

60SERIES

INSTALLATION, OPERATION, PARTS LIST, AND MAINTENANCE MANUAL

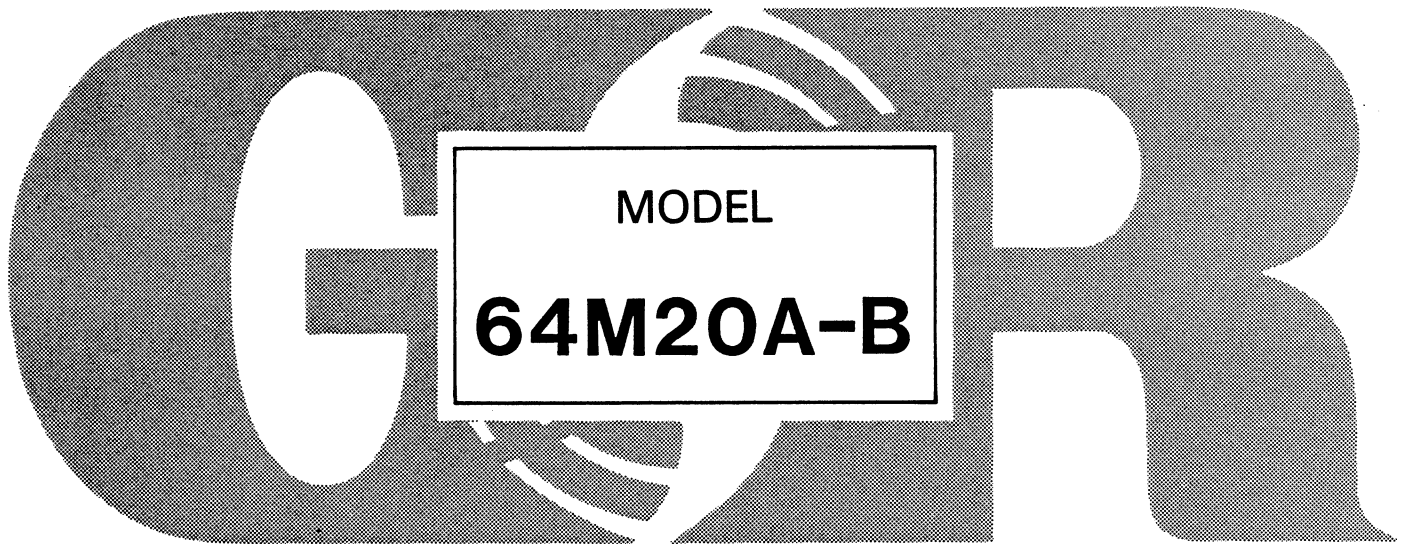


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INTRODUCTION

This Installation, Operation, and Maintenance Manual is designed to help you achieve the best performance and longest life from your Gorman-Rupp pump.

The Model 64M20A-B is a straight centrifugal pump without a suction check valve. The pump will handle most non-volatile, non-flammable liquids but is primarily designed to pump driller's mud, slurry, and other heavy liquids. The basic materials of construction for wetted parts are cast iron, with ductile iron impeller and wear rings.

The pedestal of this pump is designed with a flange for mounting to a hydraulic motor adaptor (not furnished by Gorman-Rupp) and spider coupling.

If there are any questions regarding the pump or application which are not covered in this manual or in other literature accompanying this unit, please contact your Gorman-Rupp distributor, or write:

The Gorman-Rupp Company	or	Gorman-Rupp of Canada Limited
P.O. Box 1217		70 Burwell Road
Mansfield, Ohio 44901-1217		St. Thomas, Ontario N5P 3R7

For information or technical assistance on the power source, contact the power source manufacturer's local dealer or representative.

The following are used to alert maintenance personnel to procedures which require special attention, to those which could damage equipment, and to those which could be dangerous to personnel:

NOTE

Instructions to aid in installation, operation, and maintenance or which clarify a procedure.

CAUTION

Instructions which must be followed to avoid causing damage to the product or other equipment incidental to the installation. These instructions describe the requirements and the possible damage which could result from failure to follow the procedures.

WARNING

```

////////////////////////////////////
//                               //
// These instructions must be followed to avoid causing in- //
// jury or death to personnel, and describe the procedure //
// required and the injury which could result from failure //
// to follow the procedure. //
//                               //
////////////////////////////////////

```


WARNINGS

WARNINGS - SECTION A

THESE WARNINGS APPLY TO 60 SERIES BASIC PUMPS. GORMAN-RUPP HAS NO CONTROL OVER OR PARTICULAR KNOWLEDGE OF THE POWER SOURCE WHICH WILL BE USED. REFER TO THE MANUAL ACCOMPANYING THE POWER SOURCE BEFORE ATTEMPTING TO BEGIN OPERATION.

WARNING

Before attempting to open or service the pump:
1. Familiarize yourself with this manual.
2. Disconnect or lock out the power source to ensure that the pump will remain inoperative.
3. Allow the pump to cool if overheated.
4. Vent the pump slowly and cautiously.
5. Close the suction and discharge valves.
6. Check the temperature before opening any covers, plates, or plugs.
7. Drain the pump.

WARNING

This pump is designed to pump mud and highly viscous liquids. Do not attempt to pump volatile, corrosive, or flammable liquids which may damage the pump or endanger personnel as a result of pump failure.

WARNING

After the pump has been positioned, make certain that the pump and all piping or hose connections are tight, properly supported and secure before operation.

WARNING

Do not operate the pump without shields and/or guards in place over rotating parts. Exposed rotating parts can catch clothing, fingers, or tools, causing severe injury to personnel.

WARNINGS

WARNING

```
////////////////////////////////////  
//  
// Do not operate the pump against a closed discharge valve //  
// for long periods of time. This could bring the liquid //  
// to a boil, build pressure, and cause the pump to rupture //  
// or explode. //  
//  
////////////////////////////////////
```

WARNING

```
////////////////////////////////////  
//  
// Overheated pumps can cause severe burns and injury. If //  
// overheating of the pump occurs: //  
//  
// 1. Stop the pump immediately. //  
// 2. Allow the pump to cool. //  
// 3. Refer to instructions in this manual before re- //  
// starting the pump. //  
//  
////////////////////////////////////
```

WARNING

```
////////////////////////////////////  
//  
// Do not attempt to disengage any parts of an overheated //  
// pump unit. Vapor pressure within the pump casing can //  
// eject these parts with great force when they are disen- //  
// gaged. Allow the pump to cool before servicing it. //  
//  
////////////////////////////////////
```

INSTALLATION - SECTION B

Since pump installations are seldom identical, this section offers only general recommendations and practices required to inspect, position, and arrange the pump and piping.

Most of the information pertains to a standard **static lift application** where the pump is positioned above the free level of liquid to be pumped.

If installed in a **flooded suction application** where the liquid is supplied to the pump under pressure, some of the information such as mounting, line configuration, and priming must be tailored to the specific application. Since the pressure supplied to the pump is critical to performance and safety, **be sure** to limit the incoming pressure to 50% of the maximum permissible operating pressure as shown on the pump performance curve.

For further assistance, contact your Gorman-Rupp distributor or the Gorman-Rupp Company.

Pump Dimensions

See Figure 1 for the approximate physical dimensions of this pump assembly.

