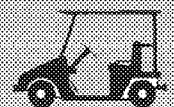
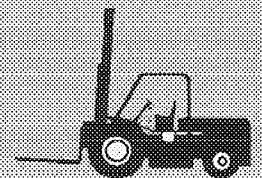
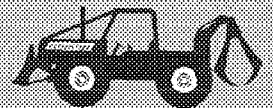
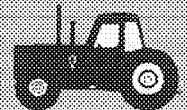
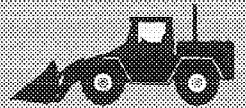
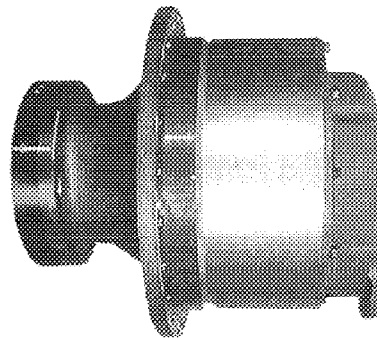
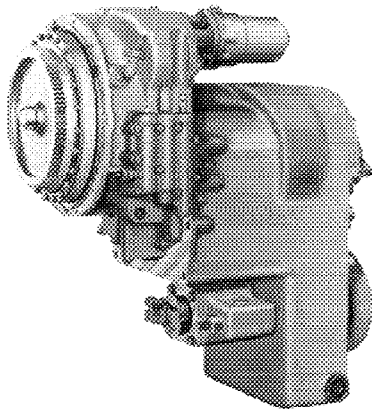
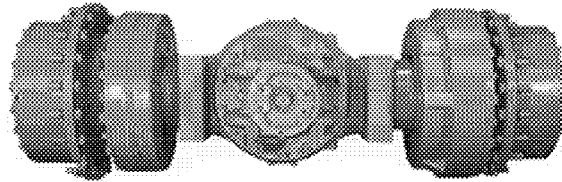
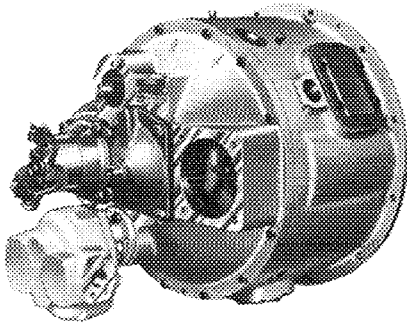
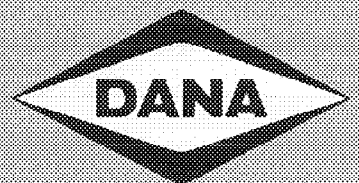


Maintenance/Service Manual
Model C2000
Torque Converter



SPICER OFF-HIGHWAY 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 torque converter portion of the power train enacts an important role in delivering engine power to the driving wheels. In order to properly maintain and service these units it is important to first understand their function and how they operate.

The torque converter and transmission function together and operate through a common hydraulic system. To obtain maximum serviceability they have been designed and built as separate units. It is necessary, however, to consider both units in the study of their function and operation.

To supplement the text herein, and for reference use therewith, the following illustrations are provided.

- Fig. A — Torque Converter Assembly — Cross Section
- Fig. B — Internal Oil Flow — Torque Converter
- Fig. C — Torque Converter Assembly — Exploded View
- Fig. D — Assembly Instructions

The torque converter is composed of four members: The impeller which is the driving member, the drive disc or impeller cover, the turbine, which is the driven member and the reaction member. The reaction member option is splined to the converter support and does not rotate in either direction or can be free wheeling, depending on the application. The impeller and drive disc form the outer shell. The turbine runs within the outer shell and is connected to the output shaft. The oil is the only connection between the turbine and impeller member.

Three pump drive gears are bearing mounted in the converter housing and meshed with a gear on the impeller hub. With the engine running the pump drive gears rotate at engine speed. The pumps are externally mounted on the converter housing and are connected to the pump shafts by a pump drive sleeve.

With the engine running, the converter charging pump draws oil from the transmission sump and directs it through oil filters to the pressure regulating valve located on top of the converter. From the regulating valve it is then directed to the transmission clutches and into the converter.

The pressure regulating valve remains closed until required pressure is delivered to the transmission for actuating the direction and speed clutches. This regulator valve consists of a hardened valve spool operating in a closely fitted bore. The valve spool is backed up by a spring to hold the valve spool against its seat until the oil pressure overrides the spring force. The valve spool moves toward the spring until a port is exposed in the side of the bore. The oil can flow through this port into a distributor which directs the oil through a passage into the converter.

After entering the converter, the oil is directed into the converter support through the impeller bearing and to the converter cavity.

Three members of the torque converter are composed of a series of blades. The blades are curved in such a manner as to force the oil to circulate from the impeller to the turbine, through the reaction member and again into the impeller. This circulation causes the turbine to turn in the same direction as the impeller. Oil enters the inner diameter of the impeller and exits from the outer diameter into the outer diameter of the turbine, then exits from the inner diameter of the turbine and through the reaction member. The oil again enters the inner diameter of the impeller.

The oil exits between the turbine shaft and reaction member support and through an oil distributor which directs the oil out of the converter, and to the oil cooler. After leaving the cooler the oil is directed to the lubricating oil inlet on the transmission and through a series of tubes to the transmission bearings, and clutches. The oil is internally returned to the transmission sump.

The converter lube and leakage oil is returned to the transmission sump by a flexible hose installed in the lowest pipe tap hole in the converter housing. This line must have a continuous drop to allow by gravity flow, leakage oil to return to the transmission sump.

A safety valve is built in the pressure regulating valve and will open to bypass oil only if an excessive pressure is built up due to a blocked passage.

With the engine operating at any speed and the turbine and output shafts stationary, the converter is in a "stall" condition. Full power or wide open throttle "stalls" for more than 30 seconds at a time will generate excessive heat and may cause converter or transmission seal damage.

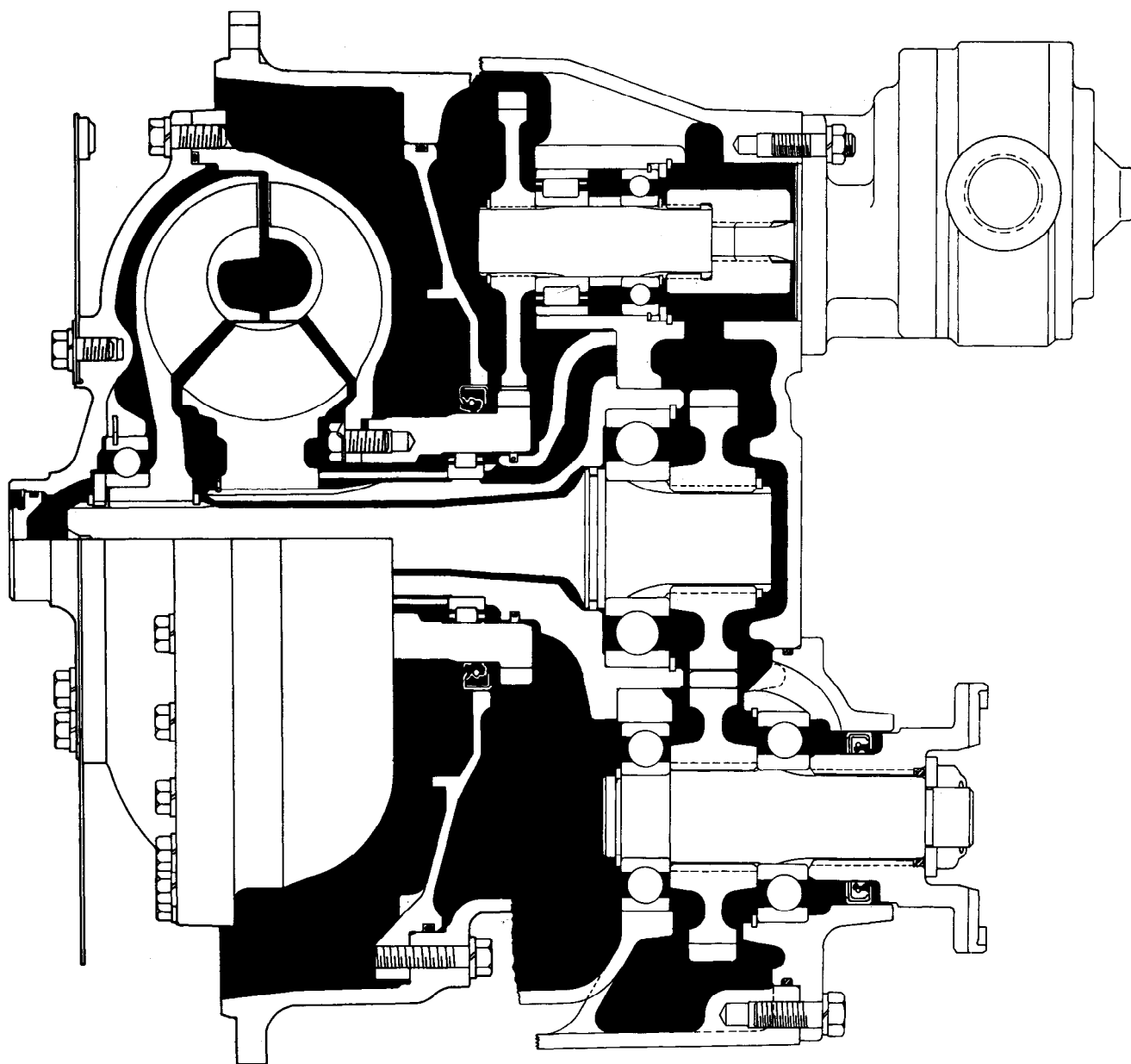


FIG. A — Torque Converter Assembly — Cross Section

C2000 SERIES CONVERTER OIL FLOW DIAGRAM

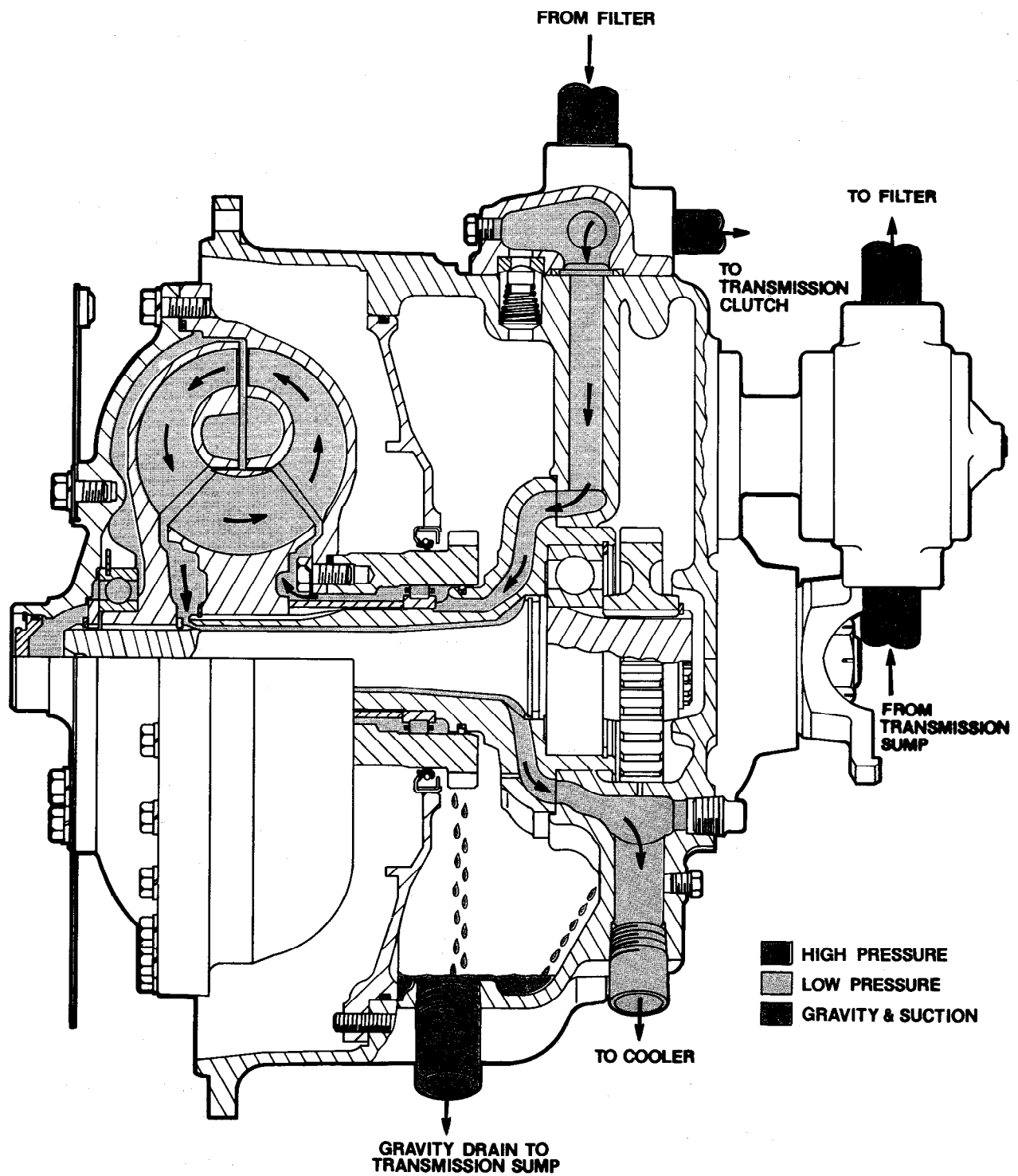
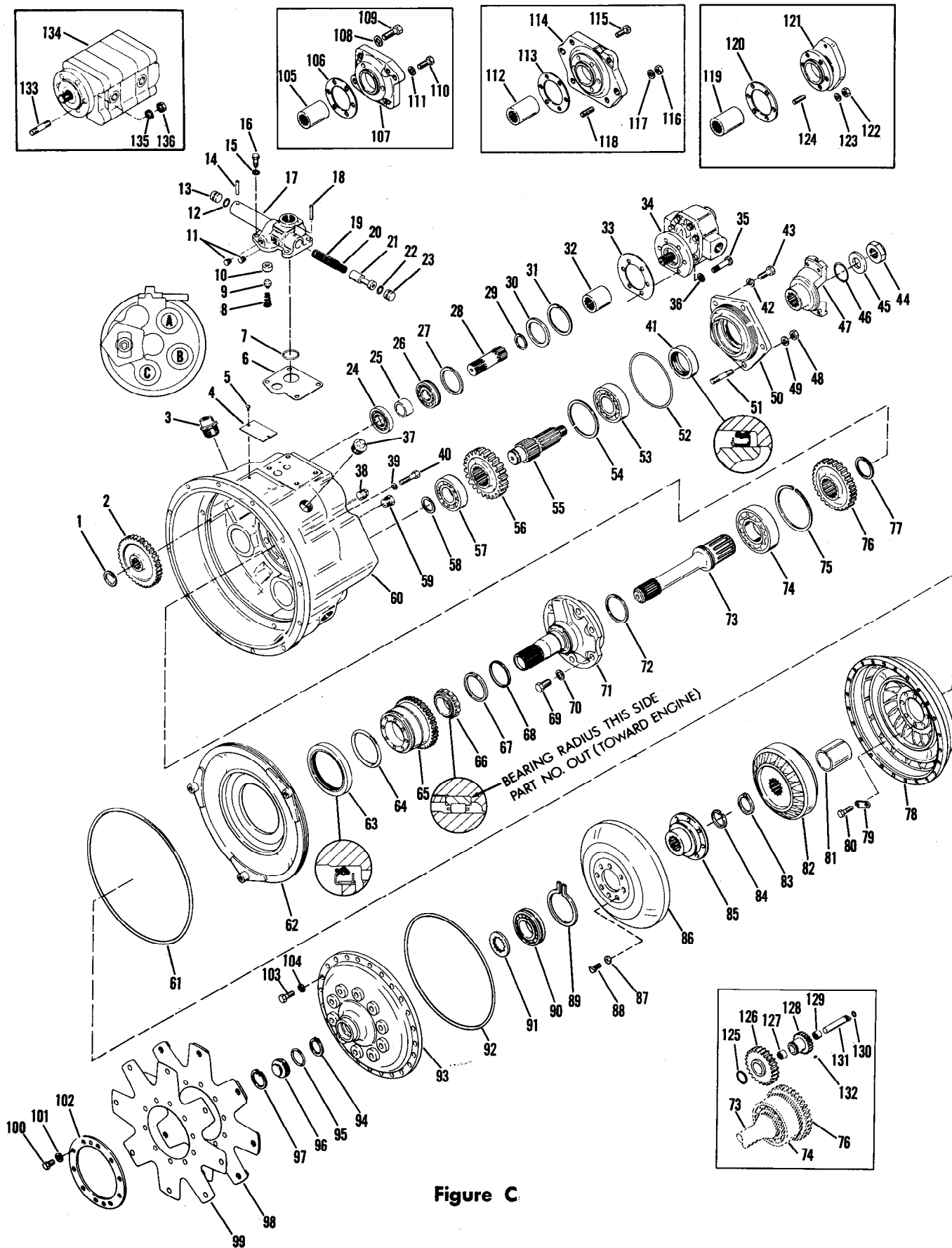
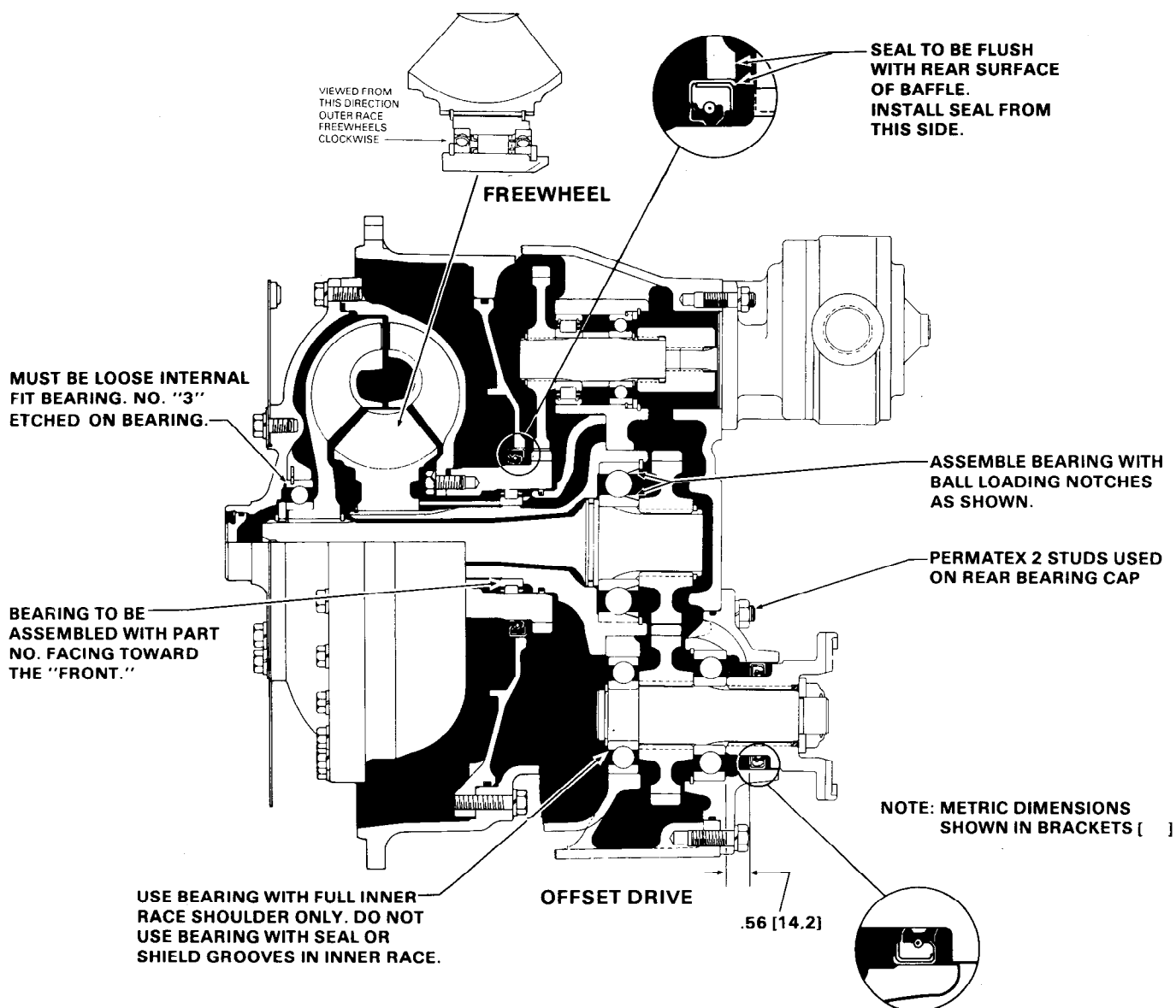


