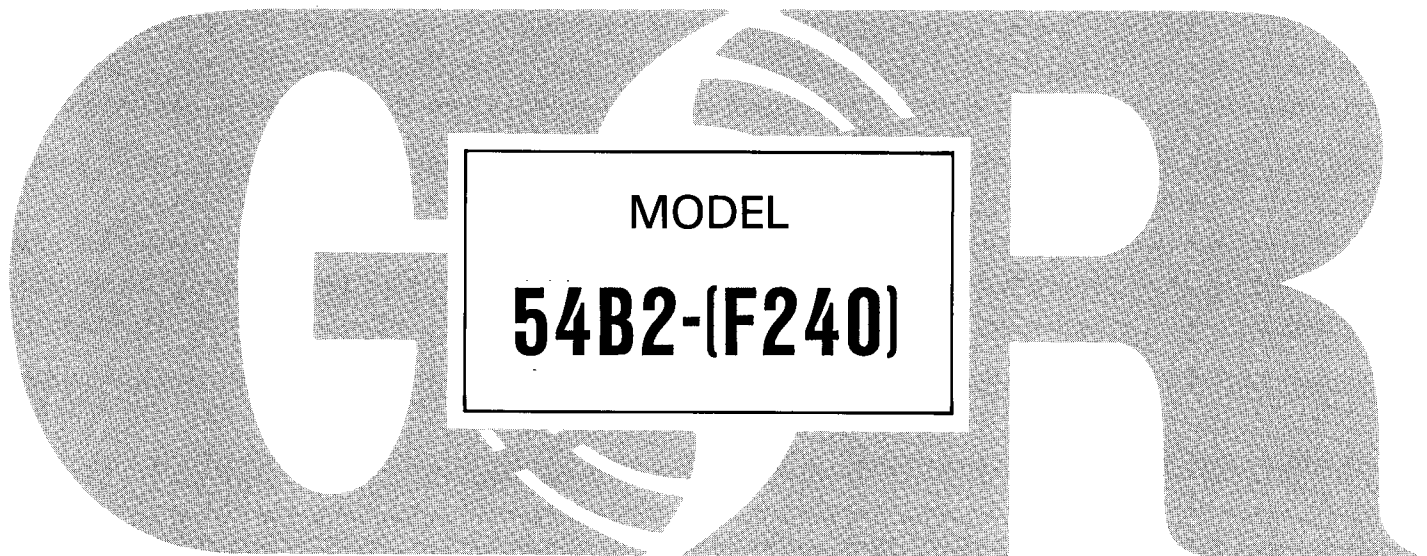


50SERIES

INSTALLATION, OPERATION, PARTS LIST, AND MAINTENANCE MANUAL



THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

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

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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.

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 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 engine, contact the engine 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 ENGINE DRIVEN PUMPS. REFER TO THE MANUAL ACCOMPANYING THE ENGINE BEFORE ATTEMPTING TO BEGIN OPERATION.

WARNING

```
//////////////////////////////////////  
//  
// Before attempting to open or service the pump: //  
//  
// 1. Familiarize yourself with this manual. //  
// 2. Disconnect the engine 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 clean liquids. Do not at- //  
// tempt to pump volatile, corrosive, or flammable liquids //  
// which may damage the pump or endanger personnel as a re- //  
// sult of pump failure. //  
//  
//////////////////////////////////////
```

WARNING

```
//////////////////////////////////////  
//  
// After the pump has been installed, make certain that the //  
// pump and all piping or hose connections are secure be- //  
// fore attempting to operate the pump. //  
//  
//////////////////////////////////////
```

WARNING

```
//////////////////////////////////////  
//  
// Make certain that the pump and engine are securely at- //  
// tached before attempting to operate the pump. //  
//  
//////////////////////////////////////
```

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

```
////////////////////////////////////  
//  
// Do not operate an internal combustion engine in an ex- //  
// plosive atmosphere. When operating internal combustion //  
// engines in an enclosed area, make certain that exhaust //  
// fumes are piped to the outside. These fumes contain //  
// carbon monoxide, a deadly gas that is colorless, //  
// tasteless, and odorless. //  
//  
////////////////////////////////////
```

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. //  
//  
////////////////////////////////////
```

WARNING

