

July 6, 1984

# **50**SERIES

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

MODEL

**54A2-B**

**THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO**

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

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## INTRODUCTION

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

This pump is a 50 Series, centrifugal model with an enclosed impeller. This pump is designed for pumping clean liquids at high heads and high discharge pressures. The basic material of construction for wetted parts is gray iron, with alloy steel impeller shaft.

If there are any questions regarding the pump or its 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  
P.O. Box 1217  
Mansfield, Ohio 44901

or 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, 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 50 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

```
//////////////////////////////////////  
//  
// Do not attempt to pump volatile, corrosive, or flammable //  
// materials, or any liquids for which this pump has not //  
// been designed. //  
//  
//////////////////////////////////////
```

## WARNING

```
//////////////////////////////////////  
//  
// After the pump has been installed, make certain that the //  
// pump and all piping connections are tight, properly sup- //  
// ported and secure before operation. //  
//  
//////////////////////////////////////
```

## WARNING

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

---

---

**WARNINGS**

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**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 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 servic- //  
// ing. //  
//  
////////////////////////////////////
```



---

---

## INSTALLATION

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### 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 pressure developed by the pump. (See Section E, Page 1). If the pump is fitted with a Gorman-Rupp double grease lubricated seal, the maximum incoming pressure must be reduced to 10 p.s.i..

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.

## OUTLINE DRAWING

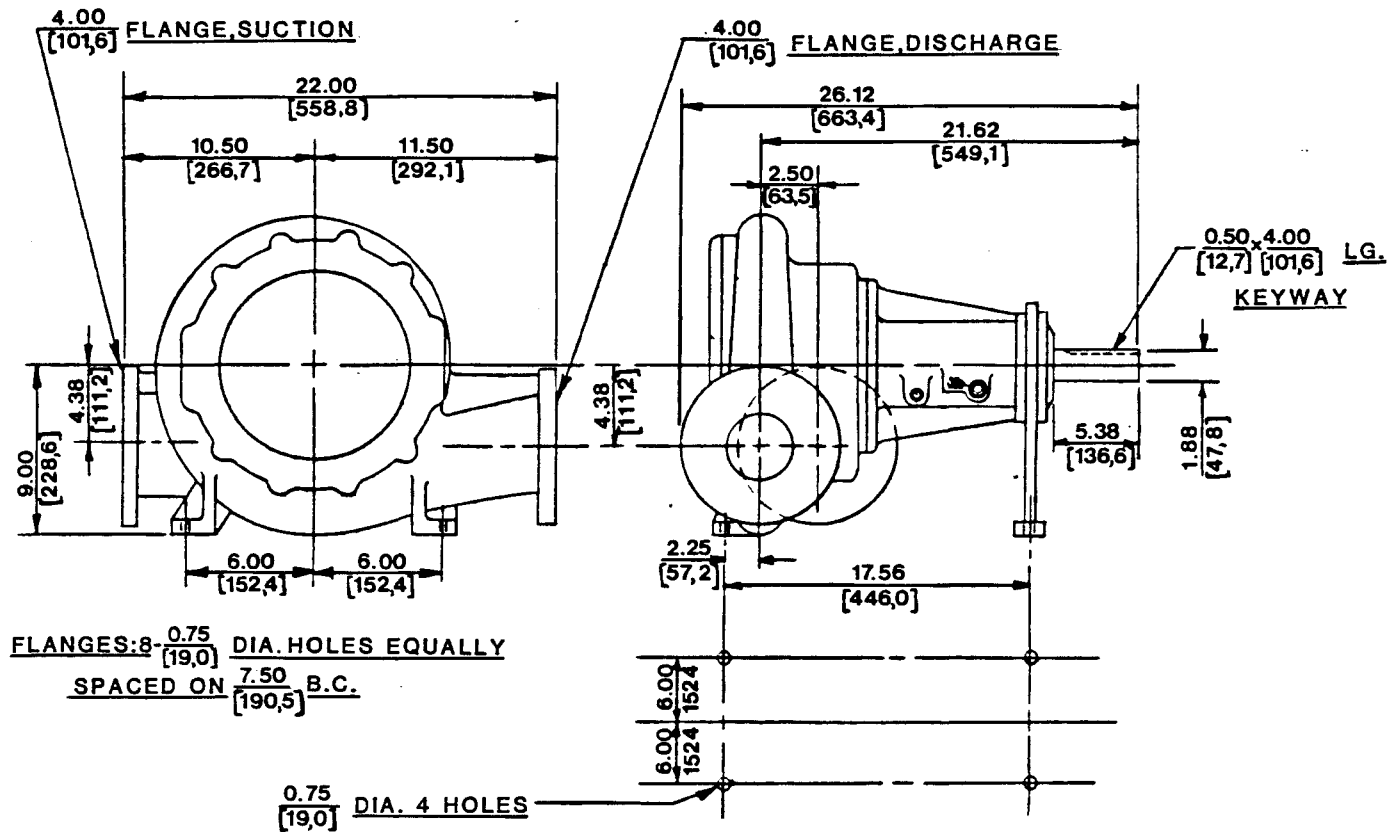


Figure 1. Pump Model 54A2-B

## 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 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 tags, decals, and markings on the pump assembly, and perform all duties indicated. Note the direction of rotation indicated

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## INSTALLATION

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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 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

