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:

1. Internal Oil Flow Torque Converter
2. Torque Converter Assembly
3. 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 downstream 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.
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<td>15</td>
<td>1</td>
<td>Regulator Spring</td>
</tr>
</tbody>
</table>
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

---

[Diagram of fluid system with labels A to H and descriptions of pressure and temperature check points]
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.
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.

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.

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

Remove backing plate retainer ring.

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.
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 converter housing on pilot end and install turbine shaft assembly in converter housing.
Position output shaft inner bearing, gear spacer and gear in converter housing rear cover.

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.

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.

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

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

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

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.

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

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

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].

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

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

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

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.
Install bearing retainer plate.

Install bearing plate retainer ring.

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

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

Install self locking bearing cap bolts in bearing cap and tighten 52 to 57 ft. lbs. torque [70.5 - 77.3 N.m].

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

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:
56 psi [378.3 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, hydraulic 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.
(82.3° - 93.3°C), engine at idle (400 to 600 RPM), shift
to neutral 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.
[82.3° - 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 op-
eration 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 tempera-
ture is hot (180-200°F). [82.3° - 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

![Graph showing recommended lubricants and their usage temperatures.](https://example.com/graph.png)

PREFERRED OIL VISCOSITY: Select highest oil viscosity compat-
ible with prevailing ambient temperatures and oil application chart.
Temperature ranges "1" and "2" may be used to lowest ambient
temperatures when sump preheaters are used.
Temperature range "3" should be used only in ambient temperature
range shown.

MODULATED SHIFT TRANSMISSIONS: 112000, 24000,
28000 & 32000 series transmissions with modulated shift and/or"Dixon or Duron"
transmissions with modulated shift use only
C-3 or temperature range 5 items (a) & (b) "Dixon or Duron"
Dixon I.D. SEE CAUTION BELOW. 3200, 4000, 5000, 6000, 8000,
16000 & 34000 series transmissions with modulated shift use only
C-3 or temperature range 5 items (a) & (b) "Dixon. Do NOT use
"Dixon II. SEE CAUTION BELOW. CAUTION: "Dixon II is NOT compatible with graphite clutch
plate friction material UNLESS IT MEETS THE APPROVED C-3
SPECIFICATIONS. "Dixon II cannot be used in the 3600,
4000, 5000, 6000, 8000, 16000 or 34000 series power shift
transmissions, or the H363000 & H3632000 series having con-
verter lock-up, or the C720 series converter having lock-up
UNLESS IT MEETS THE APPROVED C-3 SPECIFICATIONS.
Any deviation from this chart must have written approval from the
application department of the Clark-Hurth Components
Engineering and Marketing Department.

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

LUBRICATED OR PLATED

<table>
<thead>
<tr>
<th>Nominal Size</th>
<th>Fine Thread Torque Lbs./N.m.</th>
<th>Course Thread Torque Lbs./N.m.</th>
<th>Fine Thread Torque Lbs./N.m.</th>
<th>Course Thread Torque Lbs./N.m.</th>
</tr>
</thead>
<tbody>
<tr>
<td>.4375</td>
<td>41-45 [55.8-61.0]</td>
<td>37-41 [50.2-55.6]</td>
<td>58-84 [78.6-86.8]</td>
<td>52-57 [70.5-77.3]</td>
</tr>
<tr>
<td>.5000</td>
<td>64-70 [86.8-94.9]</td>
<td>57-63 [77.3-85.4]</td>
<td>90-99 [122.0-134.2]</td>
<td>80-88 [108.5-119.3]</td>
</tr>
<tr>
<td>.5625</td>
<td>91-100 [123.4-135.6]</td>
<td>82-90 [111.2-122.0]</td>
<td>128-141 [173.5-191.2]</td>
<td>115-127 [156.0-172.2]</td>
</tr>
</tbody>
</table>

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).

<table>
<thead>
<tr>
<th>CONVERTER MODEL</th>
<th>MINIMUM CONVERTER OUT PRESSURE</th>
<th>MAXIMUM CONVERTER OUT PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>C·5000</td>
<td>55 p.s.i. [379.3 kPa]</td>
<td>70 p.s.i. [482.6 kPa]</td>
</tr>
<tr>
<td>C·8000</td>
<td>55 p.s.i. [379.3 kPa]</td>
<td>70 p.s.i. [482.6 kPa]</td>
</tr>
<tr>
<td>C·16000</td>
<td>55 p.s.i. [379.3 kPa]</td>
<td>70 p.s.i. [482.6 kPa]</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>NOMINAL PUMP RATINGS:</th>
<th>C·5000</th>
<th>C·8000</th>
<th>C·16000</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 G.P.M.</td>
<td>21 G.P.M.</td>
<td>40 G.P.M.</td>
<td></td>
</tr>
<tr>
<td>31 G.P.M.</td>
<td>31 G.P.M.</td>
<td>50 G.P.M.</td>
<td></td>
</tr>
<tr>
<td>40 G.P.M.</td>
<td>40 G.P.M.</td>
<td>65 G.P.M.</td>
<td></td>
</tr>
</tbody>
</table>