```
////////////////////////////////////  
//  
// Never tamper with the governor to gain more power. The //  
// governor establishes safe operating limits that should //  
// not be exceeded. The maximum continuous operating speed //  
// is 2650 RPM. //  
//  
////////////////////////////////////
```

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.

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:

- a. Inspect the pump assembly for cracks, dents, damaged threads, and other obvious damage.
- b. 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.
- c. Carefully read all tags, decals, and markings on the pump assembly, and follow the instructions indicated.
- 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 engine 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 a least **1250 pounds**. This pump weighs approximately **250 pounds**, not including the weight of accessories and piping.

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.

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.

If the pump has been mounted on a moveable base, make certain the base is stationary by setting the brake and blocking the wheels before attempting to operate the pump.

SUCTION AND DISCHARGE PIPING

Materials

Either pipe or hose may be used for suction and discharge lines. Piping 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 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 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

INSTALLATION

will not permit passage of solids larger than the solids handling capability of the pump.

This pump is designed to handle up to 3/8-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 1 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).

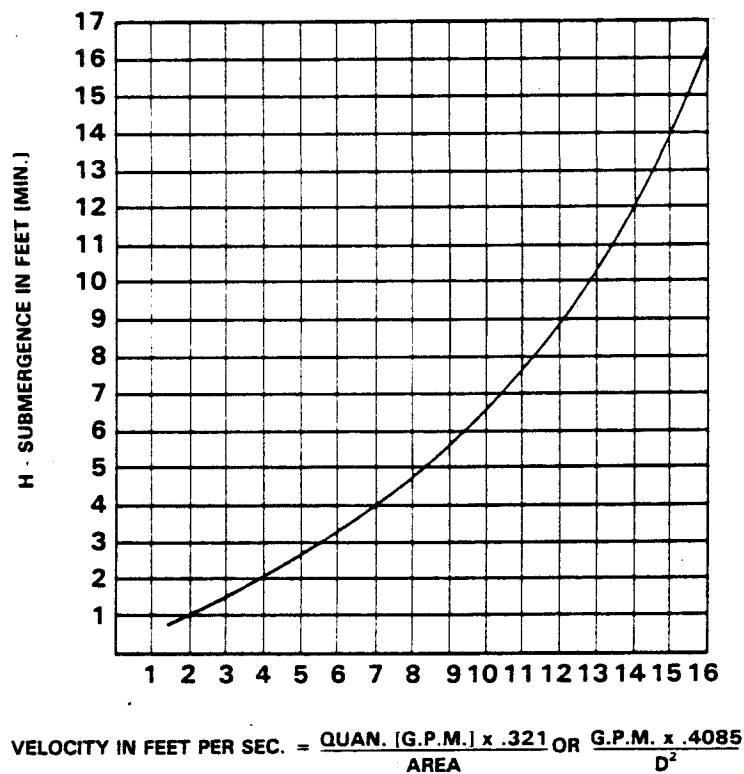


Figure 1. Recommended Minimum Suction Line Submergence Vs. Velocity

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

If a throttling valve is desired 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 a suction line.

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

With high discharge heads, it is recommended that a throttling valve and a 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.

ALIGNMENT

The alignment of the pump and the engine is critical for trouble free mechanical operation. See Section E, **Securing Pump To Engine** for detailed information.

OPERATION

OPERATION - SECTION C

WARNING

```
////////////////////////////////////  
//  
// This pump is designed to pump clean liquids. Do not at- //  
// tempt to pump volatile, corrosive, or flammable liquids //  
// which may damage the pump or endanger personnel as a re- //  
// sult of pump failure. //  
// //  
////////////////////////////////////
```

WARNING

```
////////////////////////////////////  
//  
// Never tamper with the governor to gain more power. The //  
// governor establishes safe operating limits that should //  
// not be exceeded. The maximum continuous operating speed //  
// is 2650 RPM. //  
// //  
////////////////////////////////////
```

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 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.

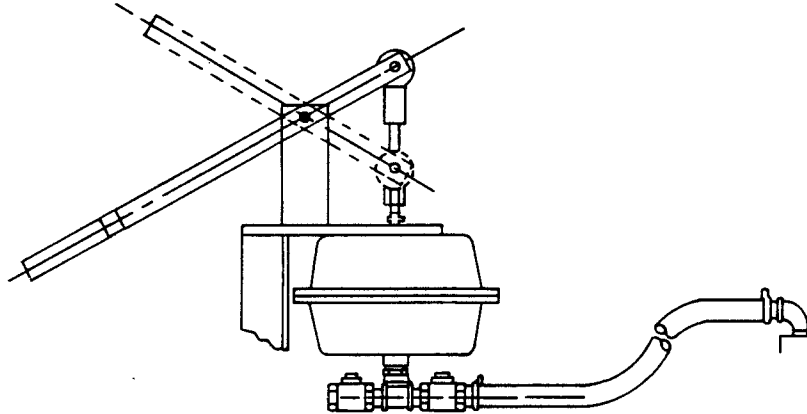


Figure 1. Hand Primer Assembly

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.

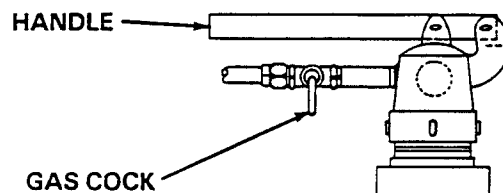


Figure 2. Exhaust Primer Assembly

OPERATION

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 engine.

NOTE

This pump is equipped with a safety shut down device to terminate engine operation if pump discharge pressure falls below 30 psi. During engine start up, the button on the discharge pressure gauge must be depressed to over-ride this safety feature.

OPERATION

CAUTION

Pump speed and operating condition points must be within the continuous performance range shown on the curve. See Section E, Page 1.

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 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 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.

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 operation 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.

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, lock out the engine ignition or take other 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.

TROUBLESHOOTING - SECTION D

WARNING

