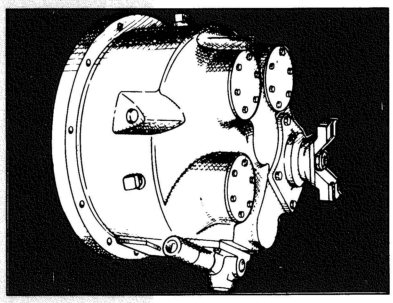
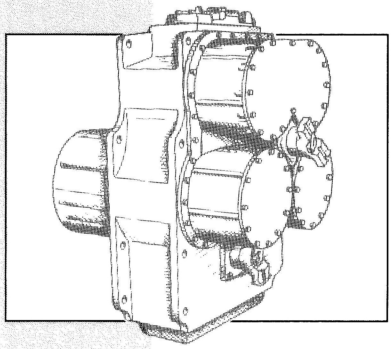
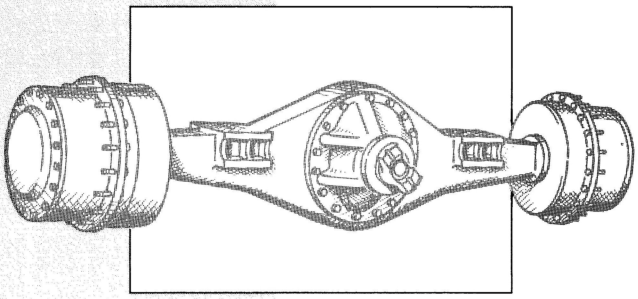
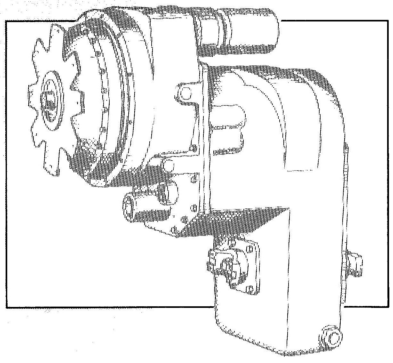
Maintenance and Service Manual









C 16000

Torque Converter

CLARK-HURTH COMPONENTS

Allied Systems 80-789

SMC 16 (Rev. 3-94)

For service questions or additional copies of this manual contact:

Allied Systems, Inc.
1-800-285-7000

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.

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.**

TABLE OF CONTENTS

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:

Fig. A — Internal Oil Flow Torque Converter

Fig. B — Torque Converter Assembly

Fig. C — 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.

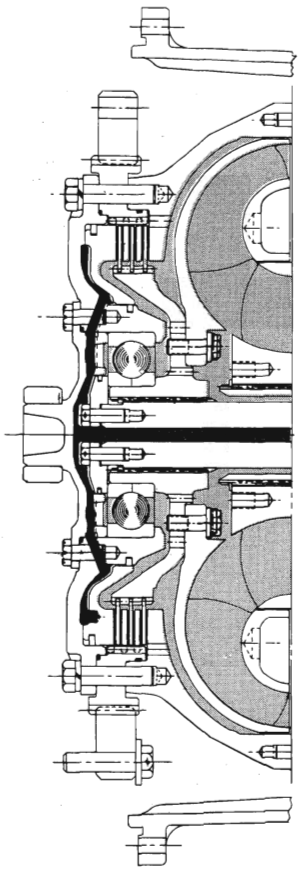
To engage the clutch, as previously stated, the control valve is placed in the desired position. This allows oil under pressure to flow from the control cover valve, through a tube in the transmission case, to a chosen clutch. Once into the drum, oil is directed through a drilled hole into the rear side 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.

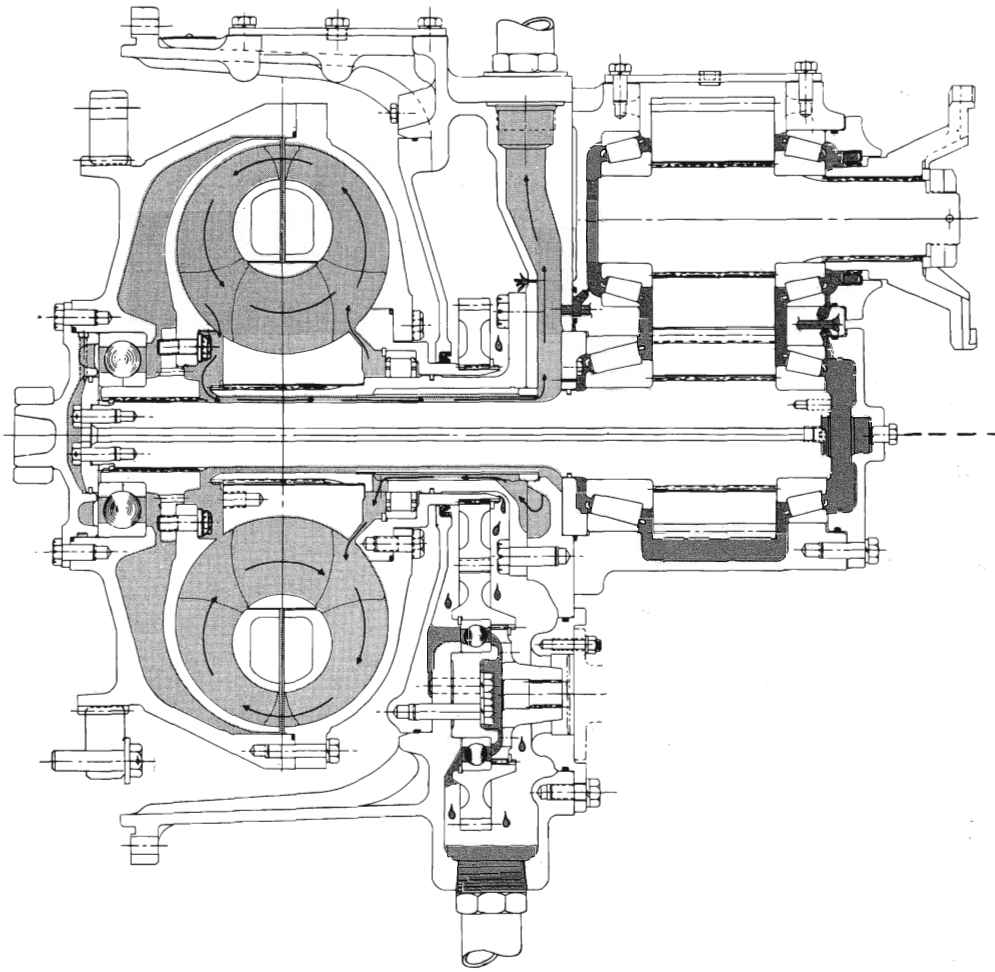
The transmission gear train consists of six shafts: (1) Input Shaft, (2) Reverse Shaft, (3) Idler Shaft, (4) First and Third Shaft, (5) Second and Fourth Shaft, (6) Output Shaft.

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.

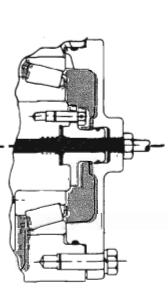
Some transmissions may have an axle declutching unit as optional equipment, this unit consists of a split output shaft with a sliding splined sleeve to engage or disengage the axle. This is accomplished by manually shifting a lever in the operator's compartment which is mechanically connected to the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



