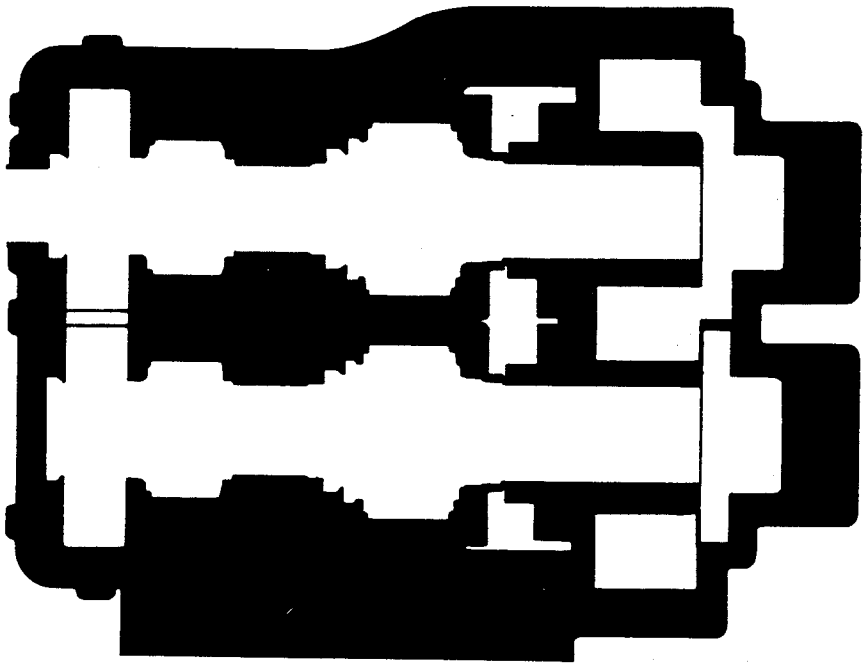
Waukesha
Cherry-Burrell

Read and understand this manual prior to installing, operating or maintaining this pump.



Waukesha Pump

INDUSTRIAL DI SERIES

SERVICE ONLY

OPERATION
MAINTENANCE
& PARTS LIST

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WARRANTY

PROVIDED THE ITEMS COVERED ARE USED AS RECOMMENDED AND HAVE NOT BEEN SUBJECTED TO ACCIDENT, ALTERATION, ABUSE OR MIS-USE, SELLER WARRANTS EVERY PART MANUFACTURED BY IT TO BE FREE OF DEFECTS OF MATERIAL AND WORKMANSHIP AND UPON PREPAID RETURN OF DEFECTIVE MATERIALS OR COMPONENTS, WILL SHIP REPLACEMENT PARTS TO PURCHASER F.O.B. SHIPPING POINT. ALL PARTS OR COMPONENTS NOT MANUFACTURED BY SELLER ARE WARRANTED ONLY TO THE EXTENT OF THE WARRANTY OF THE RESPECTIVE MANUFACTURERS. ALL CLAIMS FOR CONSEQUENTIAL DAMAGES ARE EXPRESSLY WAIVED BY PURCHASER AND THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED.

WAUKESHA PUMPS
AMCA International
1250 LINCOLN AVENUE
WAUKESHA, WISCONSIN 53186

Cut Here

WARRANTY VALIDATION

(Please fill out in full and return to Waukesha)

Customer Name: J.D.Co. **P.O. No.** W-2506

Address: 1610 1ST ST. **Start Up Date:** 11/4/75

ANYTOWN, U.S.A.

Distributor UNKNOWN **Shipped Date:** _____

Pump Model 55 GT **Serial No.** 1846555 **Speed** 300

Drive Type VAR. SPEED (55-550) **H.P.** 7.5

(See other side)

INSTRUCTIONS FOR IN WARRANTY REPAIR

"If your "WAUKESHA" pump has been in use less than one year and becomes defective, it may be returned to Waukesha Pumps in accordance with the Warranty on reverse side.

In the event that the pump qualifies for "free repairs", it will be repaired and returned to you prepaid. If it does not qualify for "free repairs", you will be so advised, and the reason therefore given. You will also be informed of the cost involved in making the necessary repairs, and in such event, no work will be undertaken to repair the pump, until after you have requested that the necessary repairs be made and you will have approved the charges for the same".

This guarantee is based upon your date of purchase. Please fill in the following information now. *If service becomes necessary,* return this form with letter of transmittal.

Date of Purchase _____

Size of Pump _____

Name of Your Company _____

Serial Number _____

WARRANTY VALIDATION

(Please fill in as much as possible)

Fluid Name/Type Corn Syrup

Viscosity 2000 **CPS** _____ **SSU**

Temp. 110 **°F** **S.G.** 1.25 **V.P.** ?

Solids DISSOLVED **%** **Particle Size** _____

Particle Description _____

☐ **Abrasive** ☒ **Nonabrasive**

Inlet 9 **NIPA Outlet** 80 **PSI**

Schematic:

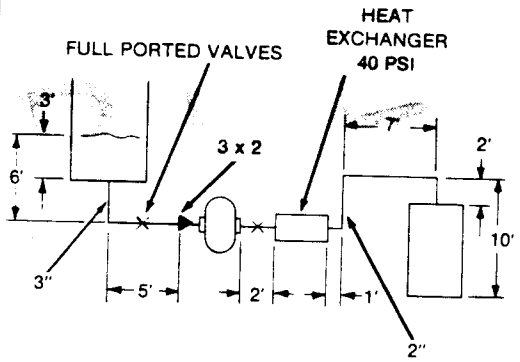


TABLE OF CONTENTS

SECTION I
RECEIVING AND WARRANTY

FACTORY INSPECTION

Each "WAUKESHA" pump is shipped completely assembled, lubricated and ready for use. The "WAUKESHA" pump is a precision product, designed to provide long, trouble-free service in a properly designed system with normal maintenance.

RECEIVING INSPECTION

Ports are covered at the factory to keep out foreign objects. If covers are missing or damaged, a thorough inspection of fluid head, by removing pump cover, is recommended. Be sure pumping head is clean and free of foreign material before rotating shaft.

LOSS OR DAMAGE

If your pump has been lost or damaged in transit, file a claim at once with the delivering carrier. They have signed the Bill of Lading acknowledging that the shipment has been received from us in good condition. Our responsibility for the shipment has ceased.

We will of course assist you in every way in collecting claims for loss, or damage, however, we are not responsible for the collection of claims or replacement of material.

WARRANTY

To insure full warranty coverage of your new pump, be sure to fill out the "Warranty Validation" form, shipped with your pump, to properly describe your pumping system. This will enable the factory to have a complete file on your pump and provide a ready reference for trouble shooting if problems develop.

SECTION II
INSTALLATION

The installation of your Waukesha pump and its piping system should follow good practice to give optimum performance, and be in accordance with local codes and restrictions.

All system equipment, such as motors, sheaves, drive couplings, speed reducers, etc., must be properly sized to insure satisfactory operation of your Waukesha pump within its limits.

CAUTION: Waukesha pumps are positive displacement, low slip design and will be severely damaged if operated with closed valves in discharge or inlet lines. Pump warranty is not valid for damages caused by a hydraulic overload from operation or start-up with a closed valve in the system.

PUMP INSTALLATION

The installation of your Waukesha pump and its piping system should follow good practice to give optimum performance.

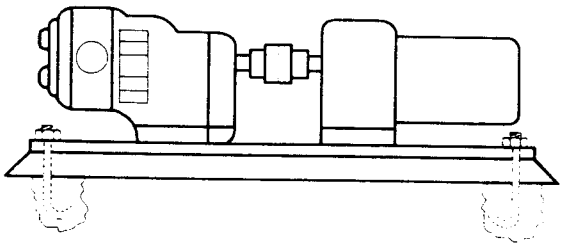
1. Installing the Pump and Drive Unit.

Pumps of this type and size are generally mounted on a common base plate with the drive.

The unit can be installed in the plant location in several ways:

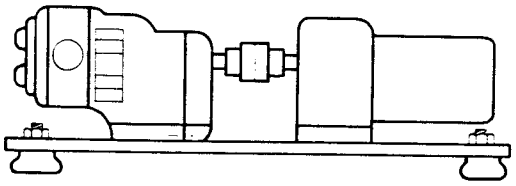
Permanent installation on foundation with bolts and grout.

Level unit before grouting.

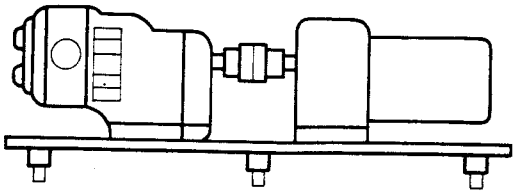


Leveling and/or vibration isolation pads.

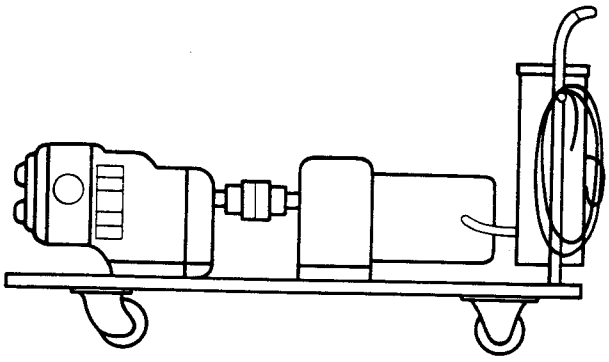
Many commercial types available.



Adjustable leg base, commonly used for sanitary pumps. For washdown under base. Can be easily moved or repositioned.



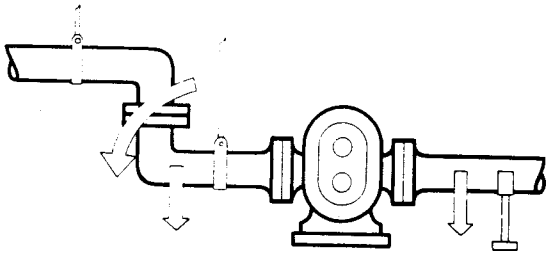
Portable bases—for movement to different locations.

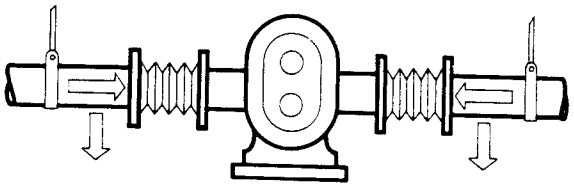


2. Good Piping Practice.

All piping to the pump snould be supported independently, to minimize the forces exerted on the pump. Such forces can cause misalignment of pump parts and lead to excessive wear of rotors, bearings and shafts.

Piping support:
Weight of piping and fluid—support piping independently with hangers or pedestals.



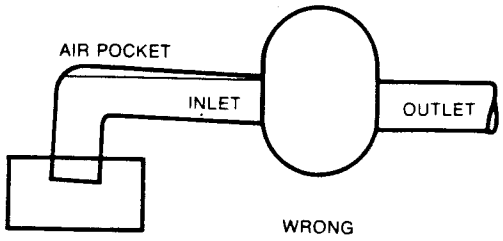


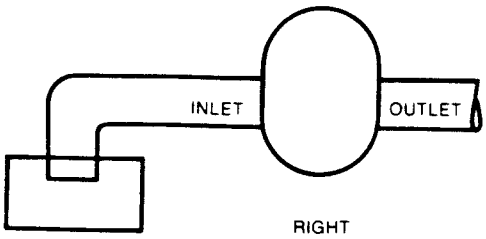
Thermal expansion of piping—can cause tremendous forces. Use thermal expansion joints to minimize forces on pump.

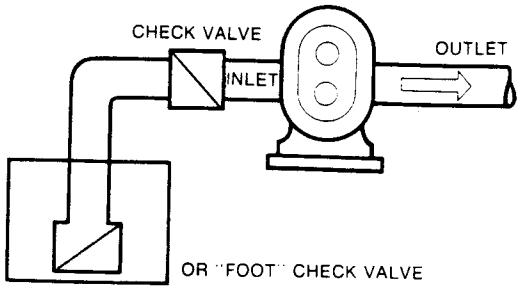
Flexible joints can also be used to limit the transmission of mechanical vibration. Anchor free ends of any flexible hose in system.

Piping Layout

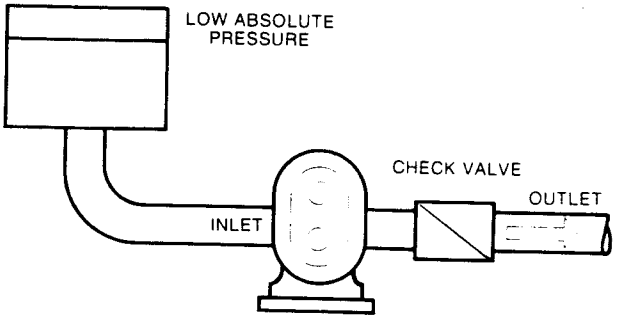
Inlet side—slope piping up to inlet to avoid air pocket.







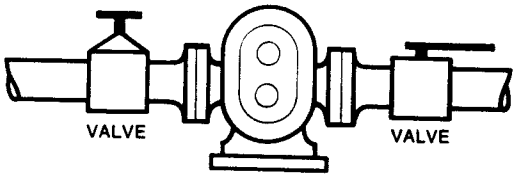
Inlet side—use check valves to keep inlet line full, particularly with low viscosity fluids, and in start-stop operation.

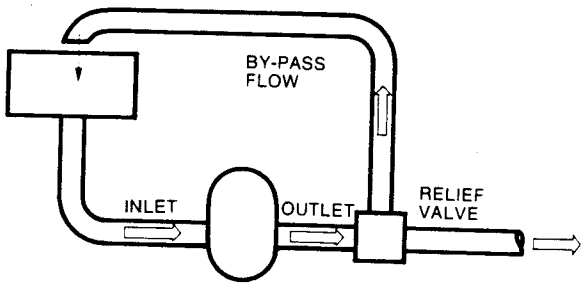


Inlet "Vacuum" Service—use check valve on outlet side

- Prevents backflow (air or fluid)
- Facilitates initial start-up (minimizes differential pressure pump must supply to start flow)

"Isolation" Valves—permit pump maintenance and removal safely and without emptying entire system

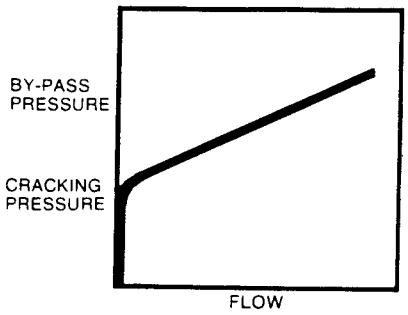




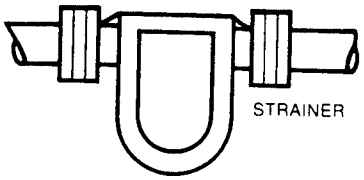
Relief Valve

To protect the pump and piping system against excessive pressure, a relief valve should be installed. An integral relief valve, designed to bypass the fluid internally from the pump outlet to the inlet, should not be used on applications where the discharge must be closed for more than a few minutes. Prolonged operation of the pump with closed discharge will cause heating of the fluid circulating through the relief valve. When such operation is necessary, the relief valve, whether integral, attachable, or line-mounted, should discharge externally through piping connected to the fluid source, or if that is not practical, into the inlet piping near the source.

A particular relief valve design will have a characteristic curve such as shown. The "cracking pressure" can usually be set by spring adjustment, or by adjustable pneumatic pressure, etc. Flow will begin to bypass when this "cracking pressure" is reached. As flow increases through the bypass, the system pressure will also increase.



The pressure increase for a given valve design depends on the valve setting, the flow rate, and the viscosity of the fluid being pumped. If the full-flow bypass pressure exceeds the maximum allowable for the particular pump and piping system, an oversize attachable relief valve may sometimes be used to limit the full-flow bypass pressure to an acceptable value.



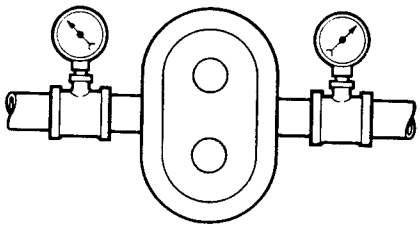
Inlet Side—Strainers and Traps.

Inlet side strainers and traps can be used to prevent pump damage from foreign matter. Selection must be **carefully made** as clogging can easily occur, restricting the inlet, causing cavitation and flow stoppage.

Pressure Gauges

Pressure and "Vacuum" gauges provide the easiest way to tell you something about the pump operation.

- Normal or abnormal pressures
- Overload conditions
- Indication of flow
- Changes in pump condition
- Changes in system conditions
- Changes in fluid viscosity



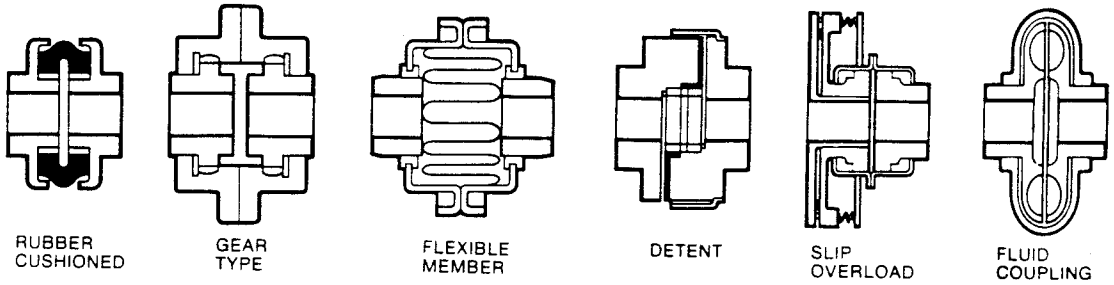
Wherever possible—install gauges!!

3. Alignment of Pump to Drive.

Pumps and drives which are ordered from the factory and mounted on a common base plate are accurately aligned before shipment. The alignment should be re-checked after the complete unit has been installed and the piping completed. Periodic re-checking is advisable during the pump service life.

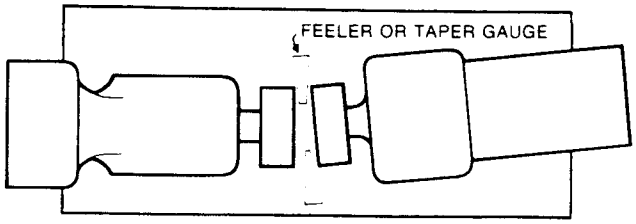
In-line Drives. For initial pump installation, and for re-checking alignment, the following steps are advised.

A flexible coupling should be used to connect the drive to the pump. Many different types are available, including couplings with slip or overload provision.

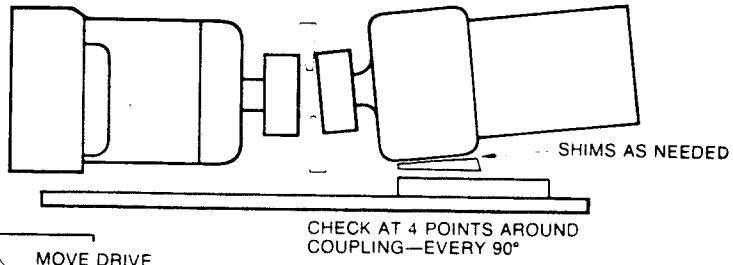


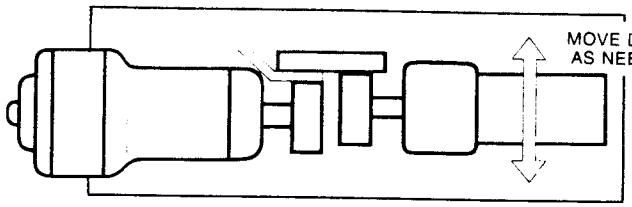
A flexible coupling is used to compensate for end play and **small** differences in alignment. The pump and drive shaft should be aligned as closely as is possible.

Checking angular alignment:
Using feeler gauges, or taper gauges.

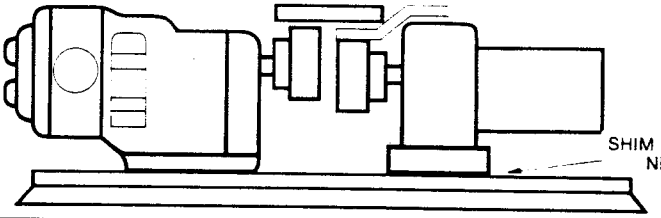


Adjust to get equal dimension at all points—at the same time set space between coupling halves to manufacturer's recommended distance.





