaft assembly from housing.



Figure 19
Remove disconnect assembly from studs.

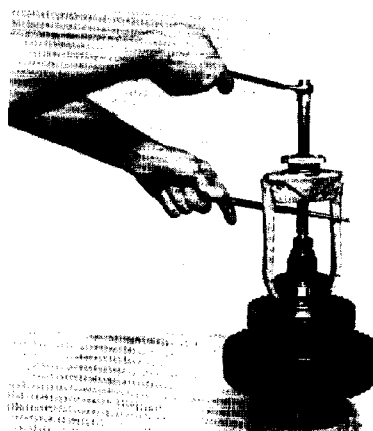


Figure 22
Remove output shaft rear bearing. Remove high range gear, bearings and shaft hub from shaft.

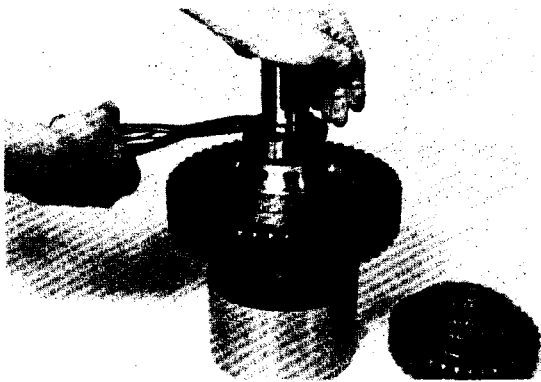


Figure 23

If unit has a disconnect, remove front bearing retainer ring.



Figure 24

Remove front bearing.

Refer to 3 speed long drop maintenance and service manual for cleaning and inspection of parts before reassembly.

REASSEMBLY

(See cleaning and inspection page)

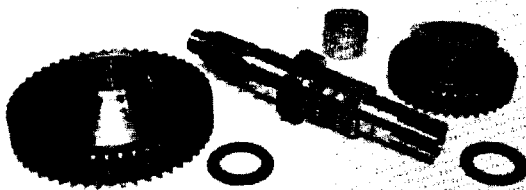


Figure 25

A bearing spacer is used in the output shaft low gear. Install inner needle bearing assembly, bearing spacer and outer bearing assembly.

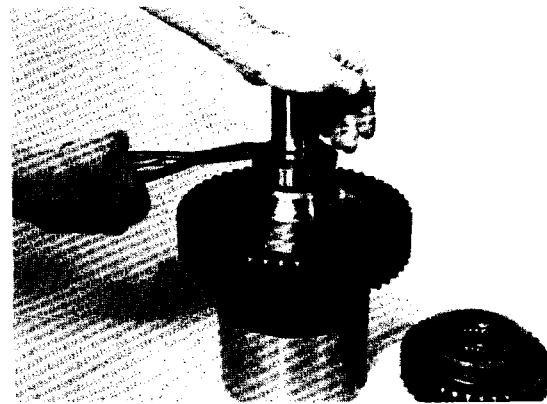


Figure 26

Position low gear on bearings and spacer. Use caution as not to damage bearings. **NOTE:** Long hub of gear up. Position thrust washer on shaft with bevel on washer up. Press front bearing on shaft. If disconnect is used install front bearing retainer ring.

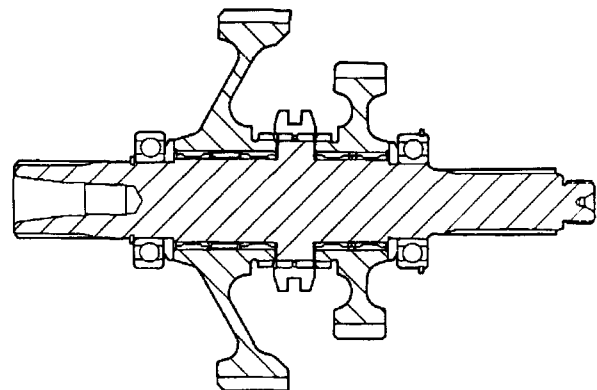


Figure 27

Cross section of output shaft showing stack up of parts.

