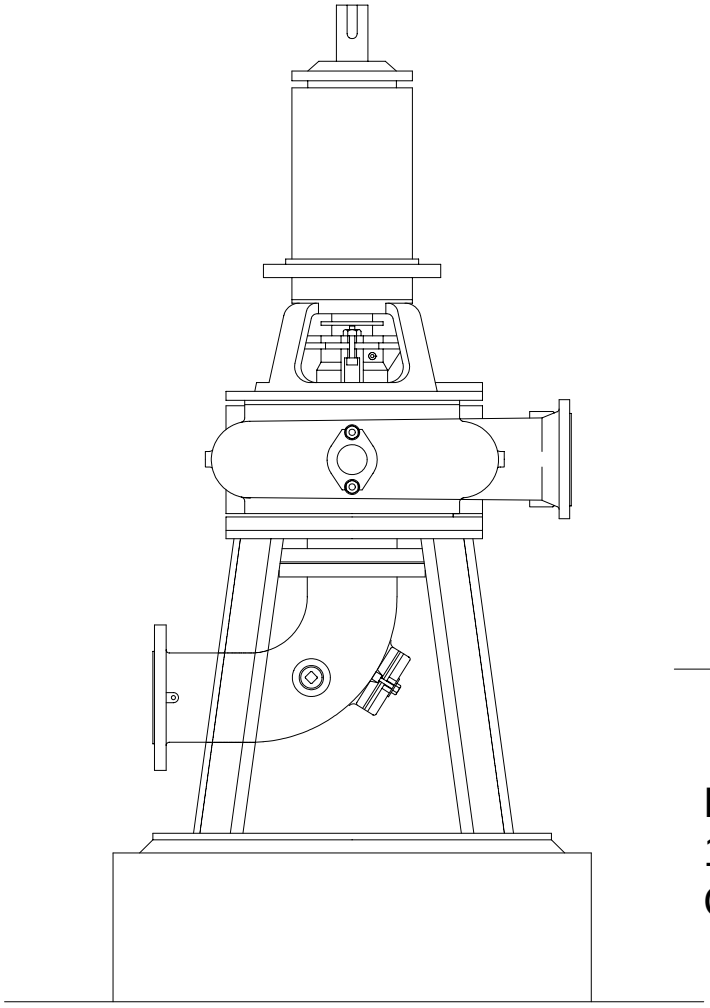
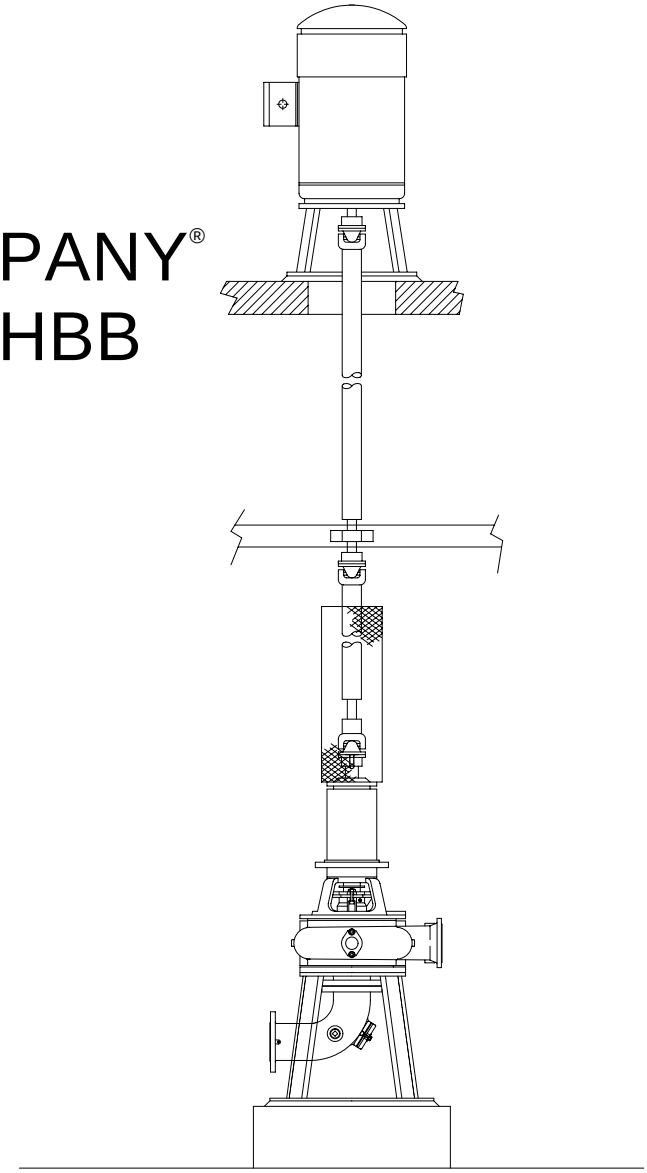
CHICAGO PUMPCOMPANY®
Type VOS, VPM and HBB
Non-Clog Pumps





Frames: 64154A Thru 1412226,
OS8-4A, OSC10-4A, LS8-4A

SERVICE INSTRUCTIONS MANUAL

TABLE OF CONTENTS

UPON RECEIPT OF PUMP EQUIPMENT:

Check carefully to see that all equipment has been received and is in good condition. Immediately report any shortage or damage to the transportation company handling the shipment noting the extent of damage and/or shortage on the freight bill and bill of lading. Do not leave the unit exposed to construction or weather hazards where pump may be damaged mechanically or motor and ball bearings become wet. This pump is well designed; skillfully built and rugged, but must be given the same careful attention that is accorded any precision machine.

NOTE: If the pump is to be stored for a prolonged period before installation, rotate the pump shaft manually every two weeks until the unit is placed in operation.

INSTALLATION

LOCATION:

Both pump and motor should be located in a clean drained area where they are accessible for installation, inspection and maintenance. This location should be dry and well ventilated. Overhead room and facilities must allow for installing and removing the pump or motor for repairs.