Checking Parallel Misalignment:
Using straight edges and shims:



After piping is complete, and drive and couplings are aligned, **turn pump shaft manually** to see that it turns freely without binding.

Check rotation direction of drive to see that pump will rotate in proper direction. Facing "Liquid End" of pump:

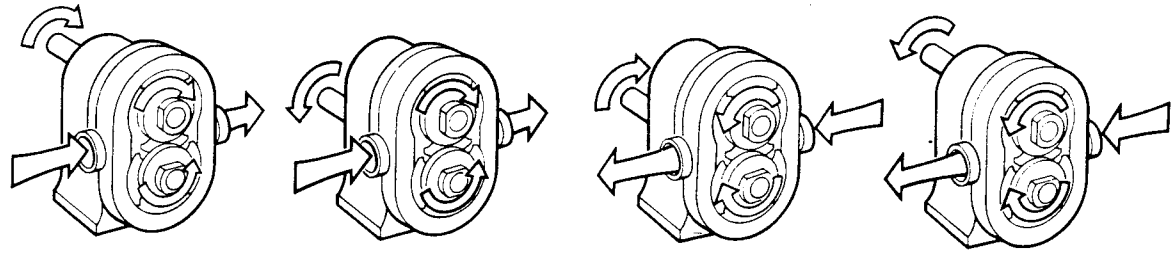
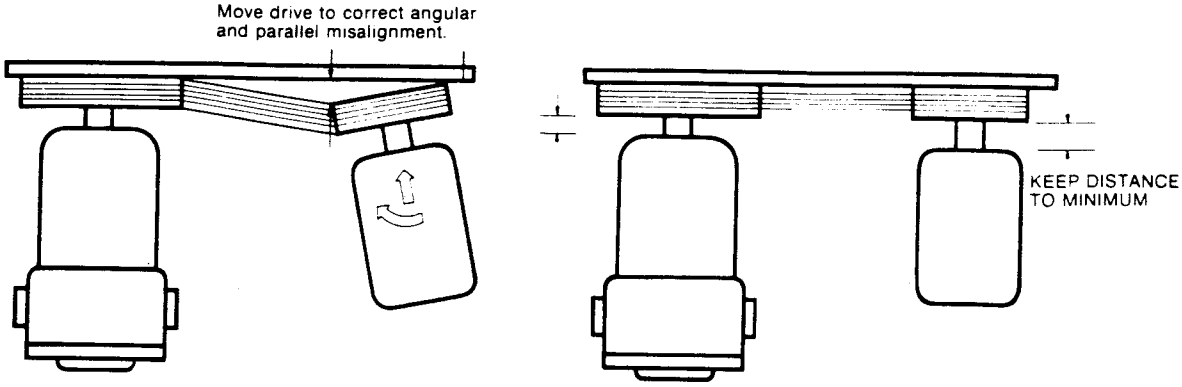


Fig. 1

THEN CONNECT COUPLING HALVES

Aligning belt and chain drives.
Using straight-edges and visual check:



After piping is complete and before belts are installed, **turn pump shaft manually** to see that it turns freely.
Check rotation direction of pump to see that pump will rotate in proper direction (see figure 1).
Then install belts and tension them correctly.

SECTION III
START-UP CHECK LIST

The Waukesha Pump is a positive displacement pump and thus can develop very high pressures. To protect lines, equipment and personnel, certain precautions must be taken.

1. Review Section II, particularly "Relief Valves." Install relief valves if needed in system.
2. Check that piping and pump are clean and free of foreign material, such as welding slag, gaskets, etc. **Do not use pump to flush system.**
3. See that all piping connections are tight and leak-free. Where possible, check system with "non-hazardous" fluid.
4. Check to see that pump and drive are lubricated. See Section V. Install breather screw. Check Drive Lubrication Instruction.
5. Check that all guards are in place and secure.
6. Seals: Packing — supply flushing fluid if needed. Leave packing gland loose for normal 'weepage'! Make adjustments as initial conditions stabilize, to maintain normal weepage. Mechanical seals with flushing — supply adequate flow of clean flushing fluids.
7. See that all valves are open on discharge system, and that free flow path is open to destination.
8. See that all valves are open on inlet side, and that fluid can reach pump.
9. Check direction of pump and drive rotation (jogging is recommended).
10. Start pump drive. Where possible, start at slow speed, or jog.

Check to see that liquid is reaching pump within several minutes. If pumping does not begin and stabilize, check items under "No Flow" or "Insufficient Flow" in Section IV, Troubleshooting a Pumping System.

SECTION IV
TROUBLESHOOTING A PUMPING SYSTEM

TROUBLESHOOTING A PUMPING SYSTEM

Once a pump is properly selected and installed in a system, operation should be troublefree. However, in existing systems, or as pump and system conditions change, problems may develop. Following are some troubleshooting hints to help identify and solve problems.

Problem	Probable Causes	Solutions
No flow, pump not turning	Drive motor not running	Check resets, fuses, circuit breakers
	Keys sheared or missing	Replace
	Drive belts, power transmission components slipping or broken	Replace or adjust
	Pump shaft, keys, or gears sheared	Inspect; replace parts
No flow, pump turning	Wrong direction of rotation	Reverse
No flow, pump not priming	Valve closed in inlet line	Open valve
	Inlet line clogged or restricted	Clear line, clean filters, etc.
	Air leaks due to bad seals or pipe connections	Replace seals; check lines for leakage (can be done by air pressure, or by filling with liquid and pressurizing with air)
	Pump speed too slow	Increase speed. Filling inlet lines with fluid may allow initial start-up. Foot valve may solve start-up problems permanently.
	Liquid drains or siphons from system during off periods	Use foot valve or check valves

Problem	Probable Causes	Solutions
No flow, pump not priming	"Air" lock. Fluids which "gas off," or vaporize, or allow gas to come out of solution during off periods	Manual or automatic air bleed from pump or lines near pump
	Extra clearance rotors, worn pump	Increase pump speed, use foot valve to improve priming
	Net inlet pressure available too low	Check NIPA, NIPR*, recalculate system. Change inlet system as needed.
	On "Vacuum" inlet system: On initial start-up,atmospheric "blow back" prevents pump from developing enough differential pressure to start flow.	Install check valve in discharge line
No flow	Relief valve not properly adjusted, or held off seat by foreign material (flow is being recirculated to inlet)	Adjust or clear valve
Insufficient flow	Speed too low to obtain desired flow	Check flow-speed curve
	Air leak due to bad seals or pipe connections	Replace seals, check inlet fittings.
Fluid vaporization ("starved" pump inlet)	Strainers, foot valves, inlet fittings or lines clogged	Clear lines. If problem continues, inlet system may require change
	Inlet line size too small, inlet line length too long. Too many fittings or valves. Foot valves, strainers too small.	Increase inlet line size. Reduce length, minimize direction and size changes, reduce number of fittings.
	NIPA too low	Raise liquid level in source tank
	NIPA too low	Increase by raising or pressurizing source tank

*NIPA - Net Inlet Pressure Available at Pump
NIPR - Net Inlet Pressure Required by Pump

Problem	Probable Causes	Solutions
Fluid vaporization ("starved" pump inlet)	NIPA too Low	Select larger pump size with smaller NIPR
	Fluid viscosity greater than expected	Reduce pump speed and accept lower flow, or change system to reduce line losses.
	Fluid temperature higher than expected (vapor pressure higher)	Reduce temperature, reduce speed and accept lower flow or change system to increase NIPA
Insufficient flow, fluid being bypassed somewhere	Relief valve not adjusted or jammed	Adjust or clear
	Flow diverted in branch line, open valve, etc.	Check system and controls
Insufficient flow, high slip	Hot (HC) or extra clearance rotors on "cold" fluid, and/or low viscosity fluid	Replace with standard clearance rotors
	Worn pump	Increase pump speed (within limits). Replace rotors, recondition pump.
	High pressure	Reduce pressure by system changes
Noisy operation	• **Cavitation**	
	High fluid viscosity, High vapor pressure fluids, High temperature	Slow down pump, reduce temperature, change system
	NIPA less than NIPR	**To increase NIPA or reduce NIPR, see Engineering Manual**
	• **Air or gas in fluid**	
	Leaks in pump or piping	Correct leaks
	Dissolved gas or naturally aerated products	Minimize discharge pressure. Also see "Cavitation" above.
	• **Mechanical noises Rotor to body contact**	
	Improper assembly	Check clearance with shims. See page 33 and 36.

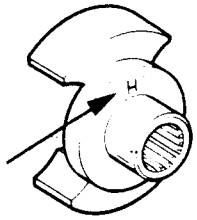
Problem	Probable Causes	Solutions
Noisy operation	• **Rotor to body contact**	
	Distortion of pump due to improper piping installation	Reassemble pump or re-install piping to assure free running
	Pressure higher than rated	Reduce pressure if possible
	Worn bearing	Rebuild with new bearings, lubricate regularly
	Worn gears	Rebuild with new gears, lubricate regularly
	• **Rotor to rotor contact**	
	Loose or mis-timed gears, twisted shaft, sheared keys, worn splines	Rebuild with new parts
	• **Relief valve chattering**	Re-adjust, repair or replace
	• **Drive component noise—gear trains, chains, couplings, bearings.**	Repair or replace drive train
Pump requires excessive power (overheats, stalls, high current draw, breakers trip)	• **Higher viscous losses than expected**	If within pump rating, increase drive size
	• **Higher pressure than expected**	Reduce pump speed, increase line sizes
	• **Fluid characteristics**	
	Fluid colder than expected, viscosity high	Heat fluid, insulate or heat trace lines. Use pump with more running clearances.
	Fluid sets up in line and pump during shut down	Insulate or heat trace line. Install "soft-start" drive. Install recirculating bypass system. Flush with other fluid.
	Fluid builds up on pump surfaces (example, latex, chocolate, fondants)	Use pump with more running clearance
"Short" pump service life	High corrosion rate	Upgrade material of pump
	Pumping abrasives	Larger pumps at slower speeds, can help
	Speeds and pressures higher than rated	Reduce speeds and pressures by changes in system
	Worn bearings and gears due to lack of lubrication	Set up and follow regular lubrication schedule
	Misalignment of drive and piping. Excessive overhung load or misaligned couplings.	Check alignment of piping. Check drive alignment and loads.

SECTION V
OPERATION

NORMAL OPERATION

Normal operation covers a speed range of 0-600 RPM and a pressure range of 0-200 PSI. Temperature range with standard rotors is -40 to 180° F and with hot clearance rotors, 180-300° F. (For operation at higher temperatures, consult factory.)

NOTE: All hot clearance rotors are identified with a stamped letter "H" on rotor hub.



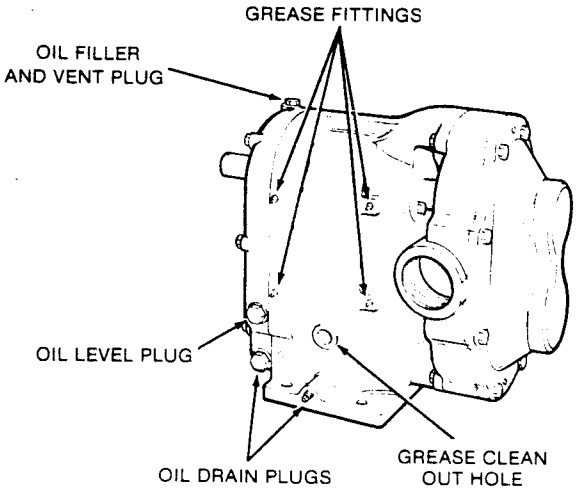
LUBRICATION

The gears are factory lubricated with Micro-Plate No. 140 oil.

The bearings are factory greased with Micro-Plate #2 grease.

Change oil every 500 hours. If pump is installed where moisture and condensation are heavy, change oil more frequently.

Bearings must be greased every 250 hours or less depending on moisture and condensation conditions. Excess grease will accumulate in the bearing housing and can be removed through the cleanout hole covered with plastic plug.



NOTE: For hot or cold extremes use appropriate lubricant as shown in following table.

OIL	GREASE
Micro-Plate #140 (-10 to +450° F)	Silicone (-20 to +5° F) Micro-Plate #2 (+5 to +400° F)

DRIVE LUBRICATION

Refer to drive manufacturer's manual shipped with unit.

CLEANING

Where possibility of material "setting up" during shut down exists, flushing with solvent or disassembly of fluid head and manual cleaning are required.

The Ductile Iron Pump should be coated with a rust preventative during extended shut-down periods and prior to storage.

SECTION VI
MAINTENANCE

GENERAL

In the maintenance of pumps it is important to recognize when parts are wearing excessively. Detecting wear in the early stages will let you repair your pump at minimum cost and get it back into operation at the earliest date.

Periodic cleaning and a simple "look-feel" inspection of your pump are recommended as good operating procedures and as a means of detecting signs of trouble at an early stage. They require only a few minutes and may save you an appreciable amount of money.

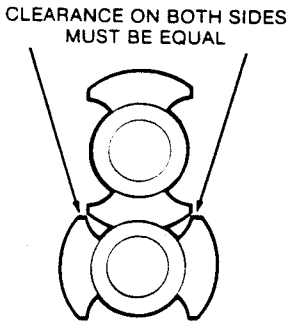
A more detailed maintenance inspection should be scheduled annually. See ANNUAL MAINTENANCE, Page 20.

The following routine "look-feel" checks are to be made by the system operator during shut-down periods.

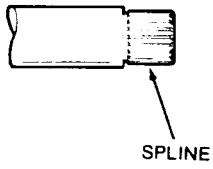
VISUAL CHECKS

1. Rotor wing tips for indications of metal-to-metal contact between rotor wings.

If this condition exists, the pump should be repaired or replaced.

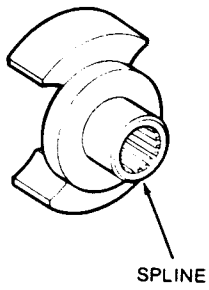


Cause	Corrective Measure
Worn shaft spline	Replace shaft.

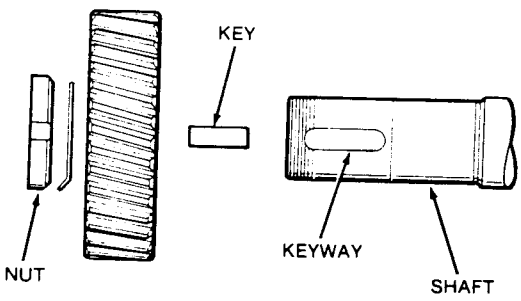


Worn rotor spline ..... Replace rotor.

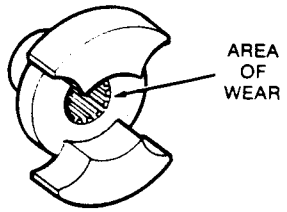
NOTE: Usually both parts will wear. The usual cause is a rotor which has been loose for extended running periods.



Loose gears	Remove gear and inspect key, keyway and shaft. If all are in good condition, reassemble and retighten gear retainer nuts to specified torque. (See Table 2.)
Worn gears	Replace gears.
Twisted shaft	Replace shaft.

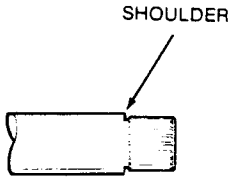


2. Rotor hub end which locks against the shaft shoulder for signs of wear.



Cause	Corrective Measure
Extended running with loose rotor retaining bolts	Replace rotor or reshim shaft to maintain back face clearance. (See Table 1 and Section IX.)

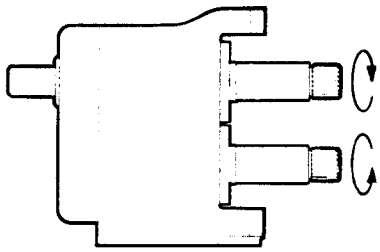
3. Shaft shoulder against which rotor hub locates and locks for deterioration.



Cause	Corrective Measure
"Steps" worn into locating face by loose rotor	Reshim or replace shaft to maintain correct running clearances. (See Table 1.)

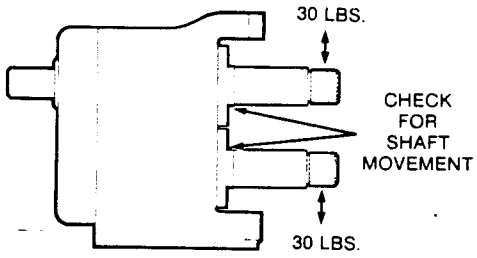
"FEEL" CHECKS

1. Gear Back Lash — If there is any free movement when rotating either shaft without transmitting motion to other shaft, the back lash is excessive.



Cause	Corrective Measure
Worn gear teeth	Replace gear.
Gear loose on shaft	Remove gear and inspect key, keyway and shaft. If all are in good condition, reassemble and retighten gear retaining nuts to specified torque. (See Table 2.)

2. Bearing Condition — If movement of either shaft can be detected when hand loading the rotor end of the shaft (approximately 30 lbs. force applied as illustrated), bearing may be failing.



Cause	Corrective Measure
Lack of lubricant or high overload	Replace bearings and review lubrication schedule. Check for means to reduce hydraulic loads.

SEAL MAINTENANCE

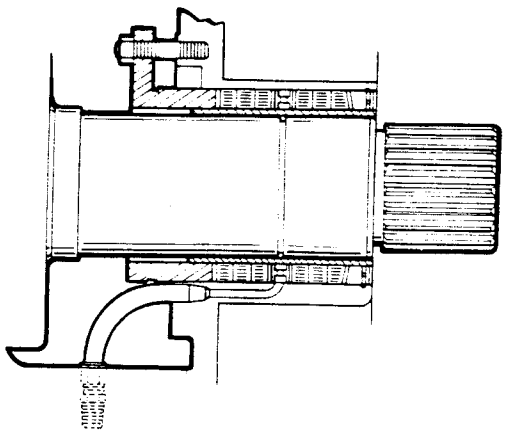
1. Packing Seal

a. To suit the required service, a variety of packing materials and replaceable shaft sleeves are available. Standard packing material is braided teflon-asbestos. Standard sleeves are 316 stainless; optional sleeves of ceramic-coated stainless are available.

b. External adjustment with gland nuts will maintain sealing until worn packing can be conveniently replaced.

c. New packing ring can be installed by loosening gland and inserting packing into cavity in front of gland.

d. **DO NOT TIGHTEN GLAND EXCESSIVELY.** A small amount of liquid leakage is normal for packing lubrication.

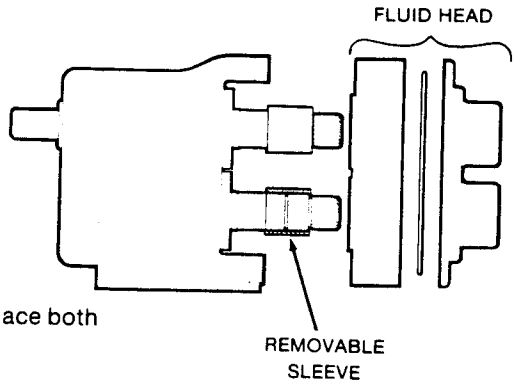


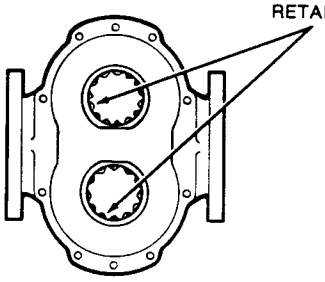
Packing Replacement

NOTE: Shut off power and isolation valves before disassembly.

a. To facilitate repacking, disassemble the fluid head from bearing housing. (See Section VIII.)

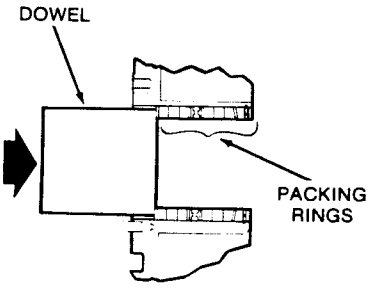
b. Clean and inspect shaft sleeves; if worn, remove and replace both sleeve and shaft "O" ring.





c. Remove packing retainers with a screwdriver or needlenose pliers.

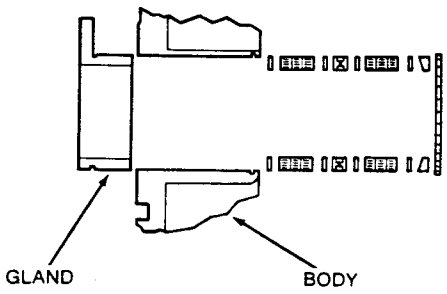
d. Turn body over, remove gland and use a dowel and soft hammer to drive packing rings from body.



