

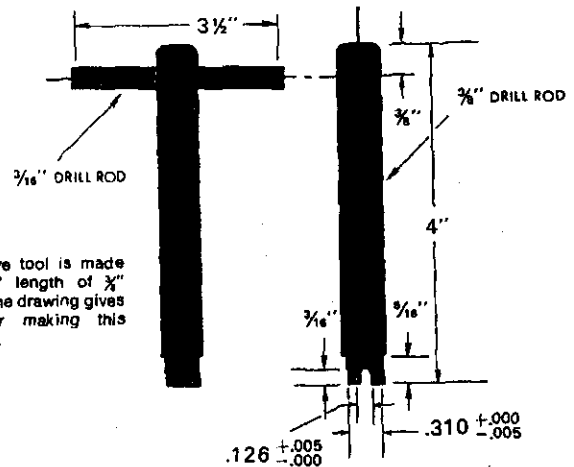
# **SERVICE INSTRUCTIONS**

# **P 30 50**

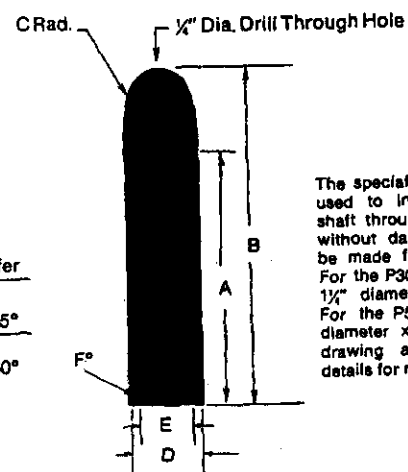
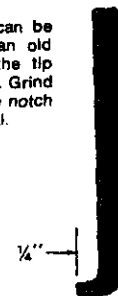


# tool list

- Arbor Press
- Awl
- 1½" Dia. Steel Ball
- Bearing Puller (Owatonna Tool Co. MD-958 or equivalent)
- Clean Lintless Cloths
- Deburring Tool (an old file with the cutting teeth ground off)
- Machinist's Hammer
- Soft Hammer
- Permatex Aviation Form-A-Gasket No. 3 Non-hardening Sealant or Equivalent
- Medium Grit Carborundum Stone
- Oil and Grease
- Snap Ring Pliers
- Prick Punch
- Sharp Razor Blade
- Scale (½" or ⅛" graduations)
- Small Screwdriver
- Torque Wrench
- V se with 8" Minimum Open Spread
- Bar for Lip Seal Installation  
Note: For P30, use 1½" dia. by 2" bar.  
For P50, use 2½" dia. by 2" bar.
- Special Steel Sleeve



Seal removal tool can be easily made from an old screwdriver. Heat the tip and bend as shown. Grind off the tip to fit the notch behind the shaft seal.



	A	B	C Radius	D Dia.	E Dia.	F° chamfer
P30	3 3/8"	4 1/2"	3/8"	1.085 +.000 -.002	1.002 +.002 -.000	.015" x 45°
P50	4 1/4"	5 3/8"	5/8"	1.290 +.000 -.002	1.250 +.002 -.000	.015" x 60°

All external surfaces must be free of scratches and burrs.

# Lubrication and oil recommendations

All parts, with the exception of the outboard bearing, are lubricated by the hydraulic oil in the circuit. Particular attention must be paid to keep the oil in the circuit system clean. Whenever there is a pump or motor failure, and there is reason to feel that metal particles may be in the system, the oil must be drained, the entire system flushed clean, and any filter screens thoroughly cleaned or replaced. New oil should be supplied for the entire system. Oil suitable and recommended for use in circuits involving Commercial's pumps and motors should meet the following specifications:

- Viscosity:**
- 50 SSU minimum @ operating temperature
  - 7500 SSU maximum @ starting temperature
  - 150 to 225 SSU @ 100°F. (37.8°C.) (generally)
  - 44 to 48 SSU @ 210°F. (98.9°C.) (generally)

Oil Grade	Approximate SSU at . . .	
	100°F. (37.8°C.)	210°F. (98.9°C.)
SAE 10	150	43
SAE 20	330	51

**Viscosity Index:** 90 minimum

**Aniline Point:** 175 minimum

**Recommended Additives:** Foam Depressant  
Rust and Oxidation Inhibitors

**Other Desirable Characteristics:**

- Stability of physical and chemical characteristics.
- High demulsibility (low emulsibility) for separation of water, air, and contaminants.
- Resistant to the formation of gums, sludges, acids, tars, and varnishes.
- High lubricity and film strength.