OUTLINE DRAWING

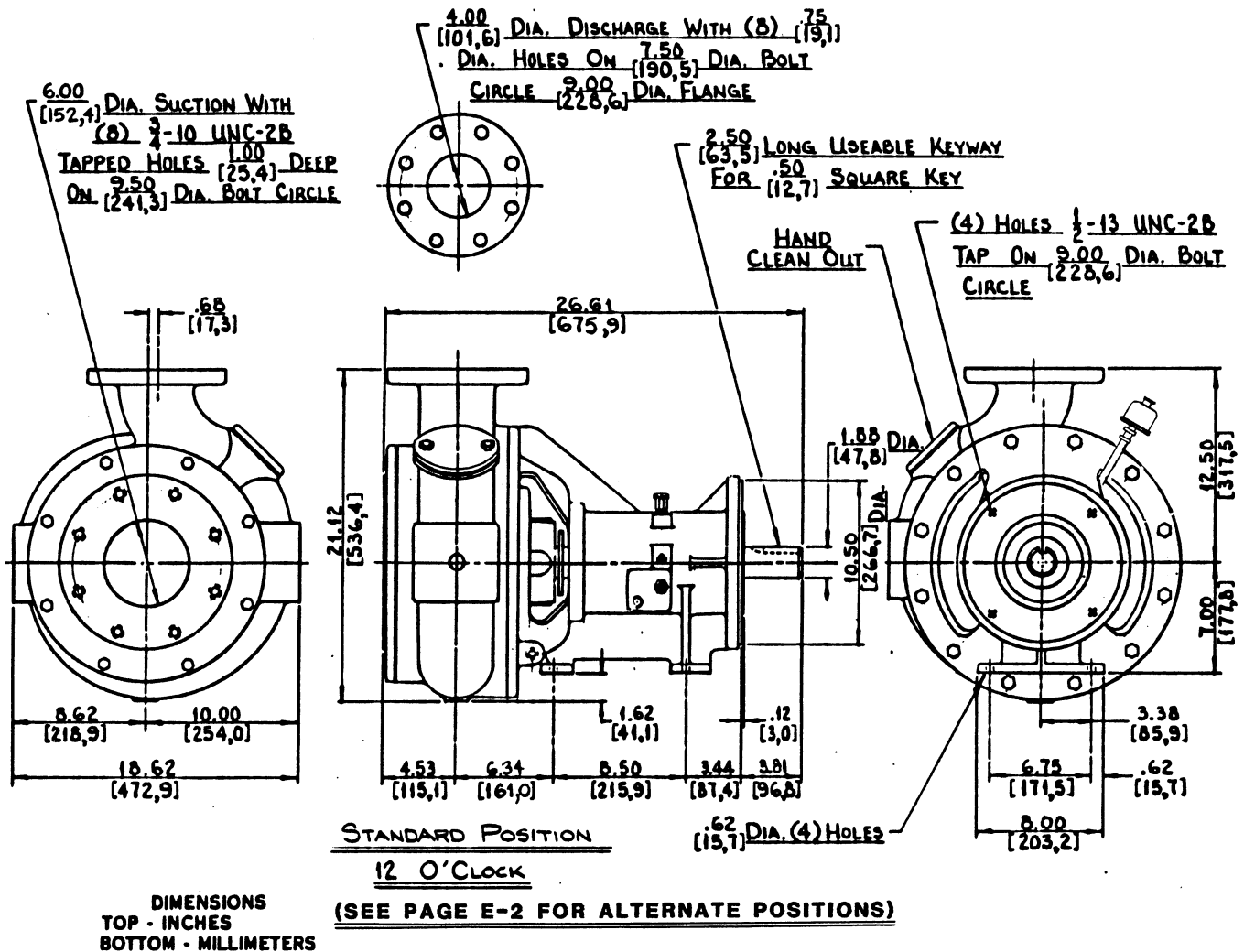


Figure 1. Pump Model 64M20A-B

PREINSTALLATION INSPECTION

The pump assembly was inspected and tested before shipment from the factory. Before installation, inspect the pump for damage which may have occurred during shipment. Check as follows:

- Inspect the pump assembly for cracks, dents, damaged threads, and other obvious damage.
- Check for and tighten loose bolts, nuts, capscrews, and other attaching hardware. Since gaskets tend to shrink after drying, check for and tighten loose nuts and capscrews securing mating surfaces.
- Carefully read all warning and cautions contained in this manual, and perform all duties indicated. Note the direction of rotation indicated

on the pump. Check that the pump shaft rotates counterclockwise facing the pump suction.

CAUTION

Only operate this pump in the direction indicated by the arrow on the pump body and on the accompanying decal. Otherwise, the impeller could become loosened from the shaft and seriously damage the pump.

- d. Check all lubricant levels and lubricate as necessary. Refer to LUBRICATION in the MAINTENANCE AND REPAIR section of this manual and perform duties as instructed.
- e. If the pump and power source have been stored for more than 12 months, some of the components or lubricants may have exceeded their maximum shelf life. These **must be inspected or replaced** to ensure maximum pump service.

If the maximum shelf life has been exceeded, or if anything appears to be abnormal, contact your Gorman-Rupp distributor or the factory to determine the repair or updating policy. **Do not** put the pump into service until appropriate action has been taken.

POSITIONING PUMP

Casing

The pump casing and integral discharge flange can be rotated to five different positions (see Figure 1, Section E). This pump is normally shipped from the factory with the discharge flange in the 12 o'clock position unless otherwise specified on the original order.

NOTE

If the user rotates the casing and discharge flange to the 11 o'clock position, the seal bottle oiler must be moved to the opposite side of the seal plate (see Figure 1, Section E).

Lifting

Use lifting equipment with a capacity of at least **2150 pounds**. This pump weighs approximately **425 pounds**, not including the weight of accessories and base. Customer installed equipment such as suction and discharge piping **must** be removed before attempting to lift.

CAUTION

The pump assembly can be seriously damaged if the cables or chains used to lift and move the unit are improperly wrapped around the pump.

Mounting

Locate the pump in an accessible place as close as practical to the liquid being pumped. Level mounting is essential for proper operation. The pump may have to be supported or shimmed to provide for level operation or to eliminate vibration.

SUCTION AND DISCHARGE PIPING

Materials

Either pipe or hose may be used for suction and discharge lines; however, the materials must be compatible with the liquid being pumped. If hose is used in suction lines, it must be the rigid-wall, reinforced type to prevent collapse under suction. Using piping couplings in suction lines is not recommended.

Line Configuration

Keep suction and discharge lines as straight as possible to minimize friction losses. Make minimum use of elbows and fittings, which substantially increase friction loss. If elbows are necessary, use the long-radius type to minimize friction loss.

Connections to Pump

Before tightening a connecting flange, align it exactly with the pump port. Never pull a pipe line into place by tightening the flange bolts and/or couplings.

Lines near the pump must be independently supported to avoid strain on the pump which could cause excessive vibration, decreased bearing life, and increased shaft and seal wear. If hose-type lines are used, they should have adequate support to secure them when filled with liquid and under pressure.

Gauges

Most pumps are drilled and tapped for installing discharge pressure and vacuum suction gauges. If these gauges are desired for pumps that are not tapped, drill and tap the suction and discharge lines not less than 18 inches from the suction and discharge ports and install the lines. Installation closer to the pump may result in erratic readings.

SUCTION LINES

To avoid air pockets which could affect pump priming, the suction line must be as short and direct as possible. When operation involves a suction lift, the line must always slope upward to the pump from the source of the liquid being pumped; if the line slopes down to the pump at any point along the suction run, air pockets will be created.

Fittings

Suction lines should be the same size as the pump inlet. If reducers are used in suction lines, they should be the eccentric type, and should be installed with the flat part of the reducers uppermost to avoid creating air pockets. Valves are not normally used in suction lines, but if a valve is used, install it with the stem horizontal to avoid air pockets.

Strainers

If a strainer is furnished with the pump, be certain to use it; any spherical solids which pass through a strainer furnished with the pump will also pass through the pump itself.

If a strainer is not furnished with the pump, but is installed by the pump user, make certain that the total area of the openings in the strainer is at least three or four times the cross section of the suction line, and that the openings will not permit passage of solids larger than the solids handling capability of the pump.

This pump is designed to handle up to 3 1/4 inch diameter spherical solids.

Sealing

Since even a slight leak will affect priming, head, and capacity, especially when operating with a high suction lift, all connections in the suction line should be sealed with pipe dope to ensure an airtight seal. Follow the sealant manufacturer's recommendations when selecting and applying the pipe dope. The pipe dope should be compatible with the liquid being pumped.

Suction Lines In Sumps

If a single suction line is installed in a sump, it should be positioned away from the wall of the sump at a distance equal to one and one-half times the diameter of the suction line.

If there is a liquid flow from an open pipe into the sump, the flow should be kept away from the suction inlet because the inflow will carry air down into the sump, and air entering the suction line will reduce pump efficiency.

If it is necessary to position inflow close to the suction inlet, install a baffle between the inflow and the suction inlet at a distance one and one-half times the diameter of the suction pipe. The baffle will allow entrained air to escape from the liquid before it is drawn into the suction inlet.