### Lifting

Use lifting equipment with a capacity of at least **1,300 pounds**. This pump weighs approximately **260 pounds**, not including the weight of accessories and base. Customer installed equipment such as suction and discharge hoses **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.

## INSTALLATION

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### Clearance

A minimum clearance of **24 inches** in front of the cover plate is required to permit removal of the cover and easy access to the pump interior.

### SUCTION AND DISCHARGE PIPING

Pump performance is adversely effected by increased suction lift, discharge elevation, and friction losses. See the performance curve and recommendations on Page E-1 to be sure your overall application allows pump to operate within the safe operation range.

### 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 1/2 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.

## INSTALLATION

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).

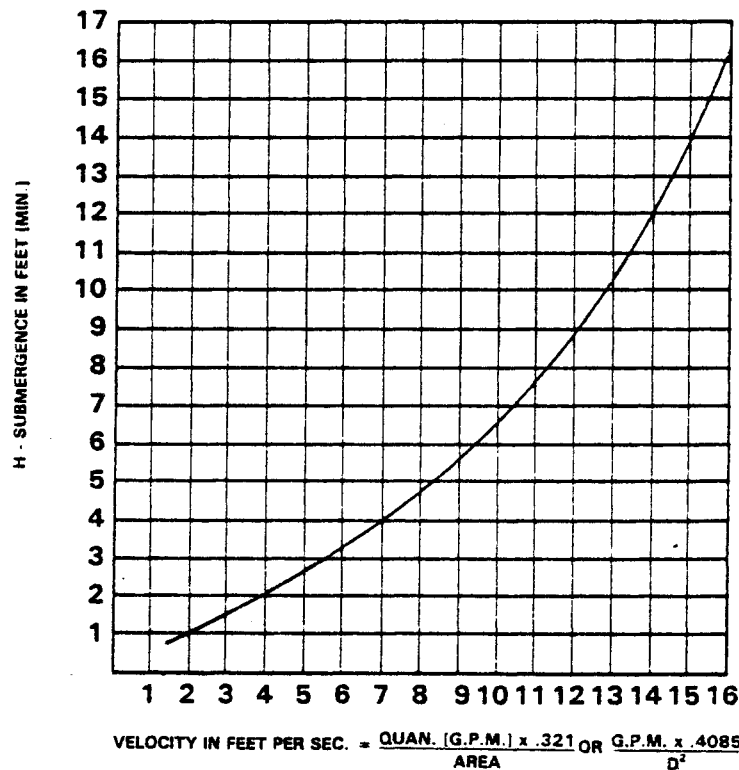


Figure 2. Recommended Minimum Suction Line Submergence Vs. Velocity

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## 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.

### Bypass Lines

If it is necessary to permit the escape of air to atmosphere during initial priming or in the repriming cycle, install a bypass line - sized so that it will not affect pump discharge capacity - between the pump and the discharge check valve. Since this pump does not use a suction check valve, the discharge end of the bypass line must be submerged in the liquid being pumped in order to maintain suction.

## 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 can occur in transit and handling. Pumps should be checked, and realigned if necessary, before being put into 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.

## INSTALLATION

## 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).

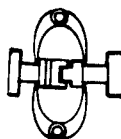


Figure 3a. Aligning Spider-Type Couplings





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.

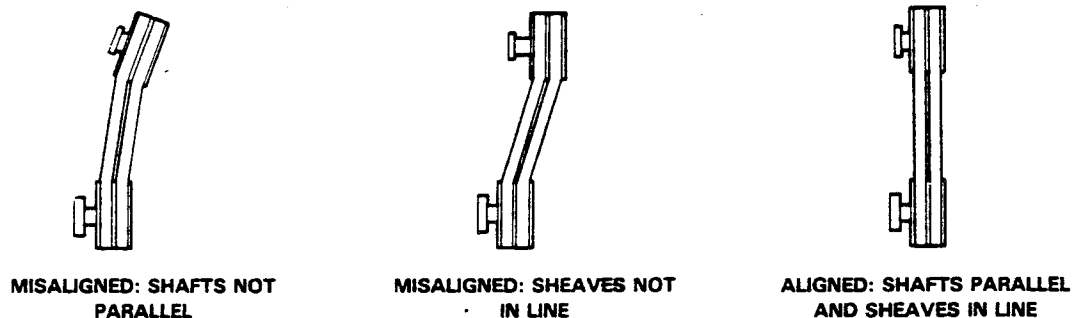


Figure 3c. Alignment of V-Belt Driven Pumps

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.

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---

**WARNING**

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

## OPERATION

## OPERATION - SECTION C

## WARNING

```
////////////////////////////////////  
//  
// Do not attempt to pump volatile, corrosive, or flammable //  
// materials, or any liquids 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).