**General Recommendations:**

A good quality hydraulic oil conforming to the characteristics listed above is essential to satisfactory performance and long life of any hydraulic system.

Oil should be changed on regular schedules in accordance with the manufacturer's recommendations, and the system periodically flushed.

Oil temperature in reservoir must not exceed 200°F., (93.3°C.) with a maximum temperature of 180°F. (82.2°C.) recommended. Higher temperatures will result in rapid oil deterioration.

Reservoir capacity should equal in gallons the pump output in gpm or the total gpm of all pumps where there is more than one in the system.

Oil poured into the reservoir should pass through a 100 mesh screen. Pour only clean oil from clear containers into the reservoir. A 100 mesh screen may be used in the suction line leading to the pump. A suction filter should be of sufficient size to handle twice the pump capacity. It must be cleaned and checked regularly to avoid damage due to contamination and cavitation.

**Normal Temperatures:**

0°F. (-18°C.) to 100°F. (37.8°C.) Ambient

100°F. (37.8°C.) to 180°F. (82.2°C.) System

Be sure your oil is recommended for the temperatures you expect to encounter.

# recommended test procedure

Be sure there is an adequate supply of oil for the pump, at least one gallon of oil for each gpm of pump capacity.

If one section of a tandem pump is being tested, make sure that all other sections not being tested are adequately supplied with oil. If any of the other sections run dry, or if plugs are left in ports, serious and permanent damage will result.

The oil should be a good quality hydraulic oil rated at 150 SSU at 100° F., with the oil temperature held at 120° F. plus or minus 5° F. (Test procedures are described in detail in SAE handbooks; see Hydraulic Power Pump Test Procedure, SAE J745c.)

The feed line must be of adequate size with no more than 5" mercury vacuum adjacent to the pump inlet. As a rule, the feed line must provide a feed flow velocity not in excess of 8 feet per second.

Hot oil must not be fed into a cold pump. It may seize. Jogging may prevent seizure.

Operate the pump at least two minutes at zero pressure and at moderate speed (not over 1500 rpm).

If pump becomes hot to touch, it is binding and may seize. This doesn't happen very often, but if it does, pump will have to be disassembled and rebuilt, with extra care taken to remove burrs and to assure freedom from binding.

Gradually increase pressure on pump, intermittently, until the desired test pressure has been reached. This should take about five minutes.

Delivery should run close to rated catalog performance figures which are averaged from testing several pumps. Something like a 5% lower reading may be used as a rated minimum if new or relatively new parts have been used. When rebuilding the pump with parts from the original pump, which, while worn, appear satisfactory for re-use, a 10% or 15% lower reading may be permitted, depending on the performance expected from the equipment. One's own experience will prove the best guide here.

Many repairmen measure the output at normal operating speed and at zero pressure, then again at 1000 psi (or the operating pressure of the equipment) and allow a volume decrease approximating the listing below. It is a suggested reference only which makes allowance for re-used parts.

GPM DELIVERY at 1800 rpm	GPM DROP OFF AT...			
	100 psi	1000 psi	1500 psi	2000 psi
5 — 14	2 to 3	2½ to 3½	3 to 4	3 to 4
15 — 25	2½ to 3½	3 to 4	3½ to 5	
26 — 50	3 to 4	4 to 5	4 to 6	

At test speeds other than 1800 rpm, gpm delivery will vary almost proportionately, but the same (drop-off) figures should be used.

Be sure to run the pump in the direction for which it was designed and built. Driving pump in the wrong direction will build up pressure behind shaft seal, damaging it and necessitating replacement.

Since it is rarely feasible to test motors on dynamometers, the practical procedure is to test them as pumps, running complete testing procedures in each direction.

After completing testing procedures, pump is ready for installation and immediate duty operation on equipment. Again, it must be remembered that to prevent seizure, hot oil must not be fed into a cold pump.

#### **Cold Weather Operation**

Oils for use in cold weather should have a viscosity not exceeding 7500 SSU at the minimum start-up temperature. A pour point of at least 20° F. below start-up temperature is recommended. Start-up procedures should allow for a gradual warm-up until the oil reaches a reasonably fluid state.