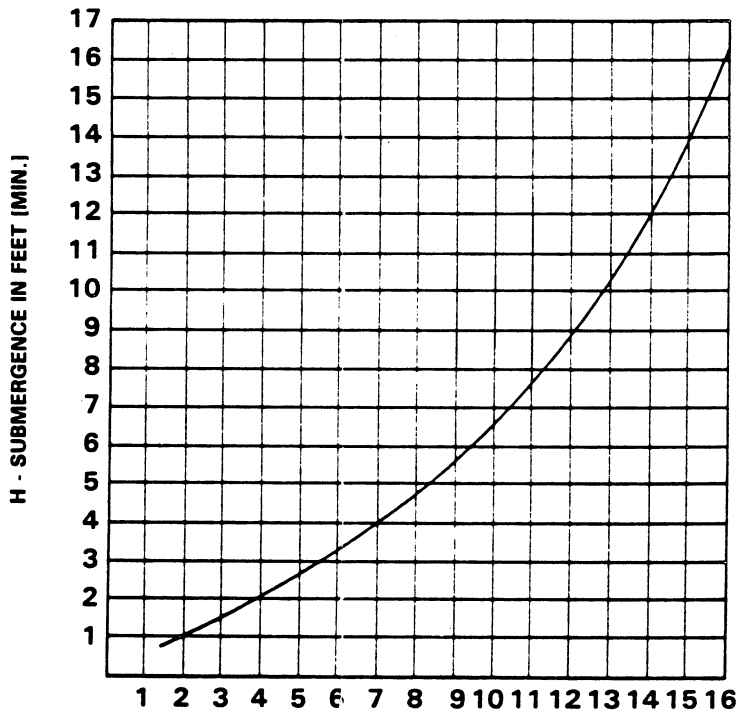
If two suction lines are installed in a single sump, the flow paths may interact, reducing the efficiency of one or both pumps. To avoid this, position the suction inlets so that they are separated by a distance equal to at least three times the diameter of the suction pipe.

Suction Line Positioning

The depth of submergence of the suction line is critical to efficient pump operation. Figure 2 shows recommended minimum submergence vs. velocity.

NOTE

The pipe submergence required may be reduced by installing a standard pipe increaser fitting at the end of the suction line. The larger opening size will reduce the inlet velocity. Calculate the required submergence using the following formula based on the increased opening size (area or diameter).



$$\text{VELOCITY IN FEET PER SEC.} = \frac{\text{QUAN. [G.P.M.] x .321}}{\text{AREA}} \text{ OR } \frac{\text{G.P.M. x .4085}}{D^2}$$

Figure 2. Recommended Minimum Suction Line Submergence Vs. Velocity

DISCHARGE LINES

Siphoning

Do not terminate the discharge line at a level lower than that of the liquid being pumped unless a siphon breaker is used in the line. Otherwise, a siphoning action causing damage to the pump could result.

Valves

A check valve in the discharge line is normally recommended, but it is not necessary in low discharge head applications.

If a throttling valve is desired in the discharge line, use a valve as large as the largest pipe to minimize friction losses. Never install a throttling valve in a suction line.

With high discharge heads, it is recommended that a throttling valve and a system check valve be installed in the discharge line to protect the pump from excessive shock pressure and reverse rotation when it is stopped.

CAUTION

If application involves a high discharge head, gradually close the discharge throttling valve before stopping the pump.

DRIVES

The drive end of the pedestal on this pump is designed with a flange for mounting to a hydraulic motor adaptor (not furnished by Gorman-Rupp), and for close-coupling by means of a magnalloy No. 500 coupling with a urethane spider. If, however, the pump is to be coupled and driven by other methods, refer to the following information on alignment before putting the pump into service.

ALIGNMENT

The alignment of the pump and its power source is critical for trouble-free mechanical operation. In either a flexible coupling or V-belt driven system, the driver and pump must be mounted so that their shafts are aligned with and parallel to each other. It is imperative that alignment be checked after the pump and piping are installed, and before operation.

NOTE

Check Rotation, Section C, before final alignment of the pump.

When mounted at the Gorman-Rupp factory, driver and pump are aligned before shipment. Misalignment will occur in transit and handling. Pumps must be checked and realigned before operation. Before checking alignment, tighten the foundation bolts. The pump casing feet and/or pedestal feet, and the driver mounting bolts should also be tightly secured.

WARNING

When checking alignment, disconnect the power source to ensure that the pump will remain inoperative.

CAUTION

Adjusting the alignment in one direction may alter the alignment in another direction. Check each procedure after altering alignment.

Coupled Drives

When using couplings, the axis of the power source must be aligned to the axis of the pump shaft in both the horizontal and vertical planes. Most couplings require a specific gap or clearance between the driving and the driven shafts. Refer to the coupling manufacturer's service literature.

Align spider insert type couplings by using calipers to measure the dimensions on the circumference of the outer ends of the coupling hub every 90 degrees. The coupling is in alignment when the hub ends are the same distance apart at all points (see Figure 3A).

Align non-spider type couplings by using a feeler gauge or taper gauge between the coupling halves every 90 degrees. The coupling is in alignment when the hubs are the same distance apart at all points (see Figure 3B).

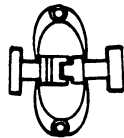


Figure 3A. Aligning Spider-Type Couplings



Figure 3B. Aligning Non-Spider Type Couplings

Check parallel adjustment by laying a straightedge across both coupling rims at the top, bottom, and side. When the straightedge rests evenly on both halves of the coupling, the coupling is in horizontal parallel alignment. If the coupling is misaligned, use a feeler gauge between the coupling and the straightedge to measure the amount of misalignment.

V-Belt Drives

When using V-belt drives, the power source and the pump must be parallel. Use a straightedge along the sides of the pulleys to ensure that the pulleys are properly aligned (see Figure 3C). In drive systems using two or more belts, make certain that the belts are a matched set; unmatched sets will cause accelerated belt wear.

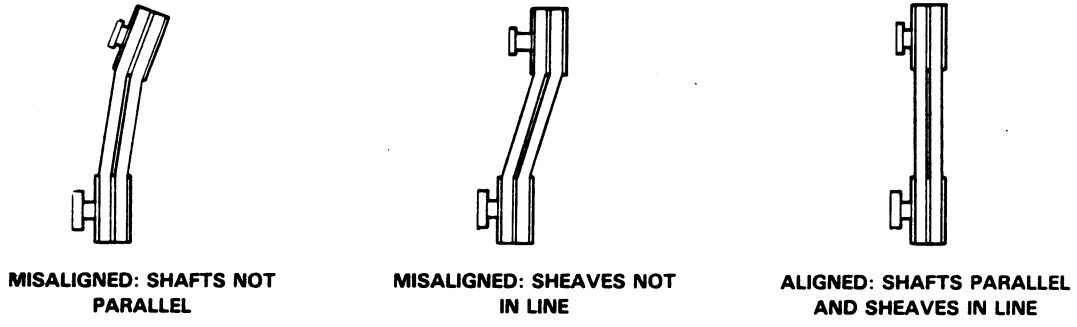


Figure 3C. Alignment of V-Belt Driven Pumps

Tighten the belts in accordance with the belt manufacturer's instructions. If the belts are too loose, they will slip; if the belts are too tight, there will be excessive power loss and possible bearing failure. Select pulleys that will match the proper speed ratio; overspeeding the pump may damage both pump and power source.

WARNING

```

////////////////////////////////////
//
// Do not operate the pump without shields and/or guards in //
// place over rotating parts. Exposed rotating parts can //
// catch clothing, fingers, or tools, causing severe injury //
// to personnel. //
//
////////////////////////////////////

```

OPERATION

OPERATION - SECTION C

WARNING

```

////////////////////////////////////
//
// This pump is designed to pump mud and highly viscous //
// liquids. Do not attempt to pump volatile, corrosive, or //
// flammable liquids which may damage the pump or endanger //
// personnel as a result of pump failure. //
// //
////////////////////////////////////

```

PRIMING

Install the pump and piping as described in INSTALLATION. Make sure that the piping connections are tight, and that the pump is securely mounted. Check that the pump is properly lubricated (see LUBRICATION in MAINTENANCE AND REPAIR).