PUMP FOUNDATIONS:

For permanence and quiet operation, it is important that the pump be firmly bolted down. Fig. 2 (page 2) illustrates the generally accepted method of anchorage. This system traps the bolt for anchorage, at the same time permits the bolt to move within the sleeve for aligning with the holes in the pump base. The bolts are fastened to a template form, usually made of wood and spaced to conform accurately with the pedestal anchor bolt holes. The form is carefully located so that the pump will stand exactly in its specified position as to elevation, shaft plumb, and suction-discharge pipe connections; then the concrete is poured. Before fis ing foundation bolt into the form, plug, top and bottom of the sleeves with oakum as illustrated, and be certain that sleeves are held rigidly against square plates.

This permits the bolts to be adjusted slightly after concrete has set allowing the bolts to conform accurately to pedestal boltholes. This prevents strains or difficulties arising from slight dimensional discrepancies. Pipe sleeve should be about two and one half diameters larger than the bolts used, and the bolts must be long enough to permit the pump to be raised 1" for grouting. If a raised foundation is desired, it should be at least sis inches greater in length and width than the base of the pump pedestal and at least deep enough to "bury" the recommended anchorage. It should never be superficially poured over a smooth concrete floor but should be rooted by one of the following means: (a) when the concrete is newly poured, cast a shallow depression in the floor using a box form, or (b) leave reinforcement bars protruding above the floor level, (c) gouge out holes in an existing concrete floor.

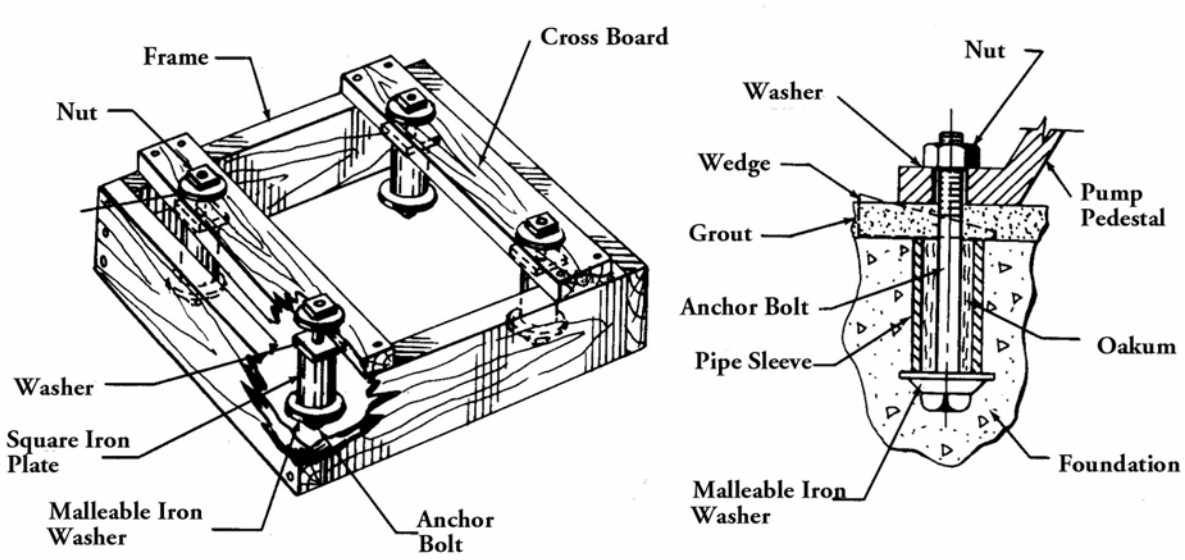


Figure 2 – A Recommended System of Foundation Construction

SETTING THE PUMP:

Set pump on the foundation over the anchor bolts, but do not bolt down. Raise the pump unit 1" and level carefully for grouting by driving wedges under the pedestal. For leveling pump, place level on face of pump coupling half and face of pump discharge flange.

GROUTING THE PUMP:

After pump is raised and leveled, pour a good quality grout under the pedestal and allow it to set; to prevent distortion, do not tighten down the nuts on the foundation bolts until the grout has properly hardened. When the pump is correctly installed, bring the suction and discharge piping to the pump connections; never force pump connections to install piping.

It is important that grouting underneath the base of a horizontal pump be carried out by pouring concrete into the large opening in the center of all pump bases, otherwise the procedure is similar to the description given above for the vertical units.

PIPING:

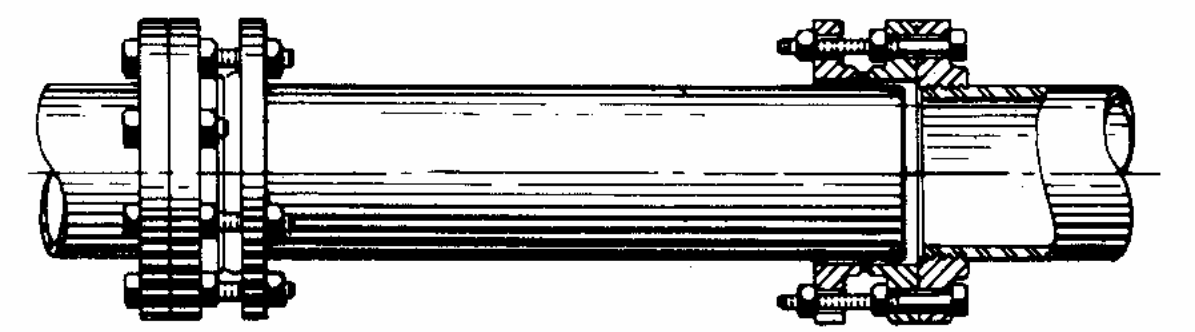
To obtain a well-designed pipe system, note the following piping recommendations:

1. Make pipe connections to the pump so that there is no pipe strain upon the unit. Support the weight of piping on suitable concrete piers or on supporting pipes with flanged feet.
2. When running a pipe through a concrete wall, leave a generous, grooved, square hole and grout the pipe in only after the pump unit is set and all final connections have been made.
3. Suction and discharge pipelines should not be smaller than the connections on the pump; it is preferred that they should be at least a pipe size or two larger.
4. In the suction pipeline include a gate valve near the pump, and employ flexible pipe connections (see Fig. 3) for ease in making final connections and to prevent pipe strain due to settling of concrete.
   NOTE: The gate valve's weight might produce a strain on the suction piping and therefore, the suction piping should be supported on concrete piers, support pipes or hangers.
5. On the discharge line, include a suitable swing check valve and a gate valve near the pump.
   NOTE: It is common practice, where horizontal space does **not permit,** to mount swing check valve in a vertical position.
6. On vertical units install a drain pipe from the connection at packing box drip pocket to the sump line. To be readily cleanable, include a union in the line near the pump; also, tees with plugs should be used rather than elbows.