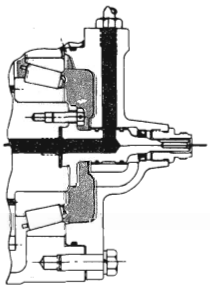
LOCK - UP



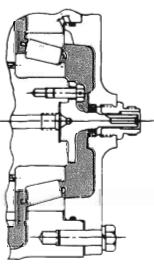
STANDARD



LOCK - UP

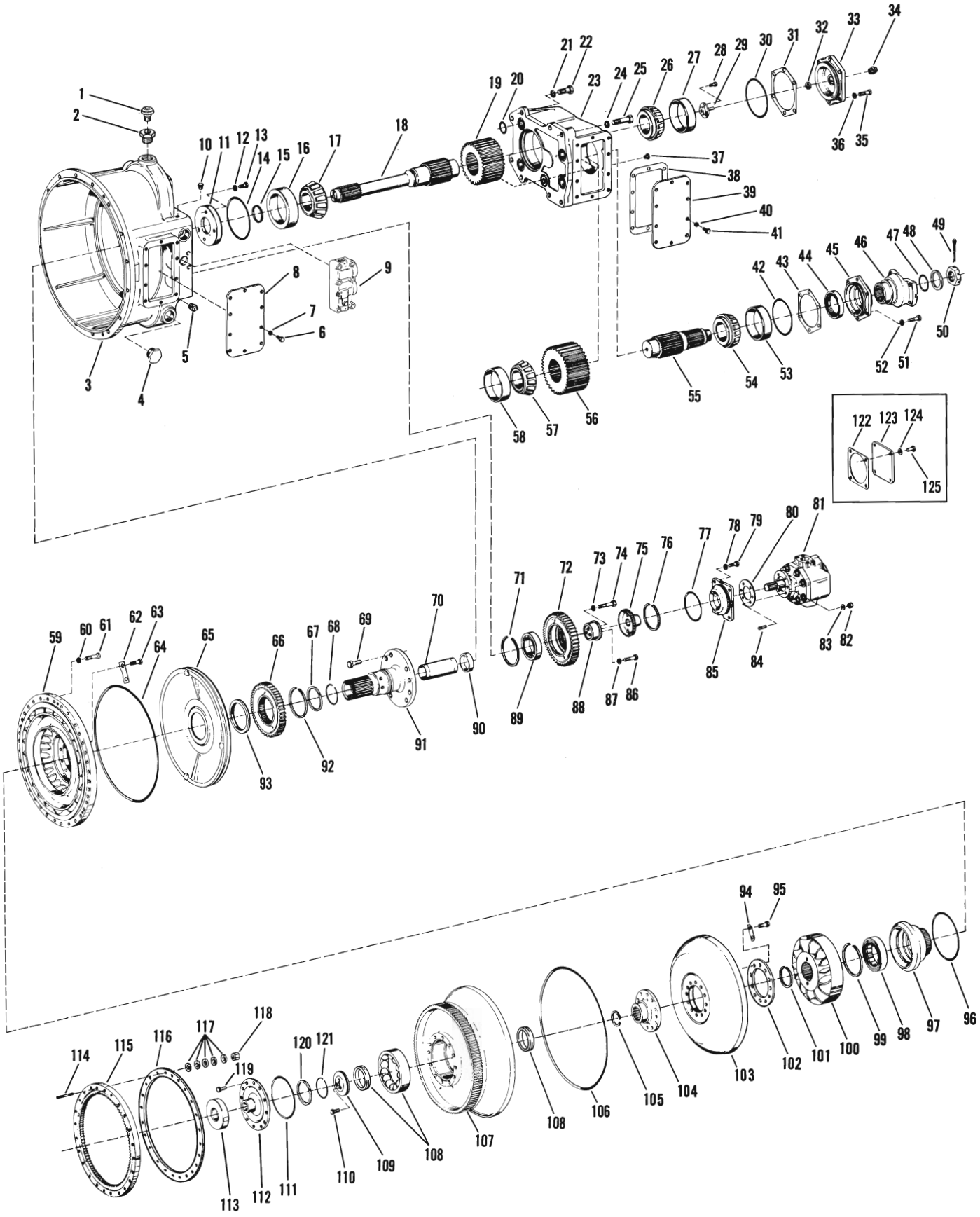


LOCK - UP &
GOV. DRIVE



GOV.
DRIVE

CLUTCH PRESSURE
CONVERTER PRESSURE
LUBE AND DRAIN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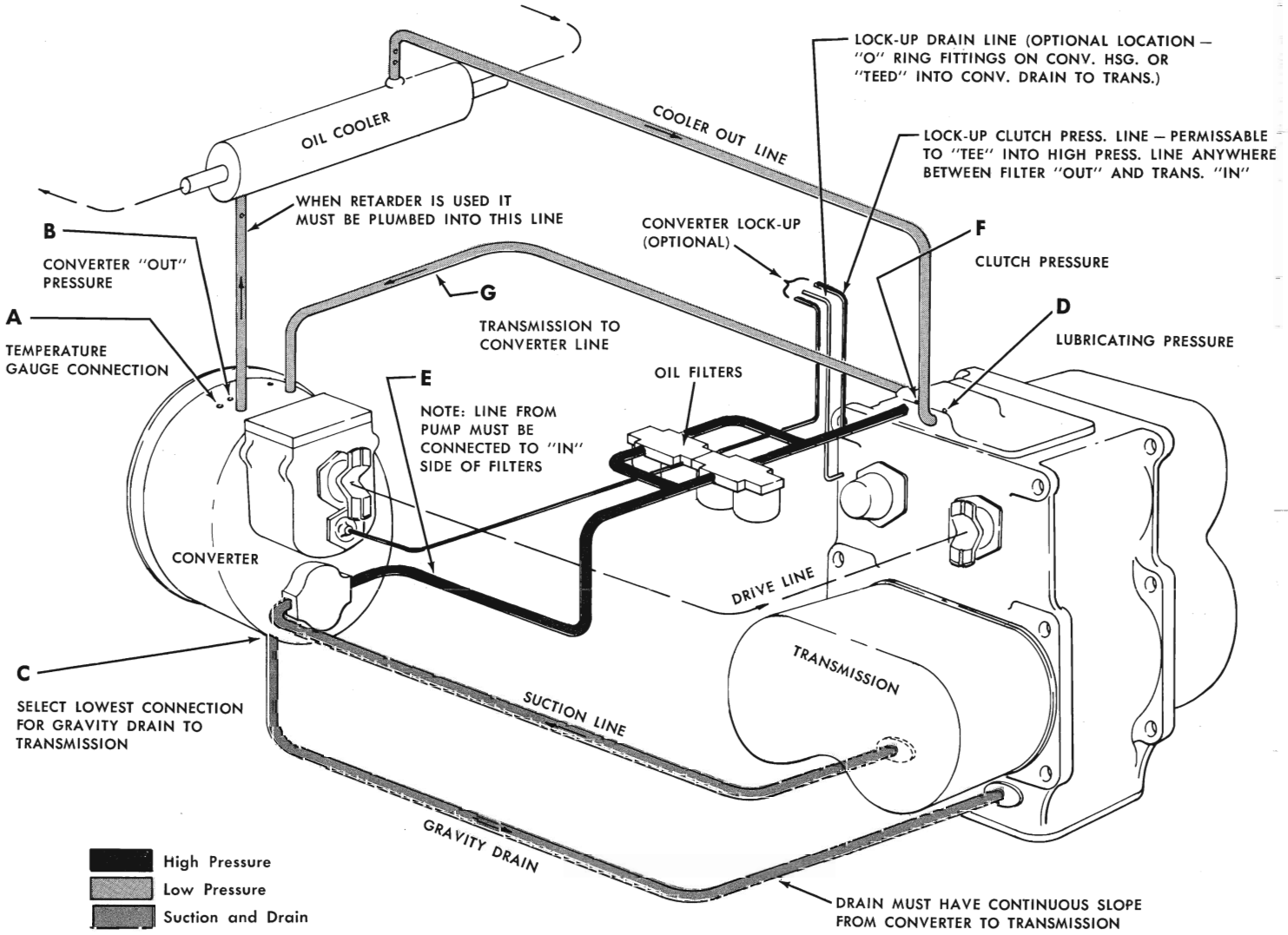
ITEM	DESCRIPTION	QTY.
1	Air Breather and Check Valve Assembly	1
2	Breather Adaptor	1
3	Converter Housing	1
4	Drain Plug	3
5	Pipe Plug	1
6	Converter Housing Cover Plate Screw	10
7	Converter Housing Cover Plate Screw Lockwasher	10
8	Converter Housing Cover Plate	1
9	Pressure Regulating Valve	1
10	Pipe Plug	1
11	Drop Gear Housing Adaptor	1
12	Lockwasher	4
13	Adaptor to Converter Housing Screw	4
14	Housing to Converter Housing "O" Ring	1
15	Piston Ring	1
16	Bearing Cup — Front	1
17	Bearing Cone — Front	1
18	Turbine Shaft	1
19	Turbine Shaft Gear	1
20	Housing to Converter Housing "O" Ring	6
21	Housing to Converter Screw Lockwasher	6
22	Housing to Converter Screw	6
23	Drop Gear Housing	1
24	Housing to Converter Screw Lockwasher	2
25	Housing to Converter Screw	2
26	Bearing Cone — Rear	1
27	Bearing Cup — Rear	1
28	Adaptor Screw	3
29	Governor Drive Adaptor	1
30	Bearing Cap "O" Ring	1
31	Bearing Cap Shim	AR
32	Bearing Cap Oil Seal	1
33	Bearing Cap	1
34	Tube Nut	1
35	Bearing Cap Screw	6
36	Bearing Cap Screw Lockwasher	6
37	Plug — Lube Line	1
38	Housing Cover Plate Gasket	1
39	Housing Cover Plate	1
40	Housing Cover Plate Screw Lockwasher	10
41	Housing Cover Plate Screw	10
42	"O" Ring	1
43	Bearing Cap Shim	AR
44	Oil Seal	1
45	Bearing Cap	1
46	Output Flange	1
47	Flange "O" Ring	1
48	Flange Washer	1
49	Flange Cotter Pin	1
50	Flange Nut	1
51	Bearing Cap Screw	6
52	Bearing Cap Screw Lockwasher	6
53	Bearing Cup	1
54	Bearing Cone	1
55	Output Shaft	1
56	Output Shaft Gear	1
57	Bearing Cone	1
58	Bearing Cup	1
59	Impeller	1
60	Impeller to Cover Screw Lockwasher	36
61	Impeller to Cover Screw	36
62	Impeller to Hub Screw Lock Plate	6
63	Impeller to Hub Screw	12
64	Oil Baffle "O" Ring	1
65	Oil Baffle	1
66	Oil Pump Drive Gear	1
67	Piston Ring	1
68	Piston Ring Expander Spring	1
69	Sleeve to Housing Screw	8
70	Oil Tube	1
71	Bearing Snap Ring	3
72	Pump Driven Gear	3
73	Bearing Carrier to Baffle Screw Lockwasher	3
74	Bearing Carrier to Baffle Screw	3
75	Pump Drive Sleeve	1
76	Pump Drive Sleeve Snap Ring	3
77	Pump "O" Ring	1
78	Adaptor to Housing Screw Lockwasher	4
79	Adaptor to Housing Screw	4
80	Pump Gasket	1
81	Converter Charging Pump	1
82	Pump Mounting Stud Nut	4
83	Pump Mounting Stud Nut Lockwasher	4
84	Pump Mounting Stud	4
85	Pump Adaptor	1
86	Bearing Carrier to Housing Screw	6
87	Bearing Carrier to Housing Screw Lockwasher	6
88	Pump Drive Bearing Carrier	3
89	Pump Driven Gear Bearing	3
90	Oil Distributor Sleeve	1
91	Stator Support and Sleeve Assembly	1
92	Gear Snap Ring	1
93	Oil Seal	1
94	Turbine to Hub Screw Lockplate	6
95	Turbine to Hub Screw	12
96	Impeller Hub "O" Ring	1
97	Impeller Hub	1
98	Impeller Hub Bearing	1
99	Impeller Hub Bearing Snap Ring	1
100	Reaction Member	1
101	Reaction Member Snap Ring	1
102	Turbine to Hub Screw Backing Ring	1
103	Turbine	1
104	Turbine Hub	1
105	Turbine Hub Snap Ring	1
106	Impeller to Cover "O" Ring	1
107	Impeller Cover	1
108	Turbine Hub Bearing	1
109	Front Bearing Plate	1
110	Front Bearing Plate Screw	3
111	Bearing Cap "O" Ring	1
112	Drive Disc Adaptor	1
113	Drive Disc Adaptor Bushing	1
114	Ring Gear Mounting Stud	12
115	Flywheel Ring Gear	1
116	Ring Gear Backing Plate	1
117	Belleville Washer	60
118	Ring Gear Stud Nut	12
119	Bearing Cap Screw	12
120	Front Bearing Plate Piston Ring	1
121	Piston Ring Expander Spring	1
122	Pump Cover Gasket	1
123	Pump Cover	1
124	Pump Cover Screw Lockwasher	4
125	Pump Cover Screw	4

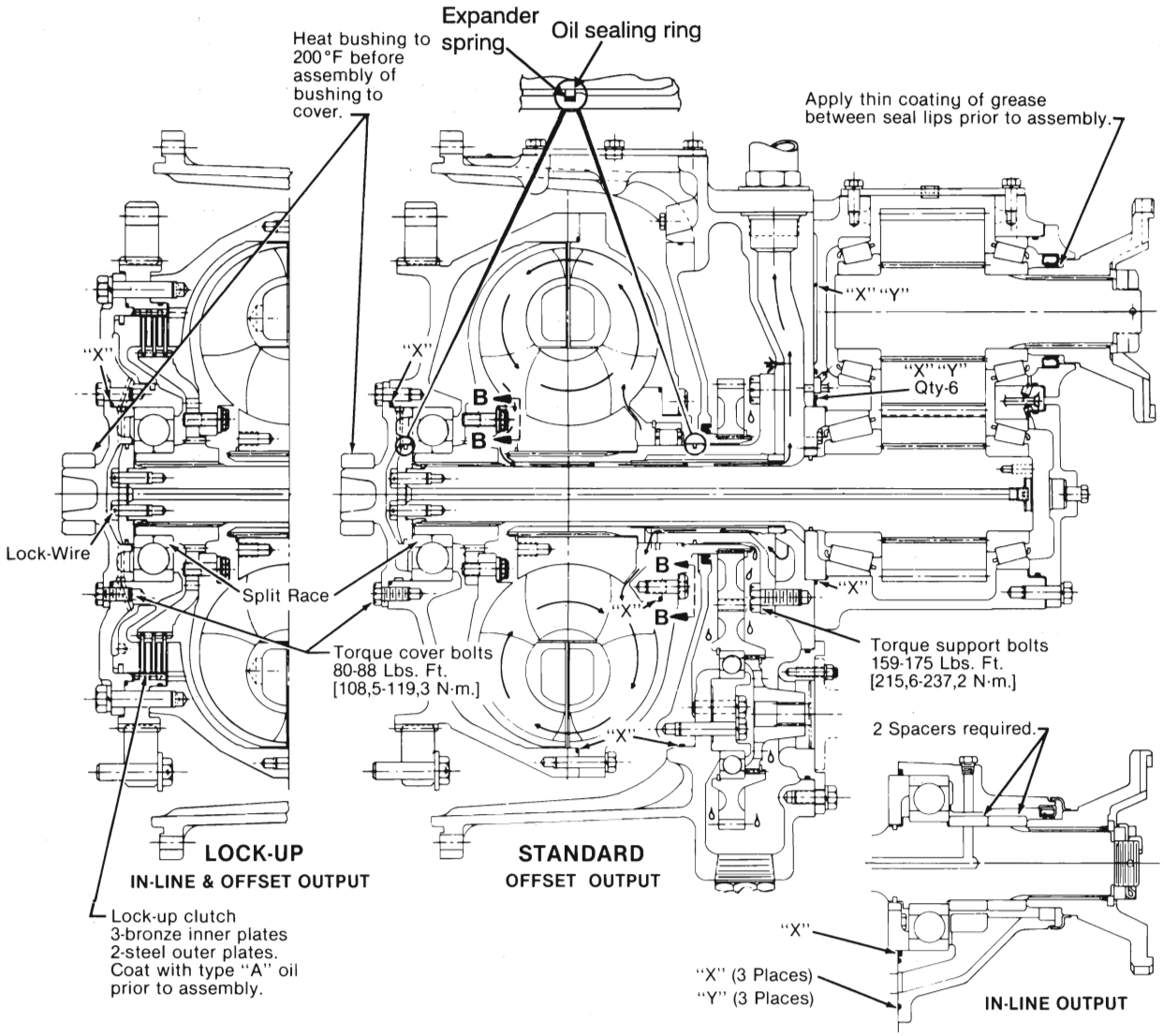
AR — As Required

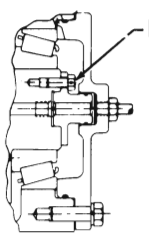
A. TEMPERATURE GAUGE CONNECTION
B. CONVERTER "OUT" PRESSURE
C. CONVERTER DRAIN BACK LINE
D. LUBRICATING PRESSURE
E. CONVERTER PUMP OUTPUT LINE
F. CLUTCH PRESSURE AT TRANSMISSION CONTROL COVER
G. TRANSMISSION TO CONVERTER LINE



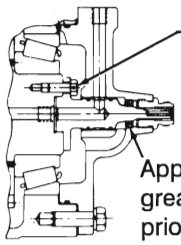
NOTES

ASSEMBLY INSTRUCTIONS
C16002 CONVERTER

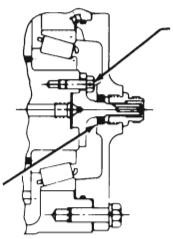




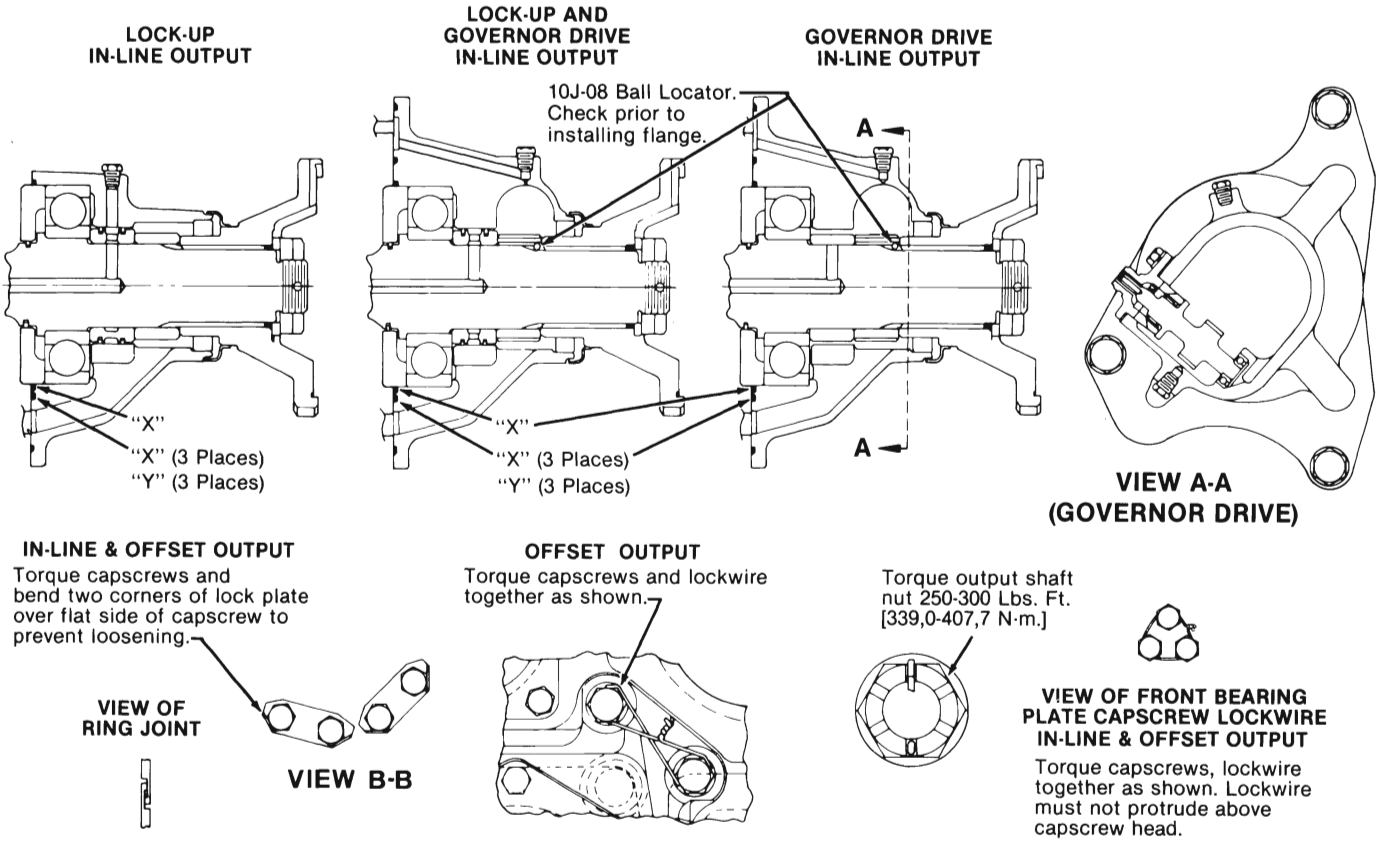
LOCK-UP OFFSET OUTPUT



LOCK-UP AND GOVERNOR DRIVE OFFSET OUTPUT



GOVERNOR DRIVE OFFSET OUTPUT



TAPER BEARING INFORMATION

GENERAL: Insure seating of bearings and related parts by seating bearing cap without using shims. CAUTION: Install ALL cap mounting screws when seating bearing cap.