NOTE: The pump can be repacked without removing fluid head if proper tools and expertise are available. See pictures for helpful hints.

e. Refer to parts list and drawing for your pump. Assemble packing components into body cavity as shown in the drawing. Stagger the breaks in the packing rings so they do not line up. Snug up gland but DO NOT tighten.

f. Make final adjustment of packing glands after startup.



2. Mechanical Seals

A copy of seal manufacturer's descriptive literature is sent with your pump for service and parts identification.

Shut off power and close isolation valves.

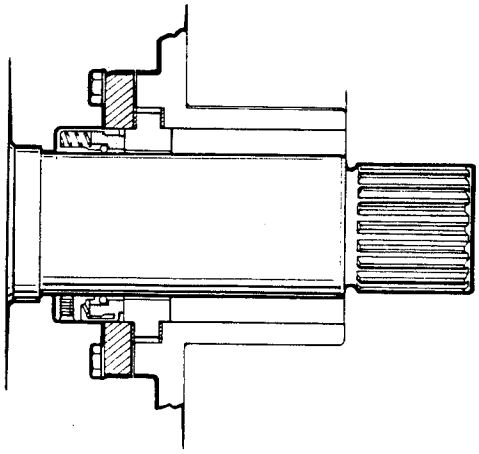
NOTE: When working with hazardous fluids it is recommended the pumping head be drained before disengaging seal faces.

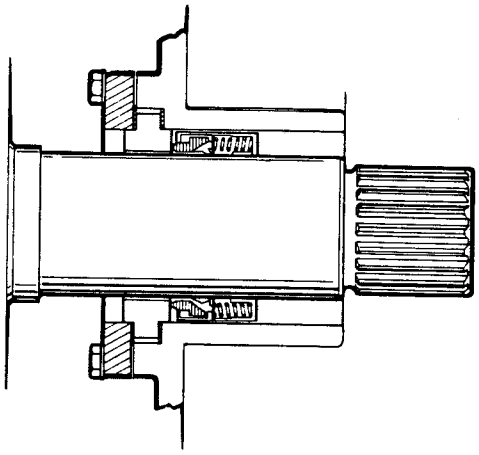
Outside Seal

a. Flush off any scale or crusted product that may have accumulated around the shaft, seal face and seal springs.

b. Check to see if seal is tight against seat. Repositioning seal to increase face seating pressure is suggested.

c. Check for cracked or damaged seal face by removing seal seat retainer bolts and sliding retainer back to expose sealing faces. If no faults are visible and leak persists or damaged face is found, the replacement of seal and seal seat is recommended. To replace seal and seat, the head must be removed. See Section VIII for proper procedure.





Inside Seal

a. If seal is leaking, replacement is recommended.

b. To replace seal and seal seat the fluid head must be removed. See Section IX for proper procedure.

Dual Inside and Outside Seal

a. Turn on seal water.

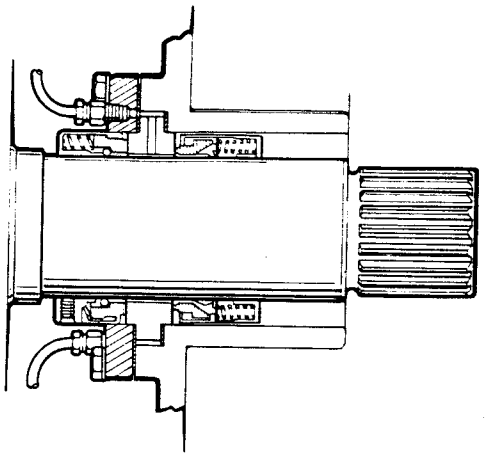
b. If water leaks past the outside seal, flush off any scale or crusted product that may have accumulated around the shaft and seal area and seal springs.

c. Check to see if seal is tight against seat. Repositioning seal to increase face seating pressure is suggested.

d. Check for cracked or damaged seal face by removing seal seat retainer bolts and sliding retainer back to expose sealing faces. If no faults are visible and leak persists or if damaged face is found, the replacement of seal and seal seat is recommended. To replace seal and seat, the fluid head must be removed. See Section VIII for proper procedure.

e. Remove pump cover and turn on seal water.

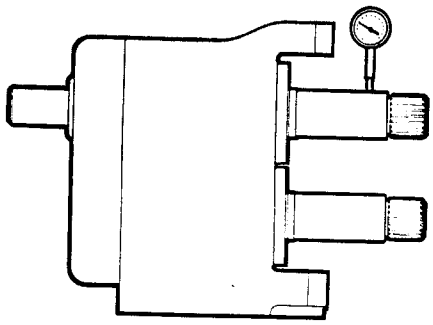
f. If water leaks past inside seal into pump body, replace entire seal assembly and seal seat. (See Section IX.)

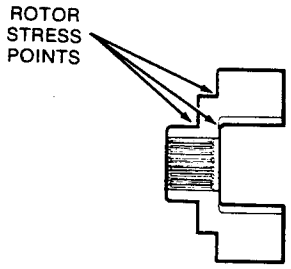


ANNUAL MAINTENANCE

The same general procedures and corrective measures outlined above should be performed and in addition the following preventive maintenance operations should be carried out at this annual checkout period.

1. Check bearing with a dial indicator for shaft radial play. If deflection is equal to or greater than rotor to body diametrical clearance (see Table 1), replace bearings.





2. Remove gear cover and inspect gears for wear, back lash and looseness. Retorque gear retaining nuts to proper torque if required. (See Table 2.)

3. Thoroughly inspect rotors for worn splines, bearing shoulder wear, and stress cracks. Use dye check method to detect any fatigue type cracks at the stress points that may develop into serious trouble.

4. Review performance record on pump and check radial and back face clearances to determine wear and its effect on desired performance. (See Table 1 and Section IX.) An adjustment on operating speed can compensate for wear in some applications. When wear and subsequent performance is objectionable, we suggest you take advantage of our reconditioning program. (See Section VII.)

NOTE: If bearings or shafts are replaced in the field, extreme care should be exercised to position the shaft, by shimming, to maintain sufficient running clearances between the rotor wing faces and the pump body faces (back face and cover face). Refer to Table 1 and BACK FACE CLEARANCE, Section IX. If rotors are slightly out of time, they can be re-timed by shimming the gears.

It is important to hold the same back face dimension for both rotors to avoid crossover interference.

SECTION VII
FACTORY RECONDITIONING

Waukesha I pumps are designed so that they may be factory reconditioned twice and backed with a new pump warranty each time.

Factory reconditioning involves replacement of all worn parts such as shafts, bearings, oil seals, gears, etc. The pump body and cover are re-machined and new rotors are installed. The pumps are stamped R-1 or R-2, after the serial number, designating that they have been reconditioned once or twice.

NOTE: It is advisable to contact the factory and furnish the serial number of any pump being considered for reconditioning.

When pumps require reconditioning it is recommended that they be returned to Waukesha Foundry Company with proper purchase order. Where this is not practical, a "reconditioned" pump may be ordered in advance of the actual return of the pump being replaced.

While a large stock of reconditioned pumps is maintained, normal delivery of four weeks should be anticipated. In these cases an invoice will be issued for the price of a new pump with credit allowed upon receipt of the old pump at the factory so that net cost will be that of a reconditioned pump.

INTERCHANGEABILITY

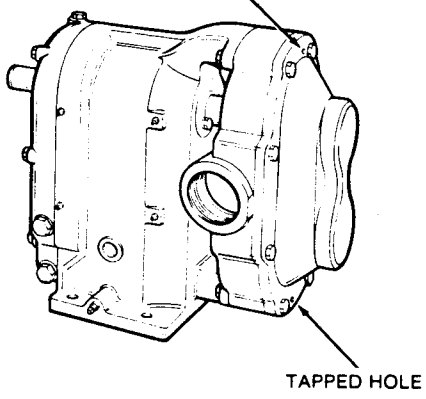
All new pumps are identified by a serial number on bearing housing nameplate and stamped on top of pump body. The housing and body must be kept together as a unit because of back face clearance. The rotors, seals and covers can be interchanged between units.

ALL reconditioned pump parts must be kept together as a unit. These are specially machined and are not interchangeable.

NOTE: If new body is replaced in the field, it is most important to check back face and front face clearances (See Table 1). Reshim shafts if required to avoid rotor and cover contact. Both rotors must have the same clearance to avoid crossover interference.

SECTION VIII
DISASSEMBLY PROCEDURES

(Refer to Section X for parts identification, drawings, and tables)

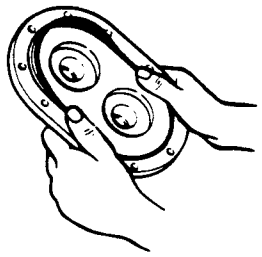


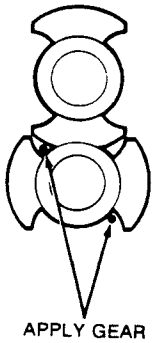
FLUID HEAD DISASSEMBLY

1. Remove eight cap screws from cover. Use two as jack bolts in tapped holes on top and bottom of cover and turn in evenly to push cover off dowels and rotor hubs. Be sure to have adequate support when sliding cover free, especially on the larger units.

2. Remove "O" ring from cover groove and inspect. Discard if not in good condition.

3. Turn shaft to orient rotors as shown for easy removal one at a time.





a. To remove rotor retainer bolts, unlock lock clip tabs using a screw driver or drift. Then, when clear, use a conventional wrench and a sharp counterclockwise impact to loosen bolt. Remove first the rotor which has both wings exposed.

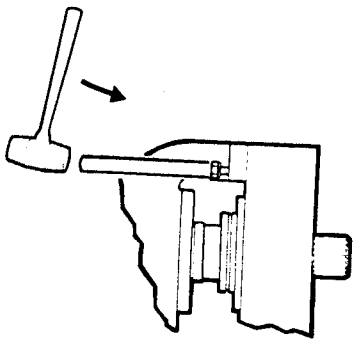
CAUTION: Some mechanical seal models use the back side of rotor as a spring retainer and will, if not restrained, push rotor off shaft with possible damage to rotor or personnel.

b. If rotor can not be removed by hand, use more forceful means such as; A standard gear puller used in the conventional manner, or a piece of hard wood used as a lever between back of rotor hub and body. (Do not use metal bar, etc.)

4. Remove the second rotor in the same way.

BODY DISASSEMBLY

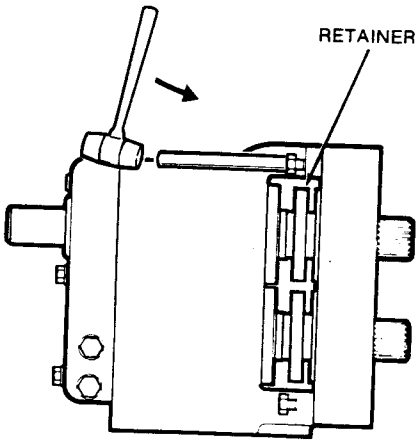
Body with Packing Seal



1. Loosen packing gland nuts.

2. Loosen body retaining bolts and tap them with soft hammer to drive body loose from bearing housing and dowel pins. Remove retaining bolts and slide body off shafts.

3. See SEAL MAINTENANCE, Section VI, for disassembly procedure of packing.

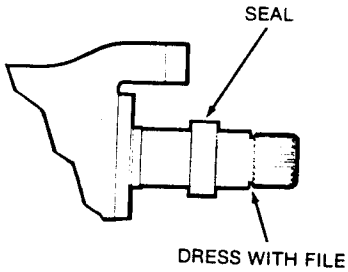


Body with Mechanical Seals

1. Remove cap screws from seal seat retainers and slide retainers back against bearing housing.

2. Loosen body retaining bolts and tap them with soft hammer to drive body loose from bearing housing and dowel pins. Remove retaining bolts and slide body off shafts.

3. Thoroughly clean the shafts. Dress off shaft around shoulder against which rotor bottoms to remove "flared end" to aid in seal removal.



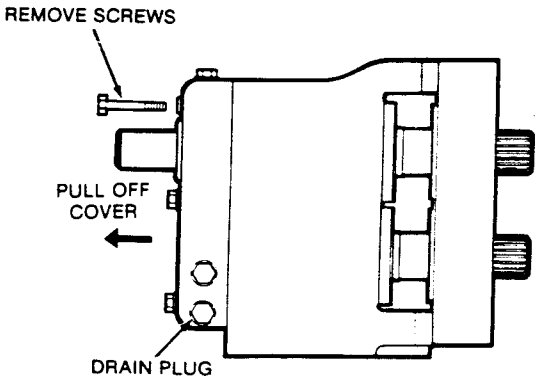
4. Loosen both inboard seals and slide off shafts. Then remove the seal seat and gaskets.

5. If equipped with outside seal, loosen set screws and slide off shafts.

6. Dress off burrs on shaft which resulted from seating of set screws with a file or emery cloth.

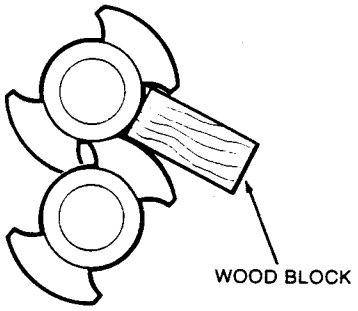
GEAR COVER DISASSEMBLY

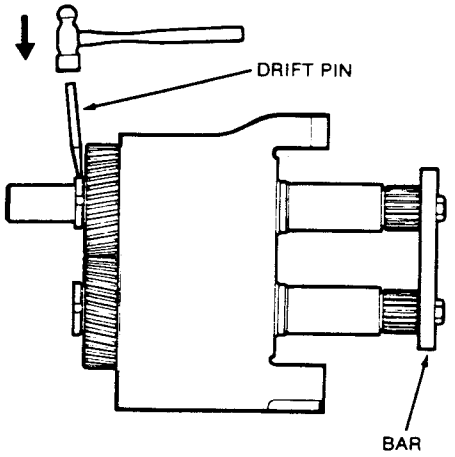
1. Drain oil by removing drain plug.
2. Remove eight cap screws. With soft hammer break cover loose from bearing housing and slide cover off the shaft extension.
3. Remove and discard gasket.
4. Inspect oil seal and replace if necessary.



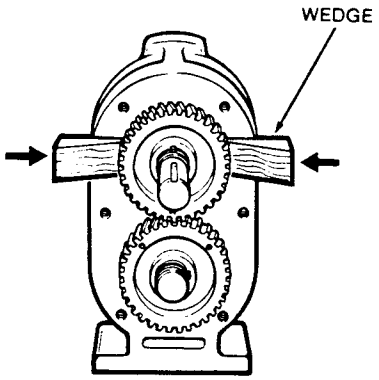
GEAR REMOVAL

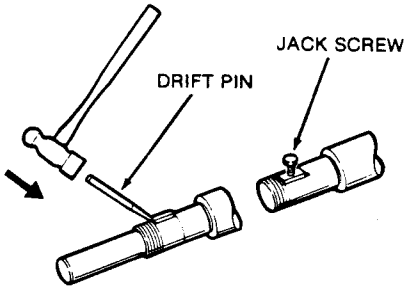
1. Straighten locking tab of lockwasher.
2. Prevent shafts from turning by attaching a bar to the ends of both shafts with the rotor retaining bolts, or by installing rotors on shafts and wedging a wooden block between the rotors.
3. Use spanner wrench or drift to remove gear lock nuts.





4. Use hardwood wedges or gear puller, if space allows, to remove gears.
5. Remove keys from keyslots with a drift pin or jack screw. If burrs develop during this operation, dress them off with file before reassembly.

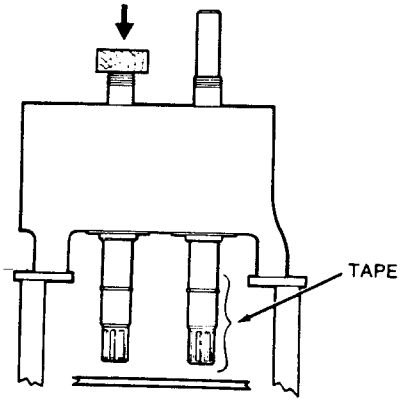


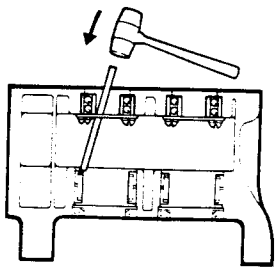


SHAFT REMOVAL

Models 25, 55 and 125 I and DI

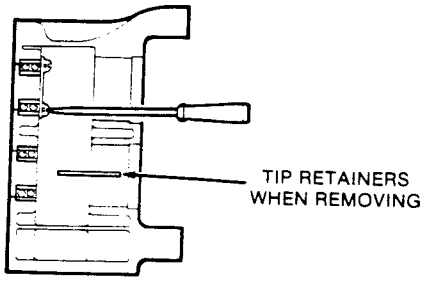
1. Place bearing housing assembly on an arbor press with liquid end down. Press out shafts one at a time. (See Table 4.) Protect fluid end of shaft by wrapping with tape.

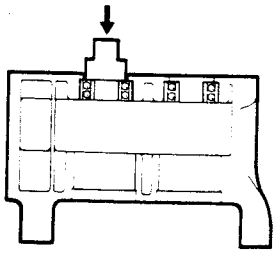




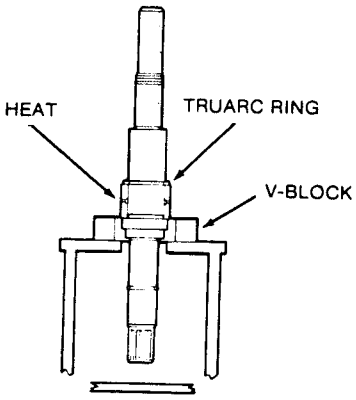
2. Remove front bearing outer race and front grease seal by driving them out of housing with a dowel or brass rod and hammer, or by using a conventional puller.

3. Set bearing housing on bench and reach through front with screw driver and remove bearing retainer bolts and retainers. Tip retainers flat and remove them through front hole.





4. Return housing to arbor press. With proper diameter block press out rear bearing and rear oil seal. (See Table 4.) Remove them through front bearing opening.



5. Remove Truarc retaining ring

6. Remove front bearing inner race from shaft using arbor press and V-blocks. (See Table 4.)

NOTE: Localized heat will aid in disassembly.

7. Thoroughly clean and inspect all parts that are to be reused.

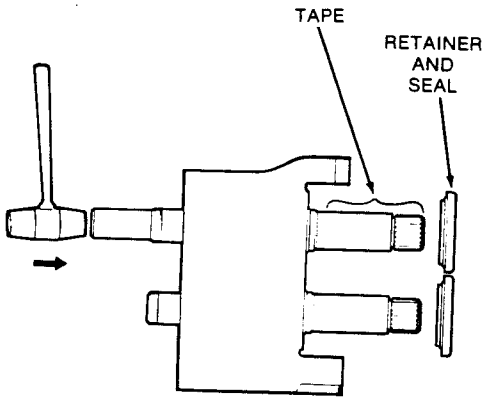
Models 200 and 300 I and DI

1. Remove front bearing retainers and grease seals. Press out and discard grease seals.

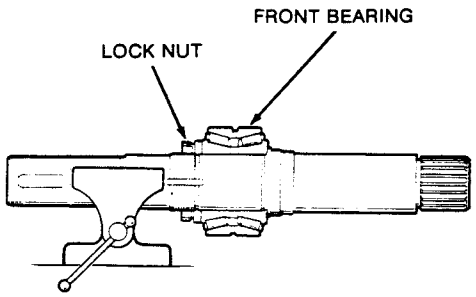
2. Protect fluid end of shafts by wrapping them with tape.

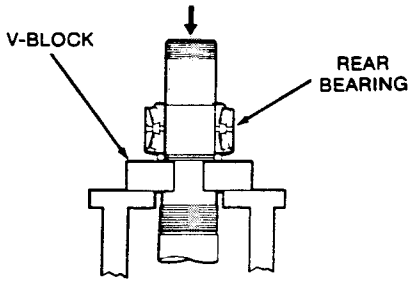
3. With bearing housing resting on base, remove the shafts by tapping them with a soft hammer. If shafts can not be removed this way, press them out with hydraulic press.

4. Remove shims and rear grease seals from bearing bores in housing.

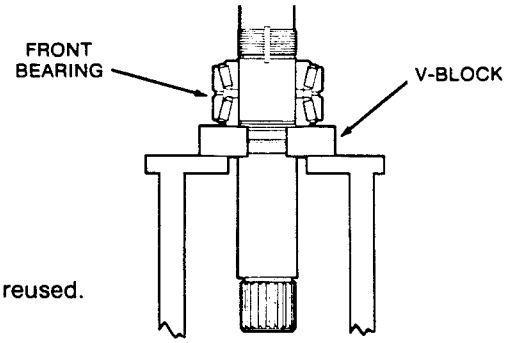


5. Remove rear bearing by using V-blocks and a hydraulic press. (See Table 4.)





6. Secure shaft assembly behind lock nut in a soft-jawed vise and remove front bearing lock nut using a spanner wrench or drift.