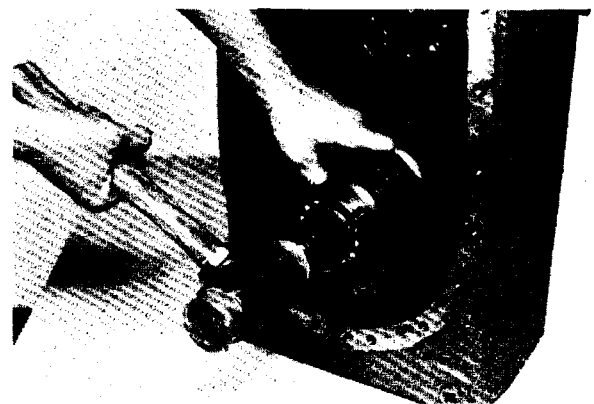


Figure 28

Install output shaft assembly in housing. Tap assembly into position.

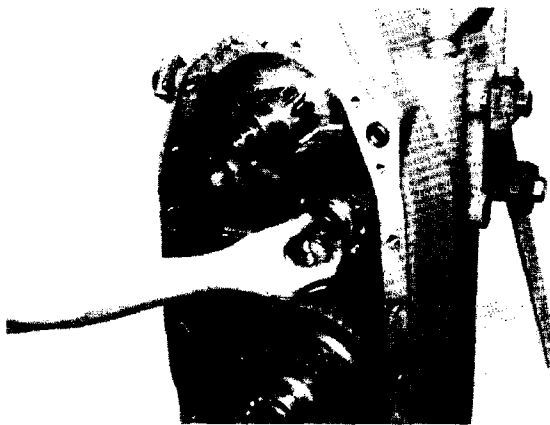


Figure 29

Insert idler shaft pilot bearing in 3rd speed clutch disc hub.

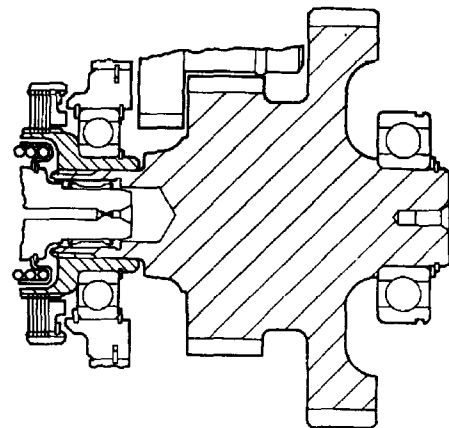


Figure 32

Cross section of idler shaft installed in 3rd speed clutch disc hub.

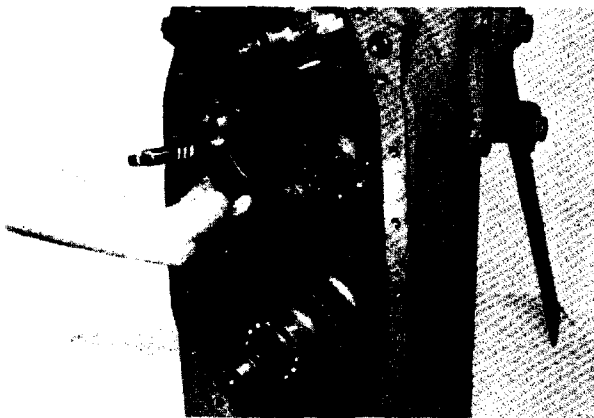


Figure 30

Position range shift fork and rail in range shift hub.

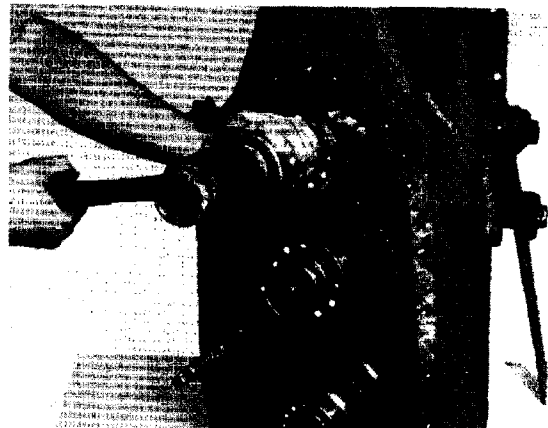


Figure 33

Install low clutch rear bearing.