TO INSTALL UNIVERSAL JOINT SHAFTING:

When installing extended shafting with universal joints, always place the section with the slip spline end (at the bottom), with spline next to the pump. When more than one section is provided, the order of connection is evident from the connection fittings provided and from the installation drawing; the opposite shafting ends are fis ed to the pump and motor shafts by means of keyed couplings held with set screws. Connect the shaft sections and align them approximately, fixing the shafting temporarily but firmly to the bearing support beams by clamping the intermediate guide or steady bearings to the beams with a sufficient number of "C" clamps. Caution! One side of the intermediate bearing housing has a drilled drainage hole. Be sure when installing that this bearing is installed properly to provide drainage of topside of bearing. When all sections are joined, align each section separately with a level as accurately as possible, starting from the bottom and using metal shims behind the steady bearings where necessary. Although universal joints will compensate for considerable misalignment, for maximum efficiency, shafting manufacture recommends an offset of 1/8” – 3/16” per foot of shaft length.

In making final adjustments, the slip spline should be spaced, as near as possible to the mid-point of its slip or end play, there must be enough slip to separate the flexible shafting from the pump coupling. Steady bearings are of the self-aligning type, perfect leveling of the bearings is not necessary; and since steady bearings are not provided to stand end-thrust, the shafting weight should be taken by the motor bearings. When alignment is completed, drill holes in the bearing supports and bolt bearings in place. Remove "C" clamps.



SETTING AND ALIGNING THE MOTOR ASSEMBLY:

(See Fig. 1.) The motor is mounted on a tripod. Set the tripod over the floor hole; position the universal shafting to the motor coupling, set and shim the motor assembly so that it is level and the shafting alignment below is maintained.

IMPORTANT:

The motor must support the weight of the line shafting. The motor coupling half should be installed in a fixed position to carry the weight of the line shaft (see page 1). You will note that the coupling half has been provided with two setscrews located at 180' apart. One setscrew is directly over the keyway and locks the key in place. The other setscrew MUST seat itself firmly into the motor shaft.

CONTROLS:

Different kinds of motors may be used depending upon size or service of a pump and the electrical currents available at the pump location. Since motors may be direct current or single or three-phase alternating current, they may vary considerably according to the system of winding employed, and are specific as to current requirements; a discussion of controls covering all types would be lengthy and is therefore not attempted.

WIRING:

Connect the electric service to the controls and make inter-control electrical connections according to wiring instructions accompanying the switches and motor, using conduit and wire sizes as required by local power companies. Be certain current characteristics of voltage and frequency indicated on the motor nameplate are the same as service provided.

ROTATION:

Check rotation of the motor, see that it turns in the direction indicated by the rotation arrow on pump casing; if incorrect refer to motor manufacturer's instructions for reversing.

FUSE RECOMMENDATIONS:

Be certain fuses are installed and comply in size with the National Electric Code and Local Code recommendations.

LUBRICATION

MOTOR LUBRICATION:

Lubricate the motor according to motor manufacturer's instruction, avoiding over lubrication.

LUBRICATION:

CHICAGO PUMP Dry Pit Pumps are equipped with ball or roller type bearings. The bearings are packed with grease at the factory and will require additional grease approximately once every fifteen hundred hours depending on the severity of operation. When adding grease always use a good grade such as those listed below.

CAUTION-DO NOT OVER-GREASE

A ball bearing requires only a few ounces of grease a year. For most efficient operation bearings should be filled to fifty percent of their capacity.

Under no circumstances should a bearing be greased until the grease oozes out of the bearing housing. Excess grease does not in any way lubricate the bearing and acts as a dirt catcher. The grease in an over greased bearing has a churning action, which tends to over-heat the bearing. In some cases, these bearings may over-heat to the point where the temper is drawn from the balls rendering them soft and causing bearing failure. A bearing under normal conditions will require from 1/2 ounce to 1 ounce of grease each lubrication period.

Lubrication periods will have to be determined by the maintenance man depending upon the severity of the operation.

CAUTION: Use only grease which is specified for use with ball bearings. Acids contained in other lubricants will ruin the bearings.

RECOMMENDED LUBRICANTS

Arco	Litholine E2
Mobil	Mobilux #2
Phillips	Phillips 113 & RB #2
Shell	Alvania EP2
Amoco	Super Permalube
Texaco	Regal AF132
Union	UNOBAE2

In cases where abnormal conditions exist, such as very high temperatures, it is advisable to consult a lubrication engineer to determine the proper lubricant to use. If this is not practical, write to CHICAGO PUMP Company stating your conditions, and we will procure the information for you.

PACKING BOXES, PACKING AND PACKING SEALS:

1. Packing Boxes:

The pumps employ gland adjusted packing boxes for sealing around the shafts. Packing boxes are packed before shipment. Packing material is replaceable. The packing material recommended for use within the pump is a combination of Super Seal #3 packing rings (white metal particles, synthetic oil-proof binder, special long-fiber acrylic with dry-graphite) and Metallic number 101M rings (flexible all metallic packing, continuous ribbons, soft babbitt foil, spirally wrapped, crinkled, folded and squared to size, layers lubricated with oil and graphite).

