DANA SPICER®
Off-Highway Products

Service Manual

Converter C8000

Allied Form # 80-900 Rev 2-2011

CSM-0006
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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 principal of operation, trouble shooting and adjustments, it is urged that the mechanic study the instructions in this manual carefully and use it as a reference when performing maintenance and repair operations.

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

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NOTE: Metric Dimensions Shown in Brackets [ ].

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:

Internal Oil Flow Torque Converter

Torque Converter Assembly

External Oil Flow—Converter and Transmission

TORQUE CONVERTER ASSEMBLY

The torque converter assembly is composed of: (1) Torque Converter, (2) Output Shaft for driving the transmission, (3) Coupling and Flange to mount the converter charging pump to supply oil under pressure to operate transmission clutches and for converter cooling.

The torque converter is composed of four members: the impeller which is the driving member, the turbine, which is the driven member, the reaction member which is splined on a fixed support, and the drive disc, which couples the converter to the engine. The impeller and drive disc members 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 members. The reaction member is splined to the converter support which is fixed and does not rotate in either direction. A gear is splined to the impeller hub and drives through gears rotating the hydraulic pumps mounted on the converter housing cover.

HOW THE UNITS OPERATE—

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

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

After entering the converter, the oil is directed through the stator support to the converter cavity and exits between the turbine shaft and converter support. The oil then passes through an oil distributor which directs the oil out of the converter by way of a down stream regulator valve and then to the oil cooler. After leaving the cooler the oil is directed through a hose to the lubricating oil inlet on the transmission, then through a series of tubes to the transmission, bearings, and clutches. The oil then returns to the transmission sump.

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

The rear compartment of the converter unit also houses the converter output shaft. A flexible hose provides an overflow to the transmission sump.

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

Converter "Stall" is achieved whenever the turbine and turbine shaft are stationary and the engine is operating at full power or wide open throttle. CAUTION: Do not maintain "Stall" for more than 30 seconds at a time. Excessive heat will be generated and may cause converter or transmission seal damage.

In converters equipped with Lock-up clutches, a hydraulic clutch, similar to the transmission clutches is used to "lock" the engine mechanically to the output shaft. This is accomplished by hydraulic pressure actuating the lock-up clutch which in turn locks the impeller cover to the turbine hub. During lock-up the converter turns at 1 to 1 speed ratio.

The down stream regulator valve on the converter consists of a valve body and regulator spool. The spool is backed up by a spring to hold the valve until converter oil pressure builds up to specified pressure. The valve is used to maintain a given converter pressure to insure proper performance under all conditions.

The control valve assembly on the transmission consists of a valve body with selector valve spools connected to the steering column by exterior linkage. A detent ball and spring in the selector spool provides four positions, one position for each speed range. A detent ball and spring in the direction spool provides three positions, one each for forward, neutral, and reverse.

On certain models, this valve also contains a shut-off valve spool operated by an air or hydraulic cylinder located on the control cover. This valve is connected to the brake system by a hose line. When the wheel brakes are applied, air or hydraulic fluid enters the valve and overcomes a spring force. This forces the spool to shift over and block pressure from entering the directional clutches. In this manner a "neutral" is established without moving the control levers.

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

The direction or speed clutch assembly consists of a drum with internal gear teeth and a bore to receive a hydraulically actuated piston. A piston is inserted into the bore of the drum. The piston is "oil tight" by the use of sealing rings. A friction disc with internal teeth is inserted into the drum and rests against the piston. Next, a disc with splines at the outer diameter is inserted. Discs are alternated until the required total is achieved. After inserting the last disc, a series of springs and pins are assembled in such a manner that these springs rest on teeth of the piston. A heavy back-up plate is then inserted and secured by a snap ring. A hub with I.D. and O.D. splines is inserted into the splines of discs with teeth on the inner diameter and a splined shaft extending through the clutch support. This hub is retained by a snap ring. The discs and inner shaft are free to increase in speed or rotated in the opposite direction as long as no pressure is present in the direction or speed clutch.

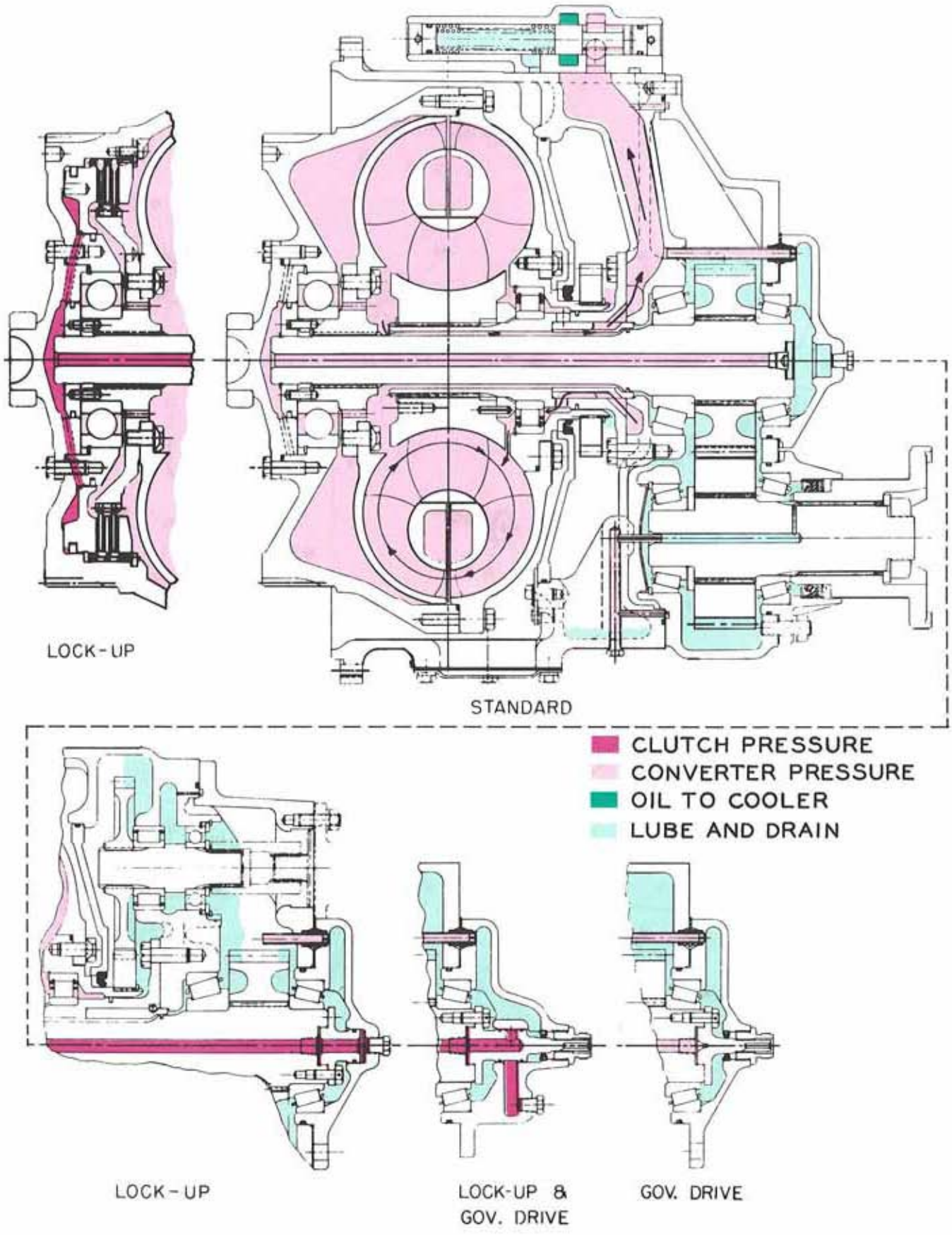
To engage the clutch, as previously stated, the control valve is placed in the desired position. This allows oil under pressure to flow from the control cover valve, through a tube in the transmission case, to a chosen clutch. Once into the drum, oil is directed through a drilled hole into the rear side of the piston bore. Pressure of the oil forces the piston and discs over against the heavy back-up plate. The discs, with teeth on the outer diameter, clamping against discs, with teeth on inner diameter, enables the clutch drum and drive shaft to be locked together and allows them to turn as a unit.

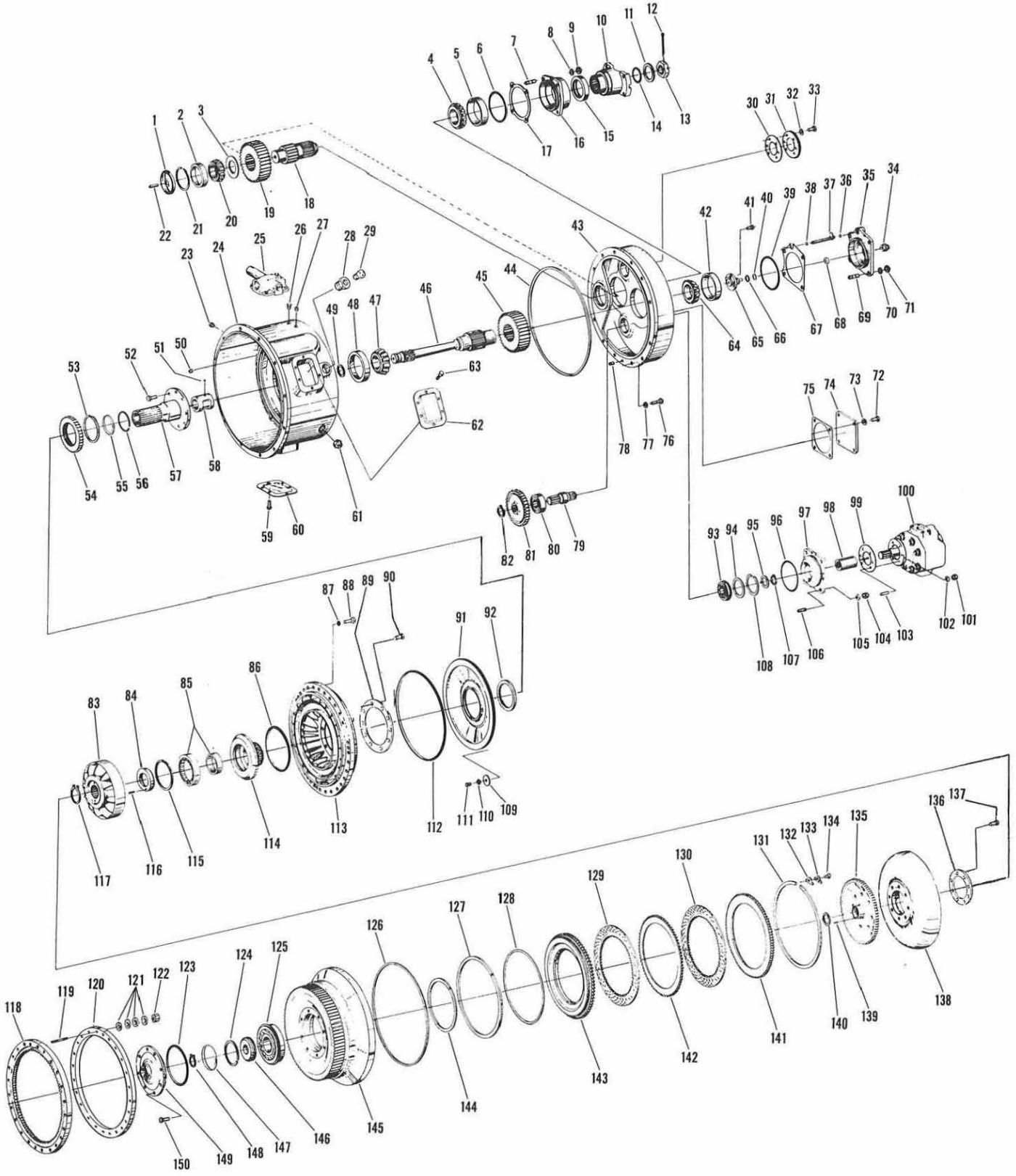
There are bleed balls in the clutch drums which allow quick escape for oil when the pressure to the piston is released.

The transmission gear train consists of six shafts: (1) Input Shaft, (2) Reverse Shaft, (3) Idler Shaft, (4) First and Third Shaft, (5) Second and Fourth Shaft, (6) Output Shaft.

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

Some transmissions may have an axle declutching unit as optional equipment, this unit consists of a split output shaft with a sliding splined sleeve to engage or disengage the axle. This is accomplished by manually shifting a lever in the operator's compartment which is mechanically connected to the shift fork on the clutching unit sliding sleeve. This unit, of course, is only used on the four wheel drive machine. On the front drive only or the rear wheel drive only, the output shaft is on one piece type and an output flange assembled only on the required end.

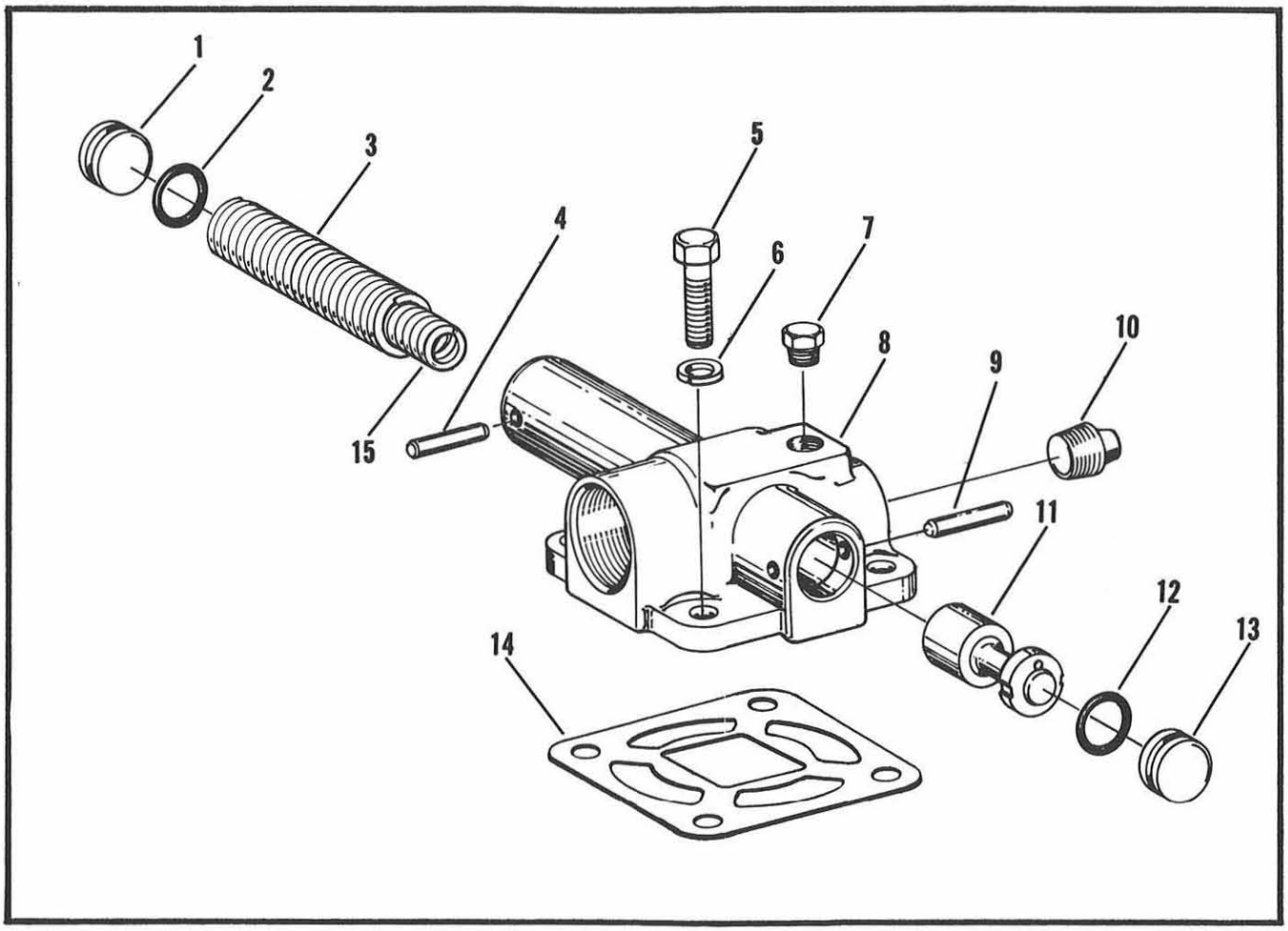

LOCK-UP
STANDARD
CLUTCH PRESSURE
CONVERTER PRESSURE
OIL TO COOLER
LUBE AND DRAIN
LOCK-UP
LOCK-UP &
GOV. DRIVE
GOV. DRIVE



ITEM	DESCRIPTION	QTY
1	Oil Baffle	1
2	Front Bearing Cup	1
3	Front Bearing Spacer	1
4	Rear Bearing Cone	1
5	Rear Bearing Cup	1
6	Bearing Cap "O" Ring	1
7	Bearing Cap Stud	4
8	Bearing Cap Stud Lockwasher	4
9	Bearing Cap Stud Nut	4
10	Flange	1
11	Flange Washer	1
12	Flange Nut Cotter Pin	1
13	Flange Nut	1
14	Flange "O" Ring	1
15	Oil Seal	1
16	Bearing Cap	1
17	Bearing Cap Shim	AR
18	Output Shaft	1
19	Output Shaft Gear	1
20	Front Bearing Cone	1
21	Front Bearing Snap Ring	1
22	Oil Tube	1
23	Pipe Plug	1
24	Converter Housing	1
25	Downstream Pressure Regulating Valve Assembly	1
26	Pipe Plug	1
27	Pipe Plug	1
28	Reducing Bushing	1
29	Air Breather and Check Valve Assembly	1
30	Pump Hole Cover Gasket	1
31	Pump Hole Cover	1
32	Cover Screw Lockwasher	3
33	Cover Screw	3
34	Tube Nut	1
35	Bearing Cap	1
36	Lube Tube "O" Ring	1
37	Lube Tube	1
38	Lube Tube "O" Ring	1
39	Bearing Cap "O" Ring	1
40	Piston Ring	1
41	Adaptor to Shaft Screw	3
42	Bearing Cup	1
43	Housing Rear Cover	1
44	Cover to Housing "O" Ring	1
45	Turbine Shaft Gear	1
46	Turbine Shaft	1
47	Bearing Cone	1
48	Bearing Cup	1
49	Piston Ring	1
50	Pipe Plug	1
51	Ball	1
52	Support to Housing Screw	8
53	Gear Snap Ring	1
54	Oil Pump Drive Gear	1
55	Piston Ring Expander Spring	1
56	Piston Ring	1
57	Stator Support	
58	Oil Distributor Sleeve	1
59	Housing Inspection Screw and Lockwasher	4
60	Housing Inspection Cover	2
61	Drain Plug	4
62	Housing Inspection Cover	1
63	Housing Inspection Screw and Lockwasher	2
64	Bearing Cone	1
65	Lock-Up Adaptor	1
66	Piston Ring	1
67	Bearing Cap Shim	AR
68	Bearing Cap Oil Seal	1
69	Bearing Cap Stud	4
70	Bearing Cap Stud Lockwasher	4
71	Bearing Cap Stud Nut	4
72	Permanent Pump Hole Cover Screw	4
73	Permanent Pump Hole Cover Screw Lockwasher	4
74	Permanent Pump Hole Cover	1
75	Permanent Pump Hole Cover Gasket	1