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

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.

## Hand-Operated Priming Pump

The hand-operated priming pump (see Figure 1) is designed to draw air out of the suction line and the pump casing. It can be used while the pump is either stopped or operating.

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**OPERATION**

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To prime the pump, close the discharge line throttling valve, and close the spring-loaded check valve (if so equipped). Open the ball valve in the priming line and operate the handle until liquid appears in the sight gauge.

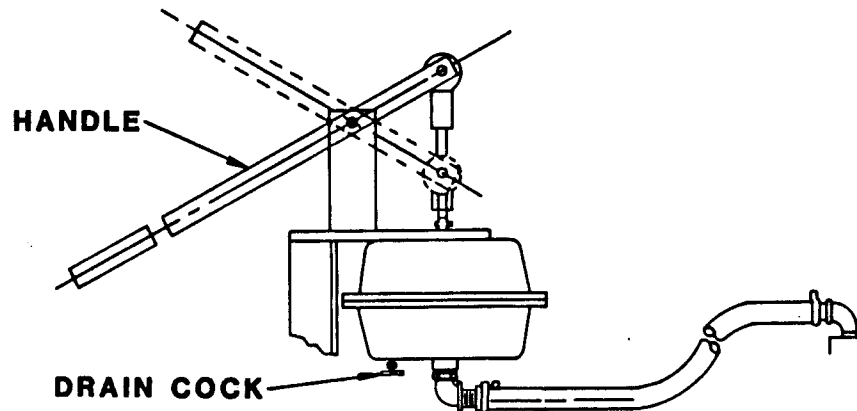


Figure 1. Hand Primer Assembly

Once the pump is fully primed, close the ball valve in the priming line, and open the discharge line throttling valve.

**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.

## OPERATION

---

---

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

### Lines With a Bypass

Either a Gorman-Rupp automatic air release valve or a hand operated shutoff valve may be installed in a bypass line.

If a Gorman-Rupp automatic air release valve has been installed, close the throttling valve in the discharge line. The Gorman-Rupp valve will automatically open to allow the pump to prime, and automatically close when priming has been accomplished. After the pump has been primed, and liquid is flowing steadily from the bypass line, open the discharge throttling valve.

If a hand operated shutoff valve has been installed, close the throttling valve in the discharge line, and open the bypass shutoff valve so that the pump will not have to prime against the weight of the liquid in the discharge line. When the pump has been primed, and liquid is flowing steadily from the bypass line, close the bypass shutoff valve and open the discharge throttling valve.

### Lines Without a Bypass

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 a 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 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.

### Liquid Temperature And Overheating

The **maximum** liquid temperature for this pump is 110°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 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 servic- //  
// ing.                                                    //  
//                                                       //  
////////////////////////////////////
```

### 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.

### 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.

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## OPERATION

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### 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.

### CAUTION

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

After stopping the pump, disconnect the power source 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.





## TROUBLESHOOTING

## 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.
//
////////////////////////////////////

```

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP FAILS TO PRIME	Auxiliary priming device faulty or improperly installed.	Repair priming device or check installation.
	Air leak in suction line.	Correct leak.
	Lining of suction hose collapsed.	Replace suction hose.
	Leaking or worn seal or pump gasket.	Check pump vacuum. Replace leaking or worn seal or gasket.
	Suction lift or discharge head too high.	Check piping installation and install bypass line if needed. See INSTALLATION.
	Strainer clogged.	Check strainer and clean if necessary.
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRES-SURE	Air leak in suction line.	Correct leak.
	Suction intake not submerged at proper level or sump too small.	Check installation and correct as needed. Check submergence chart (Section B).
	Lining of suction hose collapsed.	Replace suction hose.
	Impeller or other wearing parts worn or damaged.	Replace worn or damaged parts. Check that impeller is properly centered and rotates freely.