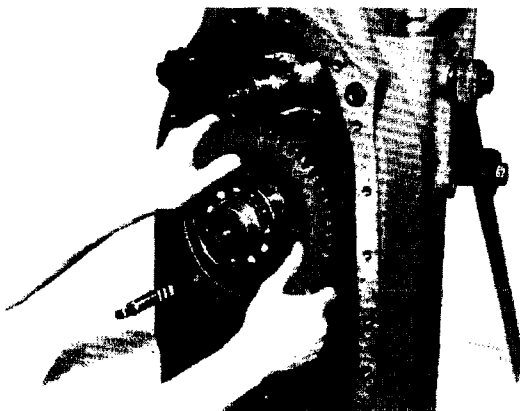


Figure 31

Install idler shaft and gear assembly in 3rd speed clutch disc hub by aligning splines on idler shaft with splines in clutch disc hub.

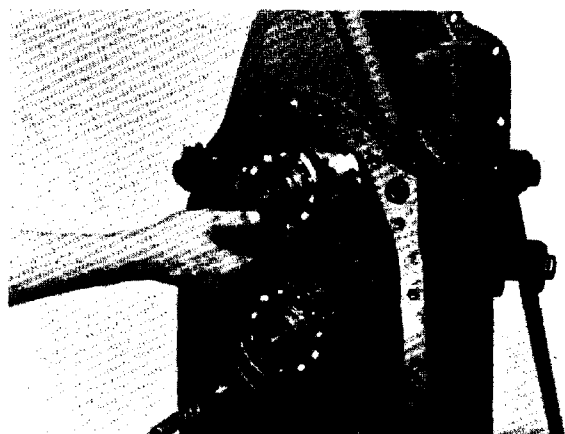


Figure 34

Install bearing spacer.

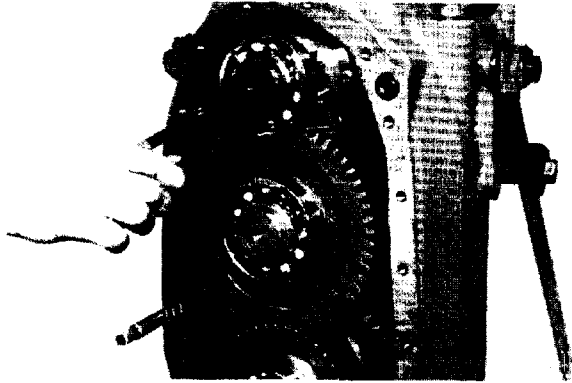


Figure 35
Install bearing retainer ring.

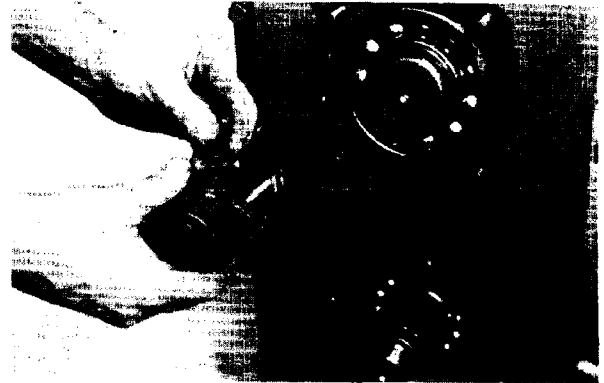


Figure 38
Position range shift rail support detent spring and ball in rail support.

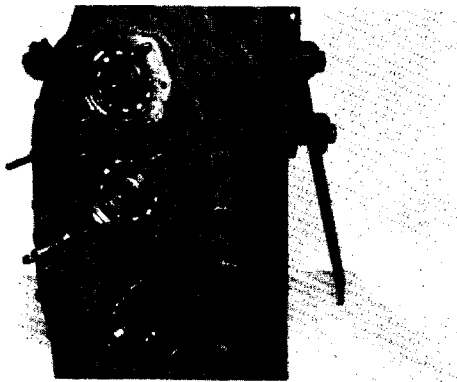


Figure 36
Position new gasket and "O" ring on rear of transmission housing. A thin coat of chassis grease will hold the gasket and "O" ring in place.
Install rear cover. Note two aligning studs to facilitate cover to housing assembly. Tap cover in place aligning shaft bearings with bearing bores. Remove studs and install cover bolts and lockwashers.