```

////////////////////////////////////
//
// Before attempting to open or service the pump:
//
// 1. Familiarize yourself with this manual.
// 2. Disconnect the engine 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.
//
////////////////////////////////////

```

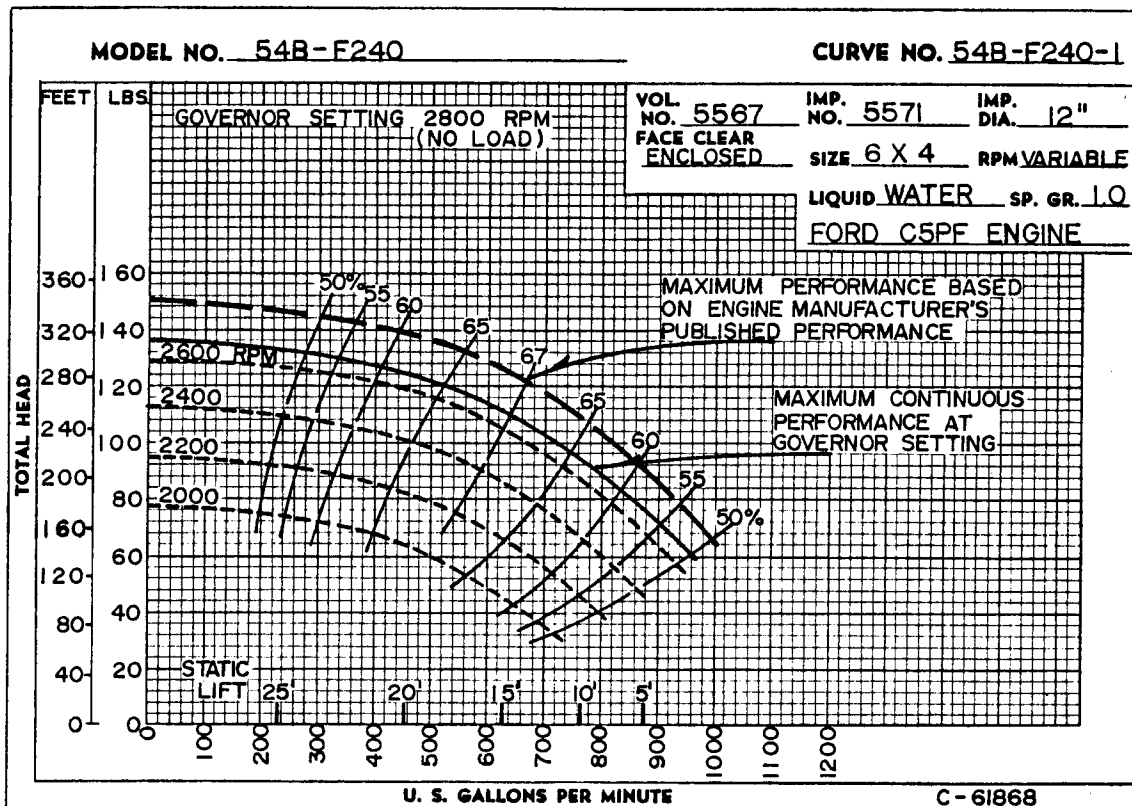
TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP FAILS TO PRIME	Auxiliary priming device faulty or improperly installed.	Repair priming device or check installation.
	Air leak in suction line.	Correct leak.
	Lining of suction hose collapsed.	Replace suction hose.
	Leaking or worn seal or pump gasket.	Check 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.
	Suction check valve or foot valve clogged or binding.	Clean valve.
	Discharge check valve open.	Check position of handle; close valve.
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE	Air leak in suction line.	Correct leak.
	Lining of suction hose collapsed.	Replace suction hose.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRES-SURE(cont.)	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.
	Suction intake not submerged at proper level or sump too small.	Check installation and correct as needed. Check submergence chart (Section B).
	Impeller or other wearing parts worn or damaged.	Replace worn or damaged parts. Check that impeller is properly centered and rotates freely.
	Impeller clogged.	Free impeller of debris.
	Pump speed too slow.	Check engine output; consult engine operation manual.
	Discharge throttling valve partially closed; check valve installed improperly.	Discharge throttling valve partially closed; check valve installed improperly.
PUMP REQUIRES TOO MUCH POWER	Discharge pressure at or below safety shutdown limit.	Check starting instructions; increase pressure.