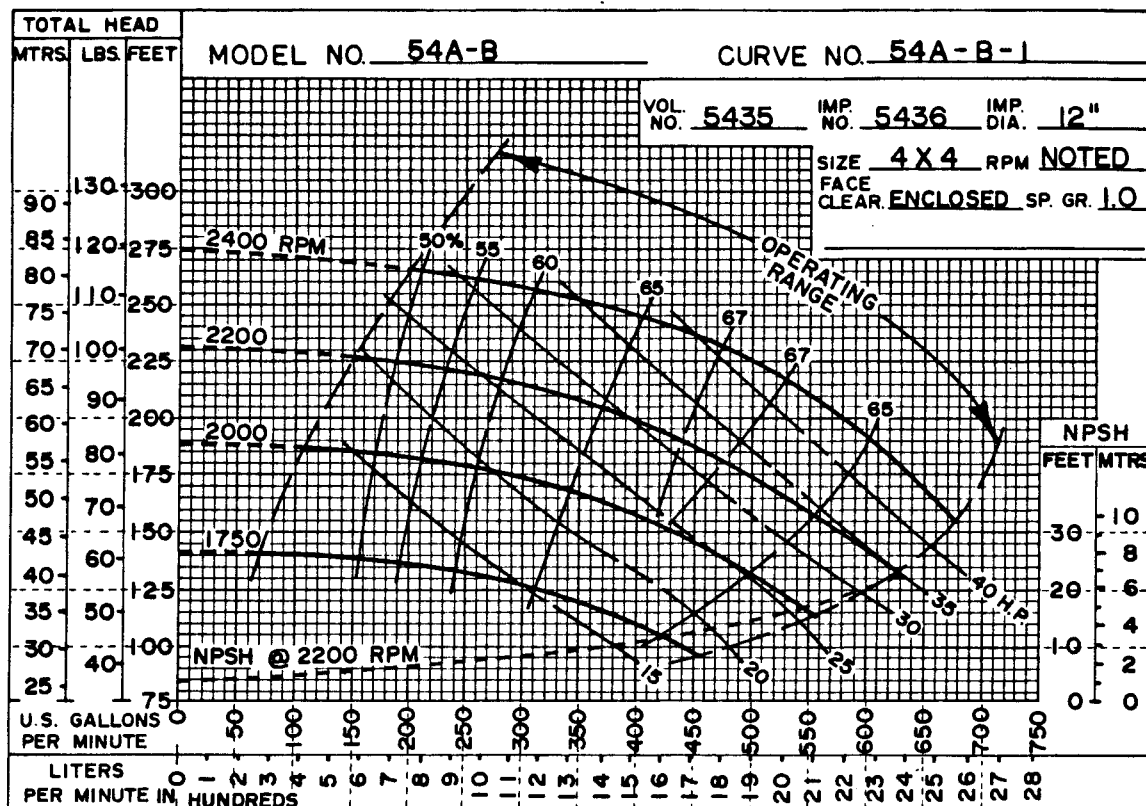
TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE(cont.)	<p>Impeller clogged.</p> <p>Pump speed too slow.</p> <p>Discharge head too high.</p> <p>Suction lift too high.</p> <p>Leaking or worn seal or pump gasket.</p> <p>Strainer clogged.</p>	<p>Free impeller of debris.</p> <p>Check driver output; check belts or couplings for slippage.</p> <p>Install bypass line.</p> <p>Measure lift w/vacuum gauge. Reduce lift and/or friction losses in suction line.</p> <p>Check pump vacuum. Replace leaking or worn seal or gasket.</p> <p>Check strainer and clean if necessary.</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>Open discharge valve fully to increase flow rate, and run power source at maximum governed speed.</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. Record vacuum and pressure gauge readings and consult local representative or factory.</p> <p>Locate and eliminate source of air bubble.</p> <p>Secure mounting hardware.</p> <p>Clean out debris; replace damaged parts.</p>

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



## 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 54A2-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.

## CAUTION

Pump speed and operating condition points must be within the continuous performance range shown on the curve.