Since this is not a self-priming pump, it will require an external priming device when installed in a **static lift application**. Many standard centrifugal models are equipped with a hand operated vacuum pump, exhaust primer, or ejector for this purpose. If a priming device was not furnished with the pump, it may be ordered from the factory as an option.

Before attempting to operate the priming device, close the discharge throttling valve. (Installation of a spring-loaded check valve is also recommended to facilitate priming.) Once the pump is fully primed, close the valve between the priming device and pump to preserve the prime. Start the pump, if not already in operation, and open the discharge valve slowly and fill the discharge line.

When installed in a **flooded suction application**, simply open the system valves and permit the incoming liquid to evacuate the air. After the pump and piping system have completely filled, evacuate any remaining air pockets in the pump or suction line by loosening pipe plugs or opening bleeder valves.

CAUTION

<p>Never operate this pump unless there is liquid in the casing. The pump will not prime when dry. Extended operation of a dry pump will destroy the seal assembly.</p>

Hand Primers

Hand-operated primers are usually mounted on the pump and, when operated, draw air out of the suction line and casing.

To prime a pump with a hand vacuum pump open the cock on the pump priming line. Operate the hand pump until liquid flows out of the check valve on the bottom of

the primer pump. Once the pump is primed, close the valve located between the primer and the pump so that the prime will not be lost.

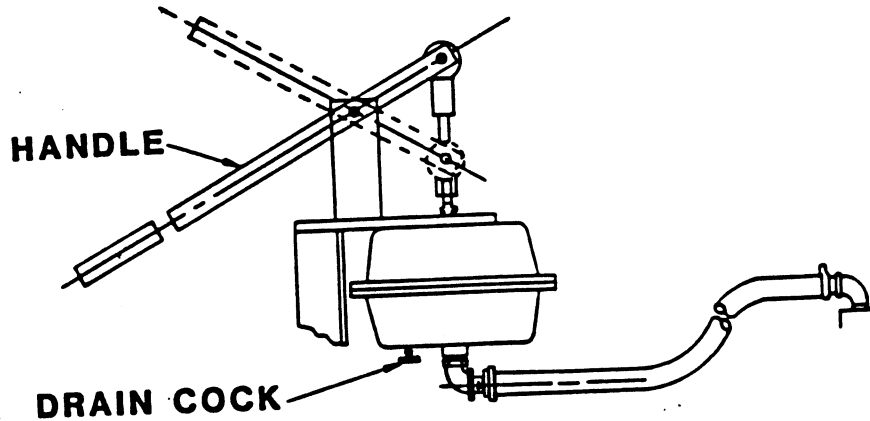


Figure 1. Hand Primer Assembly

Exhaust Primers

Engine driven pumps normally take advantage of the engine exhaust gases by using them to operate an exhaust primer. The exhaust is directed through a venturi which creates a vacuum in the pump casing in order to fill the suction line and casing with liquid.

To prime a pump using an exhaust primer, open the gas cock in the priming line and engage the exhaust primer until liquid is thrown out of the ejector nozzle.

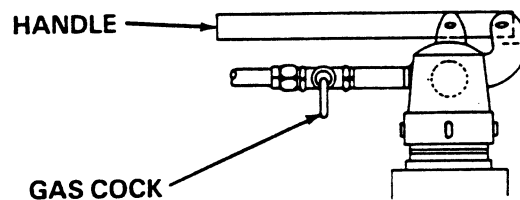


Figure 2. Exhaust Primer Assembly

Auxiliary Ejectors

Ejectors function much like exhaust primers. They may be operated by steam, compressed air, water or exhaust gases. To prime a pump using an ejector, open the gas cock in the priming line and operate the ejector until liquid is thrown out the ejector nozzle.

Vacuum Pumps

Air can be exhausted to prime a pump by using a vacuum pump. Either a wet type or a dry type vacuum pump may be used; however, a wet type is preferred since it will not be damaged if liquid enters it. If a dry vacuum pump is used, provisions must be made to keep liquid from entering it.

STARTING

Consult the operations manual furnished with the power source.

Rotation

The correct direction of pump rotation is indicated by an arrow on the pump body or accompanying decals. If the pump is operated in the wrong direction, the impeller could become loosened from the shaft and seriously damage the pump.

CAUTION

The pump must operate in the direction indicated by the arrow on the pump, or accompanying decals. Reverse rotation could loosen the impeller and seriously damage the pump.

Consult the operating manual furnished with the pump power source before attempting to start the power source.

If an electric motor is used to drive the pump, remove V-belts, couplings, or otherwise disconnect the pump from the motor before checking motor rotation. Operate the motor independently while observing the direction of the motor shaft, or cooling fan.

If rotation is incorrect on a three-phase motor, have a qualified electrician interchange any two of the three phase wires to change direction. If rotation is incorrect on a single-phase motor, consult the literature supplied with the motor for specific instructions.

OPERATION

Leakage

No leakage should be visible at pump mating surfaces, or at pump connections or fittings. Keep all line connections and fittings tight to maintain maximum pump efficiency.

OPERATION

Liquid Temperature And Overheating

The **maximum** liquid temperature for this pump is 160°F. Do not apply it at a higher operating temperature.

Overheating can occur if operated with the valves in the suction or discharge lines closed. Operating against closed valves could bring the liquid to a boil, build pressure, and cause the pump to rupture or explode. If overheating occurs, stop the pump and allow it to cool before servicing it. Refill the pump casing with cool liquid.

WARNING

```

////////////////////////////////////
//                               //
// Do not attempt to disengage any parts of an overheated //
// pump unit. Vapor pressure within the pump casing can //
// eject these parts with great force when they are disen- //
// gaged. Allow the pump to cool before servicing it. //
//                               //
////////////////////////////////////

```

Strainer Check

If a suction strainer has been shipped with the pump or installed by the user, check the strainer regularly, and clean it as necessary. The strainer should also be checked if pump flow rate begins to drop. If a vacuum suction gauge has been installed, monitor and record the readings regularly to detect strainer blockage.

Never introduce air or steam pressure into the pump casing or piping to remove a blockage. This could result in personal injury or damage to the equipment. If backflushing is absolutely necessary, **liquid pressure** must be limited to 50% of the maximum permissible operating pressure shown on the pump performance curve.

Pump Vacuum Check

Since this pump does not have a suction check valve, the discharge line must be fitted with a check valve if a pump vacuum reading is to be taken.

With the pump inoperative, install a vacuum gauge in the system, using pipe dope on the threads. Block the suction line and start the pump. At operating speed the pump should pull a vacuum of 20 inches or more of mercury. If it does not, check for air leaks in the seal, gasket, or discharge valve.

Open the suction line, and read the vacuum gauge with the pump primed and at operating speed. Shut off the pump. The vacuum gauge reading will immediately drop proportionate to static suction lift, and should then stabilize. If the vacuum reading falls off rapidly after stabilization, an air leak exists. Before checking for the source of the leak, check the point of installation of the vacuum gauge.

OPERATION

STOPPING

Never halt the flow of liquid suddenly. If the liquid being pumped is stopped abruptly, damaging shock waves can be transmitted to the pump and piping system. Close all connecting valves slowly. If the pump is driven by an engine, reduce the throttle speed slowly and allow the engine to idle briefly before stopping.

After stopping the pump, lock out the power source or take appropriate action to ensure that the pump will remain inoperative.

Cold Weather Preservation

In below freezing conditions, drain the pump to prevent damage from freezing. Also, clean out any solids by flushing with a hose. Operate the pump for approximately one minute; this will remove any remaining liquid that could freeze the pump rotating parts.

If the pump will be idle for more than a few hours, or if it has been pumping liquids containing a large amount of solids, drain the pump, and flush it thoroughly with clean water. To prevent large solids from clogging the drain port and preventing the pump from completely draining, insert a rod or stiff wire in the drain port, and agitate the liquid during the draining process. Clean out any remaining solids by flushing with a hose.

BEARING TEMPERATURE CHECK

Bearings normally run at higher than ambient temperatures because of heat generated by friction. Temperatures up to 160°F are considered normal for bearings, and they can operate safely to at least 180°F.

Checking bearing temperatures by hand is inaccurate. Bearing temperatures can be measured accurately by placing a contact-type thermometer against the housing. Record this temperature for future reference.