#### **The Use of Other Oils**

- Automatic Transmission Fluid (ATF): General experience here has been satisfactory; however, ATF oils are sometimes too expensive for normal use in hydraulic systems.

- Diesel Fuel or Kerosene (Coal Oil): Sometimes used as dilutants for cold weather operations but are not recommended as they are not sufficiently refined products.

- Fire Resistant Fluids: Of the several different types, only the inverted emulsion types may be used without changing to special seal, packing, gasket, hose, etc., compositions. Their use may materially reduce pump life. Experience indicates that the use of FR fluids can be disastrous unless certain precautions are followed. **DO NOT USE ANY FIRE RESISTANT FLUIDS OR NON-PETROLEUM OILS WITHOUT CONSULTING OUR TECHNICAL SERVICE DEPARTMENT.**

- These suggestions are intended as a guide only. **OBTAIN YOUR FINAL OIL RECOMMENDATIONS FROM YOUR OIL SUPPLIER.**

## **recommended start-up procedure for new or rebuilt pump or motor**

Before installing a new or rebuilt pump or motor, back off the main relief valve until the spring tension on the adjusting screw is relieved. This will avoid the possibility of immediate damage to the replacement unit in the event that the relief valve setting had been increased beyond the recommended operating pressure prior to removing the old unit.

Before connecting any lines to the pump or motor, fill all ports with clean oil to provide initial lubrication. This is particularly important where the unit is located above the oil reservoir.

After connecting the lines and mounting the replacement unit, operate the pump or motor at least two minutes at zero pressure at lowest possible rpm. During this break-in period, the unit should run free and not develop an excessive amount of heat. If the unit operates properly, speed and pressure can then be increased to normal operating settings.

Reset the main relief valve to its proper setting while the pump is running at maximum operating engine (motor) speed for the vehicle.