7. Remove front bearings using V-blocks and a hydraulic press. (See Table 4.)

8. Thoroughly clean and inspect all parts that are to be reused.

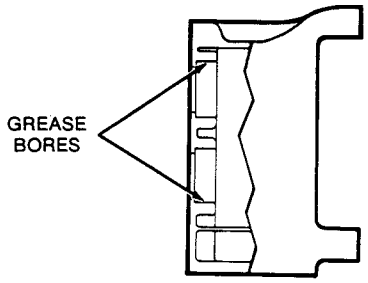
SECTION IX
ASSEMBLY PROCEDURES

(Refer to Section X for parts identification, drawings, and tables)

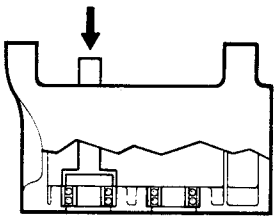
Always include the pump serial number with a spare parts order.

MODELS 25, 55 AND 125 I AND DI

1. Coat rear bearing bores of bearing housing with Molykote grease.

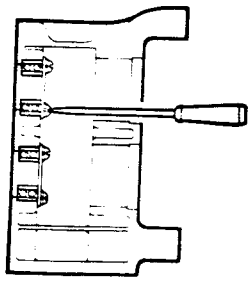


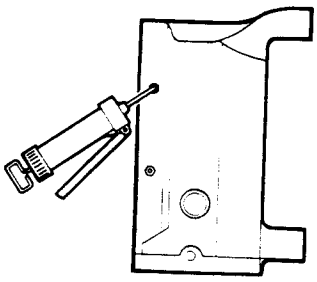
NOTE: Be sure pusher contacts outer race.



2. Press rear bearings into housing using an arbor press. (See Table 4.)

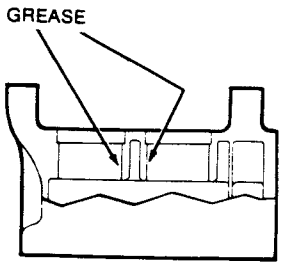
3. Install rear bearing retainers through front bearing bores and secure with round head machine screws.

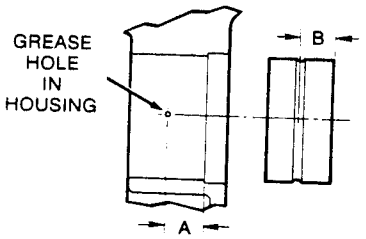




4. Grease rear bearings through grease fittings on housing with grease gun using Micro-Plate #2 grease. Pump in grease until it squirts out inside of retainers.

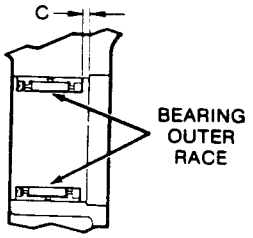
5. Coat front bearing bores with Molykote grease.

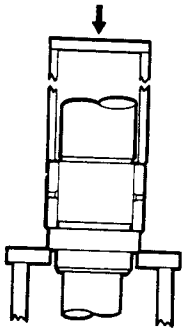




6. Measure distance A in bearing bore and distance B on bearing.

7. With the seal end of bearing toward inside of housing, press outer race and roller assembly of front bearings into bearing bores. (See Table 4.) Be sure grease hole in housing lines up with grease groove in bearing. Press bearing into housing to dimension C (A minus B).

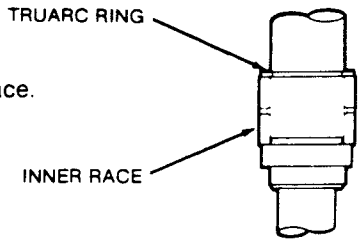


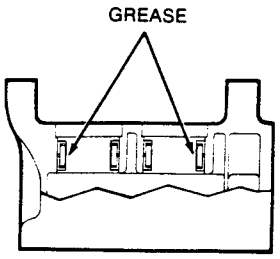


8. Coat front bearing area of shaft with Molykote grease.

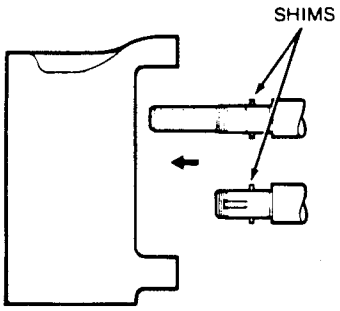
9. Press front bearing inner races onto shafts using an arbor press. (See Table 4.)

10. Install Truarc retaining rings to lock inner race in place.

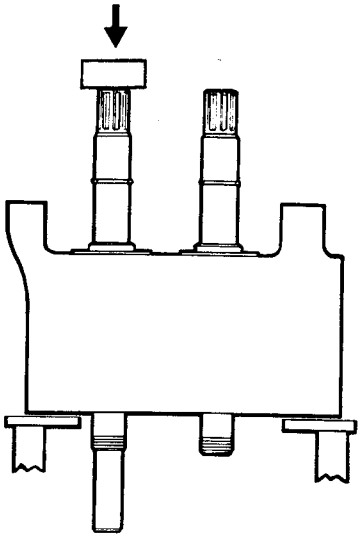




11. Coat front bearing rollers with Micro-Plate grease #2 liberally.



12. Place shim packs onto shafts and insert into housing. (See Table 3.)



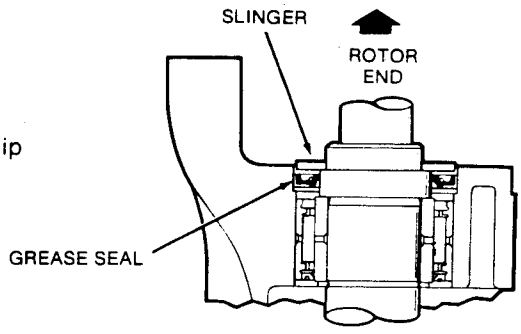
13. Place assembly onto arbor press. Using a plastic or brass plate to protect splines, press shafts into rear bearings. (See Table 4.)

NOTE: Install drive shaft in proper location for top or bottom drive. The gear cover is machined to match the drive shaft location and is not interchangeable.

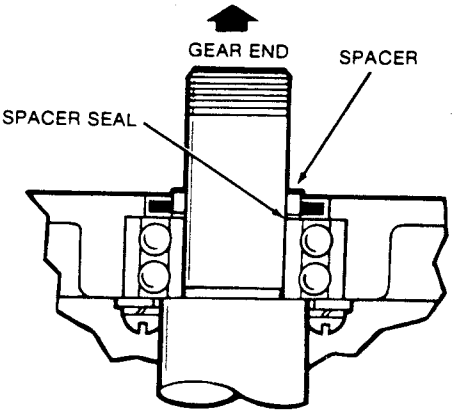
14. Check back face clearance. Refer to Table 1 and BACK FACE CLEARANCE, Page 33.

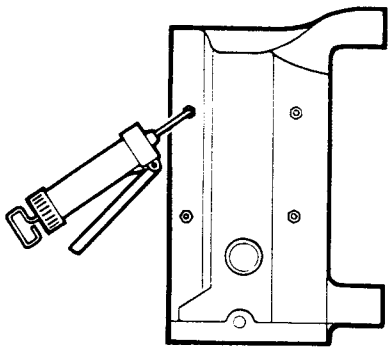
15. Press front grease seals into housing orienting sealing lip as shown.

16. Press on slingers tight against shaft shoulder.



17. Rear seal installation: Install spacer seal and spacer. Then press in rear seal flush with back face of housing.





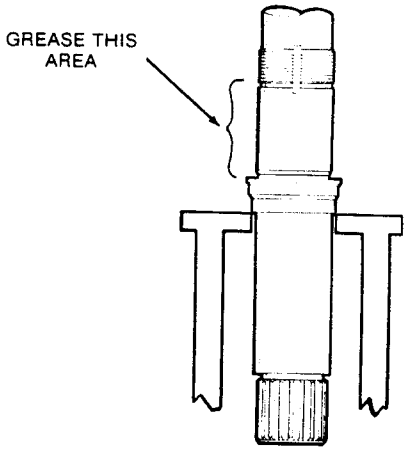
18. Grease both front and rear bearings with Micro-Plate #2 grease.

MODELS 200 AND 300 I AND DI

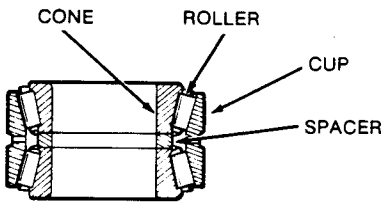
Shaft Assembly

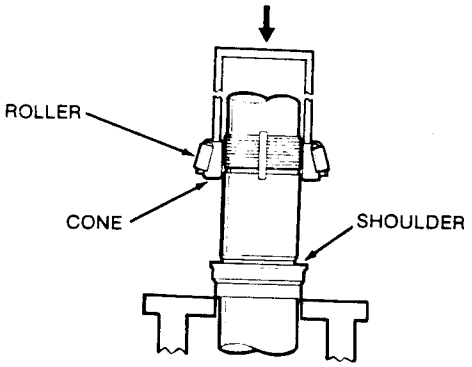
1. Front Bearing Assembly

a. Coat front bearing area of shaft with Molykote grease. Place shaft upright in hydraulic press with spline end down.



b. Unwrap front bearing assembly. *Do not interchange* parts of one bearing assembly with another. These parts are precisely matched in manufacture and must be installed as a matched assembly.



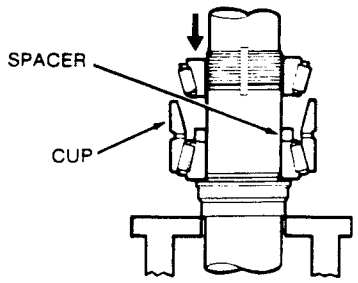


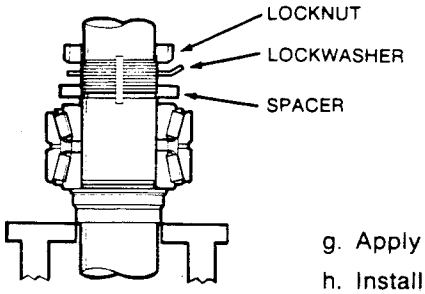
c. Lift cone and roller assembly out of bearing stack and place on shaft with radius down as shown. Press onto shaft until seated against shaft shoulder. (See Table 4.)

d. Place spacer onto bearing cone.

e. Place bearing cup over cone and roller assembly, keeping the cup oriented with proper roller assembly.

f. Coat remaining bearing cone and roller I.D. with Molykote grease and slip over shaft with roller radius up. Press onto shaft and into cup to complete assembly of front bearing on shaft. (See Table 4.)



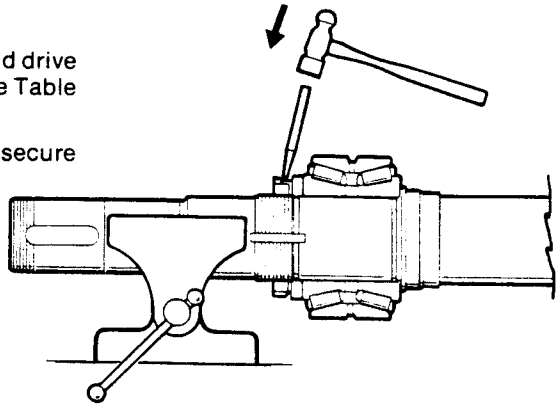


g. Apply Molykote grease to threaded area on shaft.

h. Install spacer, lock washer and lock nut finger tight.

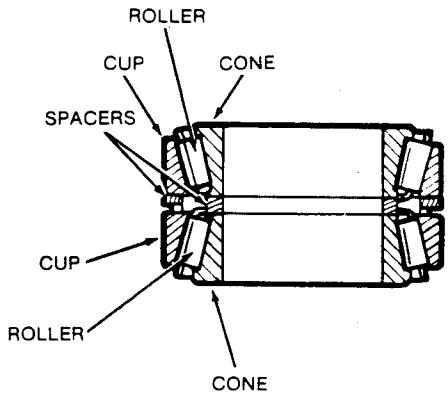
i. Clamp shaft behind lock nut in a soft jawed vise and drive lock nut tight using a spanner wrench or drift. (See Table 2.)

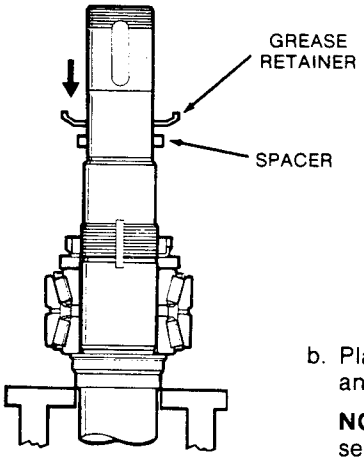
j. Bend lock washer tab into groove on nut to secure assembly.



2. Rear Bearing Assembly

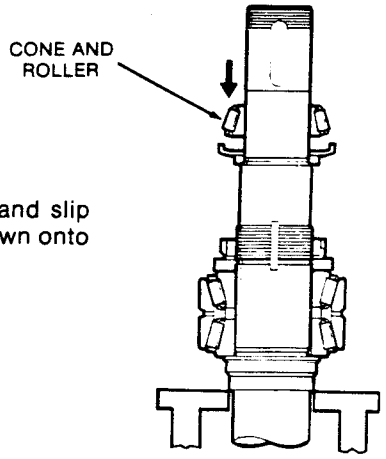
a. Unwrap rear bearing assembly. Do not interchange parts of one bearing assembly with another. These parts are precisely matched in manufacture and must be installed as a matched assembly.



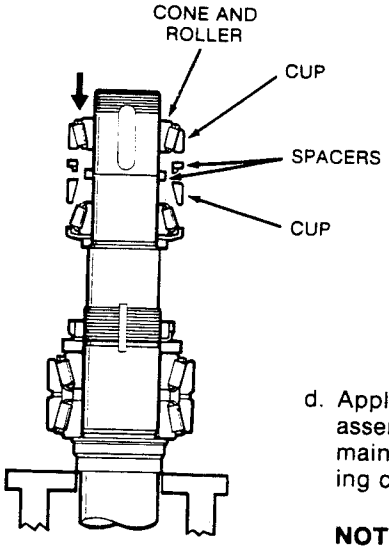


b. Place shaft upright in an arbor press with spline end down and slip on grease retainer with flange up.

NOTE: On 300 I and DI pumps install spacer before grease seal.



c. Coat shaft bearing area with Molykote grease and slip bearing cone and roller assembly with radius down onto shaft and press on. (See Table 4.)



d. Apply Molykote grease again. Slip bearing cup over roller assembly. Install both inner and outer spacers. Place remaining cup onto outer spacer and press on the remaining cone and roller assembly. (See Table 4.)

NOTE: Be sure outer spacer is concentric on shaft.

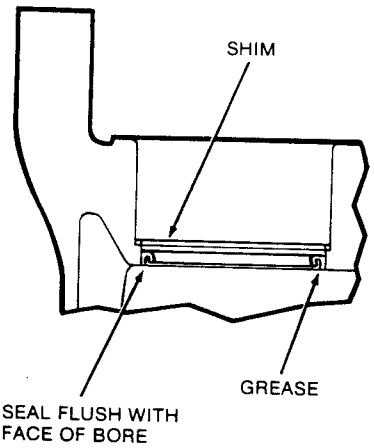
Bearing Housing Assembly

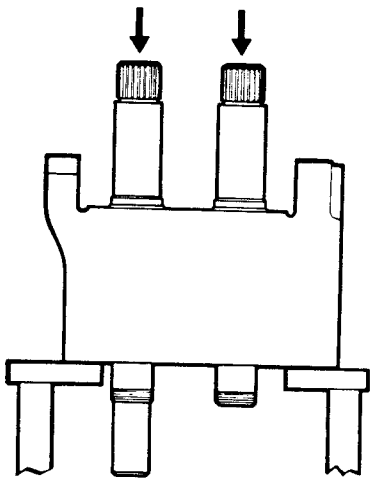
1. Shaft Installation

a. Place bearing housing on arbor press. Install front bearing grease seals, with lip towards center cavity, flush with back face of bore.

b. Coat lip seals with Micro-Plate grease #2.

c. Place standard shim pacs into place in front bearing bore.

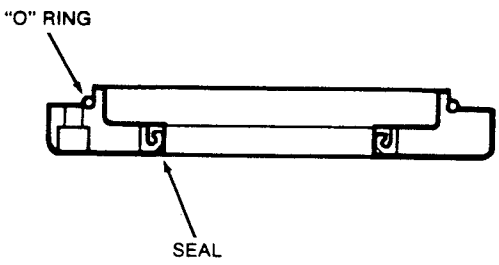


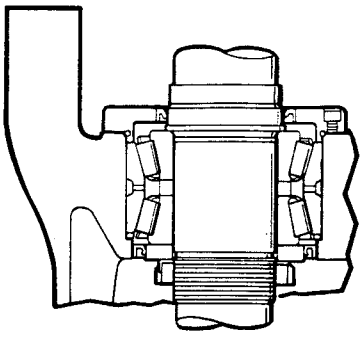


d. Install shaft assemblies in gear case with spline end up and drive shaft in proper location to give top or bottom drive as required. Press shafts into housing until seated against shim pac. (See Table 4.)

e. Install grease seals in bearing retainers and coat seal lip with Micro-Plate grease #2, and slip on "O" ring.

f. Grease front and rear bearings through grease fittings until grease is visible around roller assemblies.





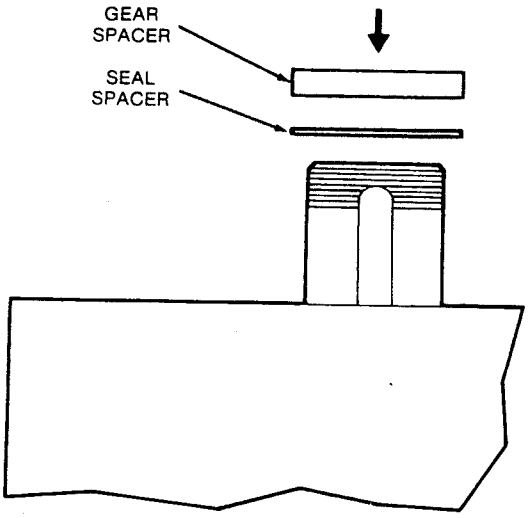
g. Secure shaft assemblies in bearing housing with bearing retainers.

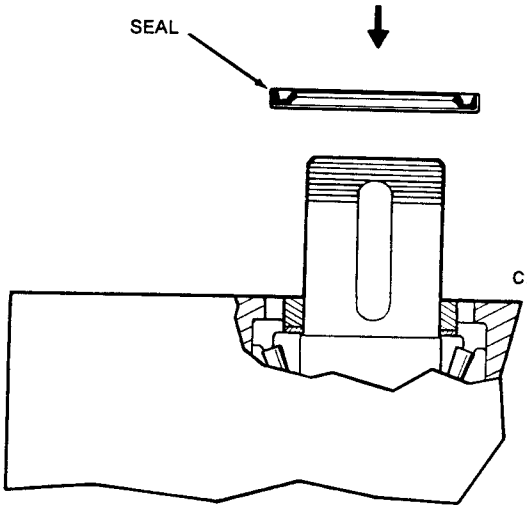
h. Check back face clearance. (See Table 1 and BACK FACE CLEARANCE, Page 33.)

2. Rear Seal Assembly

a. Install seal spacers and gear spacers.

b. Coat lip of rear seals with Micro-Plate #2 grease.



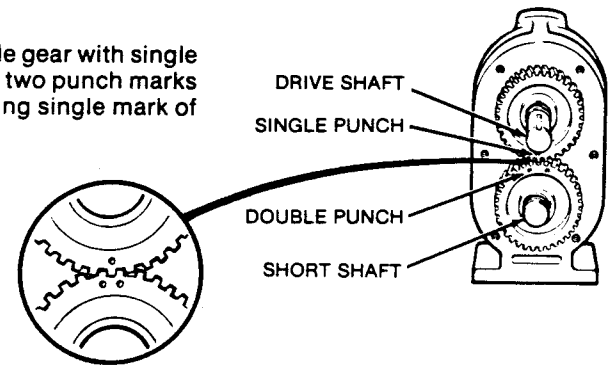


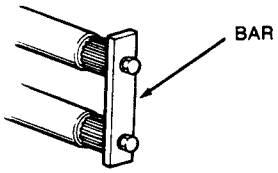
c. Press in rear seals with lip facing out.