ITEM	DESCRIPTION	QTY
76	Cover to Housing Screw	12
77	Cover to Housing Screw Lockwasher	12
78	Dowel Pin	1
79	Pump Drive Shaft	3
80	Pump Shaft Front Bearing	3
81	Pump Driven Gear	3
82	Driven Gear Snap Ring	3
83	Reaction Member	1
84	Reaction Member Spacer	1
85	Impeller Hub Bearing	1
86	Impeller Hub "O" Ring	1
87	Impeller to Cover Screw Lockwasher	32
88	Impeller to Cover Screw	32
89	Impeller Hub Screw Backing Ring	1
90	Impeller Hub Screw	8
91	Oil Baffle	1
92	Oil Seal	1
93	Pump Shaft Rear Bearing	3
94	Rear Bearing Washer - Outer	3
95	Rear Bearing Washer - Inner	3
96	Pump Adaptor "O" Ring	1
97	Pump Adaptor	1
98	Pump Drive Sleeve	1
99	Pump Gasket	1
100	Converter Charging Pump	1
101	Pump Mounting Stud Nut	3
102	Pump Mounting Stud Lockwasher	3
103	Pump Mounting Stud	3
104	Stud Nut	4
105	Stud Nut Lockwasher	4
106	Stud	4
107	Inner Washer Snap Ring	3
108	Bearing Washer Snap Ring	3
109	Oil Baffle Screw Washer	3
110	Oil Baffle Screw Lockwasher	3
111	Oil Baffle Screw	3
112	Oil Baffle "O" Ring	1
113	Impeller	1
114	Impeller Hub	1
115	Impeller Hub Bearing Snap Ring	1
116	Reaction Member Spacer Roll Pin	1
117	Reaction Member Snap Ring	1
118	Ring Gear	1
119	Ring Gear Stud	24
120	Ring Gear Backing Plate	1
121	Ring Gear Belleville Washer	96
122	Ring Gear Stud Nut	24
123	Impeller Cover Bearing Cap "O" Ring	1
124	Piston Ring	1
125	Front Bearing	1
126	Impeller to Cover "O" Ring	1
127	Piston Ring - Outer	1
128	Lock-Up Piston "O" Ring	1
129	Lock-Up Inner Disc	1
130	Lock-UP Inner Disc	1
131	Backing Plate Snap Ring	1
132	Snap Ring Lock Plate	1
133	Screw Lock Plate	1
134	Lock Plate Screw	1
135	Turbine and Lock-Up Hub	1
136	Turbine Hub Screw Backing Ring	1
137	Turbine Hub Screw	8
138	Turbine	1
139	Dowel Pin	2
140	Hub Snap Ring	1
141	Lock-Up Backing Plate	1
142	Lock-Up Outer Disc	1
143	Lock-Up Piston	1
144	Piston Ring - Inner	1
145	Impeller Cover	1
146	Bearing Retainer	1
147	Piston Ring Expander Spring	1
148	Snap Ring	1
149	Impeller Cover Bearing Cap	1
150	Impeller Cover Bearing Capscrew	8

AR - As Required

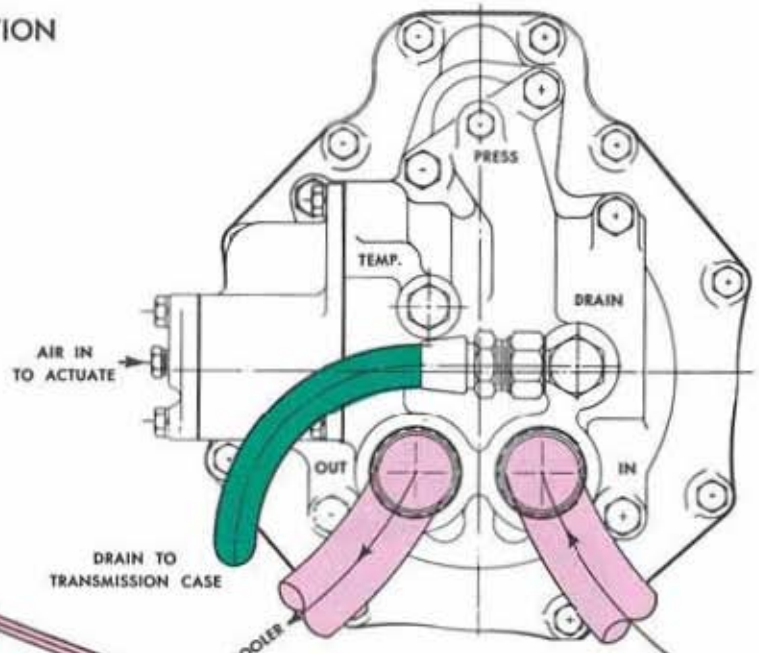


PRESSURE REGULATING VALVE

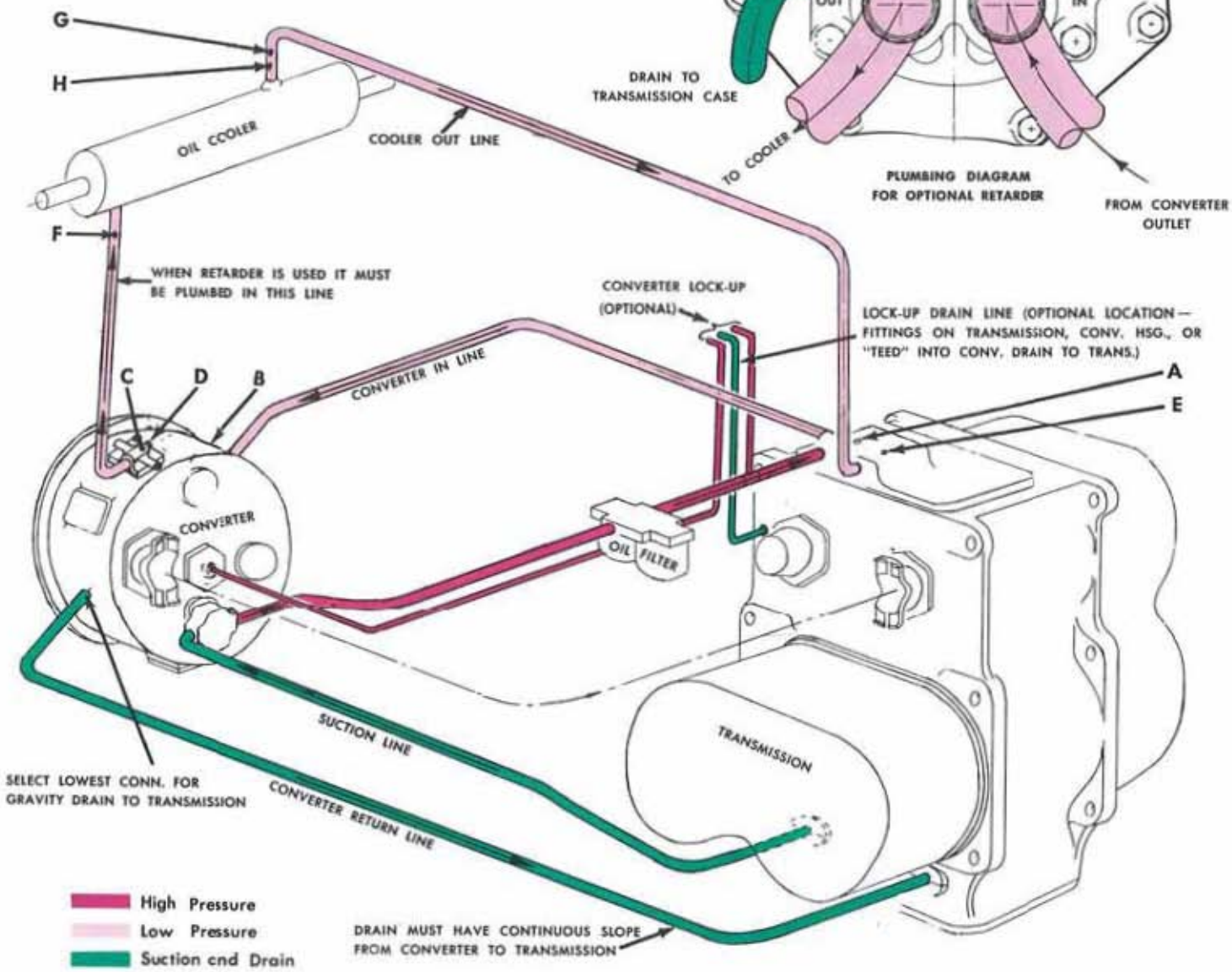
ITEM	QTY.	DESCRIPTION
1	1	Piston Stop
2	1	Piston Stop "O" Ring
3	1	Pressure Spring
4	1	Piston Stop Roll Pin
5	4	Valve to Housing Screw
6	4	Valve to Housing Screw Lockwasher
7	1	Pressure Tap Pipe Plug
8	1	Pressure Regulating Valve Body
9	1	Piston Stop Roll Pin
10	1	Pipe Plug
11	1	Regulating Valve Piston
12	1	Piston Stop "O" Ring
13	1	Piston Stop
14	1	Gasket
15	1	Regulator Spring

CHECK POINTS

A. CLUTCH PRESSURE
B. CONVERTER INLET
C. CONVERTER OUTLET
D. CONVERTER TEMPERATURE CONNECTION
E. LUBE PRESSURE
F. COOLER INLET PRESSURE
G. COOLER OUTLET PRESSURE
H. COOLER OUTLET TEMPERATURE



PLUMBING DIAGRAM FOR OPTIONAL RETARDER



OVERHAUL 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 unit must be thoroughly cleaned to prevent the possibility of dirt and foreign matter entering the mechanism.

DISASSEMBLY OF THE TORQUE CONVERTER

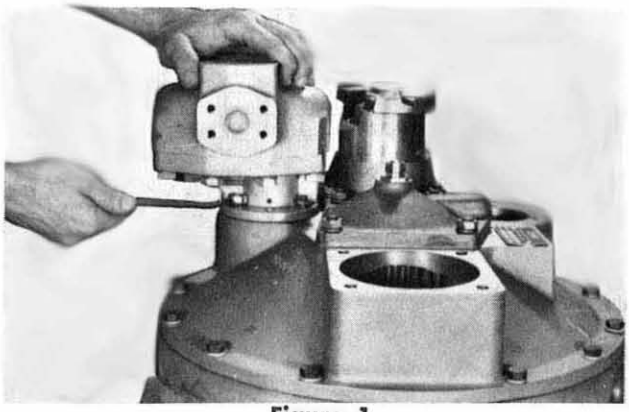


Figure 1

Remove pump stud nuts and washers.

Figure 2

Remove pump assembly and drive sleeve.

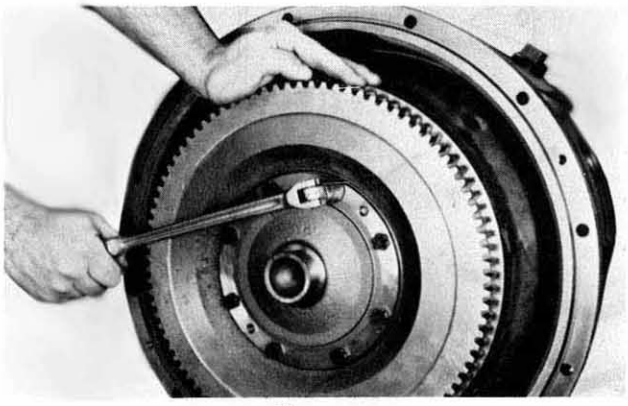


Figure 3

Remove impeller cover bearing cap bolts.

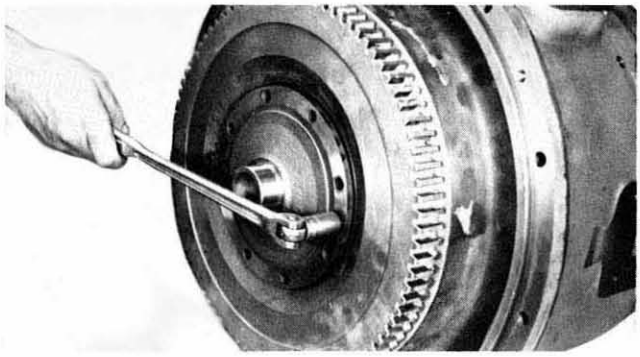


Figure 4

Install two bolts in threaded holes in bearing cap. Turn bolts evenly and remove bearing cap.

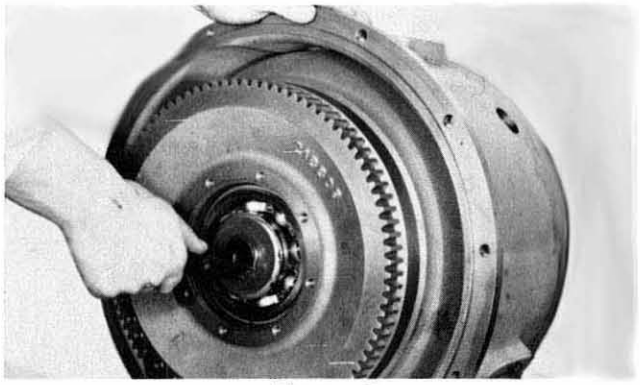


Figure 5

Remove bearing retainer plate snap ring.

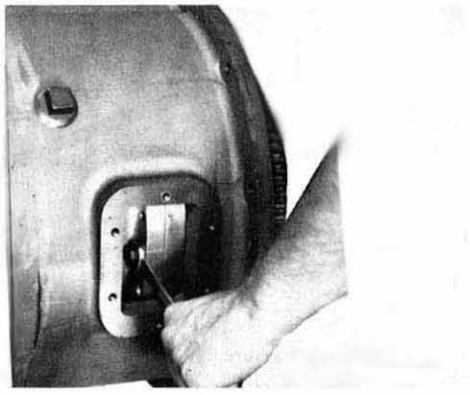


Figure 6

Remove impeller to impeller cover bolts.

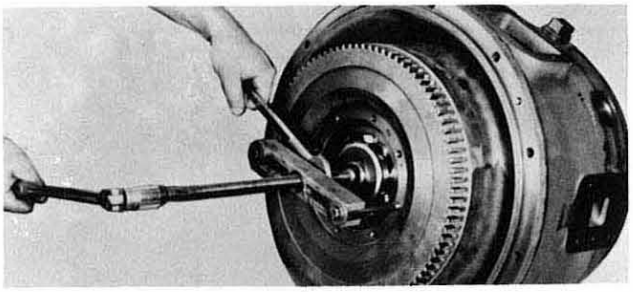


Figure 7

Using a puller as shown in Figure 7, remove bearing retainer plate, impeller cover, and turbine from turbine shaft. **CAUTION:** Secure impeller cover with a chain to prevent assembly from dropping.

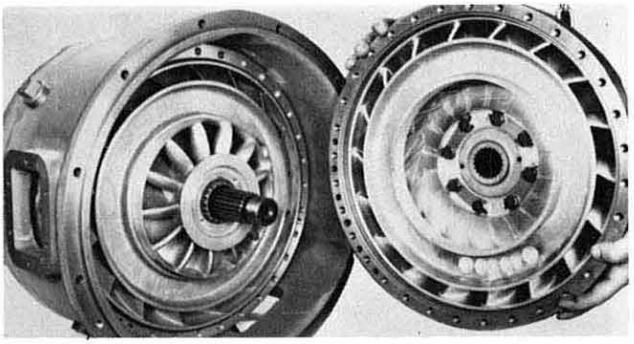


Figure 8

Turbine and impeller cover removed. Block impeller cover on the outer diameter and drive turbine hub from impeller bearing.

If lock-up is not used, omit Figure 9 through 15 and refer to Figure 16.

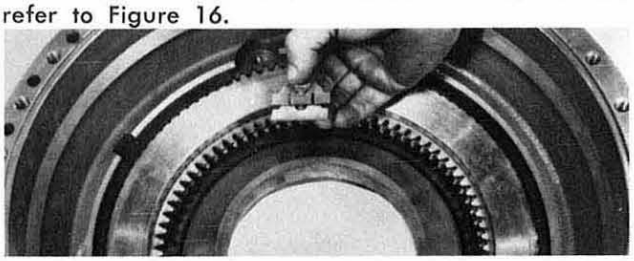


Figure 9

Straighten tangs on bolt lock and remove bolt, bolt lock and snap ring lock from lock-up cover.

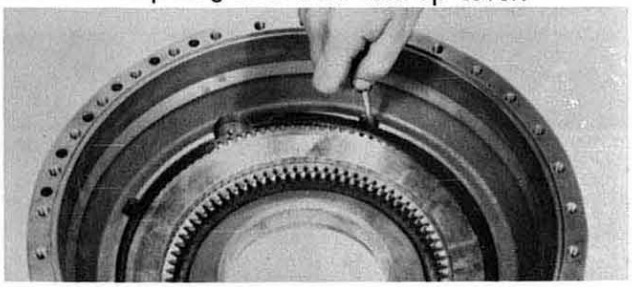


Figure 10

Remove backing plate retainer ring.

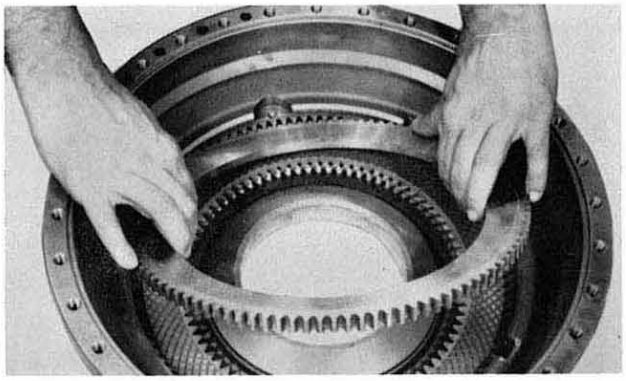


Figure 11

Remove backing plate.