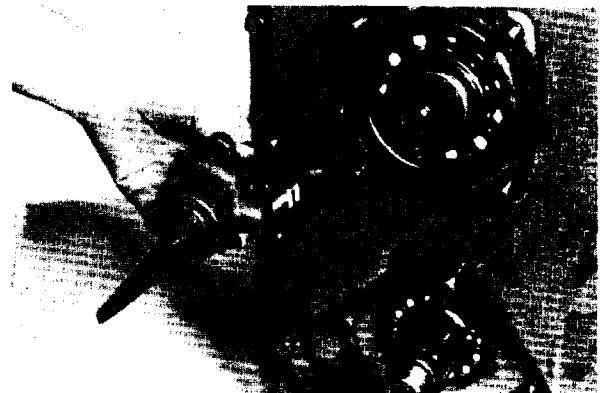


Figure 39
Detent ball and spring can be depressed with a blunt tool to hold in spring pocket until rail is in position. To facilitate assembly a taper rod was used to hold the detent spring and ball in position while installing support on shift rail.

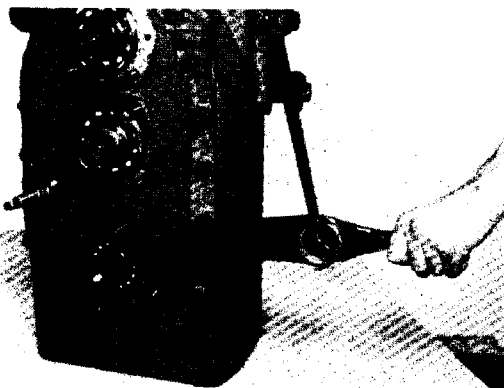


Figure 37
Tighten rear cover bolts 37 to 41 ft. lbs. torque [50,2-55,5 N.m.]



Figure 40
Install support washers and stud nuts. Tighten nuts 26 to 29 ft. lbs. torque [35,3 - 39,3 N.m.]

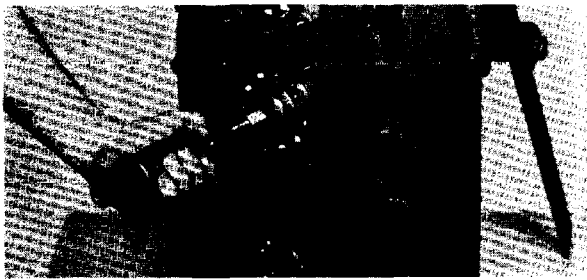


Figure 41

From the front of the transmission tap the low clutch and the output shaft to the rear far enough to install the rear bearing locating ring. On the idler shaft a hammer puller was made from a 3/8-24 threaded plug to pull the rear bearing to the rear far enough to install the locating ring.

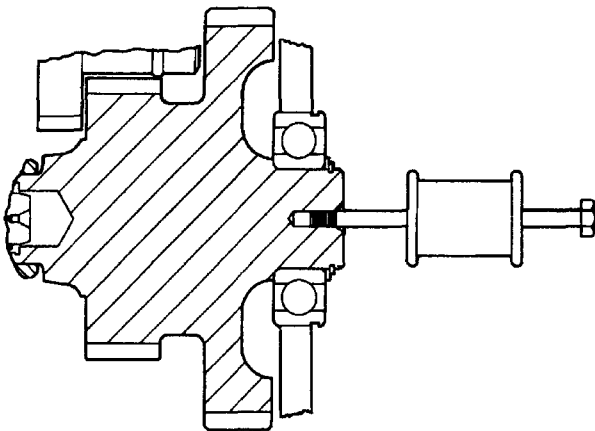


Figure 42

Cross section of hammer puller and idler shaft. Install low clutch, idler shaft and rear output shaft bearing locating rings.



Figure 43

Apply a light coat of Permatex No. 2 to the outer diameter of the output oil seal. Press seal in bearing cap with lip of seal toward bearing side of bearing cap. Position new "O" rings on bearing cap.

NOTE: Some units will have a gasket only between the cap and cover.

Install lockwashers and stud nuts. Tighten 91 to 100 ft. lbs. torque [123,4 - 135,5 N.m.]

