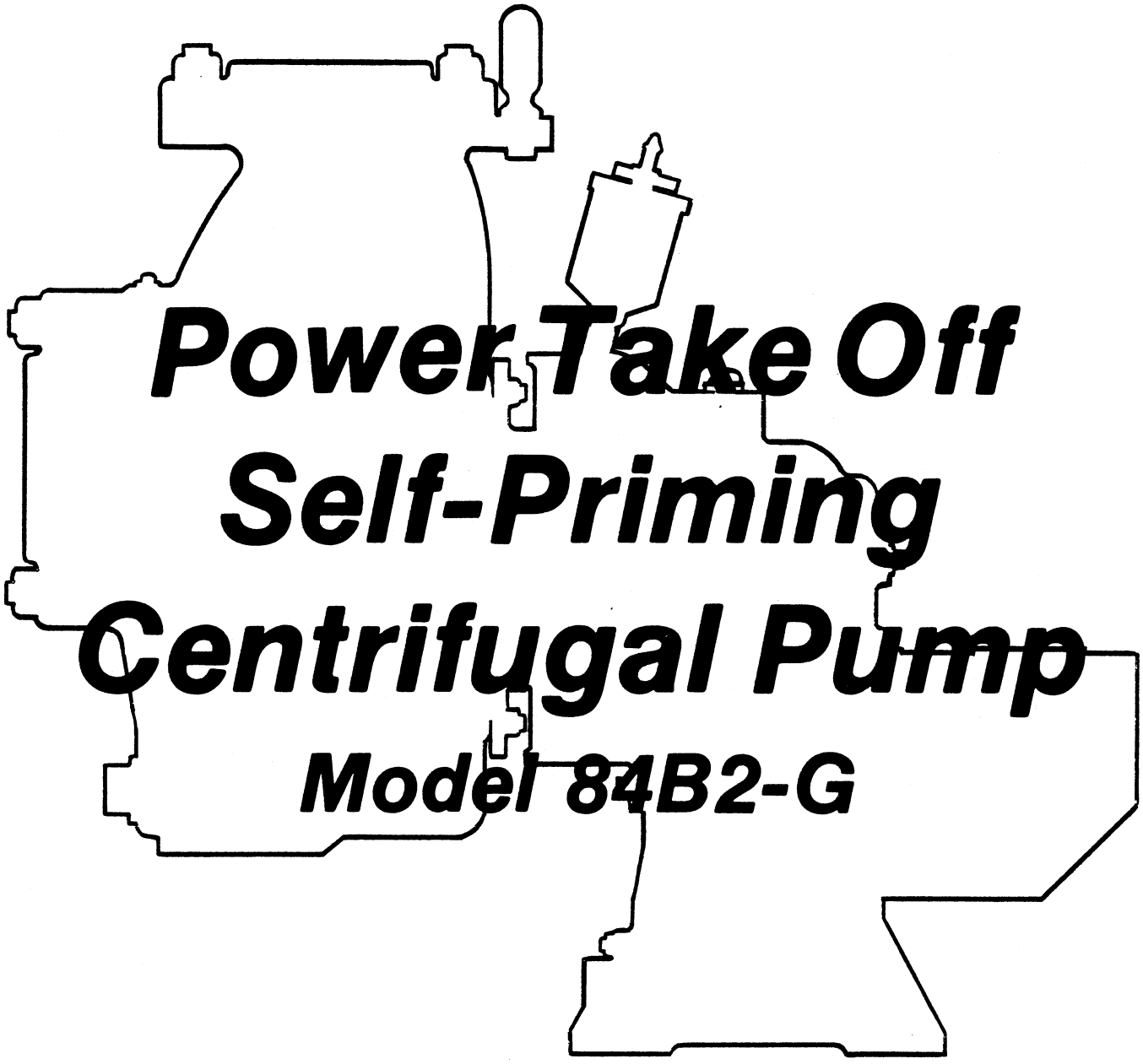
INSTALLATION, OPERATION, PARTS LIST, AND MAINTENANCE MANUAL

A E

GORMAN-RUPP

OM-00931-0P01

August 11, 1980



Power Take Off Self-Priming Centrifugal Pump

Model 84B2-G

THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

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

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

This pump is an 80 series, semi-enclosed impeller, self-priming centrifugal model. It is designed for straight-in suction where the medium being pumped enters directly to the impeller eye.

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

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

Gorman-Rupp of Canada Limited
70 Burwell Road
St. Thomas, Ontario N5P 3R7

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

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

NOTE

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

CAUTION

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

WARNING

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

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WARNINGS

THESE WARNINGS APPLY TO ALL PUMPS WITH A POWER TAKE OFF. GORMAN-RUPP HAS NO CONTROL OVER OR PARTICULAR KNOWLEDGE OF THE POWER SOURCE WHICH WILL BE USED. REFER TO THE MANUAL ACCOMPANYING THE POWER SOURCE BEFORE ATTEMPTING TO START THE POWER SOURCE.

Before attempting to open or service the pump:

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

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

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

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

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

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

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

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

Do not install and operate a non-explosion proof power source in an explosive 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.

Fuel used by internal combustion engines presents an extreme explosion and fire hazard. Make certain that all fuel lines are securely connected and free of leaks. Never refuel a hot or running engine. Avoid overfilling the fuel tank. Always use the correct type of fuel.

Never tamper with the governor to gain more power. The governor establishes safe operating limits that should not be exceeded.