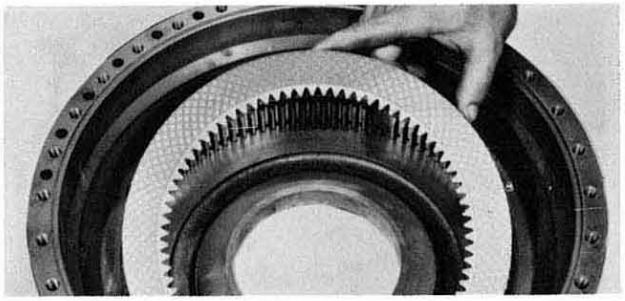


Figure 12

Remove inner and outer lock-up discs

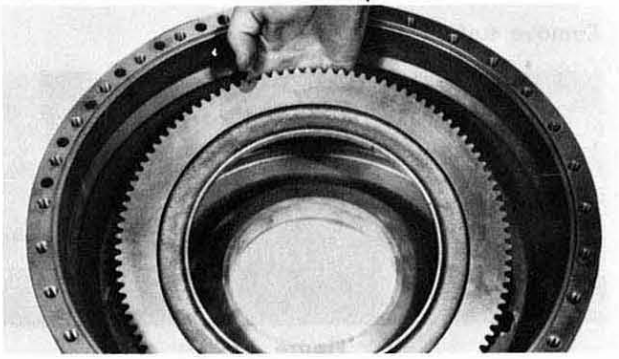


Figure 13

Remove lock-up piston.

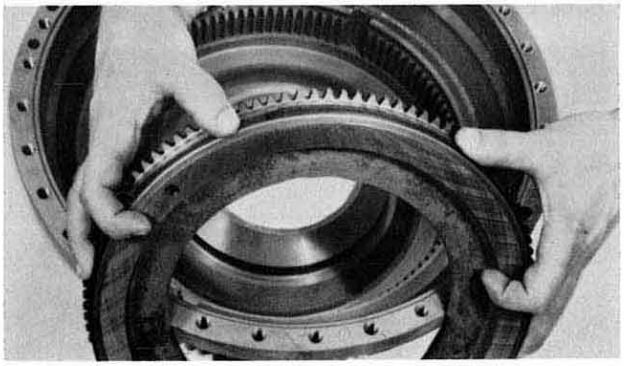


Figure 14

Remove lock-up piston outer sealing ring and "O" ring.

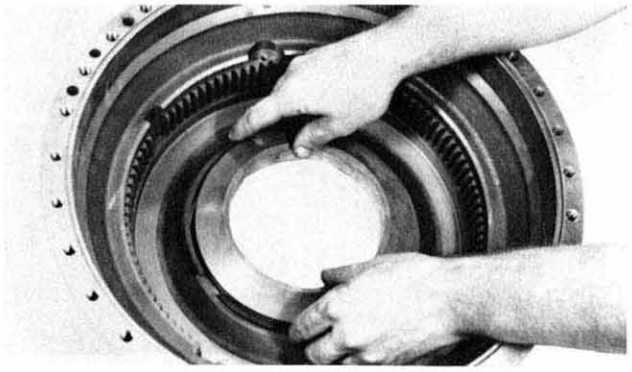


Figure 15

Remove lock-up piston inner sealing ring.

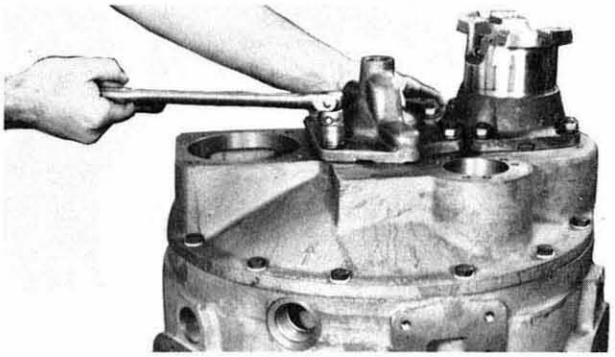


Figure 16

Remove turbine shaft bearing cap.

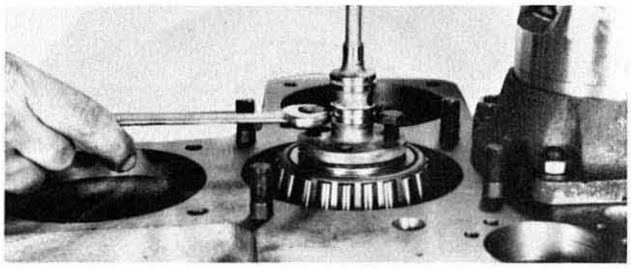


Figure 17

Remove lock wire and adaptor bolts from adaptor. Install two bolts in threaded holes in adaptor. Turn bolts evenly and remove adaptor.

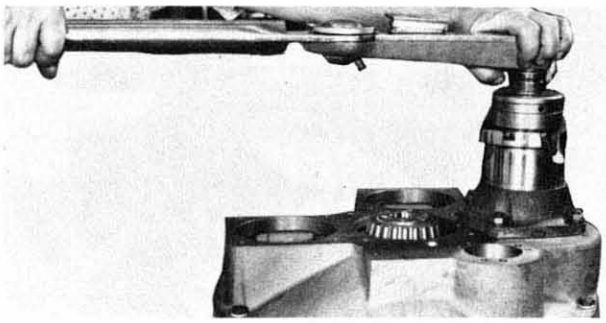


Figure 18

Lock output gears with a soft bar and remove output flange nut. Remove flange washer, "O" ring and flange.

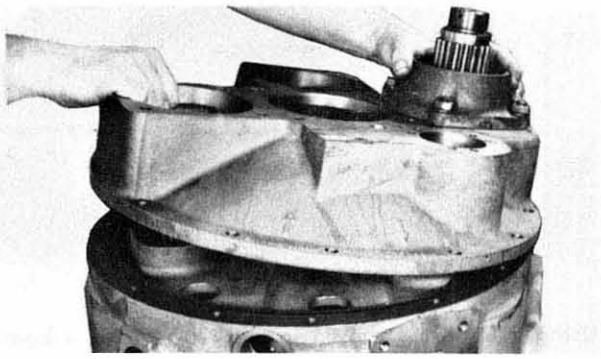


Figure 19

Remove rear housing cover bolts. Remove rear housing.

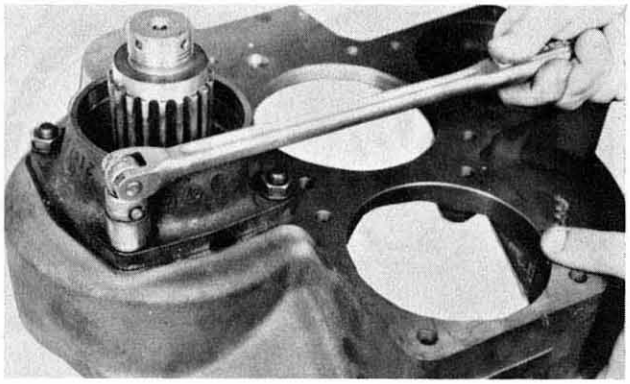


Figure 20

Remove output shaft bearing cap.

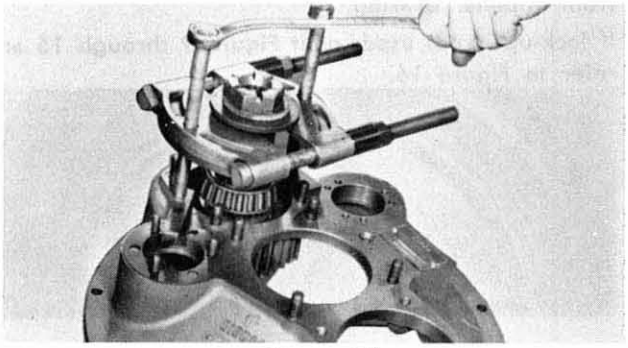


Figure 21

Using a split puller as shown remove output shaft and outer taper bearing.

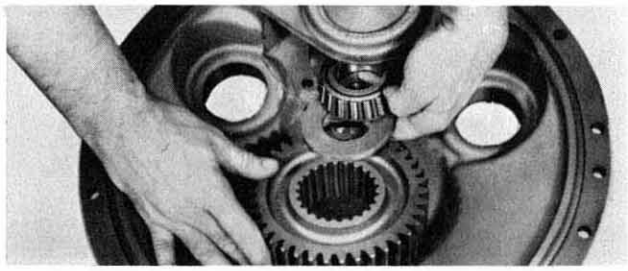


Figure 22

Remove output gear, washer and inner taper bearing from rear housing.

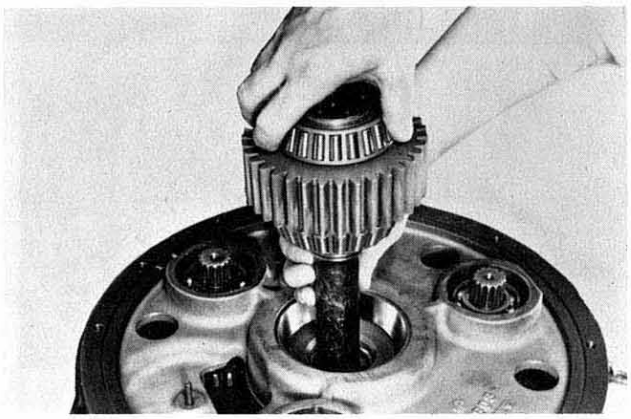


Figure 23

Remove turbine shaft and bearing assembly from converter housing.

Figure 24

Remove three (3) oil baffle retainer bolts and washers from housing.

Figure 25

Remove reaction member retainer ring.

Figure 26

Remove reaction member from stator support. If reaction member is tight, threaded holes are provided to pull same from stator support.

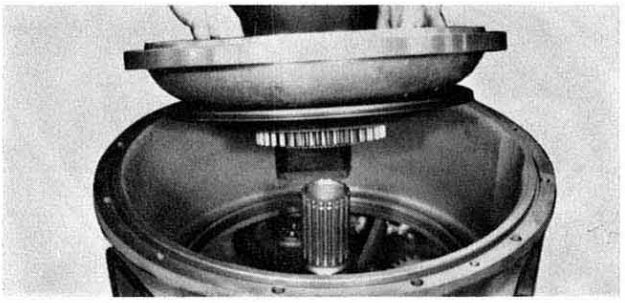


Figure 27

Remove impeller and baffle assembly from converter housing.

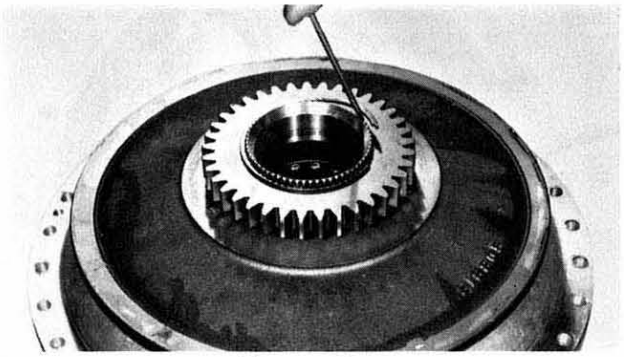


Figure 28

Remove pump drive gear retainer ring. Remove pump drive gear and oil baffle from impeller hub.

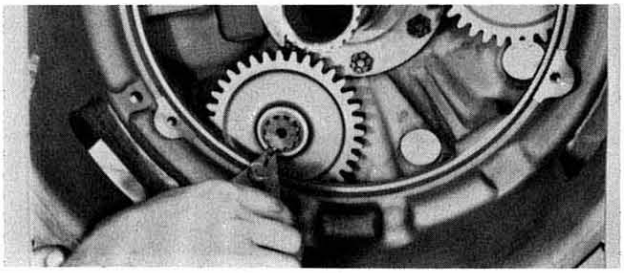


Figure 29

Remove pump driven gear retainer rings.

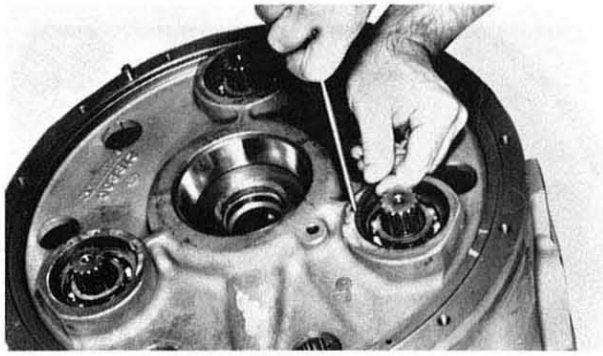


Figure 30
Remove pump shaft rear bearing retainer ring and washer.

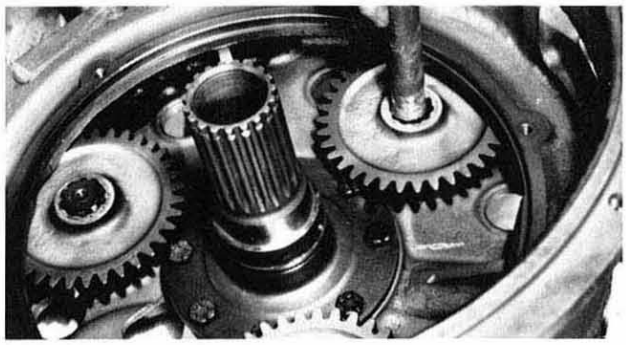


Figure 31
Using a soft bar tap pump shaft assemblies from converter housing.

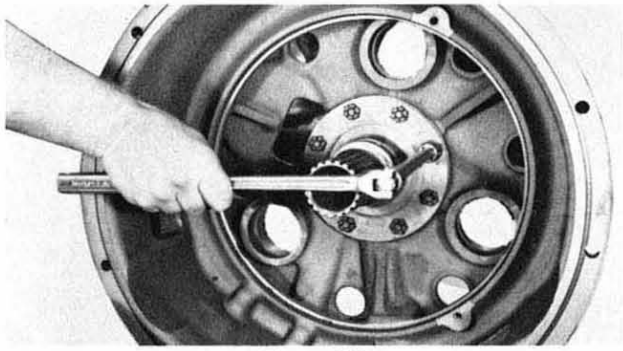


Figure 32
Remove bolts from stator supports.

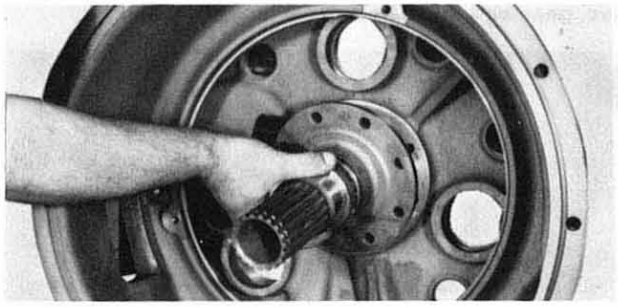


Figure 33
Remove stator support.

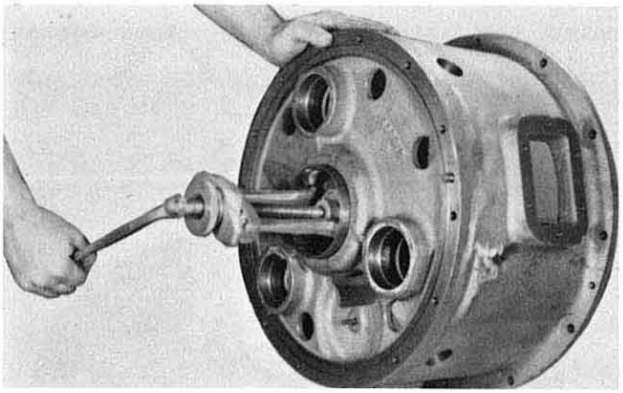


Figure 34
If inner turbine shaft bearing cup is to be replaced remove as shown in Figure 34.

CLEANING AND INSPECTION

CLEANING

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

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

Bearings

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

Housings

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

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

All parts cleaned must be thoroughly dried 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 recommended type Automatic Transmission Fluid and wrap in clean lintless cloth or paper to protect them until installed.

Oil Seals, Gaskets, Etc.

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

Gears and Shafts

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

Housing, Covers, etc.

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

NOTE: If converter housing is replaced, see page 31 for speed sensor bushing installation.

REASSEMBLY OF TORQUE CONVERTER

Instructions given below on reassembly of components are given in the sequence that must be followed in rebuilding.

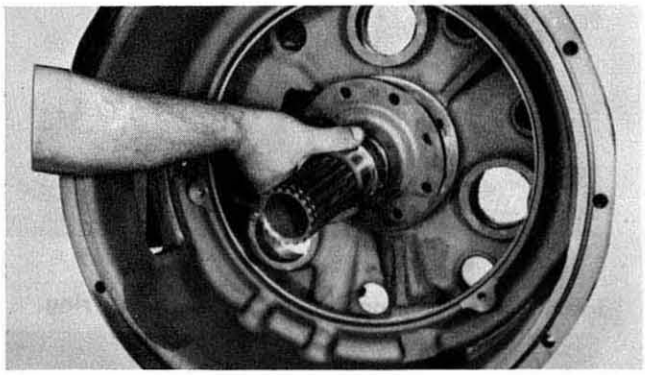


Figure 35

Install stator support.

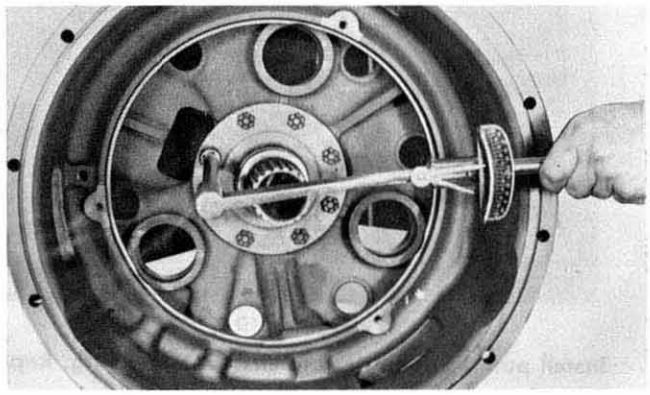


Figure 36

Install support self locking bolts and tighten 80 to 88 ft. lbs. torque [108,5 - 119,3 N.m].