Adjust to specification noted below.

Shaft should be rotated and housing rapped each time bearing cap is assembled to insure proper alignment of the bearings.

TURBINE SHAFT BEARINGS

Remove bearing cap screws after seating bearing cap as noted above. Check gap between cap and housing with shims used as a feeler gage.

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].

OUTPUT SHAFT BEARINGS

Remove bearing cap screws after seating bearing cap as noted above. Check gap between cap and housing with shims used as a feeler gage.

Remove sufficient shims to produce a .002 [0,050 mm] Tight condition. Example—gap is .010 [0,254 mm] final shim thickness to be .008]0,203 mm].

NOTE: "O" rings and adapter piston rings should be assembled AFTER shimming of bearings to prevent damage to the various parts.

NOTE: Eight body fit .7500 dia. bolts used on offset housing must be lubricated prior to assembly. Torque to 282-310 Lbs. Ft. [382,4-420,3 N-m.] and lockwire securely.

TURBINE HUB BALL BEARING WITH SPLIT INNER RACE ASSEMBLY PROCEDURE.

1. Support the turbine and hub assembly on a flat surface with the support under the turbine hub only. Using a driver with the proper inner and outer diameter, install the rear half of the split inner race.
2. Install the bearing outer race and ball assembly in the impeller cover or lock-up cover.
3. Supporting the turbine hub with the bearing race in the up position, lower the impeller or lock-up cover into position over the turbine. Rotate the cover back and forth while lowering to correctly position the bearing balls and pick up the clutch plate teeth on lock-up units.
4. With the impeller cover and turbine assembly still supported under the turbine hub and using a driver with the proper inner and outer diameter install the front half of the bearing split inner race.
5. Install complete impeller cover and turbine assembly on turbine shaft. Install bearing lock plate and capscrews. Tighten capscrews 60 to 65 Lbs. Ft. Torque [81,4-88,1 N.m.] lockwire capscrews to prevent loosening.

Lubricate all piston rings and "O" rings at assembly.

Use Permatex and Crane Sealer only where specified.

Apply very light coat of Permatex No. 2 to O.D. of all oil seals before assembly.

After assembly of parts using Permatex or Crane Sealer there must be no free or excess material that could enter oil circuit.

"O" rings marked "X" must have a white identification mark on the O.D. (Denotes high temperature material.)

"O" rings marked "Y" to be assembled by attaching to "O" ring groove with 3M brand 77 spray adhesive.

Groove to be sprayed with adhesive and "O" ring to to be positioned in groove approximately 15 to 30 seconds after spraying.

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

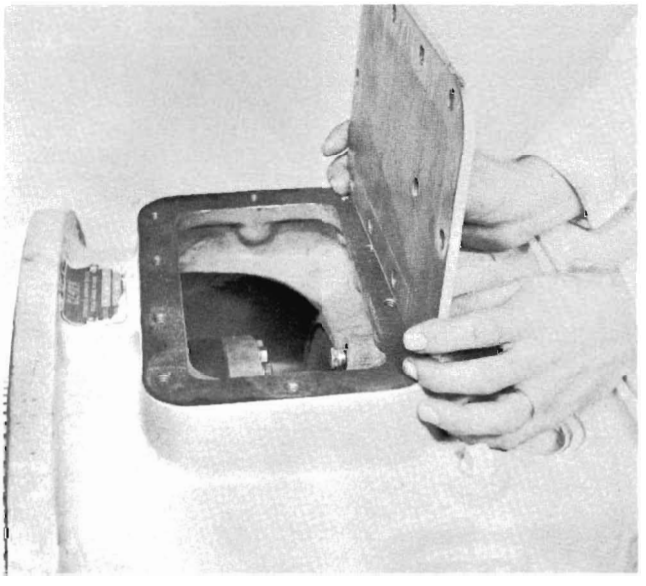


Figure 1
Remove converter housing cover plate.

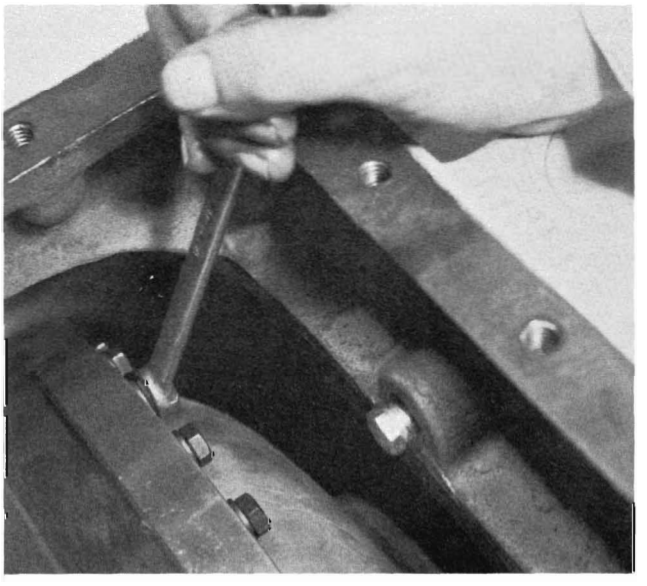


Figure 3
Remove impeller to impeller cover bolts.

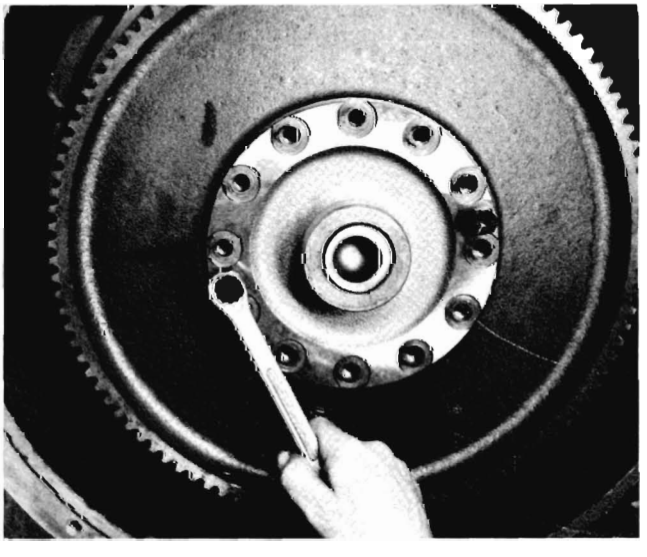


Figure 2
Remove drive disc adapter bolts, install two bolts in threaded holes and tighten evenly, remove adaptor.

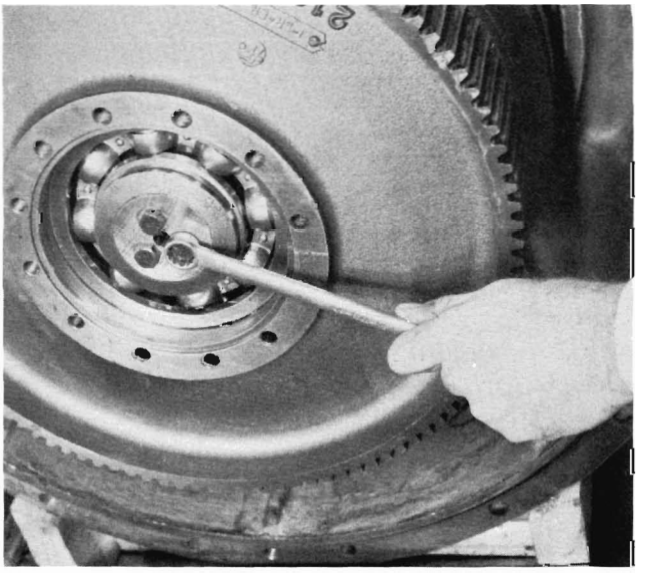


Figure 4
Remove Front Bearing plate bolts.

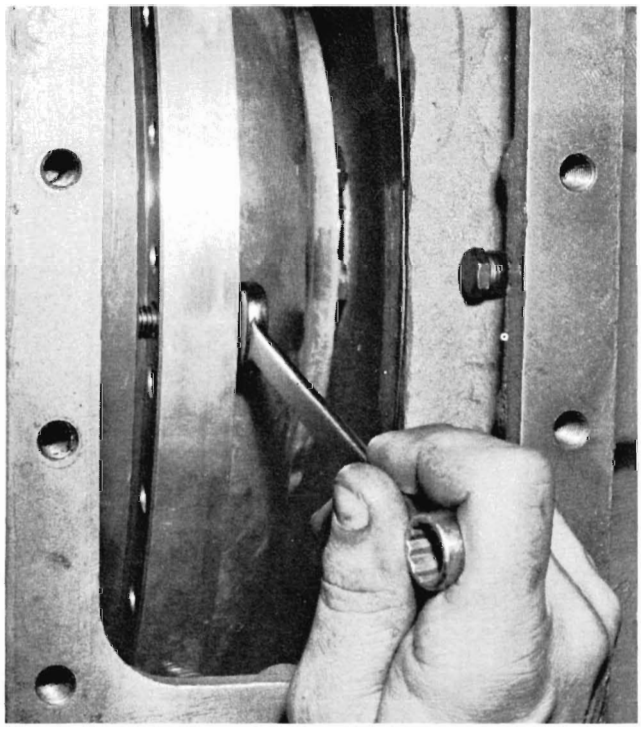


Figure 5
Secure impeller cover with a chain hoist. Install 3 impeller to impeller cover bolts in the threaded holes in the impeller (see Fig. 5). Tighten bolts evenly. Impeller cover will push front bearing plate from turbine shaft.

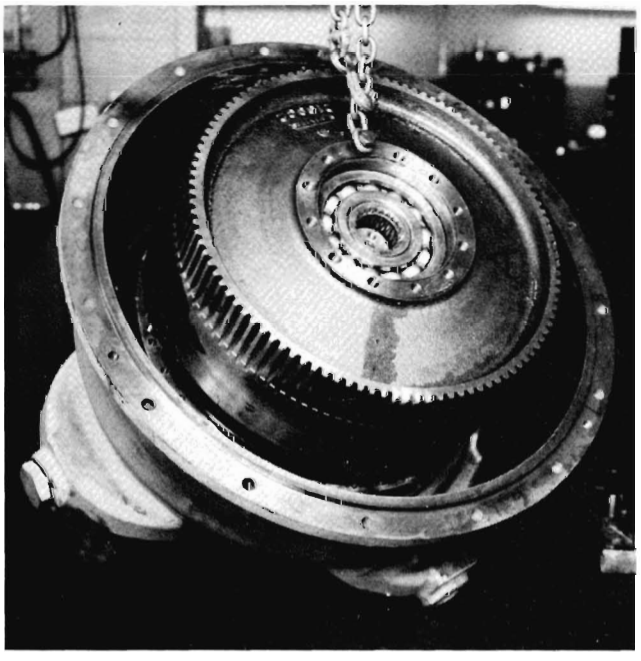


Figure 6
Remove impeller cover and turbine as an assembly.

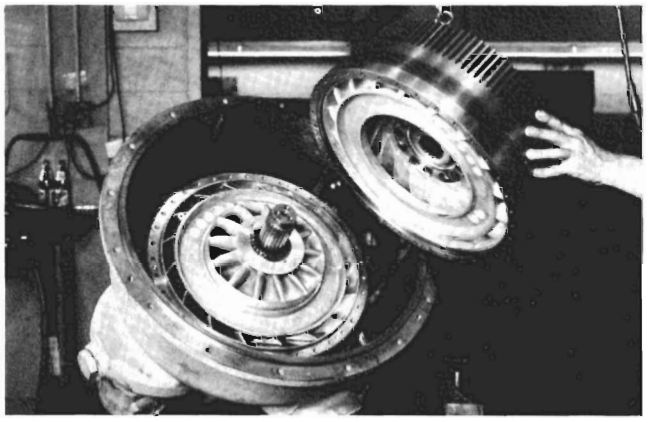


Figure 7
Impeller cover and turbine removed.

IMPELLER COVER AND TURBINE DISASSEMBLY

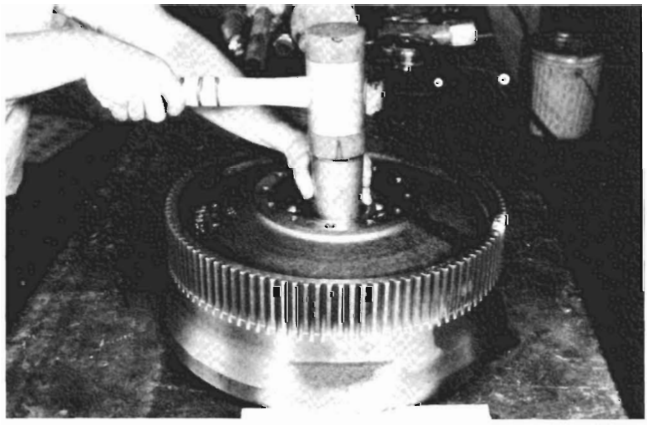


Figure 8
Position impeller cover and turbine on a flat surface. Support the outer diameter of the impeller cover. Using a driver with the proper inner and outer diameter drive turbine hub from bearing race.

Figure 9
Remove bearing inner split race.

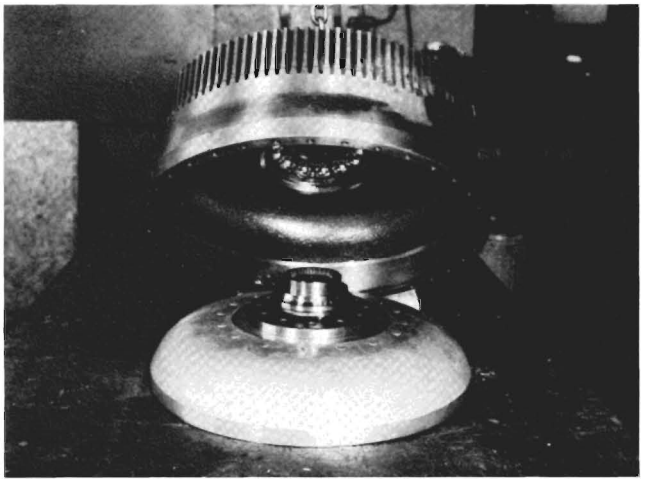


Figure 10
Remove impeller cover from turbine.

Figure 11
If the turbine hub bearing inner race is to be replaced use procedure as shown.

Figure 12
Remove reaction member retainer ring.