INSTALLATION

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

PREINSTALLATION INSPECTION

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

a. Inspect the pump assembly for cracks, dents, damaged threads, and other obvious damage.

b. Check for and tighten loose bolts, nuts, cap screws, and other attaching hardware. Since gaskets tend to shrink after drying, check for and tighten loose nuts and cap screws securing mating surfaces.

c. Carefully read all tags, decals, and markings on the pump assembly, and perform all duties indicated. Note the direction of rotation indicated on the pump. Check that the pump shaft rotates in the required direction.

CAUTION

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

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

POSITIONING THE PUMP

Mounting

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

Lifting

WARNING

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

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 it.

SUCTION AND DISCHARGE PIPING

Materials

Either pipe or hose may be used for suction and discharge lines, but hose used in suction lines must be the rigid-wall, reinforced type to prevent collapse under suction. Using pipe couplings in suction lines is not recommended.

Line Configuration

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

Connections to Pump

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

Gauges

Most pumps are drilled and tapped for installing discharge pressure and vacuum suction gauges. If these gauges are desired for pumps that are not tapped, drill and tap the suction and discharge lines close to the pump before installing the lines.

SUCTION LINES

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

Fittings

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

Strainers

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

Sealing

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

DISCHARGE LINES

Throttling Valves

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

Check Valves

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

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

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 between the pump and the discharge check valve. The bypass line should be sized so that it does not affect pump discharge capacity.

Either a Gorman-Rupp automatic air release valve—which will automatically open to allow the pump to prime, and automatically close when priming is accomplished—or a hand-operated shutoff valve should be installed in the bypass line.

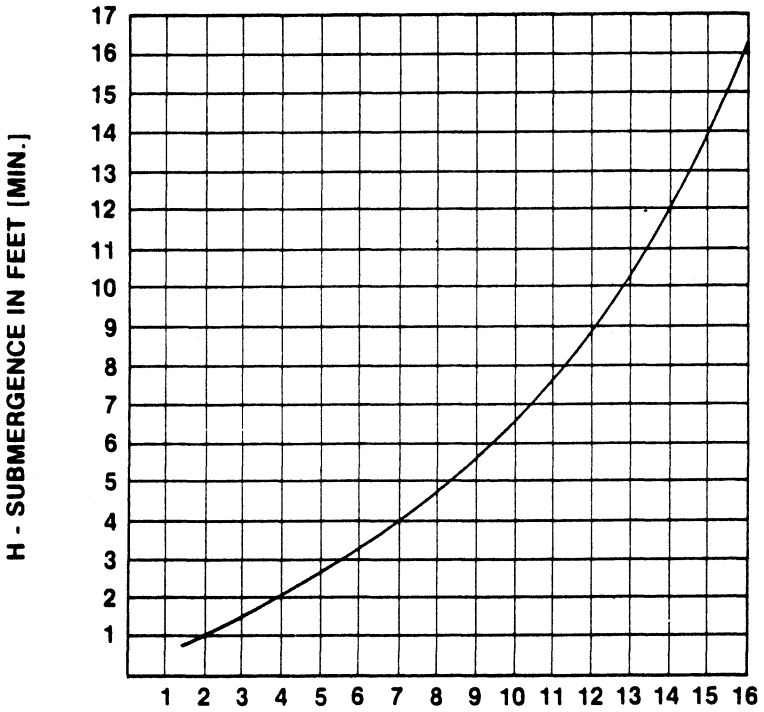
NOTE

The bypass line may clog frequently, particularly if the valve remains closed. If this condition occurs, either use a larger bypass line or leave the shutoff valve open during the pumping operation.

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

SUCTION LINE POSITIONING

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



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

Figure 1. Recommended Minimum Suction Line Submergence Vs. Velocity

WARNING

When installing and/or aligning universal shaft assemblies, disconnect the power source to ensure that the pump will remain inoperative.

The alignment of the pump and its power source is critical for trouble-free mechanical operation. Before checking alignment, make sure that the gear box mounting bolts are tight.

When using a mobile power source, block the wheels of the power source, engage the braking system, or take other precautions to ensure that the power source will remain stationary.

When using a universal joint drive shaft assembly to connect the pump to a PTO, install, support, and align the drive shaft in accordance with the manufacturer's instructions. The pump and the drive power source are generally positioned so that shaft centerlines are parallel and horizontal. The maximum operating angle should not exceed 15 degrees (see figure 1).

Check the direction of PTO rotation before starting the pump. The drive shaft must rotate in the direction shown on the body of the pump, gear box, and/or decals, tags, and labels.

WARNING

Do not operate the pump without a guard over the rotating parts. Exposed rotating parts can catch clothing, fingers, or tools, causing severe injury to personnel.