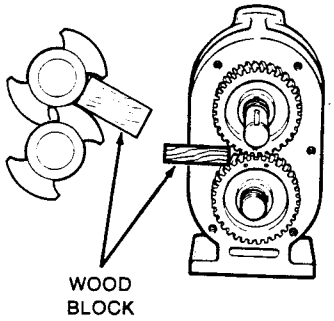
NOTE: On Model 300 pumps rear seal is pressed in flush with housing. On Model 200 pumps the rear seal must not be flush. It must be 1/8 inch outside of housing.

Gear and Gear Case Cover Assembly

1. Place keys into shaft keyslots. Then slide gear with single punch mark onto drive shaft and gear with two punch marks onto short shaft with punch marks straddling single mark of drive gear.



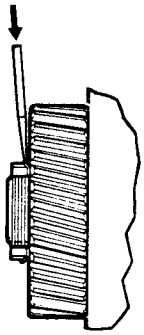


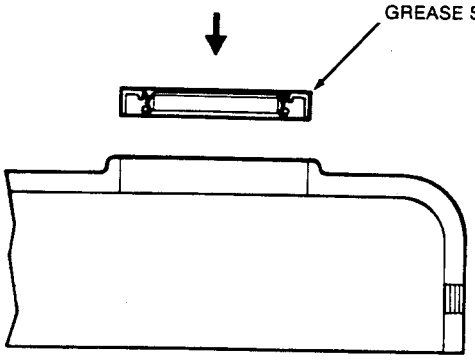


2. Prevent shafts from turning in one of following ways: by attaching a bar to the ends of both shafts with the rotor retaining bolts; by installing rotors on shafts and wedging a wooden block between rotors; or by wedging a wooden block between the gear teeth.

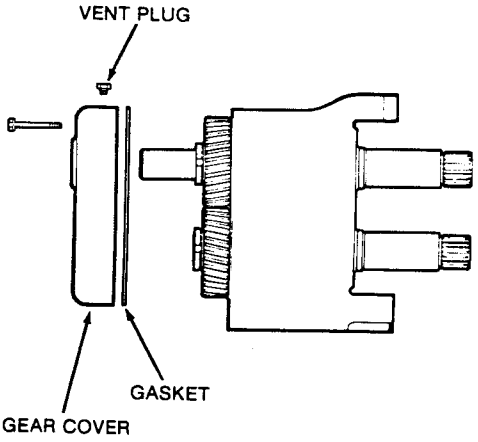
3. Apply Molykote grease to threaded area on shafts.

4. Slip on lock washers and lock nuts. Tighten lock nuts with a spanner wrench or drift. Bend locking tab to secure. See Table 2 for proper torque limit.





5. Press new grease seal into gear cover.



6. Place gasket over gear cover and mount cover assembly over shaft extension onto bearing housing.

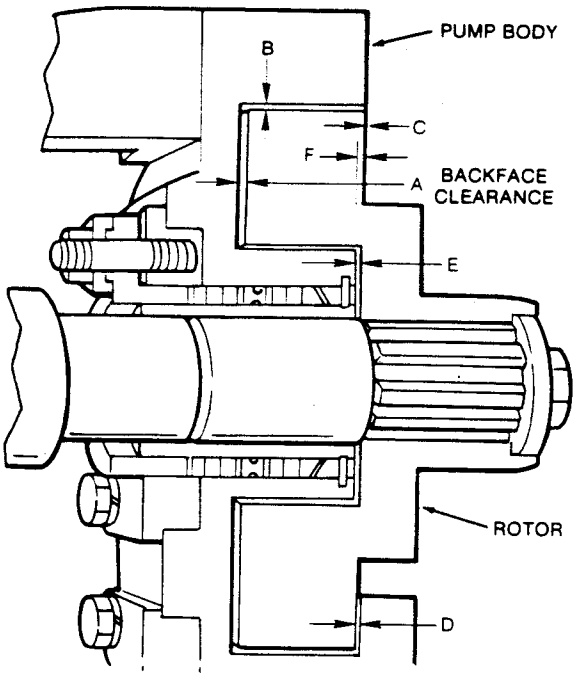
7. Fill gear cover with Micro-Plate #140 oil to proper level. Install vent plug.

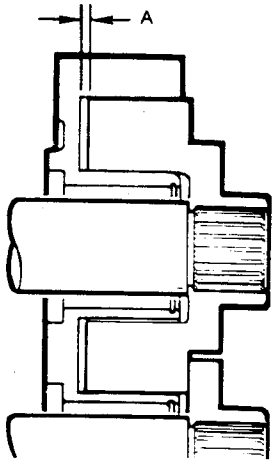
BACK FACE CLEARANCE

1. All Waukesha pumps are designed with close running clearances and the back face clearance is established with shims during assembly. The rotors lock against a shaft shoulder and the shaft is positioned with shims and locked into bearing housing. The resultant clearance between body back face and rotor wing is the back face clearance. (See Table 1.)

2. To check back face clearance, mount body, less seals, onto bearing housing. Assemble rotors and secure with retainer washers and cap screws. Measure clearance between body back face and rotor wing with feeler gauges. Check readings against recommended back face clearance in Table 1. Make note of any corrections required and follow examples to determine exact shim adjustment to make and avoid unnecessary disassembly and reassembly.

3. To make shim adjustments it is necessary to disassemble rotors and body and remove shafts. (See Section VIII, FLUID HEAD DISASSEMBLY.) Make required shim adjustment and reassemble. Recheck back face clearances. Be sure both rotors have the same clearance to avoid crossover interference.



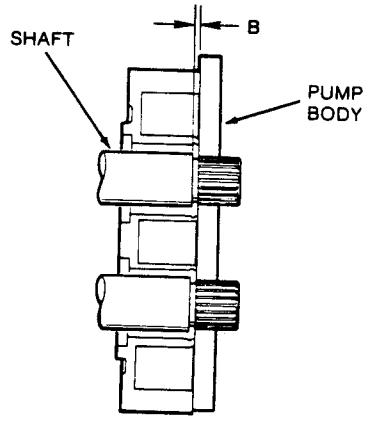


Too Much Clearance

Measure backface clearance (Dimension A). If clearance is greater than the specified clearance shown in Table 1, remove shims equal (or as close as possible) to difference between measured clearance and specified clearance.

Not Enough Clearance

If clearance is less than specified clearance shown in Table 1, shims must be added. To determine amount of shims to add, use a straight edge or a parallel bar and depth gauge and measure Dimension B between shaft shoulder and face of pump body as illustrated. Add shims equal (or as close as possible) to Dimension B plus specified clearance.



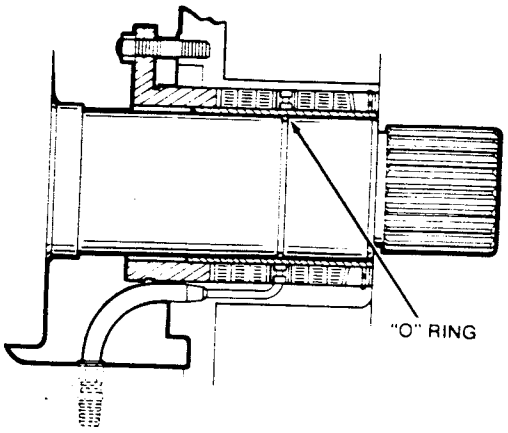
NOTE: Back face clearance for both rotors must be the same to avoid crossover interference with rotor hubs.

FLUID HEAD ASSEMBLY

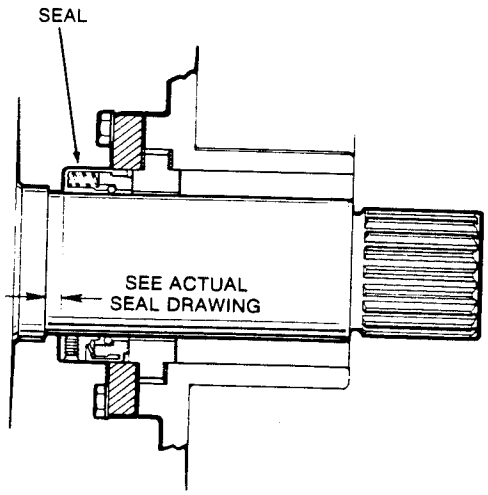
Mechanical Packing

1. Place "O" rings into grooves on shafts then slip sleeves onto shafts with pin indexed into notch on shaft.

2. For parts identification and correct order of assembly see packing parts list and sectional drawing in Section XI.



3. Mount body with packing onto shafts and secure to bearing housing with four cap screws.
4. Make final gland adjustment when pump is in service.



Mechanical Seals

NOTE: Handle all seal components with extreme care.

1. External Type

a. Place seal rotating member onto shaft with seal face out. Lock seal onto shaft at proper location. (See seal assembly drawing for correct location dimension.)

b. Slip seal seat retainer, retainer gasket, seal seat, and seat gasket onto shaft in that order.

c. Mount body on bearing housing with four cap screws being sure to insert gaskets and seal seats into cavities on back of body. Secure seal seats with retainers using cap screws (refer to seal assembly drawing).

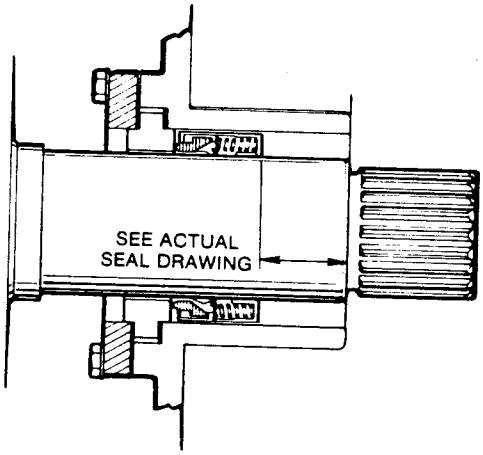
2. Internal Type

a. Slip seal seat retainers onto shafts followed by gasket, seal seat and seat gasket.

b. Slip seals with seal face towards bearing housing onto shafts and secure at proper location with set screws. (See seal assembly drawing for correct location dimension.)

c. Secure pump body to bearing housing with four cap screws.

d. Slip seat gasket into body followed by seal seat. Install seat retainer and gasket and secure with cap screws.



3. Double Seal with Flushing

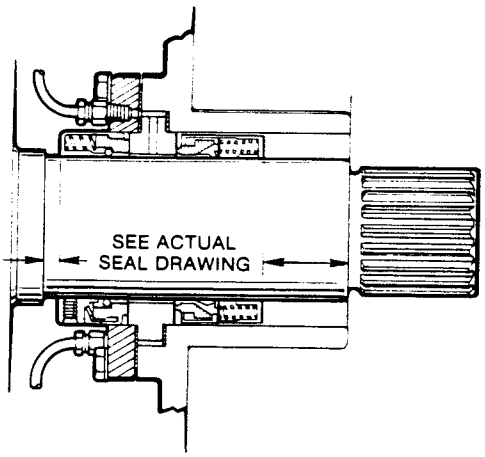
a. Place seal rotating member onto shaft with seal face out. Lock seal onto shaft at proper location. (See seal assembly drawing for correct location dimension.)

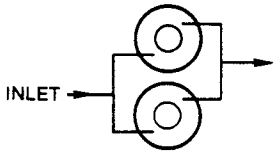
b. Slip seal seat retainer, retainer gasket, seal seat, and seat gasket onto shaft in that order.

c. Slip seals with seal face towards bearing housing onto shafts and secure at proper location with set screws. (See seal assembly drawing for correct location dimension.)

d. Mount body on bearing housing with four cap screws being sure to insert gaskets and seal seats into cavities on back of body. Secure seal seats with retainers using cap screws (refer to seal assembly drawing.)

e. Connect flushing lines after pump is installed.





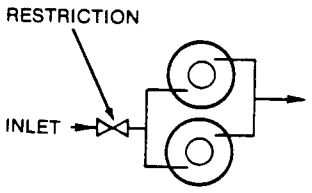
4. Flushing Connections

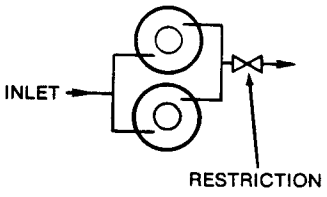
NOTE: Flushing media should be piped into lower connection of each shaft seal and discharged out upper connections. Both inlets and both outlets may be manifolded to simplify piping.

Low Pressure Flush

1. Flushing media is restricted on inlet side and has free flow to drain an outlet side.

2. Set flow rate of approximately 1/4 GPM for most applications. For high temperature applications increase flow.





High Pressure Flush

NOTE: High pressure outside seal is required.

1. Flushing media is restricted on discharge side of pump flushing glands.

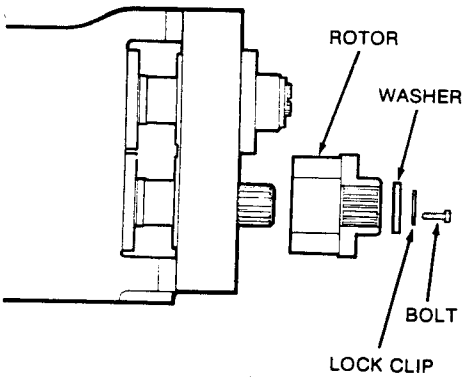
2. Set flow rate of approximately 1/4 GPM for most applications. For high temperature applications, increase flow.

Rotor and Cover Assembly

1. Install rotors onto shaft splines and secure with retainer washers, lock clips and retainer bolts. Lock bolts with locking clip tab.

2. Insert "O" ring in cover groove.

3. Mount cover over rotor hubs and body dowels. Secure with 8 cap screws.



SECTION X

REFERENCE TABLES AND REPAIR PARTS LISTS

TABLE 1. CLEARANCES

MODEL	A BACK FACE CLEAR.	B ROTOR TO BODY CLEAR.	C FRONT FACE CLEAR.	D WING TO HUB CLEAR.	E HUB TO HUB CLEAR.	F BODY HUB UNDERCUT
25	.003	.002	.003-.004	.0035-.0045	.003-.0045	.003-.0035
55	.004	.003	.005-.006	.005-.006	.0035-.005	.004-.0045
125	.004	.003	.005-.006	.005-.006	.0035-.005	.004-.0045
200	.005	.005	.004-.006	.009-.011	.004-.006	NONE
300	.006	.006	.004-.006	.010-.012	.005-.007	NONE

TABLE 2. TORQUE VALUES — FT-LBS

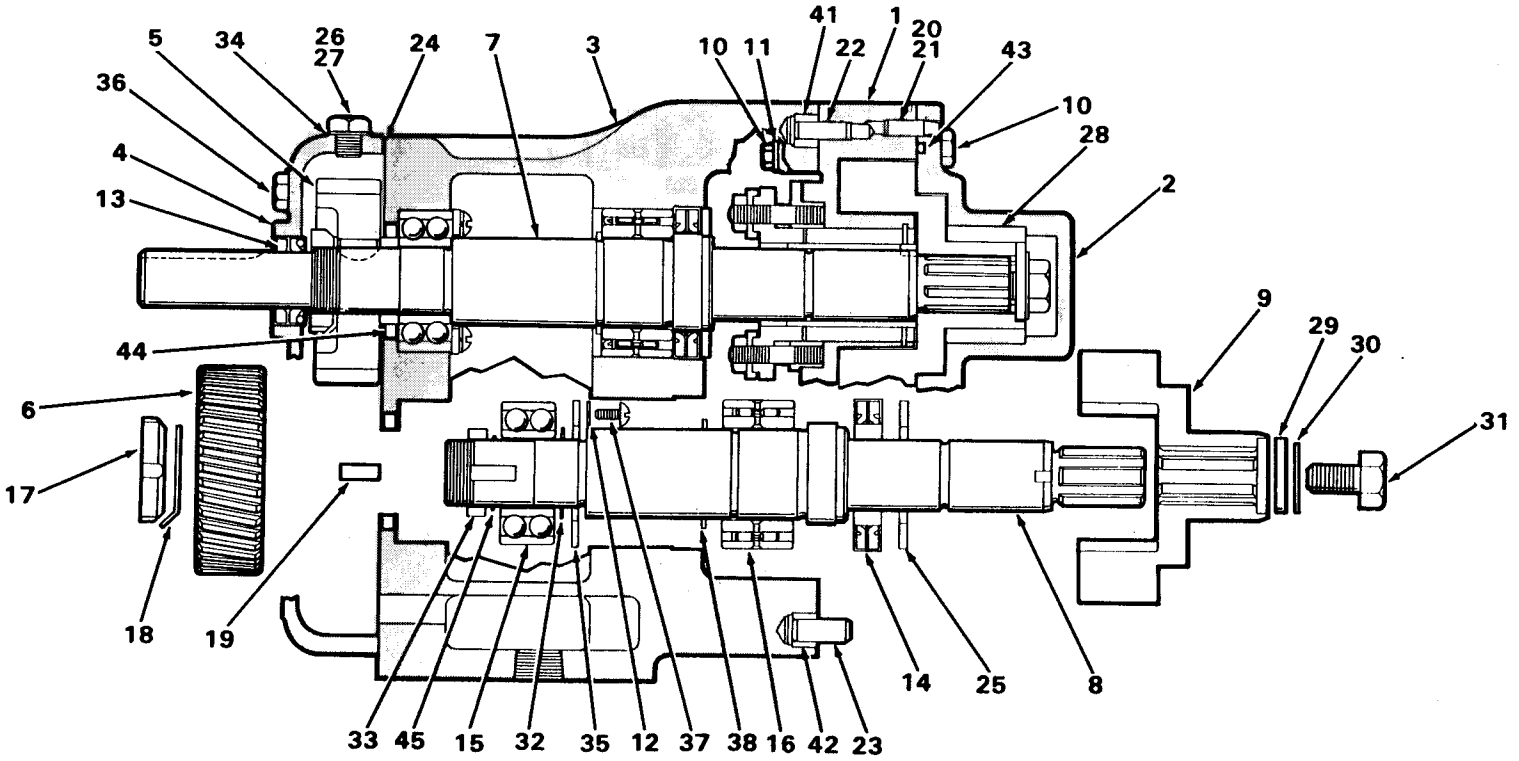
MODEL	LOCK NUT		ROTOR RETAINER
	FRONT BEARING	GEAR	
25	—	100	45
55	—	140	45
125	—	140	45
200	240	230	25
300	360	320	45

TABLE 3. SUGGESTED SHIMS

MODEL	ORIGINAL SHAFT	NEW SHAFT	REC. SHAFT	
			R_1	R_2
25	.016	.010	.080	.060
55	.016	.010	.080	.060
125	.016	.010	.080	.060
200	.106	.100	.220	.200
300	.110	.100	.220	.200

TABLE 4. PRESS REQUIREMENTS — TONS

MODEL	SHAFT		BEARINGS			
			FRONT		REAR	
	IN	OUT	ON	OFF	IN	OUT
25	1/8-1/4	1/4-1/2	1/4-3/4	1/4-1	1/4-3/4	1/4-1
55	1/4-1/2	1/2-1	1-3	3-5	1-3	3-5
125	1/4-1/2	1/2-1	1-3	3-5	1-3	3-5
200	1/4-1/2	1/2-1	3-5	12-15	ON 3-5	OFF 12-15
300	1/4-1/2	1/2-1	3-5	15-20	ON 3-5	OFF 15-20