	Discharge check valve locked closed.	Check position of handle; open valve.
PUMP CLOGS FREQUENTLY	Discharge head too low.	Adjust discharge valve.
	Liquid solution too thick.	Dilute if possible.
	Pump speed too high.	Check engine output.
	Discharge flow too slow.	Open discharge valve fully to increase flow rate, and run engine at maximum governed speed.
	Suction check valve or foot valve clogged or binding.	Clean valve.
	Discharge line clogged or restricted; hose kinked.	Check discharge lines; straighten hose.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
EXCESSIVE NOISE	Cavitation in pump.	Reduce suction lift and/or friction losses in suction line.
	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.
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.

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 54B2-(F240)

*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

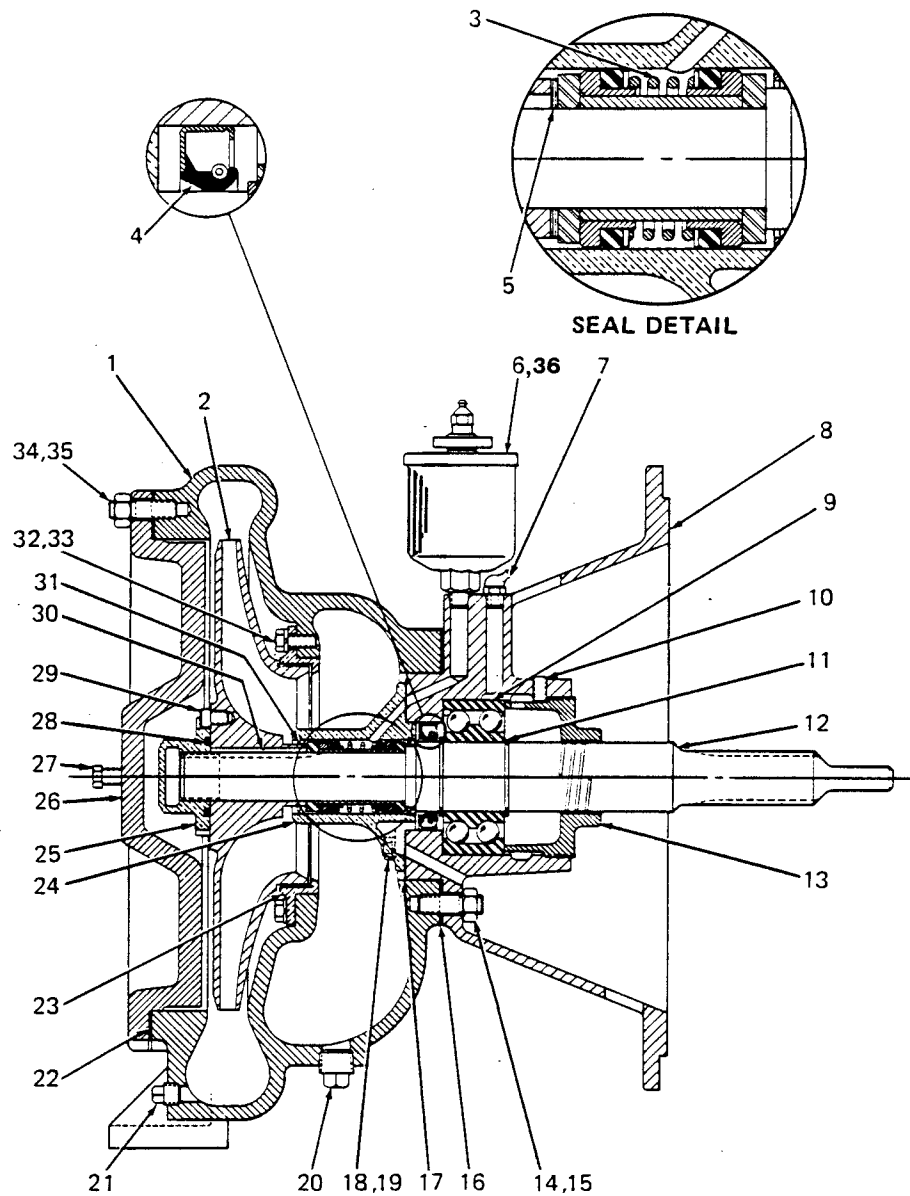


Figure 1. Pump End Assembly Model 54B2-(F240)

PARTS LIST
Pump End Assembly Model 54B2-(F240)
 (From S/N 790844 up)

ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY	ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	PUMP CASING	5567	10010	1	25	CAP NUT	2177-A	14000	1
2	*IMPELLER ASSY	5571	10010	1	26	COVER PLATE	1215-C	10010	1
3	*SEAL ASSY	GS01250	-----	1	27	HEX HD CAPSCREW	B00604	15991	2
4	*OIL SEAL	S00181	-----	1	28	*O-RING	S00461	-----	1
5	*ADJ SHIM SET	37-J	17090	REF	29	FIL HD SCREW	AW00602	14990	1
6	*SEAL GREASE CUP	S01509	-----	1	30	*IMPELLER KEY	N00408	15990	1
7	*LUBE FITTING	S00194	-----	1	31	*LOCK SPRING	947-A	16030	2
8	INTERMEDIATE	5551-C	10010	1	32	HEX HD CAPSCREW	B00603	14990	2
9	*BALL BEARING	S01034	-----	1	33	LOCKWASHER	J00006	15991	2
10	SQ HD SETSCREW	G00604	15990	1	34	STUD	C00807	15991	12
11	BRG RETAINING RING	S00442	10010	2	35	HEX NUT	D00008	15991	12