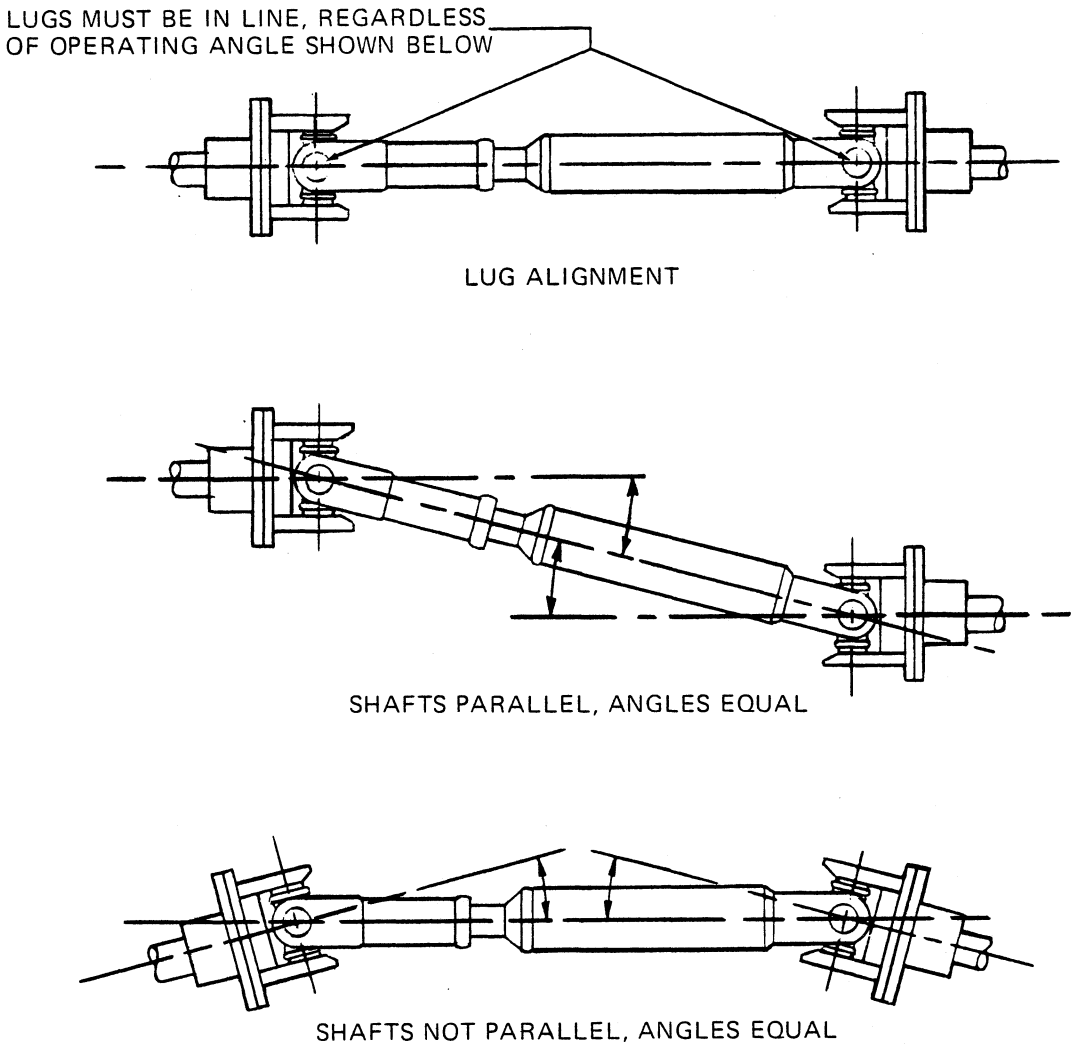


Figure 4. Proper Installation and Alignment of Universal Assembly

OPERATION

WARNING

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

PRIMING

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

This pump is self priming, but the pump volute casing must first be filled with liquid if:

1. The pump is being put into service for the first time.
2. The pump has not been used for a considerable length of time.
3. The liquid in the volute casing has evaporated.

Once the volute casing has been filled, the pump will prime and reprime as necessary.

CAUTION

Never operate a self-priming pump unless the volute is filled with liquid. The pump will not prime when dry. Extended operation of a dry pump will destroy the seal assembly.

To fill the pump, remove the volute fill cover or fill plug at the top of the casing and add clean liquid until the pump is filled. Replace the fill cover or fill plug before operating the pump.

STARTING

Consult the operating manual furnished with the power source.

Rotation

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

CAUTION

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

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

Lines 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 quieter operation. The pump may not prime immediately because the suction line must first fill with liquid. If the pump fails to prime within five minutes, stop it and check the suction line for leaks.

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

Leakage

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

Overheating

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

WARNING

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

Strainer Check

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

Pump Vacuum Check

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

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

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

STOPPING

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

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

If the pump will be idle 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, operate the pump during the draining process. Clean out any remaining solids by flushing with a hose.

TROUBLESHOOTING

WARNING

Before attempting to open or service the pump:

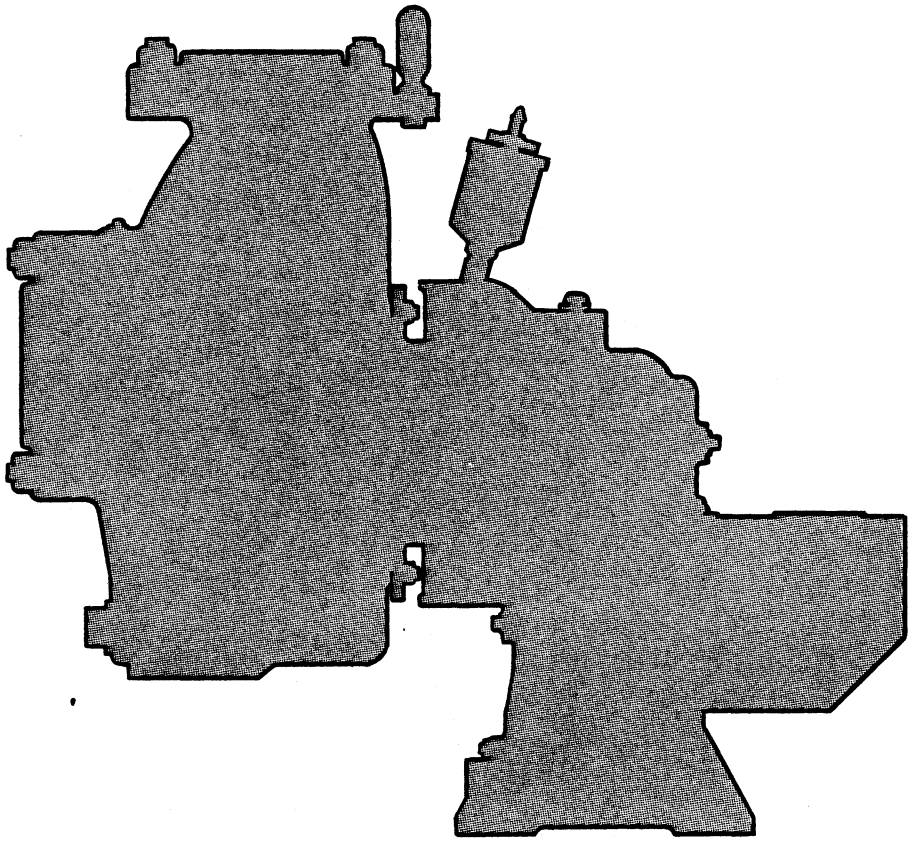
1. Consult pump service manual.
2. Disconnect the power source to ensure that the pump will remain inoperative.
3. Allow pump to cool if overheated.
4. Close suction and discharge valves.
5. Drain pump.