MODELS 25-I AND 25-DI

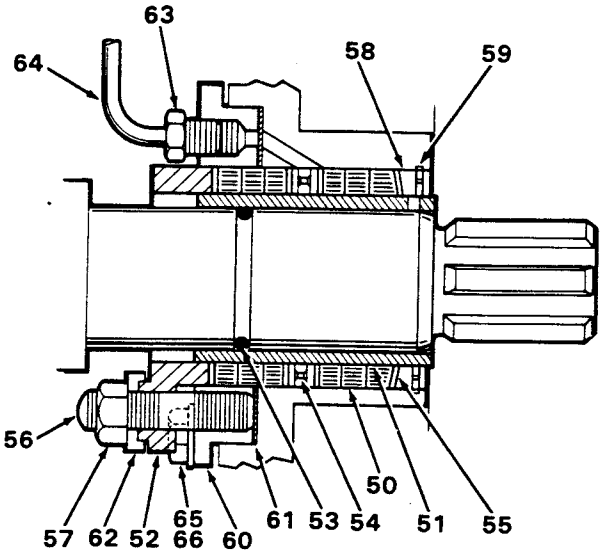
Item	Description	Qty	Part No.
1	Pump Body — I	1	OBI-001-000
	Pump Body — DI — Packing	1	BDI-001-001
	Pump Body — DI — Mech. Seal	1	BDI-001-002
2	Pump Cover — I	1	OBI-002-000
	Pump Cover — DI	1	BDI-002-001
3	Bearing Housing	1	OBI-105-000
4	Housing Cover — Upper	1	BDO-106-U00
	Housing Cover — Lower	1	BDO-106-L00
5	Gear — Drive Shaft	1	OBI-007-H10
6	Gear — Short Shaft	1	OBI-007-H20
7	Drive Shaft — I	1	OBI-008-000
	Drive Shaft — DI — Std.	1	OBI-008-000
	Drive Shaft — Mech.	1	OBI-008-004
8	Short Shaft — I	1	OBI-009-000
	Short Shaft — DI — Std.	1	OBI-009-000
	Short Shaft — Mech.	1	OBI-009-004
9	Rotor — I	2	OBI-010-200
	Rotor — DI	2	OBI-010-700
10	Hex Cap Screw — Cover — I	12	OBI-011-000
	Hex Cap Screw — Cover — DI	12	STD-081-015
11	Lockwasher — I	4	OBI-011-100
	Lockwasher — DI	4	CDO-013-000
12	Lockwasher — Brg. Ret. Plt.	8	BDO-013-000

Item	Description	Qty	Part No.
13	Oil Seal — Gear Cover	1	BDO-030-000
14	Oil Seal, Front Housing	2	BBB-030-100
15	Ball Bearingf — Rear	2	BDO-036-000
16	Roller Bearing — Front	2	OBI-036-300
17	Lock Nut — Gear	2	BDO-036-N00
18	Lockwasher — Gear	2	BDO-036-W00
19	Woodruff Key — Gear	2	BDO-037-000
20	Cover Dowel Pin — Upper	1	BDO-040-000
21	Cover Dowel Pin — Lower	1	BDO-040-100
22	Housing Dowel Pin — Upper	1	BDO-040-200
23	Housing Dowel Pin — Lower	1	BDO-040-300
24	Gasket — Gear Cover	1	BDO-042-000
25	Slinger	2	OBI-045-000
26	Cap Screw — Oil Fill	2	BDO-046-000
27	Cap Screw — Breather	1	BDO-046-100
28	Bushing — Cover Std.	2	OBI-048-000
	Bushing — 88WM	2	OBI-048-W00
29	Rotor Retaining Washer — I	2	OBI-052-A00
	Rotor Retaining Washer — DI	2	OBI-052-D00
30	Rotor Lock Clip — I	2	OBI-052-C00
	Rotor Lock Clip — DI	2	OBI-052-E00
31	Hex Cap Screw — Rotor Ret. — I	2	OCI-052-004
32	Shims (.002 & .006)	As Reqd.	BDO-054-000

Item	Description	Qty	Part No.
33	Spacer	2	BDO-055-000
34	Fiber Washer	3	BDO-065-100
35	Bearing Ret. Plate	2	OBI-080-000
36	Hex Cap Screw — B.H.C.	6	BDO-081-000
37	Screw — Brg. Pet. Plate	8	BDO-083-000
38	Truarc Ring — Ext.	2	BDO-087-R00
39*	Grease Fitting	4	BDO-092-000
40*	Drain Cock	1	ABB-094-000
41	Dowel Bushing — Upper	1	BDO-116-000
42	Dowel Bushing — Lower	1	BDO-116-100
43	O-Ring — Cover Buna N — Std.	1	BDO-117-000
	O-Ring — Cover Silicone	1	BDO-117-SC0
	O-Ring — Cover Viton-A	1	BDO-117-V00
44	Rear Oil Seal — B.H.	2	BDO-119-000
45	Spacer Seal	2	BDO-127-000
	OIL MICRO-PLATE #140		
	1 — Gallon Can		OBI-140-000
	1 — Quart Can		OBI-141-000
	GREASE MICRO-PLATE #2		
	1 — Pound Tube		OBI-142-000

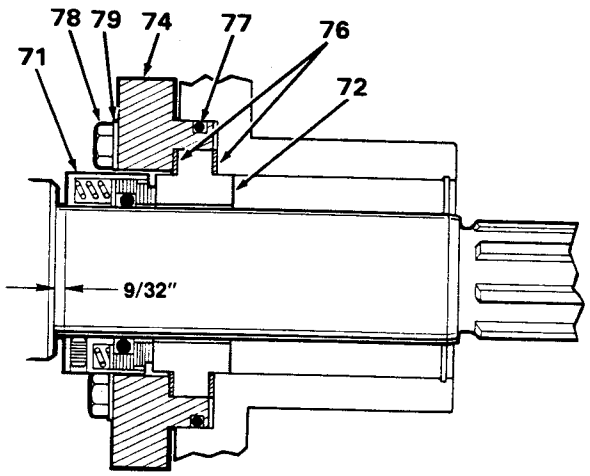
*Not Shown

MODELS 25-I AND 25-DI PACKING AND SEALS

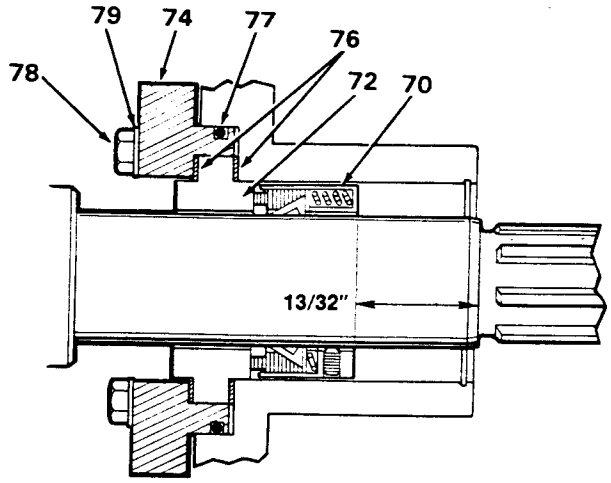


MECHANICAL PACKING

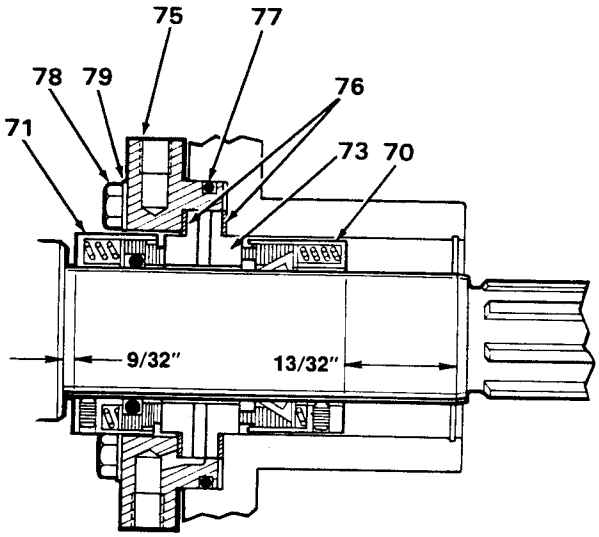
Item	Description	Qty	Part No.
50	Packing	10	OBI-033-000
51	Sleeve — Std.	2	OBI-098-000
	Sleeve — Cer. Coat.	2	OBI-098-001
52	Gland — I	2	OBI-004-000
	Gland — DI	2	BDI-004-001
53	O-Ring — Buna N — Std.	2	OBI-097-000
54	Lantern Ring	2	OBI-047-000
55	Packing Spacer	8	OBI-033-100
56	Stud	4	200-050-000
57	Hex Nut	4	OBI-050-100
58	Retainer Ring	2	OBI-051-000
59	Retainer Spring — I	2	OBI-087-SWO
	Truarc Ring — Int. — DI	2	OBI-087-SWO
60	Gland Insert	2	OBI-050-200
61	Gasket, Insert	2	OBI-043-300
62	Washer Gland	4	OCI-049-000
63	Tube Nut	4	STD-299-002
64	Copper Tube	4	STD-301-002
65	Hex Cap Screw	8	OCI-046-000
66	Lockwasher	8	OCI-013-000



OUTSIDE MECHANICAL SEAL

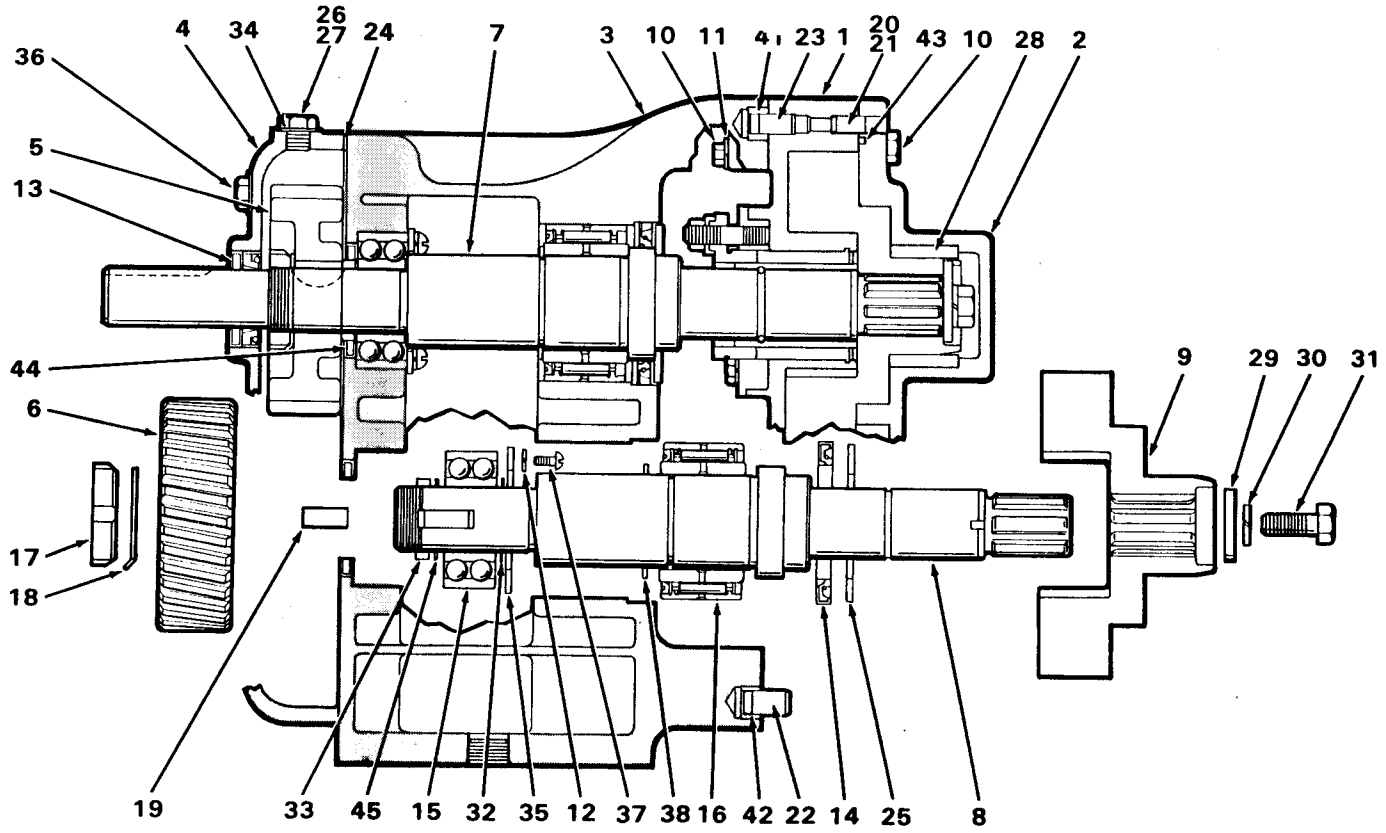


INSIDE MECHANICAL SEAL



INSIDE-OUTSIDE MECHANICAL SEAL

Item	Description	Qty	Part No.
70	Crane #9 — I	2	OBI-114-000
	Crane #1 — DI	2	BBB-114-100
71	Crane #8B2 — I	2	OBI-114-FP0
	Crane #2 — DI	2	OBI-114-100
72	Seal Seat #6 Alloy	2	025-014-011
	Seal Seat Ceramic	2	025-014-012
	Seal Seat Tungsten Carbide	2	025-014-013
73	Seal Seat/Flush #6 Alloy	2	025-014-026
	Seal Seat/Flush Ceramic	2	025-014-027
	Seal Seat/Flush Tungsten Carbide	2	025-014-028
74	Gland	2	OBI-034-001
75	Gland/Flush	2	OBI-034-003
76	Gasket	4	025-042-001
78	Hex Cap Screw	8	000-081-026
79	Lockwasher	8	OCI-013-000



MODELS 55-I AND 55-DI

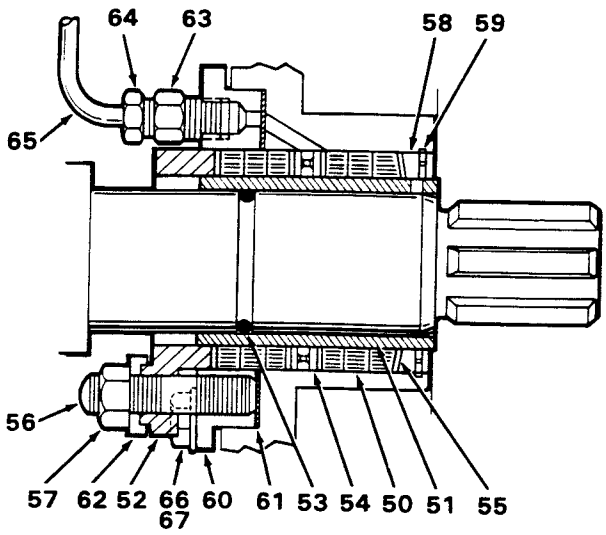
Item	Description	Qty	Part No.
1	Pump Body — I	1	OCI-001-000
	Pump Body — DI-P	1	CDI-001-001
	Pump Body — DI-Mech. Seal	1	CDI-001-002
2	Pump Cover — I	1	OCI-002-000
	Pump Cover — DI	1	CDI-002-001
3	Bearing Housing	1	OCI-105-000
4	Housing Cover — Upper	1	CDO-106-U00
	Housing Cover — Lower	1	CDO-106-L00
5	Gear — Drive Shaft	1	OCI-007-H10
6	Gear — Short Shaft	1	OCI-007-H20
7	Drive Shaft — I	1	OCI-008-000
	Drive Shaft — DI	1	OCI-008-000
	Drive Shaft — Mech.	1	OCI-008-004
8	Short Shaft — I	1	OCI-009-000
	Short Shaft — DI	1	OCI-009-000
	Short Shaft — Mech.	1	OCI-009-004
9	Rotor — I	2	OCI-010-200
	Rotor — DI	2	OCI-010-700
10	Cap Screw — Body & Cover — I	12	OCI-011-000
	Cap Screw — Body & Cover — DI	12	STD-081-022
11	Lockwasher — I	4	OCI-011-100
	Lockwasher — DI	4	CDO-013-000
12	Lockwasher — Brg. Ret. Plt.	8	CDO-013-000
13	Oil Seal — B.H.C.	1	CDO-030-000

Item	Description	Qty	Part No.
14	Oil Seal, Front — B.H.	2	CBB-030-1CC
15	Ball Bearing — Rear	2	CDO-036-000
16	Roller Bearing — Front	2	OCI-036-300
17	Lock Nut — Gear	2	CDO-036-N00
18	Lockwasher — Gear	2	CDO-036-W00
19	Woodruff Key — Gears	2	OCI-037-000
20	Cover Dowel Pin — Upper	1	CDO-040-000
21	Cover Dowel Pin — Lower	1	CDO-040-100
22	Housing Dowel Pin — Lower	1	CDO-040-R10
23	Housing Dowel Pin — Upper	1	CDO-040-R00
24	Gasket — B.H.C.	1	CDO-042-000
25	Slinger	2	OCI-045-000
26	Cap Screw, Oil Level and Drain	2	CDO-046-000
27	Cap Screw — Breather	1	CDO-046-100
28	Carbon Bushing — Cover	2	OCI-048-000
	#88 Bushing — Cover — I	2	OCI-048-W00
29	Rotor Retaining Washer	2	OCI-052-A00
30	Rotor Lock Washer — I	2	OCI-052-100
	Rotor Lock Clip — DI	2	OCI-052-C00
31	Rotor Ret. Cap Screw	2	OCI-052-004
32	Adjusting Shims (.002 & .006)	As Reqd.	CDO-054-000
33	Spacer	2	CDO-055-000
34	Fiber Washer	3	ADO-064-000

Item	Description	Qty	Part No.
35	Bearing Ret. Plate	2	OCI-080-000
36	Cap Screw — B.H.C.	6	CDO-081-000
37	Screw — Brg. Ret. Plate	8	CDO-083-000
38	Truarc Ret. Ring — Ext.	2	OCI-087-A00
39*	Grease Fitting	4	BDO-092-000
40*	Drain Cock	1	ABB 094-000
41	Dowel Bushing — Upper	1	CDO-116-000
42	Dowel Bushing — Lower	1	CDO-116-100
43	O-Ring — Cover Buna N	1	CDO-117-000
	O-Ring — Cover Silicone	1	CDO-117-SC0
	O-Ring — Cover Viton-A	1	CDO-117-V00
44	Rear Oil Seal — B.H.	2	CDO 119-000
45	Spacer Seal	2	CDO-127-000
	OIL MICRO-PLATE #140		OBI-140-000
	1 — Gallon Can		OBI-141-000
	1 — Quart Can		
	GREASE MICRO PLATE #2		OBI-142-000
	1 — Pound Tube		

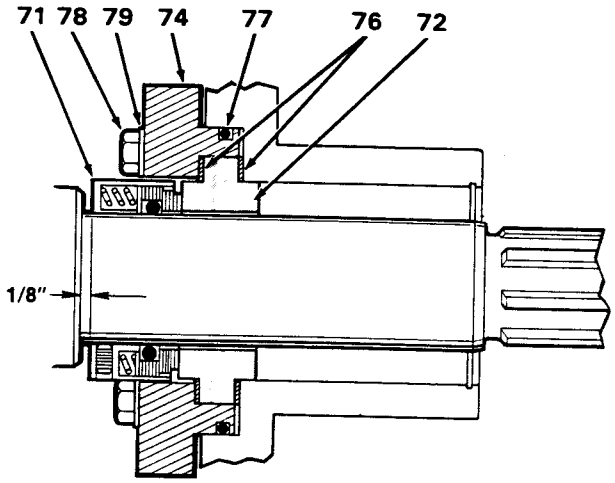
*Not Shown

MODELS 55-I AND 55-DI PACKING AND SEALS

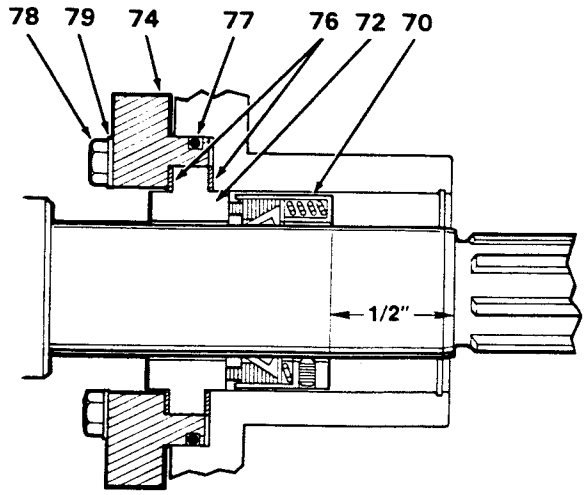


MECHANICAL PACKING

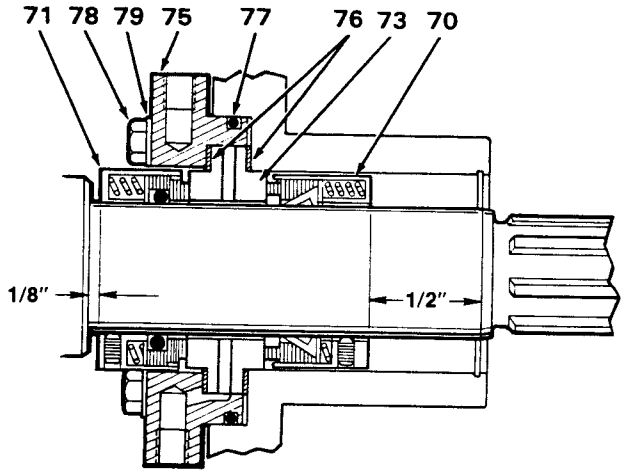
Item	Description	Qty	Part No.
50	Packing	12	OCI-033-000
51	Sleeve — St. St.	2	OCI-098-000
	Sleeve — St. St. Cer. Coat.	2	OCI-098-001
52	Packing Gland — I	2	OCI-004-000
	Packing Gland — DI	2	CDI-004-001
53	O-Ring — Buna N	2	OCI-097-000
54	Lantern Ring	2	OCI-047-000
55	Packing Spacer	8	OCI-033-100
56	Stud	4	OCI-050-000
57	Hex Nut	4	OCI-050-100
58	Retainer Ring	2	OCI-051-000
59	Retainer Spring	2	OCI-087-SW0
60	Gland Insert	2	OCI-050-200
61	Gasket, Insert	2	OCI-043-300
62	Gland Washer	4	OCI-049-000
63	Male Connector	4	STD-299-003
64	Nut	4	STD-299-023
65	Copper Tube	4	STD-301-003
66	Hex Cap Screw	8	OCI-046-000
67	Lockwasher	8	OCI-013-000