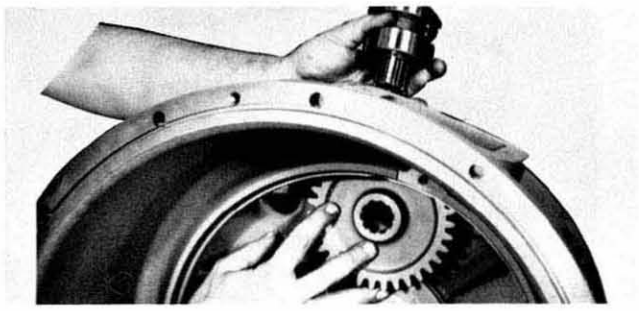


Figure 37

With pump driven gear in position, install shaft and bearing assembly through rear of case and into pump driven gear.

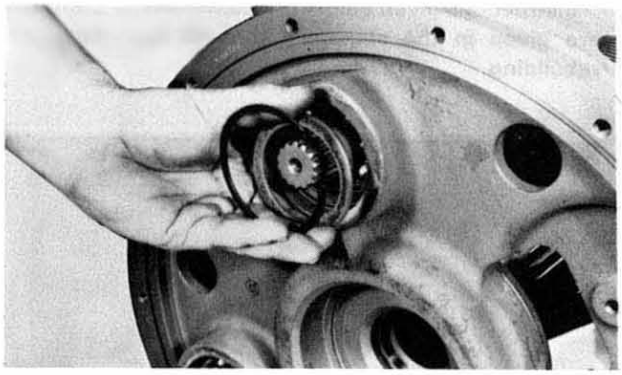


Figure 38

Install pump bearing retainer washer and ring.

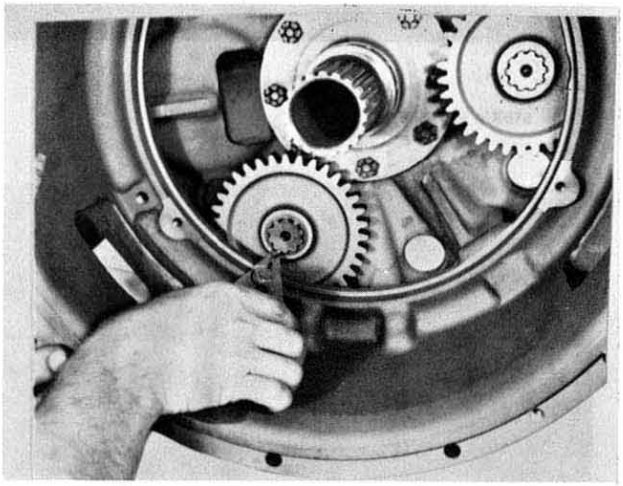


Figure 39

Install pump driven gear to shaft retainer ring. Repeat procedure for all pump shafts and gears.

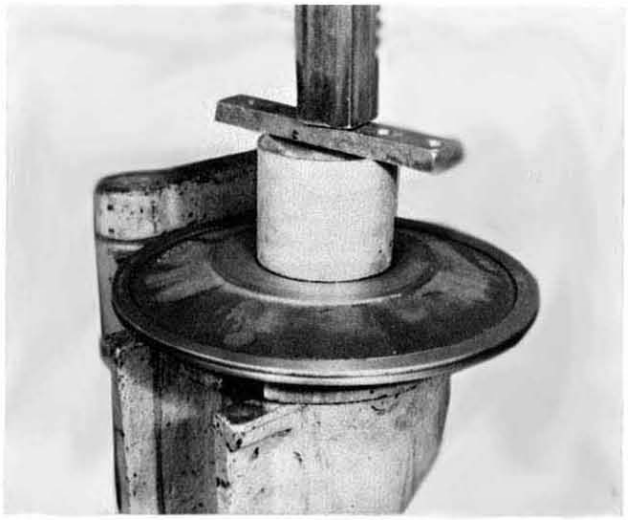


Figure 40

Apply a thin coat of No. 2 Permatex to outer diameter of oil seal and press into bore of oil baffle. Lip of seal must be upward.

NOTE: Before installing oil baffle remove impeller hub bolts and install new impeller to hub "O" ring.

Figure 41

Install oil baffle on impeller and hub assembly. Use caution as not to damage oil seal. Install pump drive gear and retainer ring.

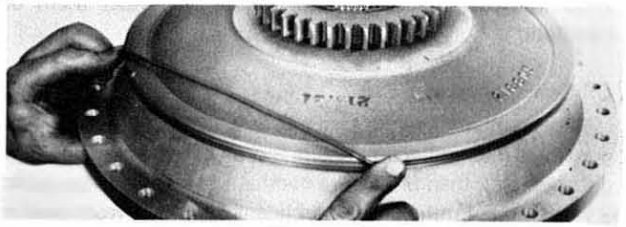


Figure 42

Install oil baffle "O" ring. Lubricate "O" ring with automatic transmission fluid.

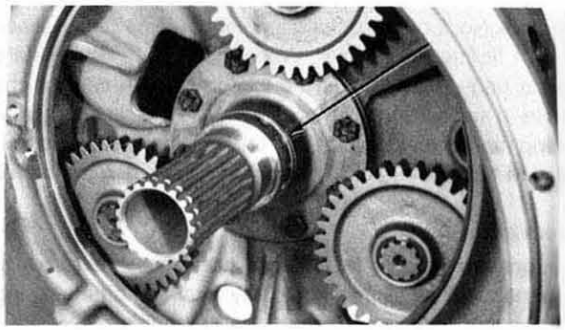


Figure 43

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

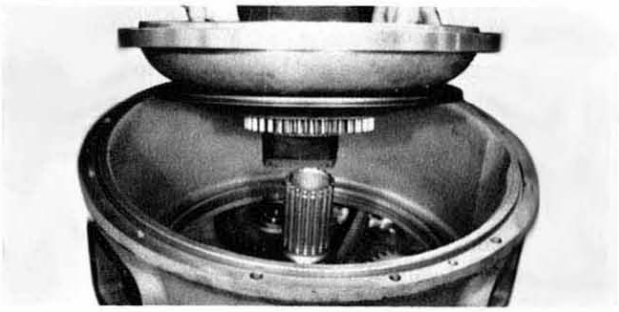


Figure 44

Install impeller and oil baffle assembly over stator support and into converter housing. Use caution as not to damage oil baffle "O" ring.

Figure 45

Install impeller hub bearing inner race.

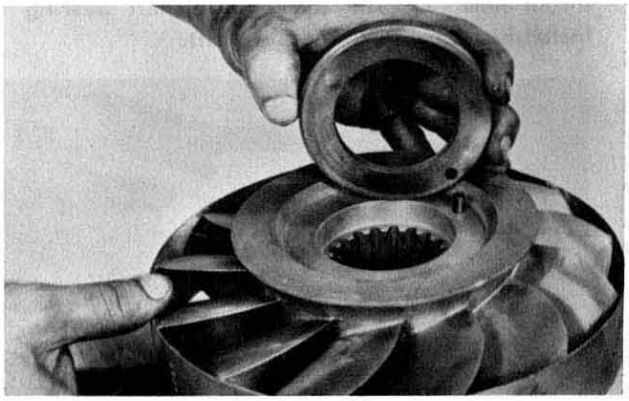


Figure 46

Press roll pin in reaction member. Press spacer on roll pin.

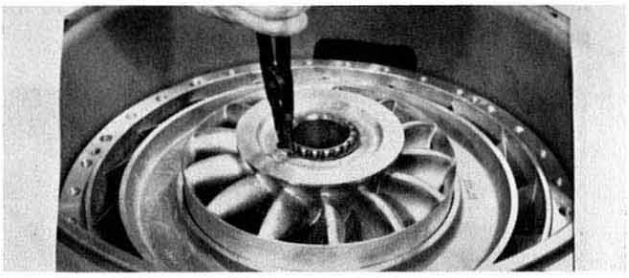


Figure 47

Install reaction member on stator support and secure with retainer ring.

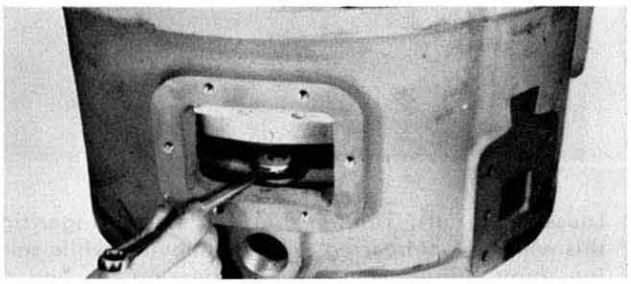


Figure 48

Install oil baffle lockwashers and flat washers on baffle bolts. Install bolts and washers in converter housing. Tighten evenly and securely.

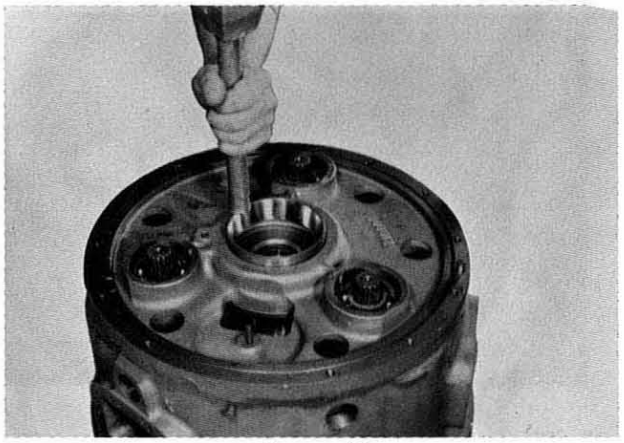


Figure 49

Using a soft bar install turbine shaft inner bearing cup.

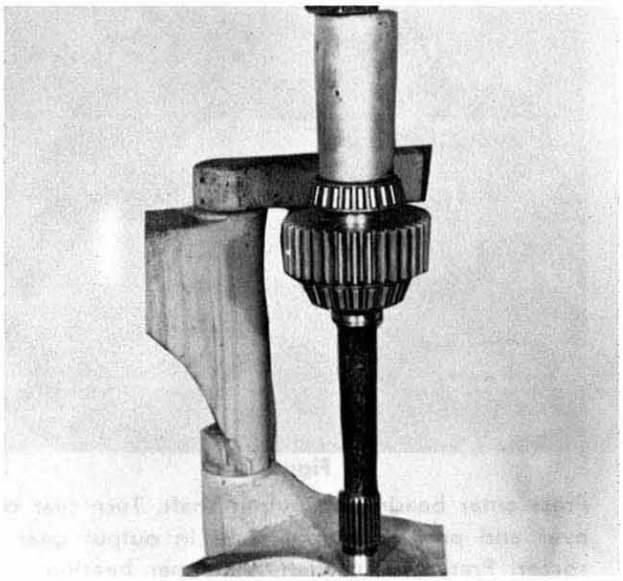


Figure 50

Install turbine shaft inner bearing, gear and outer bearing on shaft.

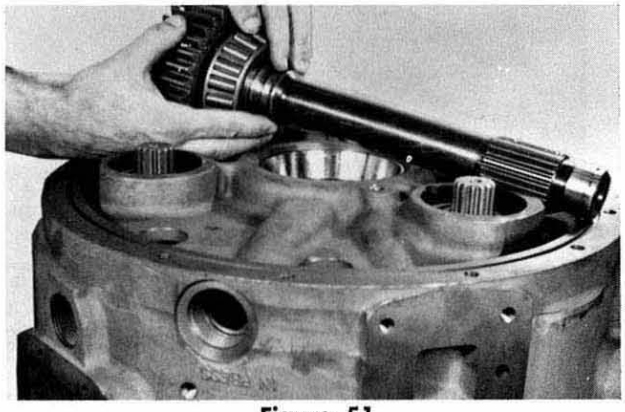


Figure 51

Install turbine shaft oil sealing ring. Block converte housing on pilot end and install turbine shaft assembly in converter housing.

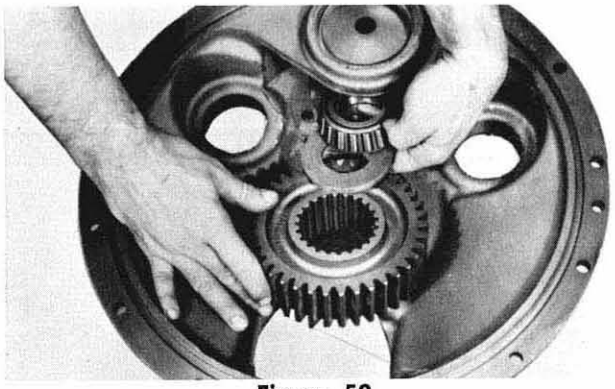


Figure 52

Position output shaft inner bearing, gear spacer and gear in converter housing rear cover.

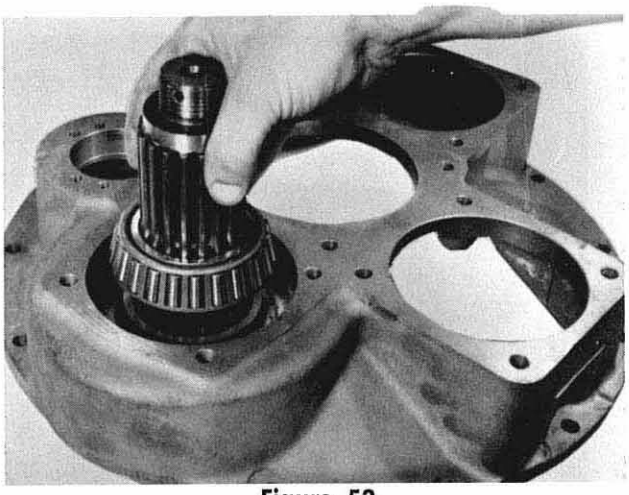


Figure 53

Press outer bearing on output shaft. Turn rear cover over and position output shaft in output gear and spacer. Press output shaft into inner bearing.

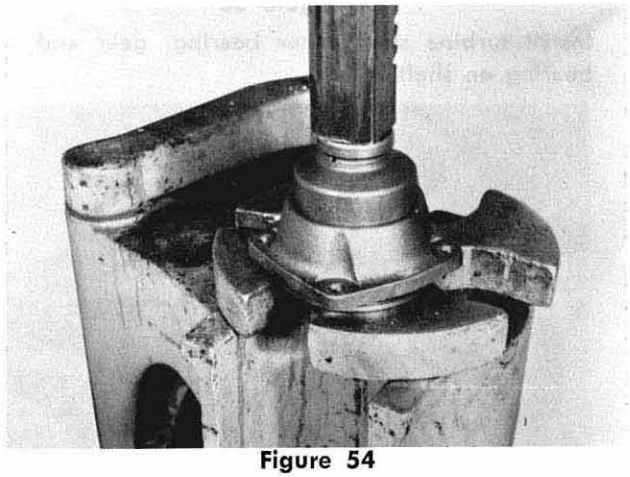


Figure 54

Apply a thin coat of Permatex No. 2 on the outer diameter of the output shaft oil seal. Press oil seal in bearing cap with lip of seal down.

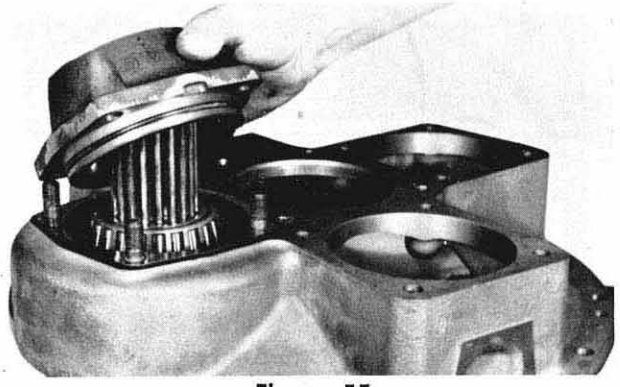


Figure 55

Install new "O" ring on output shaft bearing cap. Install bearing cap on output shaft.

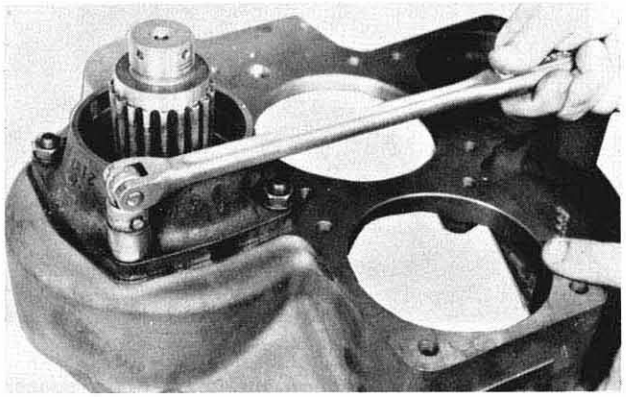


Figure 56

Install stud nuts and tighten securely. This is to insure proper seating of taper bearings.

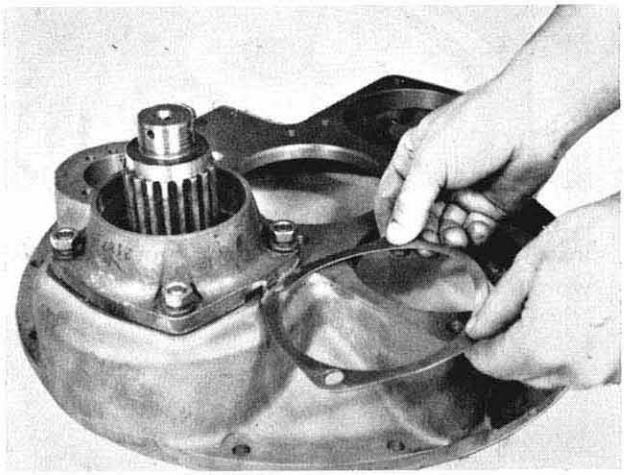


Figure 57

Loosen stud nuts. Tighten stud nuts evenly finger tight, this will prevent bearing cap from moving while selecting shims. Check gap between bearing cap and rear cover with shims used as a feeler gauge. **REMOVE** sufficient shims to produce a .002" [0, 050 mm] tight condition. **EXAMPLE:** Gap is .010" [0, 254 mm]; final shim pack thickness to .008" [0, 203 mm].