2. Water Seals:

On pumps handling liquids with solids, a water seal used principally to flush the packing and prevent entrance of solids or grit which would score the shaft or shaft sleeve. It also serves to cool and lubricate packing, and in the case of suction lift applications it is required as a seal against entrance of air. Non-Clog pumps are furnished with water seals for external or outside connection to a clear water supply having a pressure approximately 3 to 10 lbs. (7 ft. to 23 ft. head) greater than the pump discharge pressure. If the available pressure is too high (20 pounds or more above the operating head of pump) or if gland leakage is excessive a pressure-reducing valve should be used. If available pressure is below operating head of pump, or when required, it is often necessary to employ a small water seal pumping unit (see tag attached to water seal connection). The most economical consumption of sealing water is obtained by installing a solenoid valve in the water seal line, wired with the pump circuit to open automatically when the pump operates.

NOTE: As a precaution against contamination, State Departments of Health do not permit connecting the water seal line of a sewage pump directly to the city supply.

3. Gland Adjustment:

Packing boxes should be watched for leakage of sealing water. A "weep" from the packing boxes while pump is running is necessary to keep packing cool and in good condition. If serious leakage or no leakage is noted, the packing gland should be tightened or loosened as required by turning the packing glands nuts evenly a few turns only. Do not draw packing glands too tight. After adjusting packing glands, **turn** the shaft by hand to be certain it rotates freely. If serious leakage will not stop, packing is probably burnt, worn, dried out or hard and should be replaced. (Remember that when replacing packing; replace all of the packing both above and below the lantern ring.) All packing should be renewed periodically to prevent scoring of shaft or shaft sleeve; see paragraph on "Packing Boxes, Packing, and Packing Seals" on Pages 5 and 6.
NOTE: If upon removing the old packing, the shaft or shaft sleeve is found to be scored, then it will become necessary to replace the shaft or shaft sleeve before installing new packing.

4. Mechanical Seal:

For Optimum life of the mechanical seals, flow thru water lubrication is required. The water enters the seal chamber from the power frame end. The double seal housing should be vented using the petcock prior to starting the pump. This will insure that no air is trapped within the mechanical seal chamber. CAUTION: Never run the mechanical seal dry, as damage will result.
Each seal consists of a rotating element and a stationary element. The sealing faces are highly lapped surfaces of materials selected for low coefficient of friction and resistance to corrosion by the liquid being pumped. The faces have a minute running clearance and normally run on a very thin film of liquid. The sealing liquid (preferably clear water) is injected into the seal box cartridge through a tapped connection at a pressure higher than that which would exist in the box, thereby isolating the sealing faces from the liquid being pumped. If sufficient sealing pressure is not maintained the pressure within the pump will force open the lower seal and allow the liquid being pumped to enter the box, ruining the seal. A flow of 2 GPM per pump at 5 psi above the shutoff pressure is required for satisfactory seal operation. Consult the typical performance curve to determine shutoff head, or contact your CHICAGO PUMP representative. A solenoid installed in the downstream side of the seal box should open the seal water line at the mechanical seal before the pump starts. A flow meter or flow indicator installed on the seal water line at the mechanical seal will verify flow of seal water into the seal box. A pressure reducing valve and needle valve can be used to adjust pressure, and flow rate.

As the seal is a precision made product, care must be taken in handling. The carbon and ceramic parts should be safeguarded from drops or severe blows. Particular care should be taken to avoid scratching the lapped faces on the washer and floating seal.

STEADY OR INTERMEDIATE GUIDE BEARINGS:

(See Fig. 1) Steady bearings are provided with Alemite Fittings for grease lubrication, and should be lubricated with grease having the same consistency as the lubricant recommended for the pump. Steady bearings ordinarily need greasing every: 3 to 6 months.

UNIVERSAL JOINT COUPLINGS:

(See Fig. 1) Universal joint bearings and slip splines are provided with Zerk Alemite Fittings for grease lubrication, and may be lubricated with the same grease recommended for steady bearings. They need greasing only rarely, once a year usually being sufficient.

CAUTION: Pull motor disconnect before lubricating.

OPERATION

CHECK THE FOLLOWING ITEMS BEFORE STARTING UNIT:

1. Be certain all equipment has been lubricated as per lubrication instructions
2. Turn the shaft by hand to see that it rotates freely. If it sticks or turns with difficulty, refer to "Repair" section of these instructions.
3. See that current characteristics of voltage and frequency on motor nameplate coincide with service provided.
4. See that all thermal units are "set" and the selector switch (when used) is on "off" position.
5. See that gate valves on the suction and discharge lines are open.
6. Vent air from the pump volute.

STARTING:

To start the pump, engage the motor disconnect switch and set the selector switch (if used) to the automatic position. The pump will not operate unless the float switch is closed. If a selector switch is used, the pump may be run independently of the float control by turning it to the hand" or manual position.

AFTER STARTING THE UNIT:

1. See that shaft rotates in the direction indicated by the rotation arrow on the pump casing and that pump is delivering water.
2. See that all pipe connections are tight and the check valves are functioning.
3. Note operation of automatic control mechanism, observing a complete start-stop cycle; see that the float switch throws In and out properly as wet basin fills and is emptied by the pump. Check high-low water level adjustment.
4. Observe the extended line shafting; see that incorrect installation has not resulted in its vibrating or "whip-ping."
5. See that there is the desired water leakage from stuffing box (refer to paragraph under "Maintenance" for details).
6. See that bearings (8) (11) do not overheat due either to over or under lubrication.
7. Observe operation of pump closely for the first day and at regular intervals for two weeks. A new machine is frequently stiff or initial float control regulation may be incorrect: therefore, the unit should be watched to note performance. (See Periodic Inspection.)

