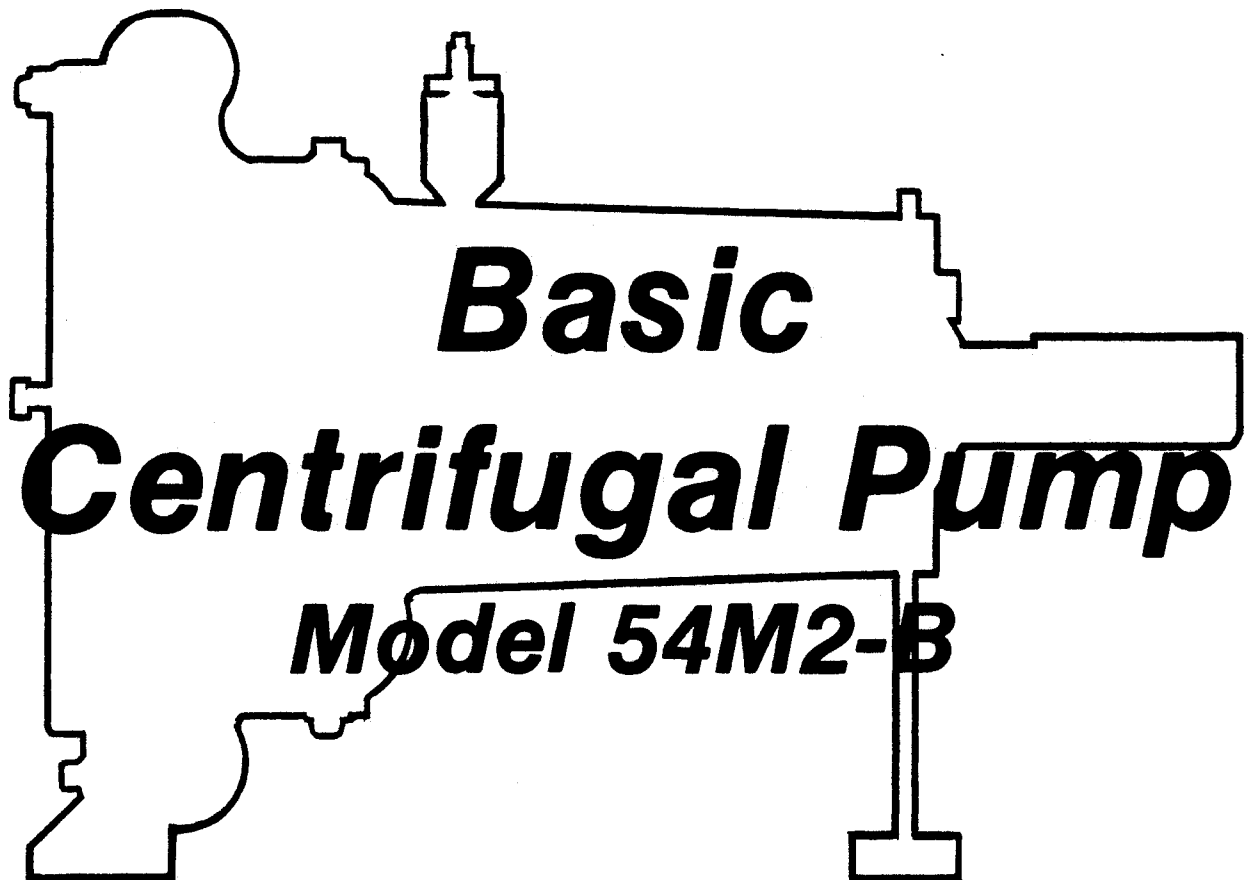


**INSTALLATION, OPERATION, PARTS LIST,
AND MAINTENANCE MANUAL**

ACE



February 26, 1981



THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA

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

This pump is a 50 Series, enclosed impeller, centrifugal model. It is specifically designed for the pumping of clean liquids at high heads and high discharge pressures.

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

The Gorman-Rupp Company
P.O. Box 1217
Mansfield, Ohio 44902

Gorman-Rupp of Canada Limited
70 Burwell Road
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, or 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 describe the procedure required and the damage which could result from failure to follow the procedure.

WARNING

Instructions which must be followed to avoid causing injury or death to personnel. These describe the procedure required and the injury which could result from failure to follow the procedure.

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WARNINGS

THESE WARNINGS APPLY TO ALL 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 START THE POWER SOURCE.

Before attempting to open or service the pump:

1. Familiarize yourself with this manual.
2. Disconnect 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.

Do not attempt to pump volatile or corrosive materials for which this pump has not been designed.