12	*IMPELLER SHAFT	11519-A	16040	1	36	ELBOW	AGS00004	11990	1
13	BRG RETAINING NUT	5566	10010	1	NOT SHOWN:				
14	STUD	C00807	15991	8		NAME PLATE	2613-D	13990	1
15	HEX NUT	D00008	15991	8		DRIVE SCREW	BM#04-03	15990	4
16	*CASING GSKT	5567-G	18000	1		STRAINER	S01529	-----	1
17	*SEAL HOUSING GSKT	956-AG	18000	1		SUCTION FLANGE	2616	10010	1
18	HEX HD CAPSCREW	B00603	14990	4		SUCT FLANGE GSKT	1678-G	18000	1
19	LOCKWASHER	J00006	15991	4		HEX HD CAPSCREW	B01010	15991	8
20	CASING DRAIN PLUG	P00008	11990	3		HEX NUT	D00010	15991	8
21	CASING DRAIN PLUG	P00006	11990	1	OPTIONAL:				
22	*COVER PLATE GSKT	1215-G	18000	1		SUCTION FLANGE	1757	10010	1
23	*WEAR RING	5570	14000	1		DISCHARGE FLANGE	1756	10010	1
24	SEAL HOUSING	5902	14000	1		DISCH FLANGE GSKT	1676-G	18000	1

*INDICATES PARTS RECOMMENDED FOR STOCK

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

CANADIAN SERIAL NO AND UP

SECTIONAL DRAWING

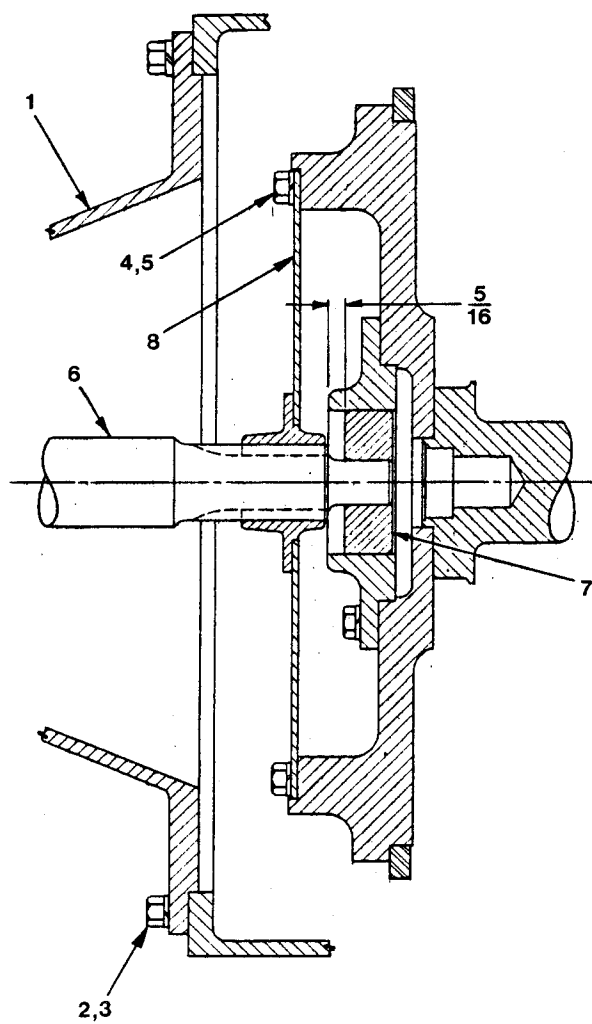


Figure 2. 12342 Drive Assembly

MAINTENANCE AND REPAIR

PARTS LIST
12342 Drive Assembly

ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	INTERMEDIATE	5551-C	10010	REF
2	HEX HD CAPSCREW	B00604	15991	12
3	LOCKWASHER	J00006	15991	12
4	HEX HD CAPSCREW	B00603	15991	8
5	LOCKWASHER	J00006	15991	8
6	IMPELLER SHAFT	11519-A	16040	REF
7	* PILOT BUSHING	8312-A	15010	1
8	DRIVE PLATE ASSY	7409-A	24020	1

*INDICATES PARTS RECOMMENDED FOR STOCK

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 2) and the accompanying parts lists.

Most service functions may be performed by draining the pump and removing the cover plate. If major repair is required, the piping and/or engine must be disconnected.

Before attempting to service the pump, take precautions to ensure that the engine will remain inoperative. Close all connecting valves.

WARNING