MAINTENANCE:

1. **Lubrication**-At regular intervals lubricate motor, pump, steady bearings and universal shaft joints as per lubrication instructions.
2. **Grease Seal**-To be effective, grease seals must maintain constant and sufficient grease pressure upon the packing.
3. **General Cleanliness**--Keep the interior and exterior of motor and controls free from moisture, oil and dirt. When necessary, blow out their interiors using a bellows. When switch contacts show signs of wear or pitting, they should be replaced.
4. **Packing Box**-Occasionally observe the packing glands (16) for leakage. A slight leakage of seal water, say 60 drops per minute (large pumps may require more), from the packing box when pump is running, acts as a lubricant and also keeps packing (31) cool and in good condition. Its serious leakage is noted, tighten the two gland nuts (17) evenly a few turns only; do not draw glands too tight. After adjusting packing glands, turn the shaft by hand to be certain it rotates freely. If serious leakage will not stop, refer to "Repair" instructions for packing renewal.

PERIODIC INSPECTION:

To insure the best operation of the pump, make a systematic Inspection at least once a week:

1. See that automatic float controls respond to rising water level in the basin.
2. See that unit starts when the float switch makes contact and that pump shuts off at the low water level.
3. See that motor comes quickly up to speed and maintains constant rotation rate. If motor is brush type, see that it does not spark profusely while running or starting.

Shutting Down:

When shutting down the pump for an extended period, the motor disconnect switch should be opened, all valves on suction, discharge and packing lubrication lines shut tight, and the pump completely drained of water by removal of vent and drain plugs until water has run out. This protects pump against sedimentation and freezing. It is also a good policy at this time to inspect the pump and bearings thoroughly so that all necessary servicing may be done during the inactive period. Relubricate bearings in power frame per instructions. Rotate shaft every two-weeks.

LOCATING TROUBLE

IF PUMP FAILS TO OPERATE:

1. Check fuses and thermal overload units, see if fuse is blown, thermal overload tripped or loose. Before replacing a burnt fuse, be certain cause for blowing is determined and corrected. Before resetting a tripped thermal unit, allow it to cool.
2. Be certain the shaft rotates try turning by hand. If it will not turn, or is unusually stiff, see that the pump is not clogged; that motor, pump or steady bearings are not worn, dry or jammed by corrosion; that the shaft is properly aligned; and. that packing glands (16) are not too tightly or unevenly adjusted.
3. See that switch contacts are not corroded, shorted or terminal connections broken anywhere in the circuit.
4. See if the automatic float control mechanism is functioning.
5. See if motor is shorted or burnt, or if brushes (when present) are stuck or worn.
6. See that wiring hook-up and service provided are correct and that all switches are set for operation.

IF NO WATER IS DELIVERED:

CHECK:

1. If the water level is so low that pump is not primed.
2. Pump to see if it is air bound by venting casing at plug (22).
3. Whether the gate valve in discharge line is shut or check valve is jammed.
4. Whether the suction pipe or inlet is clogged or gate valve is closed.
5. TDH, see if beyond pump rating.
6. If pump rotation is reversed.
7. If the impeller is badly worn.
8. If the motor speed is too slow.

IF NOT ENOUGH WATER IS DELIVERED:

CHECK:

1. If there are air leaks in the suction line or stuffing box.
2. If motor speed is too slow.
3. If the TDH is higher than anticipated.
4. If the impeller is worn or plugged.

IF FUSES BLOW OUT:

1. Check fuse rating used to that advised under "Fuse Recommendation."
2. Turn shaft by hand to see that it rotates freely. If it sticks or turns with difficulty, see paragraph 2 under **LOCATING TROUBLE.**
3. Check wiring and controls. Test for loose connections.
4. See that controls are not worn or arcing.
5. See that motor is not grounded or partially burnt out.
6. Check brushes (when present) for sparking while running or starting, or for sticking.
7. Observe if motor is overheating from overload or lack of proper ventilation.
8. See if fuse location is too hot.

REPAIRS

IF PUMP REQUIRES CLEANING:

Removable hand hole covers are provided on the pump Volute (28). To clean pump, disengage disconnect switch, lock out, close all valves, drain the pump, remove cleanout cover (51) and remove any solids.

DISASSEMBLY PROCEDURES:

Refer to Cross Section Drawing, page 11.

CAUTION-PRIOR TO DISASSEMBLING UNIT, LOCK OUT MOTOR AND DISCONNECT MOTOR LEADS.

TO REMOVE MOTOR:

Pedestal Mounted Pumps:

1.A Remove cap screws, nuts and washers (49). Lift motor with motor support (43) off of bearing housing (10). Coupling halves will separate and coupling insert can be removed. Motor half of coupling can be taken off of motor shaft by removing coupling set screw(s) (not shown). To separate motor from motor support (43) remove cap screws and washers.

Horizontal Pumps:

1.B Disconnect flexible coupling and motor leads, remove bolts from motor feet, and remove motor from base plate.
NOTE: It may be necessary to use a sling and hoist to aid in disassembling a horizontal unit. Be careful to keep unit balanced when removing bearing housing/ impeller from volute.

Line Shaft Driven Pumps:

1.C Removal of motor is not necessary. Disconnect shafting flange at pump and swing shafting out of the way. **NOTE**: Additional protection must be provided in order to eliminate the possibility of drive shaft coming apart at the spline connection (slip joint). The slip joint can be supported by using a rope to tie both sections of the shafting together.

BEARING FRAME DISASSEMBLY:

2. Remove cap screws and washers (19). Using a pry bar, break the joint between casing cover (23) and volute (28) at gasket (24). Lift complete upper assembly including impeller (27) from volute (28). Place entire assembly on blocks with shaft horizontal and with impeller and pump half of coupling overhanging. Remove coupling half by removing set screw(s) (not shown).
3. Inspect suction wear ring (80) if provided, by viewing through volute (28). If replacement is necessary, remove screws (81) to extract wear ring (80). Impeller wear ring (54) can be visually inspected while bearing frame assembly is on blocks. Impeller wear ring (54) can be removed by taking out screws. It may be necessary to apply heat to screws to facilitate removal.

4.A (#4 Frames) Remove impeller locknut and washer (20) off stud. Because of the tapered shaft fit, impeller (27) can be easily removed by placing a wedge between the impeller (27) and casing cover (23) and "popping" impeller off of shaft (1). Remove key (25).