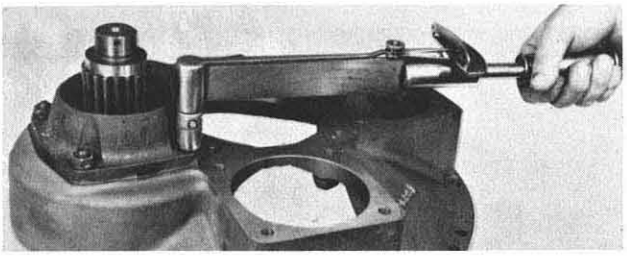


Figure 58

Install shim pack, bearing cap, stud lockwashers and stud nuts. Tighten nuts to 64 to 70 ft. lbs. torque [86,8 - 94,9 N.m].

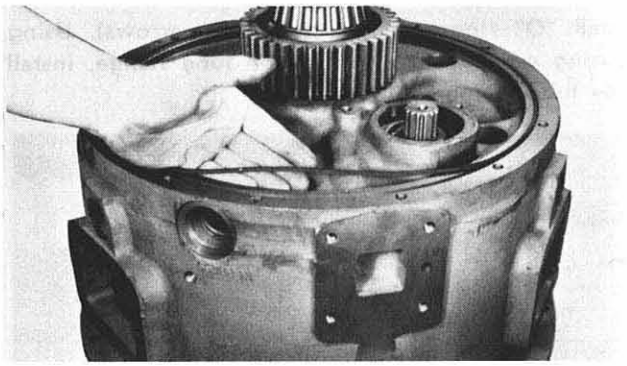


Figure 59

Install converter housing to rear cover "O" ring.

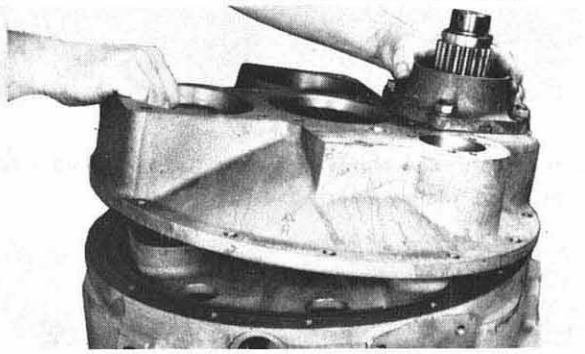


Figure 60

Install rear cover and output shaft on converter housing.

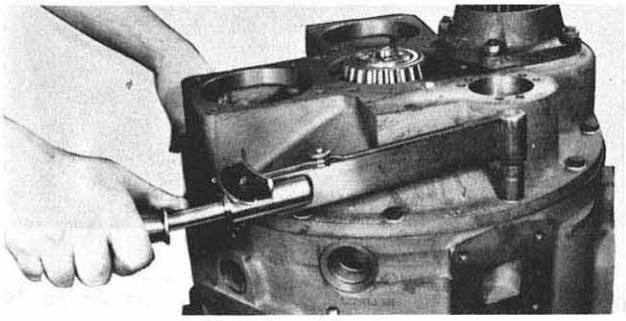


Figure 61

Install rear cover bolts and lockwashers. Tighten bolts 41 to 45 ft. lbs. torque [55,6 - 61,0 N.m].

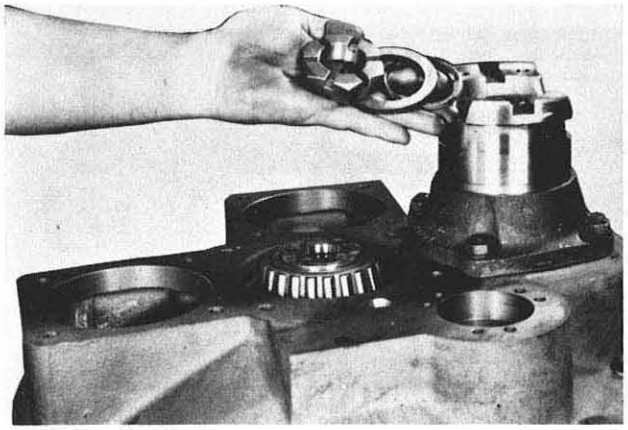


Figure 62

Using a soft bar, lock converter output gears. Install output flange, flange "O" ring, washer, and nut.

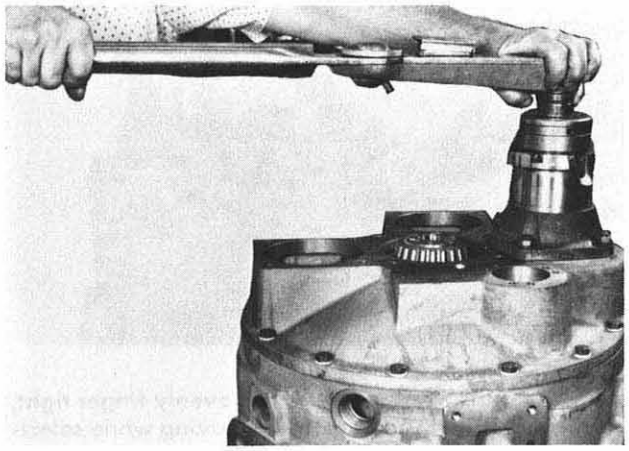


Figure 63

Tighten flange nut 250 to 300 ft. lbs. torque [339,0 - 406,7 N.m].

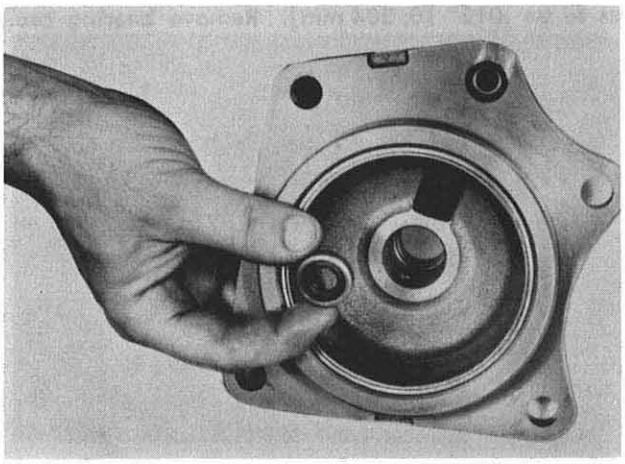


Figure 64

If governor drive is used, install new oil seal (lip of seal up) in turbine shaft bearing cap. Install turbine shaft outer bearing cup in bearing cap.

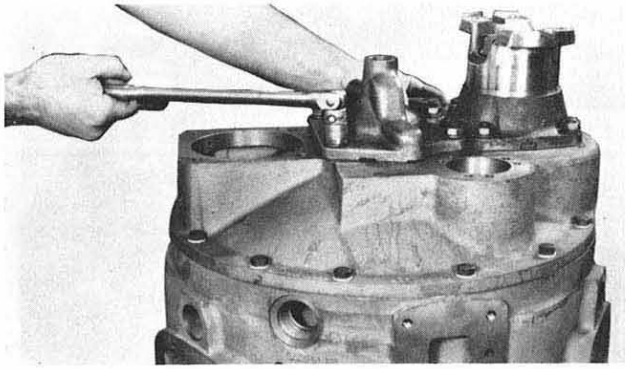


Figure 65

Install bearing cap on turbine shaft. Install stud nuts and tighten securely. This is to insure proper seating of taper bearings.

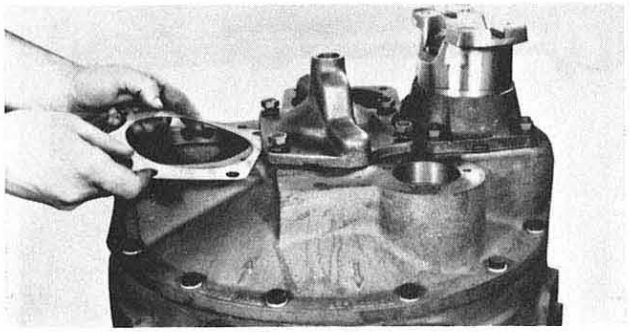


Figure 66

Loosen stud nuts. Tighten stud nuts evenly finger tight, this will prevent bearing cap from moving while selecting shims. Check gap between bearing cap and rear cover with shims used as a feeler gauge. **ADD** sufficient shims to produce a .002" [0, 050 mm] loose condition. **EXAMPLE:** Gap is .010" [0, 254 mm]; final shim thickness to be .012" [0, 304 mm]. Remove bearing cap.

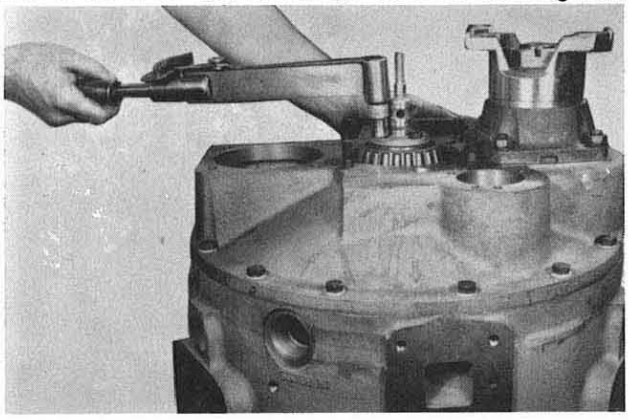


Figure 67

Install adaptor on turbine shaft. **NOTE:** Adaptor will vary for lock-up, lock-up and governor drive, and governor drive. Assembly and disassembly is the same for all. Install bolts and tighten 26 to 29 ft. lbs. torque [35,3 - 39,3 N.m].

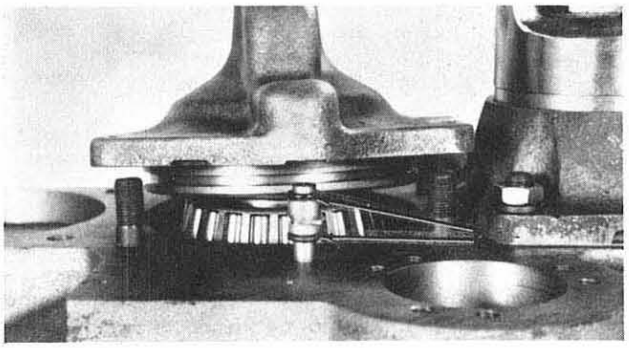


Figure 68

Install "O" rings on lube tube (see arrows). Using bearing cap as a guide for lube tube flange, install lube tube in rear housing.

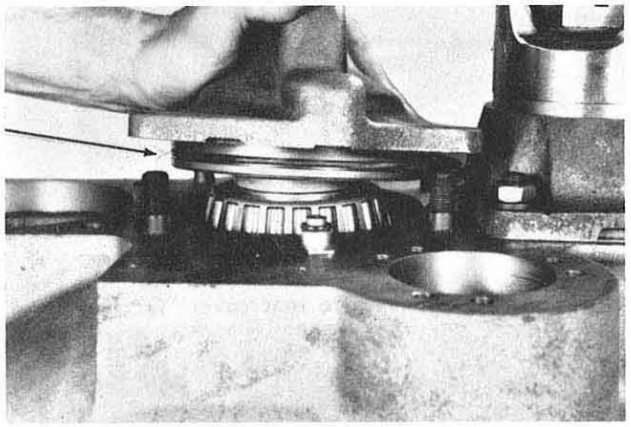


Figure 69

With bearing cap shims and new "O" ring (see arrow) in position install bearing cap.

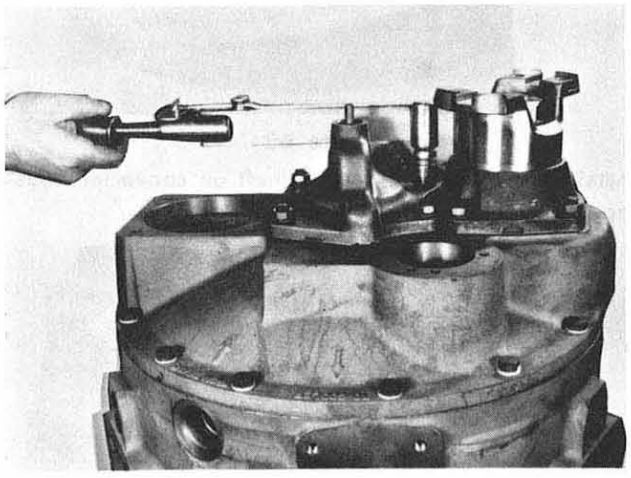


Figure 70

Install lockwashers and nuts. Tighten nuts 64 to 70 ft. lbs. torque [86,8 - 94,9 N.m].

If lock-up is used refer to Figure 71 through 87. If non lock-up is used refer to Figures 88 through 94.

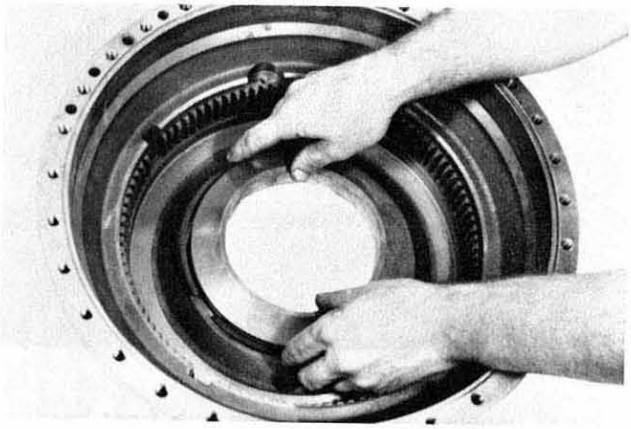


Figure 71

Install lock-up piston inner sealing ring.

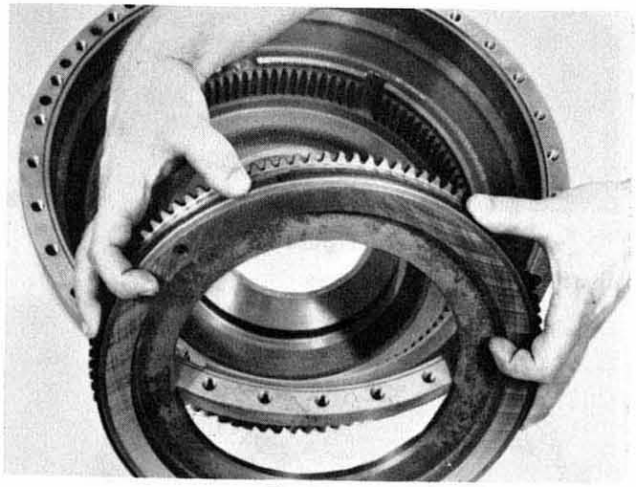


Figure 72

Install lock-up piston outer sealing "O" ring and piston outer lock joint sealing ring.

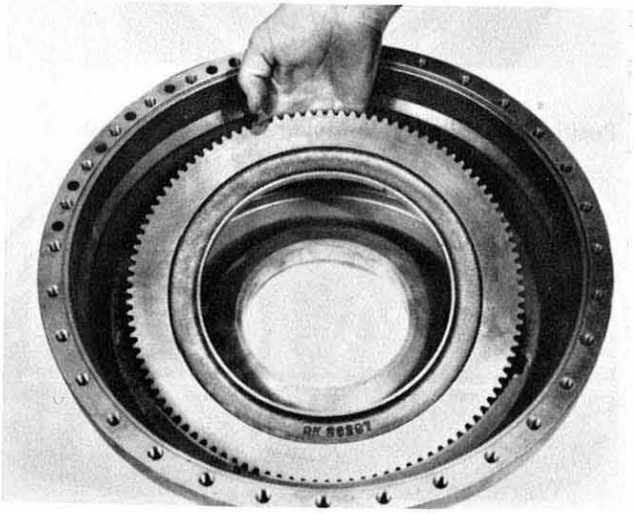


Figure 73

Install lock-up piston in impeller cover.

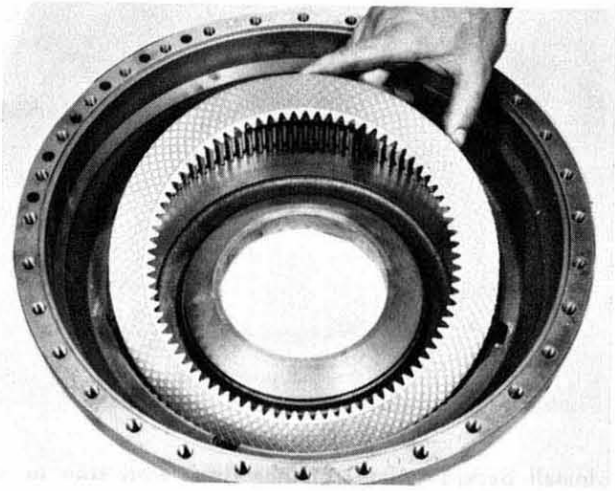


Figure 74

Install one (1) friction inner disc against lock-up piston.

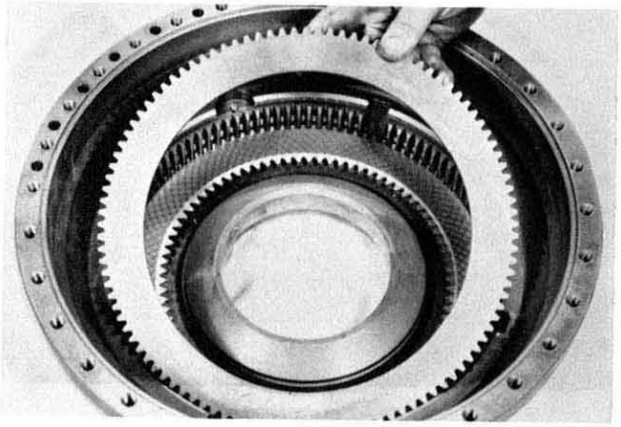


Figure 75

Install one (1) steel outer disc. Install friction inner disc against steel outer disc.

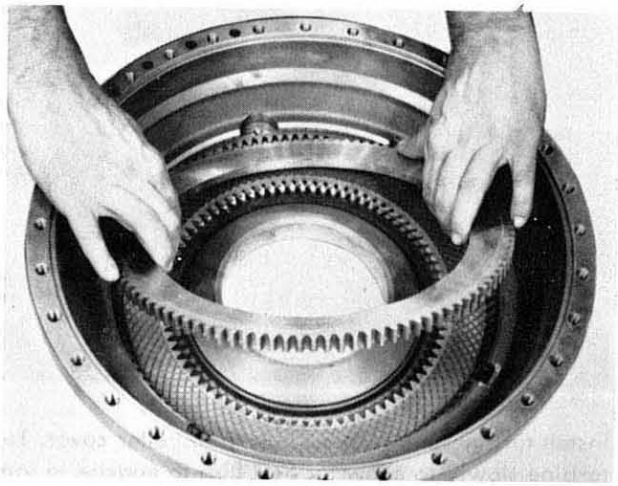


Figure 76

Install lock-up backing plate with flat side of plate against the last friction disc.