```
//////////////////////////////////////  
//  
// Before attempting to open or service the pump: //  
//  
// 1. Familiarize yourself with this manual. //  
// 2. Disconnect the engine 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. //  
//  
//////////////////////////////////////
```

Cover Plate Removal

(Figure 1)

The impeller, wear ring, and seal assembly are easily accessible, and can be serviced after the cover plate (26) has been removed.

Before removing the cover plate, remove the pump casing drain plugs (20 and 21) and drain the pump. Clean and reinstall the drain plugs.

Loosen the nuts (35) securing the cover plate to the pump casing (1), and use the jacking screws (27) to force the cover plate from the pump casing. remove the cover plate gasket (22).

Impeller Removal

(Figure 1)

Turn the cross arm on the automatic lubricating seal grease cup (6) clockwise until it rests against the cover (see Figure 4). This will prevent the grease in the cup from escaping when the impeller is removed.

Remove the fillister head screw (29), and unscrew the cap nut (25) from the impeller shaft (12). Remove the cap nut O-ring (28).

The impeller is keyed onto the shaft. Using an impeller puller if necessary, remove the impeller from the shaft and retain the impeller key (30).

Slide the impeller adjusting shims (5) from the impeller shaft. For ease of re-assembly, tag and tie the shims, or measure and record their thickness.

Seal Disassembly

(Figure 1)

Remove the outboard seal lock spring (31), and carefully remove the stationary and rotating seal elements and the spacer sleeve, using a stiff wire with a hooked end if necessary.

NOTE

It is not necessary to remove the inboard seal lock spring.

If no further disassembly is required, see **Seal Reassembly**.

Pump Disassembly

(Figure 1)

Remove the capscrews and lockwashers (32 and 33) securing the wear ring (23) to the pump casing and insert two 5/16-18 x 2 1/2-inch jacking screws in the threaded holes provided. Remove the wear ring by turning the screws evenly.

Remove the capscrew and lockwashers (18 and 19) securing the seal housing (24) to the intermediate (8).

Remove the seal housing gasket (17), and the oil seal (4).

To service the intermediate, bearings, or drive assembly, the pump end must be removed from the base. See Figure 1, and remove the nuts (15) securing the pump casing (1) to the intermediate (8), and remove the pump casing and the pump casing gasket (16). If shims have been used under the mounting feet to level the pump casing, tag and tie these shims.

Separating Intermediate And Drive Assembly From Engine

(Figure 2)

If necessary to separate the intermediate and drive assemblies from the engine, support the intermediate using a hoist and sling, and remove the capscrews and lockwashers (2 and 3) securing the intermediate (1) to the engine bellhousing. Separate the assemblies by pulling the intermediate straight away from the engine.

It is not necessary to remove the drive plate assembly (8) from the engine flywheel unless the assembly or the pilot bushing (7) must be replaced. To remove the drive plate assembly, remove the capscrews and lockwashers (4 and 5) securing the assembly to the engine flywheel, and remove the drive plate.

Inspect the pilot bushing, and replace it if worn.

Impeller Shaft And Bearing Disassembly

(Figure 1)

When the pump is properly operated and maintained, the rotating assembly 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.

Loosen the setscrews (10) securing the bearing retaining nut (13), and unscrew the nut from the intermediate (8).

Place a block of wood against the impeller end of the shaft (12), and drive the shaft and assembled bearing out of the intermediate.

Remove the outboard bearing retaining ring (11), and pull the bearing off the shaft, using a bearing puller if necessary.

Impeller Shaft And Bearing Reassembly

(Figure 1)

Clean the bore of the intermediate, impeller shaft, and all component parts (except bearing) 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. //
//
////////////////////////////////////

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

MAINTENANCE AND REPAIR

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

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 rollers or races and cause premature bearing failure.

The bearing tolerances provide a light press fit onto the impeller shaft, and a snug push fit into the intermediate. If the shaft is worn so that the bearing slips on and off easily, the shaft must be replaced. The intermediate housing must be replaced if the bearing does not fit snugly.

Position the bearing so that the loading groove faces toward the impeller end of the shaft and press it on until squarely seated against the shaft shoulder. Secure the bearing with the retaining ring (11).

NOTE

When installing the bearing onto the shaft, **never** press or hit against the outer race, balls, or ball cage. Press **only** on the inner race.

Install the oil seal (4) into the intermediate bore with the lip positioned as shown in Figure 1.

Push the shaft and assembled bearing into the intermediate bore until the outer race of the bearing seats squarely against the intermediate shoulder. **Be careful** not to damage the oil seal already installed.

NOTE

When installing the bearing into the intermediate push against the outer race. **Never** hit the balls or ball cage.

Reinstall the retaining nut (13) into the intermediate and secure it with the setscrews (10).

NOTE

Shaft end play should be between .002 - .010 inch. Adjust the retaining nut to establish the correct end play.

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

Securing Intermediate And Drive Assembly To Engine

(Figure 2)

Apply 'Never-Seez' lubricant to the inside diameter of the pilot bushing, and install the bushing in the engine flywheel as shown in Figure 2. Be sure the bushing does not protrude and preload the shaft and bearing.

CAUTION

If the pilot bushing and drive plate are not properly positioned on the shaft, excessive wear and a preload condition could cause premature thrust bearing failure.

Pump Reassembly

(Figure 1)

Clean the seal housing cavity and the impeller 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. //  
//  
////////////////////////////////////
```