After the pump has been located in its operating position, make certain that the pump has been secured before attempting to operate it.

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

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.

Overheated pumps can cause severe burns and injury. If overheating of the pump casing occurs:

1. Stop the pump immediately.
2. Allow the pump to cool.
3. Refer to instructions in this manual before restarting the pump.

Do not remove plates, covers, gauges, pipe plugs, or fittings from an overheated pump. Vapor pressure within the pump can cause parts being disengaged to be ejected with great force. Allow the pump to cool before servicing.

INSTALLATION

Seldom are two pump installations identical. The information presented in this section is a summary of the recommended installation practices related to inspection, pump positioning, hardware, suction and discharge piping, and sumps. For further assistance, contact your Gorman-Rupp distributor or the Gorman-Rupp Company.

PREINSTALLATION INSPECTION

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

- a. Inspect the pump assembly for cracks, dents, damaged threads, and other obvious damage.
- b. Check for and tighten loose bolts, nuts, cap screws, and other attaching hardware. Since gaskets tend to shrink after drying, check for and tighten loose nuts and cap screws securing mating surfaces.
- c. Carefully read all tags, decals, and markings on the pump assembly, and perform all duties indicated. Note the direction of rotation indicated on the pump. Check that the pump shaft rotates in the required direction.

CAUTION

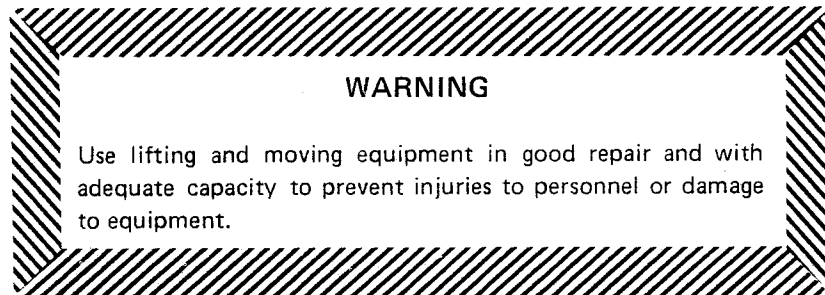
Only operate this pump in the direction indicated by the arrow on the pump body and on the accompanying decal. Otherwise, the impeller could become loosened from the shaft and seriously damage the pump.

- d. Check all lubricant levels and lubricate as necessary. Refer to the MAINTENANCE AND REPAIR section of this manual.

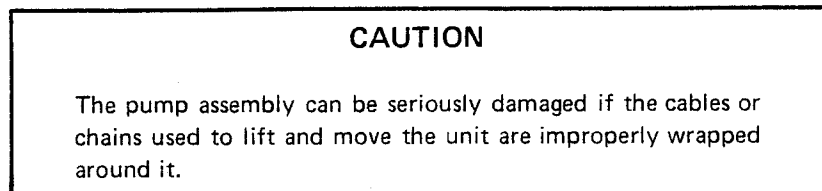
POSITIONING THE PUMP

Mounting

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

Lifting

Make sure that hoists and other lifting equipment are of sufficient capacity to safely handle the pump assembly. If chains and cables are used, make certain that they are positioned so that they will not damage the pump, and so that the load will be balanced.

**SUCTION AND DISCHARGE PIPING****Materials**

Either pipe or hose may be used for suction and discharge lines, but hose used in suction lines must be the rigid-wall, reinforced type to prevent collapse under suction. Using pipe 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

Never pull a pipe line into place by tightening the flange bolts. The connecting flange must be aligned exactly with the pump port. Lines near the pump must be independently supported to avoid strain on the pump which could cause serious vibration, decreased bearing life, and increased shaft and seal wear. Hose-type lines should have supports strong enough to secure the line when it is 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 close to the pump before installing the lines.

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 down or to either side to avoid air pockets.

Strainers

Install a strainer at the end of the suction line to avoid possible clogging or damage to the pump. The total area of the openings in the strainer should be at least three or four times the cross section of the suction line; but no opening should be larger than the solids handling capability of the pump. Clean the strainer regularly during operation.

Sealing

All connections in the suction line should be sealed with pipe dope to ensure an airtight seal. Even a slight leak will affect priming, head, and capacity, especially when operating with a high suction lift. After installation, inspect the suction line carefully for potential leaks.