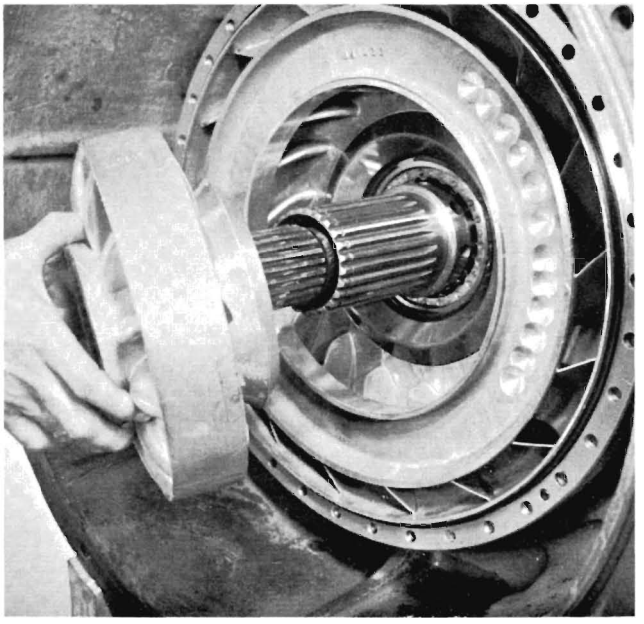


Figure 13
Remove reaction member from stator support. If reaction member is tight, threaded holes are provided to pull member from support.

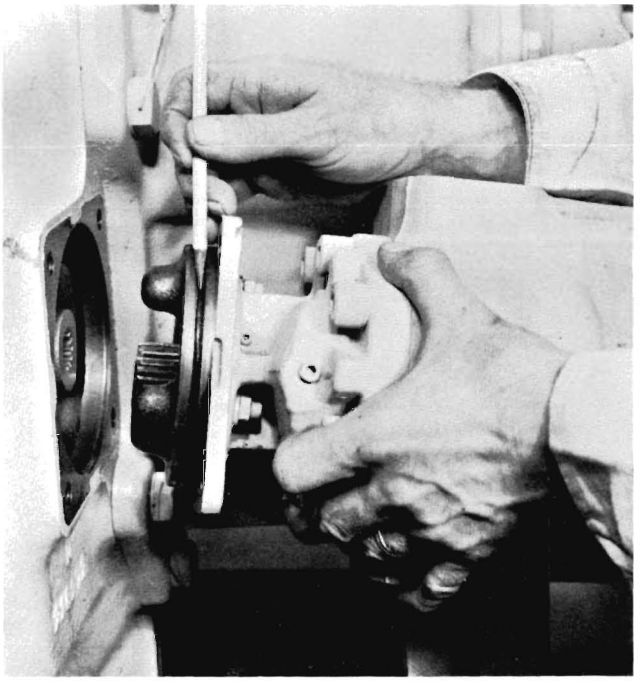


Figure 14
Remove pump adaptor bolts, remove pump and adaptor from converter housing. Unit may have from one to three pumps or cover plates. Remove all pumps and plates.

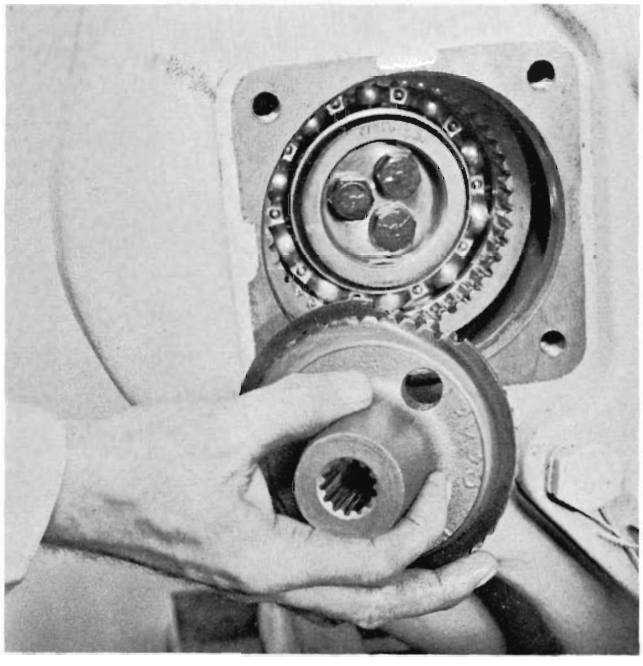


Figure 15
Remove pump drive sleeve retainer ring and sleeve, unit may have from one to three pump drive sleeves, remove all.

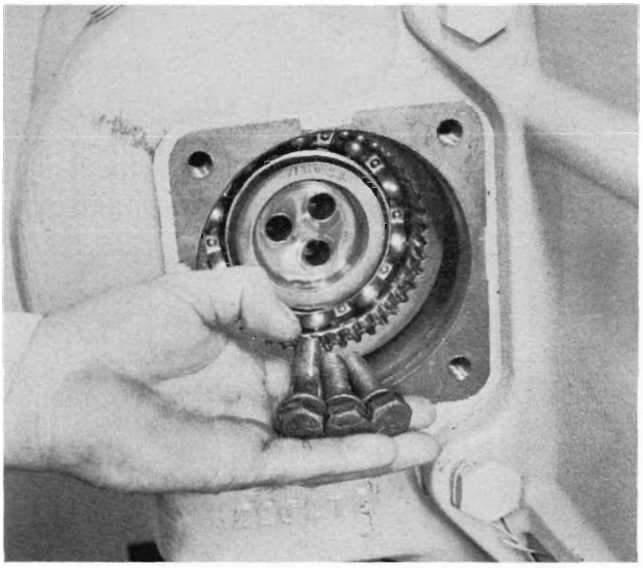


Figure 16
Pump driven gear bearing carrier is secured in the coverter housing by three bolts. The two shorter bolts of the three secure the bearing carrier to the converter housing. The third (longer of the three) locates and secures the oil baffle to the converter housing. Remove all three bolts in each pump drive bearing carrier.

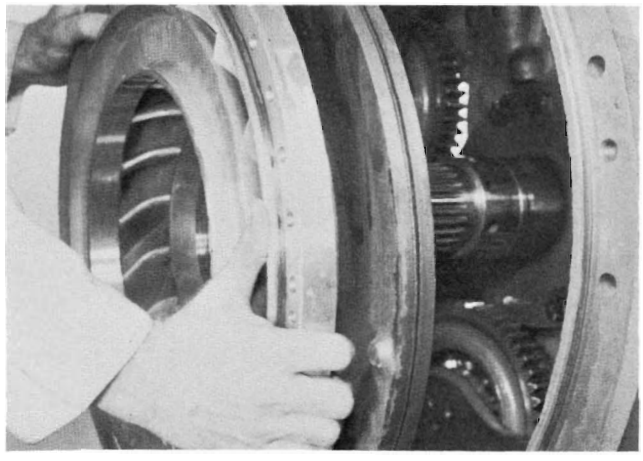


Figure 17
Remove impeller and oil baffle assembly from converter housing.

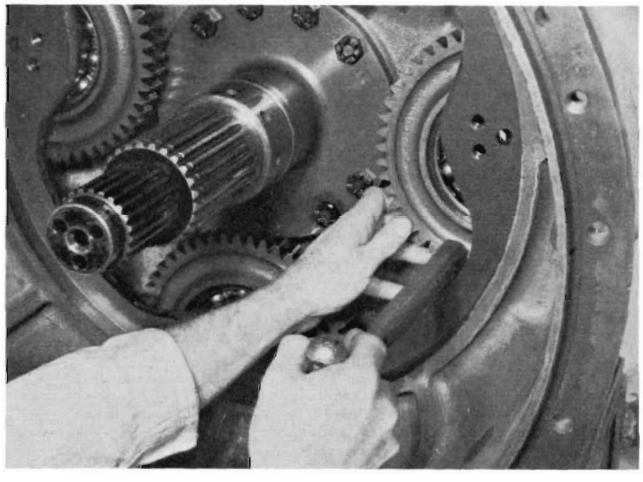


Figure 18
Tap pump driven gears from housing.

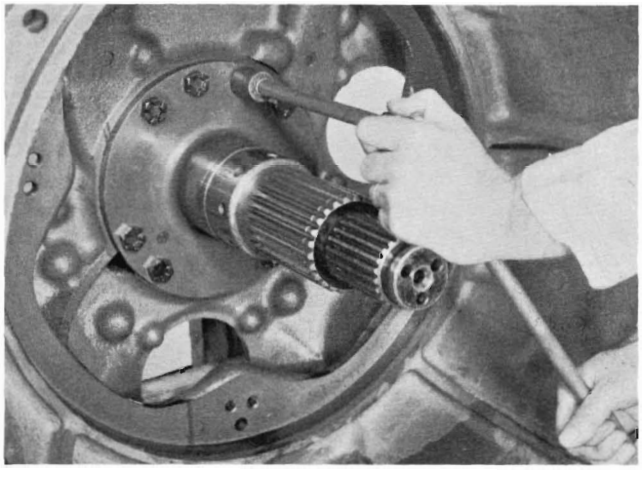


Figure 19
Remove stator support bolts. Remove support from housing.

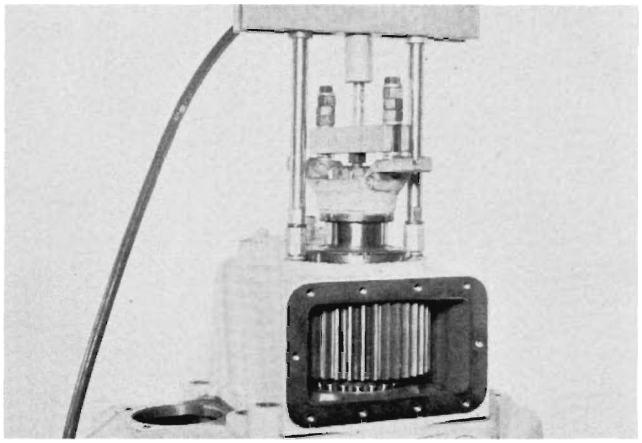


Figure 20

Remove companion flange nut and flange from output shaft. Remove output shaft bearing cap. Install companion flange and nut on output shaft. Use shaft puller as shown in Fig. 20 to remove output shaft.

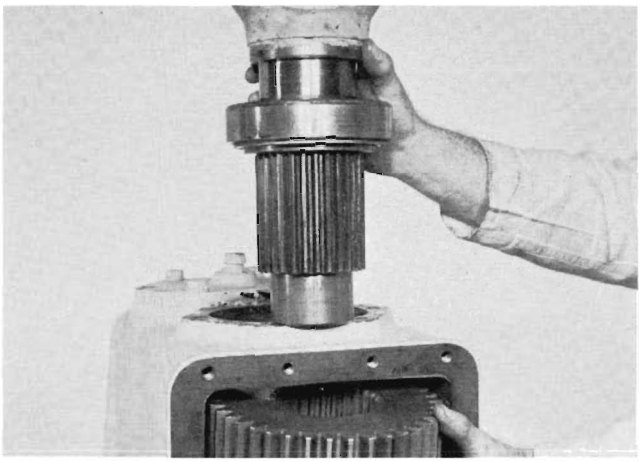


Figure 21

Output shaft and rear bearing removed.

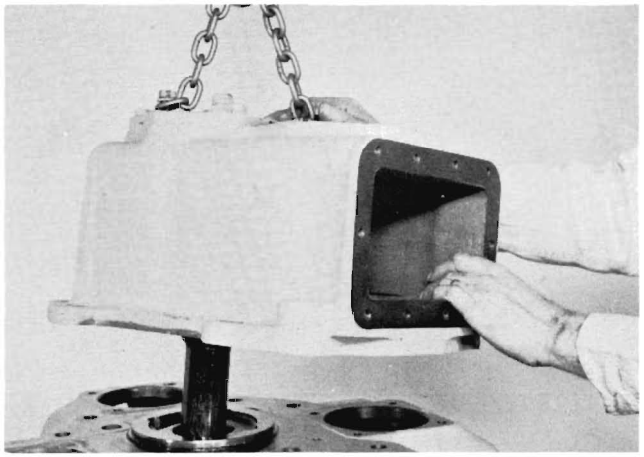


Figure 22

Remove all bolts in drop gear housing. Remove drop gear housing from converter housing.

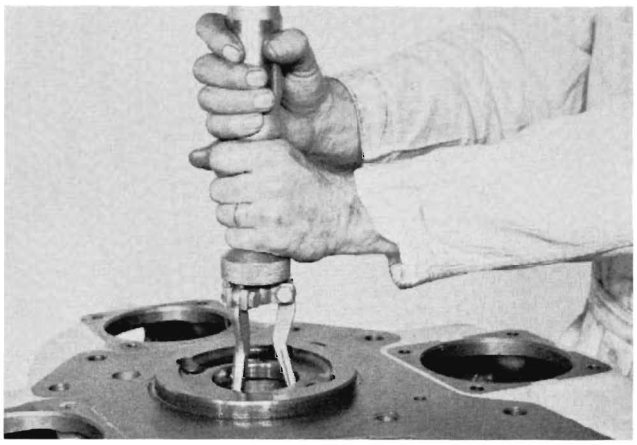


Figure 23

Remove piston ring outer race bolts and washers. Using a hammer puller as shown remove outer race.

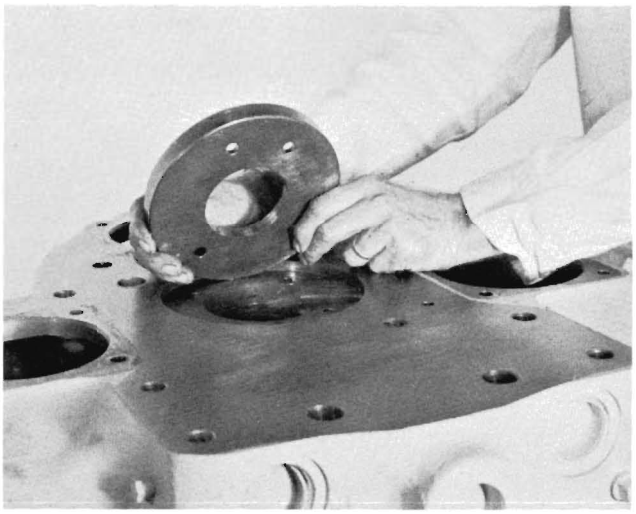


Figure 24

Piston ring outer race removed.