Inspect the seal housing and the impeller shaft for burrs or sharp corners, and remove any that exists.

Replace the seal housing gasket (17), and secure the seal housing (24) to the intermediate with capscrews and lockwashers. **Be sure** the seal lubrication passages through the intermediate, seal housing, and gasket are properly aligned.

Replace the pump casing gasket (16), and secure the pump casing (1) to the intermediate (8) with hex nuts.

Secure the wear ring (23) to the pump casing with capscrews and lockwashers. Secure the pump casing to the base, be certain that any leveling shims used under the pump casing mounting feet have been reinstalled before securing the pump casing.

Seal Reassembly

(Figure 1 And 3)

The seal is not normally reused since any damage to the precision finished faces could result in premature seal failure. However, if it is necessary to reuse the old seal, wash all metallic parts in fresh cleaning solvent and dry them thoroughly.

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.                //  
//                               //  
////////////////////////////////////
```

Handle the seal parts with extreme care to prevent damage to the precision finished faces. Even fingerprints on the faces can shorten seal life. Cleanliness is essential.

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 with water or a **very small** amount of oil, and apply a drop of light lubricating oil on the precision finished faces. Assemble the seal as follows, (see Figure 3).

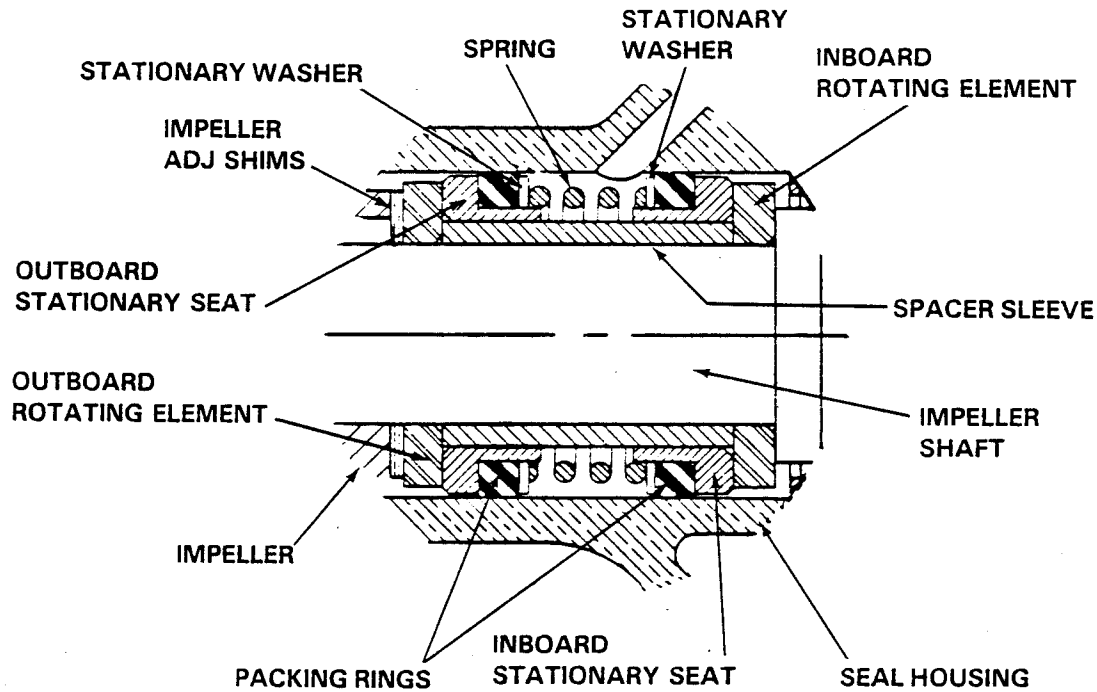


Figure 3. GS01250 Seal Assembly

Position the inboard rotating element on the shaft with the chamfered side facing the drive end of the pump, and slide it on until fully seated.

Subassemble the inboard stationary seat, packing ring, and spring washer. Press this unit into the seal housing.

Install the spacer sleeve and spring.

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

Position the outboard rotating element on the shaft with the chamfered side facing the impeller, and slide it on until fully seated.

CAUTION

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

Install the outboard lock spring (31) in the bore of the seal housing.

After the impeller has been installed, lubricate the seal assembly as indicated in LUBRICATION.

Impeller Reassembly And Adjustment

(Figure 1)

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

Slide the same number of impeller adjusting shims (5) as previously removed onto the shaft.