WARNING: IMPELLER MUST BE INDEPENDENTLY SUPPORTED PRIOR TO ITS REMOVAL.

4.B (#5 & 6 Frames-Figures 2). Remove impeller set screw (26) and remove locknut (20) off of threaded shaft end. Proceed as 4A above.

PACKING DISASSEMBLY:

5.A Back off gland nuts (17) and remove stuffing box gland halves (16). Remove nuts and washers (125) from studs and pull stuffing box (120) off shaft. Packing rings (31) and seal ring (32) may then be removed from stuffing box. If the shaft area surrounding the water slinger (13) is corroded, polish with a fine emery cloth before sliding water slinger (13) off shaft. Polish and oil remainder of shaft in this area to prevent damage to grease seal (12) when shaft is pulled through.

IF UNIT IS EQUIPPED WITH MECHANICAL SEAL:

5.B Remove cap screws and washer (123). Remove seal box (120) from shaft (1). If the shaft area surrounding the water slinger (13) is corroded, polish with a fine emery cloth before sliding water slinger (13) off shaft. Polish and oil remainder of shaft in this area to prevent damage to grease seal (12) when shaft is pulled through.

5.C Push the mechanical seal seat out of the seal box cover (121), using care not to scratch seal face. Lift the rotating assembly out of the seal box (120). Push the mechanical seal seat out of the seal box (120), again being careful not to scratch the seal face.

SHAFT SLEEVE DISASSEMBLY:

6. Shaft sleeve (30) may be pulled off of shaft after shaft sleeve set screw (98) is removed. Remove shaft sleeve "0" ring (101).

REMOVAL OF RADIAL BEARING:

7. Remove cap screws (6), tighten adjusting screw (57) approximately 1/2 turn, and remove shims (133). Rotor assembly consisting of thrust bearing housing (2), shaft (1), thrust bearing (8) and radial bearing (11) can then be pulled through the top of the radial bearing housing (10) and casing cover (23).
8. Using a suitable pulling device, remove radial bearing (11) and bearing holder (5) (#4B Frame only-Figure 3), if furnished.

REMOVAL OF THRUST BEARING:

9. Remove retaining ring (7). Clean, polish and oil end of shaft around grease seal (21) and pull thrust bearing housing (2) off of bearing/shaft. Remove bearing locknut (3) and washer (4). Using a suitable bearing puller, remove bearing (8). Remove grease seal (21) from thrust bearing housing (2).
10. To separate radial bearing housing (10) from casing cover (23), remove cap screws (142). Remove grease seal (12) from casing cover (23). Generally it is not necessary to disassemble the lower (suction) end of the pump. On vertical units, cap screws (63) secure the volute (28) to the section plate (62) to the pump support (39) (when furnished). Screws (37) secure the suction elbow (93) to the suction plate (62). The volute Handhole cover (51) is secured with screws (56), and the suction elbow Handhole cover is secured with screws (34).

REASSEMBLY PROCEDURES:

When assembling and reassembling pumps, CHICAGO PUMP strongly urges replacing all parts subject to wear, as listed on parts list on page 10. The procedure for ordering spare parts is outlined on page 9.

Prior to reassembling the pump:

- Clean, polish and oil shaft, inspecting for unusual wear or scoring.
- Scrape and clean all gasketed mating faces to insure proper scaling.
- Make sure that stuffing/seal box, shaft sleeve and seal ring arc thoroughly cleaned.
- Clear all lubricant paths and replace any defective fittings.
- If any part not listed as a recommended spare part shows excessive wear, it too should be replaced. Contact your CHICAGO PUMP representative for ordering replacement parts.

CAUTION-WHEN INSTALLING BALL OR ROLLER BEARINGS, PRESS ONLY AGAINST INNER RACES OF BEARINGS. PRESSING ON OUTER RACES WILL DAMAGE BALLS OR ROLLERS AND RUIN THE BEARING. PRESS EVENLY ON BEARING INNER RACE, USING EXTREME CARE NOT TO SCORE SHAFT.

It may be necessary to heat bearings to facilitate installation because of close tolerance fits. Bearings may be heated by either of the following methods:

OIL BATH: Accomplished by submerging bearing in a tank of oil having a high flash point. The bearing should be suspended so as not to be in contact with the heat source, for 20 to 30 minutes at a temperature of approximately 200^0F Oil temperature must not exceed 250^0F.

INDUCTION HEATING: Accomplished by applying heat directly to the bearing (i.e. commercially available induction bearing heater). Extreme caution must be exercised to insure that bearing temperature does not exceed 200^0F

The bearings should be quickly installed and positioned squarely against mating face while it is still hot, and secured with appropriate locknut or retaining ring.

WARNING-SUITABLE PROTECTIVE CLOTHING (I.E. GLOVES) MUST BE WORN WHEN HANDLING HEATED COMPONENTS.

BEARING HOUSING REASSEMBLY:

1. Press bearing holder (5) if furnished, onto shaft (1). Holder can be heated in the same manner as recommended for the bearings to case assembly. Carefully press radial bearing (11) onto shaft.
2. Place retaining ring (7) loosely over mid section of shaft.
3. Carefully press thrust bearing (8) onto shaft. Bearings must be installed so that the narrow inner races of each bearing are face to face. Secure with bearing lock-washer (4) and bearing locknut (3). Pack thrust and radial bearings 1/2 to 3/4 full of grease (see Recommended Lubricants, Page 4). DO NOT OVER GREASE.
4. Install grease seal (12) into casing cover (23). Primary lip should be oriented to restrict the entrance of dirt, water, and contaminants on grease lubricated bearings. Assemble radial bearing housing (10) to casing cover (23) and secure with cap screws (142).
5. Install grease seal (21) into thrust bearing cap (2). Primary lip should be oriented to restrict the entrance of dirt, water, and contaminants on grease lubricated bearings
6. Turn shaft assembly vertical, with impeller end of shaft up, and drop assembly into thrust bearing cap (2). Install retaining ring (7). Be sure that retaining ring is properly seated in groove.
7. Rotate and insert shaft assembly into radial bearing housing assembly. Loosely install cap screws (6) and adjusting stud/screws (57) onto thrust bearing cap (2).
8. Slide water slinger (13) onto shaft end.