**ALWAYS USE AN ACCURATE GAGE WHEN ADJUSTING  
THE RELIEF VALVE PRESSURE SETTING.**

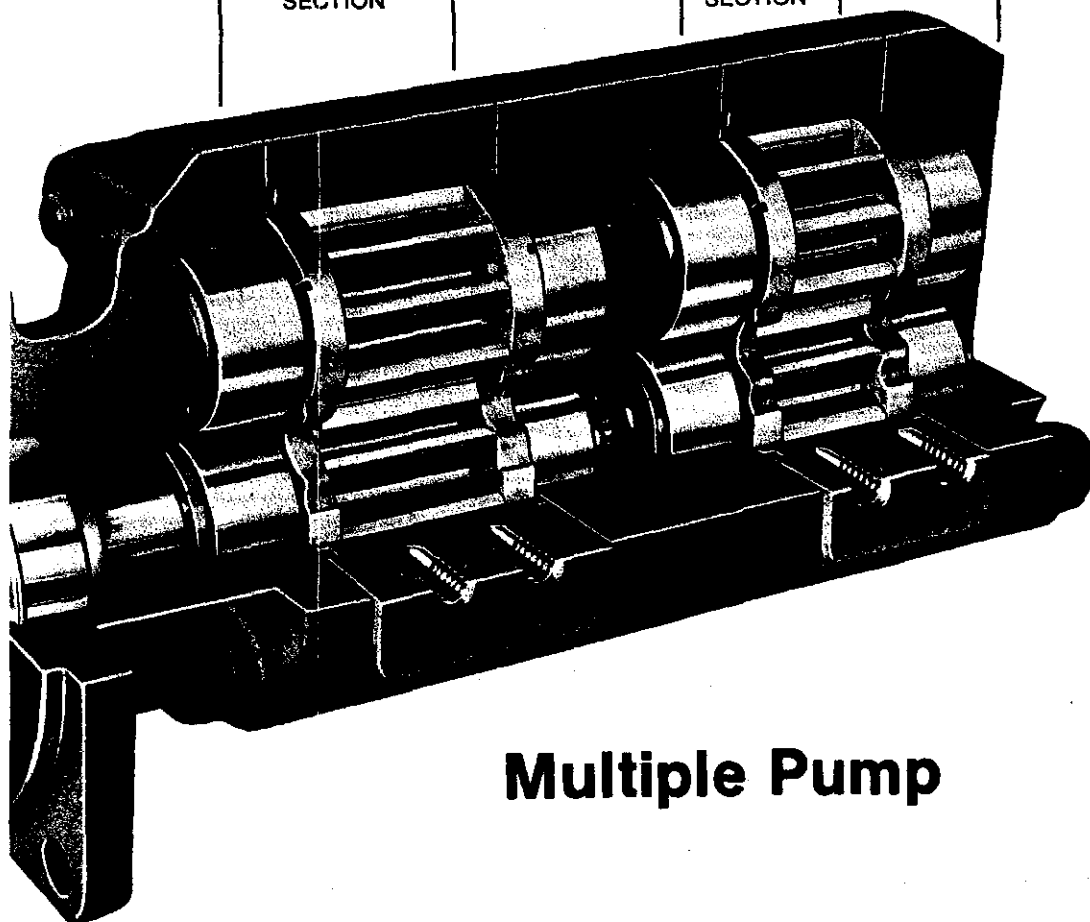
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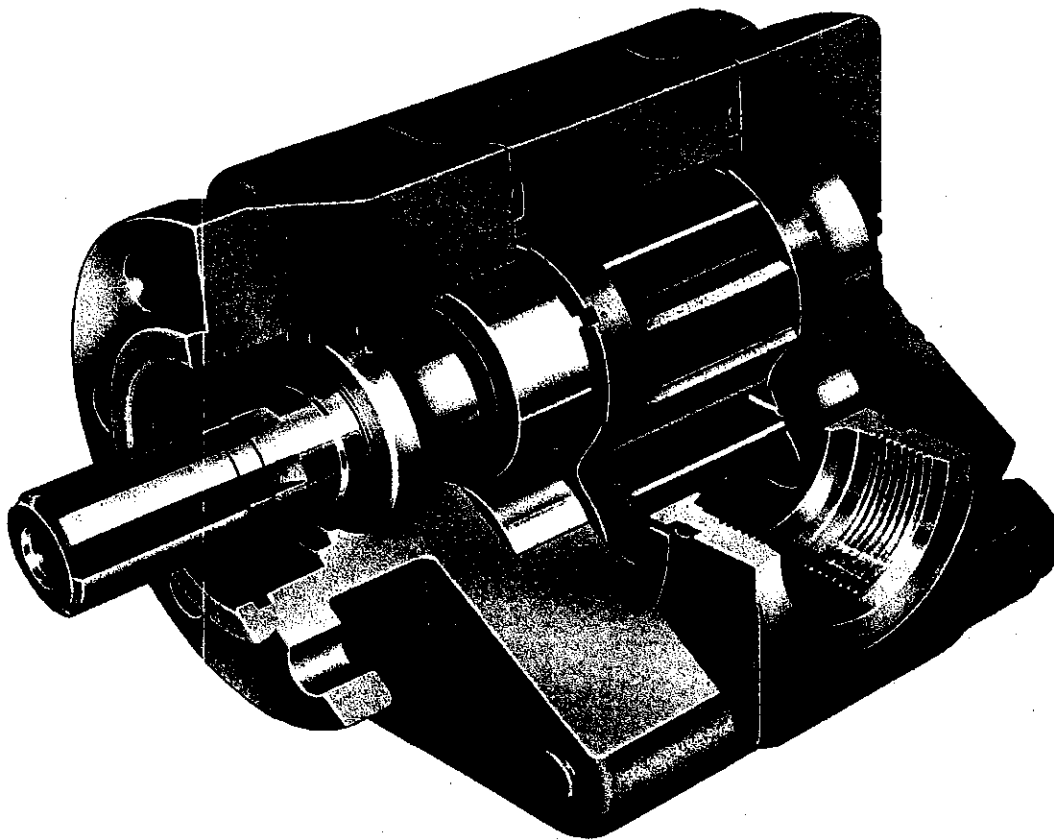
PORT  
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COVER