Figure B



C2000 CONVERTER WITH OFFSET OUTPUT

ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY
1	Pump Gear Snap Ring	3	54	Rear Bearing Retainer Ring	1
2	Pump Drive Gear	3	55	Output Shaft	1
3	Breather	1	56	Output Shaft Gear	1
4	Name Plate	1	57	Output Shaft Front Bearing	1
5	Name Plate Screw	2	58	Front Bearing Retainer Ring	1
6	Pressure Regulating Valve to Housing		59	Converter Out Pressure Port	1
	Gasket	1	60	Converter Housing	1
7	Valve to Housing "O" Ring	1	61	Oil Baffle "O" Ring	1
8	Safety Valve Spring	1	62	Oil Baffle	1
9	Safety Valve Plunger	1	63	Oil Baffle Oil Seal	1
10	Safety Valve Seat	1	64	Impeller Hub "O" Ring	1
11	Pressure Port Pipe Plugs	2	65	Impeller Hub Gear	1
12	Valve Stop "O" Ring	1	66	Impeller Hub Gear Bearing	1
13	Valve Stop	1	67	Support Oil Sealing Ring	1
14	Roll Pin	1	68	Sealing Ring Expander Spring	1
15	Regulating Valve to Housing Screw		69	Support Screw	6
	Lockwasher	4	70	Support Screw Lockwasher	6
16	Regulating Valve to Housing Screw	4	71	Reaction Member Support	1
17	Regulating Valve Assembly	1	72	Turbine Shaft Oil Sealing Ring	1
18	Roll Pin	1	73	Turbine Shaft	1
19	Regulating Valve Spring (Outer)	1	74	Turbine Shaft Bearing	1
20	Regulating Valve Spring (Inner)	1	75	Bearing Retainer Ring	1
21	Regulating Valve Piston	1	76	Turbine Shaft Gear	1
22	Valve Stop "O" Ring	1	77	Gear Retainer Ring	1
23	Valve Stop	1	78	Impeller	1
24	Pump Drive Front Bearing	3	79	Impeller to Hub Screw Lock Tab	4
25	Pump Shaft Spacer	3	80	Impeller to Hub Screw	8
26	Pump Drive Rear Bearing	3	81	Reaction Member Spacer	1
27	Rear Bearing Locating Ring	3	82	Reaction Member	1
28	Pump Drive Shaft	3	83	Reaction Member Retainer Ring	1
29	Rear Bearing Retainer Ring	3	84	Turbine Locating Ring	1
30	Pump Shaft Retaining Washer	3	85	Turbine Hub	1
31	Pump Shaft Retaining Ring	3	86	Turbine	1
32	Pump Drive Sleeve Assembly	1	87	Turbine to Hub Screw Washer	12
33	Pump Gasket	1	88	Turbine to Hub Screw	12
34	Charging Pump	1	89	Turbine Hub Bearing Locating Ring	1
35	Pump Mounting Screw	3	90	Turbine Hub Bearing	1
36	Pump Mounting Screw Lockwasher	3	91	Bearing Retainer Washer	1
37	Pipe Plug	3	92	Impeller Cover "O" Ring	1
38	Converter "Out" Temperature Port	1	93	Impeller Cover	1
39	Oil Baffle Screw Lockwasher	3	94	Turbine Retaining Ring	1
40	Oil Baffle Screw	3	95	Bore Plug "O" Ring	1
41	Output Shaft Oil Seal	1	96	Impeller Cover Bore Plug	1
42	Output Bearing Retainer Lockwasher	3	97	Bore Plug Retaining Ring	1
43	Output Bearing Retainer Screw	3	98	Flexplate Assembly	1
44	Output Flange Nut	1	99	Flexplate	1
45	Output Flange Washer	1	100	Flexplate Mounting Screw	10
46	Flange Washer "O" Ring	1	101	Flexplate Mounting Screw Lockwasher	10
47	Output Flange	1	102	Backing Ring	1
48	Bearing Retainer Stud Nut	2	103	Impeller Cover to Impeller Screw	24
49	Bearing Retainer Stud Nut Lockwasher	2	104	Impeller Cover to Impeller Screw	
50	Output Bearing Retainer	1		Lockwasher	24
51	Output Bearing Retainer Stud	2			
52	Output Bearing Retainer "O" Ring	1			
53	Output Shaft Rear Bearing	1			
			105 thru 136	are various options	





Grade 5 				Torque Specification for Lubricated or Plated Screw Threads				Grade 8 				
NOM. SIZE	FINE THREAD		COARSE THREAD		FINE THREAD		COARSE THREAD		FINE THREAD		COARSE THREAD	
	LB-FT	[N·M]	LB-FT	[N·M]	LB-FT	[N·M]	LB-FT	[N·M]	LB-FT	[N·M]	LB-FT	[N·M]
.5625	91 - 100	[123.4 - 135.5]	82 - 90	[111.2 - 122.0]	128 - 141	[173.6 - 191.1]	115 - 127	[156.0 - 172.2]				
.5000	64 - 70	[86.8 - 94.9]	57 - 63	[77.3 - 85.4]	90 - 99	[122.1 - 134.2]	80 - 88	[108.5 - 119.3]				
.4375	41 - 45	[55.6 - 61.0]	37 - 41	[50.2 - 55.5]	58 - 64	[78.7 - 86.7]	52 - 57	[70.6 - 77.2]				
.3750	26 - 29	[35.3 - 39.3]	23 - 25	[31.2 - 33.8]	37 - 41	[50.2 - 55.5]	33 - 36	[44.8 - 48.8]				
.3125	16 - 20	[21.7 - 27.1]	12 - 16	[16.3 - 21.6]	28 - 32	[38.0 - 43.3]	26 - 30	[35.3 - 40.6]				
.2500	9 - 11	[12.3 - 14.9]	8 - 10	[10.9 - 13.5]	11 - 13	[15.0 - 17.6]	9 - 11	[12.3 - 14.9]				

Figure D

OVERHAUL INSTRUCTIONS FOR TORQUE CONVERTER

The following instructions will cover the disassembly and reassembly of the torque converter in a sequence that would normally be followed after the unit is removed from the machine and is to be completely overhauled.

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

DISASSEMBLY OF THE TORQUE CONVERTER

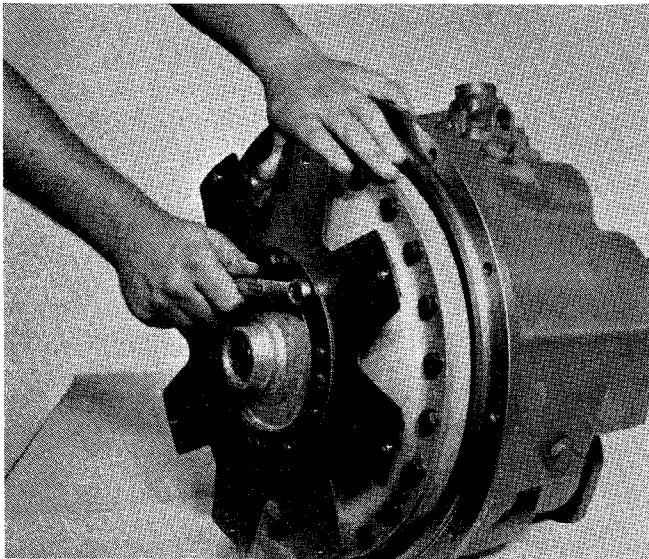


Figure 1

Remove flexplate mounting screws and washers.

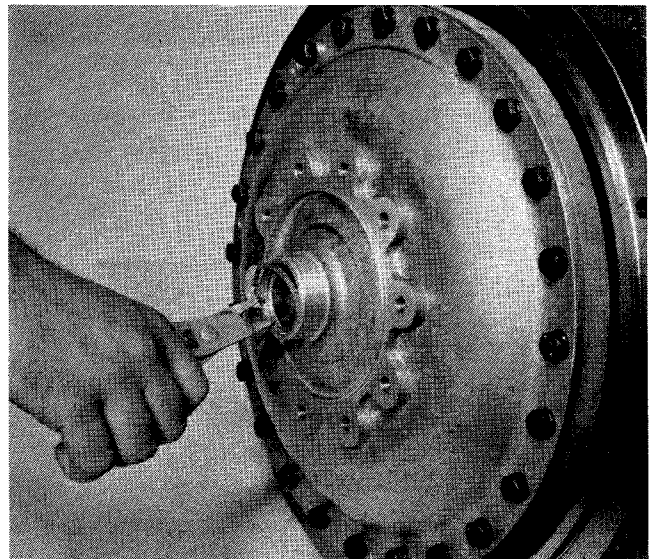


Figure 3

Remove impeller cover bore plug retainer ring.

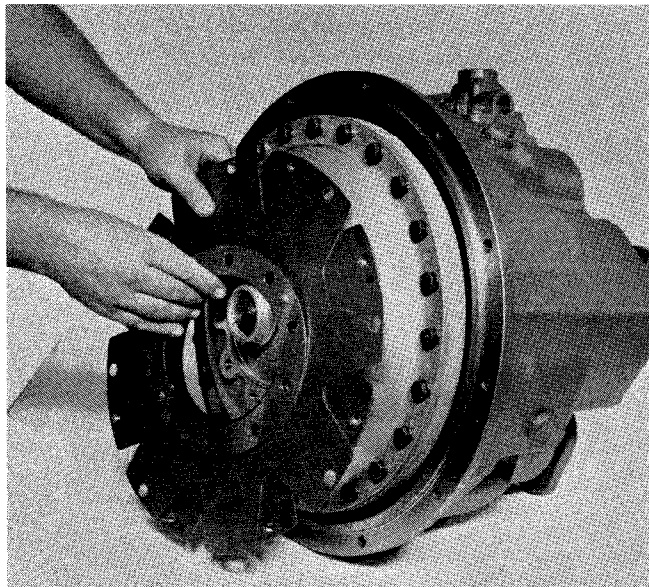


Figure 2

Remove flexplate and backing ring.

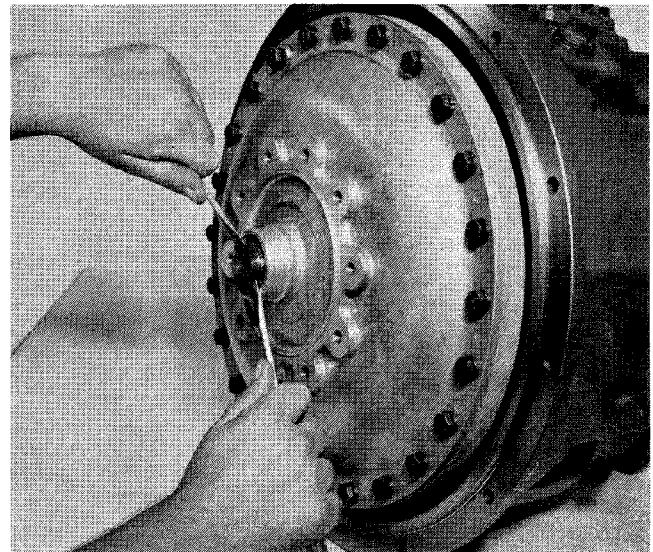


Figure 4

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

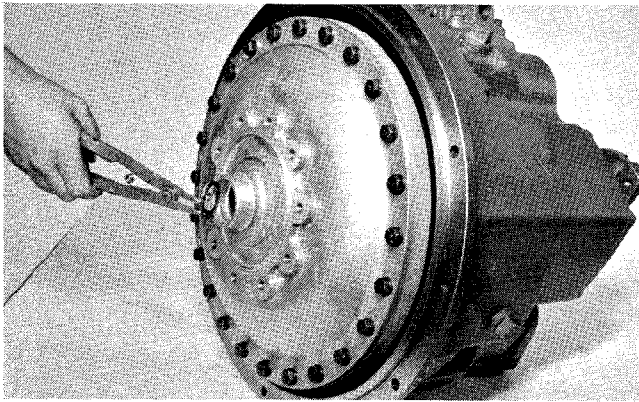


Figure 5

Through bore plug hole, remove turbine retaining ring. See Figure 6.

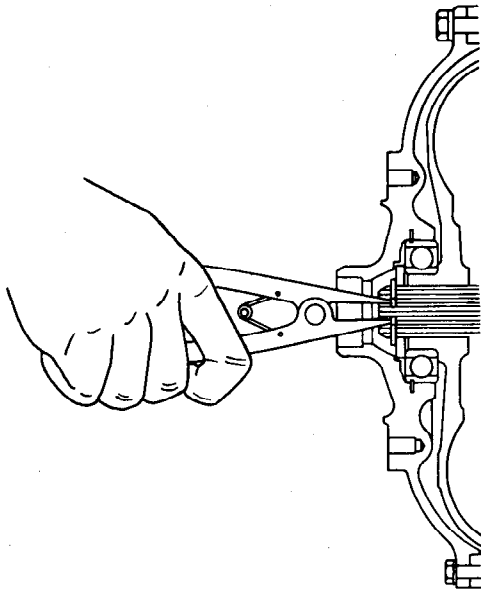


Figure 6

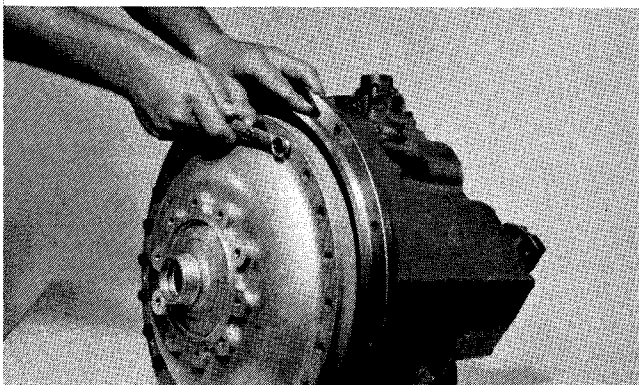


Figure 7

Remove impeller cover to impeller bolts

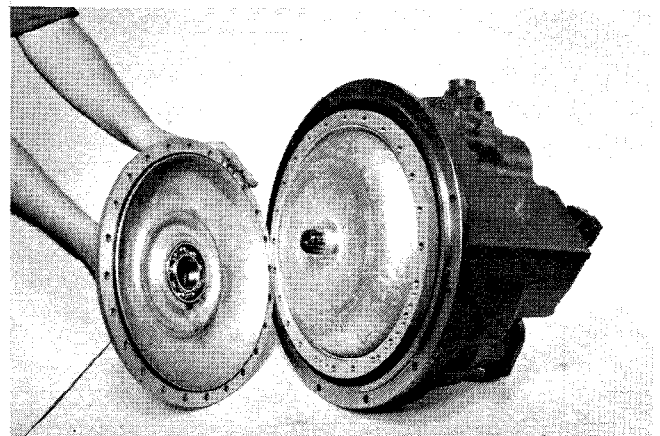


Figure 8

Remove impeller cover and bearing assembly. Remove turbine.