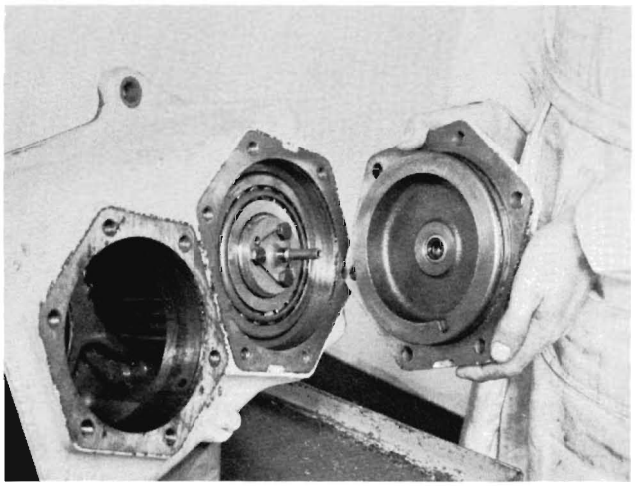


Figure 25

Remove turbine shaft rear bearing cap.

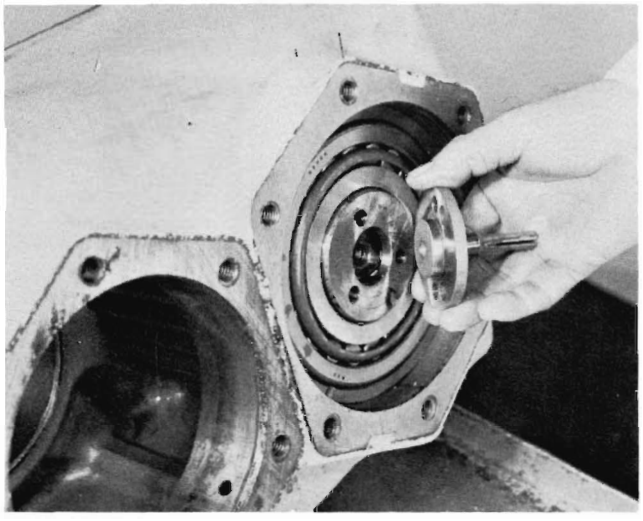


Figure 26

Remove governor drive adaptor bolts, install two bolts in threaded holes, tighten evenly and remove adaptor.

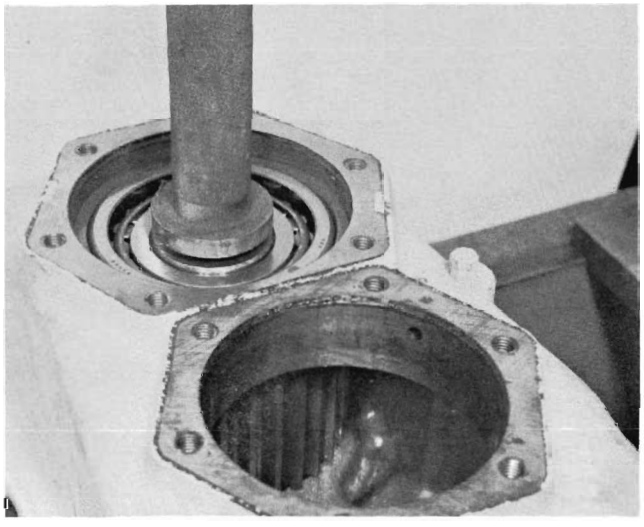


Figure 27

Press turbine shaft from drop gear adaptor. Remove turbine shaft gear from drop gear case. If inner cone on turbine shaft is to be replaced press from shaft.

CLEANING AND INSPECTION

CLEANING

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

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

Bearings

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

Housings

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

CAUTION: Care should be exercised to avoid 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 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 Permatix 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.

REASSEMBLY OF TORQUE CONVERTER

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

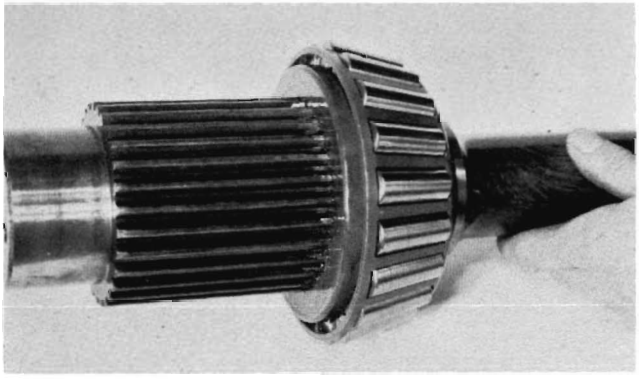


Figure 28
Press front cone bearing on turbine shaft.

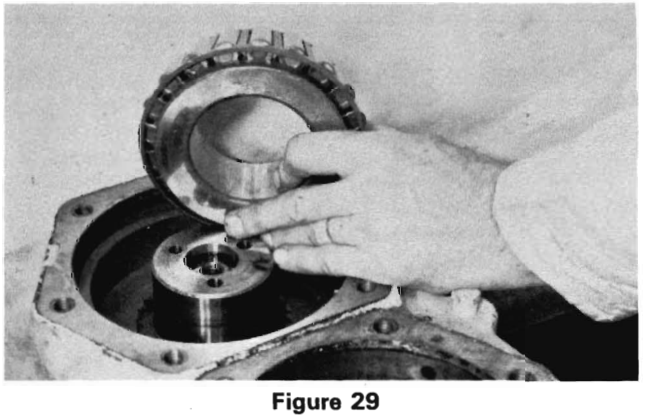


Figure 29
Insert turbine shaft gear in drop gear housing. Insert turbine shaft through gear. Block turbine shaft and center cone bearing on shaft.

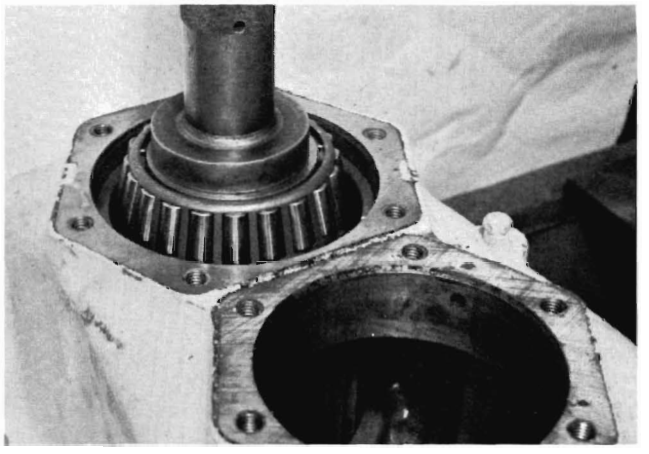


Figure 30
Press outer cone bearing on turbine shaft.

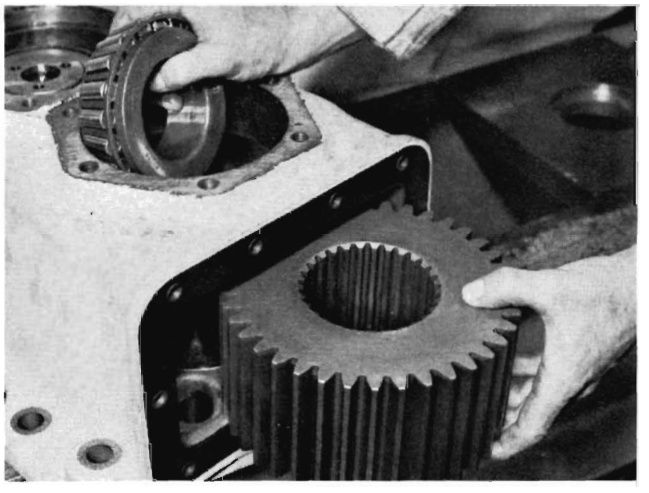


Figure 31
Insert output inner cone bearing in inner bearing cup. Insert output gear over inner bearing.

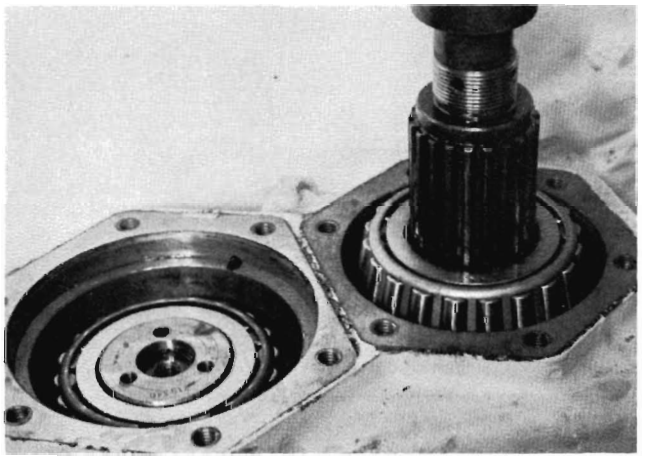


Figure 32
Press output shaft and bearing through output gear and into inner bearing.

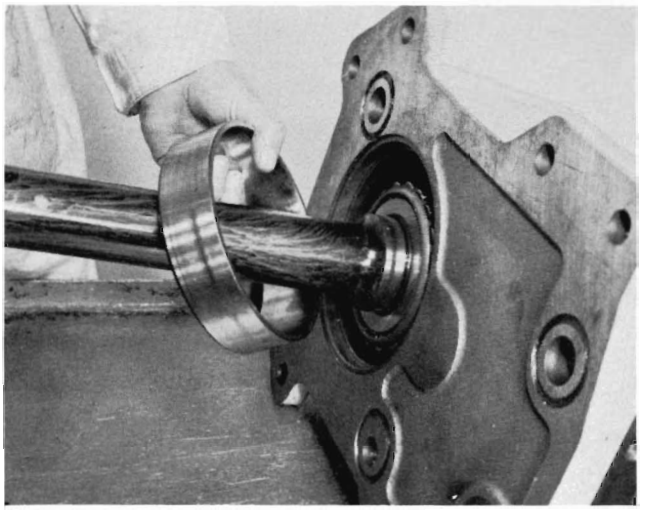


Figure 33
Install turbine shaft inner bearing cup on bearing cone.

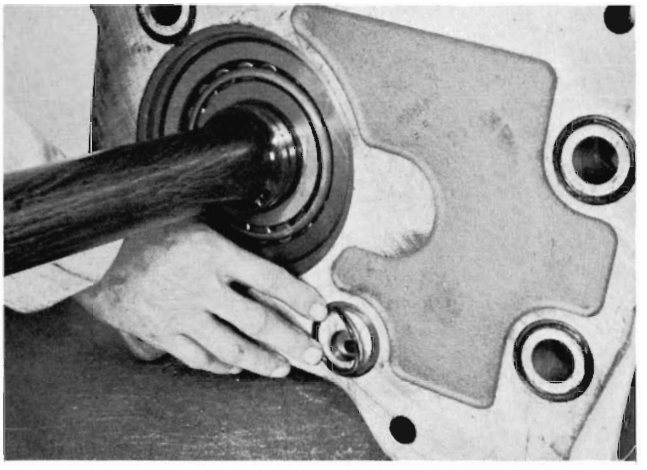


Figure 34
Install drop gear housing to converter housing "O" Rings.

Figure 35
Install new lock type oil sealing ring. **NOTE:** Some units will have a plastic or hard nylon type oil sealing ring without a lock (see your parts list).

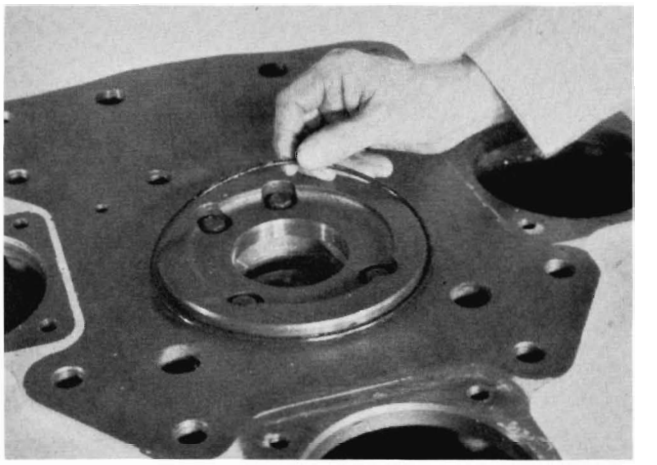


Figure 36
Install oil sealing ring outer race to converter housing. Tighten bolts 23 to 25 ft. lbs. torque [31,2 - 33,9 N.m]. Install new outer race "O" ring.

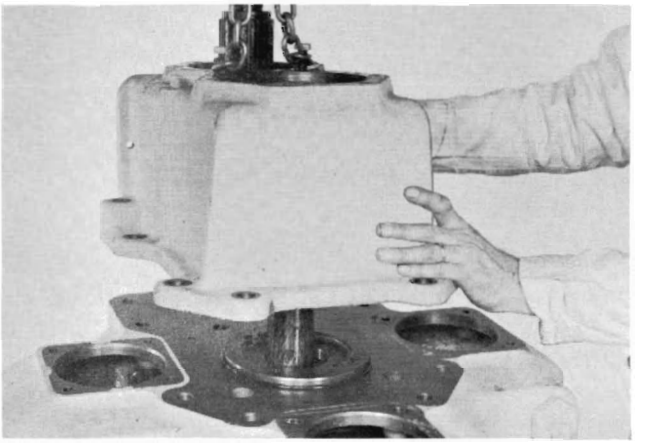


Figure 37
Install drop gear case and turbine and output shaft assembly on converter housing. Lubricate body fit bolts prior to assembly. Tighten bolts 282 to 310 ft. lbs. torque [382,4 - 420,3 N.m] and lockwire securely.

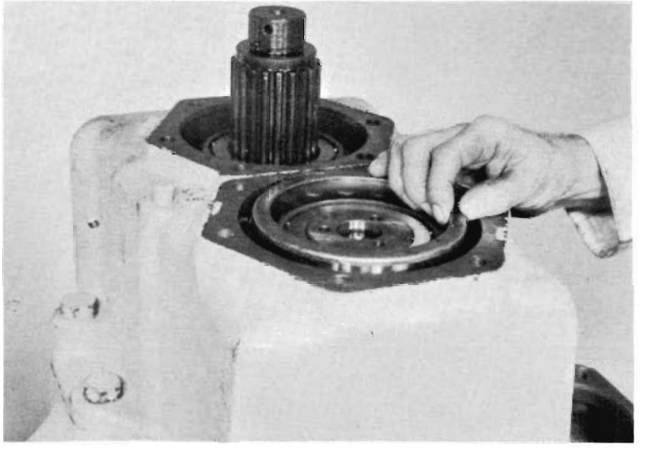


Figure 38
Install turbine shaft outer cone bearing cup.