DISCHARGE LINES

Throttling Valves

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

Check Valves

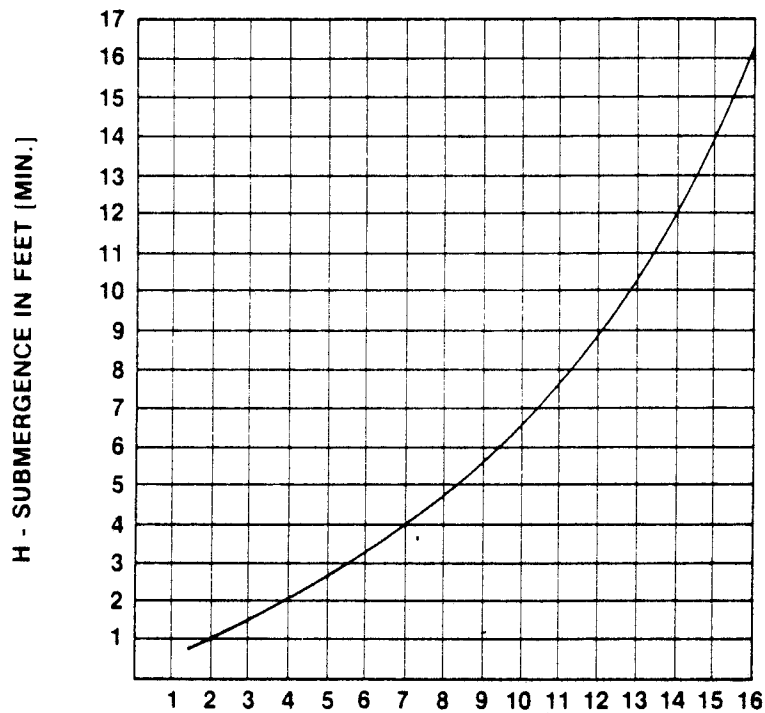
A check valve in the discharge line is normally recommended, but is not necessary in low discharge head applications.

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

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 could result, causing damage to the pump.

SUCTION LINE POSITIONING

The depth of submergence of the suction line is critical to efficient pump operation. Figure 1 shows recommended minimum submergence vs. velocity.



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

Figure 1. Recommended Minimum Suction Line Submergence Vs. Velocity

OPERATION

WARNING

Do not attempt to pump volatile or corrosive materials for which this pump has not been designed.

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).

This is not a self-priming pump and therefore will normally require an external priming device. Many Gorman-Rupp pumps are equipped with an exhaust primer or a hand-operated vacuum pump for priming purposes. Pumps not equipped with either of these devices require the use of an external priming device such as an ejector or vacuum pump.

Normally, pumps are equipped with a spring-loaded check valve, and this valve should be closed before priming. Once the pump is primed, close the valve between the priming device and the pump so that the prime will not be lost.

Hand Primers

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

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.

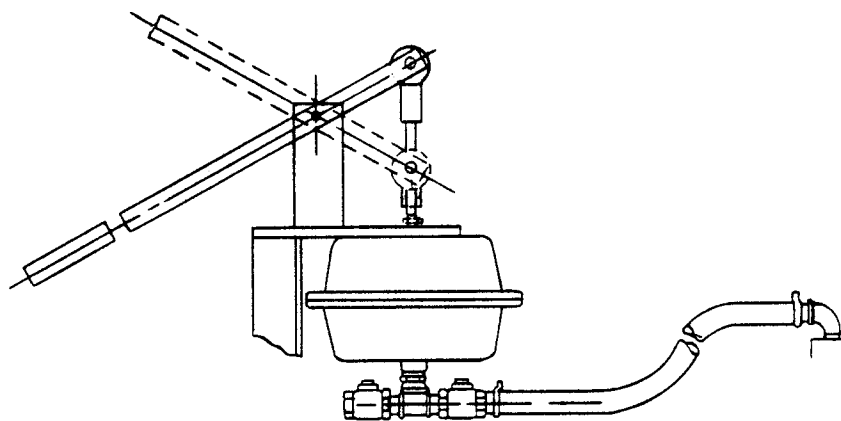


Figure 1. Hand Primer Assembly

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 volute in order to fill the suction line and volute 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.

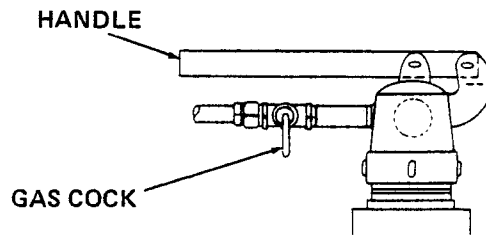


Figure 1. Exhaust Primer Assembly

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

Starting procedures will vary slightly depending on the pump application, type of priming device, and type of drive.

Consult the operating manual furnished with the power source.