## Multiple Pump

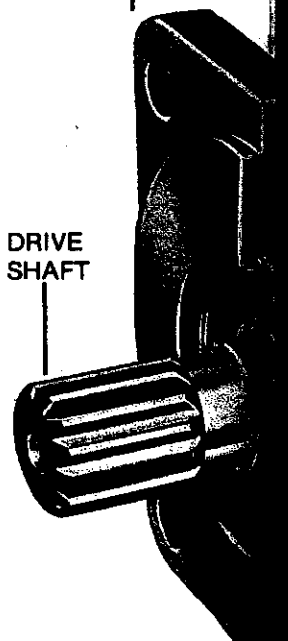
***W. RING, INC.***

**Commercial Replacement Parts**



**Single Pump**

DRIVE  
SHAFT



***COMMERCIAL SHEAR***

**Use Genuine**



**COMMERCIAL SHEARING, INC.**

# P30 and P50 pump or motor service instructions

## GENERAL INSTRUCTIONS

These service instructions will familiarize you with Commercial's single and multiple pumps and motors — their component parts — the relative position of each part — proper methods for assembly or disassembly of the units — care and use of these oil hydraulic power units — so that best performance and longer working life will result for your benefit.

To facilitate the repair of these units — and before any work is done — we suggest that you first read all of the steps used in disassembly and all of the steps used in building up the unit.

Dirt is the enemy of any hydraulic system. The first requirement of good maintenance of hydraulic equipment is cleanliness. **MAKE SURE YOU DISASSEMBLE AND ASSEMBLE YOUR HYDRAULIC EQUIPMENT IN A CLEAN AREA.**

It is important to airblast all parts and wipe them with a clean, lintless cloth before assembly.

**USE CAUTION IN GRIPPING ALL PARTS IN THE VISE TO AVOID DAMAGING MACHINED SURFACES.**

A pump must be driven in the direction of rotation for which it was built; otherwise, pressure will blow the shaft seal. Check the exploded view below for proper direction of rotation.

## COMMERCIAL'S REPLACEMENT PARTS

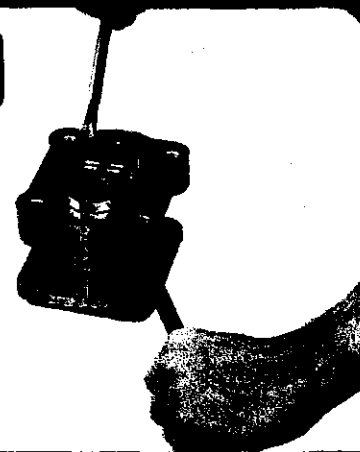
Commercial's replacement parts are of original equipment standards. For assured quality of material and workmanship, and for compatibility in assembly, **USE ONLY GENUINE PARTS FROM COMMERCIAL.**

It is a good idea to check all replacement parts closely before installing to insure that no damage occurred during shipment.



Place the drive shaft DO NOT MACHIN ASSEMB Index mar punch. Be when re-

10



Pry the thrust plate from the shaft end cover, port end cover, or bearing carrier with a screw driver or similar tool. Avoid distorting the thrust plate. Remove and discard all rubber pocket seals and gasket seals.

11

Examine ing, spaul ment is ne with a be

10





1. Place in a vise with the mounting face down. Caution: DO NOT STRIKE OR NEAR ANY MACHINED SURFACES DURING DISASSEMBLY. Use a prick punch to align these marks.



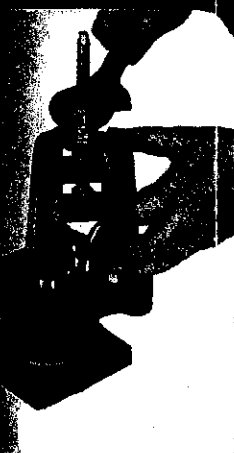
2. Remove the 4 cap screws or hex nuts and washers with a socket wrench.



3. Lift off the port end cover. If necessary to pry loose, be careful not to damage the machined surfaces. If the thrust plate remains in the gear housing, it can be tapped out later with a wooden hammer handle. Be careful not to distort the thrust plate.



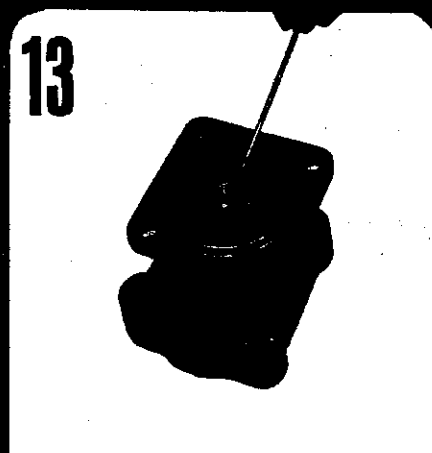
4. Lift off the thrust plate. If not possible, it can be tapped out later with a wooden hammer handle. Be careful not to distort the thrust plate.