## SECTIONAL DRAWING

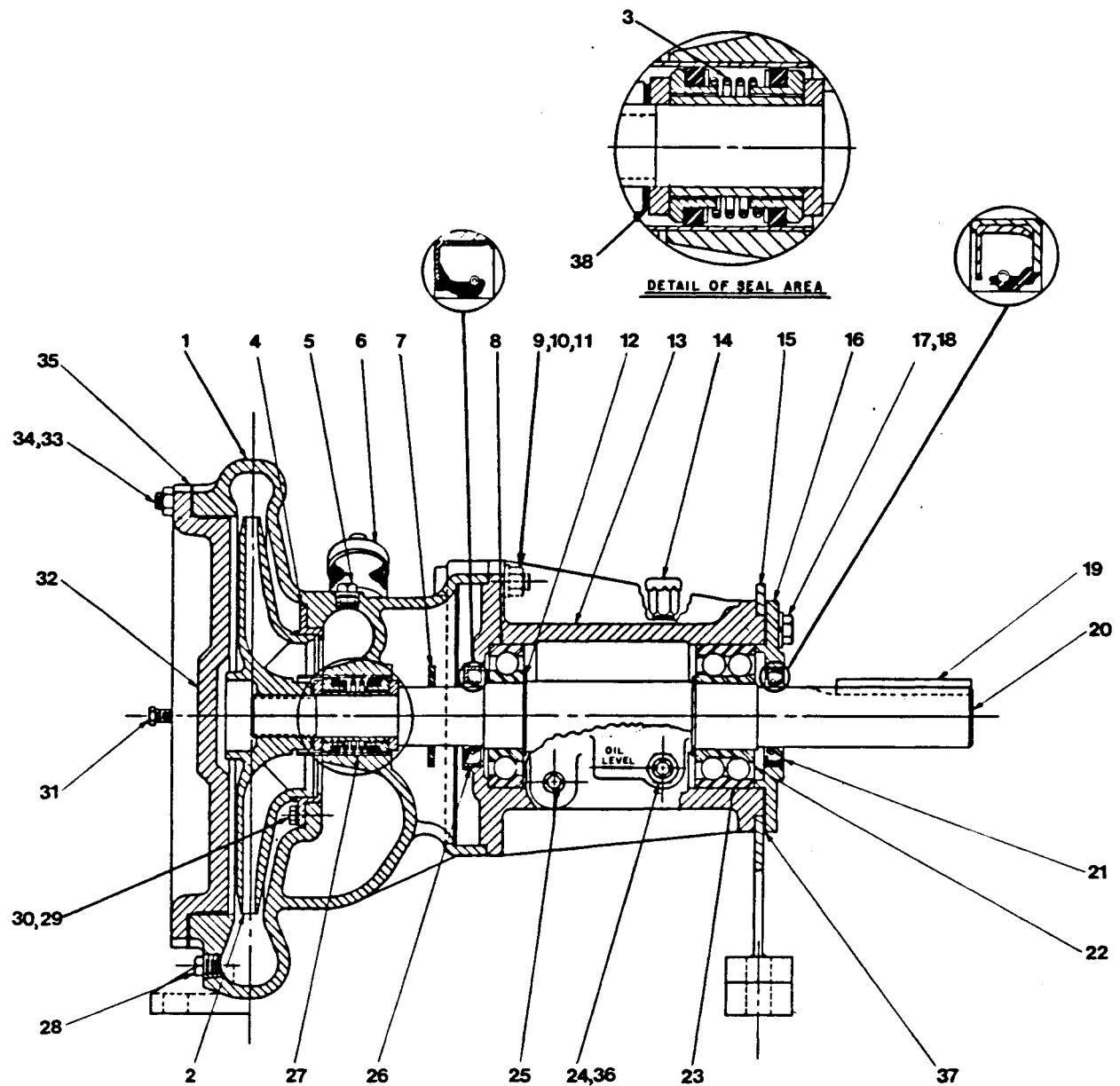


Figure 1. Pump Model 54A2-B

**PARTS LIST**  
**Pump Model 54A2-B**  
 (From S/N 806819 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	5435	10010	1	27	*SEAL LINER	2205-A	14080	1
2	*IMPELLER	5436	10010	1	28	CASING DRAIN PLUG	P00006	11990	1
3	*SEAL ASSY	GS01250	-----	1	29	HEX HD CAPSCREW	B00503	14990	2
4	*IMP WEAR RING	4869	14000	1	30	LOCKWASHER	J00005	15991	2
5	ACCESSORY PLUG	P00006	11990	1	31	JACKING SCREWS	B00604	15991	2
6	*SEAL GREASE CUP	S01509	-----	1	32	COVER PLATE	1215-B	10010	1
7	*DEFLECTOR RING	3209	19120	1	33	STUDS	C00807	15991	12
8	*BALL BEARING	S01077	-----	1	34	HEX NUTS	D00008	15991	12
9	HEX HD CAPSCREW	B01011	15991	4	35	*COVER GSKT	1215-G	18000	1
10	LOCKWASHER	J00010	15991	4	36	PIPE PLUG	P00006	11990	1
11	HEX NUT	D00010	15991	4	37	*BRG CAP GSKT	5558-G	18000	1
12	*BRG RETAINING RING	S01164	-----	2	38	*IMP SHIM SET	37-J	17090	1
13	PEDESTAL	5557-C	10010	1	NOT SHOWN:				
14	AIR VENT	S01703	-----	1		STRAINER	S01528	-----	1
15	PEDESTAL FOOT	5562	15990	1		CASING DRAIN PLUG	P00008	11990	1
16	*BEARING CAP	5558-A	10010	1		NAME PLATE	2613-D	13990	1
17	HEX HD CAPSCREW	B00805	15991	4		ROTATION DECAL	2613-CU	00000	1
18	LOCKWASHER	J00008	15991	4	OPTIONAL:				
19	*SHAFT KEY	N00816	15991	1		SUCT/DISCH FLANGE	1756	10010	2
20	*IMP SHAFT	5561	16040	1		SUCT/DISCH FLANGE	1676-A	18000	2
21	*OIL SEAL	S01917	-----	1		GASKET			
22	*BRG SHIM SET	8546	15990	1		HEX HD CAPSCREW	B01010	15991	16
23	*BALL BEARING	23421-461	-----	1		HEX NUT	D00010	15991	16
24	SIGHT GAUGE	26714-011	-----	1		DISCH CHECK VALVE	GRP14-4A	-----	1
25	PED DRAIN PLUG	P00006	11990	1		HAND PRIMER	GRP43-2	-----	1
26	*OIL SEAL	S00181	-----	1					

\*INDICATES PARTS RECOMMENDED FOR STOCK

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

CANADIAN SERIAL NO ..... AND UP

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## 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 may be performed by draining the pump and removing the cover plate. If major repair is required, the piping and/or power source must be disconnected.

