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JANUARY 22, 1981
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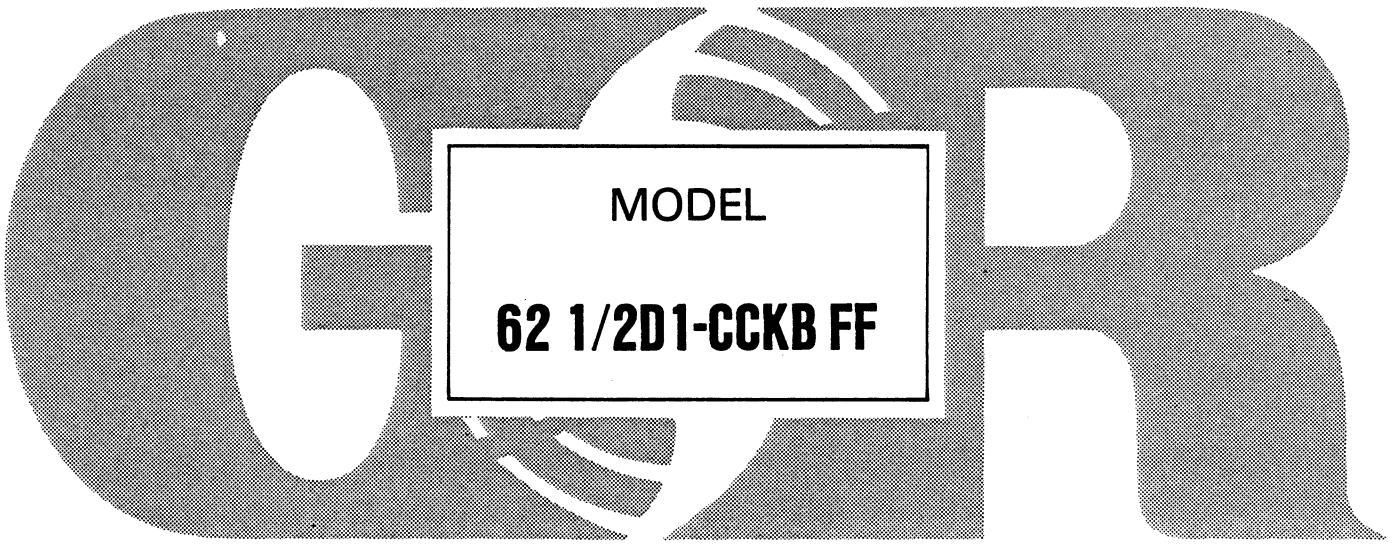
60 SERIES

INSTALLATION, OPERATION, PARTS LIST, AND MAINTENANCE MANUAL



THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO
GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA
Printed in U.S.A.

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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 60 Series, centrifugal model with an enclosed impeller. This pump is designed for use in fire fighting service. It is close-coupled to an Onan Model CCKB-MS/3104J twin cylinder, air cooled gasoline engine and mounted on a common hand-carry base. Standard equipment includes an electric starter with 12-volt battery, exhaust primer system, spark arresting muffler, discharge check valve, suction strainer and pressure gauge. The basic material of pump construction is aluminum, with bronze wear and balance rings, and a self-lubricated mechanical seal.

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 44901-1217	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 injury or death to personnel, and describe the procedure required and the injury which could result from failure to follow the procedure.

WARNINGS - SECTION A

THESE WARNINGS APPLY TO 60 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 spark plug wires or battery cables 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 handle clear water for high pressure distribution. Do not attempt to pump volatile, corrosive or flammable liquids which may damage the pump or endanger personnel as a result of pump failure.

WARNING

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 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.

WARNING

After the pump is installed, make certain the pump and hoses are properly supported and secure before operation.

WARNING

Do not operate an internal combustion engine 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.

WARNING

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.

WARNING

Never tamper with the governor to gain more power. The governor establishes safe operating limits that should not be exceeded. Continuous duty performance is limited to 3900 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 permissible operating pressure as shown on the pump performance curve.