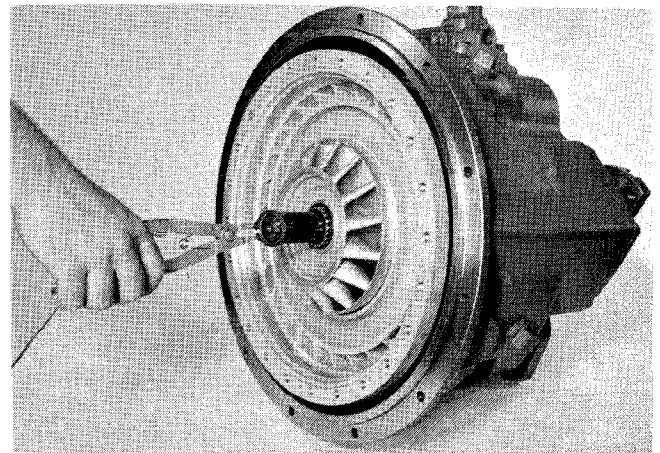


Figure 9

Remove turbine locating ring.

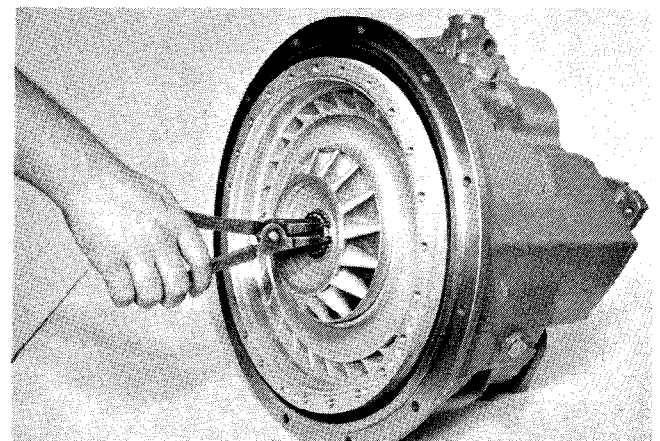


Figure 10

Remove reaction member retainer ring.

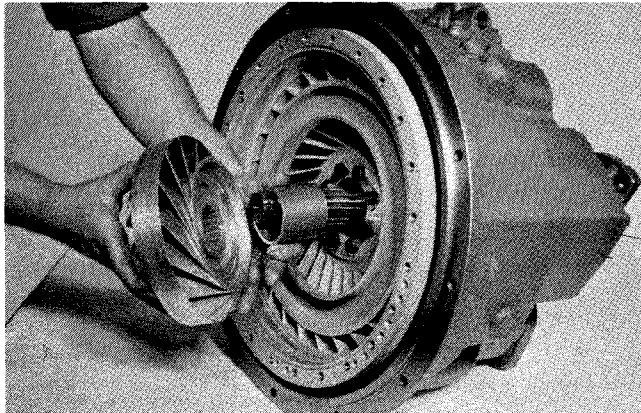


Figure 11

Remove reaction member and spacer. If reaction member is free wheeling remove as an assembly. (See Fig. 42 for freewheel disassembly).

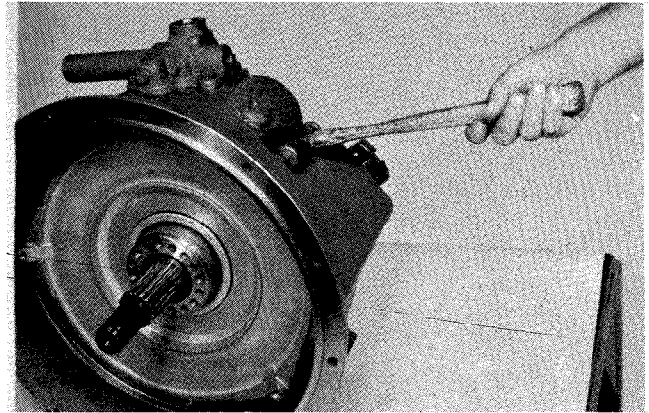


Figure 14

Loosen oil baffle bolts (qty. 3). Tap lightly on each bolt. This will loosen oil baffle from converter housing.

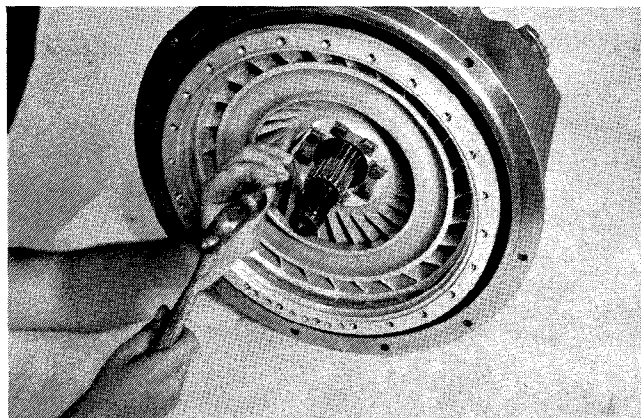


Figure 12

Straighten corner of impeller to hub screw lock tabs. Remove impeller hub bolts and lock tabs.

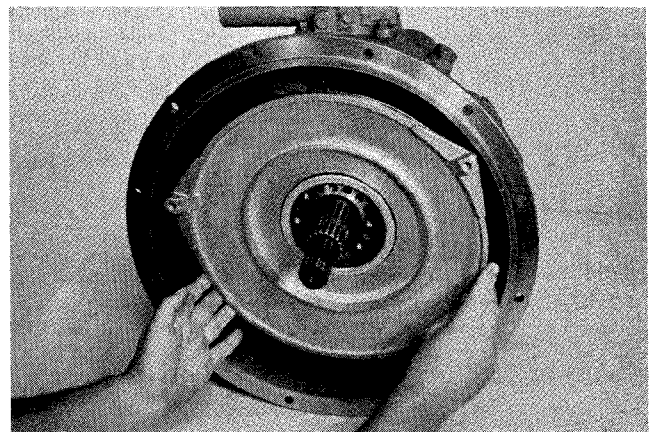


Figure 15

When baffle is loose remove baffle bolts. Remove oil baffle from housing.

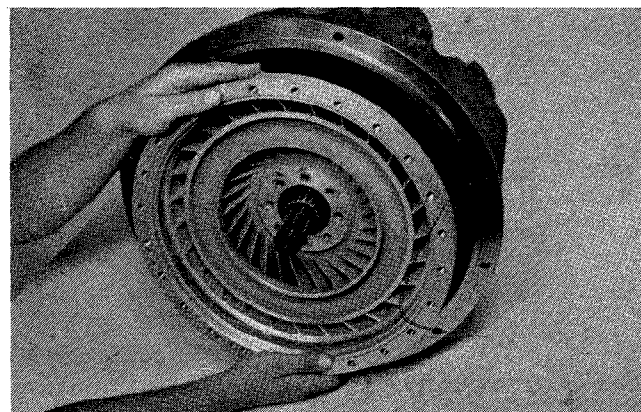


Figure 13

Remove impeller.

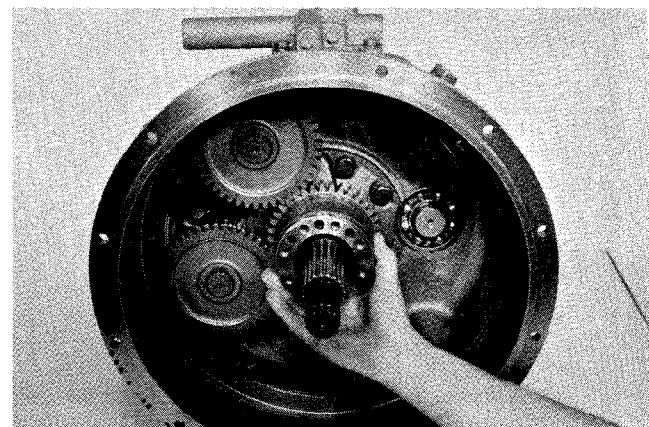


Figure 16

Remove impeller hub from housing.

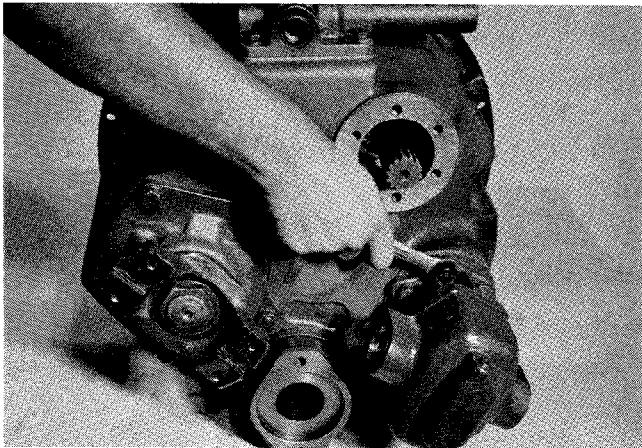


Figure 17
Remove charging pump to converter housing bolts.

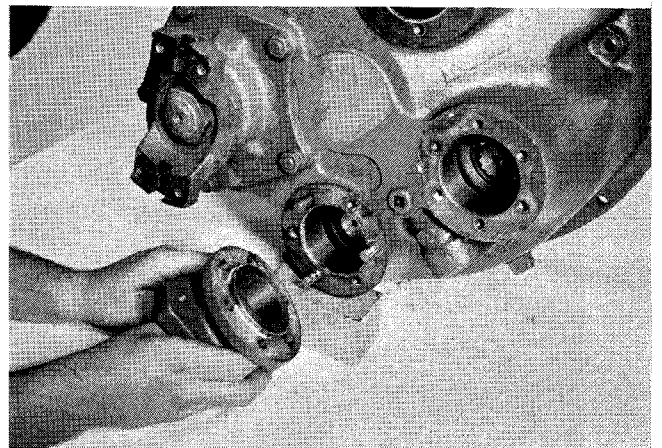


Figure 20
Remove adaptors

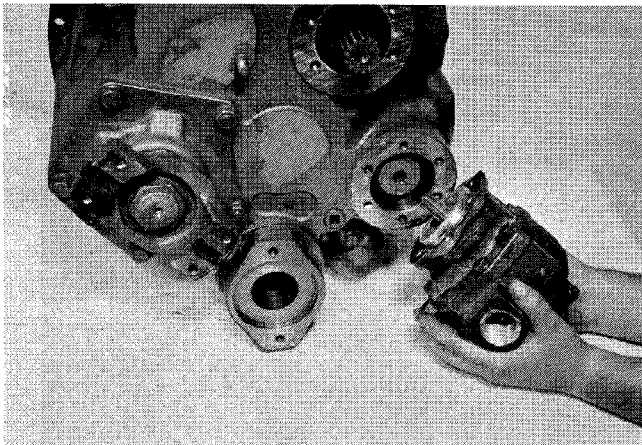


Figure 18
Remove charging pump.

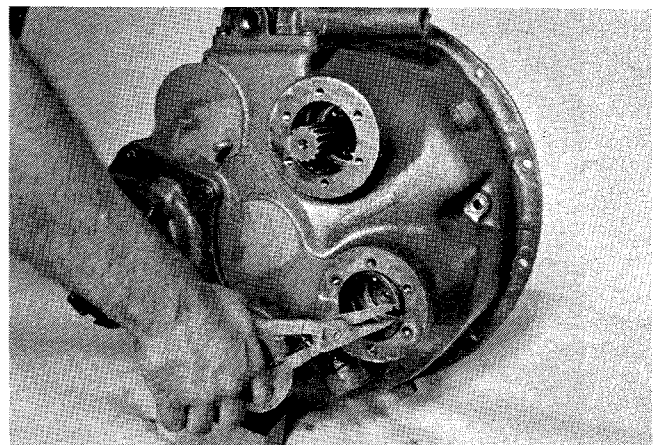


Figure 21
Remove pump shaft retaining ring.

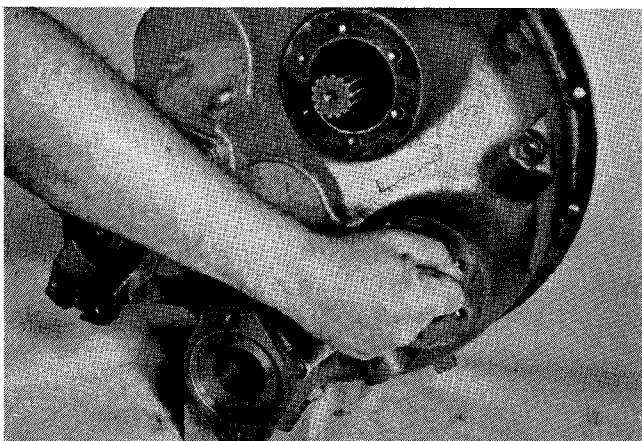


Figure 19
Remove accessory pump drive adaptor bolts.

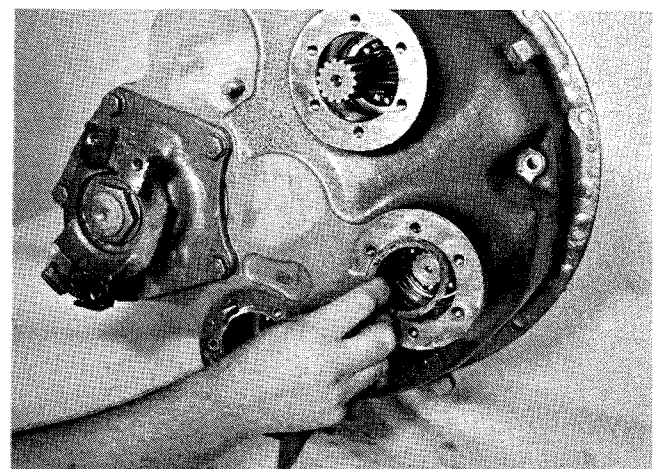


Figure 22
Remove pump shaft retaining washer.

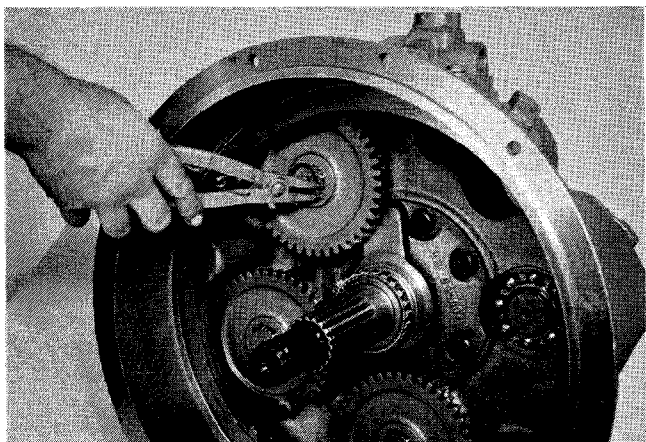


Figure 23
Remove pump drive gear retainer ring

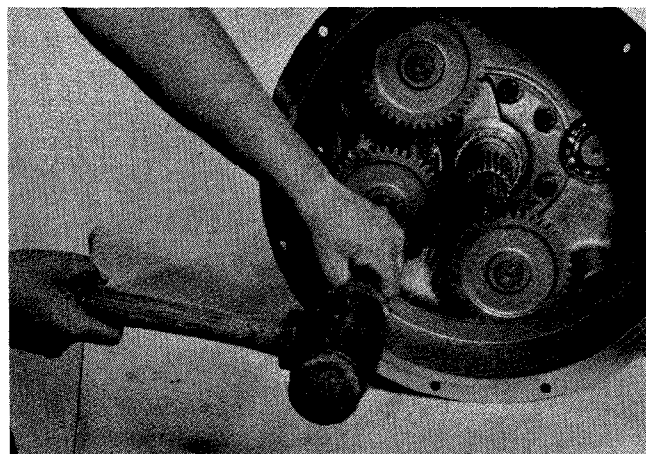


Figure 24
Tap on pump shaft. Remove pump drive gear.

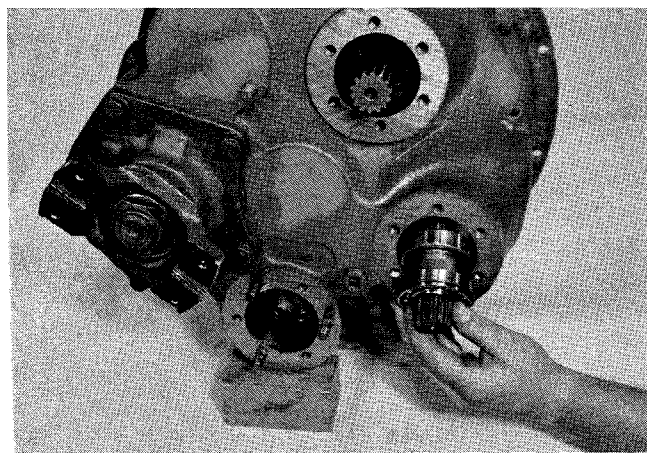


Figure 25
From rear of housing remove pump drive shaft and bearing assembly.