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 - 93 °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:

<table>
<thead>
<tr>
<th></th>
<th>Forward - Low speed thru High</th>
<th>Reverse - Low speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump Volume at idle</td>
<td>8 gal.</td>
<td>Pump volume</td>
</tr>
<tr>
<td>Forward - Low speed</td>
<td>6 gal.</td>
<td>Forward - Low speed</td>
</tr>
<tr>
<td>Reverse - Low speed</td>
<td>6 gal.</td>
<td>Clutch leakage</td>
</tr>
</tbody>
</table>

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 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
1. Low Oil Level.
2. Broken spring in transmission regulator valve.
3. Clutch pressure regulator valve spool stuck in open position.
4. Faulty charging pump.

REMEDY
1. Fill to proper level.
2. Replace spring.
3. Clean valve spool and sleeve.
4. See paragraph on charging pump output.

LOW CLUTCH PRESSURE WITH EXCESSIVE CLUTCH LEAKAGE

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

1. Replace sealing rings.
2. Clean bleed valve thoroughly.
3. Replace sealing rings.
4. See paragraph on charging pump output.
LOW CONVERTER CHARGING PUMP OUTPUT

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Low oil level.</td>
<td>1. Fill to proper level.</td>
</tr>
<tr>
<td>2. Sump screen plugged.</td>
<td>2. Clean screen and sump.</td>
</tr>
<tr>
<td>3. Air leaks at pump intake hose and connections or collapsed hose.</td>
<td>3. Tighten all connections or replace hose if necessary.</td>
</tr>
<tr>
<td>4. Defective oil pump.</td>
<td>4. Replace pump.</td>
</tr>
</tbody>
</table>

LOW FLOW THROUGH COOLER WITH LOW CONVERTER IN PRESSURE

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

LOW FLOW THROUGH COOLER WITH HIGH CONVERTER OUT PRESSURE

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Plugged oil cooler. Indicated if transmission lube pressure is low.</td>
<td>1. Back flush and clean oil cooler.</td>
</tr>
<tr>
<td>2. Restricted cooler return line.</td>
<td>2. Clean out lines.</td>
</tr>
<tr>
<td>3. Lube oil ports in transmission plugged. Indicated if transmission</td>
<td>3. Check lube lines for restrictions.</td>
</tr>
<tr>
<td>lube pressure is high.</td>
<td></td>
</tr>
</tbody>
</table>

OVERHEATING

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Worn oil sealing rings. See paragraph E.</td>
<td>1. Remove, disassemble, and rebuild converter assembly.</td>
</tr>
<tr>
<td>2. Worn oil pump.</td>
<td>2. Replace.</td>
</tr>
<tr>
<td>3. Low oil level.</td>
<td>3. Fill to proper level.</td>
</tr>
<tr>
<td>4. Pump suction line taking air.</td>
<td>4. Check oil line connections and tighten securely.</td>
</tr>
</tbody>
</table>

NOISY CONVERTER

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Worn coupling gears.</td>
<td>1. Replace.</td>
</tr>
<tr>
<td>2. Worn oil pump.</td>
<td>2. Replace.</td>
</tr>
<tr>
<td>3. Worn or damaged bearings.</td>
<td>3. A complete disassembly will be necessary to determine what bearing</td>
</tr>
<tr>
<td></td>
<td>is faulty.</td>
</tr>
</tbody>
</table>

LACK OF POWER

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Low engine RPM at converter stall.</td>
<td>1. Tune engine check governor.</td>
</tr>
<tr>
<td>2. See “Over-heating” and make same checks.</td>
<td>2. Make corrections as explained in “Over-Heating.</td>
</tr>
</tbody>
</table>
C & CL-8000 TORQUE CONVERTERS
FLYWHEEL RING GEAR INSTALLATION PROCEDURE

![Diagram of Flywheel and Ring Gear installation](image)

**C & CL-8000**

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

**The 802551 Kit Includes:**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>249087</td>
<td>Ring Gear</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>235050</td>
<td>Stud</td>
<td></td>
</tr>
<tr>
<td>96</td>
<td>228987</td>
<td>Belleville Washer</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>229769</td>
<td>Stud Nut</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>802552</td>
<td>Instruction Sheet</td>
<td></td>
</tr>
</tbody>
</table>

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.


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

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

Stake 3 places approx. equally spaced.