A sudden increase in bearing temperatures is a warning that the bearings are at the point of failing to operate properly. Make certain that the bearing lubricant is of the proper viscosity and at the correct level (see LUBRICATION in MAINTENANCE AND REPAIR). Bearing overheating can also be caused by shaft misalignment and/or excessive vibration.

When pumps are first started, the bearings may seem to run at temperatures above normal. Continued operation should bring the temperatures down to normal levels.

PUMP TROUBLESHOOTING - SECTION D

WARNING

```

////////////////////////////////////
//
// Before attempting to open or service the pump:
//
// 1. Familiarize yourself with this manual.
// 2. Disconnect or lock out the power source to ensure
//    that the pump will remain inoperative.
// 3. Allow the pump to cool if overheated.
// 4. Vent the pump slowly and cautiously.
// 5. Close the suction and discharge valves.
// 6. Check the temperature before opening any covers,
//    plates, or plugs.
// 7. Drain the pump.
//
////////////////////////////////////
    
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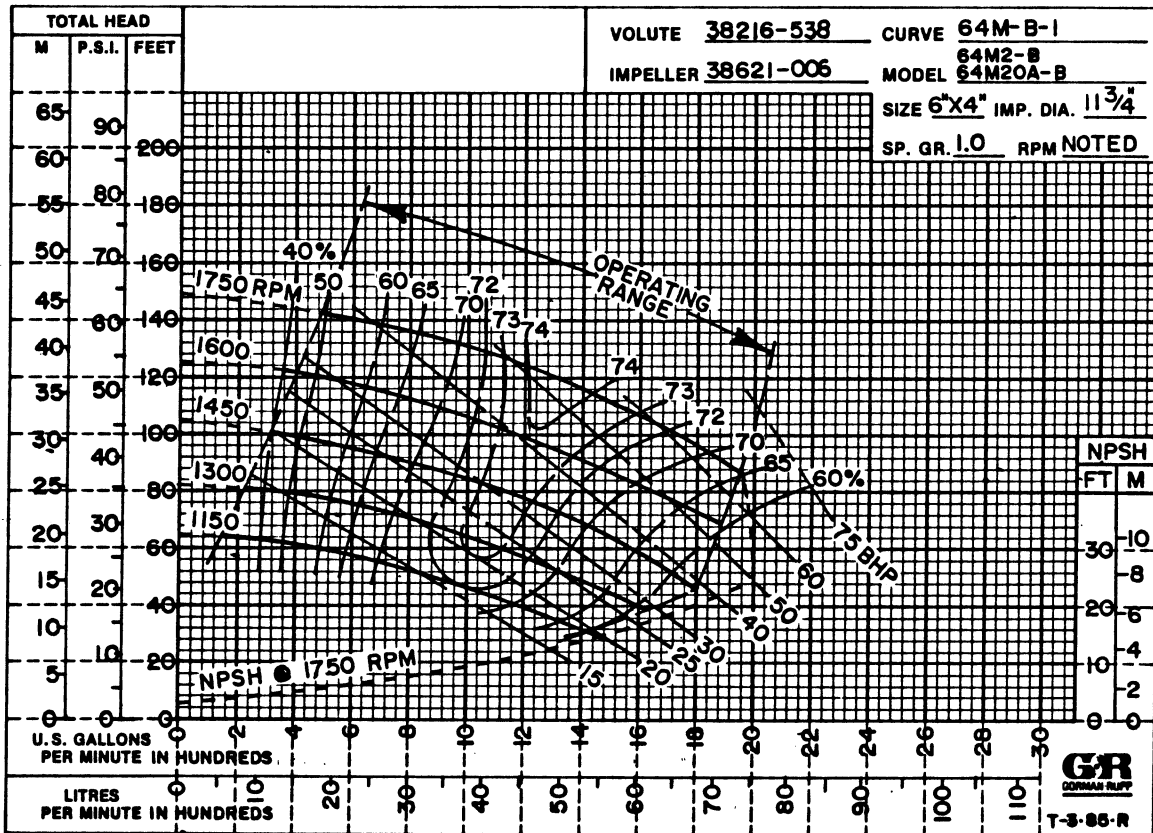
TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP FAILS TO PRIME	Auxiliary priming device faulty or improperly installed. Air leak in suction line. Lining of suction hose collapsed. Leaking or worn seal or pump gasket. Suction lift too high. Strainer clogged.	Repair priming device or check installation. Correct leak. Replace suction hose. Check pump vacuum. Replace leaking or worn seal or gasket. Measure lift w/vacuum gauge. Reduce lift and/or friction losses in suction line. Check strainer and clean if necessary.
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRES-SURE	Air leak in suction line. Suction intake not submerged at proper level or sump too small. Impeller or other wearing parts worn or damaged. Impeller clogged.	Correct leak. Check installation and correct submergence as needed. Replace worn or damaged parts. Check that impeller is properly centered and rotates freely. Free impeller of debris.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE (cont.)	Pump speed too slow.	Check driver output; check belts or couplings for slippage.
	Suction lift too high.	Measure lift w/vacuum gauge. Reduce lift and/or friction losses in suction line.
	Discharge head too high.	Reduce head.
	Cavitation in pump.	Reduce suction lift and/or friction losses in suction line. Record vacuum and pressure gauge readings and consult local representative or factory.
PUMP REQUIRES TOO MUCH POWER	Strainer clogged.	Check strainer and clean if necessary.
	Pump speed too high.	Check driver output; check that sheaves or couplings are correctly sized.
	Discharge head too low.	Adjust discharge valve.
PUMP CLOGS FREQUENTLY	Liquid solution too thick.	Dilute if possible.
	Pump speed too slow.	Check driver output; check belts or couplings for slippage.
EXCESSIVE NOISE	Liquid solution too thick.	Dilute if possible.
	Cavitation in pump.	Reduce suction lift and/or friction losses in suction line. Record vacuum and pressure gauge readings and consult local representative or factory.
	Pumping entrained air.	Locate and eliminate source of air bubble.
	Pump or drive not securely mounted.	Secure mounting hardware.
	Impeller clogged or damaged.	Clean out debris; replace damaged parts.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
BEARINGS RUN TOO HOT	<p>Bearing temperature is high, but within limits.</p> <p>Low or incorrect lubricant.</p> <p>Suction and discharge lines not properly supported.</p> <p>Drive misaligned.</p>	<p>Check bearing temperature regularly to monitor any increase.</p> <p>Check for proper type and level of lubricant.</p> <p>Check piping installation for proper support.</p> <p>Align drive properly.</p>