Trouble	Possible Cause	Probable Remedy
PUMP FAILS TO PRIME	Air leak in suction line.	Correct leak.
	Lining of suction hose collapsed.	Replace suction hose.
	Suction check valve clogged or binding.	Clean valve.
	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.
	Suction strainer clogged.	Clean suction strainer.
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE	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, page 4).
	Lining of suction hose collapsed.	Replace suction hose.
	Impeller or other wearing parts worn or damaged.	Check impeller clearance. Replace worn parts as needed.
	Impeller clogged.	Free impeller of debris.
	Pump speed too slow.	Check driver output; check belts or couplings for slippage.
	Discharge head too high.	Install bypass line.
	Suction lift too high.	Reduce suction lift.

Trouble	Possible Cause	Probable Remedy
PUMP STOPS OR FAILS TO DE-LIVER RATED FLOW OR PRESSURE (cont)	Leaking or worn seal or pump gaskets.	Check pump vacuum. Replace leaking or worn seal or pump gaskets.
	Suction strainer clogged.	Clean suction strainer.
PUMP REQUIRES TOO MUCH POWER	Pump speed too high.	Check driver output; check that sheaves or couplings are correctly sized.
	Discharge head too low.	Adjust discharge valve.
	Liquid solution too thick.	Dilute if possible.
PUMP CLOGS FREQUENTLY	Discharge flow too slow.	Open discharge valve fully to increase flow rate, and run engine at maximum governed speed.
	Suction check valve clogged or binding.	Free valve, and clean or replace it.
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.