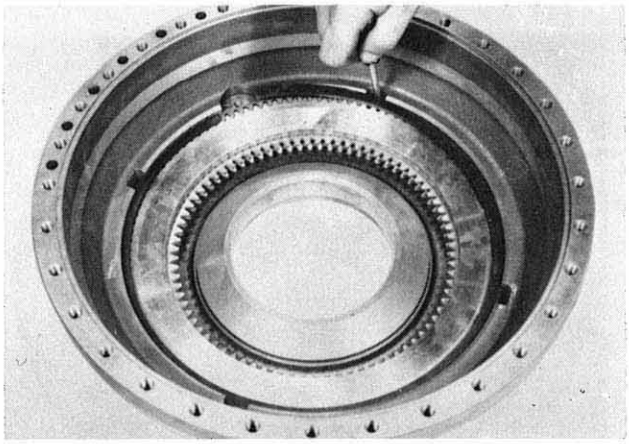


Figure 77

Install backing plate retainer ring, with split in ring at lock plate position.

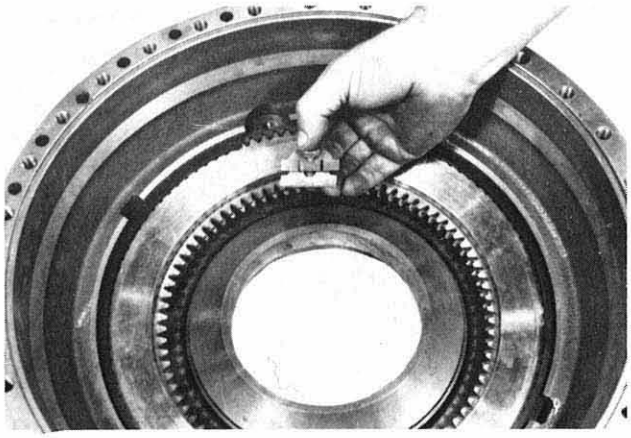


Figure 78

Install retainer ring lock, bolt lock and bolt. Tighten bolt to 12 to 16 ft. lbs. torque [16,3 - 21,7 N.m]. Bend tangs of bolt lock over head of bolt.

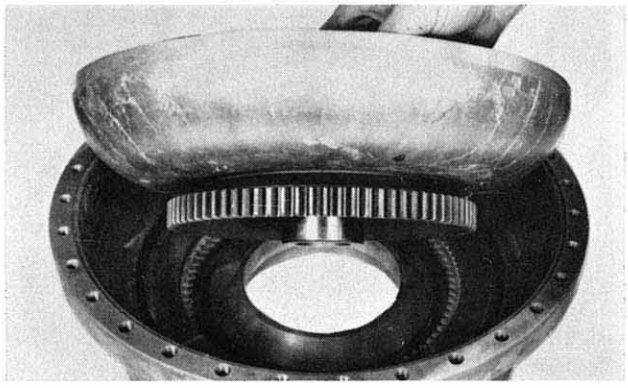


Figure 79

Install turbine and lock-up hub in impeller cover. Turn turbine slowly to allow lock-up hub to engage in inner lock-up discs. Do not force this operation. When turbine is in full position in lock-up discs, turn assembly over and block turbine to prevent it from dropping out of position.

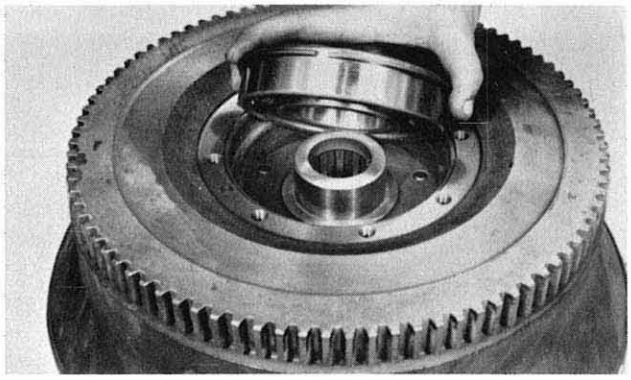


Figure 80

Install impeller cover to turbine hub front bearing.

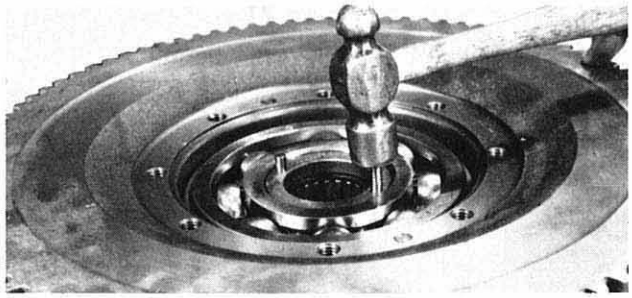


Figure 81

Install turbine hub dowels.

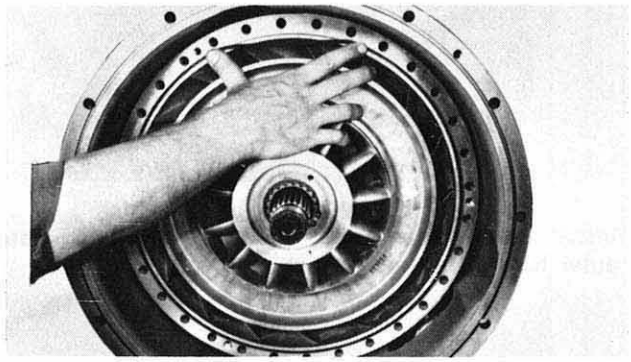


Figure 82

Position impeller to impeller cover "O" ring.

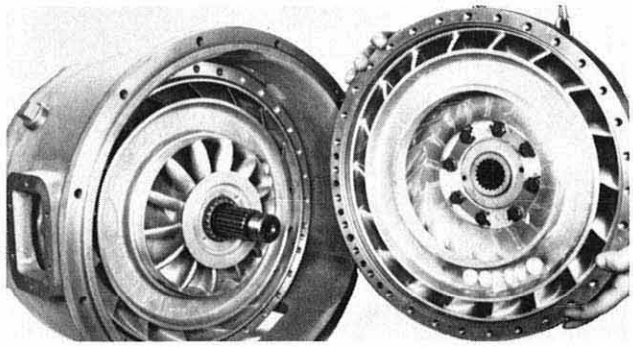


Figure 83

Install turbine and lock-up cover on turbine shaft.

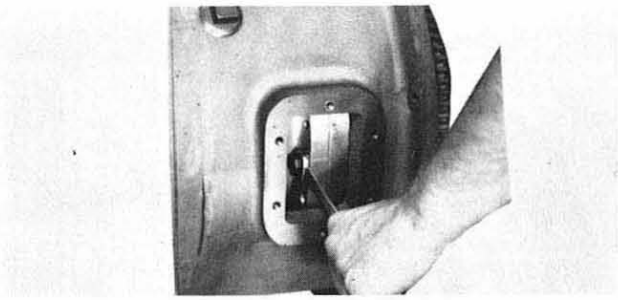


Figure 84

Align holes in impeller with holes in impeller cover. Install bolts and lockwashers. Tighten bolts evenly and securely.

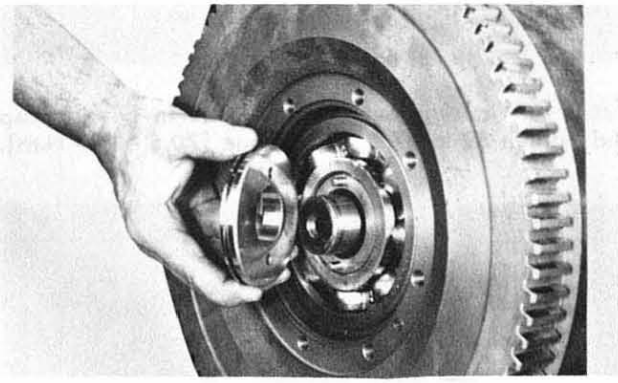


Figure 85

Install bearing retainer plate on turbine shaft.

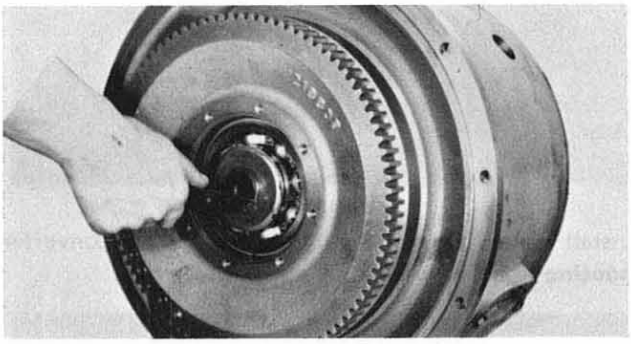


Figure 86

Install bearing plate retainer ring.

Figure 87

Install bearing plate oil sealing ring.

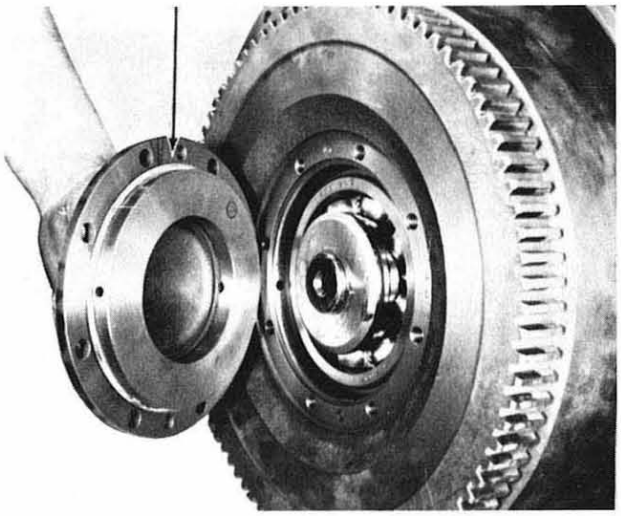


Figure 88

Position new "O" ring (see arrow) on impeller cover bearing cap. Install bearing cap on impeller cover. See Figure 95 for torque.

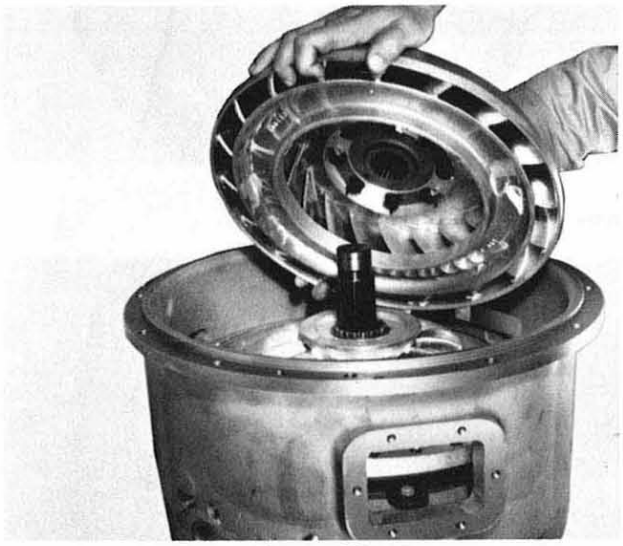


Figure 89

If lock-up is not used install turbine assembly on turbine shaft.

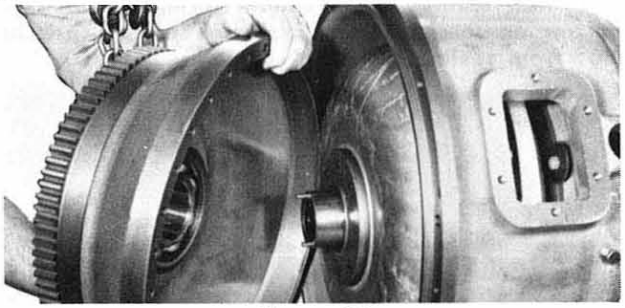


Figure 90

Install impeller cover and bearing assembly on turbine hub. Drive bearing into position. Align holes in impeller with impeller cover and install bolts and lockwashers. Tighten bolts evenly and securely.

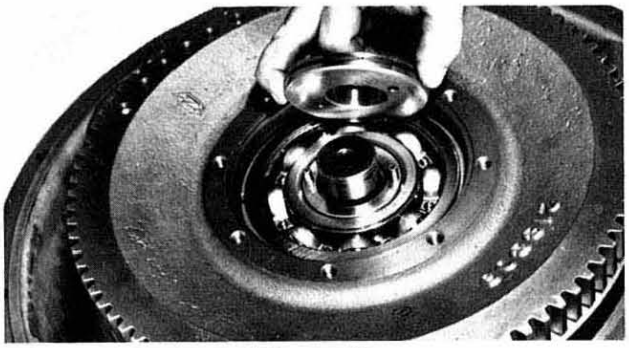


Figure 91

Install bearing retainer plate.

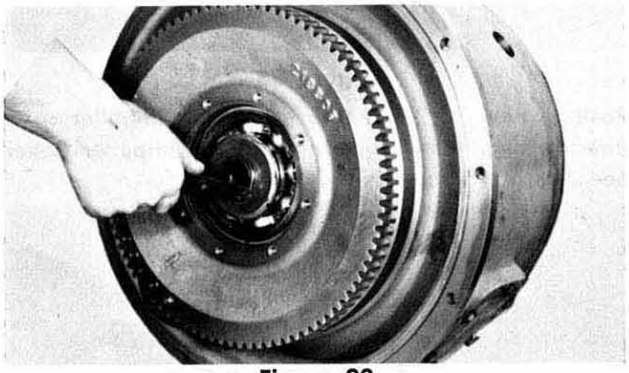


Figure 92

Install bearing plate retainer ring.

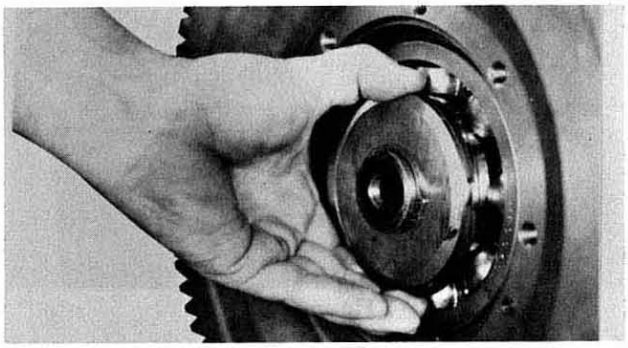


Figure 93

Install new sealing ring expander spring and oil sealing ring on bearing plate. Expander spring gap to be 180° from sealing ring hook joint.

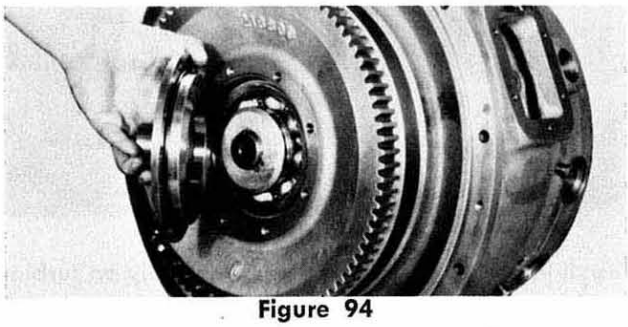


Figure 94

Position new "O" ring on impeller cover bearing cap. Install bearing cap on impeller cover.

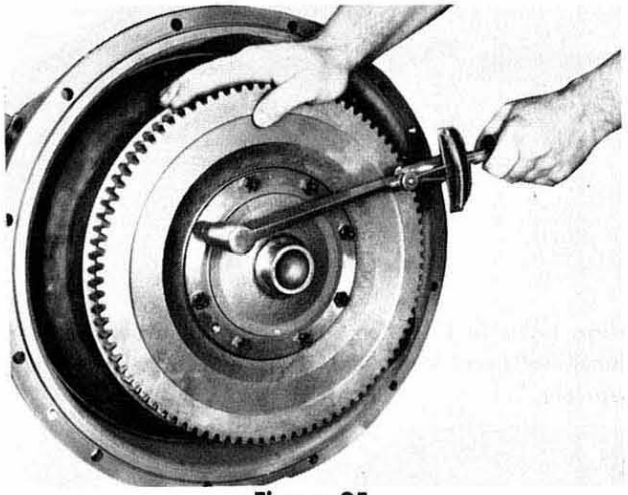


Figure 95

Install self locking bearing cap bolts in bearing cap and tighten 52 to 57 ft. lbs. torque [70,5 - 77,3 N.m].

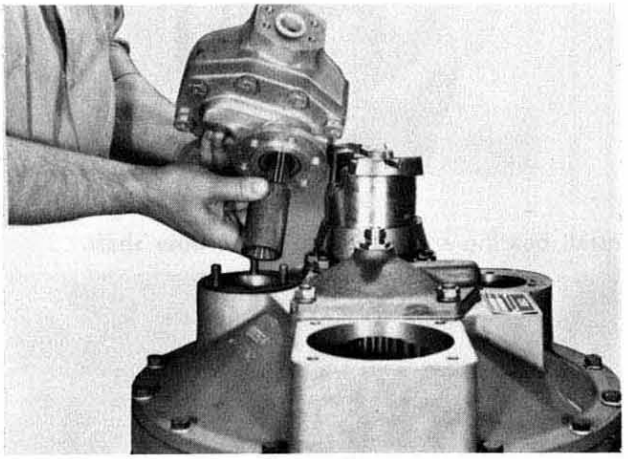


Figure 96

Install pump drive-sleeve and pump on converter housing rear cover.

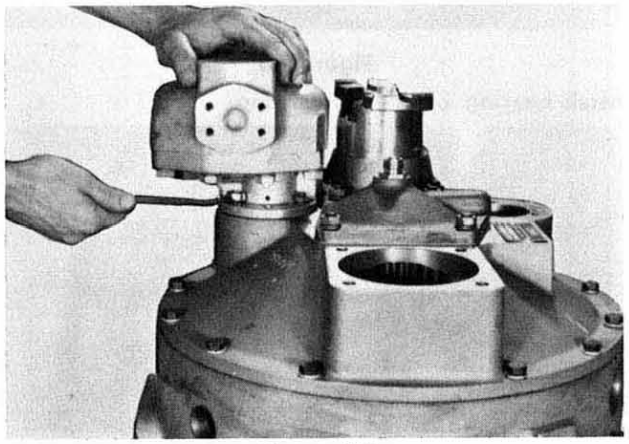


Figure 97

Install lockwashers and stud nuts. Tighten securely.