STUFFING BOX REASSEMBLY:

9. Slip shaft sleeve (30) into stuffing box (120). Place packing rings (31) and seal ring (32) into stuffing box, making sure that the center of the seal ring lines up with tapped lubrication hole in stuffing box (120). Rings should be placed so that ends butt together and joints, are staggered in stuffing box.
10. Install studs (when furnished), and then packing gland halves (16) and gland nuts (17). Gland nuts should be tightened such that threads just engage. Adjustment will not be made until entire upper assembly with impeller has been installed and adjusted. Remove shaft sleeve (30) from stuffing box, leaving packing rings (31) and seal ring (32) intact.
11. Place "O" ring, (101) onto pump shaft (1). Install shaft sleeve (30) over shaft (1). Insert and tighten setscrew (98). Place gasket (124) on casing cover (23) and install assembled stuffing box onto shaft. Secure to casing cover (23) with nuts (125), making sure that casing cover and stuffing box are properly lined up.
12. Place bearing frame assembly horizontal on blocks or bench. Go directly to instruction 17.

MECHANICAL SEAL BOX REASSEMBLY:

The mechanical seal assembly is a precision product. Treat it with care. In handling, do not let the carbon-sealing washer fall; and take particular care not to scratch the lapped faces on the washer and floating seat. If the seal has been used before, do not put it back in service until the sealing faces of the carbon washer have either been relapped or replaced,

9.A Oil the outer surface of the stationery seat rings (use light oil, not grease) and push the assembly into the seal cover and into the seal box. Seating them firmly and squarely. If it is not possible to insert seats with clean fingers, place a cardboard protecting ring over face of seats and press into bore with a piece of brass tubing having a square cut smooth end. Tubing should be slightly larger than diameter of shaft. Remove cardboard after seat is firmly seated.
Before completing the shaft installation, wipe the lapped sealing faces of the seat and sealing washer perfectly clean.

10.A Place washer and bellows inboard assembly on shaft (not spring) and slide into position against inboard (seal box) seat. When sliding seal assembly on shaft, be sure to press ONLY on tail sections of bellows and driving band. Use a smooth sleeve of about 1/32" over shaft diameter with a wall thickness sufficient to butt against the driving band.

11.A Install spring into position making sure it is properly seated over retainer.

12.A Place washer and bellows outboard (seal cover) assembly on shaft and slide into a position so that spring is not compressed more than 1/16". Make sure spring is properly seated.

13. Before putting seal cover (121) on shaft thoroughly clean and oil lapped faces of both seal washer and seat. Then slide seal cover (121) and press it in as far as it will go. Do not allow it to spring out or move backward.

14.A IMMEDIATELY install impeller as described in 17, and 18.

15.A Set impeller clearance as described in 19B, on page 9.

CAUTION—SEAL MUST NOT BE ALLOWED TO REST ON SHAFT TOO LONG BEFORE SEAL BOX COVER IS PLACED IN POSITION AS SEAL BELLOWS HAS TENDENCY TO ADHERE TO SHAFT CAUSING TAIL BELLOWS TO BE IMPROPERLY SEATED.

16. Tighten cap screws (123) uniformly to keep faces of the seat at right angles to shaft. Tightening of seal box cover (121) automatically sets seal in proper position.

IMPELLER INSTALLATION:

17. Spray impeller end of shaft with machinists bluing. Slide- impeller (27) all the way onto shaft (1) and mark the shaft at the back end of the impeller hub. Remove impeller, and check shaft bluing for impeller engagement. Impeller should have at least three-fourths engagement when checked without impeller key (25). Place key (25) into shaft keyway, and jam impeller (27) onto shaft (1). Impeller hub MUST return flush to mark on shaft. If it does not, check engagement of key (25) and grind key to fit. Once impeller is fully engaged, secure with Locknut and washer (20). When impeller set screw (26) is used (#5 & 6 frames), it will be necessary to drill a new locating hole in the impeller hub for the dog point of the setscrew. Using the pilot hole in the Locknut (20). Drill a 5/16” diameter by 3/16” deep hole into the impeller hub, and install set screw (26).
18. Entire upper assembly with adjusting screws (57) full extended can now be assembled to volute (28) after placing gasket (24) on volute (28). Bolt upper assembly (casing cover) to volute with cap screws and washers (19).

IMPELLER CLEARANCE ADJUSTMENT (PACKED PUMP):

19.A To adjust axial impeller or wear ring clearance, with-draw jack screws (57) and tighten cap screws (6) clown evenly until impeller (27) just touches suction plate (62), or impeller wear ring (54) just touches suction wear ring (80). Measures gap for shims (133) and add 1/32". Loosen cap screws (6), and evenly tighten adjusting screw (57) until desired shimming gap is obtained. Install appropriate amount of shims (133), and tighten screws (6).

Check that shaft turns freely. Gland nuts can be tightened down a bit more securely, but final gland adjustment cannot be made until stuffing box weepage is checked during initial period of start-up. Gland must be kept level at all times,

IMPELLER CLEARANCE ADJUSTMENT (MECHANICAL SEAL):

19.B Impeller clearance must be set with seal box cover (121) loose. To adjust axial impeller or wear ring clearance, withdraw adjusting screws (57) and tighten cap screws (6) down evenly until impeller (27) touches suction plate (62), or impeller wear ring (54) touches suction wear ring (80). Measure gap) for shims (133) and add 1/32". Loosen cap screws (6), and evenly tighten adjusting screw (57) until desired shimming gap is obtained. Install appropriate amount of shims (133), and tighten screws (6). Check that shaft turns freely. After initial installation, impeller may be lowered an additional 1/16" before complete seal box disassembly and reassembly is required.