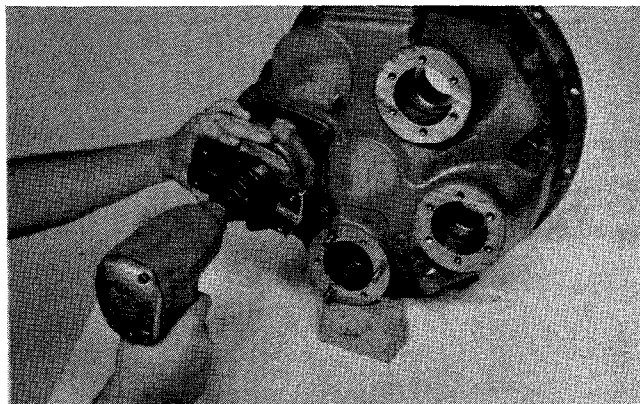


Figure 26
Using an impact wrench (if available) remove output flange nut. If impact wrench is not available a flange retainer bar must be used to hold flange from turning while removing flange nut.

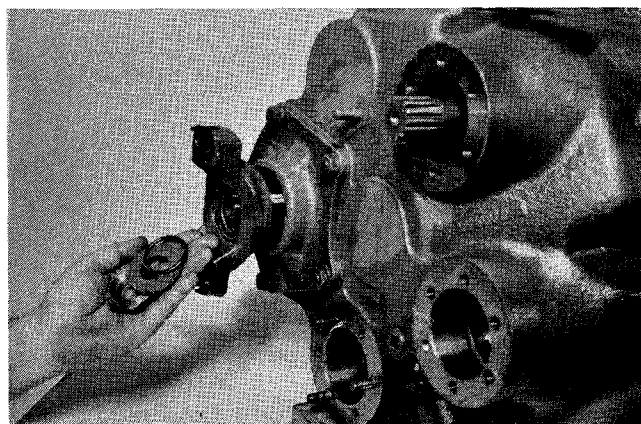


Figure 27
Remove flange nut, washer, "O" ring and flange from output shaft.

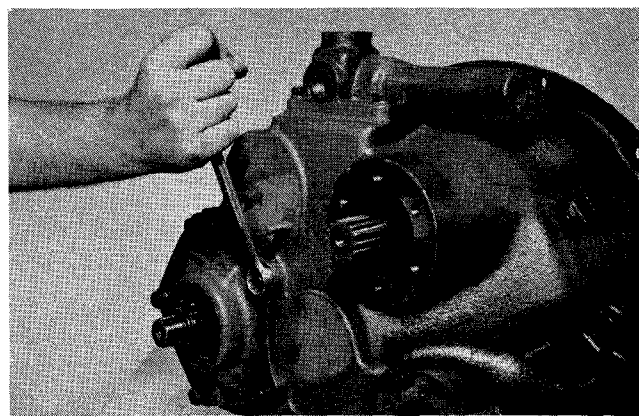


Figure 28
Remove output shaft bearing retainer bolts, stud nuts and washers.

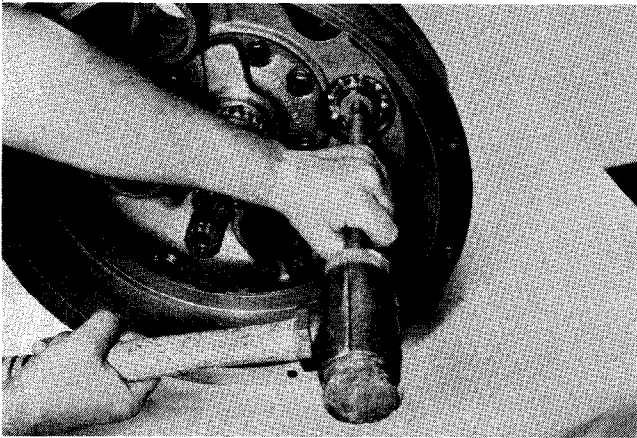


Figure 29

From front of housing drive output shaft assembly from converter housing.

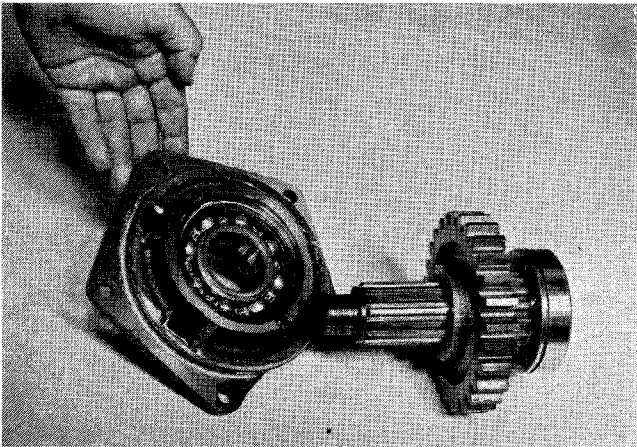


Figure 30

Output shaft, gear and bearing pressed from bearing retainer.

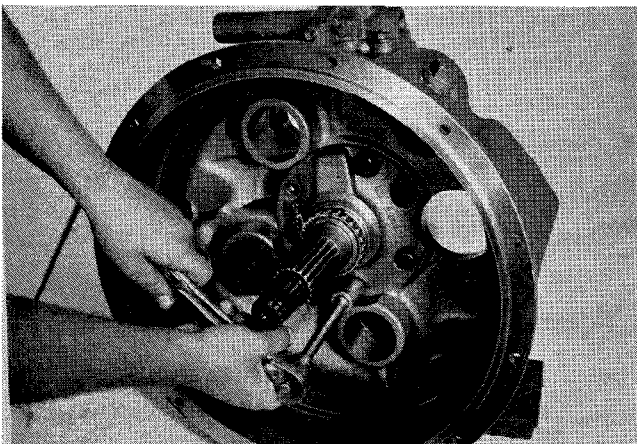


Figure 31

Remove reaction member support bolts.

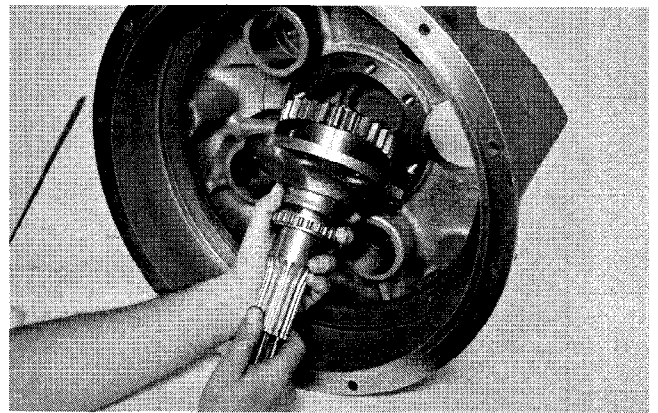


Figure 32

Remove support and turbine shaft assembly.

NOTE: If converter housing has a bore plug in the rear center line, remove plug. Remove turbine shaft gear retainer ring. Remove support and turbine shaft assembly. Turbine shaft gear will remain in rear of housing. This is a special ratio gear and is larger than the support bore.

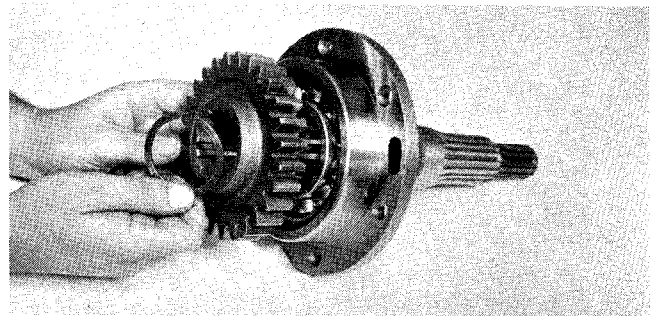


Figure 33

Remove turbine shaft gear retainer ring and gear. See note above.

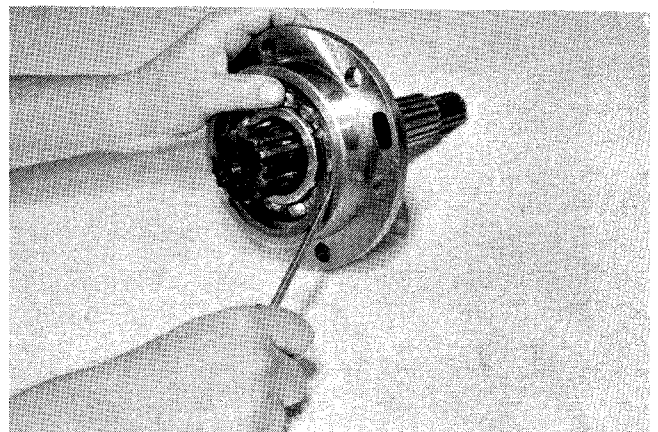


Figure 34

Remove turbine shaft bearing retainer ring from support.

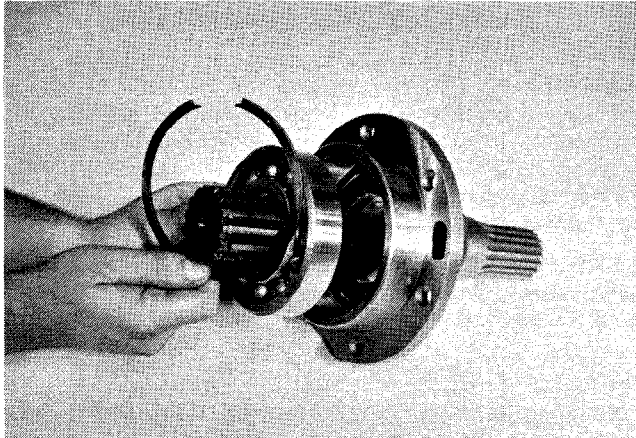


Figure 35

Remove turbine shaft and bearing from support.

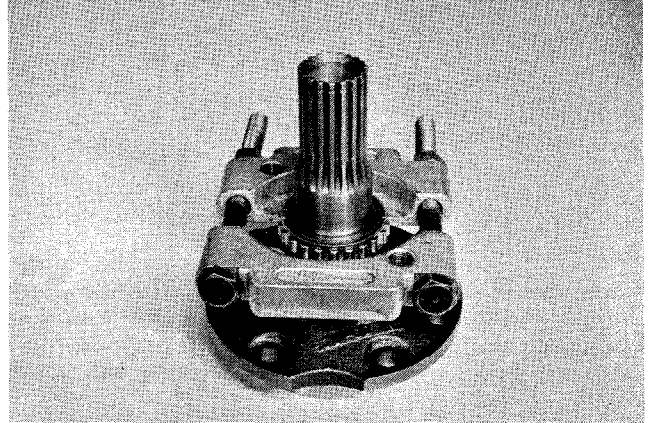


Figure 38

If support bearing is to be removed procedure shown with split puller is recommended.

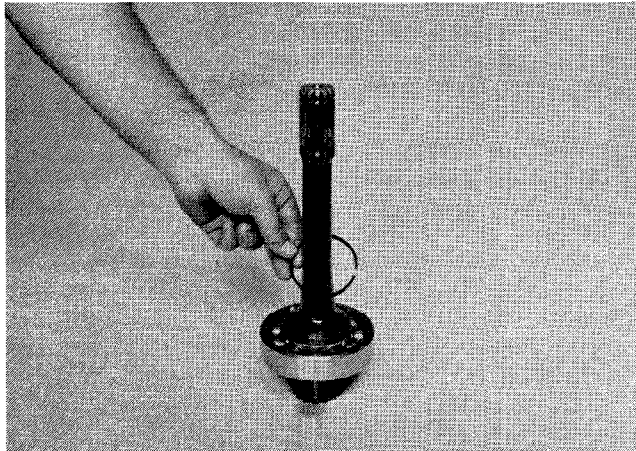


Figure 36

Remove turbine shaft oil sealing ring.

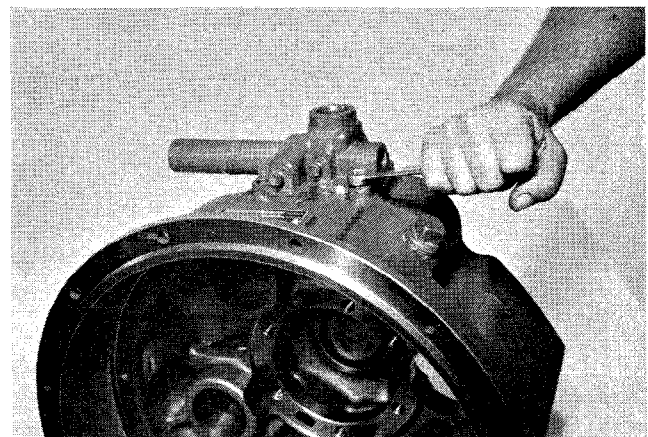


Figure 39

Remove pressure regulating valve to housing screws and lockwashers.

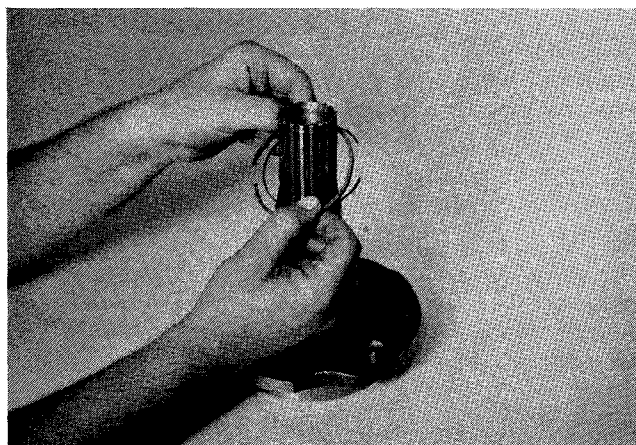


Figure 37

Remove support oil sealing ring and sealing ring expander spring.

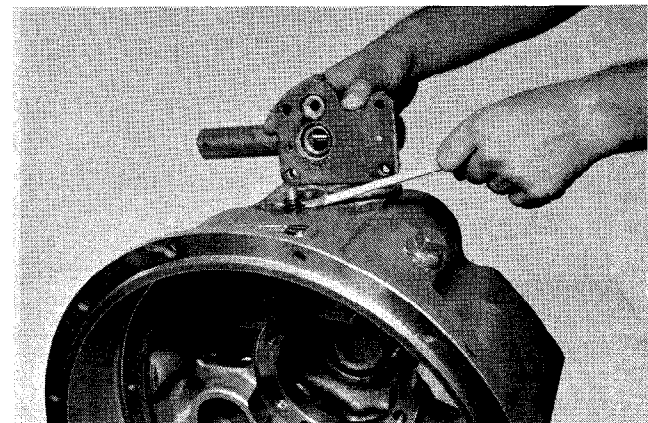


Figure 40

Remove pressure regulating valve, safety valve plunger and spring.

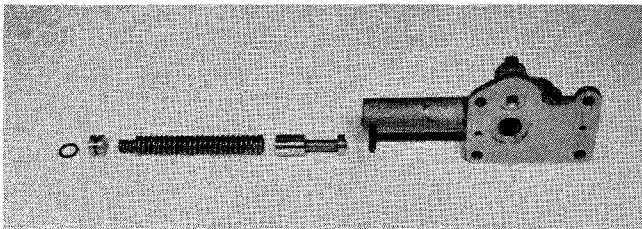


Figure 41

If pressure regulating is to be disassembled, compress valve spring stop. Tap roll pin from valve housing. **CAUTION:** Spring stop is under spring pressure. Remove spring stop, inner and outer spring and valve piston.

FREEWHEEL DISASSEMBLY

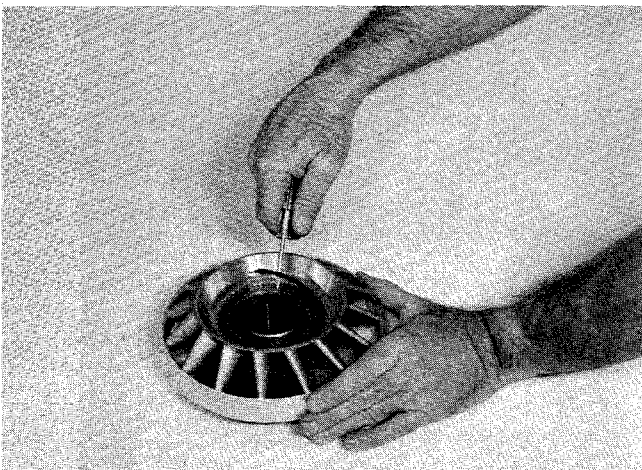


Figure 42

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

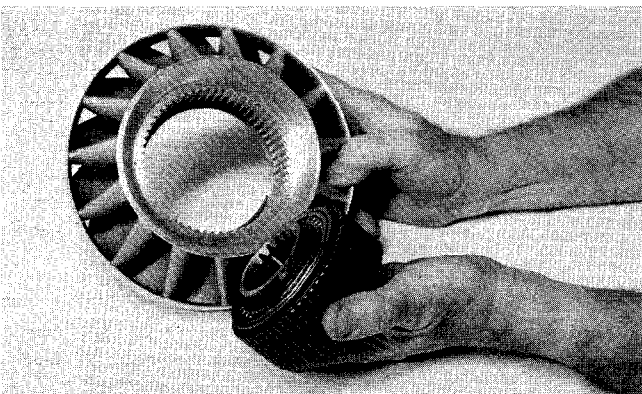


Figure 43

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.