Before attempting to service the pump, disconnect or lock out the power source, and close all connecting valves.

### 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

```
////////////////////////////////////  
//  
// Use lifting and moving equipment in good repair and with //  
// adequate capacity to prevent injuries to personnel or //  
// damage to equipment. //  
//  
////////////////////////////////////
```

## Pump Disassembly

Remove the casing drain plugs (28) to drain the pump. Clean and reinstall plugs.

To remove the cover plate (32) from the pump casing (1), disengage the nuts (34). Tighten the jacking screws (31) evenly (to prevent binding) until the cover plate separates from the casing. Remove the casing gasket (35) and clean the gasket seating surfaces on the cover plate and casing.

Before removing the impeller, turn the cross arm on the automatic grease cup (6) clockwise until it rests against the cover (See Figure 3). This will prevent the grease in the cup from escaping as the impeller is removed.



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To remove the impeller, block the shaft (20) to prevent rotation. Use an impeller wrench to turn the impeller in a counterclockwise direction (when facing the impeller). Use caution when unscrewing the impeller; tension on the seal spring will be released as the impeller is unscrewed. Inspect the impeller and replace it if cracked or badly worn.

Remove the impeller adjusting shims (38). For ease of reassembly, tag and tie the shims, or measure and record their thickness.

To remove the wear ring (4), disengage the hardware (29 and 30). Inspect the wear ring and replace it if scored or badly worn.

### Seal Disassembly

Carefully remove the seal spring, shaft sleeve, packing rings and the stationary and rotating seal elements, using a stiff wire with a hooked end if necessary. Inspect the seal liner (27) for wear or grooves which could cause leakage or damage to the seal packing rings. The seal liner is a press fit in the pump casing (1) and does not normally require replacement. If replacement is necessary, the casing must be separated from the pedestal (See **Impeller Shaft And Bearing Disassembly**) and the liner must be pressed out of the casing (See **Impeller Shaft And Bearing Reassembly**).

If no further disassembly is required, refer to **Seal Reassembly**.

### Impeller Shaft And Bearing 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 power source, being careful not to lose the key (19).

Remove the hardware (9, 10 and 11) and separate the casing from the pedestal (13).

Remove the slinger ring (7).

Drain the bearing lubricant by removing pedestal drain plug (25). Clean and reinstall the drain plug.

Remove hardware (17 and 18) securing the bearing cap (16) to the pedestal. Press the oil seal (21) from the bearing cap. Remove the bearing cap gasket (37).

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Remove pedestal foot (15) from the pedestal.

Remove the bearing shim set (22). Tag and tie the shims, or measure and record their thickness.

Place a block of wood against the impeller end of the shaft (20) and tap the shaft, along with the assembled bearings, from the pedestal bore. Be careful not to damage the shaft threads during removal. Press the inboard oil seal (26) from the pedestal.

Use a bearing puller to remove the inboard bearing (8) and outboard bearing (23) from the impeller shaft. Inspect the retaining rings (12) for wear and replace if required.

### Impeller Shaft And Bearing Reassembly

Clean the bore of the pedestal, all component parts and the impeller shaft with a soft cloth soaked in cleaning solvent. Inspect the parts for wear, and replace as necessary.