VERTICAL PEDESTAL-MOUNTED PUMPS:

GENERAL DIRECTIONS:

Vertical pedestal-mounted non-clog pumps have the same general design as do vertical open-shaft pumps, with the exception that they employ pedestals to support the motors and are connected to motors through flexible couplings. The proceeding general facts concerning vertical open-shaft pumps therefore apply as well to these units.

FLOODING:

When pedestal-mounted pumps or horizontal pumps are installed in basins, suitable means for manual, or preferably automatic, drainage should be provided.

CAUTION: Do not allow water to submerge lower ball bearing.

MOUNTING THE MOTOR AND ALIGNING THE COUPLING:

ALIGNMENT FOR VERTICAL PUMPS:

On pedestal mounted Pumps, the motor supports are indexed (top and bottom) to maintain factory alignment. FLEXIBLE COUPLINGS: Flexible couplings are used to compensate for temperature changes and to prevent interference between pump shaft and motor shaft during operation.

They are NOT to be used to compensate for misalignment of the motor and pump shafts. The flexible coupling is aligned at the factory, but the unit is shipped with the coupling halves separated and requires rechecking before field conneetions are made. The following procedure applies to factory standard couplings only. When special couplings are provided, the specific manufacturer's instructions will be supplied and must be strictly adhered to. If questions arise as to the type of coupling supplied with the unit, contact your CHICAGO PUMP representative.

The maximum parallel offset for factory standard couplings is .015", and the maximum angular offset is one (1) degree between pump shaft and motor shaft. Alignment is checked with the flexible sleeve removed. Using a straightedge and feeler gauges, check for proper alignment on two mutually independent perpendicular planes. Use the feeler
gauge to measure the offset, and place shims under the pump or motor to compensate for any misalignment.

ORDERS FOR REPLACEMENT AND SPARE PARTS**:** Always furnish the following information when ordering parts:

1. Unit Serial Number from Nameplate.
2. Description from Parts List.
3. Item Number from Cross Sections.

Send order to authorized CHICAGO PUMP Representative in your area, or to:

CHICAGO PUMP PRODUCTS
3905 Enterprise Court
Aurora, IL 60598-0620

Phone: 630-236-6900
Fax: 630-236-6932

PARTS LIST FOR DRAWING
64154A thru 1412226 - 0S8-4A - OSCIO-4A - LS8-4A

ITEM #	DESCRIPTION	PUMP FRAME	SPARE PARTS	OPT.
1	Shaft			
2	Thrust Bearing Housing			
3	Locknut - Thrust Bearing			
4	Lockwasher - Thrust Bearing			
5	Bearing Holder	4B	XXX	
6	Cap Screws (Thrust Bearing Housing to Radial Bearing Housing)			
7	Retaining Ring			
8	Thrust Bearing - Ball		XXX	
10	Radial Bearing Housing			
11	Radial Bearing - Roller	4B	XXX	
		5,6		
	Ball	4A		
12	Grease Seal		XXX	
13	Water Slinger			
16	Stuffing Box Gland Halves			
17	Gland Nuts			
18	Alemite Grease Fitting			
19	Cap Screw & Washer (Casing Cover to Volute)			
20	Impeller Self-locking Cap Screw & Washer		XXX	
	Impeller Stud, Locknut & Washer	4A,4B .	.XXX	
	Impeller Locknut	5,6	XXX	
21	Grease Seal		XXX	
22	Pipe Plug			
23	Casing Cover			
24	Gasket (Casing Cover to Volute)		XXX	
25	Impeller Key			
26	Impeller Set Screw	5,6		
27	Impeller			
28	Volute			
30	Shaft Sleeve		XXX	
31	Packing Rings			
32	Seal Ring			
34	Cap Screw, Nut & Washer (Elbow Handhole Cover)			
35	Elbow Handhole Cover			
36	Gasket (Elbow Handhole Cover)		XXX	
37	Cap Screw, Nut & Washer (Elbow to Suction Plate)			
38	Gasket (Suction Elbow to Suction Plate)		XXX	
39	Pump Support			
40	Pipe Plug			
43	Motor Support			
47	Coupling Key			
49	Cap Screw, Nut & Washer (Motor Support to Bearing Housing)			
51	Volute Handhole Cover			
52	Gasket (Volute Handhole Cover)		XX	
54	Impeller Wear Ring	XXX	XXX	
55	Flat Head Machine Screws -Impeller Wear Ring	5,6	XXX	XX
	X (Not Shown)			
56	Cap Screw & Washer (Volute Handhole Cover)			
57	Adjusting Screw			
62	Suction Plate			
63	Cap Screw & Washer (Suction Plate to Volute to Base)			
65	Nameplate			
66	Rotation Arrow			
67	Drive Screws (Nameplate and Rotation Arrow)			
80	Suction Wear Ring	XXX	XXX	
81	Flat Head Maching Screws Suction Wear Ring (Not Shown)	XXX	XXX	
93	Suction Elbow			
95	Mechanical Seal	XXX	XXX	
98	Shaft Sleeve Set Screw			
101	Shaft Sleeve "O" Ring		XXX	
112	Mechanical Seal Adapting Ring	5,6	XXX	
114	Mechanical Seal Adapting Ring "O" Ring	5,6	XXX	XXX
120	Stuffing/Seal Box			
121	Seal Box Cover		XXX	
122	Gasket (Seal Box to Seal Box Cover)		XXX	XXX
123	Cap Screw & Washer (SealBox to Seal Box Cover) (Not Shown)		XXX	
124	Gasket (Casing Cover to Stuffing Box)		XXX	
125	Stud, Nut & Washer (Stuffing/Seal Box to Casing Cover)			
133	Shims			
142	Cap Screws (Casing Cover to Bearing Housing)			

NOTES

1. Special to frames noted in this column. If no number appears here, part is applicable to all frames.
2. Parts recommended to be carried as spare parts.
3. Optional items furnished at additional cost when specified.

CROSS SECTION DRAWINGS