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

Pump Dimensions

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

OUTLINE DRAWING

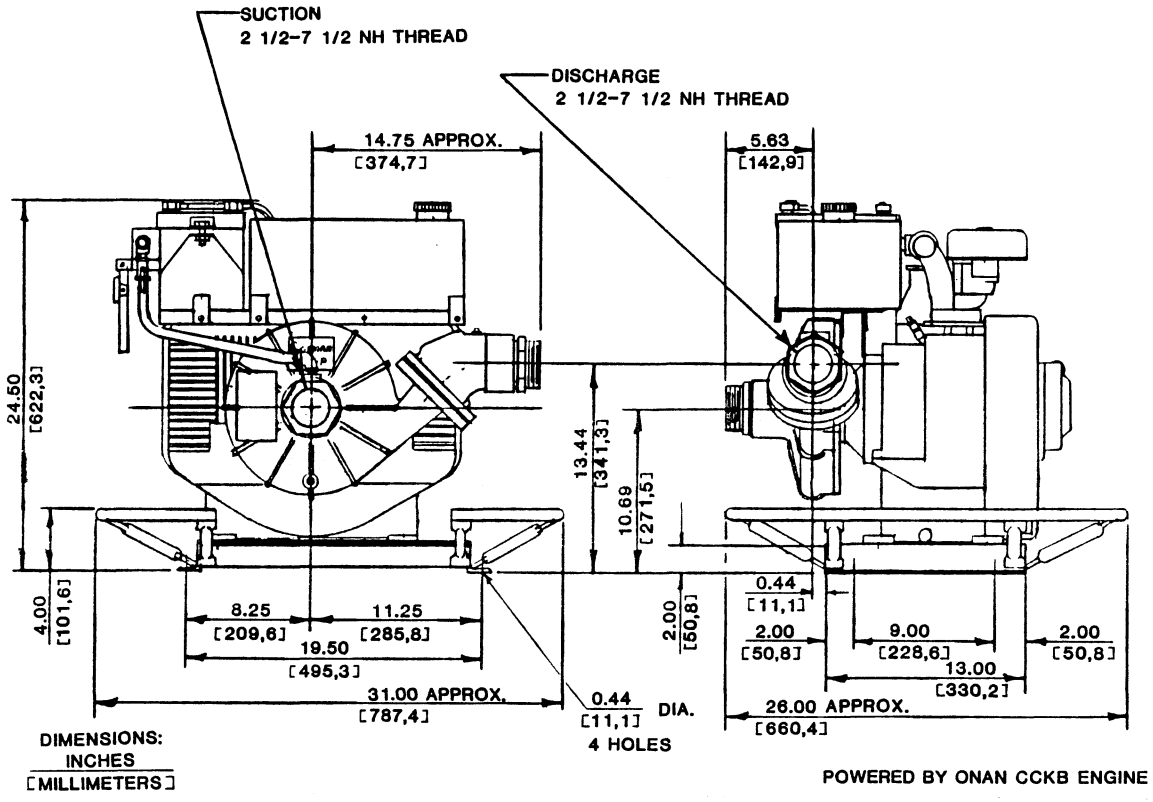


Figure 1. Pump Model 62 1/2D1-CCKB FF

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 for cracks, dents, damaged threads, and other obvious damage.

b. Check for and tighten loose attaching hardware. Since gaskets tend to shrink after drying, check for loose hardware at 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.

f. Check to be sure the following standard equipment items are included, and properly installed on the pump:

- Fully charged 12-volt battery.
- Brass fire hose adaptors in pump suction and discharge ports.
- Discharge pressure gauge.
- Suction strainer assembly.

If the maximum shelf life on any item 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

This pump is designed to be hand carried using the 2-man carry handles. The total pump weight is approximately 290 pounds, not including accessories or strainer. Customer installed equipment such as suction and discharge hoses **must** be removed before attempting to lift.

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.

To ensure sufficient lubrication and fuel supply to the engine, **do not** position the pump and engine more than 15° off horizontal for continuous operation. The pump and engine may be positioned up to 30° off horizontal for **intermittent operation only**; however, the engine manufacturer should be consulted for continuous operation at angles greater than 15°.

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 1/4-inch diameter spherical solids.

It is recommended that a strainer with a built-in foot valve be installed in the suction line. The foot valve will hold water in the line while the pump is idle, eliminating the need to reprime.