PUMP MAINTENANCE AND REPAIR - SECTION E

MAINTENANCE AND REPAIR OF THE WEARING PARTS OF THE PUMP WILL MAINTAIN PEAK OPERATING PERFORMANCE.

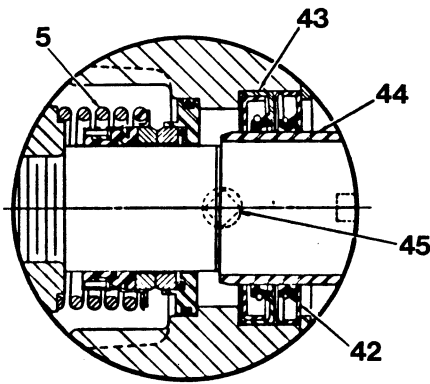


*STANDARD PERFORMANCE FOR PUMP MODEL 64M20A-B

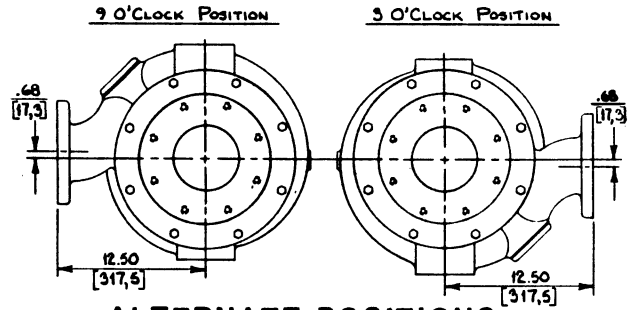
*Based on 70°F clear water at sea level with minimum suction lift. Since pump installations are seldom identical, your performance may be different due to such factors as viscosity, specific gravity, elevation, temperature, and impeller trim.

If your pump serial number is followed by an "N", your pump is NOT a standard production model. Contact the Gorman-Rupp Company to verify performance or part numbers.

SECTIONAL DRAWING



SEAL AREA DETAILS



ALTERNATE POSITIONS

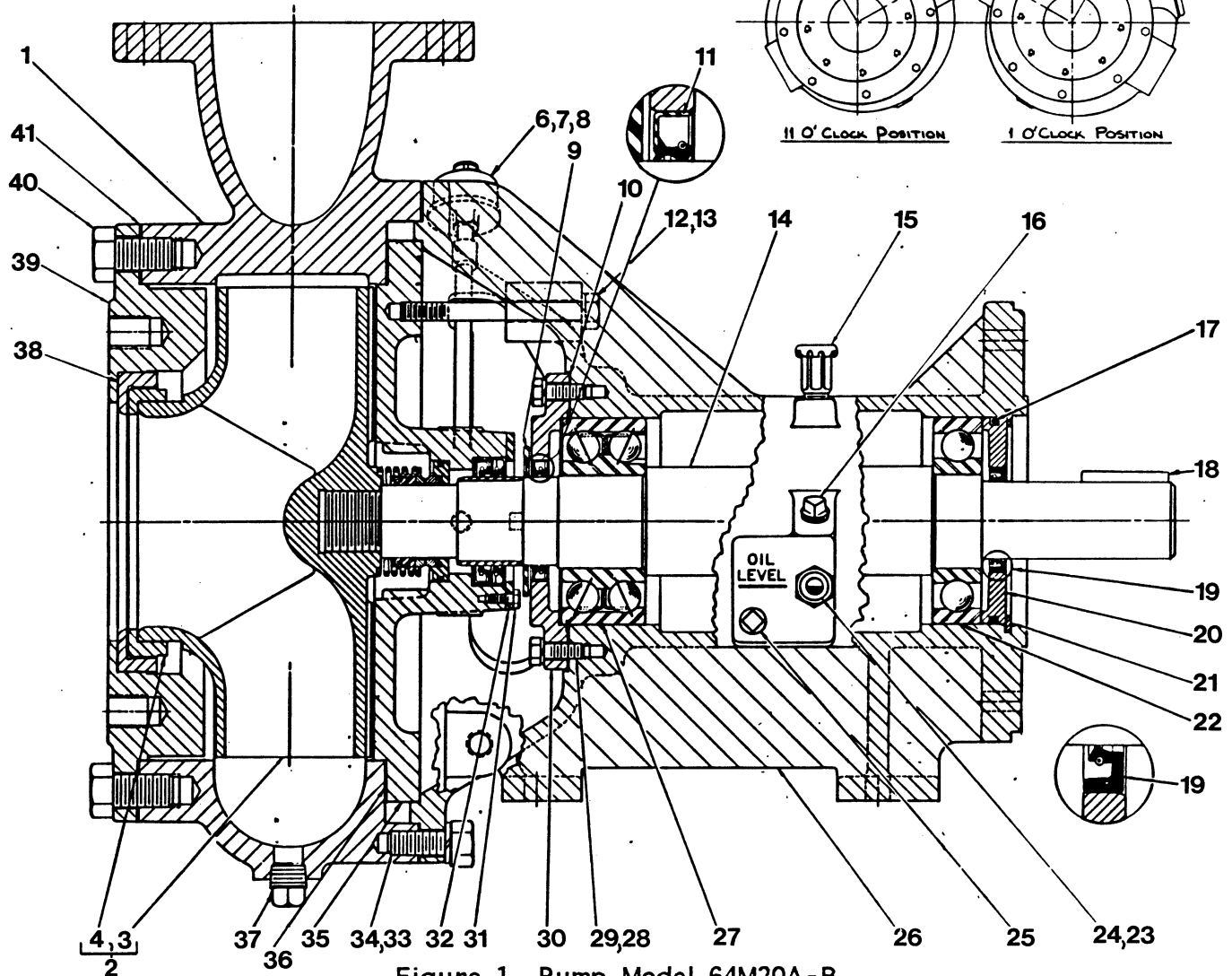
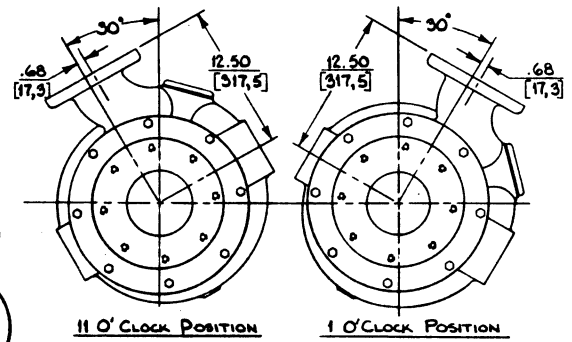


Figure 1. Pump Model 64M20A-B

PARTS LIST
PUMP MODEL 64M20A-B
 (From S/N 771150N up)

If your pump serial number is followed by an "N", your pump is **NOT** a standard production model. Contact the Gorman-Rupp Company to verify part numbers.

ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY	ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	PUMP CASING	38216-538	10010	1	27	*BALL BEARING	23422-613	-----	1
2	*IMPELLER ASSY	46154-014	-----	1	28	HEX HD CAPSCREW	B00604	15991	6
3	-IMPELLER	38621-006	11000	1	29	LOCK WASHER	J00006	15991	6
4	*-ROT WEAR RING	38691-355	1108H	1	30	BEARING COVER	38322-408	10010	1
5	*SEAL ASSEMBLY	46512-066	-----	1	31	HEX HD CAPSCREW	B00402 1/2	15991	8
6	BOTTLE OILER	46711-505	-----	1	32	SEAL RETAINER	38329-310	15020	1
7	PIPE COUPLING	AE00004	11990	1	33	HEX HD CAPSCREW	B01006	15991	12
8	PIPE NIPPLE	THA00430	15070	1	34	LOCKWASHER	J00010	15991	12
9	SLINGER RING	31134-067	19120	1	35	SEAL PLATE	38272-001	10010	1
10	*BRG COVER GSKT	38683-446	18000	1	36	*SEAL PLATE GASKET	38682-610	18000	1
11	*OIL SEAL	25258-725	-----	1	37	CASING DRAIN PLUG	P00008	11990	3
12	HEX HD CAPSCREW	B00818	15991	1	38	*STA WEAR RING	38691-356	1108H	1
13	LOCKWASHER	J00008	15991	1	39	SUCTION HEAD	38246-611	10010	1
14	*IMPELLER SHAFT	38515-564	1706H	1	40	HEX HD CAPSCREW	B01206	15991	6
15	LUBE AIR VENT	S01703	-----	1	41	*CASING GASKET SET	48211-044	-----	1
16	FILL PLUG	P00006	11990	1	42	*OIL SEAL	25227-733	-----	1
17	*BRG COVER O-RING	25152-351	-----	1	43	*OIL SEAL	25227-734	-----	1
18	*SHAFT KEY	N00809	15990	1	44	*SHAFT SLEEVE	31185-009	17030	1
19	*OIL SEAL	25217-601	-----	1	45	SEAL DRAIN PLUG	P00004	11990	5
20	BEARING COVER	38322-520	10010	1	NOT SHOWN:				
21	RETAINING RING	24121-078	-----	1		NAME PLATE	2613-C	13990	1
22	*BALL BEARING	S01911	-----	1		DRIVE SCREW	BM#04-03	15990	4
23	SIGHT GAUGE	26714-011	-----	1		SHIPPING PLUG	11495-A	11990	1
24	PIPE PLUG	P00006	11990	1		HAND HOLE COVER	38244-017	10010	1
25	DRAIN PLUG	P00006	11990	1		*COVER GASKET	38686-010	18000	1
26	PEDESTAL	38257-514	10010	1		HEX HD CAPSCREW	B00804	15991	2

*INDICATES PARTS RECOMMENDED FOR STOCK

Above Serial Numbers Do Not Apply To Pumps Made In Canada.

CANADIAN SERIAL NO AND UP

PUMP AND SEAL DISASSEMBLY AND REASSEMBLY

This pump requires little service due to its rugged, minimum-maintenance design. However, if it becomes necessary to inspect or replace the wearing parts, follow these instructions, which are keyed to the sectional view (see Figure 1) and the accompanying parts list.

Most service functions, such as seal replacement or shaft and bearing disassembly, may be performed without removing the suction and discharge piping. However, these instructions assume complete pump disassembly is required.

Before attempting to service the pump, disconnect or lock out the power source to ensure that it will remain inoperative and close all valves in the suction and discharge lines. Remove the suction and discharge piping.

WARNING