OUTSIDE MECHANICAL SEAL

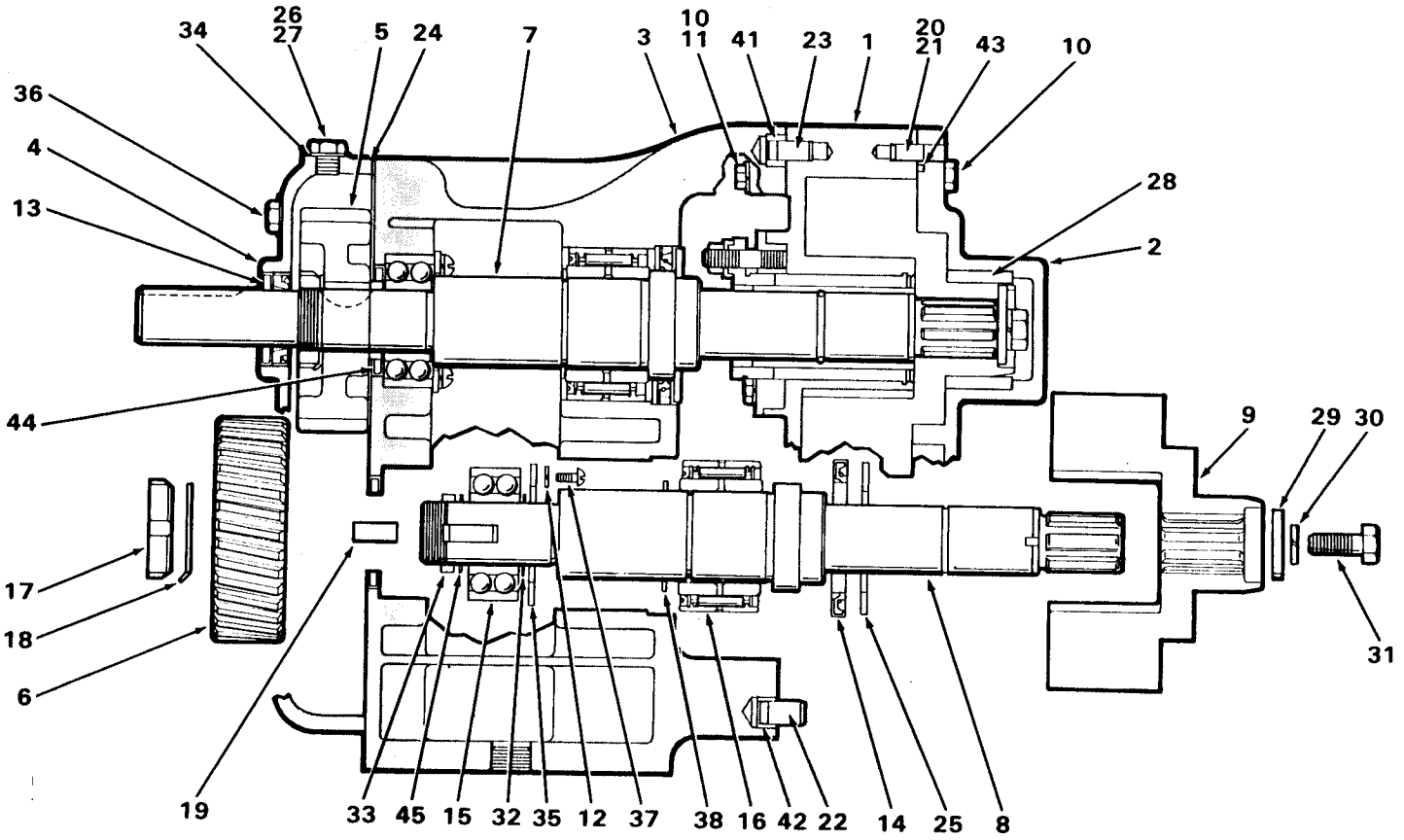


INSIDE MECHANICAL SEAL



INSIDE-OUTSIDE MECHANICAL SEAL

Item	Description	Qty	Part No.
70	Crane #9 — I (Inner)	2	OCI-114-000
	Crane #1 — DI (Inner)	2	CBB-114-CC0
71	Crane #8B2 — I (Outboard)	2	OCI-114-008
	Crane #2 — DI (Outboard)	2	OCI-114-100
72	Seal Seat #6 Alloy	2	055-014-011
	Seal Seat Ceramic	2	055-014-012
	Seal Seat Tungsten Carbide	2	055-014-013
73	Seal Seat/Flush #6 Alloy	2	055-014-026
	Seal Seat/Flush Ceramic	2	055-014-027
	Seal Seat/Flush Tungsten Carbide	2	055-014-028
74	Gland	2	OCI-034-001
75	Gland/Flush	2	OCI-034-003
76	Gasket	4	055-042-001
78	Hex Cap Screw	8	000-081-026
79	Lockwasher	8	OCI-013-000



MODELS 125-I AND 125-DI

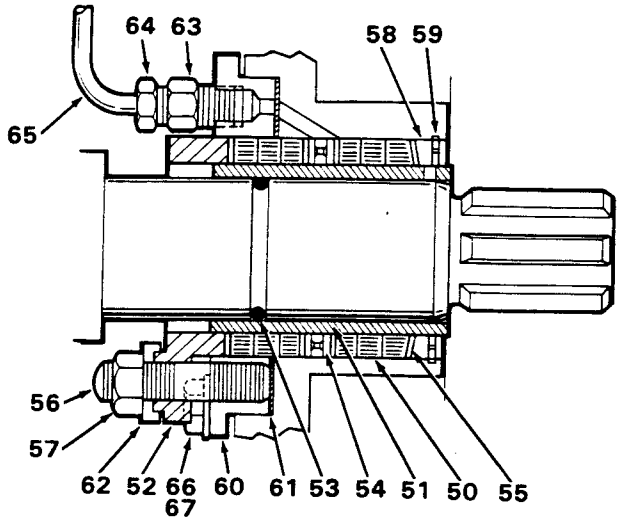
Item	Description	Qty	Part No.
1	Pump Body — I	1	OEI-001-000
	Pump Body — DI-P	1	EDI-001-001
	Pump Body — DI-Mech. Seal	1	EDI-001-002
2	Pump Cover — I	1	OCI-002-000
	Pump Cover — DI	1	CDI-002-001
3	Bearing Housing	1	OCI-105-000
4	Housing Cover — Upper	1	CDO-106-U00
	Housing Cover — Lower	1	CDO-106-L00
5	Gear — Drive Shaft	1	OCI-007-H10
6	Gear — Short Shaft	1	OCI-007-H20
7	Drive Shaft — I	1	OEI-008-000
	Drive Shaft — DI	1	OEI-008-000
	Drive Shaft — Mech.	1	OEI-008-004
8	Short Shaft — I	1	OEI-009-000
	Short Shaft — DI	1	OEI-009-000
	Short Shaft — Mech.	1	OEI-009-004
9	Rotor — I	2	OEI-010-200
	Rotor — DI	2	OEI-010-700
10	Hex Cap Screw — I	12	OCI-011-000
	Hex Cap Screw — DI	12	STD-081-022
11	Lockwasher — I	4	OCI-011-100
	Lockwasher — DI	4	CDO-013-000
12	Lockwasher — Brg. Ret. Plt.	8	CDO-013-000

Item	Description	Qty	Part No.
13	Oil Seal — B.H.C.	1	CDO-030-000
14	Oil Seal, Front — B.H.	2	CBB-030-ICC
15	Ball Bearing — Rear	2	CDO-036-000
16	Roller Bearing — Front	2	OCI-036-300
17	Lock Nut — Gear	2	CDO-036-N00
18	Lockwasher — Gear	2	CDO-036-W00
19	Woodruff Key — Gear	2	OCI-037-000
20	Cover Dowel Pin — Upper	1	CDO-040-000
21	Cover Dowel Pin — Lower	1	CDO-040-100
22	Housing Dowel Pin — Lower	1	CDO-040-R10
23	Housing Dowel Pin — Upper	1	CDO-040-R00
24	Gasket — B.H.C.	1	CDO-042-000
25	Slinger	2	OCI-045-000
26	Cap Screw, Oil Fill and Drain	2	CDO-046-000
27	Cap Screw — Breather	1	CDO-046-100
28	Carbon Bushing	2	OCI-048-000
	#88 Bushing	2	OCI-048-W00
29	Rotor Retaining Washer	2	OCI-052-A00
30	Rotor Lock Washer — I	2	OCI-052-100
	Rotor Lock Clip — DI	2	OCI-052-C00
31	Rotor Ret. Cap Screw	2	OCI-052-004
32	Adjusting Shims (.002 & .006)	As Reqd.	CDO-054-000

Item	Description	Qty	Part No.
33	Spacer	2	CDO-055-000
34	Fiber Washer	3	ADO-064-000
35	Bearing Ret. Plate	2	OCI-080-000
36	Cap Screw — B.H.C.	6	OCI-081-000
37	Screw — Brg. Ret. Plate	8	CDO-083-000
38	Truarc Ext.	2	OCI-087-R00
39*	Grease Fitting	4	BDO 092 000
40*	Drain Cock	1	ABB-094-000
41	Dowel Bushing — Upper	1	CDO-116-000
42	Dowel Bushing — Lower	1	CDO-116-100
43	O-Ring — Cover Buna N	1	CDO-117-000
	O-Ring — Cover Silicone	1	CDO-117-SC0
	O-Ring — Cover Viton A	1	CDO-117-V00
44	Rear Oil Seal — B.H.	2	CDO-119-000
45	Spacer Seal	2	CDO-127-000
	OIL MICRO-PLATE #140		
	1 — Gallon Can		OBI-140-000
	1 — Quart Can		OBI-141-000
	GREASE MICRO-PLATE #2		
	1 — Pound Tube		OBI-142-000

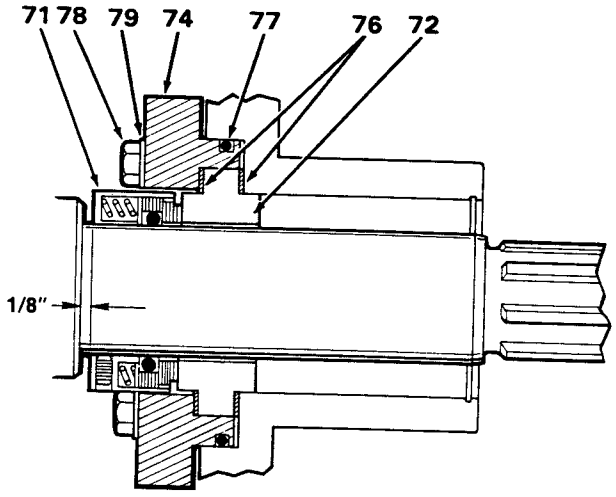
*Not Shown

MODELS 125-I AND 125-DI PACKING AND SEALS

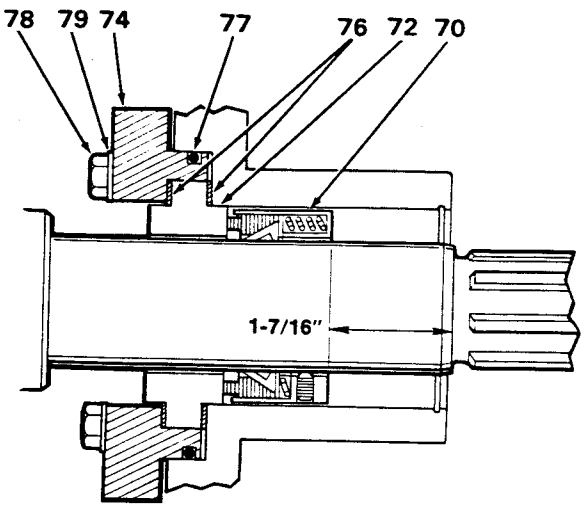


MECHANICAL PACKING

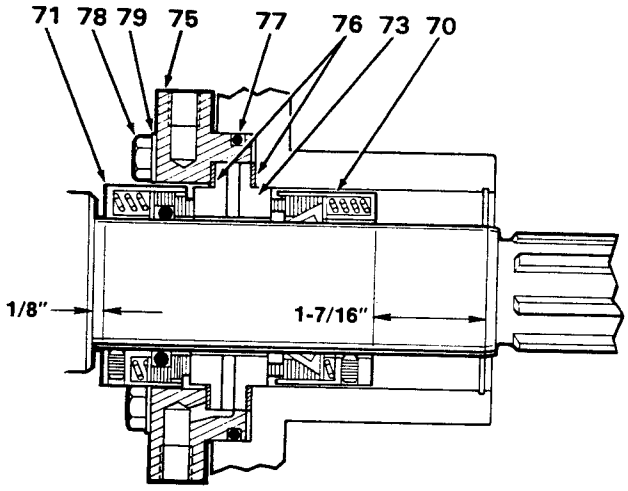
Item	Description	Qty	Part No.
50	Packing	12	OCI-033-000
51	Sleeve	2	OEI-098-000
	Sleeve — Cer. Coat.	2	OEI-098-001
52	Gland — I	2	OCI-004-000
	Gland — DI	2	CDI-004-001
53	O-Ring Shaft — Buna N	2	OCI-097-000
54	Lantern Ring	2	OEI-047-000
55	Packing Spacer	8	OCI-033-100
56	Stud	4	OCI-050-000
57	Hex Nut	4	OCI-050-100
58	Retaining Ring	2	OCI-051-000
59	Retaining Spring	2	OCI-087-SWO
60	Gland Insert	2	OCI-050-200
61	Gasket	2	OCI-043-300
62	Gland Washer	4	OCI-049-000
63	Male Connector	4	STD-299-003
64	Nut	4	STD-299-023
65	Copper Tube	4	STD-301-003
66	Hex Cap Screw	8	OCI-046-000
67	Lockwasher	8	OCI-013-000



OUTSIDE MECHANICAL SEAL

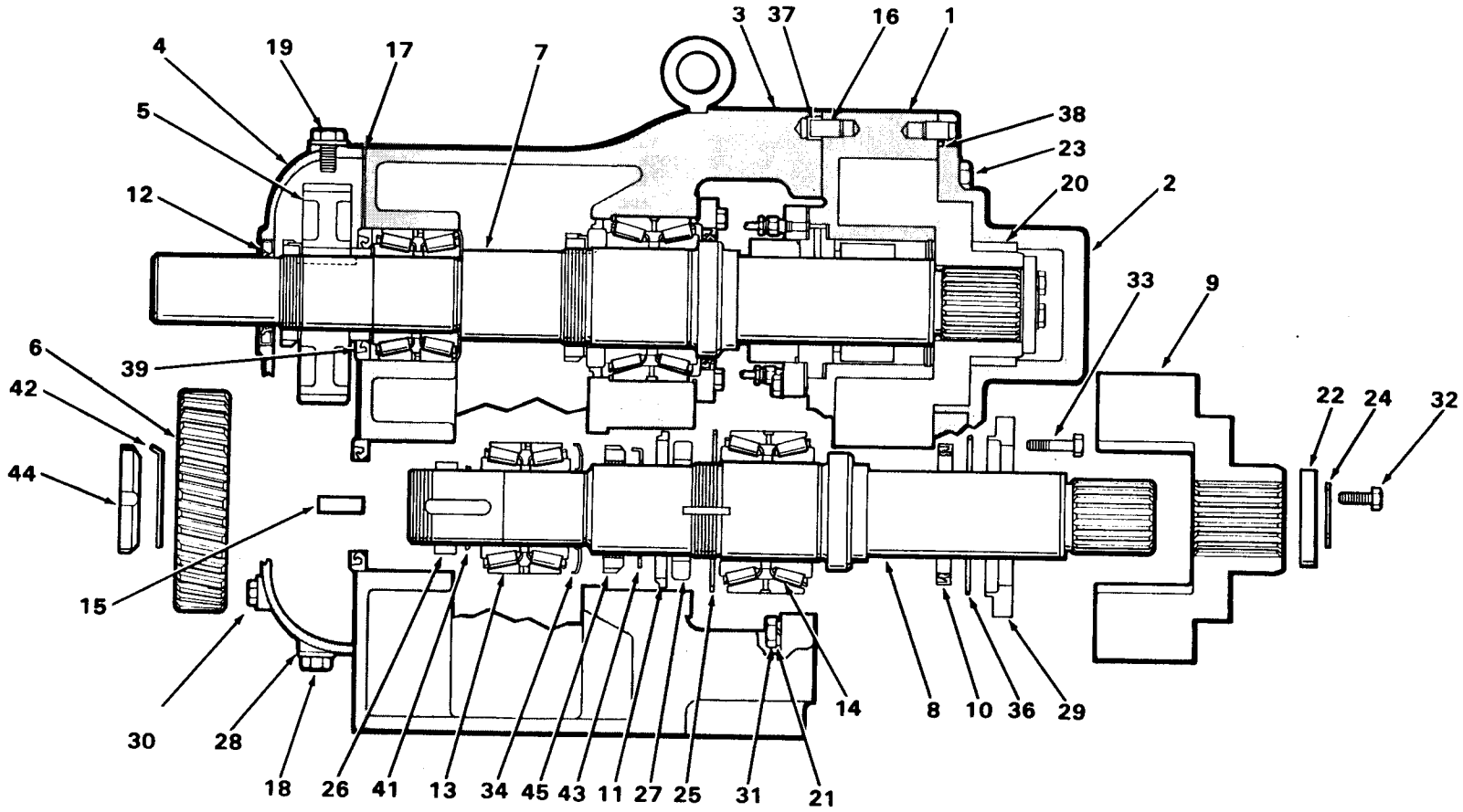


INSIDE MECHANICAL SEAL



INSIDE-OUTSIDE MECHANICAL SEAL

Item	Description	Qty	Part No.
70	Crane #9 — I	2	OCI-114-000
	Crane #1 — DI	2	OEI-114-001
71	Crane #8B2 — I	2	OCI-114-008
	Crane #2 — DI	2	OCI-114-100
72	Seal Seat #6 Alloy	2	055-014-011
	Seal Seat Ceramic	2	055-014-012
	Seal Seat Tungsten Carbide	2	055-014-013
73	Seal Seat/Flush #6 Alloy	2	055-014-026
	Seal Seat/Flush Ceramic	2	055-014-027
	Seal Seat/Flush Tungsten Carbide	2	055-014-028
74	Gland	2	OCI-034-001
75	Gland/Flush	2	OCI-034-003
76	Gasket	4	055-042-001
78	Hex Cap Screw	8	000-081-026
79	Lockwasher	8	OCI-013-000



MODELS 200-I AND 201-DI

Item	Description	Qty	Part No.
1	Pump Body — I-Mech.	1	200-001-000
	Pump Body — I-Pack.	1	200-001-001
	Pump Body — DI-Mech.	1	201-001-000
	Pump Body — DI-Pack.	1	201-001-001
2	Pump Cover — I	1	200-002-000
	Pump Cover — DI	1	201-002-000
3	Bearing Housing	1	200-105-001
4	Housing Cover	1	200-106-000
5	Gear — Drive	1	200-007-001
6	Gear — Driven	1	200-007-002
7	Drive Shaft — Mech.	1	200-008-000
	Drive Shaft — Pack.	1	200-008-006
8	Short Shaft — Mech.	1	200-009-000
	Short Shaft — Pack.	1	200-009-006
9	Rotor — Twin Blade — I	2	200-010-000
	Rotor — Twin Blade — DI	2	201-010-000
10	Grease Seal	2	STD-030-002
11	Oil Seal — Front	2	STD-030-005
12	Oil Seal — B.H.C.	1	STD-030-006
13	Rear Bearing	2	200-035-000
14	Front Bearing	2	200-036-000