5. Pull the bearings for scoring or pitting. If replacing, pull the bearings out with a bearing puller.



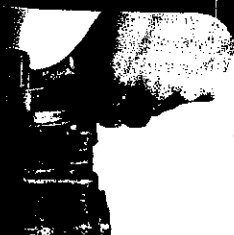
12. Remove ring seals. It is generally advisable to replace ring seals when rebuilding unit. To replace, pull the drive gear bearing with a bearing puller and remove ring seal from the bottom of bearing bore.



13. If the pump is equipped with an outboard bearing, place the shaft and cover in a vise with the mounting face up. Remove the bearing snap ring with a small screwdriver or awl.



14. If possible, place the shaft and cover in a vise with the mounting face up.



6

7

operation if the pump  
re an outboard bearing.  
is equipped with an  
aring, guide the bearing  
s in the shaft end cover.  
a press fit.

Insert the snap ring into its groove  
to retain the outboard bearing.

**ASSEMBLY STEPS 6, 7, 8, 9, 10, AND  
11 APPLY TO SHAFT END COVER,  
BEARING CARRIERS, AND PORT  
END COVER.**

If ring seals are being replaced, in-  
sert into bottom of drive gear bear-  
ing bore. The notch in the ring seal  
**MUST BE VISIBLE.** This is a check  
to be certain the notched side is  
next to the bearing.

If any b  
from th  
cover, o  
bearing  
bearing

**15**



Slide the first section gear housing  
over the gears and tap it with a soft  
hammer until it rests tightly against  
the shaft end cover. Be careful not  
to pinch the gasket seal. Squirt oil  
over the gears to provide initial  
lubrication when pump is started.

**16**



With the thrust plates on the bear-  
ing carrier, position it on the gear  
housing so that the roller bearings  
receive the journals of the drive and  
driven gears. Make sure that the  
index marks are properly aligned.

FOR MULTIPLE ASSEMBLIES ONLY.

Insert a  
spline

FOR M

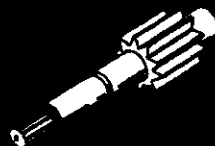
new gasket seals and  
into the grooves in both  
gear housings.

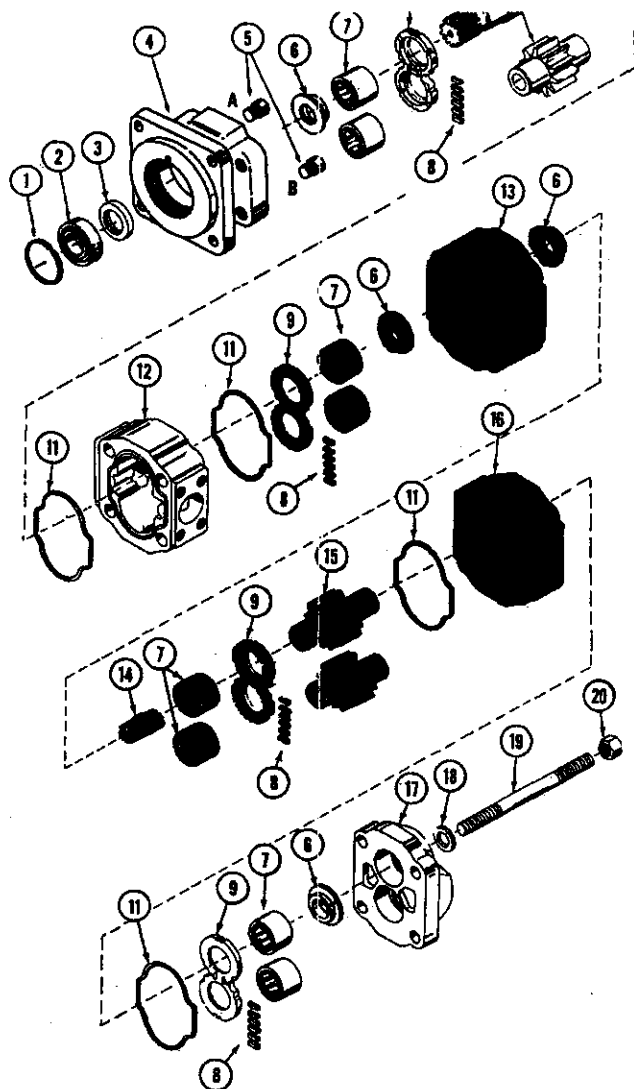
tion, "How much wear is allowed before the part should be replaced?"