```

////////////////////////////////////
//
// Before attempting to open or service the pump:
//
// 1. Familiarize yourself with this manual.
// 2. Disconnect or lock out the power source to ensure
// that the pump will remain inoperative.
// 3. Allow the pump to cool if overheated.
// 4. Vent the pump slowly and cautiously.
// 5. Close the suction and discharge valves.
// 6. Check the temperature before opening any covers,
// plates, or plugs.
// 7. Drain the pump.
//
////////////////////////////////////

```

Pump Disassembly

Before attempting to service the pump, remove the casing drain plug (37) and drain the pump. Clean and re-install the drain plug.

For access to the impeller assembly (2), remove the hardware (33 and 34) securing the pedestal (26) to the pump casing (1). Use a hoist and sling of suitable capacity to separate the assemblies. Remove the seal plate gasket (36) and clean the mating surfaces.

Before removing the impeller assembly, remove the lowest of the seal cavity drain plugs (45) and drain the seal cavity. This will prevent oil from escaping when the impeller assembly is removed. Clean and reinstall the drain plug.

To loosen the impeller assembly, immobilize the impeller shaft (14) and tap the vanes in a counterclockwise direction (when facing the impeller) with a block of wood or a soft-faced mallet. Use caution when removing the impeller assembly, tension on the seal spring will be released as the impeller assembly is unscrewed.

Inspect the impeller (3) and rotating wear ring (4) for excessive wear and replace as required.

NOTE

The rotating wear ring is a shrink fit on the impeller and must be heated to be removed.

Inspect the stationary wear ring (38) for excessive wear. If replacement is required, remove the hardware (40) and separate the assembled suction head (39) and wear ring from the pump casing. Heat the suction head and use an arbor (or hydraulic) press to remove the wear ring.

Remove the casing gasket set (41) and clean the mating surfaces.

Seal Removal

This pump is designed with three seals: a primary mechanical seal (5) located directly behind the impeller, and two oil seals (42 and 43) located at the back of the seal oil cavity. If the liquid being pumped begins to leak past the oil seals, all three seals should be replaced as soon as possible.

Remove the seal spring, bellows retainer, and rotating element from the shaft.

To ease removal, the seal plate (35), remaining mechanical seal components, and oil seals may be removed as a single unit.

Remove the bottle oiler and piping (6, 7 and 8) from the seal plate. Remove the capscrew and lockwasher (12 and 13) and slide the seal plate, seal components and oil seals off the shaft as a single unit.

Remove the stationary element and stationary seat with O-rings from the seal plate. Disengage the hardware (31) and separate the seal retainer (32) from the seal plate. Use a stiff wire with a hooked end and a screwdriver (or other suitable tool) to pry the seals from the bore. Be careful not to scratch or damage the bore.

Inspect the shaft sleeve (44) for excessive wear or scoring. The sleeve is secured to the shaft with retaining compound. If replacement is required, use a gear puller to preload the sleeve, and heat the sleeve with a torch until it separates from the shaft. If no further disassembly is required, see **Seal Installation**.

Shaft and Bearing Removal And Disassembly

When the pump is properly operated and maintained, the pedestal should not require disassembly. Disassemble the shaft and bearings **only** when there is evidence of wear or damage.

CAUTION

Shaft and bearing disassembly in the field is not recommended. These operations should be performed only in a properly-equipped shop by qualified personnel.

Remove the slinger ring (9) and shaft key (18) from the shaft. Remove the pedestal drain plug (25) and drain the pedestal. Clean and reinstall the plug.

Disengage the hardware (28 and 29) and remove the assembled bearing cover (30) and oil seal (11). Remove the bearing cover gasket (10) and clean the mating surfaces.

Inspect the oil seal (11), and if replacement is required, press it from the bearing cover.

Place a block of wood against the drive end of the shaft and tap the shaft and assembled bearings (22 and 27) out of the pedestal.

Remove the retaining ring (21), and pull the outboard bearing cover (20), O-ring (17), and oil seal (19) from the pedestal. Remove the bearing cover O-ring (17). Inspect the oil seal, and if replacement is required, press it from the bearing cover.

Use a bearing puller to remove the inboard and outboard bearings from the impeller shaft.

Shaft and Bearing Reassembly And Installation

Clean the impeller shaft, pedestal, bearing covers, and all component parts (except bearings) with a soft cloth soaked in cleaning solvent. Inspect the parts for wear and replace as necessary.

WARNING

Warning text enclosed in a box with slashes: // Most cleaning solvents are toxic and flammable. Use them only in a well-ventilated area free from excessive heat, sparks, and flame. Read and follow all precautions printed on solvent containers.

Inspect the shaft for distortion, nicks or scratches and for thread damage on the impeller end. Dress small nicks and burrs with a fine file or honing stone. Replace the impeller shaft if defective.

Clean the bearings thoroughly in fresh cleaning solvent. Dry the bearings with filtered air and coat with light oil.

Rotate the bearings by hand to check for roughness or binding and inspect the bearing balls. If rotation is rough, or the balls are discolored, replace the bearings.

CAUTION

Bearings must be kept free of all dirt and foreign material. Failure to do so will greatly shorten bearing life. DO NOT spin dry bearings. This may scratch the balls or races and cause premature bearing failure.

The bearing tolerances provide a tight press fit onto the impeller shaft and a snug slip fit into the pedestal. If the bearings slip on and off easily, the shaft is worn and must be replaced. The pedestal must be replaced if the bearings do not fit snugly.

Lubricate the shaft with light oil and position the outboard bearing (22) on the shaft. Press the bearing onto the shaft until it seats squarely against the shaft shoulder.

CAUTION

When installing the bearings onto the shaft, NEVER press or hit against the outer race, balls, or ball cage. Press ONLY on the inner race.

Position the inboard bearing (27) on the shaft with the loading groove facing **away** from the impeller. Press the bearing onto the shaft until it seats squarely against the shaft shoulder.

Slide the shaft and assembled bearings into the pedestal until the retaining ring on the inboard bearing seats against the pedestal.

Install the oil seal (11) in the bearing cover (30) with the lip positioned as shown in Figure 1. Install the bearing cover gasket (10).

Slide the assembled bearing cover and oil seal over the shaft and secure it with the hardware (28 and 29). Be careful not to damage the oil seal lip on the shaft threads.

Install the oil seal (19) in the bearing cover (20) with the lip positioned as shown in Figure 1. Replace the bearing cover O-ring (17), and press the bearing cover into the pedestal. Be careful not to cut the oil seal lip on the shaft keyway.

Install the bearing cover retaining ring (21).

Lubricate the bearings as indicated in LUBRICATION.

Seal Installation

If the shaft sleeve (44) was removed, polish the seating surface on the shaft with No. 400 emery cloth to remove the old retaining compound.

Clean the bore of the seal plate, seal retainer and impeller shaft with a soft cloth soaked in cleaning solvent.

WARNING

```

////////////////////////////////////
//
// Most cleaning solvents are toxic and flammable. Use //
// them only in a well-ventilated area free from excessive //
// heat, sparks, and flame. Read and follow all prec- //
// autions printed on solvent containers. //
// //
////////////////////////////////////

```

Coat the sleeve I.D. and the sleeve seating surface on the shaft with "Loctite Locquic Primer Grade T" and allow to dry for approximately 5 minutes. When the primer is dry, coat the same surfaces with "Loctite RC 620" retaining compound. Install the sleeve on the shaft with the notches toward the shaft shoulder and allow to set for 5 minutes before installing the seal.

NOTE

Follow the manufacturer's recommendations for complete cure time before putting the pump back into service.

Lay the seal plate on a flat surface with the impeller side facing down.

Press the innermost oil seal (43) into the seal plate with the lip positioned as shown in Figure 1. Pack the cavity between the inner and outer oil seals with "Lubriplate Marine Lube A" grease or equivalent. Press the outer oil seal (42) into the seal plate with the lip positioned as shown in Figure 1. Install the seal retainer (32) and secure with the hardware (31).

Since the mechanical seal is the primary seal in the pump, special consideration should be given to ensure proper installation.

Clean the seal cavity and shaft with a cloth soaked in fresh cleaning solvent.

WARNING