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.

Freewheel Assembly

Clean the complete freewheel assembly the same as cleaning bearings. **NOTE:** Do not disassemble freewheel assembly. If freewheel assembly is damaged it must be replaced with a complete assembly.

After cleaning and drying freewheel assembly dip complete assembly in automatic transmission fluid and wrap in a clean lintless cloth or paper to protect until assembled.

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.

Thoroughly dry all parts cleaned 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, Etc.

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

Gears and Shafts

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

Housing, Covers, etc.

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

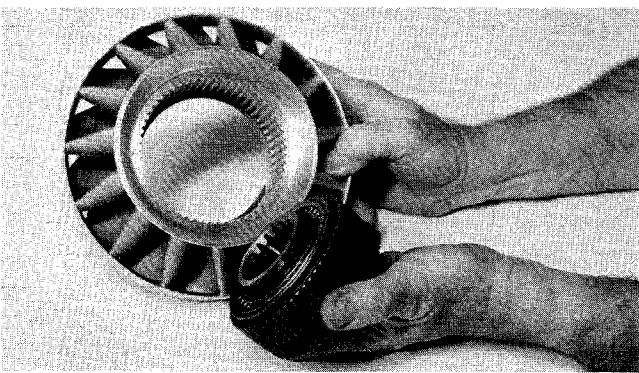


Figure 44

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

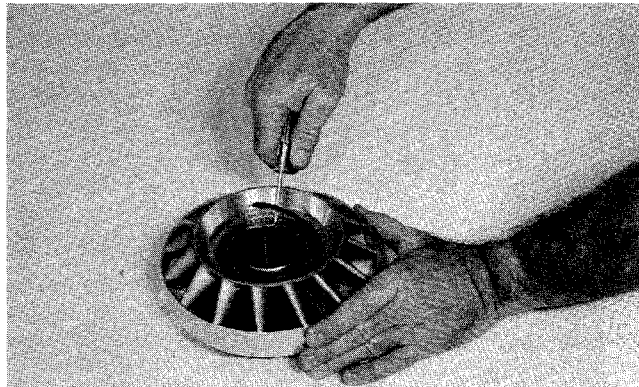


Figure 45

Install outer race to reaction member retainer ring.

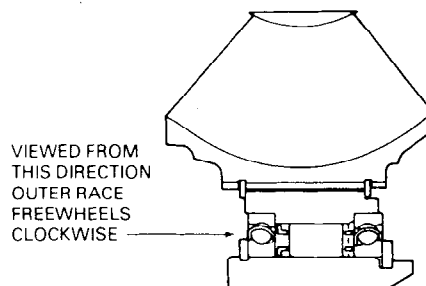


Figure 46

REASSEMBLY OF TORQUE CONVERTER

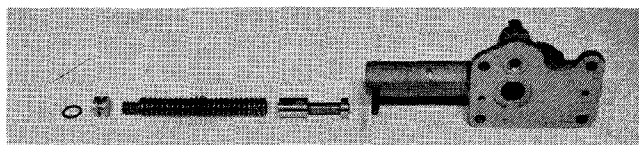


Figure 47

If pressure regulating valve was disassembled, reassemble as follows: Install new "O" ring on valve spring stop (one on each end, only one shown). Insert piston in housing. Install inner and outer valve springs. Install spring stop on spring. Depress spring stop and install spring stop roll pin.

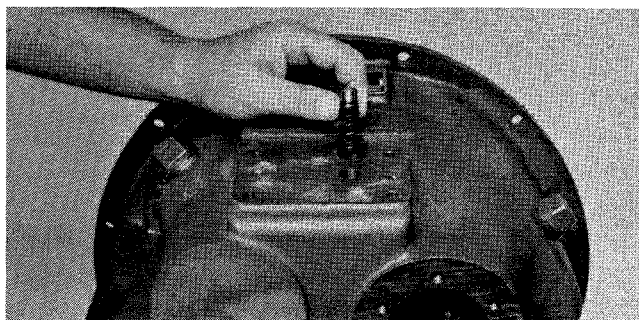


Figure 48

Position safety valve spring and plunger in converter housing.

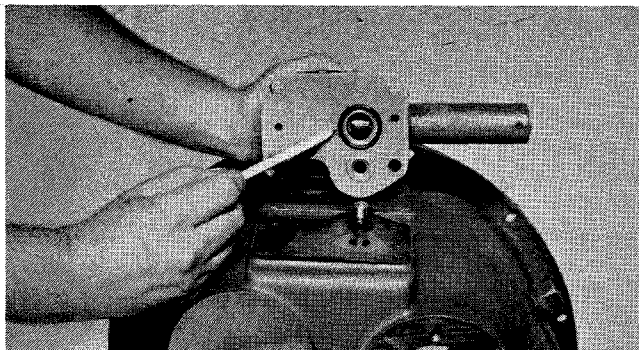


Figure 49

Install new gasket on converter housing, and new "O" ring on valve housing. Position valve assembly on converter housing.

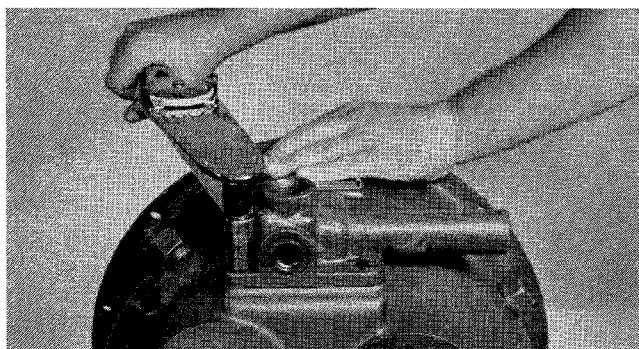


Figure 50

Install valve screws and lockwashers. Tighten 23 to 25 ft. lbs. torque [31,2 - 33,8 N.m.]

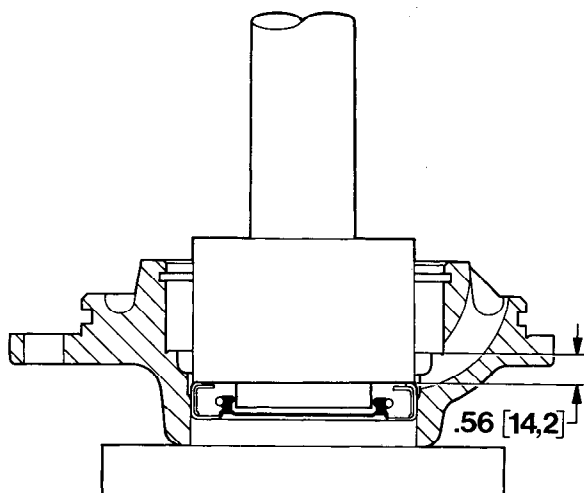


Figure 51

Apply a light coat of Permatex on the outer diameter of the output shaft oil seal. Press oil seal in bearing retainer from inside of retainer as shown and to dimension shown. See assembly instruction sheet, page 6.

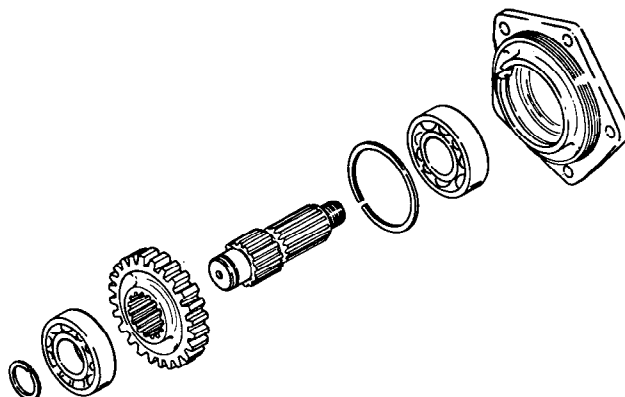


Figure 52

Press output rear bearing in bearing retainer. Secure with retainer ring. Press output shaft into bearing retainer. Use caution as not to damage oil seal. Position output gear on shaft. Press front output bearing on shaft. **NOTE: Use bearings with full inner race shoulder only. Do not use bearing with seal or shield grooves on inner race.** Install bearing retainer ring.

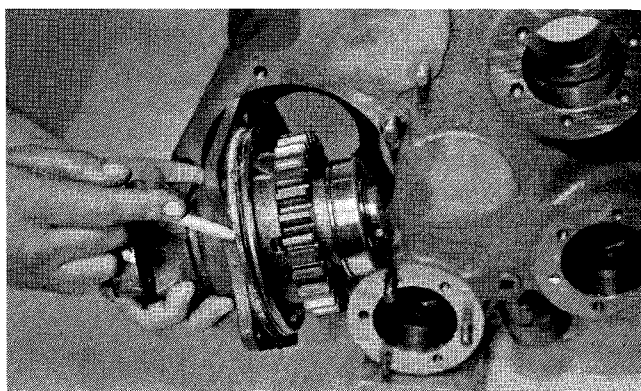


Figure 53

Install output flange, "O" ring, washer and flange nut. Tighten nut 200 to 250 ft. lbs. torque [271,2 - 338,9 N.m.] Install new "O" ring on output shaft bearing retainer. Position output assembly on converter housing.

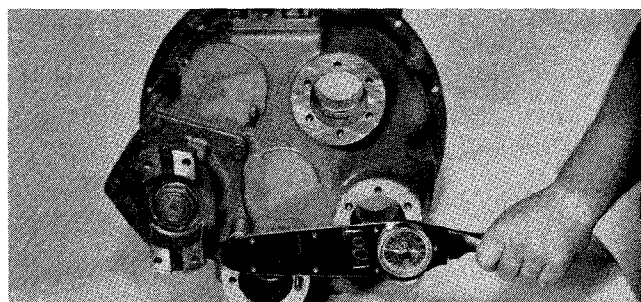


Figure 54

Install lockwashers, cap screws and stud nuts. tighten stud nuts 41 to 45 ft. lbs. torque [55,6-61,0 N.m.] Tighten cap screws 37 to 41 ft. lbs. torque [50,2 - 55,5 N.m.]

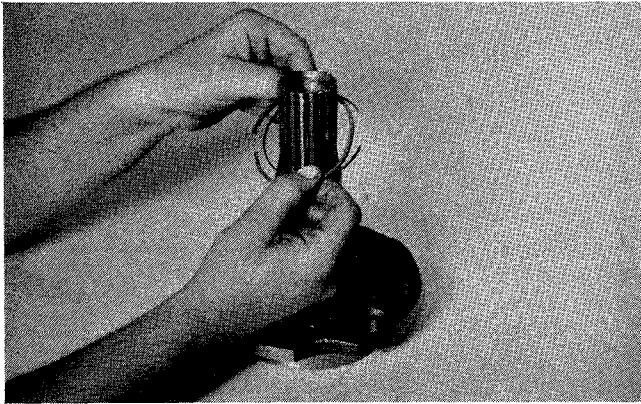


Figure 55

Install new oil sealing ring expander spring and oil sealing ring on reaction member support. Expander spring gap to be 180° from sealing ring hook joint.

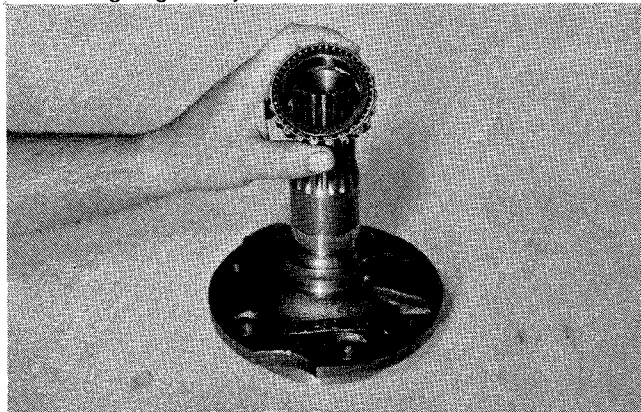


Figure 56

Install bearing on support. **NOTE:** Bearing part number must be up. Press bearing into position.

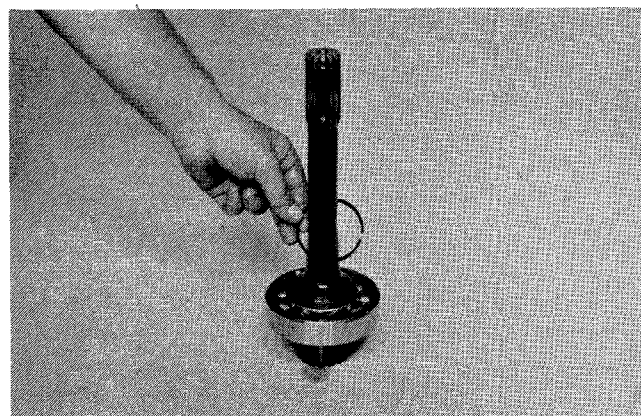


Figure 57

If turbine shaft bearing was removed, press bearing on shaft. **NOTE:** Ball bearing loading notches must be away from shoulder of turbine shaft. Install new turbine shaft oil sealing ring.

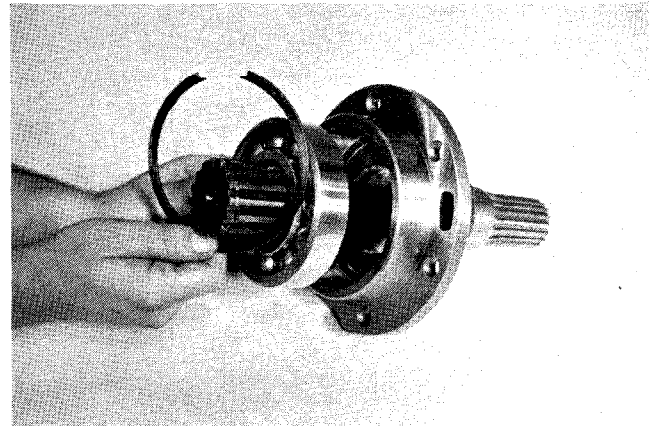


Figure 58

Install turbine shaft assembly in reaction member support. Use caution as not to damage turbine shaft oil sealing ring.

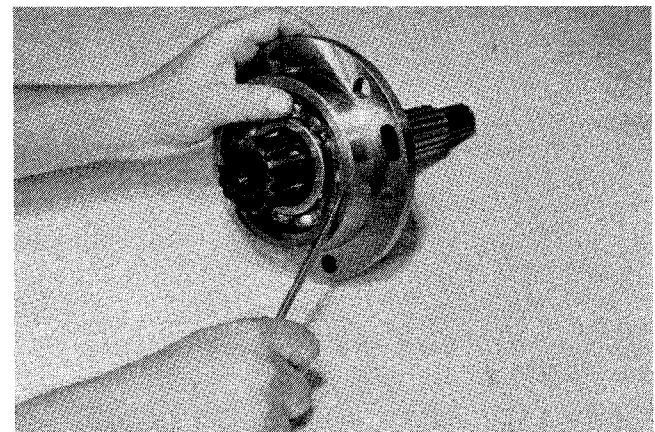


Figure 59

Install turbine shaft bearing retaining ring.

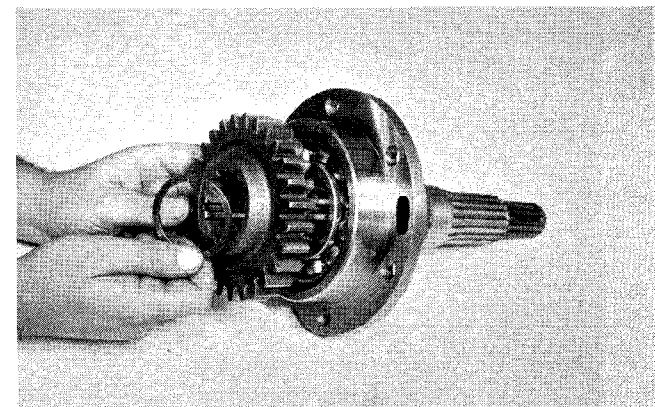


Figure 60

Position turbine shaft gear on shaft. Install gear retaining ring. See note on page 12 and reassemble accordingly.

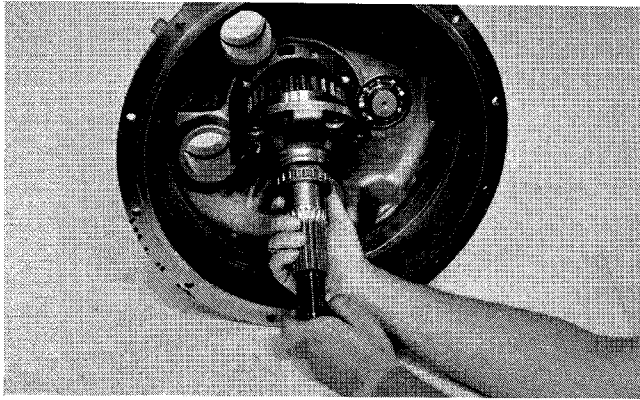


Figure 61

Install reaction member support and turbine shaft assembly in converter housing.