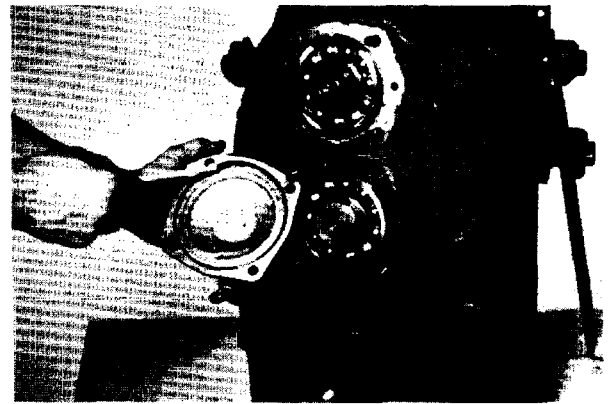


Figure 44

Position new "O" ring on idler shaft bearing cap. Install cap on studs and secure with lockwashers and nuts.

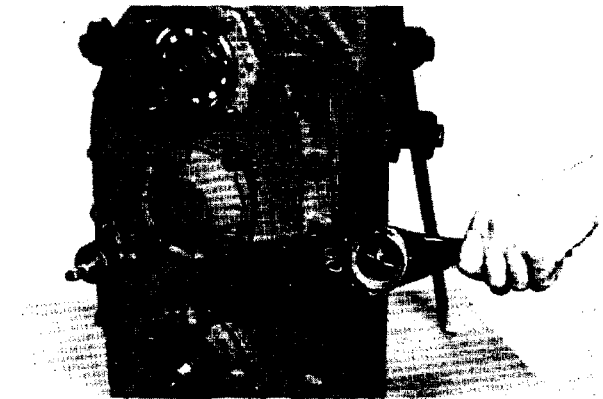


Figure 45

Tighten idler shaft bearing cap stud nuts 41 to 45 ft. lbs. torque [55,6 - 61,0 N.m.]



Figure 46

Install new low clutch oil sealing ring. **NOTE:** Sealing ring must be sized before installing bearing cap. Sizing can be done by using a round rod as shown and forcing ring into groove and back to original size.

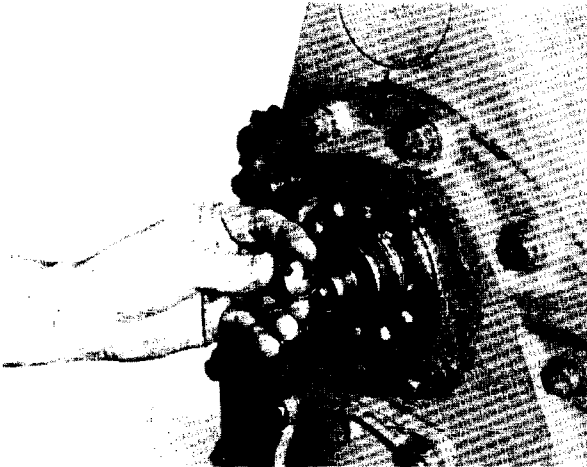


Figure 47

To facilitate bearing cap assembly a sizing tool can be made for ease of sizing oil sealing ring. See Figure 48.

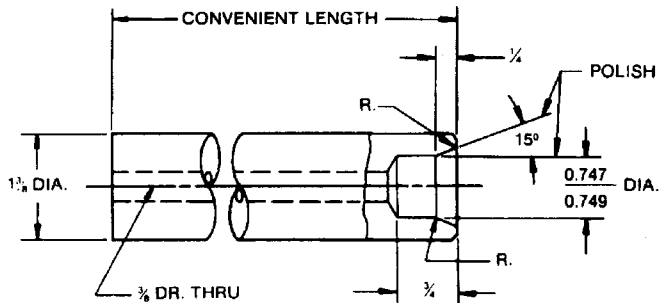


Figure 48

Low shaft oil sealing ring sizing tool.

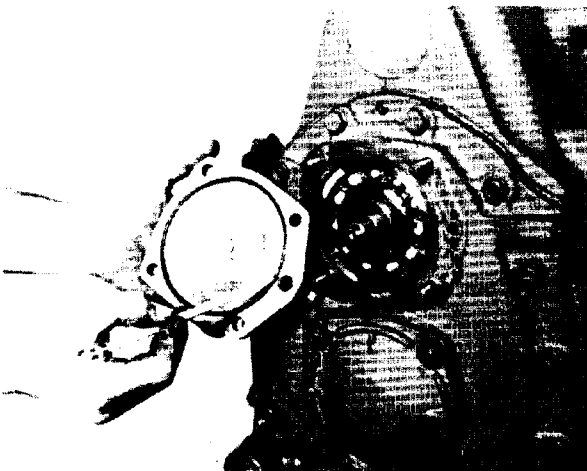


Figure 49

Install new bearing cap and low clutch pressure port "O" rings on low shaft bearing cap. Position bearing cap on low shaft. Install washers and stud nuts.