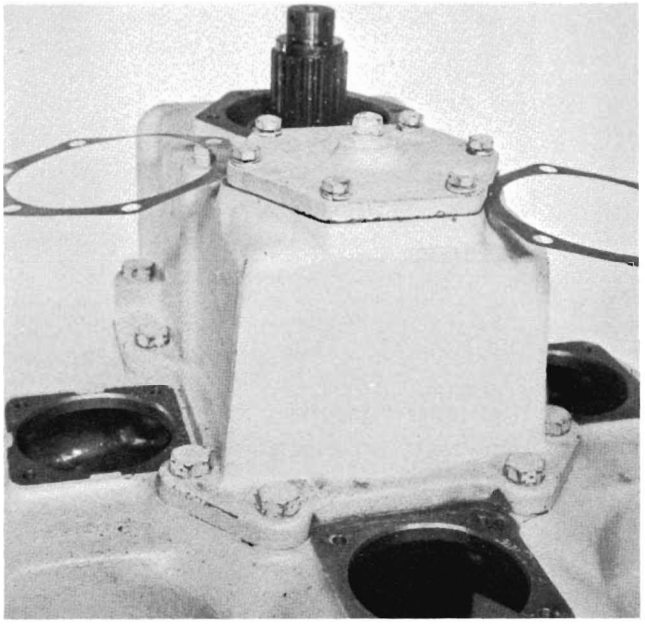


Figure 39

Install bearing cap on turbine shaft. Install bolts and washers and tighten securely. This is to insure proper seating of taper bearings. Loosen bolts, tighten bolts 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" [0,304mm]. Remove bearing cap.

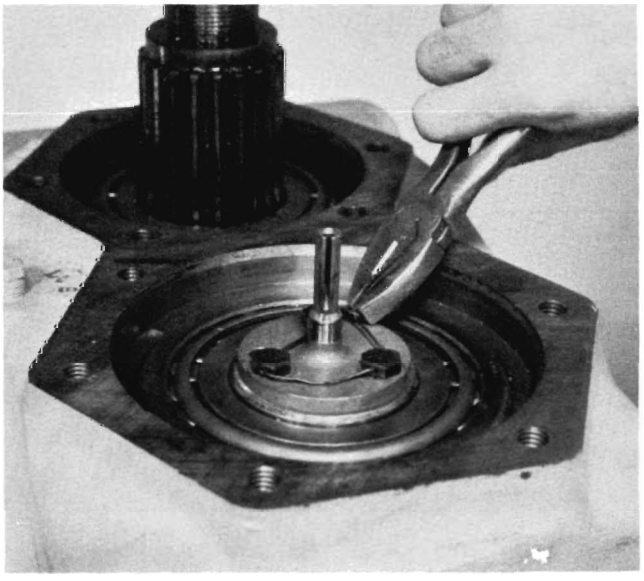


Figure 40

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 23 to 25 ft. lbs. torque [31,2 - 33,9 N.m]. Lock-wire to prevent loosening.

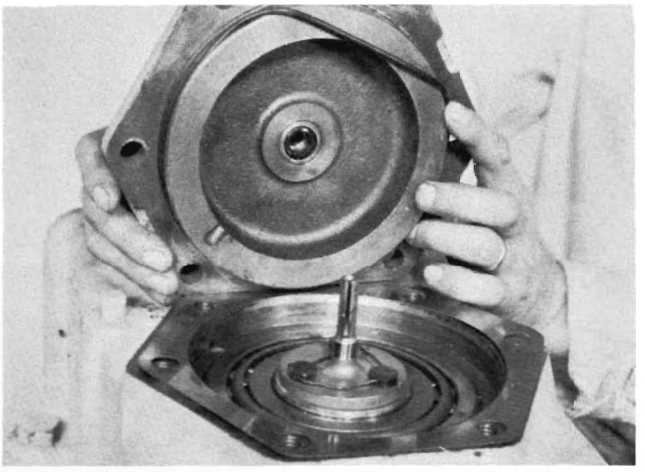


Figure 41

With bearing cap shims in position, install new "O" ring and oil seal on turbine shaft bearing cap. Install bolts and lockwashers, tighten 57 to 63 ft. lbs. torque [77,3 - 85, 4 N.m.].

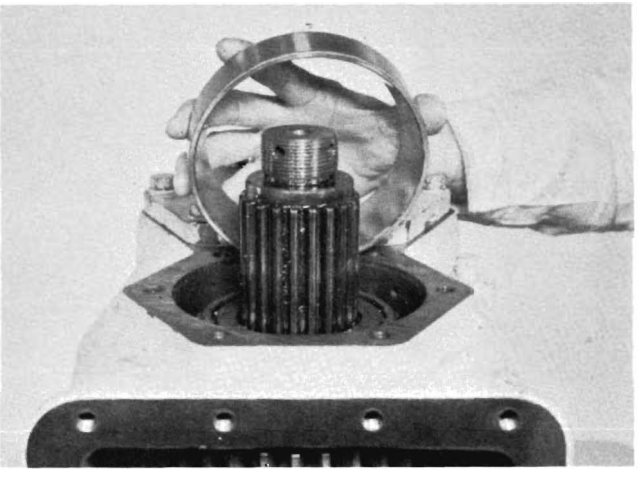


Figure 42

Install output shaft outer cone bearing cup.

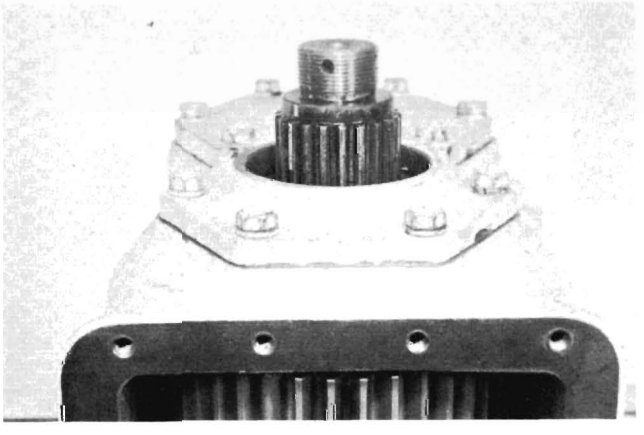


Figure 43

Install output shaft bearing cap and bolts, tighten securely. This is to insure proper seating of taper bearings.

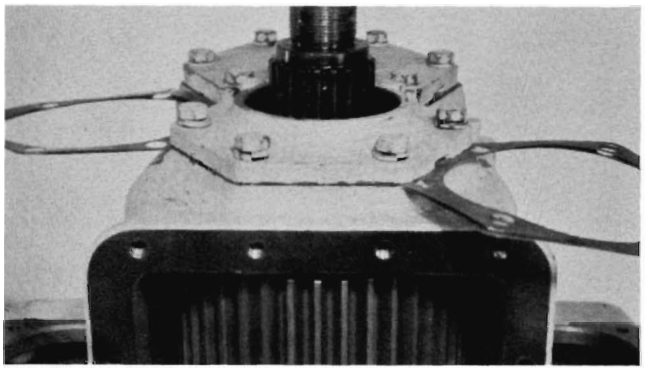


Figure 44

Loosen bolts. Tighten bolts 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]. Remove bearing cap.

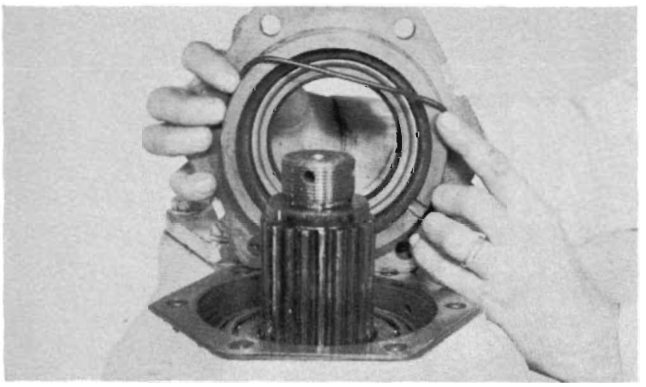


Figure 45

Apply a thin coat of Permatix No. 2 on the outer diameter of the output shaft oil seal. Press oil seal in bearing cap with lip of seal down. With bearing cap shims in position install new "O" ring on bearing cap. Install bolts and lockwashers. Tighten 57 to 63 ft. lbs. torque [77,3-85,4 N.m.].

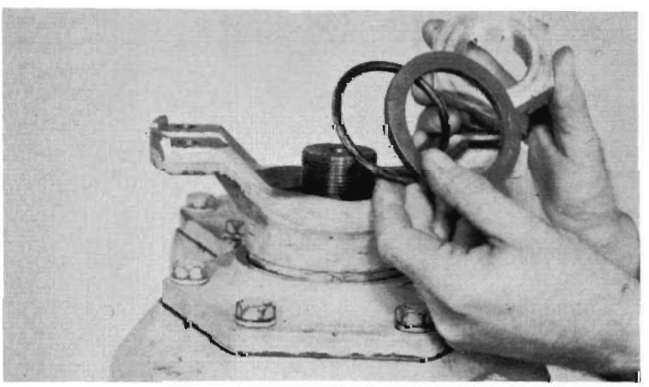


Figure 46

Install companion flange, "O" ring, washer and nut. Using a soft bar, lock converter output gears. Tighten output nut 250 to 300 ft. lbs. torque [339,0 - 406,7 N.m.].

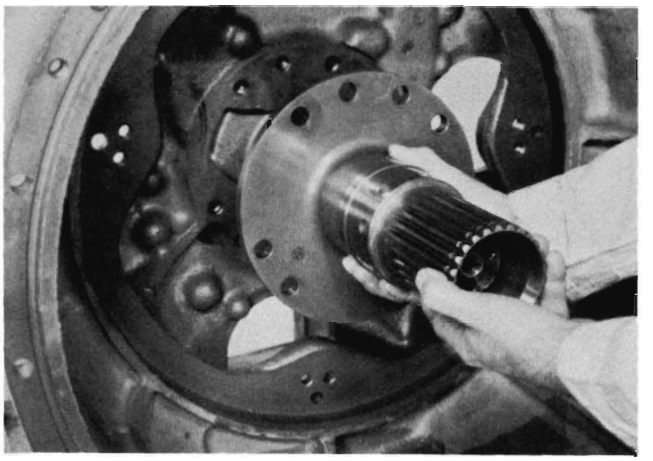


Figure 47

Install stator support and special self locking bolts. Tighten bolts 159 to 175 ft. lbs. torque [215,6 - 237,3 N.m]

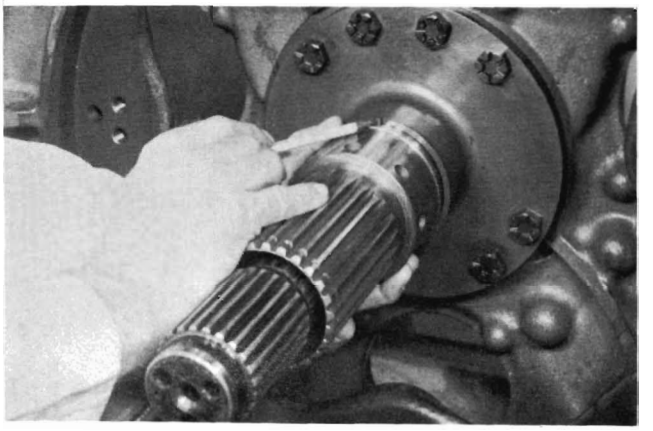


Figure 48

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

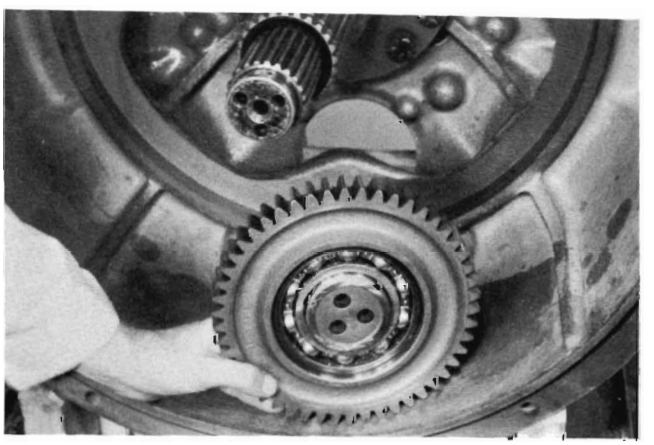


Figure 49

Position pump driven gear, bearing and bearing carrier in converter housing. Secure bearing carrier with two short bolts into threaded holes in converter housing. Tighten 57 to 63 ft. lbs. torque [77,3 - 85,4 N.m.].

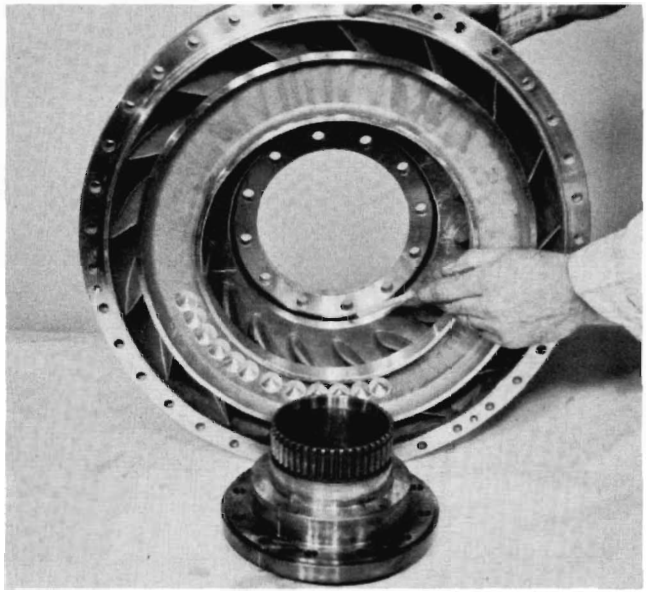


Figure 50
Install new impeller to impeller hub "O" Ring.

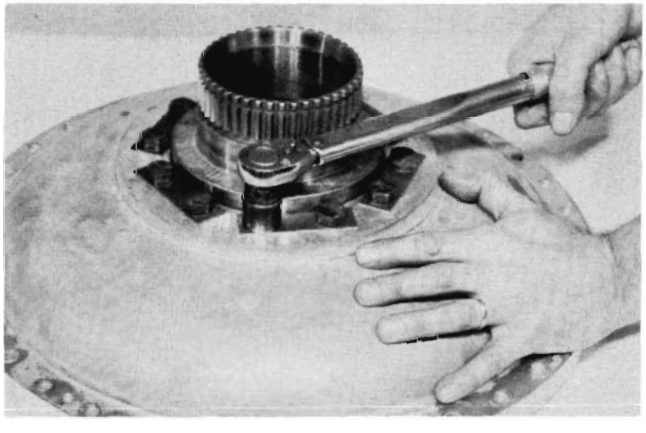


Figure 51
With lock plates in position install impeller to impeller hub bolts. Tighten 57 to 63 ft. lbs. torque [77,3 - 85,4 N.m.].