**GEARS:**



**DRIVE SHAFTS:**





Plug 5 in position B gives clockwise rotation.  
Plug 5 in position A gives counterclockwise rotation.

Check valves in both positions give bi-directional rotation.

#### PARTS LIST

- |                                       |                         |
|---------------------------------------|-------------------------|
| 1. Snap Ring                          | 11. Gasket Seals        |
| 2. Outboard Bearing                   | 12. Gear Housing        |
| 3. Seal                               | 13. Bearing Carrier     |
| 4. Shaft End Cover                    | 14. Connecting Shaft    |
| 5. Check Assemblies or Plug           | 15. Matched Gear Set    |
| 6. Ring Seals                         | 16. Gear Housing        |
| 7. Roller Bearings                    | 17. Port End Cover      |
| 8. Pocket Seals                       | 18. Washers             |
| 9. Thrust Plates                      | 19. Studs or Cap Screws |
| 10. Integral Drive Shaft and Gear Set | 20. Nuts                |

ITEMS SHOWN IN COLOR APPLY TO MULTIPLE ASSEMBLIES ONLY.

Coat outside of double lip seal and its recess with purple Loctite Seal Retainer. With the metal side of the double lip seal up, press it into the mounting flange side of the shaft end cover with an arbor press and bar.\* Make certain double lip seal is fully seated in the recess. Wipe off surplus Loctite.

\*see tool list

Omit this step if the pump outboard bearing does not have a recess. If the pump outboard bearing does not have a recess, press it into its recess. This is NOT

13



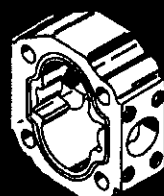
Lightly grease the drive shaft. Insert the integral gear and drive shaft with a twisting motion. Be careful not to damage the double lip seal. Push down carefully until gear rests against thrust plate. Insert the driven gear.

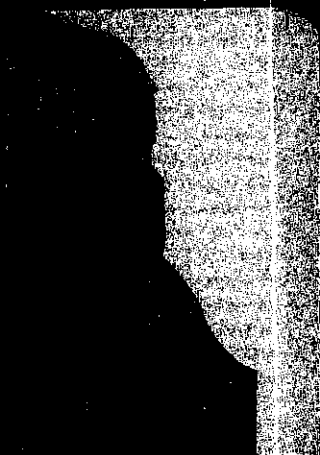
14

Grease the integral gear and drive shaft. Insert them into the gear housing. Grease the sides of all

As a guide in answering the question

GEAR HOUSING





5. Lift gear housing from the gears. If necessary to pry loose, take care not to damage machined surfaces.

FOR MULTIPLE ASSEMBLIES ONLY.



6. Remove the drive and driven gears. Keep the gears together because they are a matched set. Examine and replace if necessary. See below.

Take care not to damage the machined surfaces of gears.

FOR MULTIPLE ASSEMBLIES ONLY.



7. Remove the connecting shaft.

FOR MULTIPLE ASSEMBLIES ONLY.



8. If the shaft end cover is equipped with an outer bearing, it should be removed with a bearing puller.

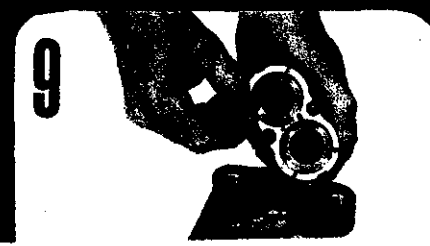


9. Grip the shaft end cover in a vise with the mounting face down. Remove double lip seal by inserting the special tool\* into the notch between the double lip seal and the shaft end cover. Tap the seal out and discard.