#### 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.                //  
//                               //  
////////////////////////////////////
```

Inspect the shaft for damaged threads, distortion, or nicks and scratches. Dress small nicks and burrs with a fine file or honing stone. Replace the impeller shaft if severely damaged.

To prevent contamination, wash the bearings separately in **fresh** cleaning solvent. Dry the bearings with filtered compressed air and coat with light oil for ease of reassembly.

Rotate the bearings by hand to check for roughness or binding. If rotation is rough, 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 snug push 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.

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Dip the bearings in clean oil and position them on the shaft. The loading groove on the inboard bearing (23) **must** face away from the impeller. Use an arbor press against the inner races until the bearings seat squarely against the bearing retaining rings.

#### 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.

Slide the shaft and assembled bearings into the pedestal bore until the inboard bearing (8) bottoms against the bore shoulder.

#### CAUTION

When installing the shaft and bearings into the bearing bore, push against the outer race. NEVER hit the balls or ball cage.

Install the same thickness of bearing adjusting shims (22) as previously removed.

#### NOTE

Impeller shaft end play should be between .002 and .010 inch. Add or subtract bearing shims to establish the correct endplay.

Install the pedestal foot onto the pedestal body.

Install the bearing cap gasket (37), then secure the bearing cap to the pedestal.

Apply a light coat of oil on the outboard and inboard oil seals (21 and 26) and install them with the lips positioned as shown in Figure 1.

Install the slinger ring and shaft key onto the impeller shaft.

Before securing the pump casing to the pedestal, inspect the bore of the seal liner (27) for wear or grooves which might cause leakage or damage to the seal packing rings. If the seal liner must be replaced, position the casing on the bed of an arbor (or hydraulic) press and use a new sleeve to force the old one out. After the new liner is properly installed, a 1/4 inch diameter hole must be drilled through it to permit the flow of lubricant to the seal assembly. **Be careful** to center the drill in the threaded grease pipe hole and not damage the threads. Deburr the hole from the inside of the seal liner after drilling.

Secure the pump casing to the pedestal assembly with the previously removed hardware.

Lubricate the bearings as indicated in **LUBRICATION** at the end of Section E.

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## Seal Reassembly

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 seal spacer 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 packing rings and seal liner 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).