Rotation

The correct direction of pump rotation is indicated by an arrow on the pump body and on the accompanying decal. If the pump is operated in the wrong direction, the impeller could become loosened and the pump damaged.

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.

When checking the rotation of a pump driven by a three-phase electric motor, start the pump for a moment to see if the rotation is correct. If the shaft, coupling, or V-belt is not visible, rotation can usually be determined by observing the motor cooling fan. If the rotation is incorrect, have qualified personnel interchange any two of the three-phase wires to change direction.

Lines

Open all valves in the discharge line and start the power source. Priming is indicated by a positive reading on the discharge pressure gauge or by quieter operation. The pump may not prime immediately because the suction line must first fill with liquid. If the pump fails to prime within five minutes, stop it and check the suction line for leaks.

After the pump has been primed, partially close the discharge line throttling valve in order to fill the line slowly and guard against excessive shock pressure which could damage pipe ends, gaskets, sprinkler heads, and any other fixtures connected to the line. When the discharge line is completely filled, adjust the throttling valve to the required discharge flow rate.

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.

Overheating

Overheating can occur if the valves in the suction or discharge lines are 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 volute casing with cool liquid.

WARNING

Do not remove plates, covers, gauges, pipe plugs, or fittings from an overheated pump. Vapor pressure within the pump can cause parts being disengaged to be ejected with great force. Allow the pump to cool before servicing.

Strainer Check

Check the suction strainer regularly during pump operation, or if the pump flow rate begins to drop, and clean it as necessary. Be especially alert for unusual noises when pumping liquids containing solids.

Pump Vacuum Check

Install a vacuum gauge in the system, using pipe dope on the threads.

The pump should pull a vacuum of 20 inches or more of mercury at operating speed with the suction line blocked. If it does not, check for air leaks in the seal or gaskets.

With the pump primed and at operating speed, and the suction line open, read the vacuum gauge. Shut off the pump, keep the vacuum line open, and read the gauge again to see if the vacuum remains at the maximum developed by the pump. If the vacuum falls off rapidly, an air leak exists. If the liquid level at the source of supply remains at a constant level, check to make certain that the air leak is not from the vacuum gauge connection.

STOPPING

After stopping the pump, disconnect the power source to ensure that the pump will remain inoperative.

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, 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, operate the pump 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 pedestal bearings, and they can operate safely to at least 180°F.

Checking bearing temperatures by hand is inaccurate. They 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. Dynamic operation will bring the temperatures down to normal levels.

TROUBLESHOOTING

WARNING

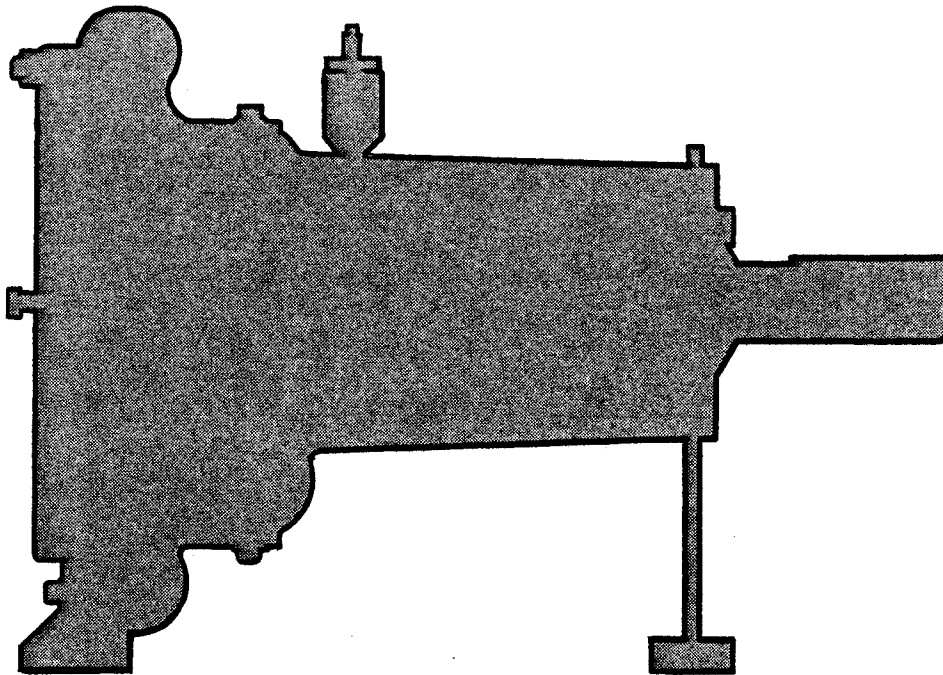
Before attempting to open or service the pump:

1. Consult pump service manual.
2. Disconnect the power source to ensure that the pump will remain inoperative.
3. Allow pump to cool if overheated.
4. Close suction and discharge valves.
5. Drain pump.