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.

SPECIFICATIONS AND SERVICE DATA—POWER SHIFT TRANSMISSION AND TORQUE CONVERTER

CONVERTER OUT PRESSURE	Converter outlet oil temp. 180° - 200° F. [82,3° - 93,3° C]. Transmission in **NEUTRAL.** Operating specifications: 55 psi [379,3 kPa] minimum pressure at 2000 R.P.M. engine speed **AND** a maximum of 70 psi [482,6 kPa] outlet pressure with engine operating at no-load governed speed.
CONTROLS	Forward and Reverse — Manual Speed Selection — Manual
CLUTCH TYPE	Multiple discs, hydraulically actuated, spring released, automatic wear compensation and no adjustment. All clutches oil cooled and lubricated.
CLUTCH INNER DISC	Friction.
CLUTCH OUTER DISC	Steel.
OIL FILTRATION	Full flow oil filter safety by-pass, also strainer screen in sump at bottom of transmission case.
CLUTCH PRESSURE	180-220 psi [1241,1 - 1516,8 kPa] — With parking brake set **(see note)** , oil temperature 180° - 200° F. [82,2° - 93,3° C], engine at idle (400 to 600 RPM). shift thru direction and speed clutches. All clutch pressure must be equal within 5 psi, [34,5 kPa]If ,clutch pressure varies in any one clutch more than 5 psi, [34,5 kPa] repair clutch.

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

ALWAYS USE PARKING BRAKE WHEN MAKING CLUTCH PRESSURE CHECKS.

LUBRICATION

TYPE OF OIL See Lube Chart.

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

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

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

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

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

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

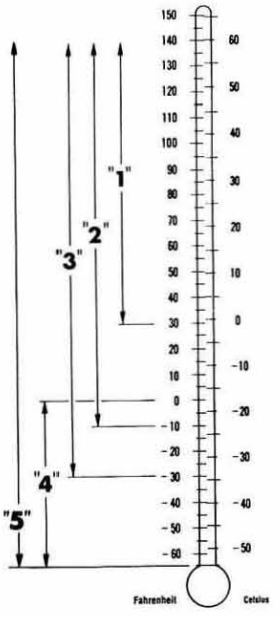
(c) **Refill transmission to LOW mark.**

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

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

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

Prevailing Ambient Temperature



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

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

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

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

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

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

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

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

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

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

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

*Dexron is a registered trademark of General Motors Corporation.

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

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

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

Grade 5

LUBRICATED OR PLATED

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

Grade 8

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

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

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

TROUBLE SHOOTING GUIDE

The following data is presented as an aid to locating the source of difficulty in a malfunctioning unit. It is necessary to consider the torque converter charging pump, transmission, oil cooler and connecting oil lines as a complete system when running down the source of trouble since the proper operation of any unit therein depends greatly on the condition and operation of the others. By studying the principles of operation together with data in this section, it may be possible to correct any malfunction which may occur in the system.

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

MECHANICAL CHECKS

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

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

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

HYDRAULIC CHECKS

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

1. Check oil level in transmission. This should be done with oil temperatures of 180-200°F. [82,2-93,3°C.]. DO NOT ATTEMPT THESE CHECKS WITH COLD OIL. To bring the oil temperature to this specification it is necessary to either work the machine or "stall" out the converter. Where the former means is impractical, the latter means should be employed as follows:

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

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

PRESSURE AND OIL FLOW CHECKS

Whenever improper performance is evident the following basic pressure and oil flow checks should be performed and recorded. It is also recommended that these checks be taken periodically as a preventative maintenance measure. Doing so will permit possible detection of difficulties in advance of actual breakdown, thus permitting scheduling of repair operation. Likewise, repair of minor difficulties can be made at considerably less cost and down-time than when delayed until major and complete breakdowns occur.

Analyzing the results of these checks by comparison with specifications and with each other will indicate in most cases the basic item or assembly in the system as the source of difficulty. Further checking of that assembly will permit isolation of the specific cause of trouble.

(SEE PLUMBING AND CHECK POINT DIAGRAM)

OIL PRESSURE AT **CONVERTER OUT** PORT.

Install hydraulic pressure gauge at **PRESSURE** connection on Converter Regulator Valve or at **CONVERTER OUT** pressure tap. (All models do not have pressure regulating valves.) Check and record oil pressure at 2000 RPM and at maximum speed (engine at full throttle) (see instructions on Stalling Converter previously listed).

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

If a flow meter is available, install in line between converter charging pump and oil filters. Flow meter must be able to withstand 300 p.s.i. [2068,4 kPa].

Disconnect hose between pump and filter at filter end and using suitable fittings connect to pressure port of tester. Install hose between filter and tester, connecting same to reservoir port of tester.

DO NOT USE TESTER LOAD VALVE AT ANY TIME DURING TEST. When taking flow reading, all readings should be taken on the first (left) half of flow gauge. Whenever the needle shows on the right half of gauge, correct by switching to higher scale.

If a flow meter is not available for checking converter pump output, proceed with manual transmission and converter checks. If the converter shows leakage within specifications and clutch pressures (180 to 220 p.s.i.) [1241,1 - 1516,8 kPa] are all equal within 5 p.s.i. [34,5 kPa] refer to paragraph on Low Converter Charging Pump Output.

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

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

Pump output listed applies to a new pump in each case. A 20% tolerance below this figure is permissible; however, if pump output is more than 20% below specification the pump must be replaced or rebuilt.

TRANSMISSION CLUTCH LEAKAGE

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

If a flow meter is available install in line coming out of converter pump. See flow diagram for location of pressure on flow checks. Check pump volume at 2000 RPM and at low engine idle. Record readings. See pump volume specifications at 2000 RPM.

Install flow meter in the line coming from transmission to converter. Check oil volume at 2000 RPM and at low idle in the following speed selections. Record readings.

Forward — Low speed thru High Reverse — Low speed

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

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

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

LEAKAGE IN TRANSMISSION CLUTCHES

Leakage in 3000 series must not exceed 4 gal. max.
Leakage in 5000 series must not exceed 4 gal. max.
Leakage in 8000 series must not exceed 6 gal. max.
Leakage in 16000 series must not exceed 7 gal. max.

CONVERTER LUBE FLOW

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

LEAKAGE IN CONVERTER

Leakage in C270 series not to exceed 2 gal. max.
Leakage in C5000 series not to exceed 3 gal. max.
Leakage in C8000 series not to exceed 5 gal. max.
Leakage in C16000 series not to exceed 5 gal. max.

LOW CLUTCH PRESSURE WITH NORMAL CLUTCH LEAKAGE

CAUSE	REMEDY
1. Low Oil Level.	1. Fill to proper level.
2. Broken spring in transmission regulator valve.	2. Replace spring.
3. Clutch pressure regulator valve spool stuck in open position.	3. Clean valve spool and sleeve.
4. Faulty charging pump.	4. See paragraph on charging pump output.

LOW CLUTCH PRESSURE WITH EXCESSIVE CLUTCH LEAKAGE

1. Broken or worn clutch piston sealing rings.	1. Replace sealing rings.
2. Clutch drum bleed valve ball stuck in open position.	2. Clean bleed valve thoroughly.
3. Broken or worn sealing rings on clutch support.	3. Replace sealing rings.
4. Low converter charging pump output.	4. See paragraph on charging pump output.

LOW CONVERTER CHARGING PUMP OUTPUT

CAUSE	REMEDY
1. Low oil level.	1. Fill to proper level.
2. Sump screen plugged.	2. Clean screen and sump.
3. Air leaks at pump intake hose and connections or collapsed hose.	3. Tighten all connections or replace hose if necessary.
4. Defective oil pump.	4. Replace pump.

LOW FLOW THROUGH COOLER WITH LOW CONVERTER IN PRESSURE

1. Defective safety by-pass valve spring.	1. Replace spring.
2. Converter by-pass valve partially open.	2. Check for worn by-pass ball seat.
3. Excessive converter internal leakage. See paragraph on converter lube flow.	3. Remove, disassemble, and rebuild converter assembly, replacing all worn or damaged parts.
4. Broken or worn sealing rings in transmission clutches.	4. See paragraph on Clutch leakage.

LOW FLOW THROUGH COOLER WITH HIGH CONVERTER OUT PRESSURE

1. Plugged oil cooler. Indicated if transmission lube pressure is low.	1. Back flush and clean oil cooler.
2. Restricted cooler return line.	2. Clean out lines.
3. Lube oil ports in transmission plugged. Indicated if transmission lube pressure is high.	3. Check lube lines for restrictions.

OVERHEATING

1. Worn oil sealing rings. See paragraph E.	1. Remove, disassemble, and rebuild converter assembly.
2. Worn oil pump.	2. Replace.
3. Low oil level.	3. Fill to proper level.
4. Pump suction line taking air.	4. Check oil line connections and tighten securely.

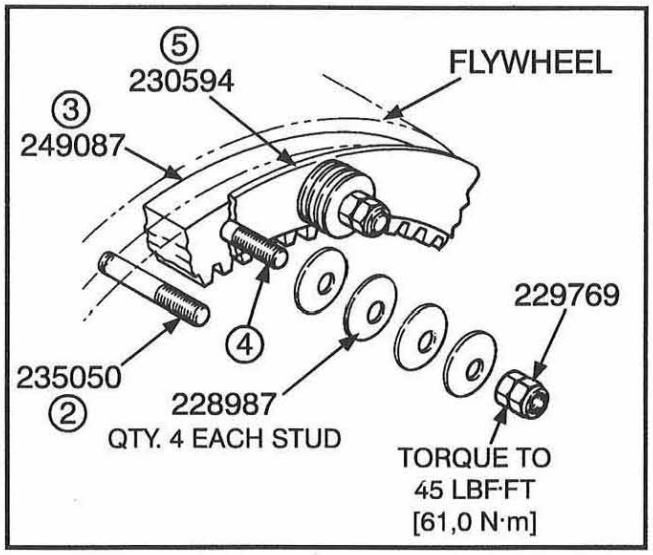
NOISY CONVERTER

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

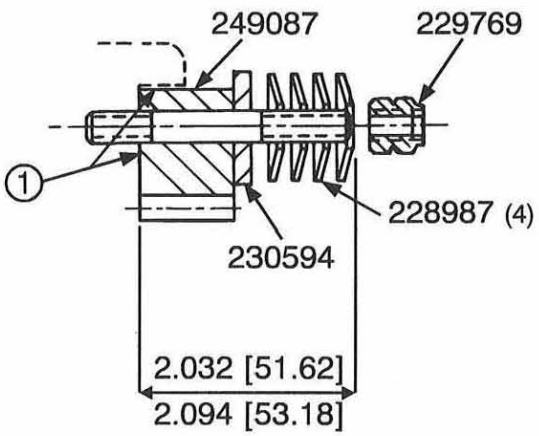
LACK OF POWER

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

C & CL-8000 TORQUE CONVERTERS
FLYWHEEL RING GEAR INSTALLATION PROCEDURE



C & CL-8000



If Backing Ring is to be replaced order Part No. 230594 Backing Plate.

The 802551 Kit Includes:

1	249087	Ring Gear
24	235050	Stud
96	228987	Belleville Washer
24	229769	Stud Nut
1	802552	Instruction Sheet

1 Remove all burrs from Flywheel Mounting Face and Pilot Bore, clean with solvent.

The engine Flywheel and Housing must conform to standard S.A.E. No. **1** - S.A.E. J927 tolerance specifications for Pilot Bores, Eccentricities and Mounting Face deviations. Check engine crankshaft "End Play", must be the same value before and after the torque converter is mounted to the engine.

2 Install three (3) Studs 235050 - equally spaced. Tighten 33 to 36 lbf·ft [44,8 - 48,8 N·m] of torque.

3 Install Ring Gear 249087 by tapping lightly in place.

4 Install remaining studs. Tighten 33 to 36 lbf·ft [44,8 - 48,8 N·m] torque.

5 Install Backing Plate 230594.

6 Lubricate Stud Threads, Belleville Washers and Nuts with S.A.E. #10 oil.

7 Install Belleville Washers and Elastic Stop Nuts as shown (3 washers, each stud for C & CL-5000 and HR & LHR-34000; 4 washers, each stud for C & CL-8000). Tighten nuts in a criss cross pattern to 25 lbf·ft [34 N·m]. Then tighten nuts in increments of 5 lbf·ft [6,7 N·m] in a criss cross pattern to 35 lbf·ft [47,5 N·m] for C & CL-5000 and HR & LHR-34000 and 45 lbf·ft [61,0 N·m] for C & CL-8000 torque.

PROPER OIL CHECKING & FILLING PROCEDURE

Refer to transmission maintenance manual or lubrication chart. Use only specified transmission fluid.

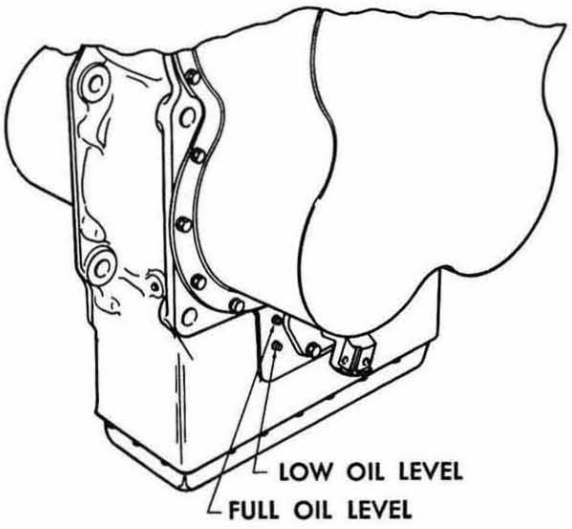
Fill torque converter and transmission through filler opening until fluid comes up to **LOW** mark on transmission dipstick. **NOTE:** If the dipstick is not accessible oil level check plugs are provided. (See below).

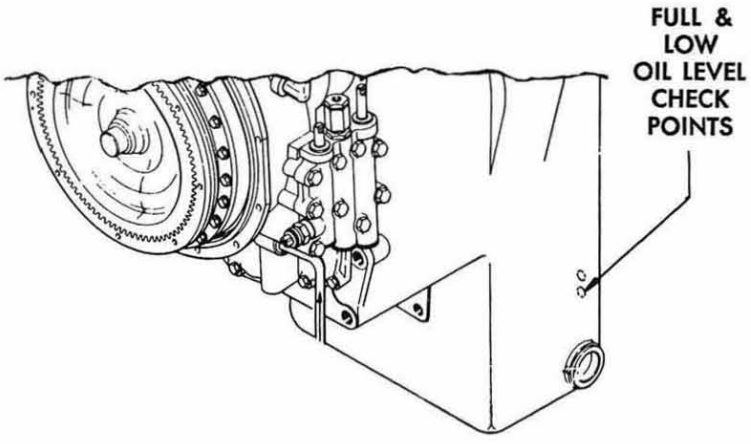
Remove **LOWER** check plug, fill until oil runs from **LOWER** oil hole. Replace filler and level plug.

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).

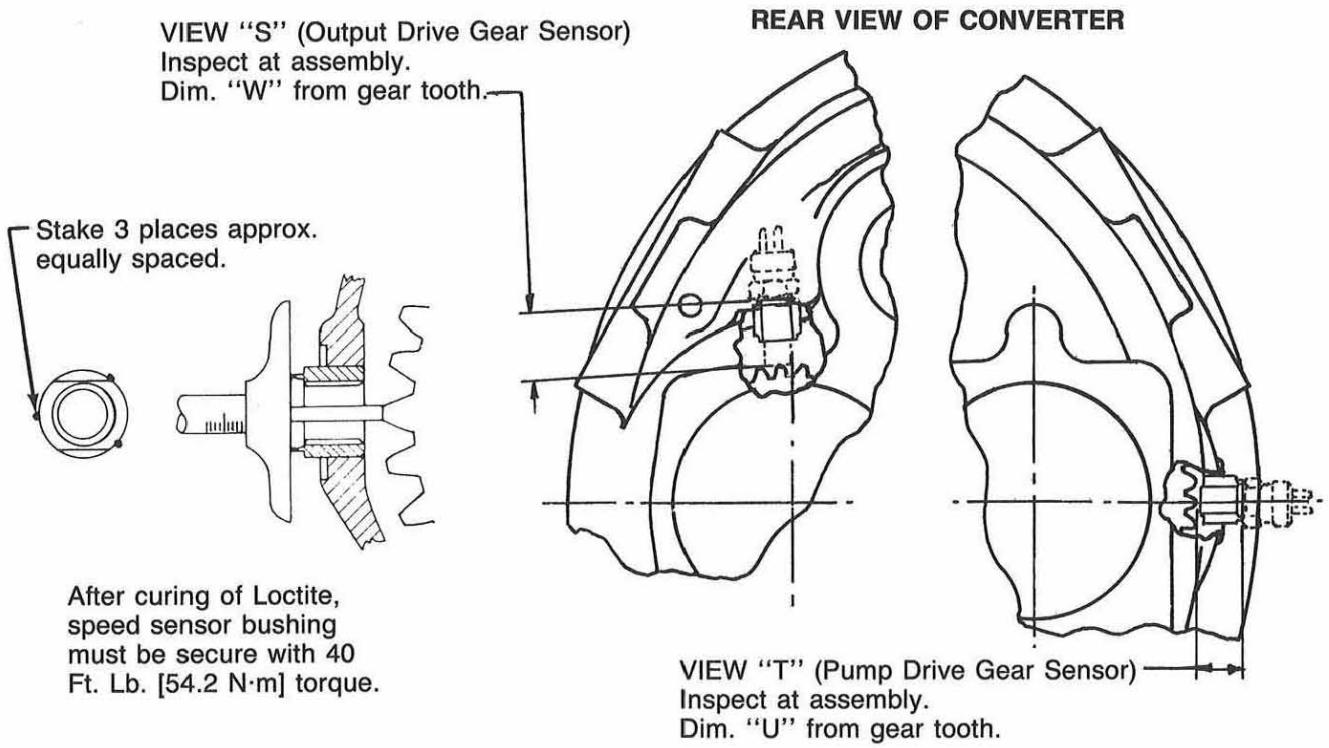
Add quantity necessary to bring fluid level to **LOW** mark on dipstick or runs freely from **LOWER** oil level check plug hole. Install oil level plug or dipstick. Recheck with hot oil (180-200 degrees).