\*see tool list



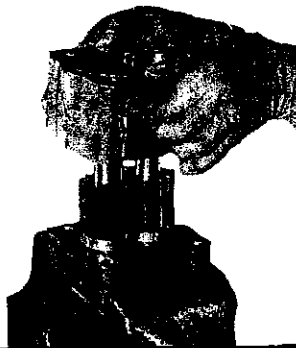
10. Stone off all machined surfaces with a medium grit carborundum stone.



Lift off the bearing carrier  
care not to damage the ma-  
chined surfaces.

MULTIPLE ASSEMBLIES ONLY

8



Lift or pry off the first section gear housing. Be careful not to damage machined surfaces. Remove thrust plate as described in step 3.

9



Remove the drive gear with shaft and the driven gear. Keep these together as they are a matched set. Examine and replace if necessary. See below\*.

Take care not to damage the machined surfaces of gears.

1



If bearings have been removed, deburr bearing bores. Rinse parts in a solvent. Air blast all parts and wipe with a clean, lintless cloth before starting reassembly.

2



Grip shaft and cover in vise with mounting face down. Examine plug or 2 check valves to be sure they're tightly in place. Replacement is necessary only if parts are damaged. Remove with screw driver or special tool (see tool list). ■ Screw in new part tightly. Stake plug with prick punch at both ends of screw driver slot and around edges. ■ Screw check valves in tightly with tool. Peen edge of hole 1/32" to 1/16" with 1½" diameter steel ball.

11



12





Bearings have been removed from the shaft end cover, port end or bearing carrier, replace the bearings by pressing them into the bore with an arbor press.



Check all thrust plates for wear. Replace if necessary (see below).



Cut 2 pocket seals 7/32" long from the pocket seal strip. Grease these pocket seals and insert into the middle slots in the thrust plate.



Insert the connecting shaft in the drive gear.

FOR MULTIPLE ASSEMBLIES ONLY



Insert the drive and driven gears of the second section in their respective bearings. Push down tightly against the thrust plate.

FOR MULTIPLE ASSEMBLIES ONLY



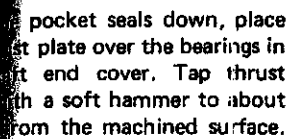
Slide the second section gear housing over the gears and tap it tight against the bearing carrier with a soft hammer. Be careful not to pinch the gasket seal. Squirt oil over the gears to provide initial lubrication when pump is started.

FOR MULTIPLE ASSEMBLIES ONLY

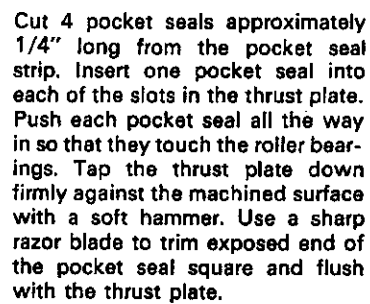
we offer the following suggestions...

THRUST PLATES:

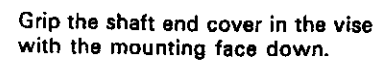




...pocket seals down, place  
...thrust plate over the bearings in  
...shaft end cover. Tap thrust  
...with a soft hammer to about  
...from the machined surface.



Cut 4 pocket seals approximately  
1/4" long from the pocket seal  
strip. Insert one pocket seal into  
each of the slots in the thrust plate.  
Push each pocket seal all the way  
in so that they touch the roller bear-  
ings. Tap the thrust plate down  
firmly against the machined surface  
with a soft hammer. Use a sharp  
razor blade to trim exposed end of  
the pocket seal square and flush  
with the thrust plate.



Grip the shaft end cover in the vise  
with the mounting face down.

**DO NOT GRIP ON OR NEAR ANY  
MACHINED SURFACES DURING  
ASSEMBLY OR DISASSEMBLY.**



...the port end cover over the  
journals and tap tightly against  
gear housing. Be careful not to  
...the gasket seal.



Thread the 4 fasteners (cap screws  
and washers, or studs and nuts)  
into the shaft end cover and snug-  
up alternately or cross-corner. Ro-  
tate the drive shaft with a 6" wrench  
to make sure there is no binding in  
the pump.



After the fasteners are tight and you  
are sure there is no internal binding,  
torque the diagonally opposite fas-  
teners to 200 ft. lbs. (2400 in. lb.)



**BEARINGS:**



**SEALS AND GASKETS:**



**CHECK VALVES:**