Trouble	Possible Cause	Probable Remedy
PUMP FAILS TO PRIME	<p>Air leak in suction line.</p> <p>Lining of suction hose collapsed.</p> <p>Suction check valve clogged or binding.</p> <p>Leaking or worn seal or pump gasket.</p> <p>Suction lift or discharge head too high.</p> <p>Suction strainer clogged.</p>	<p>Correct leak.</p> <p>Replace suction hose.</p> <p>Clean valve.</p> <p>Check pump vacuum. Replace leaking or worn seal or gasket.</p> <p>Check piping installation and install bypass line if needed. See INSTALLATION.</p> <p>Clean suction strainer.</p>
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE	<p>Air leak in suction line.</p> <p>Suction intake not submerged at proper level or sump too small.</p> <p>Lining of suction hose collapsed.</p> <p>Impeller or other wearing parts worn or damaged.</p> <p>Impeller clogged.</p> <p>Pump speed too slow.</p> <p>Discharge head too high.</p> <p>Suction lift too high.</p>	<p>Correct leak.</p> <p>Check installation and correct as needed. Check submergence chart (Section B, page 4).</p> <p>Replace suction hose.</p> <p>Check impeller clearance. Replace worn parts as needed.</p> <p>Free impeller of debris.</p> <p>Check driver output; check belts or couplings for slippage.</p> <p>Install bypass line.</p> <p>Reduce suction lift.</p>

Trouble	Possible Cause	Probable Remedy
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE (cont)	<p>Leaking or worn seal or pump gaskets.</p> <p>Suction strainer clogged.</p>	<p>Check pump vacuum. Replace leaking or worn seal or pump gaskets.</p> <p>Clean suction strainer.</p>
PUMP REQUIRES TOO MUCH POWER	<p>Pump speed too high.</p> <p>Discharge head too low.</p> <p>Liquid solution too thick.</p>	<p>Check driver output; check that sheaves or couplings are correctly sized.</p> <p>Adjust discharge valve.</p> <p>Dilute if possible.</p>
PUMP CLOGS FREQUENTLY	<p>Discharge flow too slow.</p> <p>Suction check valve clogged or binding.</p>	<p>Open discharge valve fully to increase flow rate, and run engine at maximum governed speed.</p> <p>Free valve, and clean or replace it.</p>
EXCESSIVE NOISE	<p>Cavitation in pump.</p> <p>Pumping entrained air.</p> <p>Pump or drive not securely mounted.</p> <p>Impeller clogged or damaged.</p>	<p>Reduce suction lift and/or friction losses in suction line.</p> <p>Locate and eliminate source of air bubble.</p> <p>Secure mounting hardware.</p> <p>Clean out debris; replace damaged parts.</p>
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.</p> <p>Check for proper type and level of lubricant.</p> <p>Check piping installation for proper support.</p> <p>Align drive properly.</p>

Basic Centrifugal Pump Model 54M2-B



The only moving parts of this pump are the impeller, seal rotating elements, and the shaft. The wear ring, impeller, and seal, which receive the most wear, are easily accessible and can be replaced by removing the cover without disturbing the volute casing and piping. Maintenance and replacement of these three parts will maintain the peak operating efficiency of the pump.