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

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

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

<table>
<thead>
<tr>
<th>PUMP DRIVE RATIO</th>
<th>RATIO</th>
<th>DRIVE GEAR NO. OF TEETH</th>
<th>DRIVEN GEAR NO. OF TEETH</th>
<th>SPEED SENSOR BUSHING DEPTH &quot;U&quot; PER VIEW &quot;T&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.250</td>
<td>32</td>
<td>40</td>
<td>1.060 ± .007 [26.9 ± .17]</td>
</tr>
<tr>
<td></td>
<td>1.057</td>
<td>35</td>
<td>37</td>
<td>1.060 ± .007 [26.9 ± .17]</td>
</tr>
<tr>
<td></td>
<td>.946/25°</td>
<td>37 (25° P.A.)</td>
<td>35 (25° P.A.)</td>
<td>1.390 ± .007 [35.3 ± .17]</td>
</tr>
<tr>
<td></td>
<td>.946</td>
<td>37</td>
<td>35</td>
<td>1.390 ± .007 [35.3 ± .17]</td>
</tr>
<tr>
<td></td>
<td>.800</td>
<td>40</td>
<td>32</td>
<td>1.390 ± .007 [35.3 ± .17]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OUTPUT GEAR RATIO</th>
<th>RATIO</th>
<th>TURBINE SHAFT &amp; GEAR ASS'Y NO. OF TEETH</th>
<th>OUTPUT GEAR NO. OF TEETH</th>
<th>SPEED SENSOR BUSHING DEPTH &quot;W&quot; PER VIEW &quot;S&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.323</td>
<td>31</td>
<td>41</td>
<td>1.060 ± .007 [26.9 ± .17]</td>
</tr>
<tr>
<td></td>
<td>1.118</td>
<td>34</td>
<td>38</td>
<td>1.060 ± .007 [26.9 ± .17]</td>
</tr>
<tr>
<td></td>
<td>1.000</td>
<td>36</td>
<td>36</td>
<td>1.390 ± .007 [35.3 ± .17]</td>
</tr>
<tr>
<td></td>
<td>.895</td>
<td>38</td>
<td>34</td>
<td>1.390 ± .007 [35.3 ± .17]</td>
</tr>
<tr>
<td></td>
<td>.846</td>
<td>39</td>
<td>33</td>
<td>1.390 ± .007 [35.3 ± .17]</td>
</tr>
</tbody>
</table>
**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**
- Lube holes to be checked prior to assembly. Holes must be free of dirt & burrs.
- Cork gasket “when specified” to be installed dry.
- Torque output shaft Nut 250-300 Lbs. Ft. [339.0 - 406.7 N.m]
- Permatex studs used on rear bearing cap.

**VIEW OF RING JOINT**
- Heat bushing to 200°F before assembly of bushing to cover.
- Lock-up clutch 2 bronze inner plates 1 steel outer plate Coat with type “A” oil prior to assembly.
- Stamped cage bearing only
- Piston ring and expander installation
- Piston ring and expander installation

**VIEW OF RING JOINT**
- View of ring joint

---

**PIN NO.**
- **RATIO**
- **P / N TURBINE**
- **NO. TEETH**
- **P / N OUTPUT**
- **NO. TEETH**

<table>
<thead>
<tr>
<th>RATIO</th>
<th>P / N TURBINE</th>
<th>NO. TEETH</th>
<th>P / N OUTPUT</th>
<th>NO. TEETH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.323</td>
<td>219417</td>
<td>31</td>
<td>219418</td>
<td>41</td>
</tr>
<tr>
<td>1.198</td>
<td>218729</td>
<td>34</td>
<td>218728</td>
<td>38</td>
</tr>
<tr>
<td>1.000</td>
<td>218871</td>
<td>36</td>
<td>218871</td>
<td>36</td>
</tr>
<tr>
<td>.895</td>
<td>218728</td>
<td>38</td>
<td>218729</td>
<td>34</td>
</tr>
<tr>
<td>.846</td>
<td>242637</td>
<td>39</td>
<td>242638</td>
<td>33</td>
</tr>
</tbody>
</table>

---

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

GENERAL: Insure seating of bearings & related parts by sealing 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.

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

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.

REMOVAL 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.

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.

![Diagram of assembly instructions]

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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.

**INTERMEDIATE DRIVE PLATES**

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Kit No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.00&quot;</td>
<td>802587-10mm</td>
</tr>
<tr>
<td>16.00&quot;</td>
<td>802558-10mm</td>
</tr>
<tr>
<td>16.00&quot;</td>
<td>802590-7/16-20</td>
</tr>
<tr>
<td>16.875&quot;</td>
<td>802609-7/16-20</td>
</tr>
<tr>
<td>17.00&quot;</td>
<td>802593-10mm</td>
</tr>
<tr>
<td>17.00&quot;</td>
<td>802562-7/16-20</td>
</tr>
</tbody>
</table>

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
1. Remove all burrs from flywheel mounting face and nose pilot bore. Clean drive plate surface with solvent. Dry thoroughly.

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.