Power Take Off Self-Priming Centrifugal Pump

Model 84B2-G



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

SECTIONAL DRAWING

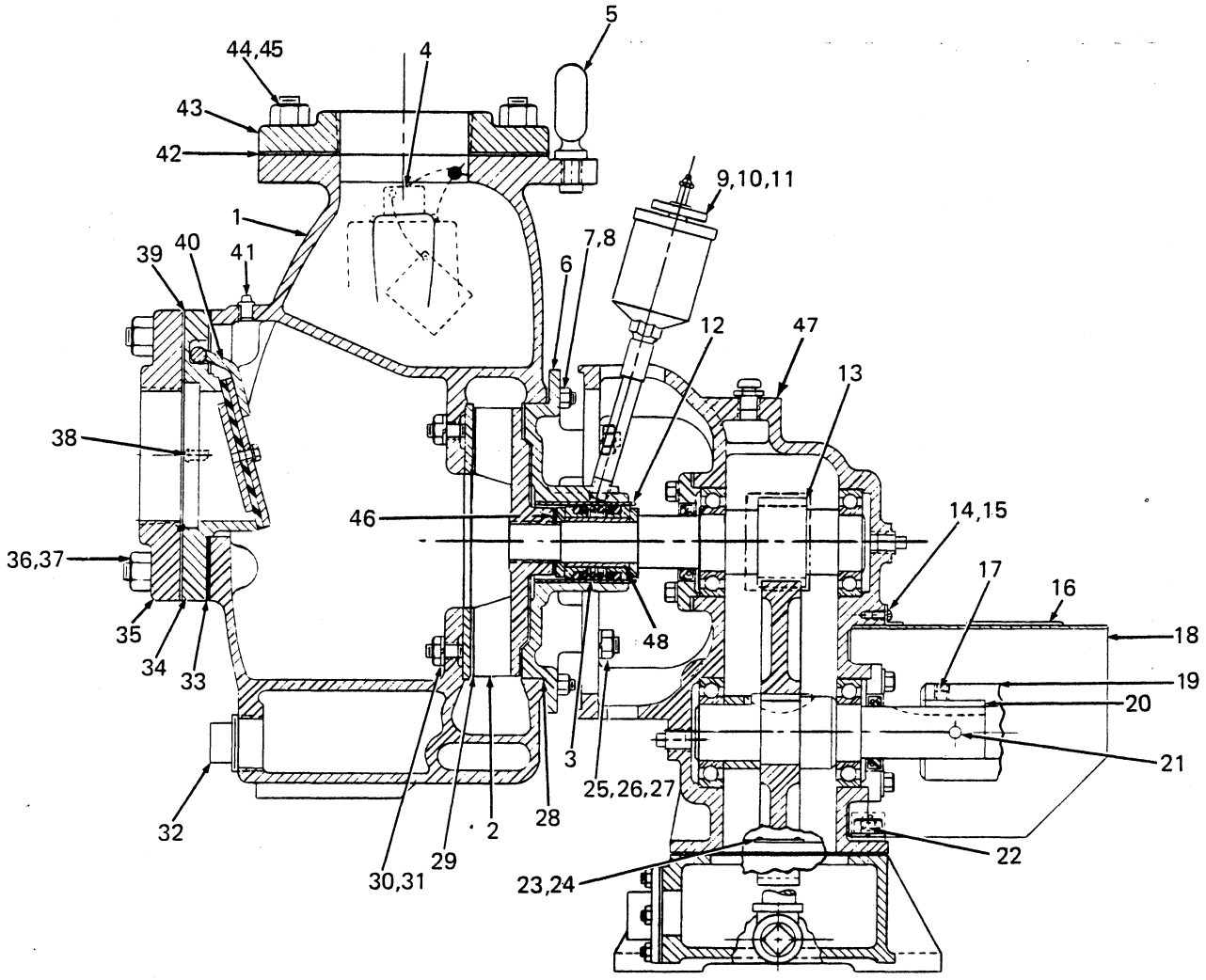


Figure 1. Pump Model 84B2-G

PARTS LIST

PUMP MODEL 84B2-G

ITEM NO.	PART NAME	PART NUMBER	MATL CODE	NO. REQ.
1	VOLUTE CASING	8881	10010	1
2	IMPELLER	8882-A	10010	1
3	★SEAL ASSEMBLY	GS-1250		1
4	FILL PLUG ASSEMBLY	48271-065		1
5	EYE BOLT	NOT FURNISHED		
6	★SEAL PLATE	13901-A	10010	1
7	STUD	C-0605	15991	8
8	HEX NUT	D-06	15991	8
9	★SEAL GREASE CUP	S-1509		1
10	PIPE COUPLING	AE-04	11990	1
11	PIPE NIPPLE	T-0416	15070	1
12	★SEAL LINER	2205	14080	1
13	WARNING STICKER	38816-062		1
14	RD HD MACHINE SCREW	X-0402	15991	1
15	LOCKWASHER	J-04	15991	1
16	WARNING STICKER	38816-063		1
17	SETSCREW	GA-0601½	15991	1
18	UNIVERSAL GUARD	6408	15990	1
19	UNIVERSAL ASSEMBLY	S-1413-A		1
20	★SHAFT KEY	N-0608	15990	1
21	★COTTER PIN	M-0616	15990	1
22	PAN HEAD TAPSCREW	BP#14-02	15990	2
23	RPM INPUT PLATE	2613-EV	00000	1
24	DRIVE SCREW	BM-02		2
25	STUD	C-0808	15991	4
26	LOCKWASHER	J-08	15991	4
27	HEX NUT	D-08	15991	4
28	★VOLUTE GASKET SET	2474-G	18000	1
29	★WEAR PLATE	2605	15990	1
30	HEX NUT	D-06	15991	2
31	LOCKWASHER	J-06	15991	2
32	VOLUTE DRAIN PLUG	P-20	11990	1
33	★FLAP VALVE SEAT GSKT	7336-G	18000	1
34	★FLAP VALVE SEAT	7336	10010	1
35	SUCTION FLANGE	1756	10010	1
36	STUD	C-1013	15991	8
37	HEX NUT	D-10	15991	8
38	RD HD MACHINE SCREW	X-0403	14990	2
39	★SUCTION FLANGE GSKT	1676-G	18000	1
40	★FLAP VALVE ASSEMBLY	7340		1
41	ACCESSORY PLUG	P-04	11990	1
42	★DISCHARGE FLNG GSKT	1676-G	18000	1
43	DISCHARGE FLANGE	1756	10010	1
44	STUD	C-1009	15991	8
45	HEX NUT	D-10	15991	8
46	★IMPELLER SHIM SET	37-J	17090	1
47	GEARBOX ASSY (figure 2)	GRP44-14		1
48	SHAFT SLEEVE	37-C	16000	1
NOT SHOWN:				
	STRAINER	S-2003		1
	NAME PLATE	2613-AY	13990	1
	DIRECTION PLATE	2613-BM	00000	1
	AXLE	6150	15990	1
	AXLE BRACKET	6417-A	15990	1
	AXLE BRACKET	6417-B	15990	1
	POP RIVET	11703-D	13990	2
	MOUNTING HARDWARE			
	MACHINE BOLT	A-1008	15991	2
	HEX HEAD CAPSCREW	B-0608	15991	4
	HEX NUT	D-06	15991	4
	HEX NUT	D-10	15991	2
	LOCKWASHER	J-06	15991	4
	LOCKWASHER	J-10	15991	2
	HEX NUT	D-08	15991	4
	SQUARE HD SETSCREW	G-0604	15990	1
	LOCKWASHER	J-08	15991	4
	COTTER PIN	M-0306	15990	4
	FLAT WASHER	S-1532		4
	PNEU WHEEL	S-2005		2
	BASE	41547-546		1

★INDICATES PARTS RECOMMENDED FOR STOCK

Note: This parts list applies to pumps from serial no. **531206**
Above Serial Numbers Do Not Apply To Pumps Made In Canada.