Sealing

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

Suction Lines In Sumps

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

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

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

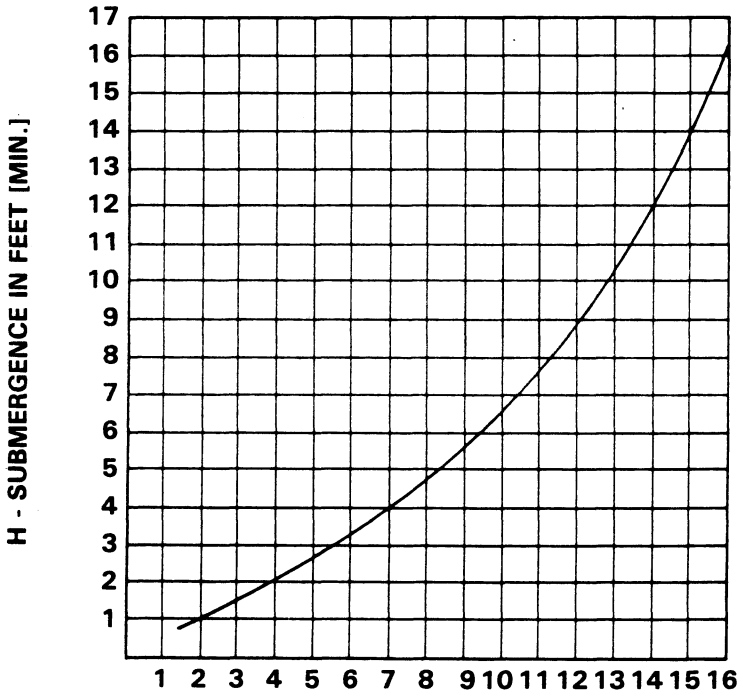
If two suction lines are installed in a single sump, the flow paths may interact, reducing the efficiency of one or both pumps. To avoid this, position the suction inlets so that they are separated by a distance equal to at least three times the diameter of the suction pipe.

Suction Line Positioning

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

NOTE

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



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

Figure 2. Recommended Minimum Suction Line Submergence Vs. Velocity

DISCHARGE LINES

Siphoning

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

Valves

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

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

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

OPERATION - SECTION C

WARNING

This pump is designed to handle clear water for high pressure distribution. Do not attempt to pump volatile, corrosive or flammable liquids which may damage the pump or endanger personnel as a result of pump failure.

WARNING

Never tamper with the governor to gain more power. The governor establishes safe operating limits that should not be exceeded. Continuous duty performance is limited to 3900 RPM.

PRIMING

Install the pump 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**).

Exhaust Primer

Since this pump is not self-priming, it is equipped with an exhaust primer assembly (Figure 1).

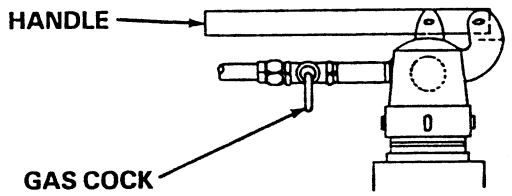


Figure 1. Exhaust Primer Assembly

The exhaust primer utilizes engine exhaust gases, directed through a venturi, to create a vacuum and draw air out of the suction line and pump casing.

The exhaust primer is capable of priming a pump with a maximum priming lift of 15 feet within 90 seconds; less time will be required for priming at a lesser lift. If the pump does not prime in a reasonable length of time, check the suction line for leaks.

To prime the pump, close the throttling valve in the discharge line.

Close the exhaust primer handle (see Figure 1), and open the cock in the priming line. Consult the starting instructions in this manual as well as the engine operating manual, and start the engine. Operate the engine at maximum governed speed and allow the pump to prime until liquid flows continuously from the exhaust primer nozzle. When the pump is fully primed, open the exhaust primer handle, and close the cock in the priming line.

Once fully primed, reduce engine speed and partially open the discharge throttling valve. The discharge line should be filled slowly to prevent damage to the piping, gaskets, and other devices, resulting from the initial shock of liquid filling the lines. When the discharge line is completely filled, adjust the discharge throttling valve to the desired flow rate.

STARTING

Consult the operations manual furnished with the engine.

OPERATION

Leakage

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

Liquid Temperature And Overheating

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

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

Strainer Check

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

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

Pump Vacuum Check

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.

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. On engine driven pumps, 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 spark plug wires or battery cables 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.