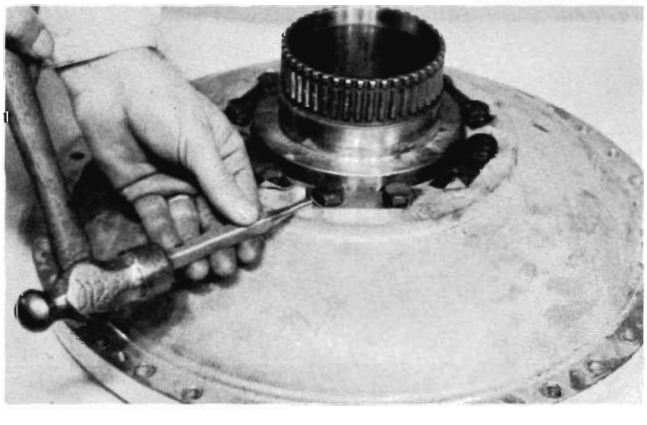


Figure 52
Bend two corners of lock plate over flat side of bolts to prevent loosening.

Figure 53
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.

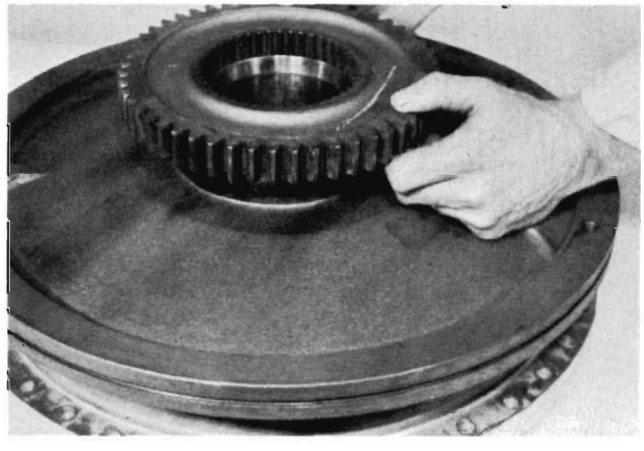


Figure 54
Install oil baffle and oil pump drive gear on impeller and hub assembly. Secure gear with retainer ring.

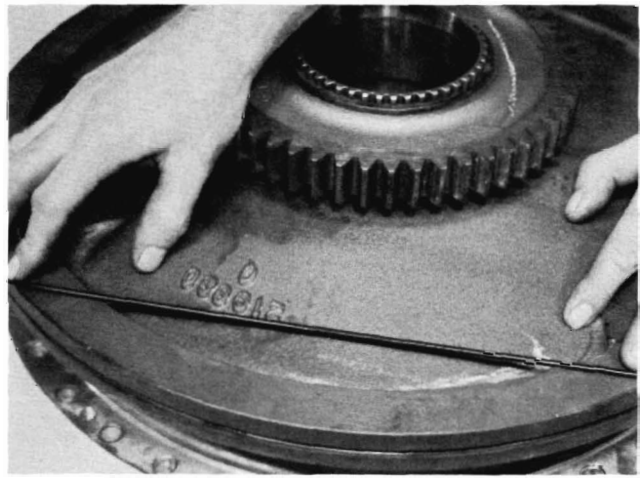


Figure 55
Install new "O" Ring on oil baffle.

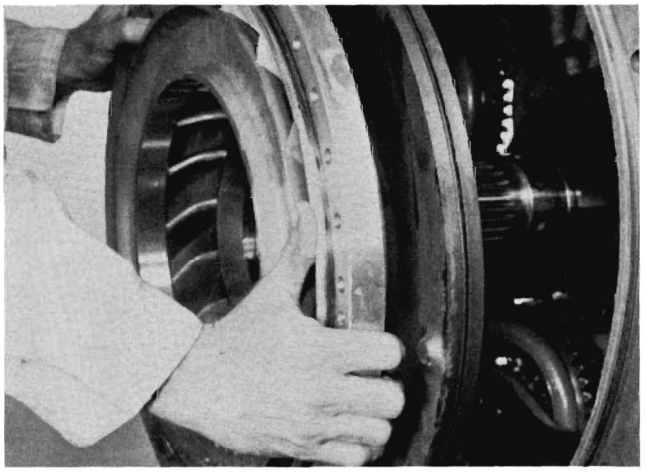


Figure 56

Install impeller and oil baffle assembly on stator support. Use caution as not to damage support sealing ring, oil baffle "O" Ring and oil seal. Install new impeller to impeller cover "O" Ring.

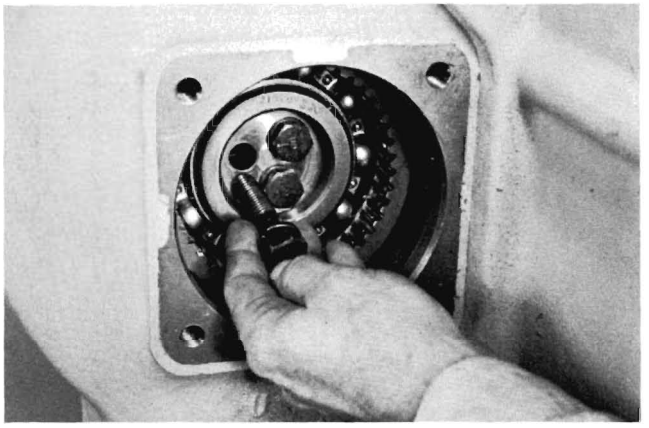


Figure 57

Align threaded hole in oil baffle with holes in pump driven gear bearing carrier. Install oil baffle bolts and tighten 57 to 63 ft. lbs. torque [77,3 - 85,4 N.m.].

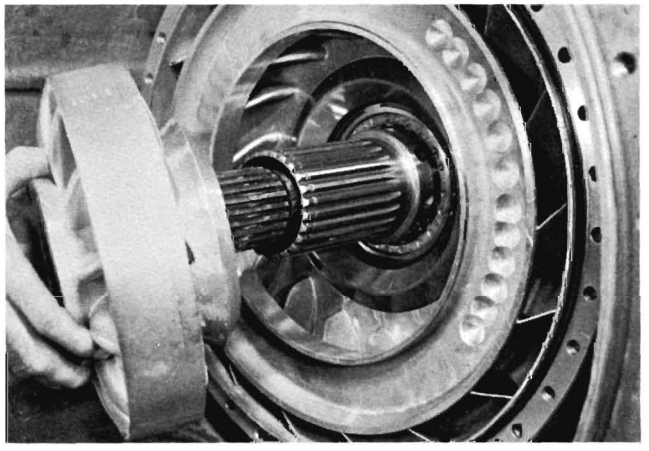


Figure 58

Install reaction member on support.

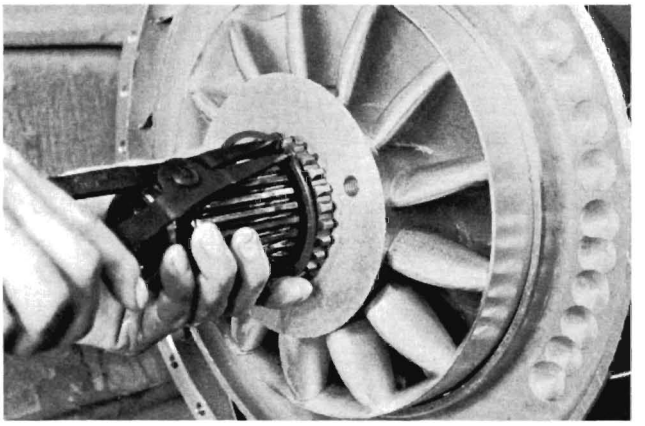


Figure 59

Install reaction member retainer ring.

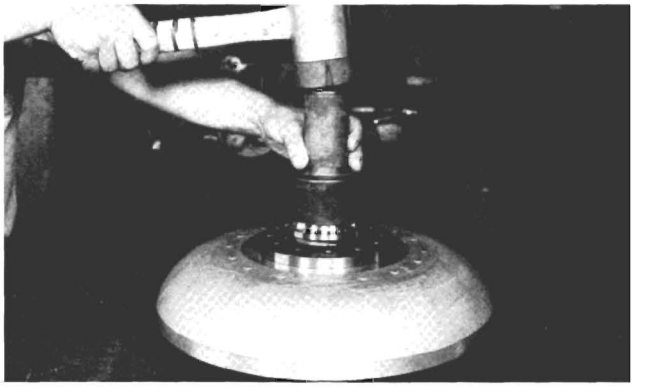


Figure 60

Support the turbine and hub assembly on a flat surface with the support under the turbine hub only. Using a driver with the proper inner and outer diameter, install the rear half of the split inner race. **NOTE:** The race must be fully seated on hub.

Install the bearing outer race and ball assembly in the impeller cover or lock-up cover.

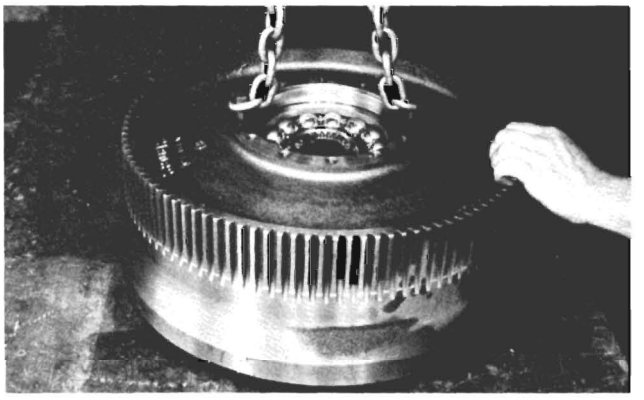


Figure 61

Supporting the turbine hub with the bearing race in the up position, lower the impeller or lock-up cover into position over the turbine. Rotate the cover back and forth while lowering to correctly position the bearing balls and pick up the clutch plate teeth on lock-up units.

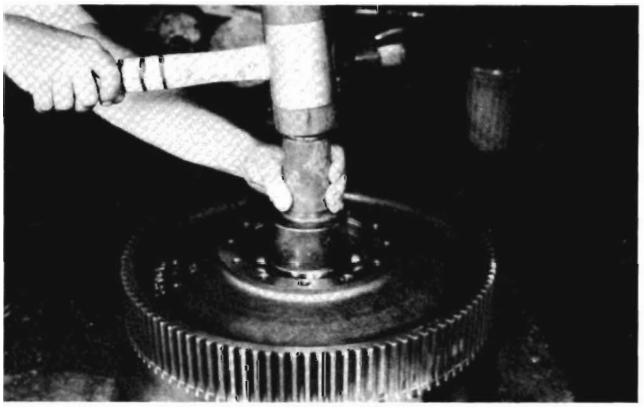


Figure 62

With the impeller cover and turbine assembly still supported under the turbine hub and using a driver with the proper inner and outer diameter install the front half of the bearing split inner race. **NOTE:** The race must be fully seated in hub.

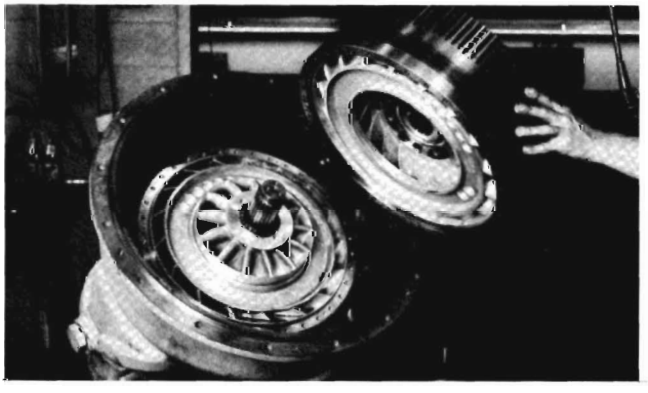


Figure 63

Install complete impeller cover and turbine assembly on turbine shaft. Align holes in impeller cover with holes in impeller. Install impeller to impeller cover bolts. Tighten evenly 37 to 41 ft. lbs. torque [50,2 - 55,6 N.m.].

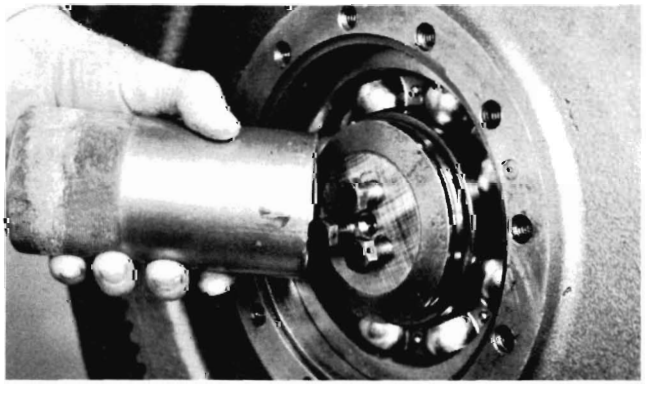


Figure 64

Align holes in bearing retainer plate with holes in turbine shaft. Start bearing plate bolts. **NOTE:** Prior to torque converter Serial No. 44321-W grade 5 bolts were used for the bearing retainer plate retention. It is recommended that a grade 8 Part No. 237928 be used in place of the grade 5 bolts when reassembling. Drive plate into position.

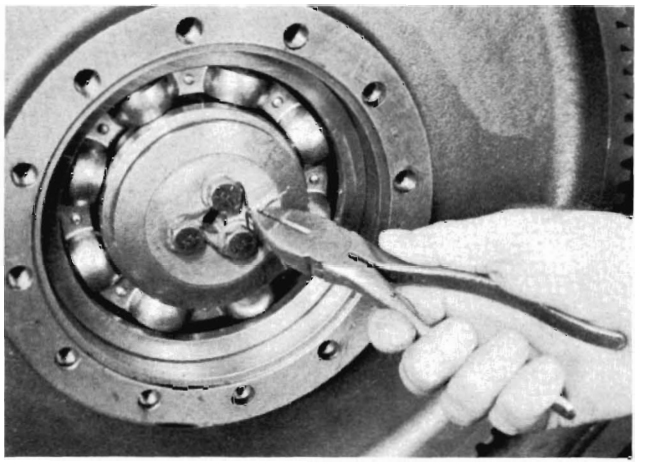


Figure 65

Tighten grade 8 bearing retainer plate bolts 60 to 65 ft. lbs. torque [81,4 - 88,1 N.m]. Lockwire to prevent loosening.