```

////////////////////////////////////
//
// Most cleaning solvents are toxic and flammable. Use //
// them only in a well-ventilated area free from excessive //
// heat, sparks, and flame. Read and follow all prec- //
// autions printed on solvent containers. //
// //
////////////////////////////////////

```

The seal is not normally reused because wear patterns on the finished faces cannot be realigned during reassembly. This could result in premature failure. If necessary to reuse an old seal in an emergency, **carefully** wash all metallic parts in fresh cleaning solvent and allow to dry thoroughly.

Handle the seal parts with extreme care to prevent damage. Be careful not to contaminate precision finished faces; even fingerprints on the faces can shorten seal life. If necessary, clean the faces with a non-oil based solvent and a clean lint free tissue. Wipe **lightly** in a concentric pattern to avoid scratching the faces.

Inspect the seal components for wear, scoring, grooves, and other damage that might cause leakage. Clean and polish the shaft sleeve, or replace it if there are nicks or cuts on either end. If any components are worn, replace the complete seal; **never mix old and new seal parts.**

If a replacement seal is being used, remove it from the container and inspect the precision finished faces to ensure that they are free of any foreign matter.

To ease installation of the seal, lubricate the O-rings and bellows with water or a very **small** amount of oil, and apply a drop of light lubricating oil on the finished faces. Assemble the seal as follows, (see Figure 2).

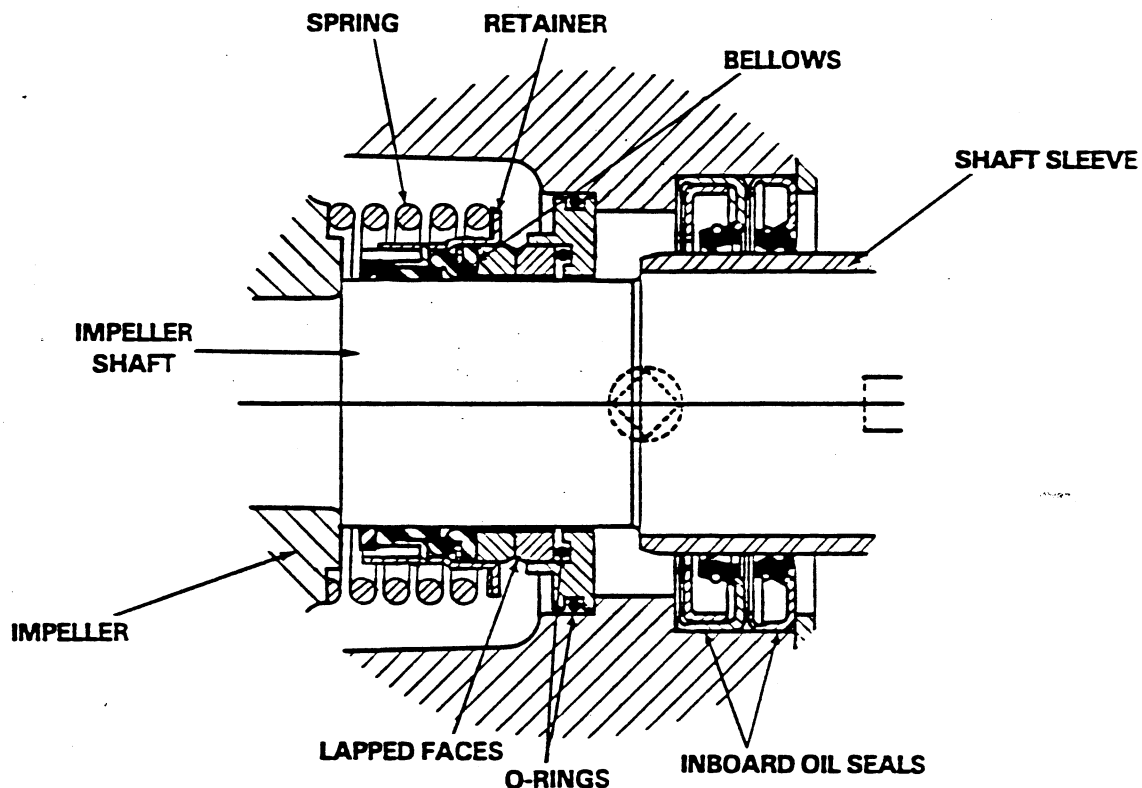


Figure 2. 46512-066 Seal Assembly

CAUTION

This seal is not designed for operation at temperatures above 160°F. Do not use at higher operating temperatures.

Subassemble the stationary seat, O-rings and stationary seal element. Turn the seal plate over, and press this subassembly into the front of the seal plate until the stationary seat sits squarely against the shoulder bore. **Be careful** not to damage the seal face.

Install the slinger ring (9) on the impeller shaft. Slide the assembled seal plate, oil seals and stationary subassembly over the impeller shaft, being careful not to damage the oil seals or stationary element on the shaft threads. Secure the seal plate to the pedestal with the hardware (12 and 13).

Subassemble the rotating element and bellows retainer as shown in Figure 2 and position this subassembly on the end of the shaft. Apply firm, steady pressure on the seal retainer until it slides onto the shaft and the rotating element makes contact with the stationary element. Install the seal spring.

NOTE

It is recommended that a tapered sleeve be installed over threads of the impeller shaft to ease installation of the rotating seal elements.

Install the bottle oiler and piping (6, 7 and 8) in the seal plate.

Lubricate the seal assembly as indicated in **LUBRICATION** after the impeller has been installed and the pump reassembled.

Pump Reassembly

Inspect the impeller, and replace it if cracked or badly worn. If the wear ring (4) was removed for replacement, chill the impeller by refrigeration or other means. Heat the wear ring and press it onto the shoulder on the front of the impeller.

CAUTION

When replacing the rotating wear ring, the wear ring **MUST** seat squarely on the impeller. Otherwise, binding and/or excessive wear will occur as the shaft turns.

Screw the impeller assembly onto the shaft until tight.

Replace the seal plate gasket (36). Slide the pump casing over the impeller and secure the pedestal to the casing with the hardware (33 and 34),

If the stationary wear ring (38) was removed for replacement, chill the wear ring and heat the suction head. Press the wear ring into the bore until it seats squarely against the shoulder.

CAUTION

When replacing the stationary wear ring, the wear ring **MUST** seat squarely in the suction head. Otherwise, binding and/or excessive wear will occur as the shaft turns.

A clearance of .024 to .036 inch between the stationary and rotating wear rings is necessary for maximum pump efficiency. To set this clearance, install the casing gasket set (41) and secure the suction head to the pump casing with the hardware (40). Reach through the suction head with a feeler gauge to measure the gap, and add or remove gaskets from the gasket set until the dimension is obtained.

Install the suction and discharge lines and open all valves. Fill the pump casing with clean liquid, check that all piping connections are secure, and reconnect the power source.

Lubricate the pump as indicated in **LUBRICATION** before starting the power source.

LUBRICATION

Seal Assembly

Fill the seal bottle oiler (6) with SAE No. 30 non-detergent oil.

Bearings

The pedestal was fully lubricated when shipped from the factory. Check the oil level regularly through the sight gauge (23) and maintain it at the mid-point of the gauge. When lubrication is required, remove the air vent (15) and add SAE No. 30 non-detergent oil through the opening. **Do not** over-lubricate the pedestal. Over-lubrication will cause the bearings to overheat, resulting in premature bearing failure.

NOTE

The white reflector on the sight gauge must be positioned horizontally to provide proper drainage.

Under normal conditions, drain the pedestal once each year and refill with clean oil. Change the oil more frequently if the pump is operated continuously or installed in an environment with rapid temperature change.

CAUTION

Monitor the condition of the bearing lubricant regularly for evidence of rust or moisture condensation. This is especially important in areas where variable hot and cold temperatures are common.

For cold weather operation, consult the factory or lubricant supplier for the recommended grade of oil.

**For U.S. and International Warranty Information,
Please Visit www.grpumps.com/warranty
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U.S.: 419-755-1280
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or call:
519-631-2870**