Item	Description	Qty	Part No.
15	Key — Gear	2	200-037-000
16	Dowel Pin	4	CDO-040-R10
17	Gasket — B.H.	1	GDO-042-SM0
18	Screw — Oil Drain and Level	3	CDO-046-000
19	Hex Cap Screw — Breather	1	CDO-046-100
20	Rotor Bearing	2	200-048-000
21	Lockwasher	4	OCI-052-100
22	Rotor Retaining Washer	2	200-052-000
23	Hex Cap Screw	8	OCI-052-004
24	Lock Clip	2	200-053-000
25	Shim Pak	4	220-054-000
26	Spacer — Gear	2	200-055-000
27	Spacer — Front Brg.	2	200-055-001
28	Fiber Washer	4	ADO-064-000
29	Retainer — Front Brg.	2	220-080-000
30	Hex Hd. Cap Screw	6	GDO-081-000
31	Hex Hd. Cap Screw	4	STD-081-008
32	Hex Hd. Cap Screw	6	STD-081-014
33	Hed Hd. Cap Screw	8	STD-081-022
34	Grease Retainer	2	STD-091-001
35*	Grease Fitting	4	BDO-092-000

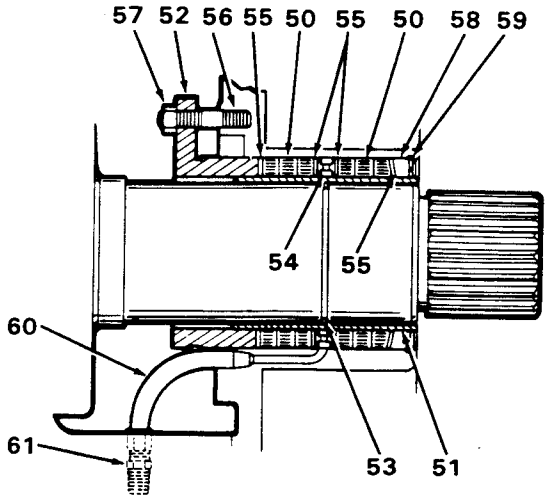
Item	Description	Qty	Part No.
36	O-Ring	2	B70-137-047
37	Dowel Bushing	2	CDO-116-100
38	O-Ring Cover Buna N	1	GDO-117-000
	O-Ring Cover Silicone	1	GDO-117-SC0
	O-Ring Cover Viton-A	1	GDO 117-V00
39	Oil Seal	2	STD-119-002
40*	Cleanout Plug — Plastic	1	BDO-121-100
41	Spacer Seal	2	200-127-000
42	Lockwasher — Gear Nut	2	STD-136-011
43	Lockwasher — Front Brg.	2	STD-136-014
44	Lock Nut — Gear	2	STD-236-011
45	Lock Nut — Front Brg.	2	STD-236-014

OIL MICRO-PLATE #140
1 — Gallon Can OBI-140-000
1 — Quart Can OBI-141-000

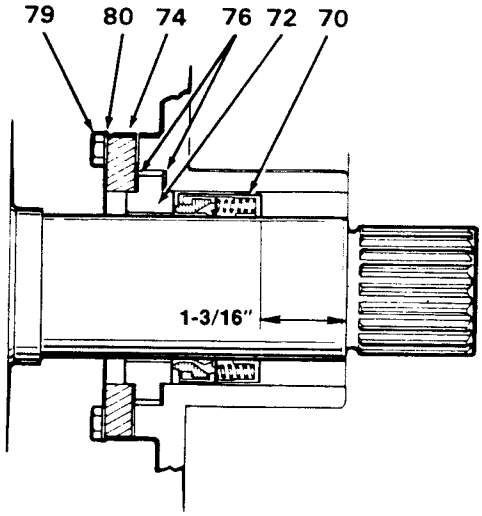
GREASE MICRO-PLATE #2
1 — Pound Tube OBI-142-000

*Not Shown

MODELS 200-I AND 201-DI - PACKING AND SEALS

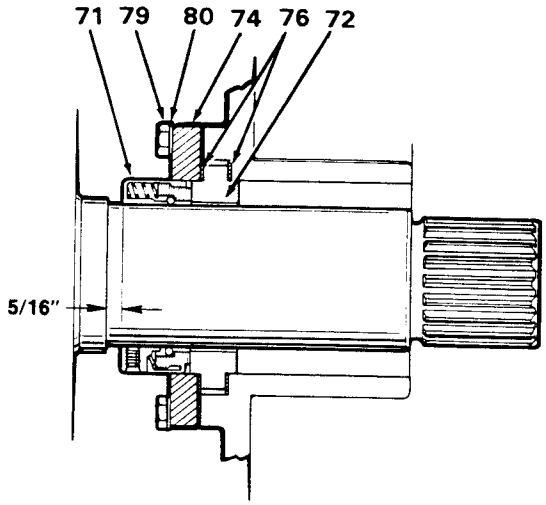


MECHANICAL PACKING

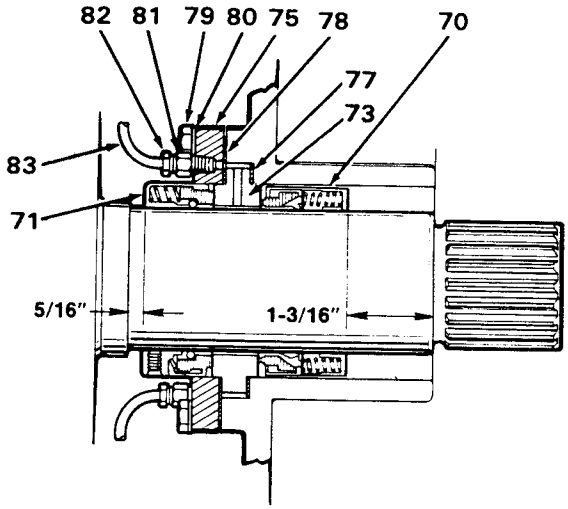


INSIDE MECHANICAL SEAL

Item	Description	Qty	Part No.
50	Packing	8	200-033-000
51	Sleeve	2	200-098-000
	Sleeve — Ceramic Coated	2	200-098-003
42	Gland	2	200-004-000
53	O-Ring — Shaft Buna N	2	B70-137-140
54	Lantern Ring	2	200-047-000
55	Packing Spacer	8	200-032-000
56	Stud	4	200-050-000
57	Hex Nut	4	OBI-050-100
58	Retaining Ring	2	200-051-000
59	Retaining Spring	2	200-087-000
60	Flushing Tube	4	200-317-000
61	Male Connector	4	000-299-032

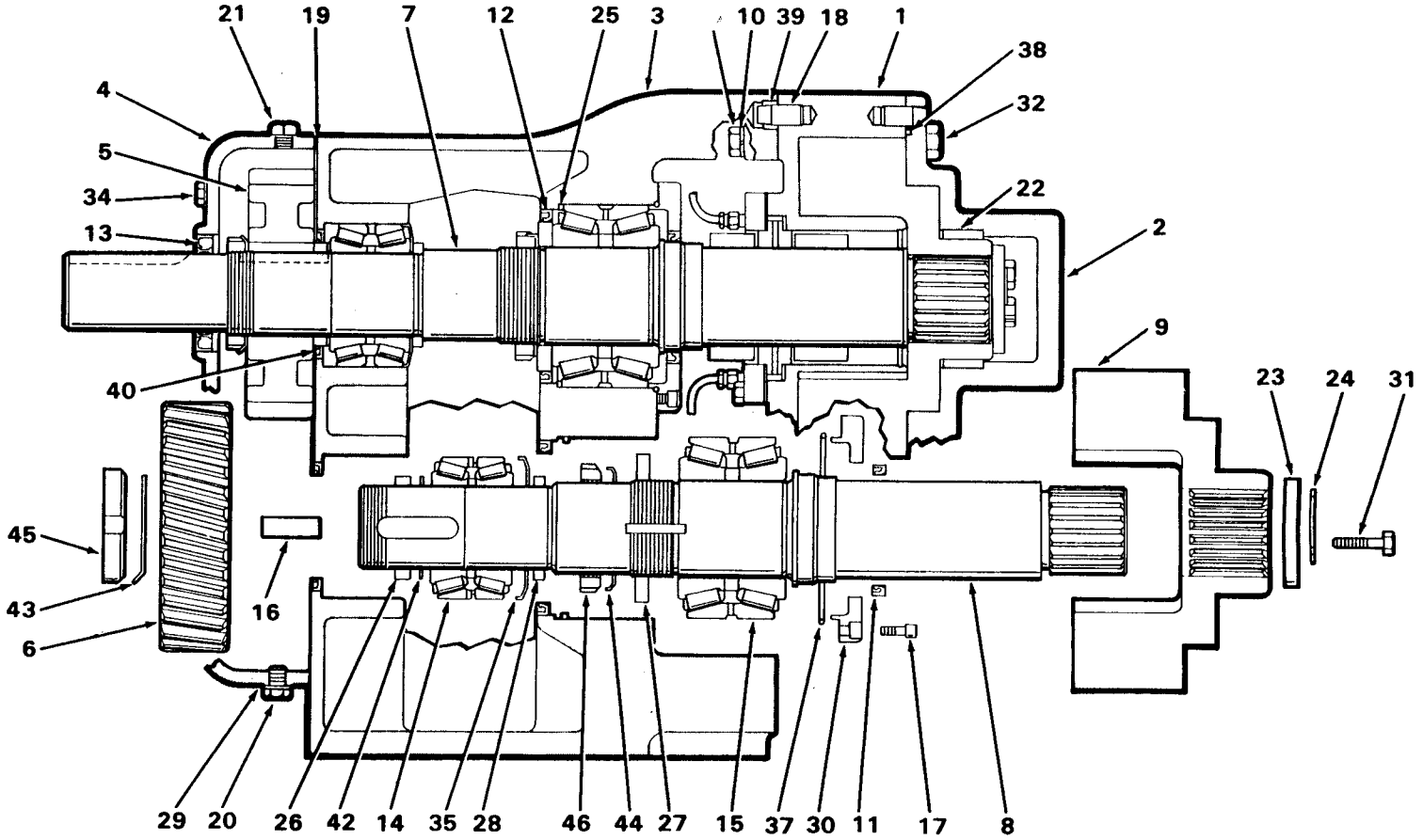


OUTSIDE MECHANICAL SEAL



INSIDE-OUTSIDE MECHANICAL SEAL

Item	Description	Qty	Part No.
70	Crane #9 — I	2	200-114-000
	Craane #1 — DI	2	201-114-000
71	Crane #8B2 — Outside	2	200-114-002
72	Seal Seat #6 Alloy	2	200-014-011
	Seal Seat Ceramic	2	200-014-012
	Seal Seat Tungsten Carbide	2	200-014-013
73	Seal Seat/Flush #6 Alloy	2	200-014-026
	Seal Seat/Flush Ceramic	2	200-014-027
	Seal Seat/Flush Tungsten Carbide	2	200-014-028
74	Gland	2	200-034-000
75	Gland/Flush	2	200-034-001
76	Gasket	4	200-042-001
77	Gasket/Flush — Inner	2	200-042-001
78	Gasket/Flush — Outer	2	200-042-002
79	Hex Cap Screw	8	OBI-011-000
80	Lockwasher	8	OBI-011-100
81	Male Connector	4	STD-299-003
82	Nut	4	STD-299-023
83	Copper Tube	4	STD-301-003



MODELS 300-I AND 301-DI

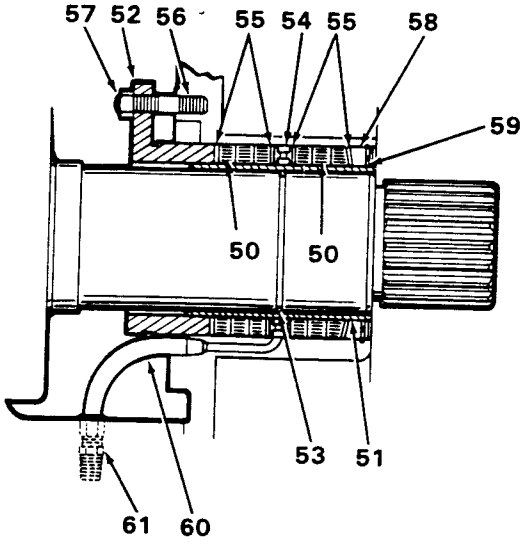
Item	Description	Qty	Part No.
1	Pump Body — I Mech.	1	OHI-001-000
	Pump Body — DI Mech.	1	301-001-000
	Pump Body — I San.	1	OHI-001-003
	Pump Body — DI Pack.	1	301-001-001
2	Pump Cover — I	1	OHI-002-000
	Pump Cover — DI	1	301-002-000
	Pump Cover — I San.	1	OHI-002-002
3	Bearing Housing	1	OHI-105-000
4	Housing Cover	1	OHI-106-000
5	Gear — Drive Shaft	1	OHI-007-001
6	Gear — Short Shaft	1	OHI-007-002
7	Drive Shaft — I — Mech. Seal	1	OHI-008-000
	Drive Shaft — DI — Mech. Seal	1	OHI-008-000
	Drive Shaft — I San.	1	OHI-008-002
	Drive Shaft — I — Pack.	1	OHI-008-006
	Drive Shaft — DI — Pack.	1	OHI-008-006
8	Short Shaft — I Mech. Seal	1	OHI-009-000
	Short Shaft — DI — Mech. Seal	1	OHI-009-000
	Short Shaft — I San.	1	OHI-009-002
	Short Shaft — I Pack.	1	OHI-009-006
	Short Shaft — DI — Pack.	1	OHI-009-006
9	Rotor — Twin Blade — I	2	OHI-010-200
	Rotor — Twin Blade — DI	2	301-010-000
10	Lockwasher	4	STD-013-010

Item	Description	Qty	Part No.
11	Grease Seal — Front Ret.	2	STD-030-002
12	Grease Seal — Front B.H.	2	STD-030-003
13	Oil Seal — B.H.C.	1	STD-030-004
14	Bearing — Rear	2	OHI-036-000
15	Bearing — Front	2	OHI-036-003
16	Key — Gear	2	OHI-037-000
17	Soc. Cap Screw	8	STD-039-000
18	Dowel Pin	4	OHI-040-000
19	Gasket — B.H.C.	1	OHI-042-000
20	Screw — Oil Drain and Level	3	CDO-046-000
21	Hex Cap Screw — Breather	1	CDO-046-100
22	Carbon Bushing — Cover	2	OHI-048-000
23	Rotor Retaining Washer	2	OHI-052-000
24	Lock Clip	2	OHI-053-000
25	Bearing Shim	2	OHI-054-000
26	Gear Spacer	2	OHI-055-000
27	Spacer — Front Brg.	2	OHI-055-001
28	Spacer — Rear Brg.	2	OHI-055-002
29	Fiber Washer	4	ADO-064-000
30	Bearing Retainer — Front	2	OHI-080-000
31	Hex Cap Screw	6	STD-081-008
32	Hex Cap Screw — I	8	STD-081-009
	Hex Cap Screw — DI	8	000-081-031
33	Hex Cap Screw — I	4	STD-081-010

Item	Description	Qty	Part No.
	Hex Cap Screw — DI	4	000-081-030
34	Hex Cap Screw	6	STD-081-012
35	Grease Retainer	2	STD-091-000
36*	Grease Fitting	4	BDO-092-000
37	O-Ring — Brg. Ret.	2	B70-137-050
38	O-Ring — Cover	1	B70-137-280
39	Dowel Bushing	2	OHI-116-000
40	Oil Seal	2	STD-119-000
41*	Clean Out Plug — Plastic	1	BDO-121-100
42	Spacer Seal — Rear Brg.	2	OHI-127-000
43	Lockwasher — Gear	2	OHI-136-000
44	Lockwasher — Front Brg.	2	OHI-136-001
45	Lock Nut — Gear	2	OHI-236-000
46	Lock Nut — Front Brg.	2	OHI-236-001
	OIL MICRO PLATE #140		
	1 — Gallon		OBI-140-00
	1 — Quart		OBI-141-000
	GREASE MICRO PLATE #2		
	1 — Pound Tube		OBI 142-000

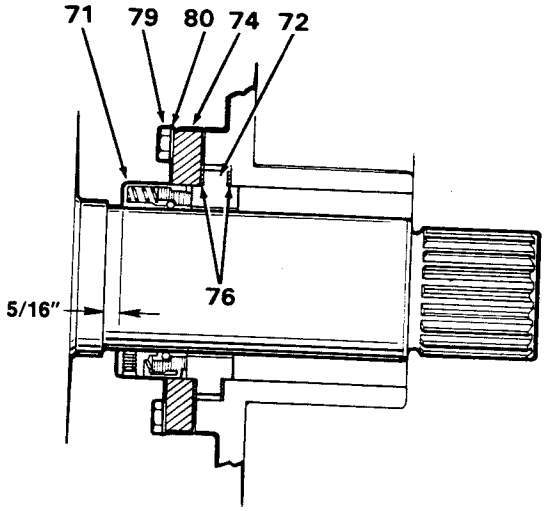
*Not Shown

MODELS 300-I AND 301-DI PACKING AND SEALS

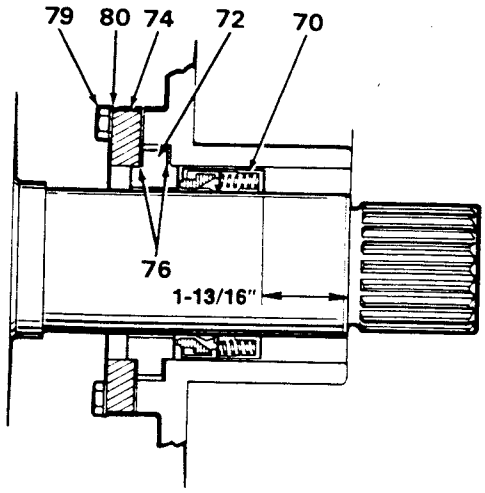


MECHANICAL PACKING

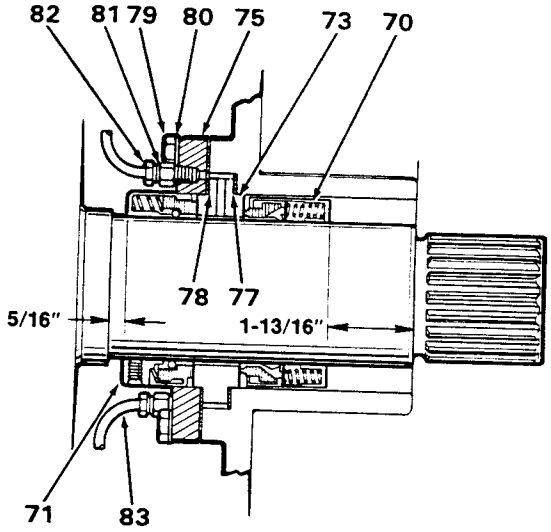
Item	Description	Qty	Part No.
50	Packing	12	300-033-000
51	Sleeve	2	300-098-000
	Sleeve — Ceramic Coated	2	300-098-003
52	Gland	2	300-004-000
53	O-Ring — Shaft Buna N	2	B70-137-149
54	Lantern Ring	2	300-047-000
55	Spacer	8	300-032-000
56	Stud	4	OCI-050-000
57	Hex Nut	4	OCI-050-100
58	Retainer Ring	2	300-051-000
59	Retaining Spring	2	300-087-000
60	Flushing Tube	4	200-317-000
61	Male Connector	4	000-299-032



OUTSIDE MECHANICAL SEAL



INSIDE MECHANICAL SEAL



INSIDE-OUTSIDE MECHANICAL SEAL

Item	Description	Qty	Part No.
70	Crane #9	2	300-114-000
71	Crane #8B2	2	300-114-002
72	Seal Seat #6 Alloy	2	300-014-011
	Seal Seat Ceramic	2	300-014-012
	Seal Seat Tungsten Carbide	2	300-014-013
73	Seal Seat/Flush #6 Alloy	2	300-014-026
	Seal Seat/Flush Ceramic	2	300-014-027
	Seal Seat/Flush Tungsten Carbide	2	300-014-028
74	Gland	2	300-034-000
75	Gland/Flush	2	300-034-001
76	Gasket	4	300-042-001
77	Gasket — Inner	2	300-042-001
78	Gasket — Outer	2	300-042-002
79	Hex Cap Screw	8	OCI-011-000
80	Lockwasher	8	OCI-011-100
81	Male Conn.	4	STD-299-003
82	Nut	4	STD-299-023
83	Copper Tube	4	STD-301-003

NOTES

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MM609

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