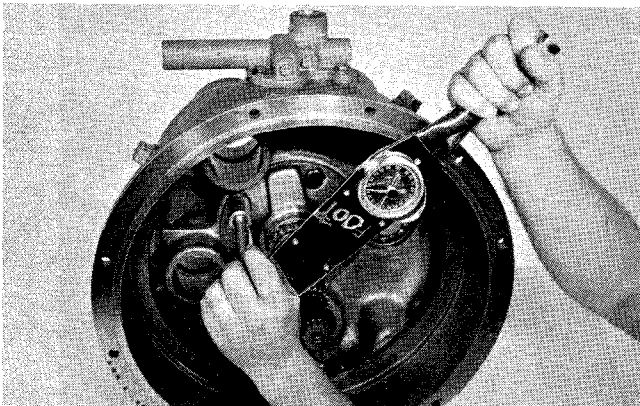


Figure 62

Install support washers and screws. Torque screws 57 to 63 ft. lbs. torque [77,3 - 85,4 N.m.]

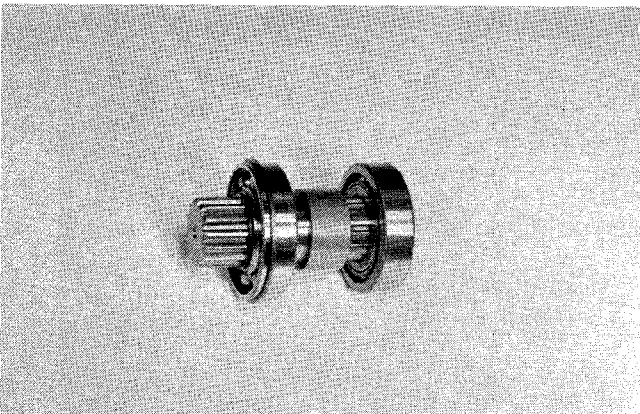


Figure 63

Install pump shaft rear bearing locating ring. Press rear bearing on pump shaft with bearing snap ring toward rear of shaft. Install bearing spacer and press front bearing on shaft until it shoulders against bearing spacer.

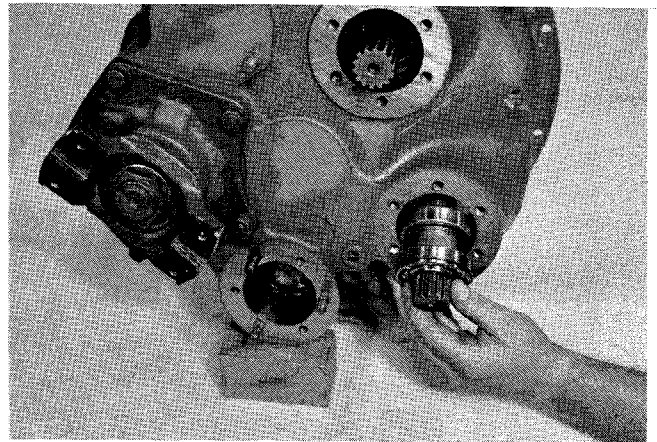


Figure 64

Install pump shaft and bearing assembly in converter housing. From front of converter housing start pump drive gear on shaft.

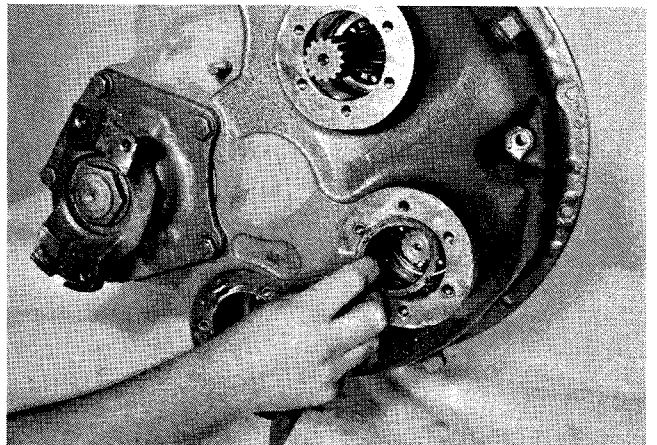


Figure 65

Install pump shaft rear bearing retainer washer.

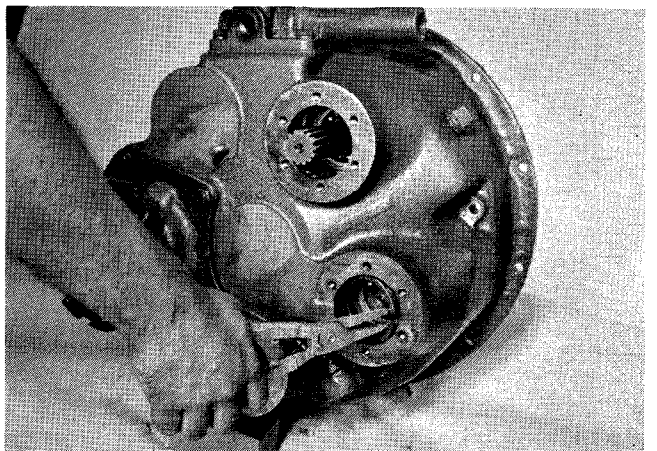


Figure 66

Install retainer washer snap ring.

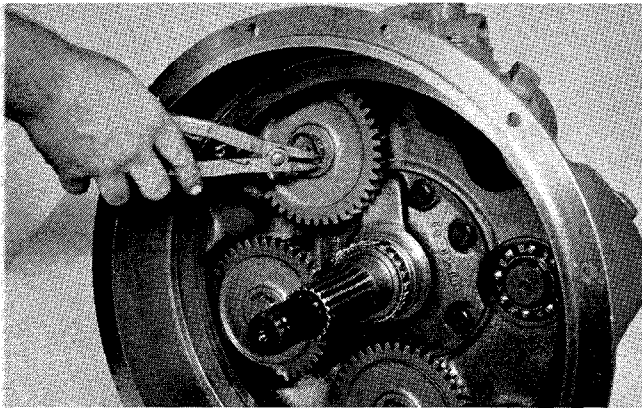


Figure 67
Install pump drive gear retainer rings.

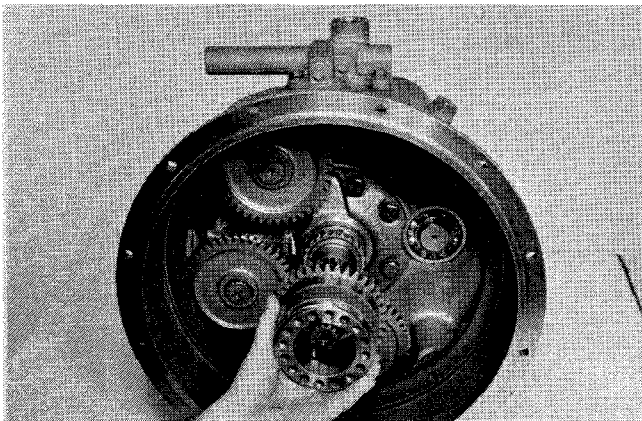


Figure 68
Position impeller hub gear on reaction member support. **NOTE:** Use extreme caution as not to cut, break or unhook the oil sealing ring on the support.

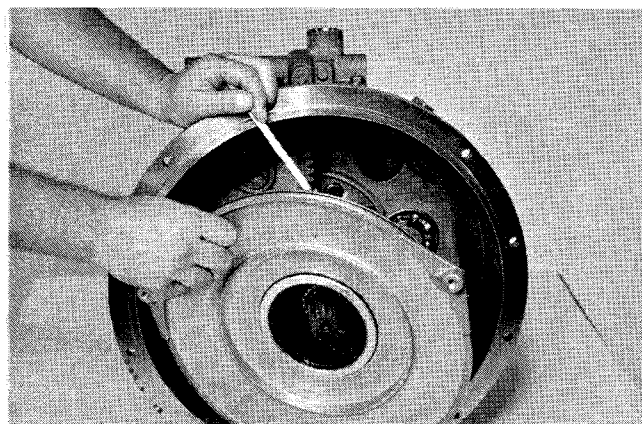


Figure 69
Install new oil baffle oil seal as shown in assembly instruction sheet on page 6. Install new oil baffle "O" ring. Align three (3) oil baffle bolt holes with bolt holes in converter housing.

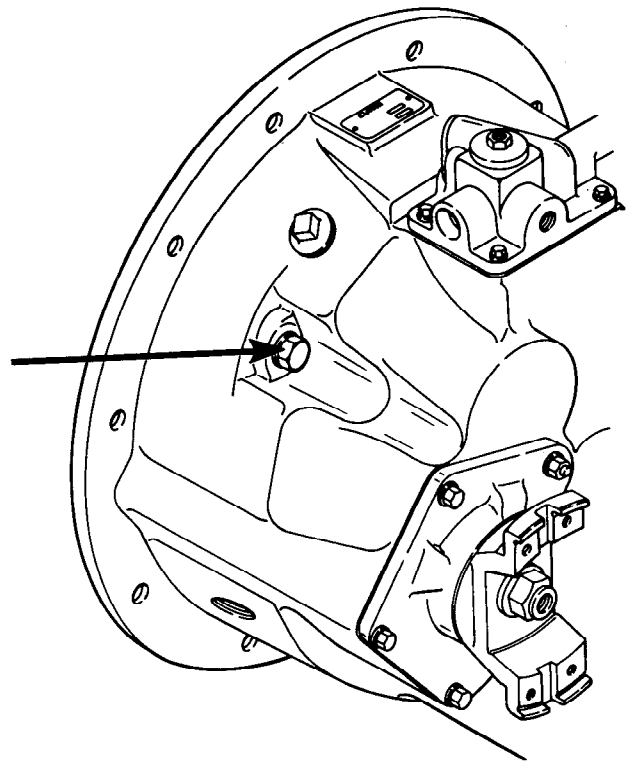


Figure 70
Install three (3) oil baffle bolts and lockwashers. Tighten baffle bolts evenly to prevent damaging oil baffle "O" ring.

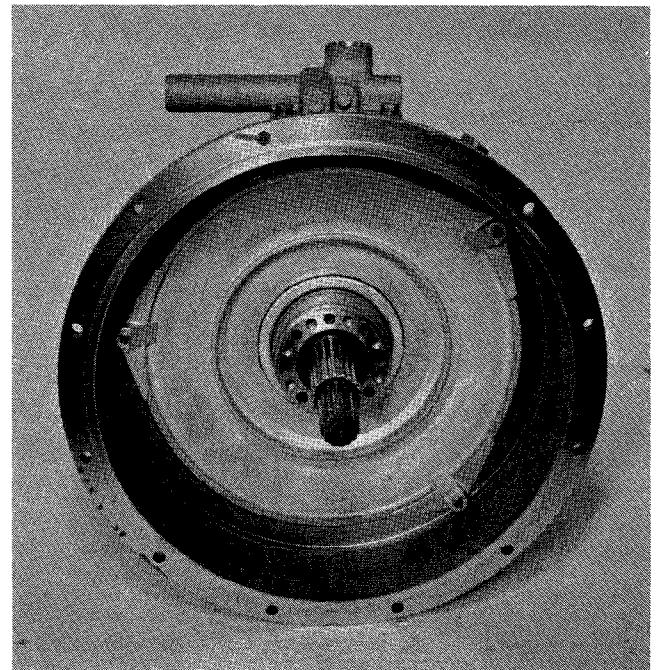


Figure 71
Oil baffle installed.

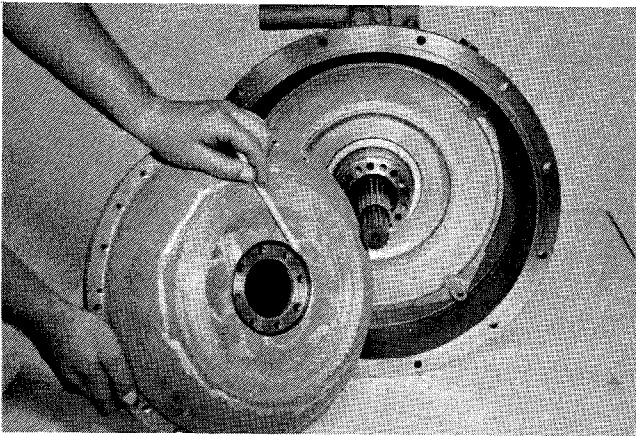


Figure 72

Install new impeller to impeller hub "O" ring.

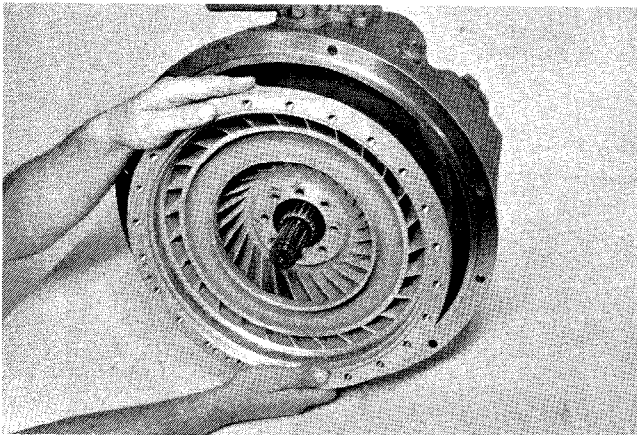


Figure 73

Install impeller on impeller hub. Use caution as not to damage "O" ring.

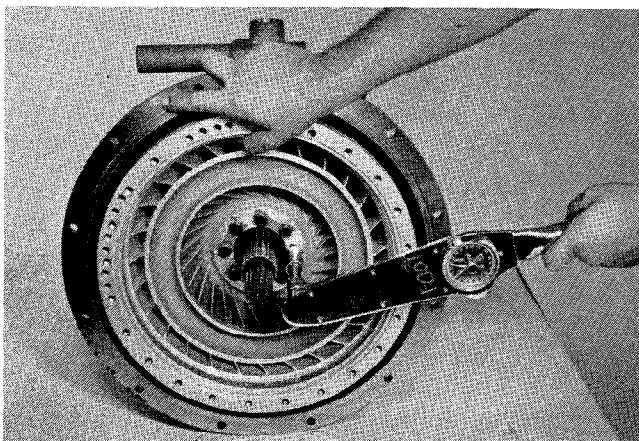


Figure 74

Install impeller to impeller hub lock tabs and cap screws. Tighten cap screws 23 to 25 ft. lbs. torque [31,2 - 33,8 N.m.]

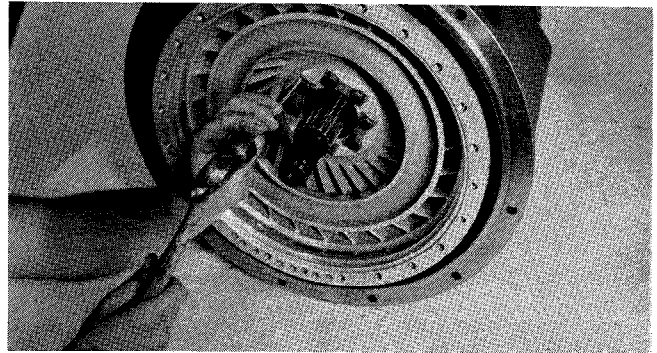


Figure 75

Bend one corner of the lock tab over a flat side of the impeller to hub screws to prevent screws from loosening.

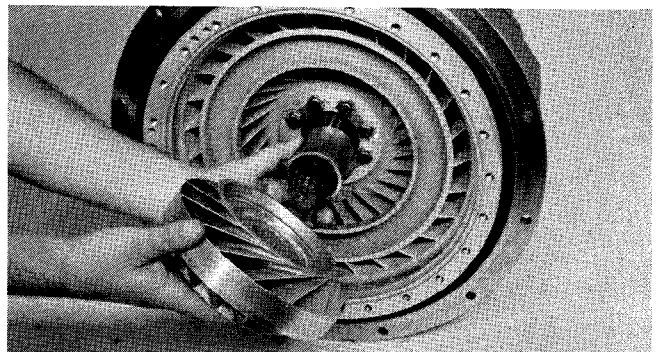


Figure 76

Install reaction member spacer and reaction member on reaction member support. If freewheeling reaction member is used it will require a different spacer than the one used with a fixed reaction member.

**MUST FREEWHEEL IN
CLOCKWISE ENGINE ROTATION**

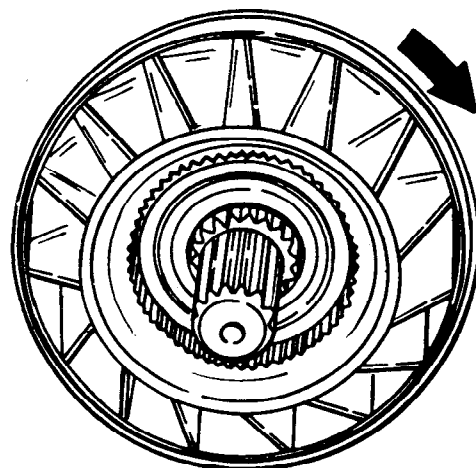


Figure 77

Check rotation of freewheeling reaction member to be sure of proper freewheel assembly.