CANADIAN SERIAL NO. . . . . AND UP

SECTIONAL DRAWING

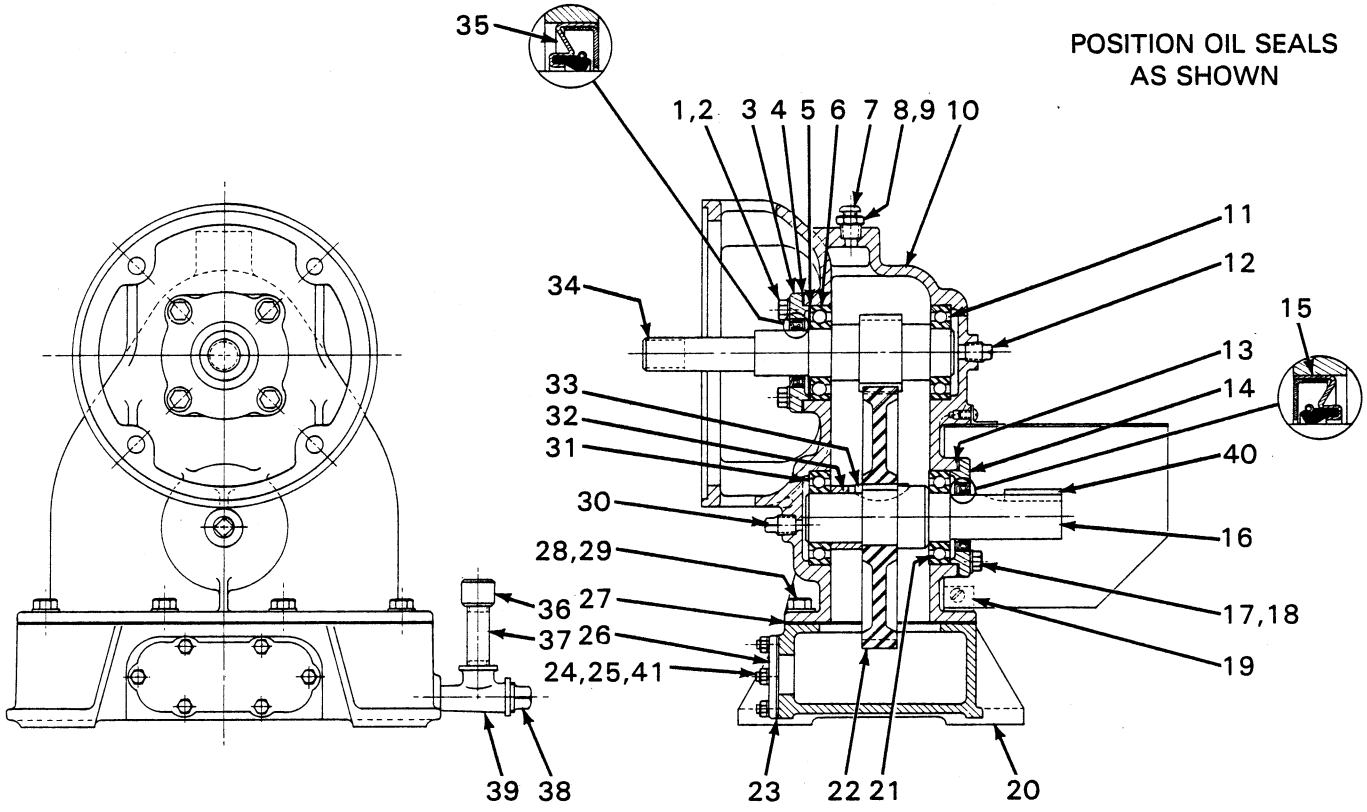


Figure 2. GRP44-14 Gearbox Assembly for 84B2-G

PARTS LIST

GRP44-14 GEARBOX ASSEMBLY

ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	HEX HEAD CAPSCREW	B-0604	15991	4
2	LOCKWASHER	J-06	15991	4
3	INBOARD BEARING CAP	6404	10010	1
4	★BEARING CAP GASKET	6404-G	—	1
5	★BEARING SHIM SET	8544	15990	1
6	★BEARING	S-1096	—	1
7	AIR VENT PLUG	S-2162	—	1
8	REDUCER BUSHING	AP-0602	15990	1
9	SHIPPING PLUG	11495-A	11990	1
10	GEARBOX HOUSING	6412	10010	1
11	★BEARING	S-1096	—	1
12	PIPE PLUG	P-06	11990	1
13	★BEARING CAP GASKET	6404-G	—	1
14	OUTBOARD BEARING CAP	6404	10010	1
15	★OIL SEAL	S-0959	—	1
16	★DRIVE SHAFT	6405	16040	1
17	HEX HEAD CAPSCREW	B-0604	15991	4
18	LOCKWASHER	J-06	15991	4
19	BRACKET	6408-C	15990	1
20	BASE	6409	10010	1
21	★BEARING	S-1096	—	1
22	★DRIVE GEAR	13904	16040	1
23	★COVER PLATE GASKET	6518-G	18000	1
24	STUD	C-0505	15991	6
25	HEX NUT	D-05	15991	6
26	COVER PLATE	6518-A	10010	1
27	★BASE GASKET	6409-G	18000	1
28	HEX HEAD CAPSCREW	B-0804	15991	8
29	LOCKWASHER	J-08	15991	8
30	PIPE PLUG	P-06	11990	1
31	★BEARING	S-1096	—	1
32	SPACER SLEEVE	6414	15990	1
33	DRIVE GEAR KEY	AV-1622	15990	1
34	★PINION SHAFT	13903	16040	1
35	★OIL SEAL	S-0959	—	1
36	DIP STICK	42111-319	—	1
37	PIPE NIPPLE	T-0812	15070	1
38	GEARBOX DRAIN PLUG	P-08	11990	1
39	SERVICE TEE	US-08	11990	1
40	DRIVE SHAFT KEY	N-0608	15990	1
41	LOCKWASHER	J-05	15991	6

★INDICATES PARTS RECOMMENDED FOR STOCK

PUMP, SEAL, AND GEARBOX 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 views (see figures 1 and 2), and the accompanying parts lists.