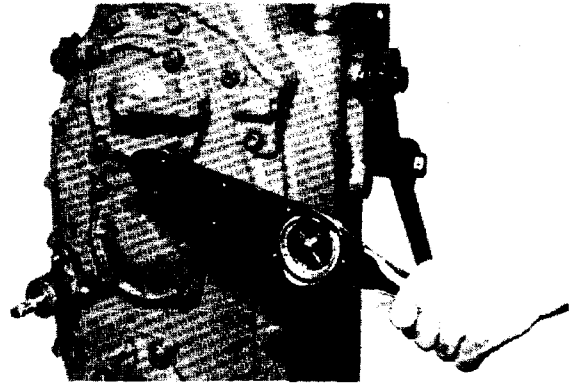


Figure 50

Tighten stud nuts 41 to 45 ft. lbs. torque [55,6 - 61,0 N.m.]

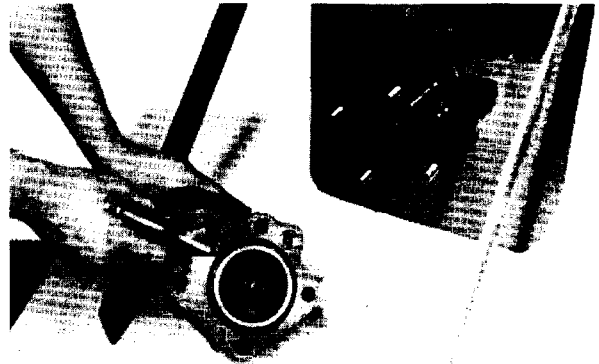


Figure 51

Position new "O" ring on disconnect housing. Install disconnect assembly on studs.

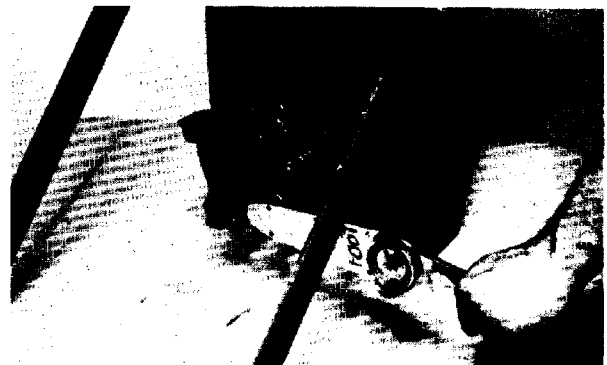


Figure 52

Install washers and stud nuts. Tighten 64 to 70 ft. lbs. torque [86,8-94,9 N.m.] Install rear output flange, "O" ring, washer and flange nut. Block flange to prevent turning. Tighten flange nut 200 to 250 ft. lbs. torque [271,1-338,9 N.m.]

Refer to 3 Speed Long Drop 18000 service information for further reassembly.

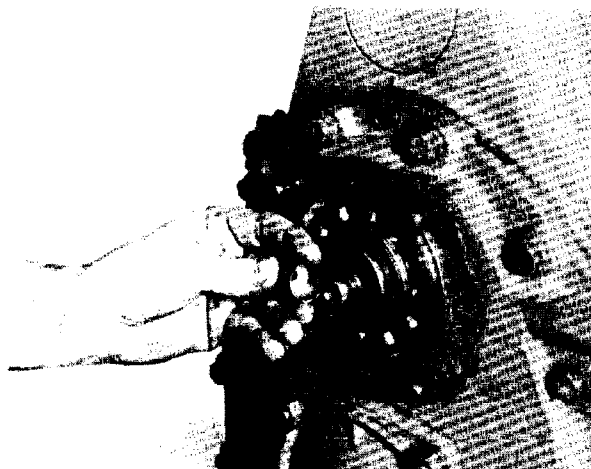


Figure 47

To facilitate bearing cap assembly a sizing tool can be made for ease of sizing oil sealing ring. See Figure 48.