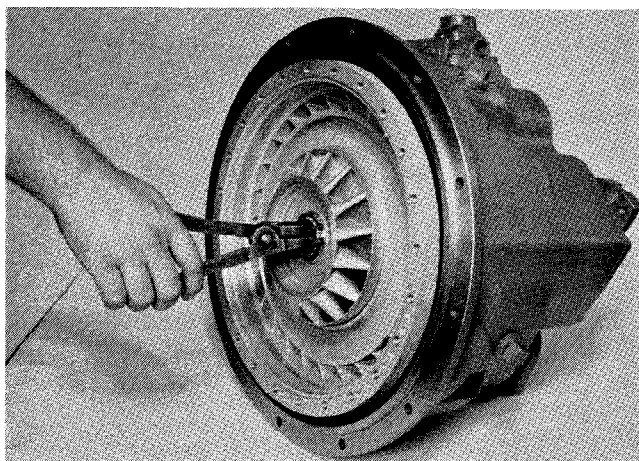


Figure 78

Install reaction member to support retainer ring.

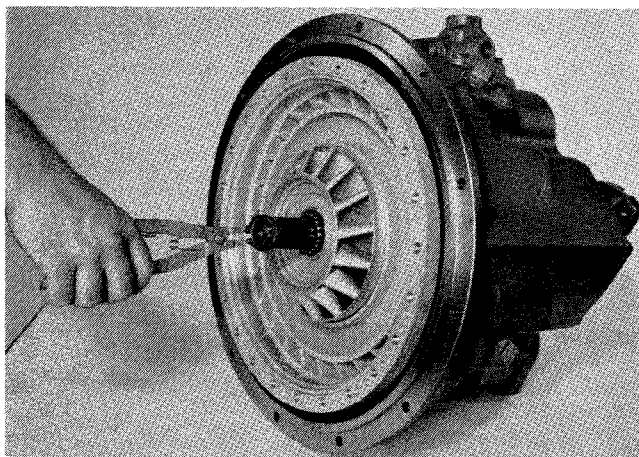


Figure 79

Install turbine locating ring on turbine shaft.

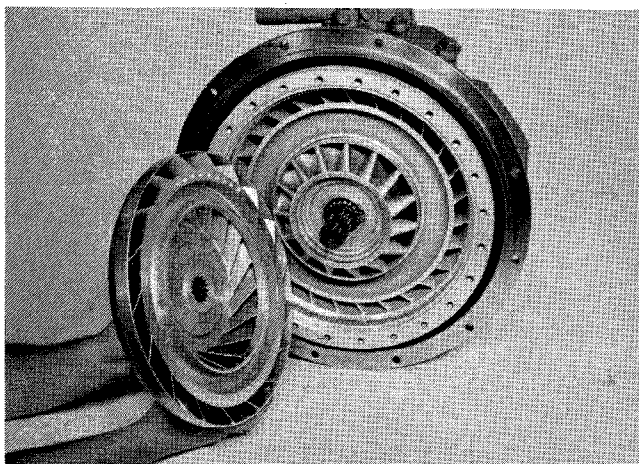


Figure 80

Install turbine on shaft.

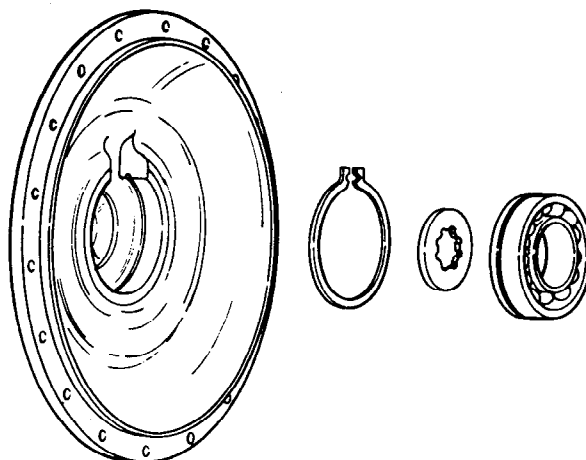


Figure 81

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.

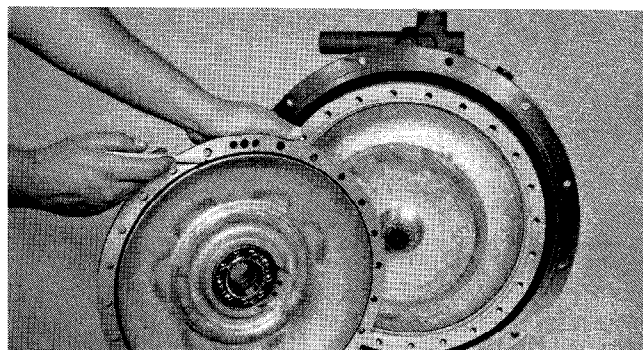


Figure 82

Position new "O" ring on impeller cover.

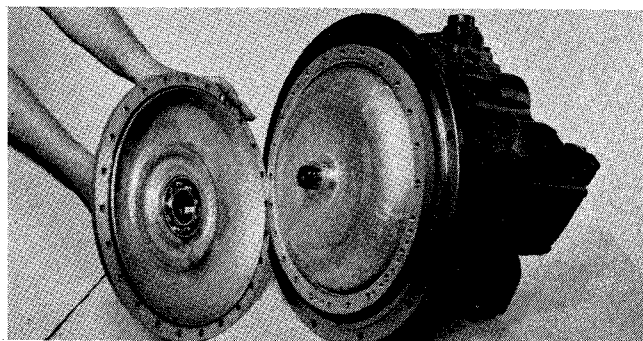


Figure 83

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

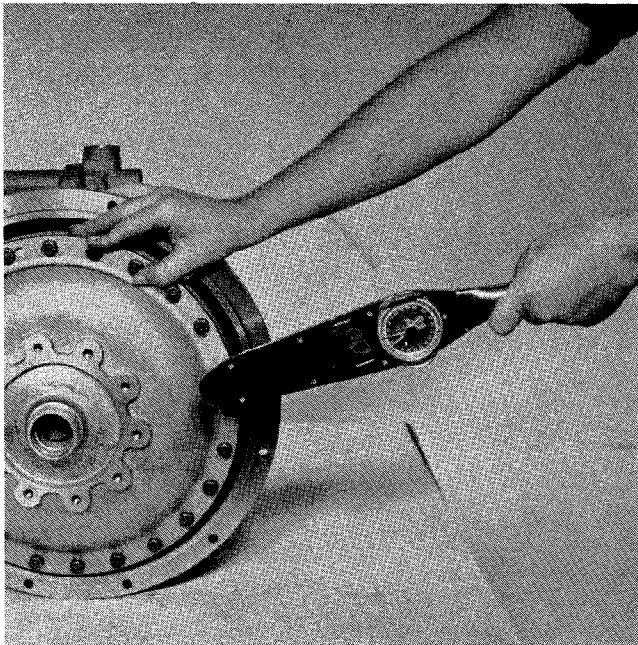


Figure 84

Install impeller cover to impeller capscrew 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 - 33,8 N.m.]

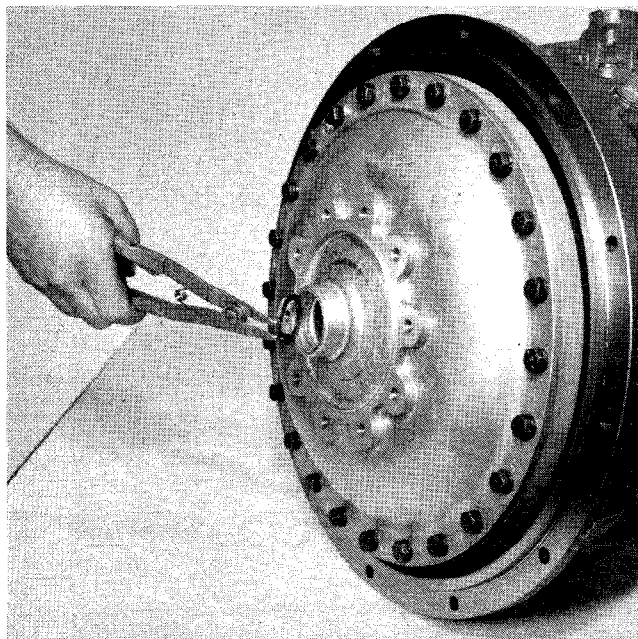


Figure 85

Install turbine retainer ring. See Figure 86.

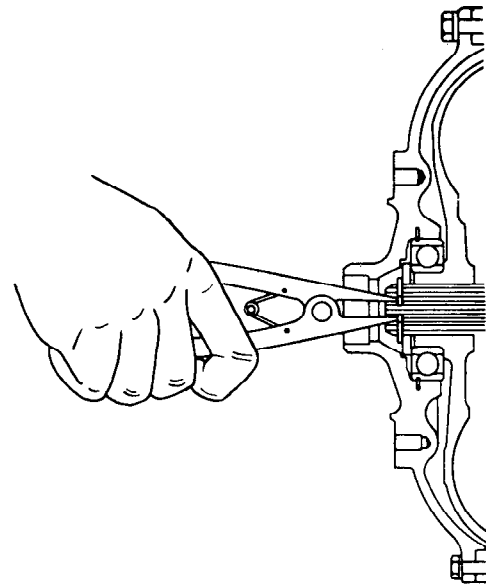


Figure 86

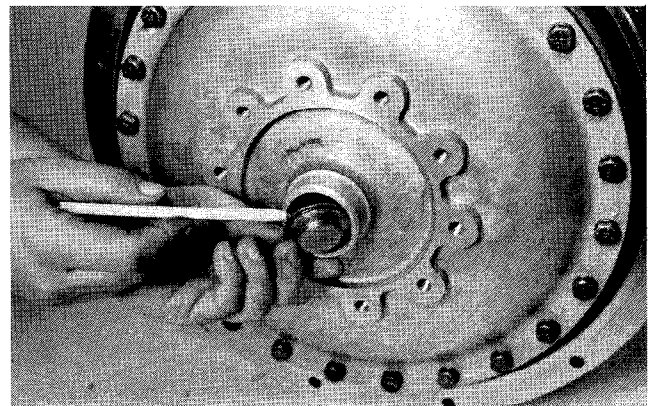


Figure 87

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

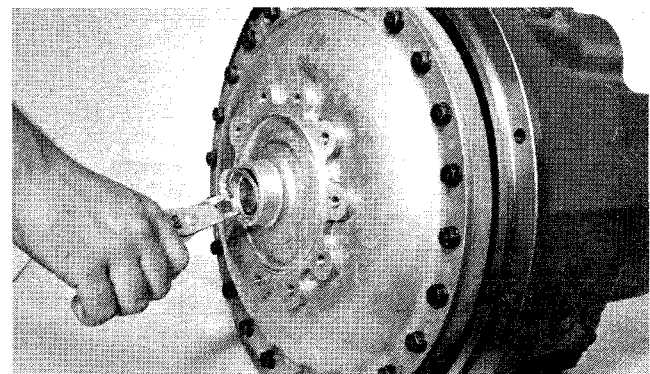


Figure 88

Install bore plug retainer ring.

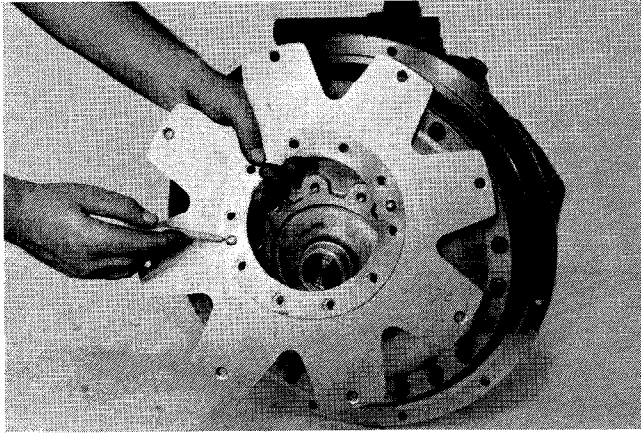


Figure 89

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.

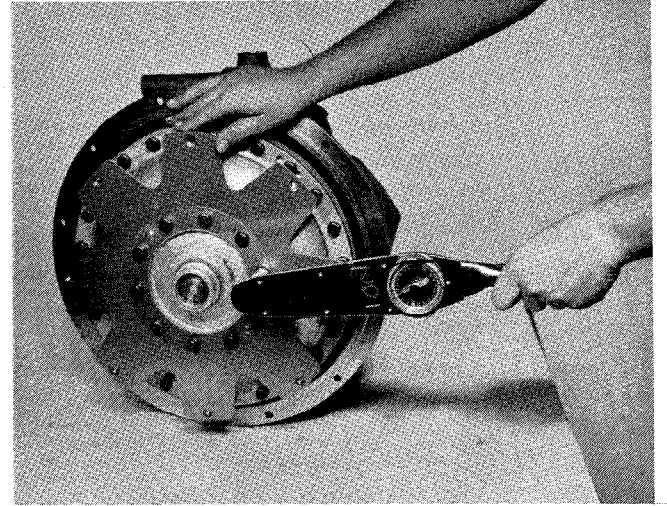


Figure 90

Tighten flex plate cap screws 23 to 25 ft. lbs. torque [31,2 - 33,8 N.m.]

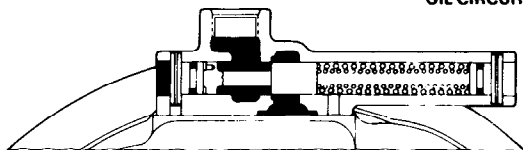
Install pump adaptors, charging and accessory pumps.



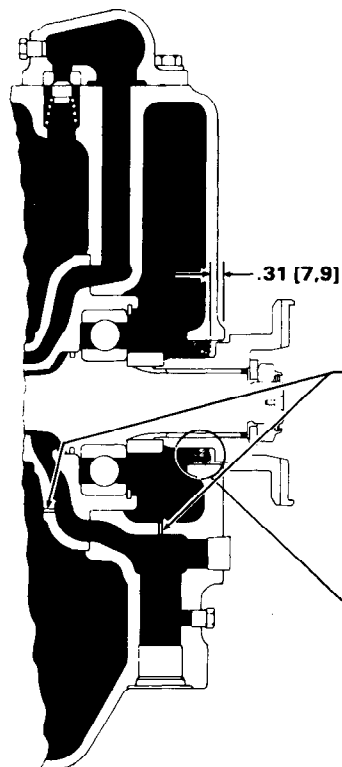
SEE PAGE 31 FOR SPEED SENSOR INSTALLATION

1. TIGHTEN OUTPUT OR TURBINE SHAFT NUT 200 TO 250 LBS. FT. [271.63-338.96 N M] TORQUE.
2. ALL LEAD-IN CHAMFERS FOR OIL SEALS, PISTON RINGS & O-RINGS MUST BE SMOOTH AND FREE FROM BURRS. INSPECT AT ASSEMBLY.
3. LUBRICATE ALL PISTON RINGS & O-RINGS AT ASSEMBLY.

4. USE PERMATEX & CRANE SEALER ONLY WHERE SPECIFIED.
5. APPLY VERY LIGHT COAT OF PERMATEX NO. 2 TO O.D. OF ALL OIL SEALS BEFORE ASSEMBLY.
6. AFTER ASSEMBLY OF USING PERMATEX OR CRANE SEALER, THERE MUST BE NO FREE OR EXCESS MATERIAL THAT COULD ENTER THE OIL CIRCUIT.



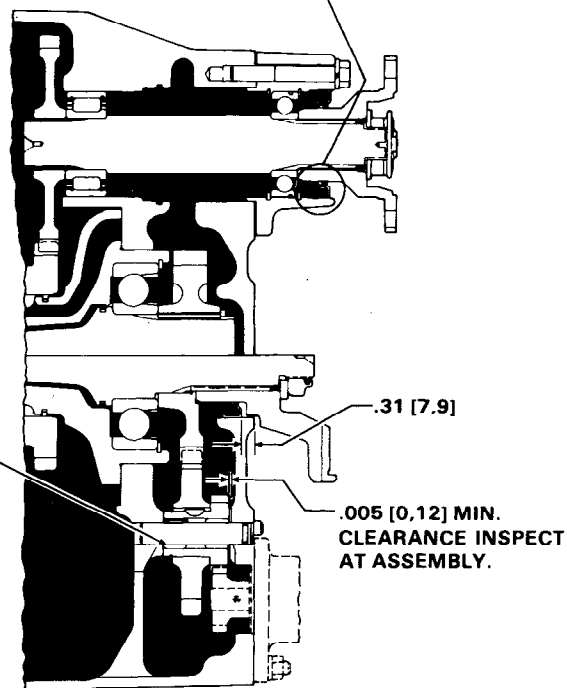
REGULATOR VALVE



STRAIGHT THRU DRIVE

LUBE HOLES TO BE CHECKED PRIOR TO ASSEMBLY. HOLES MUST BE FREE OF DIRT & BURRS.

NEEDLE BEARING TO BE PRESSED .03-.06 [0.8-1.5] BELOW END OF GEAR.



POWER TAKE-OFF & GOVERNOR DRIVE

NOTE: METRIC DIMENSIONS SHOWN IN BRACKETS []

Figure E

OIL PRESSURE AND LUBRICATION SPECIFICATIONS FOR C2000 SERIES CONVERTERS

CONVERTER OUT PRESSURE Converter outlet oil temperature 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.

Converter outlet pressure equals the total pressure drop of the cooler, cooler lines and back pressure of the transmission lubrication system.

CONVERTER LUBE FLOW Disconnect CONVERTER DRAIN BACK line at transmission with engine running at 2000 RPM and measure oil into a gallon container. Measure oil leakage for 15 seconds and multiply the volume of oil by four to get gallons per minute leakage.

LEAKAGE IN CONVERTER Leakage in C2000 series not to exceed 2 gal. max.