SECTIONAL DRAWING

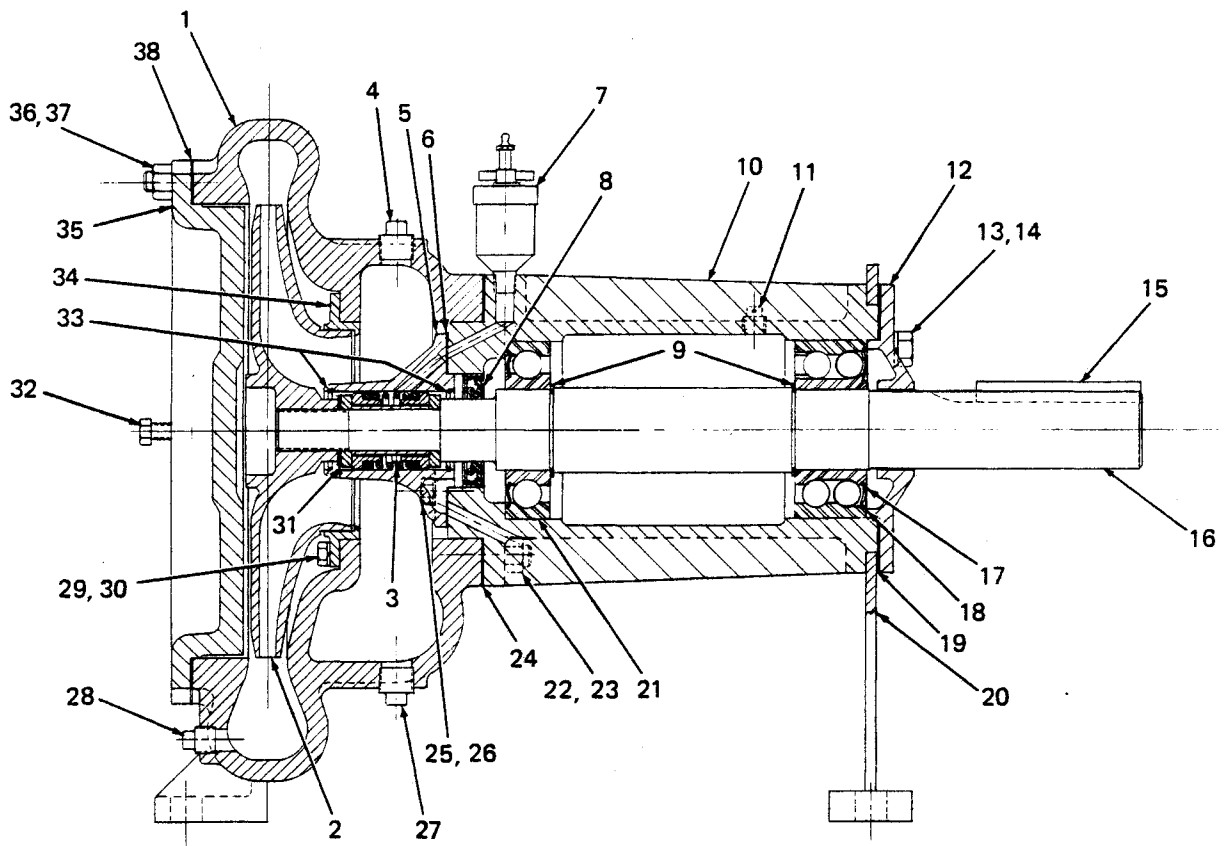


Figure 1. Pump Model 54M2-B



PARTS LIST
PUMP MODEL 54M2-B
(From S/N 480083 up)

ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY	ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	VOLUTE CASING	4270-A	10010	1	24	★VOLUTE GASKET	5567-G	18000	1
2	★IMPELLER	4868-A	10010	1	25	HEX HEAD CAPSCREW	B-0604	14990	4
3	★SEAL ASSEMBLY	GS-1000	—	1	26	LOCKWASHER	J-06	15991	4
4	ACCESSORY PLUG	P-08	11990	1	27	VOLUTE DRAIN PLUG	P-08	11990	1
5	SEAL HOUSING	956-A	14010	1	28	VOLUTE DRAIN PLUG	P-06	11990	1
6	★SEAL HOUSING GASKET	956-AG	18000	1	29	LOCKWASHER	J-05	15991	2
7	★SEAL GREASE CUP	S-36	—	1	30	HEX HEAD CAPSCREW	B-0503	14990	2
8	★OIL SEAL	S-734	—	1	31	★IMPELLER SHIM SET	2-X	17090	1
9	★BEARING RETAINING RING	S-1164	—	2	32	HEX HEAD CAPSCREW	B-0604	15991	2
10	PEDESTAL	5579	10010	1	33	★SNAP RING	S-593	—	2
11	★VENTED PEDESTAL PLUG	4823	11990	1	34	★IMPELLER WEAR RING	4869	14000	1
12	★BEARING CAP	5558	10010	1	35	COVER PLATE	2202-B	10010	1
13	HEX HEAD CAPSCREW	B-0805	15991	4	36	HEX NUT	D-08	15991	12
14	LOCKWASHER	J-08	15991	4	37	STUD	C-0807	15991	12
15	★SHAFT KEY	N-0816	15990	1	38	★COVER GASKET	2202-G	18000	1
16	★IMPELLER SHAFT	5581-A	16040	1		NOT SHOWN:			
17	★BALL BEARING	S-1032	—	1		STRAINER	S-1528	—	1
18	★BEARING SHIM SET	8546	15990	1		OPTIONAL:			
19	★BEARING CAP GASKET	5558-G	18000	1		SUCTION FLANGE	1756-A	10010	1
20	PEDESTAL FOOT	5580	24000	1		DISCHARGE FLANGE	1756-A	10010	1
21	★BALL BEARING	S-616	—	1		HAND PRIMER	GRP43-2	—	1
22	STUD	C-0807	15991	8		DISCH CHECK VALVE	GRP14-4A	—	1
23	HEX NUT	D-08	15991	8					

★ 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. If it becomes necessary to inspect and/or replace the wearing parts, however, follow these instructions, which are keyed to the sectional view (see figure 1) and the accompanying parts list.