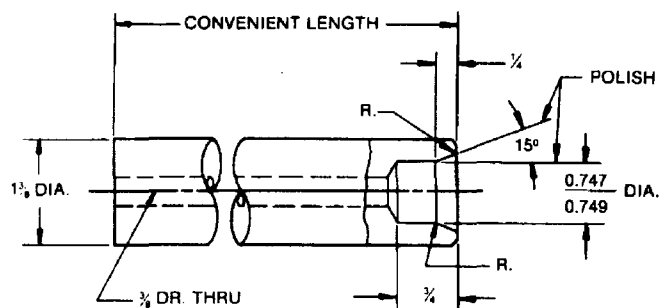


Figure 48

Low shaft oil sealing ring sizing tool.

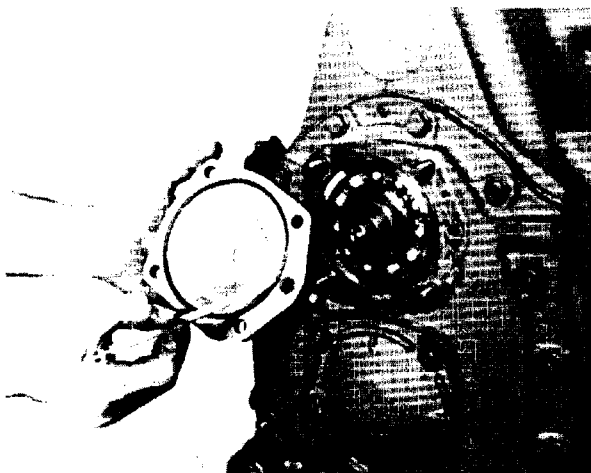


Figure 49

Install new bearing cap and low clutch pressure port "O" rings on low shaft bearing cap. Position bearing cap on low shaft. Install washers and stud nuts.

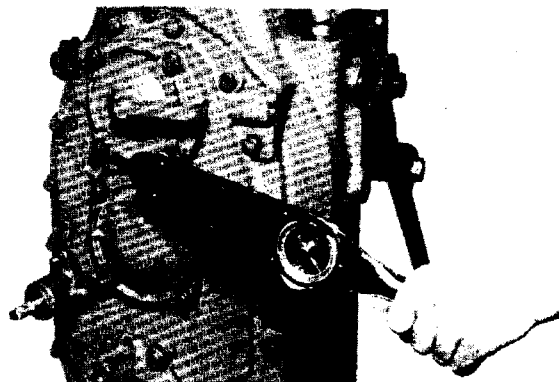


Figure 50

Tighten stud nuts 41 to 45 ft. lbs. torque [55,6 - 61,0 N.m.]