Pump Disassembly

Disconnect the power source to ensure that the pump will remain inoperative, and close all connecting valves. Remove the volute drain plug (32, figure 1) to drain the pump. Clean and reinstall the drain plug.

The pump and gearbox assemblies may be serviced while mounted on the base.

If it is desired to remove the pump and gearbox, disengage the round head machine screw (14) and pan head tapscrews (22) securing the universal guard (18) to the gearbox assembly (47). Remove the guard. Disengage the allen head setscrew (17) and remove the cotter pin (21) securing the universal assembly (19) to the drive shaft. Remove the universal assembly. Disengage the hex nuts securing the pump and gearbox assemblies to the base.

Remove the hex nuts (8) securing the seal plate (6) to the volute casing (1), and the hex nuts (27) securing the gearbox assembly to the seal plate. Separate the assemblies.

To loosen the impeller (2), immobilize it by placing a block of wood between the vanes, and turn the shaft counter to the direction of pump rotation. Unscrew the impeller with caution; pressure on the seal spring will be released as the impeller is unscrewed.

Remove the impeller adjusting shims (46). For ease of reassembly, tag and tie the shims.

Seal Disassembly

Before removing the seal assembly (3), turn the cross arm on the seal grease cup (9) clockwise until it rests against the cover (see figure 4). This will prevent the grease in the cup from escaping after the seal is removed.

Carefully remove the rotating and stationary seal elements and the shaft sleeve (47), using a stiff wire with a hooked end if necessary.

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

WARNING

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

Seal Reassembly

If the gearbox is to be serviced or disassembled, do not reassemble the seal or the pump at this time.

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

Inspect the seal components for wear, scoring, grooves, and other damage that might cause leakage. If any components are worn, replace the complete seal; never mix old and new seal parts.

CAUTION

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

See figure 3 for the correct order of installation of seal components.

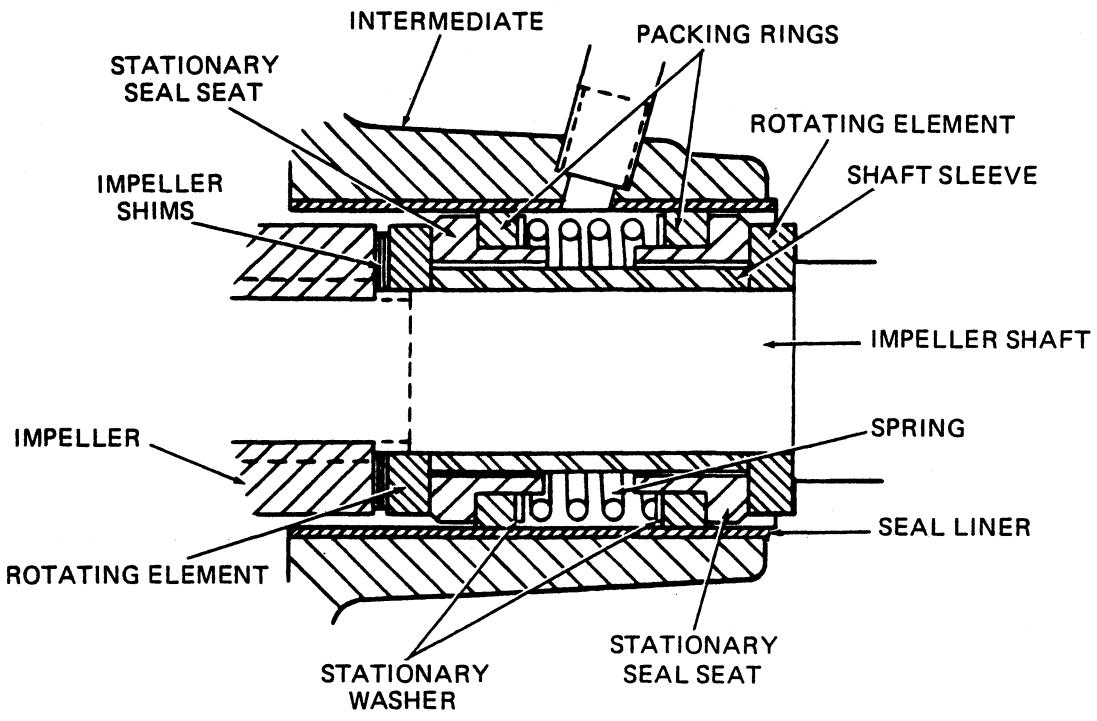


Figure 3. GS-1250 Seal Assembly

Inspect the seal liner (7), which is a press fit, and replace it if worn or grooved. If the seal liner is replaced, a hole must be drilled in it after installation to permit the flow of lubricant from the grease cup to the seal assembly. Deburr the hole after drilling, and clean the seal liner.

Clean and polish the shaft sleeve, or replace it if there are nicks or cuts on the end.

Install the shaft sleeve. Place a drop of light lubricating oil on the lapped faces of the seal, and lubricate the packing rings with soft grease or oil. Install the seal as a complete unit.

Pump Reassembly

Inspect the wear plate (29), and replace it if scored or worn.