Pump Disassembly

Disconnect the power source, making certain that it will remain inoperative while the pump is being serviced, and close all connecting valves. Remove the volute drain plugs (27 and 28) to drain the pump.

Remove the hex nuts (36) securing the cover plate (35) to the volute casing (1) for access to the wear ring (34), impeller (2), and seal assembly (3).

To remove the impeller, block the shaft (16) or power source to prevent rotation, and using an impeller wrench, turn the impeller in the direction of pump rotation. Unscrew the impeller and replace it if scored or badly worn.

Remove the impeller adjusting shims (31). For ease of reassembly, tag and tie the shims, or measure and record their thickness.

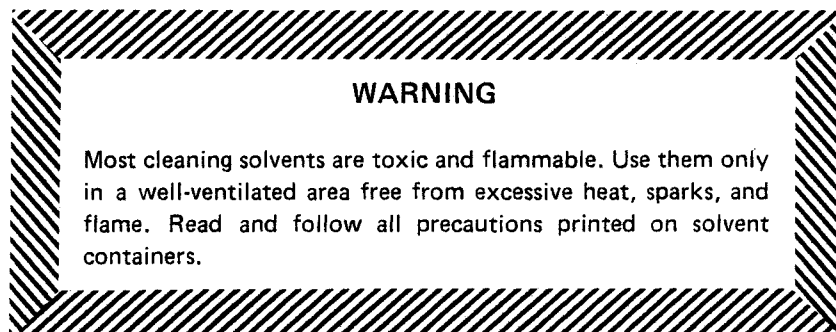
Inspect the wear ring, and replace it if scored or worn.

Seal Disassembly

Before removing the seal assembly, turn the cross arm on the seal grease cup (7) clockwise until it rests against the cover (see figure 3). This will prevent the grease in the cup from escaping after the seal is removed.

Carefully remove the seal spring, the shaft sleeve, and the stationary and rotating seal elements, using a stiff wire with a hooked end if necessary.

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

**Seal Reassembly**

The seal is not normally reused because of the high polish on its lapped faces, but if it is necessary to reuse the old seal, wash all metallic parts in cleaning solvent and dry thoroughly.

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

CAUTION

This seal is not designed for operation at temperatures above 110°F. Do not use at higher operating temperatures.

Reinstall the shaft sleeve, and install the replacement seal as a complete unit.

Lubricate the packing rings with soft grease or oil when installing the seal, and place a drop of light lubricating oil on the lapped faces. Assemble the seal as shown in figure 2.

Before starting the pump, fill the grease cup through the grease fitting with a good grade of No. 2 pressure gun grease until grease escapes from the relief hole. Turn the grease cup arm counterclockwise until it is at the top of the stem; this will release the spring to apply grease to the seal (see figure 3).