LUBRICATION

RECOMMENDED LUBRICANTS FOR CLARK POWER SHIFTED TRANSMISSION AND TORQUE CONVERTERS

Prevailing Ambient Temperature

TYPE OF OIL See Lube Chart.

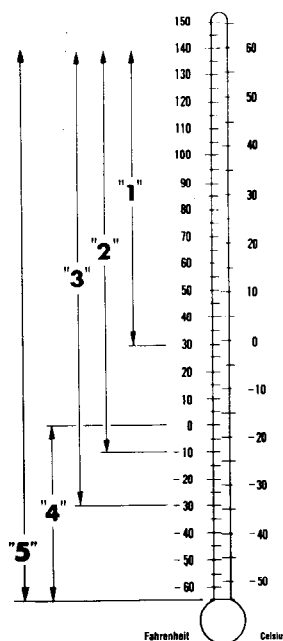
CAPACITY Consult Operator's Manual on applicable machine model for system capacity. Torque Converter, Transmission and allied hydraulic system must be considered as a whole to determine capacity.

CHECK PERIOD Check oil level DAILY with engine running at 500-600 RPM and oil at 180° to 200° F. [82,2 - 93,3° C]. Maintain oil level to FULL Mark.

**NORMAL *
DRAIN PERIOD** Every 500 hours, change oil filter element. Every 1000 hours, drain and refill system as follows: Drain with oil at 150° to 200° F. [65,6 - 93,3° C].

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

- (a) Drain transmission and remove sump screen. Clean screen thoroughly and replace, using new gaskets.
- (b) Drain oil filters, remove and discard filter elements. Clean filter shells and install new elements.
- (c) Refill transmission to LOW mark.
- (d) Run engine at 500-600 RPM to prime converter and lines.
- (e) Recheck level with engine running at 500-600 RPM and add oil to bring level to LOW mark. When oil temperature is hot (180-200° F.) [82,2-93,3° C] make final oil level check. BRING OIL LEVEL TO FULL MARK.



*Dexron is a registered trademark of General Motors Corporation.

Temperature Range "1"
C-2 Grade 30
C-3 Grade 30
Engine Oil: Grade 30 API-CD/SE or CD/SF
MIL-L-2104C-Grade 30
MIL-L-2104D-Grade 30

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

Temperature Range "3"
*Dexron
*Dexron II D - See Caution Below

Temperature Range "4"
MIL-L-46167
MIL-L-46167 A

Temperature Range "5"
Conoco High Performance Synthetic Motor Oil — Spec. No. 6718

PREFERRED OIL VISCOSITY: Select highest oil viscosity compatible with prevailing ambient temperatures and oil application chart. Temperature ranges "2" and "3" may be used to lower ambient temperatures when sump preheaters are used. Temperature range "4" should be used only in ambient temperature range shown.

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

CAUTION: *Dexron II D is not compatible with graphitic clutch plate friction material UNLESS IT MEETS THE APPROVED C-3 SPECIFICATIONS. *Dexron II D cannot be used in the 3000, 4000, 5000, 6000, 8000, 16000 or 34000 series power shift transmissions, or the HR28000 & HR32000 series having converter lock-up, or the C270 series converter having lock-up UNLESS IT MEETS THE APPROVED C-3 SPECIFICATIONS. Any deviation from this chart must have written approval from the application department of the Clark-Hurth Components Engineering and Marketing Department.

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

IRREGULARITIES IN PERFORMANCE

C2000 Series Converters

Make all checks with converter outlet temperature at least 180° - 200° F. [82,3° - 93,3° C.]

TROUBLE	PROBABLE CAUSE	REMEDY
1. Low converter OUT pressure (Below 25 P.S.I. [172,4 kPa] with engine at 2000 RPM - NO LOAD) (See Converter Pressure Specifications).	Worn oil sealing and "O" rings Worn oil pump. Safety Valve stays open.	Trouble is internal and will require a complete tear-down of the converter. Replace. Clean and check valve spring and valve.
2. Suction line taking air.	Low oil level. Suction line connections taking air. Worn oil pump.	Fill to proper level. Check oil line connections and tighten securely. Replace.
3. High converter OUT pressure (Above 70 P.S.I. [482,6 kPa] with engine operating at no- load governed speed. (See Converter Pressure Specifications).	Oil cooler or oil lines restricted. Oil too heavy Cold oil.	Check oil cooler line and oil cooler for restrictions. Clean or replace. Check oil weight. See oil recommenda- tions. Converter pressure in cold weather will vary. As soon as converter gets hot, pres- sure should drop.
4. Over-heating	See items No. 1 & 2. Oil cooler or oil cooler lines restricted causing safety valve to stay open. Oil cooler too small. Worn oil pump Converter drain line to transmission or oil sump not installed properly.	Clean and check oil cooler and oil cooler lines. Replace if necessary. Replace with larger cooler. Replace oil pump. Install at lowest drain opening in conver- ter housing. Line must maintain constant gradual drop to oil sump for gravity drain.
5. Noisy Converter.	Worn oil pump Damaged bearing. Worn drive gears.	Replace. A complete teardown will be necessary to determine this. Replace if necessary. Replace.
6. Low clutch pressure. (See pressure specifications)	Transmission malfunc- tion. Worn oil pump. Regulator valve stuck open.	Close pressure line to transmission con- trol valve. If clutch pressure returns to normal, trouble is in transmission. Replace. Clean and check valve for worn or dirty parts, replace if necessary.

IRREGULARITIES IN PERFORMANCE (Cont'd.)

C2000 Series Converters

TROUBLE	PROBABLE CAUSE	REMEDY
7. High clutch pressure. (See pressure specifications)	Regulator valve stuck closed.	Clean and check valve for worn or dirty parts, replace if necessary.
8. Lack of power.	Improper engine function.	Tune engine.
	Engine stall speed below normal.	Tune engine. Check governor.
	Low converter out pressure.	See item No. 1.
	Air in the oil.	See item No. 2.
	Improper oil.	See oil recommendations.
9. Oil in engine flywheel housing.	"O" ring between impeller cover and impeller damaged.	Replace.
	Oil baffle "O" ring damaged.	Replace.
	Oil baffle oil seal damaged.	Replace.
	Impeller cover bore plug "O" ring damaged.	Replace.

GENERAL INFORMATION:

Use Clark 1533614 Oil Filter only.

Use Clark 215502 Oil Filter Element only.

Use minimum number of Pipe and Hose Fittings.

Gravity drain from Converter Sump to Transmission must be of minimum length and have no "U" bends to trap air or oil.

Cooler capacity for normal application, 30 per cent of net Engine Horsepower at Governed Speed.

Check oil level with engine idling and transmission in neutral.

TRANSMISSION CLUTCH OIL PRESSURE P.S.I.

The C2000 Converter will be equipped with one of three variations involving the clutch regulating valve. They are as follows:

1. Inlet cover for **Converter oil only** with clutch pressure valve in transmission control cover. **180 to 220 P.S.I. [1241,1 - 1516,8 kPa]** pressure range. (See note).

2. Pressure regulator valve on Converter with a **240 to 280 P.S.I. [1654,8 - 1930,5 kPa]** pressure range. (See note).

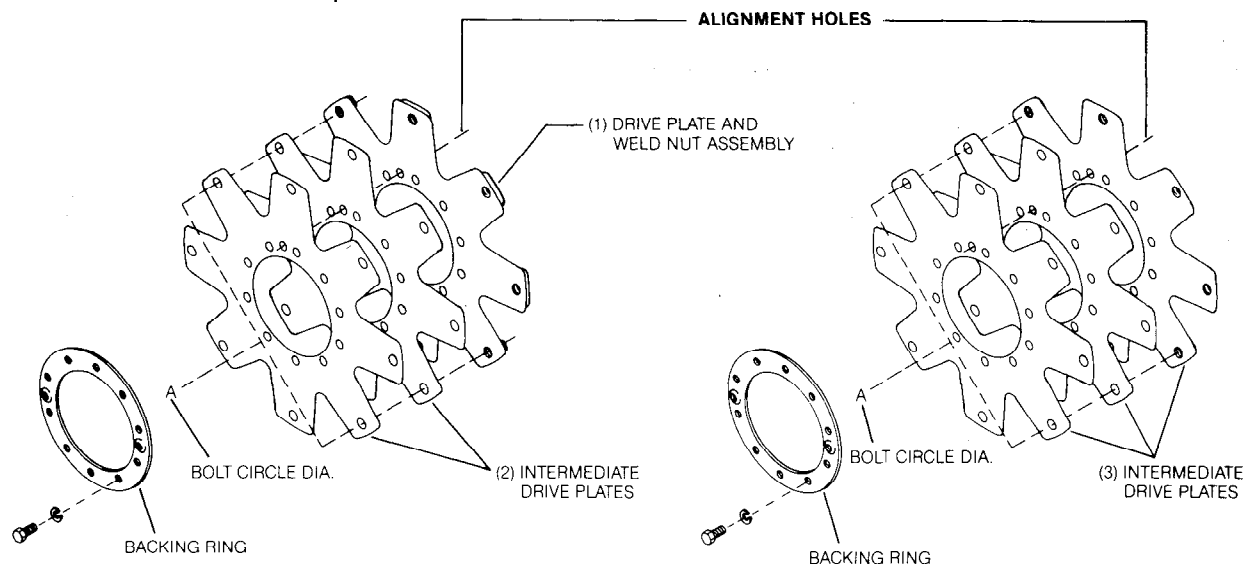
3. Pressure regulator valve on Converter with a **180 to 220 P.S.I. [1241,1 - 1516,8 kPa]** pressure range. (See note).

NOTE: All pressure must be equal within **5 P.S.I. [34,4 kPa]**. If clutch pressure varies in any one clutch more than **5 P.S.I. [34,4 kPa]** repair clutch. All pressures must be taken with two clutches engaged.

DRIVE PLATE INSTALLATION

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.].

CONVERTER 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.

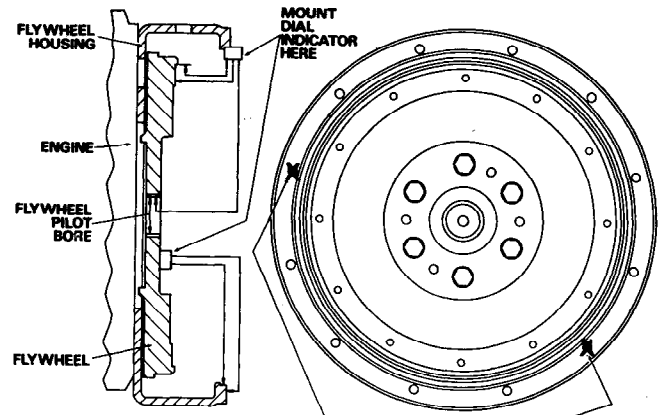


FIG 1

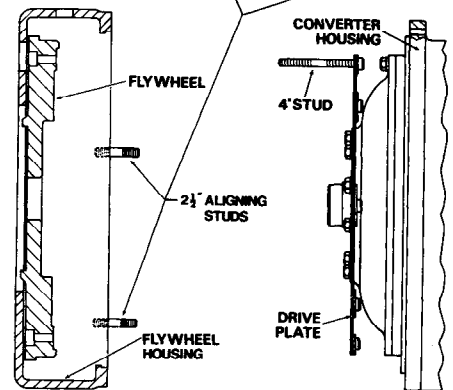


FIG 2

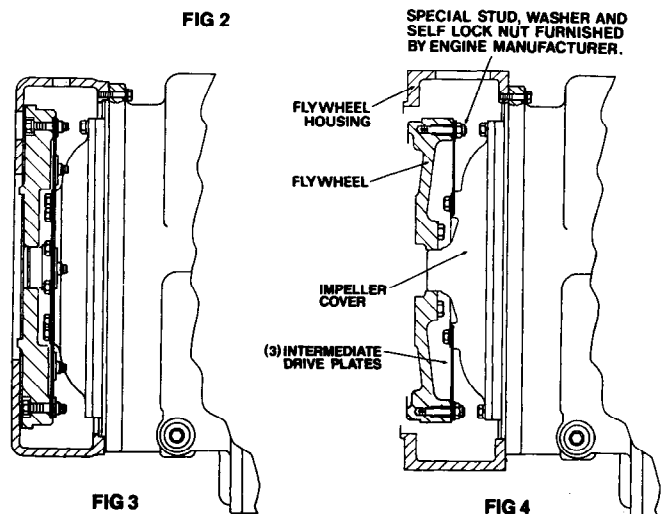


FIG 3

FIG 4

SERVICING MACHINE AFTER TORQUE CONVERTER OVERHAUL

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

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

The following are considered the minimum steps to be taken:

1. Drain entire system thoroughly.
2. Disconnect and clean all hydraulic lines. Where feasible, hydraulic lines should be removed from machine for cleaning.
3. Replace oil filter elements, cleaning out filter cases thoroughly.
4. The oil cooler must be thoroughly cleaned. The cooler should be "back flushed" with oil and compressed air until all foreign material has been removed. Flushing in direction of normal oil flow will not adequately clean the cooler. If necessary, cooler assembly should be removed from machine for cleaning, using oil, compressed air and steam cleaner for that purpose. **DO NOT** use flushing compounds for cleaning purposes.

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

6. Reassemble all components and use only type oil recommended in lubrication section. Fill transmission through filler opening until fluid comes up to **LOW** mark on transmission dipstick. **NOTE:** If the dipstick is not accessible oil level check plugs are provided.

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

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

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

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

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

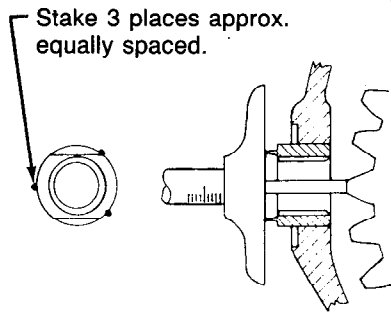
CONVERTER CHARGE PUMP REPLACEMENT AND PRIMING PROCEDURE

1. The cause for pump failure must be found and corrected before a replacement pump is installed. Check all of the hoses, tubes, "O" rings, adaptors and split flanges.
2. Replace any collapsed or damaged hoses, damaged split flange "O" rings, tube "O" rings and adaptors.
3. After all checks have been made and corrections completed install the pump.
4. See filling instructions in paragraph 6 above.
5. Start the engine. Run the engine at low idle for two minutes, watch the clutch pressure gage and listen for cavitation of the pump.
6. If the pressure does not come up, check the oil level and bleed off air from system as follows.
7. To bleed off the air from the system, loosen the pressure gage line at the pressure regulating valve or loosen the pressure hose at the oil filter or pressure regulating valve. Crank the engine over until the air is displaced with oil. **DO NOT START THE ENGINE.**
8. If bleeding the lines does not correct the problem it may become necessary to prime the pump. Disconnect the suction hose or pressure hose, whichever is higher, and fill the port with transmission oil, reconnect the hose and tighten.
9. Start the engine and check pressure.
10. Recheck oil level with hot oil (180-200°F) with engine at idle. Add oil as necessary to bring oil level to full mark.

SPEED SENSOR INSTALLATION

VIEW "T" (Pump Drive Gear Sensor)
Inspect at assembly.
Dim. "U" from gear tooth.

REAR VIEW OF CONVERTER



After curing of Loctite,
speed sensor bushing
must be secure with 40
Ft. Lb. [54.2 N·m] torque.

VIEW "S" (Output Drive Gear Sensor)
Inspect at assembly.
Dim. "W" from gear tooth.

Assemble Speed Sensor Bushing in housing to specified
dimension "U" or "W" with Loctite 262 and stake (3) three
places. See Pump Drive and Output Gear Charts for dimensions.

PUMP DRIVE RATIO

RATIO	DRIVE GEAR NO. OF TEETH	DRIVEN GEAR NO. OF TEETH	SPEED SENSOR BUSHING DEPTH "U" PER VIEW "T"
1.135	37	42	$1.060 \pm .007$ [26.9 \pm .17]
.951	41	39	$1.060 \pm .007$ [26.9 \pm .17]

OUTPUT GEAR RATIO (6 PITCH)

RATIO	TURBINE SHAFT & GEAR ASS'Y NO. OF TEETH	OUTPUT GEAR NO. OF TEETH	SPEED SENSOR BUSHING DEPTH "W" PER VIEW "S"
1.292	24	31	$1.060 \pm .007$ [26.9 \pm .17]
1.115	26	29	$1.060 \pm .007$ [26.9 \pm .17]
1.037	27	28	$1.390 \pm .007$ [35.3 \pm .17]
.964	28	27	$1.390 \pm .007$ [35.3 \pm .17]
* .897	29	26	$1.390 \pm .007$ [35.3 \pm .17]

*Requires straight thru housing plus bore plug

OUTPUT GEAR RATIO (5.35 PITCH)

RATIO	TURBINE SHAFT & GEAR ASS'Y NO. OF TEETH	OUTPUT GEAR NO. OF TEETH	SPEED SENSOR BUSHING DEPTH "W" PER VIEW "S"
1.333	21	28	$1.060 \pm .007$ [26.9 \pm .17]
1.130	23	26	$1.060 \pm .007$ [26.9 \pm .17]
1.042	24	25	$1.390 \pm .007$ [35.3 \pm .17]
.960	25	24	$1.390 \pm .007$ [35.3 \pm .17]
.885	26	23	$1.390 \pm .007$ [35.3 \pm .17]

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APPLICATION POLICY

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



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