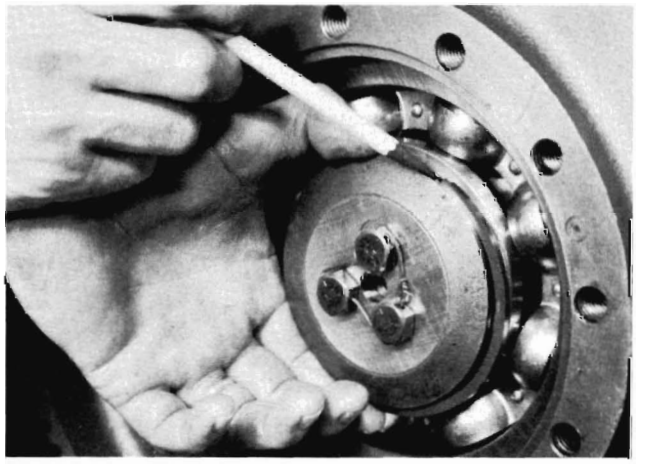


Figure 66

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

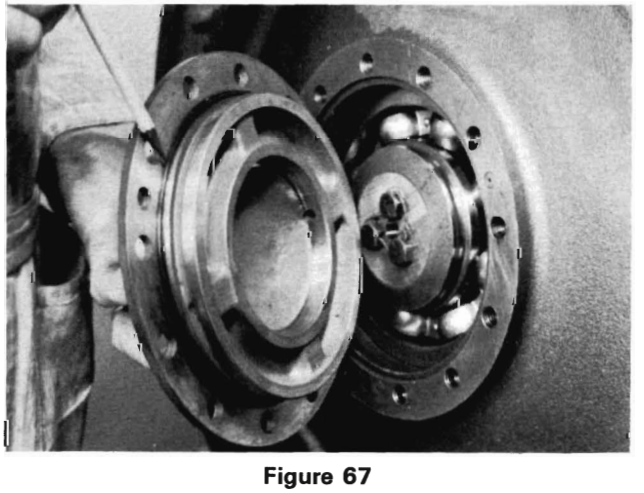


Figure 67

Install new "O" Ring on drive disc adaptor. Position adaptor on impeller cover.

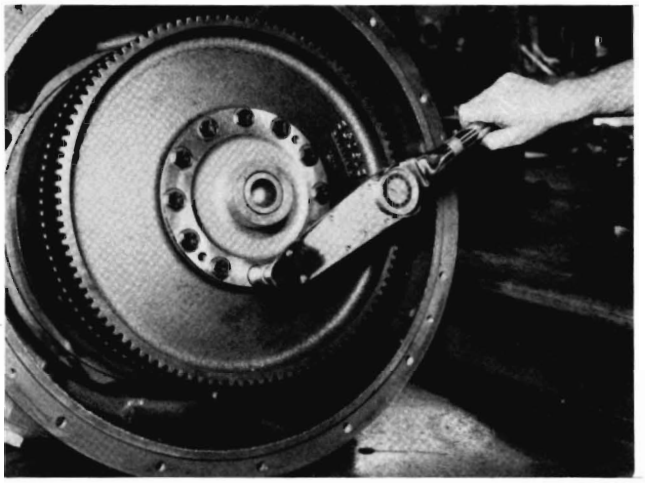


Figure 68

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

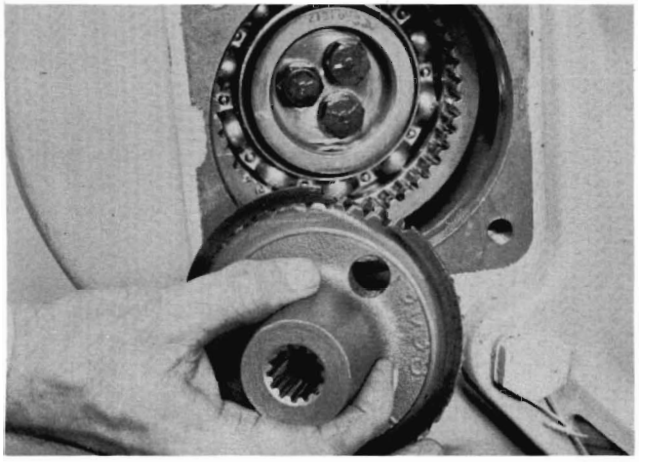


Figure 69

Install pump drive sleeves and retainer rings.

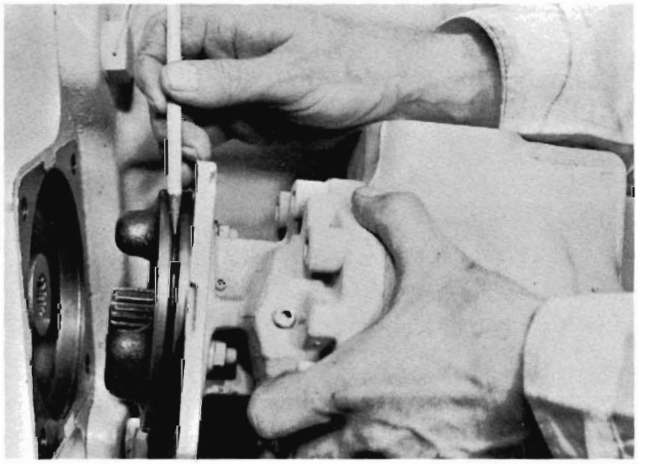


Figure 70

Install new "O" Ring on pump adaptor. Install pumps or pump hole cover plates.

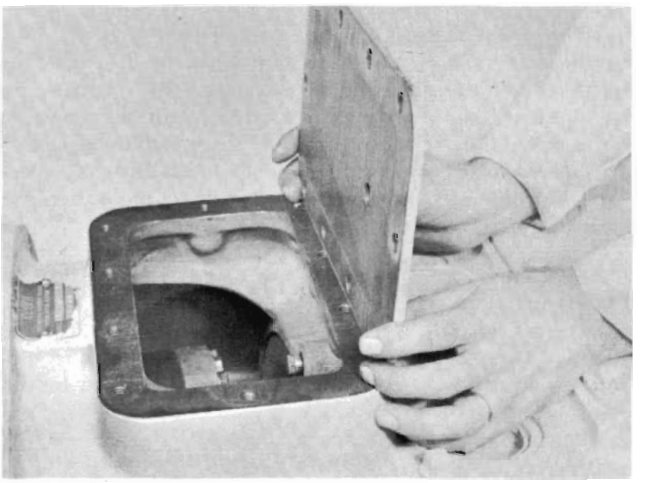


Figure 71

Install converter housing and drop gear housing cover plates.

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.**

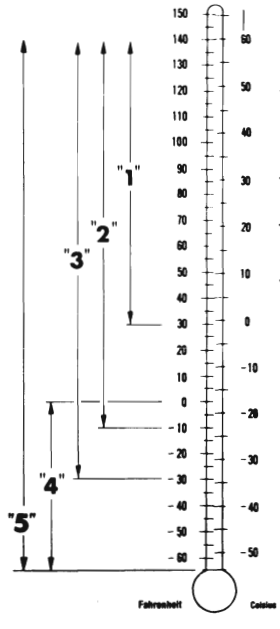
(c) **Refill transmission to LOW mark.**

(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 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 Polor Start DN-600 Fluid

*Dexron is a registered trademark of General Motors Corporation.

NOTES: 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: H125, H200, H500, H600, 18000, 24000, 28000, 32000 & 34000 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 series transmissions with modulated shift use only C-3 or temperature range 3 items (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 or 16000 series power shift transmissions, or the HR28000, HR32000 & HR34000 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 Components International 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.**

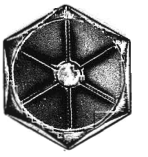
TORQUE IN (LBS.—FT.)
BOLTS, CAPSCREWS, STUDS AND NUTS

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

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

Grade 5

LUBRICATED OR PLATED



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.
.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]

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 E, check 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-16000 FLYWHEEL RING GEAR INSTALLATION PROCEDURE

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. 0 - 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 219670 - equally spaced. Tighten 159 to 175 lbf·ft [215,6 - 237,2 N·m] of torque. ***See note reverse side for stud standout Dimension.***

③ Install Ring Gear 576613 by tapping lightly in place.

④ Install remaining studs. Tighten 159 to 175 lbf.ft [215,6 - 237,2 N.m] torque.

⑤ Install Backing Plate 219672.

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

⑦ Install Belleville Washers and Elastic Stop Nuts as shown (5 washers, each stud). Tighten nuts in a criss cross pattern to 160 lbf·ft [217 N·m] torque. Then tighten nuts in increments of 10 lbf·ft [13,6 N·m] in a criss cross pattern to 180 to 198 lbf·ft [244,1 - 268,4 N·m] torque.

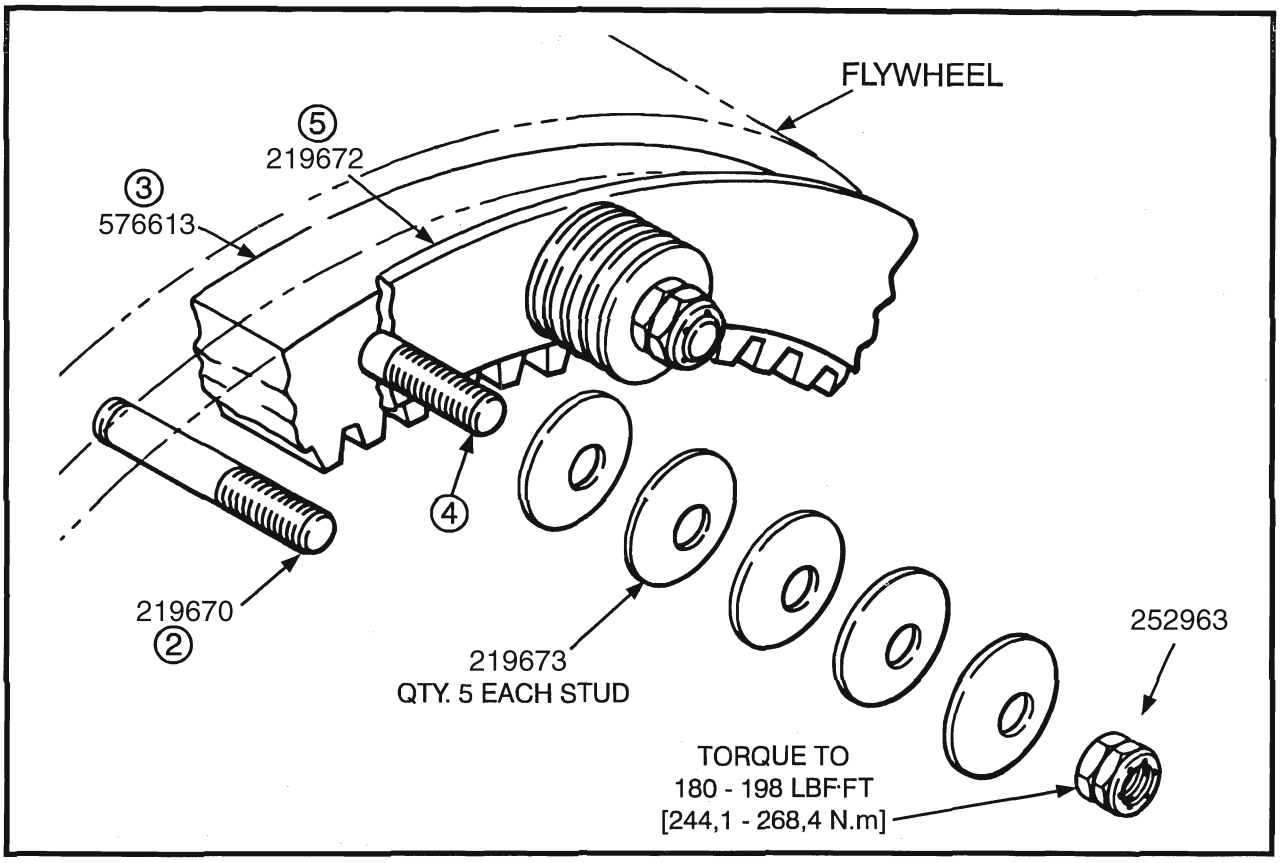
When the C & CL-16000 Flywheel Ring Gear is to be replaced order Kit No. 252965.

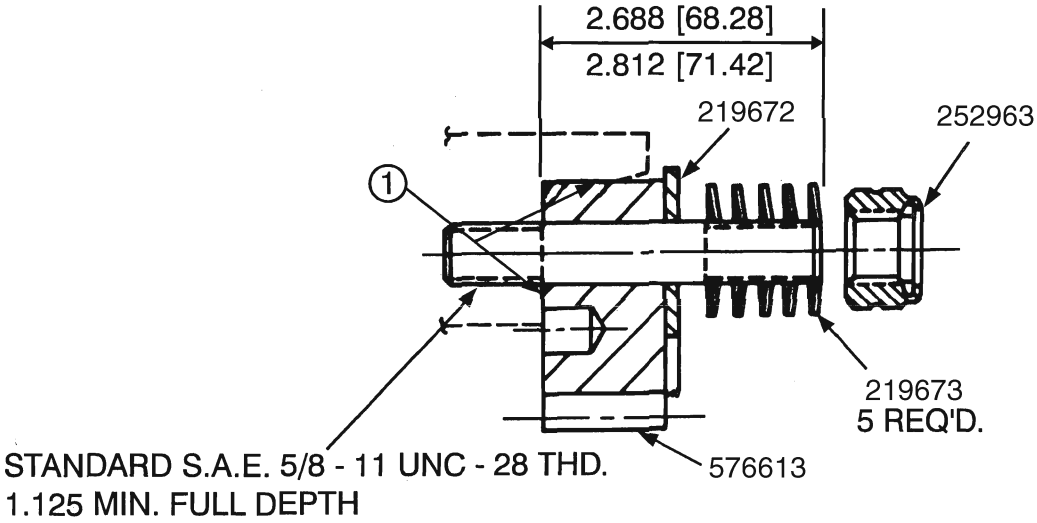
If Backing Ring is to be replaced order Part No. 219672 Backing Plate.

The 252965 Kit Includes:

1	576613	Ring Gear
12	219670	Stud
60	219673	Belleville Washer
12	252963	Stud Nut
1	252964	Instruction Sheet

See page 31 for proper installation.





NOTE: When installing studs in flywheel, the stud standout must range between 2.688 [68.28] to 2.812 [71.42].

Dimensions are in inches. - Dimension in [ ] are mm.

NOTES

CLARK-HURTH
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Statesville, North Carolina

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