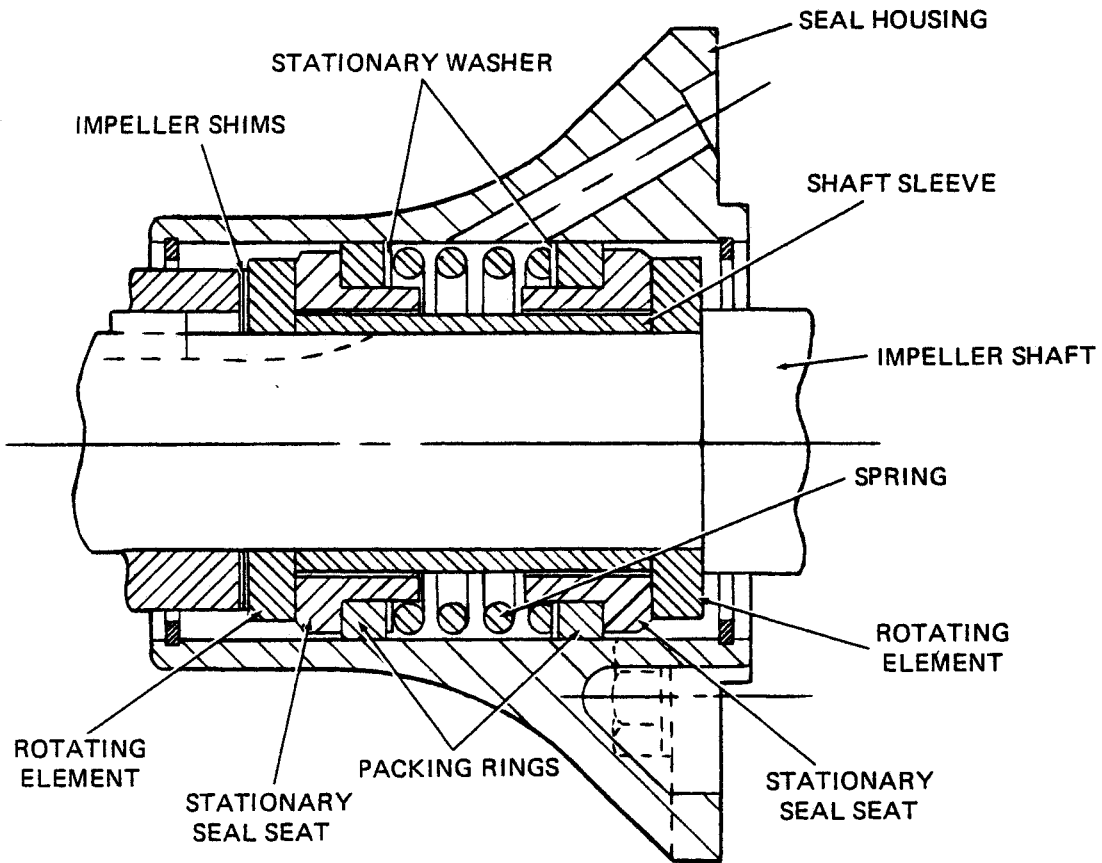


Figure 2. GS-1000 Seal Assembly

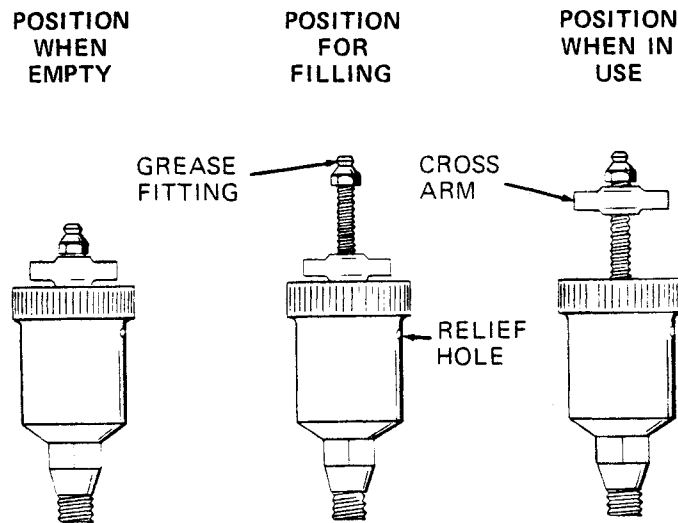


Figure 3. Automatic Lubricating Grease Cup

Pump Reassembly

Reinstall the impeller adjusting shims and the impeller. It is necessary for the impeller to be centered in the volute scroll for maximum pump efficiency. Measure this clearance and add or subtract impeller shims until it is reached.

Reassemble the cover plate to the volute casing, replacing the cover gasket (38).

Before starting the pump, turn the impeller shaft to be sure the impeller does not bind or scrape.

Clean and reinstall the volute drain plugs.

LUBRICATION

Seal Assembly

Before starting the pump, fill the grease cup through the grease fitting with a good grade of No. 2 pressure gun grease until grease escapes from the relief hole. Turn the grease cup arm counterclockwise until it is at the top of the stem; this will release the spring to apply grease to the seal (see figure 3).

Bearings

When shipped from the factory, the pump contains sufficient grease to lubricate the bearings for approximately 5,000 operating hours. Do not lubricate sooner than required. When additional grease is required, remove the vented pedestal plug (11) and fill the pedestal cavity with No. 0 pressure gun grease until the cavity is approximately one third full, or just below the shaft. Clean and reinstall the vented pedestal plug.

**For U.S. and International Warranty Information,
Please Visit www.grpumps.com/warranty
or call:
U.S.: 419-755-1280
International: +1-419-755-1352**

**For Canadian Warranty Information,
Please Visit www.grcanada.com/warranty
or call:
519-631-2870**