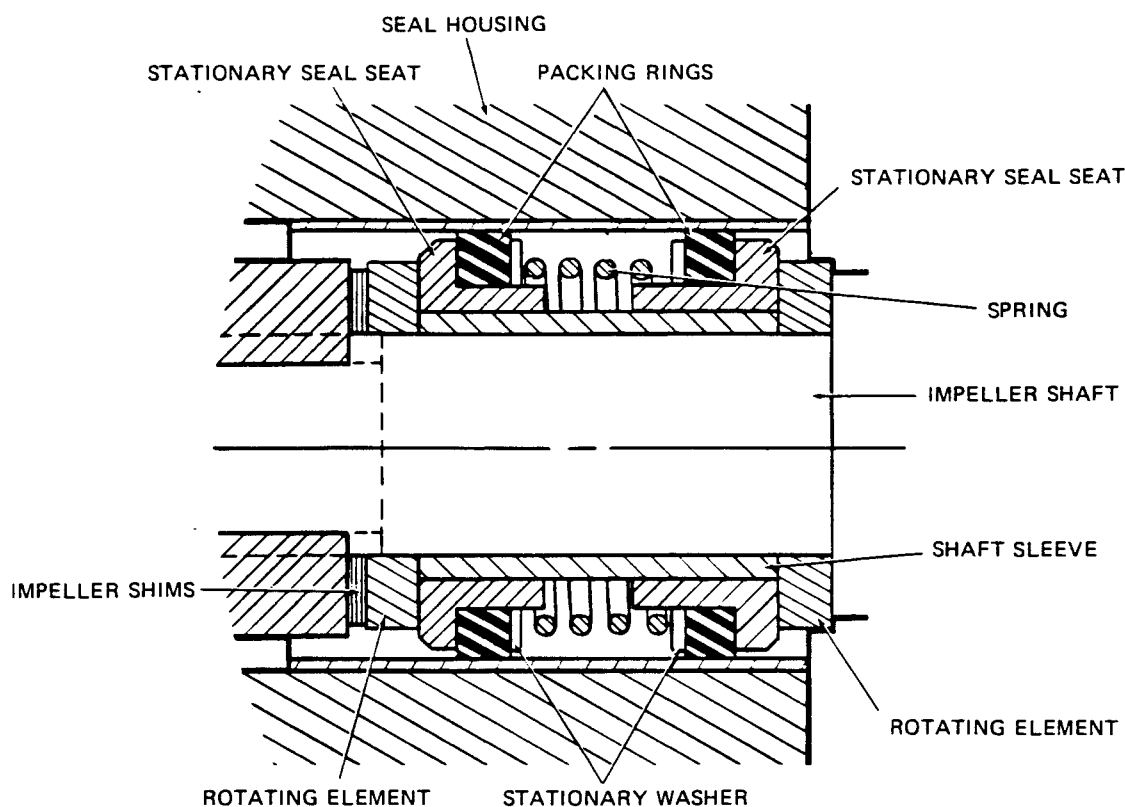


Figure 2. GS01250 Seal Assembly

### CAUTION

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

Inspect the pump casing, the seal liner, and the impeller shaft for burrs or sharp corners, and remove any that exist. Replace the seal liner (27) if wear or grooves exist which could cause leakage or damage to the seal packing rings.

### NOTE

- The pump casing must be removed to install a new seal liner. See **Impeller Shaft And Bearing Reassembly** for specific instructions on seal liner installation.

Slide the inboard rotating element onto the shaft (chamfered side facing the shaft shoulder) until it seats against the shaft shoulder.

Subassemble the inboard stationary seat, packing ring, and spring washer and press the unit into the lubricated seal liner.

Install the spacer sleeve and spring.

Subassemble the outboard stationary seat, packing ring and spring washer. Press this unit into the lubricated seal liner.

Install the outboard rotating element with the chamfered side facing the impeller.

If removed during disassembly, reinstall the automatic grease cup (6).

Lubricate the seal as indicated in LUBRICATION, after the impeller has been installed.

### Impeller Reassembly And Adjustment

Replace the wear ring (4) and install the hardware (29 and 30).

Inspect the impeller and replace it if cracked or badly worn.

For maximum pump efficiency, the impeller must be centered in the volute scroll.

To verify the impeller positioning, measure the pump casing and impeller as shown in Figure 3. Use these measurements to calculate the required impeller location (dimension E). Add or remove impeller adjusting shims until dimension E is obtained.

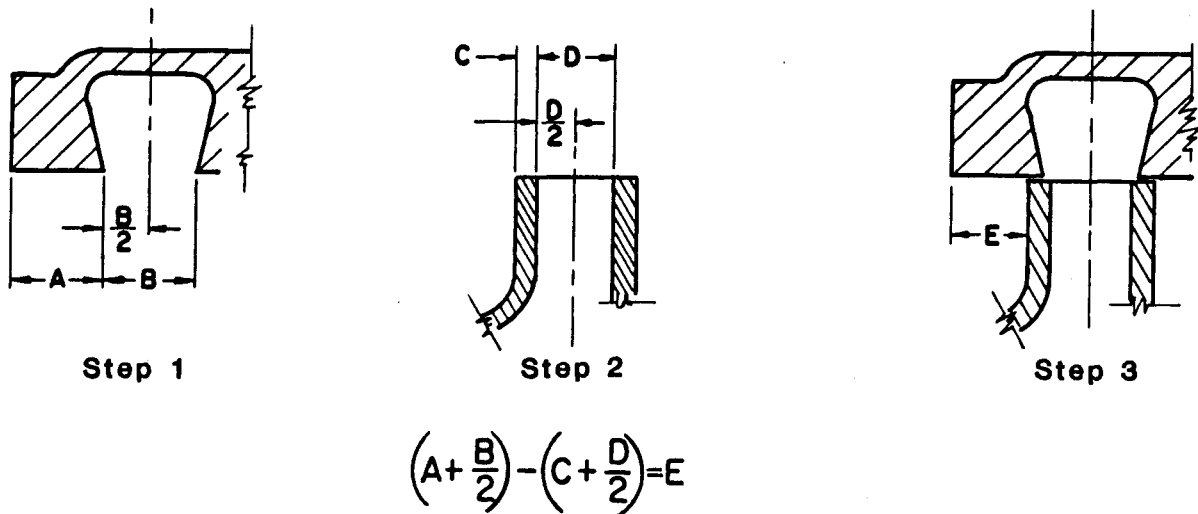


Figure 3. Centering Impeller Within Volute Scroll

### NOTE

After the impeller has been properly positioned, check for free rotation. Correct any scraping binding before further reassembly.

Replace the cover gasket (35) and reassemble the cover plate to the pump casing. Make sure the jacking screws (31) do not interfere with the cover gasket seating.

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## 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 4).

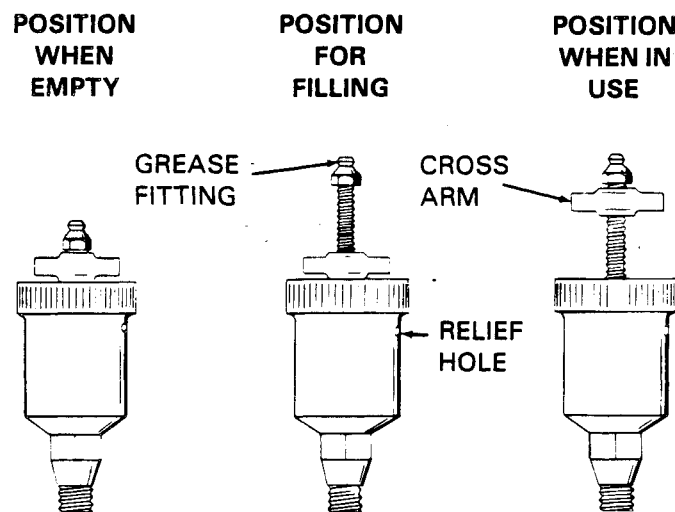


Figure 4. Automatic Lubricating Grease Cup

### Bearings

Oil-lubricated bearings should be drained and filled yearly under normal operating conditions, but the oil level should be checked regularly. Do not add oil sooner than required; over-oiling will cause excessive preloading and overheating which will shorten bearing life.

When lubrication is required, remove the pedestal air vent (14) and fill the bearing housing with a good grade of non-detergent SAE No. 30 motor oil to the midpoint of the oil level sight gauge (24). Make sure the white reflector in the sight gauge is positioned horizontally to ensure proper drainage. Do not over-fill the housing. Clean and reinstall the pedestal air vent.







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