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





SPEED SENSOR BUSHING INSTALLATION



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"
1.250	32	40	1.060 ± .007 [26.9 ± .17]
1.057	35	37	1.060 ± .007 [26.9 ± .17]
.946/25°	37 (25° P.A.)	35 (25° P.A.)	1.390 ± .007 [35.3 ± .17]
.946	37	35	1.390 ± .007 [35.3 ± .17]
.800	40	32	1.390 ± .007 [35.3 ± .17]

OUTPUT GEAR RATIO

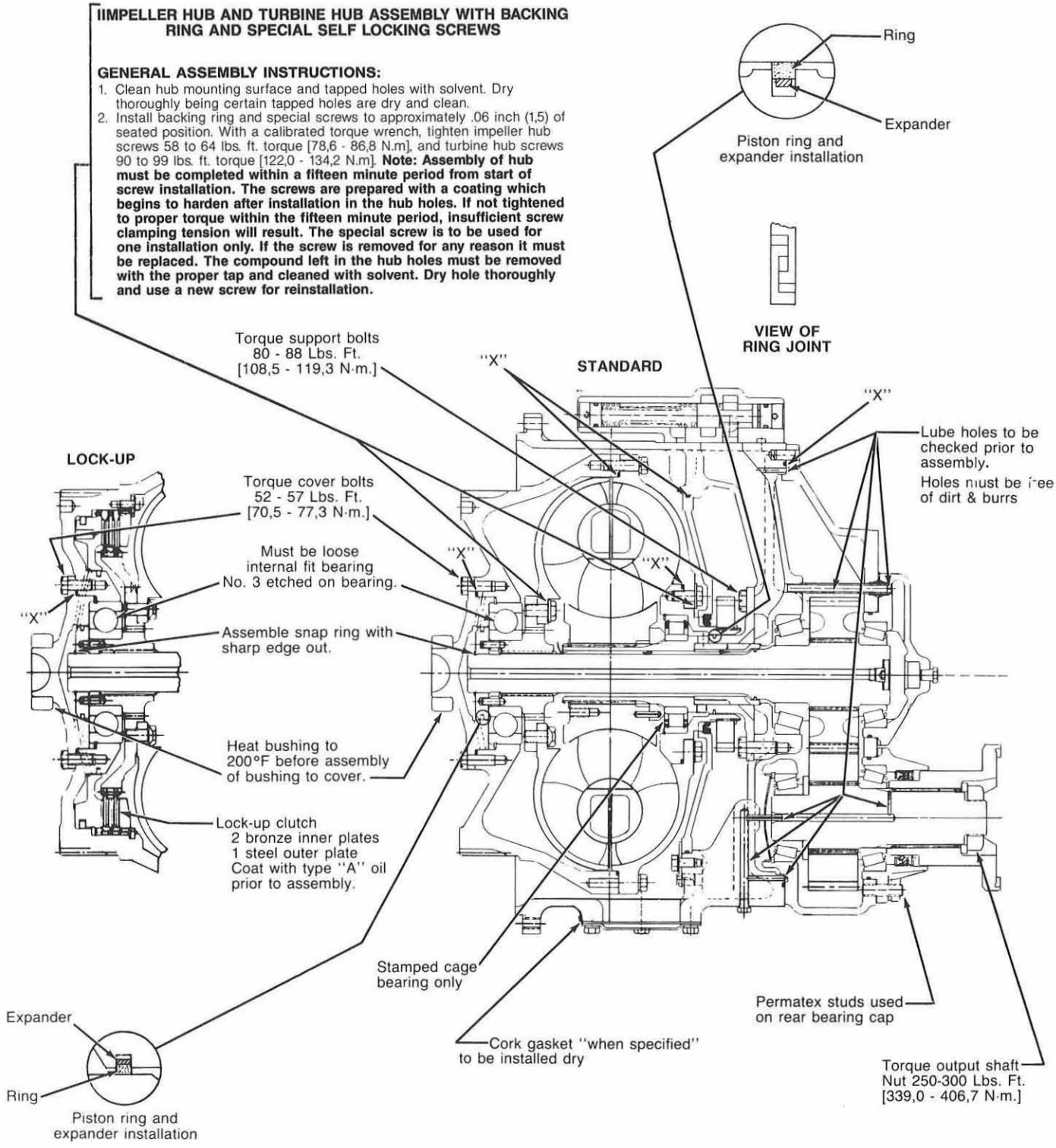
RATIO	TURBINE SHAFT & GEAR ASS'Y NO. OF TEETH	OUTPUT GEAR NO. OF TEETH	SPEED SENSOR BUSHING DEPTH "W" PER VIEW "S"
1.323	31	41	1.060 ± .007 [26.9 ± .17]
1.118	34	38	1.060 ± .007 [26.9 ± .17]
1.000	36	36	1.390 ± .007 [35.3 ± .17]
.895	38	34	1.390 ± .007 [35.3 ± .17]
.846	39	33	1.390 ± .007 [35.3 ± .17]

ASSEMBLY INSTRUCTIONS
C-8000 CONVERTER

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

GENERAL ASSEMBLY INSTRUCTIONS:

1. Clean hub mounting surface and tapped holes with solvent. Dry thoroughly being certain tapped holes are dry and clean.
2. Install backing ring and special screws to approximately .06 inch (1,5) of seated position. With a calibrated torque wrench, tighten impeller hub screws 58 to 64 lbs. ft. torque [78,6 - 86,8 N.m], and turbine hub screws 90 to 99 lbs. ft. torque [122,0 - 134,2 N.m]. **Note: Assembly of 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.**



VIEW OF RING JOINT

Do not assemble offset gears in any combination except those listed below. A wrong combination may mesh but will not run properly.

RATIO	P / N TURBINE	NO. TEETH	P / N OUTPUT	NO. TEETH
1.323	219417	31	219418	41
1.118	218729	34	218728	38
1.000	218871	36	218871	36
.895	218728	38	218729	34
.846	242637	39	242638	33

TAPERED BEARING INFORMATION:—
GENERAL: Insure seating of bearings & related parts by seating bearing cap without using shims.
CAUTION—Install all cap mounting screws when seating bearing cap.
Adjust to specifications noted right.
Shaft should be rotated & housing rapped each time bearing cap is assembled to insure proper alignment of the bearings.

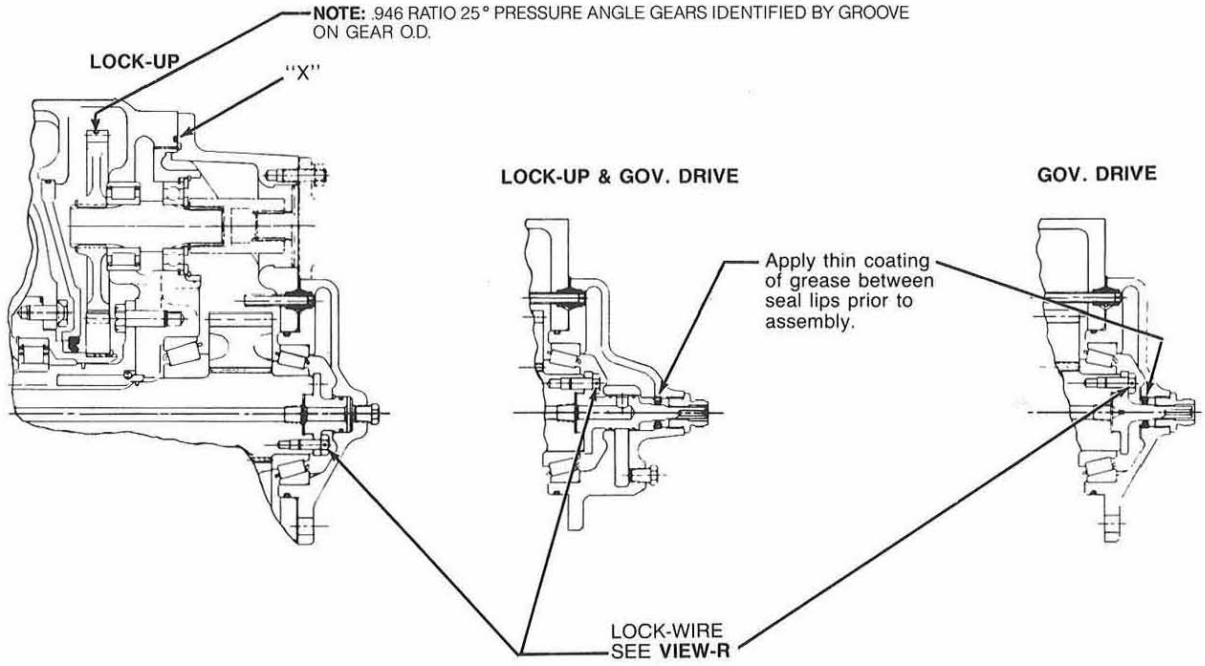
NOTE:
"O" Rings, adapter, adapter piston rings & lube tube should be assembled after shimming of bearings to prevent damage to the various parts.

OUTPUT SHAFT BEARINGS:—
Remove bearing cap screws after seating bearing cap as noted left. Check gap between cap & housing with shims used as feeler gage.
REMOVE sufficient shims to produce a .002 tight condition. EXAMPLE:—Gap is .010, final shim thickness to be .008.

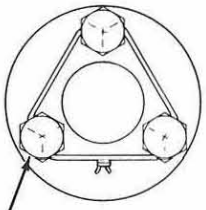
TURBINE SHAFT BEARINGS:—OFFSET & STRAIGHT THRU DRIVE
Remove bearing cap screws after seating bearing cap as noted above. Check gap between cap & housing with shims used as a feeler gage.
ADD sufficient shims to produce a .002 loose condition. EXAMPLE:—Gap is .010, final shim thickness to be .012.

RATIO	DRIVE GEAR	NO. TEETH	DRIVE GEAR	NO. TEETH
1.250	226844	32	226845	40
1.057	233658	35	233657	37
.946/25°	243755	37/25° PA	243756	35/25° PA
.946	222035	37	222037	35
.800	233715	40	237167	32

NOTE: .946 RATIO 25° PRESSURE ANGLE GEARS IDENTIFIED BY GROOVE ON GEAR O.D.



GENERAL ASSEMBLY INSTRUCTIONS:
1. Assemble to parts list as to location of charging pump, flange size, wheel size, gear ratios, etc.
2. All lead in chamfers for oil seals, piston rings & "O" Rings must be smooth & 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 prior to assembly.
6. After assembly of parts using Permatex or Crane Sealer, there must be no free or excess material that could enter the oil circuit.
7. "O" Rings marked "X" have a white identification mark on the O.D.
   Denotes high temperature material.

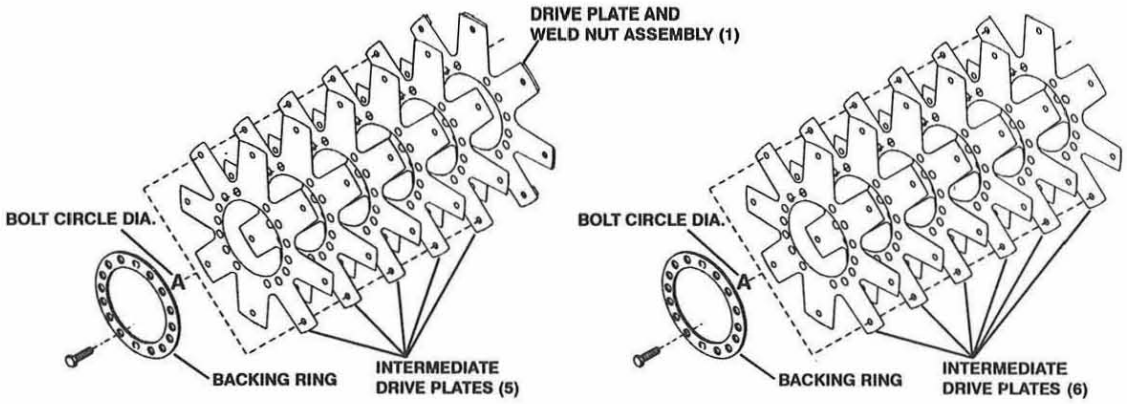


VIEW R

Torque capscrews & lockwire together as shown, lockwire must not protrude above capscrew head.

C & CL8000 Series Converter Drive Plate
INSTALLATION INSTRUCTIONS
Proper Identification by Bolt Circle Diameter

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



"A" Dimension (Bolt Circle Diameter)

15.00" [381,000 mm] diameter
Kit No. 802587-10mm

16.00" [406,400 mm] diameter
Kit No. 802558-10mm

16.00" [406,400 mm] diameter
Kit No. 802590-7/16-20

16.875" [428,625 mm] diameter
** Kit No. 802609-7/16-20

17.00" [431,800 mm] diameter
Kit No. 802593-10mm

17.00" [431,800 mm] diameter
Kit No. 802562-7/16-20

Each kit will include the following parts:
- 5 Intermediate Drive Plates
- 1 Drive Plate Assembly
- 1 Backing Plate
- 14 Drive Plate Mounting Capscrews
- Instruction Sheet
- ** 1 pc. Drive Plate Mounting Spacer is included in Kit No. 802609.

"A" Dimension (Bolt Circle Diameter)

16.00" [406,400 mm] diameter
Kit No. 802594 W/O Nuts

Each kit will include the following parts:
- 6 Intermediate Drive Plates
- 1 Backing Plate
- 14 Drive Plate Mounting Capscrews
- Instruction Sheet

NOTE: Assembly of flexplates must be completed within a 15 minute period from start of screw installation. If the screw is removed for any reason it must be replaced. The adhesive left in the tapped holes must be removed with the proper tap and cleaned with solvent. Dry the hole thoroughly and use a new screw for reinstallation.

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. Tighten capscrews 52-57 ft·lbs torque [70.4 - 77.1 N·m].

See page 35 for TORQUE CONVERTER TO ENGINE INSTALLATION PROCEDURE

TRANSMISSION TO ENGINE INSTALLATION PROCEDURE

1. Remove all burrs from flywheel mounting face and nose pilot bore. Clean drive plate surface with solvent. Dry thouroughly.
2. Check engine flywheel and housing for conformance to standard S.A.E. #1 - S.A.E J-927 and J-1033 tolerance specifications for pilot bore size, pilot bore runout and mounting face flatness. Measure and record engine crankshaft end play.
3. Install two 3.50 [88,90 mm] long converter 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 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 converter on flywheel housing aligning drive plate to flywheel and converter to flywheel housing.

   Install converter to flywheel housing screws. Tighten screws to specified torque. Remove converter to engine guide studs. Install remaining screws and tighten to specified torque.
6. Remove drive plate locating stud.
7. Install drive plate attaching screw. Snug screw but **do not tighten.** Some engine flywheel housings have a hole located on the flywheel housing circumference in line with the drive plate screw access hole. A screwdriver or pry bar used to hold the drive plate against the flywheel will facilitate installation of the drive plate screws. Rotate the engine flywheel and install the remaining seven (7) flywheel to drive plate attaching screws. Snug screws but do not tighten. After all eight (8) screws are installed, tighten each capscrew to the following torque- 7/16 capscrew 58-64 ft. lbs torque [78-86 N.m]:M-10 capscrews 48-55 ft. lbs torque [65-75 N.m]. This will require rotating the engine flywheel until the full amount of eight (8) screws have been tightened.
8. Measure engine crankshaft end play after converter has been completely installed on engine flywheel. This value must be within .001 [0,025 mm] of the end play recorded in Step No. 2.

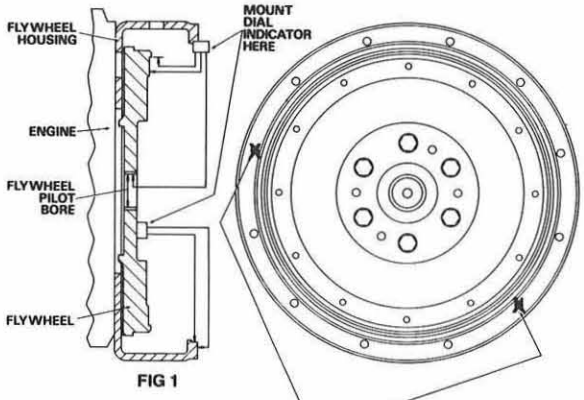


FIG 1

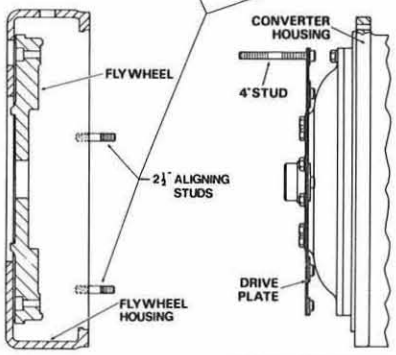


FIG 2

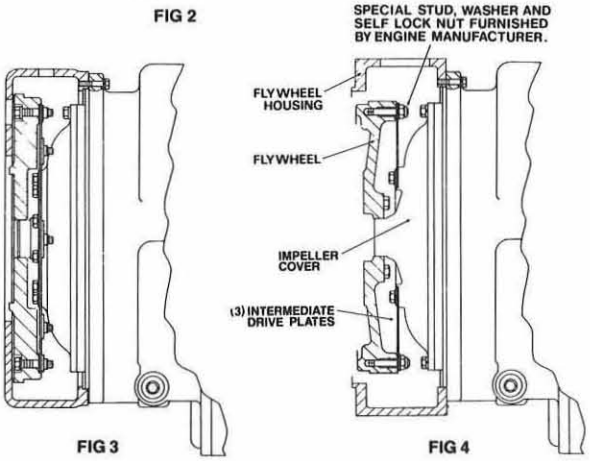
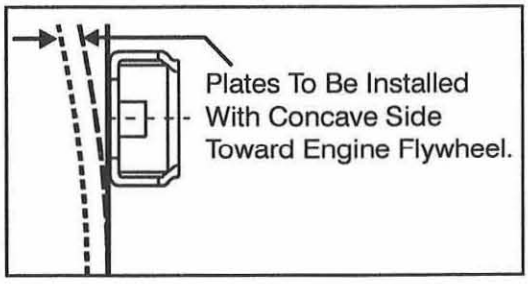


FIG 3 FIG 4



NOTES

For product inquiries or support,
visit www.dana.com or call 419-887-6445
For other service publications,
visit www.SpicerParts.com/literature.asp
For online service parts ordering,
visit www.SpicerParts.com/order.asp

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