Install the impeller key (30) on the shaft. Align the impeller keyway with the key, and slide the impeller onto the shaft until it bottoms against the adjusting shims.

For maximum pump efficiency, the impeller should be centered with the volute scroll of the pump casing. Center the impeller by adding or removing adjusting shims.

Replace the cap nut O-ring (28), and screw the cap nut (25) tight on the impeller shaft.

Install the fillister head screw (29), and check that the impeller remains centered in the volute scroll. Adjust as necessary.

Cover Plate Reassembly

Clean any scale or debris from the cover plate shoulder and pump casing which might prevent a good seal. Replace the cover plate gasket (22), and secure the cover plate (26) to the pump casing with hex nuts.

NOTE

To ease future disassembly, apply a film of grease or 'Never-Seez' on the back cover shoulder, or any surface which contacts the pump casing. This action will reduce rust and scale build-up.

Final Pump Reassembly

Be sure the pump end assembly is secured to the base and engine.

Install the suction and discharge lines and open all valves in the lines. Make certain that all piping connections are secure.

Be sure the pump end and engine have been properly lubricated; see LUBRICATION.

Refer to **OPERATION**, Section C, and start the pump.

LUBRICATION

Seal Assembly

Fill the grease cup through the grease fitting with a good grade of No. 2 lithium base grease until it 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).

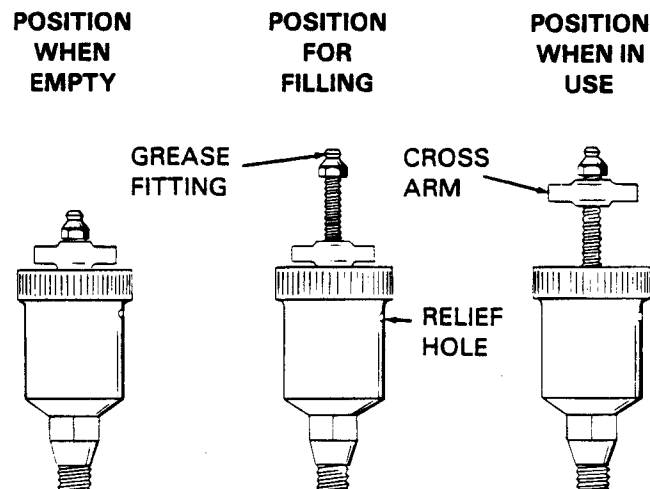


Figure 4. Automatic Lubricating Grease Cup

Bearings

The intermediate bearing cavity was fully lubricated when shipped from the factory. When additional lubrication is required, add one shot of No. 0 pressure gun grease to the grease fitting (7). **Do not over lubricate.** Excessive grease can cause overheating and reduce bearing life.

There are no provisions in the bearing cavity to drain or flush the lubricant. The pump must be disassembled to completely clean and maintain this cavity.

When lubricating a dry (overhauled) intermediate, fill the cavity through the grease fitting with 1/4 lb. of grease (approximately one-third full).

Under normal conditions, change the grease each 5000 hours of operation, or at 12 month intervals, whichever occurs first. In extremely dirty or humid conditions, change more frequently.

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

Engine

Consult the literature supplied with the engine, or contact your local engine representative.

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or call:
519–631–2870**