Inspect the impeller, and replace it if cracked or badly worn. Reinstall the impeller adjusting shims and the impeller. A clearance of .020 to .040 inch between the impeller and the seal plate is necessary for maximum pump efficiency. Measure this clearance, and adjust it by adding or removing impeller shims.

Reassemble the volute casing, seal plate, and gearbox, replacing the volute gasket set (28). A clearance of .010 to .020 inch between the impeller and the wear plate is also recommended for maximum pump efficiency. This clearance can be reached by adding or subtracting gaskets in the volute gasket set until the impeller binds against the wear plate when the shaft is turned. After the impeller binds, add .015 inch of gaskets.

Reinstall the pump and gearbox assemblies on the base. Reconnect the universal assembly, and reinstall the guard.

Fill the volute with clean liquid, open all connecting valves, and check that all piping is secure. Reconnect the power source.

Gearbox Disassembly

Refer to **Pump Disassembly** and **Seal Disassembly**. Close all connecting valves and drain the pump. Remove the impeller and seal assembly

Drain the gearbox by removing the drain plug (38). Clean and reinstall the plug after draining.

Disengage hex head capscrews (28) securing the gearbox to the base (20), and remove the base.

Disengage the hex head capscrews (17) securing the outboard bearing cap (14) to the gearbox housing (10), and remove the bearing cap and oil seal (15).

Remove the pipe plug (30) at the inboard end of the gearbox, and use an arbor press to force the drive shaft (16) and bearings (21 and 31) from the gearbox, retaining the spacer sleeve (32), drive gear (22), and drive gear key (33) as the shaft comes free.

Disengage hex head capscrews (1) securing the inboard bearing cap (3) to the gearbox housing, and remove the bearing cap, oil seal (35), and bearing shim set (5).

Remove the pipe plug (12) at the outboard end of the gearbox, and use an arbor press to force the pinion shaft (34) and bearings (6 and 11) from the gearbox.

Gearbox Reassembly

Inspect the shafts, bearings, and drive gear, and replace as necessary.

Clean the shafts and bearings with a soft cloth soaked in cleaning solvent.

WARNING

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

Dip the pinion shaft bearings in clean oil, and use an arbor press to press the bearings onto the shaft until they seat against the shaft shoulders. **Press on the inner races only; do not press or strike the outer races, balls, or ball cages.** New bearings should be a tight fit on the shaft; if the bearings slip on and off easily, the shaft is worn and **must** be replaced.

Push or press the assembled shaft and bearings into the housing until the outboard bearing bottoms in the housing bore. If the bearing does not fit snugly in the housing bore, replace the bearing.

Reinstall the pipe plug at the outboard end of the gearbox.

Reinstall the pinion shaft bearing shim set. Replace the bearing cap gasket (4). Inspect the oil seal, and replace as necessary. Install the oil seal, and secure the inboard bearing cap. Recommended shaft end play is .005 to .015 inch. Measure the end play, and add or remove bearing shims as necessary.

Dip the drive shaft bearings in clean oil. Install the inboard bearing in its respective bore in the gearbox housing, making certain that it seats squarely.

Position the drive shaft in the gearbox housing, and reinstall the drive shaft spacer, drive gear key, and drive gear, making certain that the drive gear engages the pinion shaft.

Reinstall the outboard drive shaft bearing snugly against the shoulder of the shaft. Replace the bearing cap gasket (13). Inspect the oil seal, and replace as necessary. Install the oil seal, and secure the outboard bearing cap.

Reinstall the pipe plug at the inboard end of the gearbox.

Replace the base gasket (27) and secure the gearbox assembly to the base. Secure the volute housing and seal plate to the gearbox assembly.

See **Seal Reassembly** and **Pump Reassembly.** Reinstall the seal assembly and the impeller. Reinstall the pump and gearbox assemblies on the base. Reconnect the universal assembly, and reinstall the guard.

Refer to **LUBRICATION,** and lubricate the gearbox assembly.

Fill the volute, open all connecting valves, and make certain that all piping connections are tight before starting the pump.

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 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).

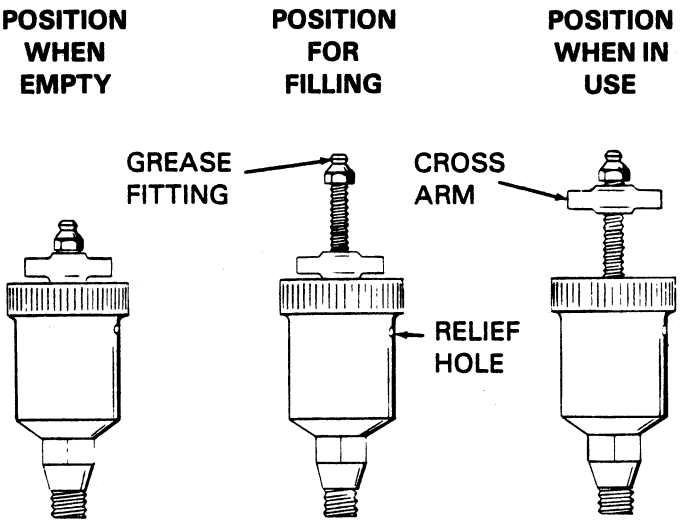


Figure 4. Automatic Lubricating Grease Cup

Gearbox

Remove the air vent and bushing (7 and 8) at the top of the gearbox. Add 4 ounces of Molykote M to the gearbox. Add sufficient SAE No. 90 non-detergent motor oil until the correct level shows on the dipstick (36).

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