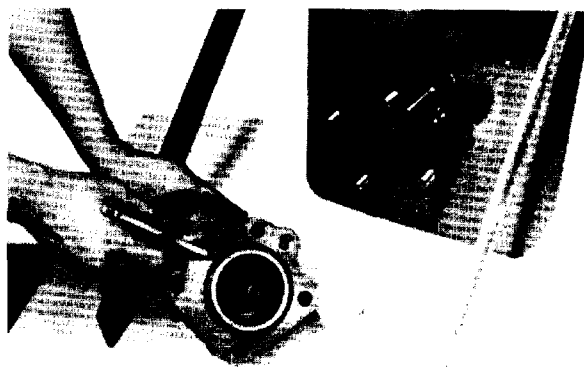


Figure 51

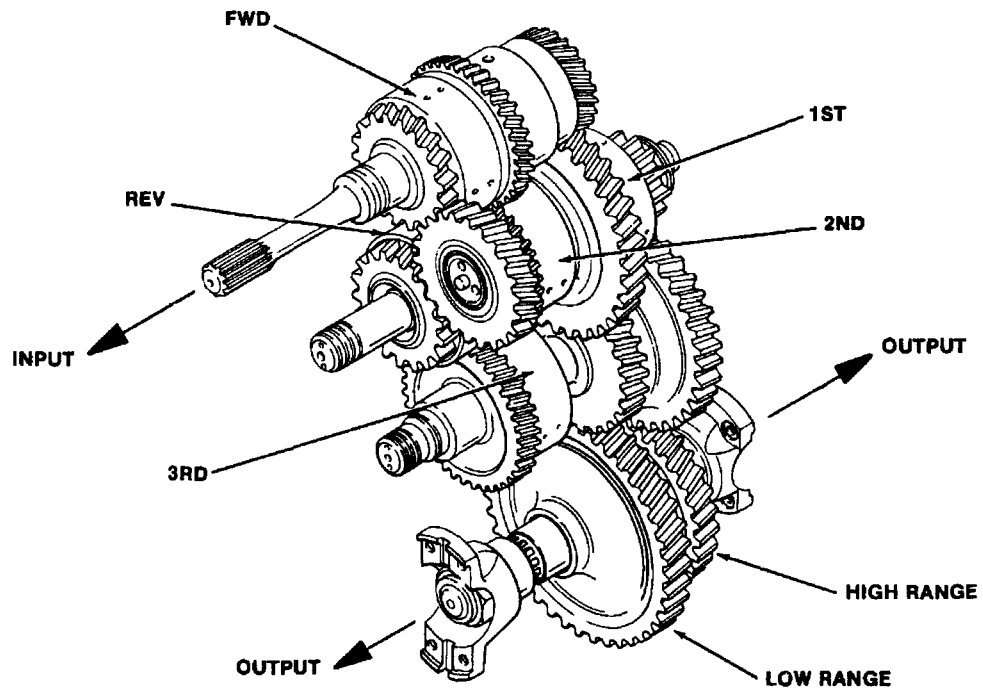
Position new "O" ring on disconnect housing. Install disconnect assembly on studs.



Figure 52

Install washers and stud nuts. Tighten 64 to 70 ft. lbs. torque [86,8-94,9 N.m.] Install rear output flange, "O" ring, washer and flange nut. Block flange to prevent turning. Tighten flange nut 200 to 250 ft. lbs. torque [271,1-338,9 N.m.]

Refer to 3 Speed Long Drop 18000 service information for further reassembly.

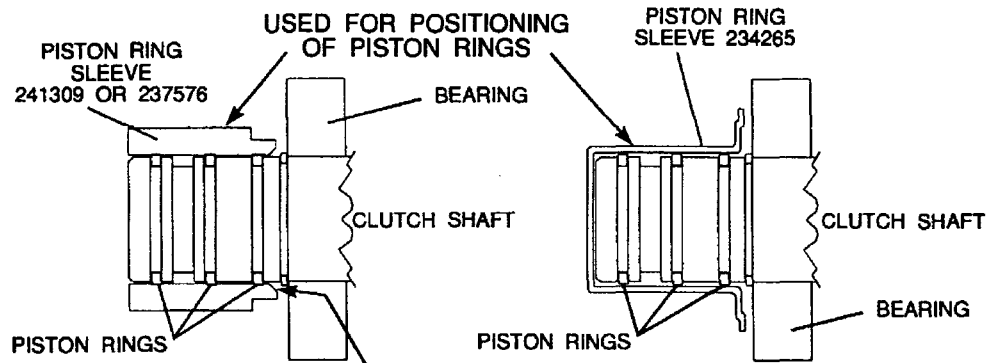


**18000 SERIES 6 SPEED LONG DROP
CLUTCH AND GEAR ARRANGEMENT**

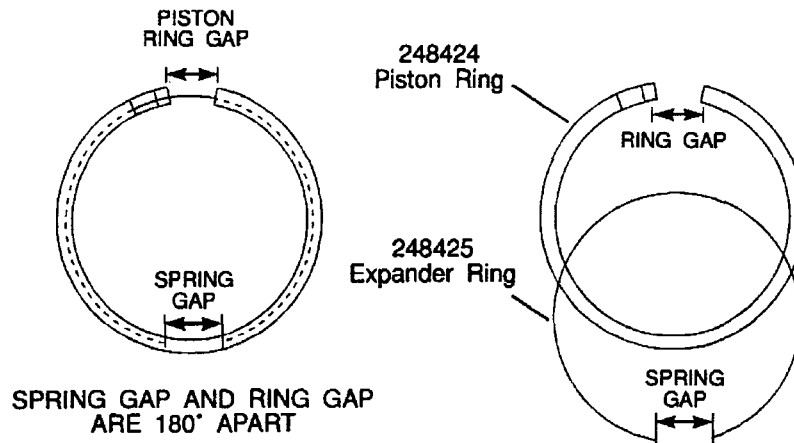
CLUTCH SHAFT OIL SEALING RING (PISTON RING) INSTALLATION

NOTE: NOT ALL UNITS 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 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 grooves. Use extreme caution to not damage piston rings when installing the clutch shaft in the front transmission 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.



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

NOTES

[illegible]

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