PUMP TROUBLESHOOTING - SECTION D

WARNING

Before attempting to open or service the pump:

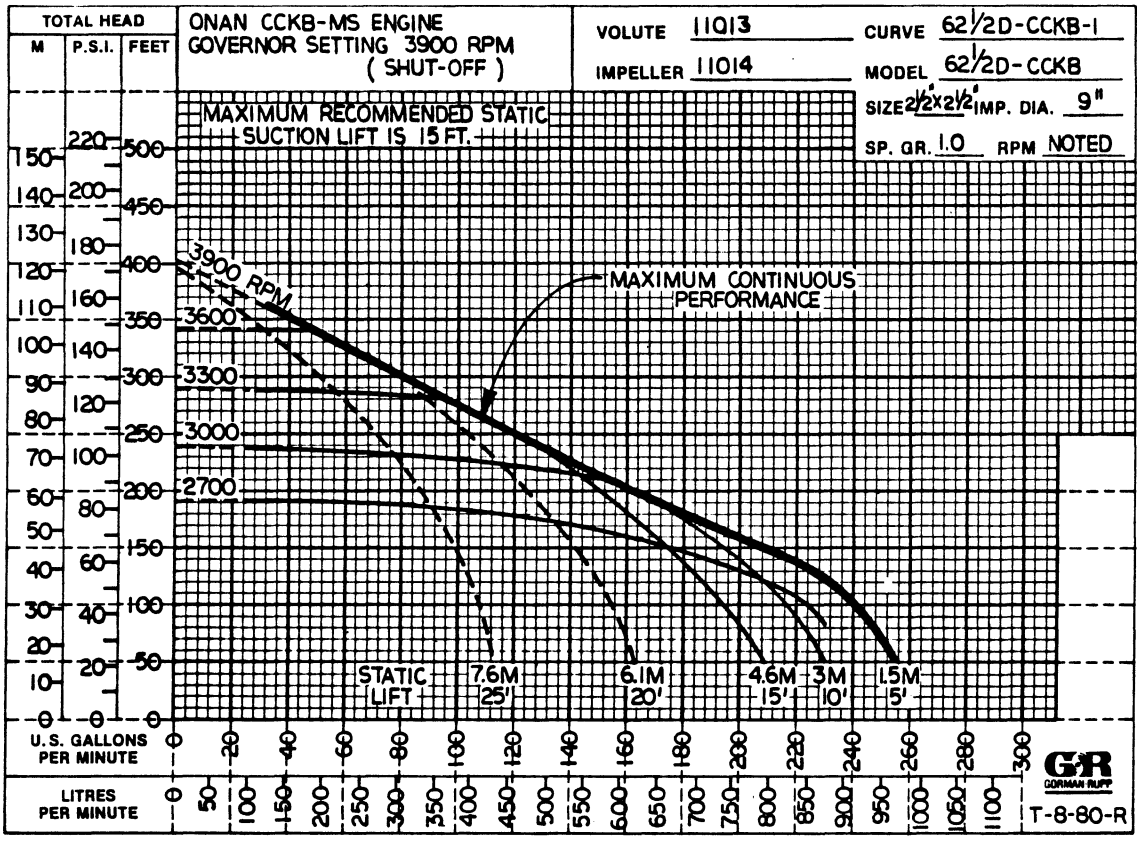
1. Familiarize yourself with this manual.
2. Disconnect the spark plug wires or battery cables to ensure that the pump will remain inoperative.
3. Allow the pump to cool if overheated.
4. Vent the pump slowly and cautiously.
5. Close the suction and discharge valves.
6. Check the temperature before opening 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.
	Integral discharge check valve clogged or binding.	Clean valve.
	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 PRESSURE	Air leak in suction line.	Correct leak.
	Suction intake not submerged at proper level or sump too small.	Check installation and correct submergence as needed.
	Lining of suction hose collapsed.	Replace suction hose.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE (cont.)	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.
	Suction lift too high.	Measure lift w/vacuum gauge. Reduce lift and/or friction losses in suction line.
	Leaking or worn seal or pump gasket.	Check pump vacuum. Replace leaking or worn seal or gasket.
PUMP REQUIRES TOO MUCH POWER	Pump speed too high.	Check engine output.
	Liquid solution too thick.	Dilute if possible.
	Exceeding operating limits.	See performance curves in PUMP MAINTENANCE AND REPAIR.
EXCESSIVE NOISE	Cavitation in pump.	Reduce suction lift and/or friction losses in suction line. Record vacuum and pressure gauge readings and consult local representative or factory.
	Pumping entrained air.	Locate and eliminate source of air bubble.
	Pump or drive not securely mounted.	Secure mounting hardware.
	Impeller clogged or damaged.	Clean out debris; replace damaged parts.

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 62 1/2D1-CCKB FF

*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.

WARNING

Never tamper with the governor to gain more power. The governor establishes safe operating limits that should not be exceeded. Continuous duty performance is limited to 3900 RPM.

SECTIONAL DRAWING

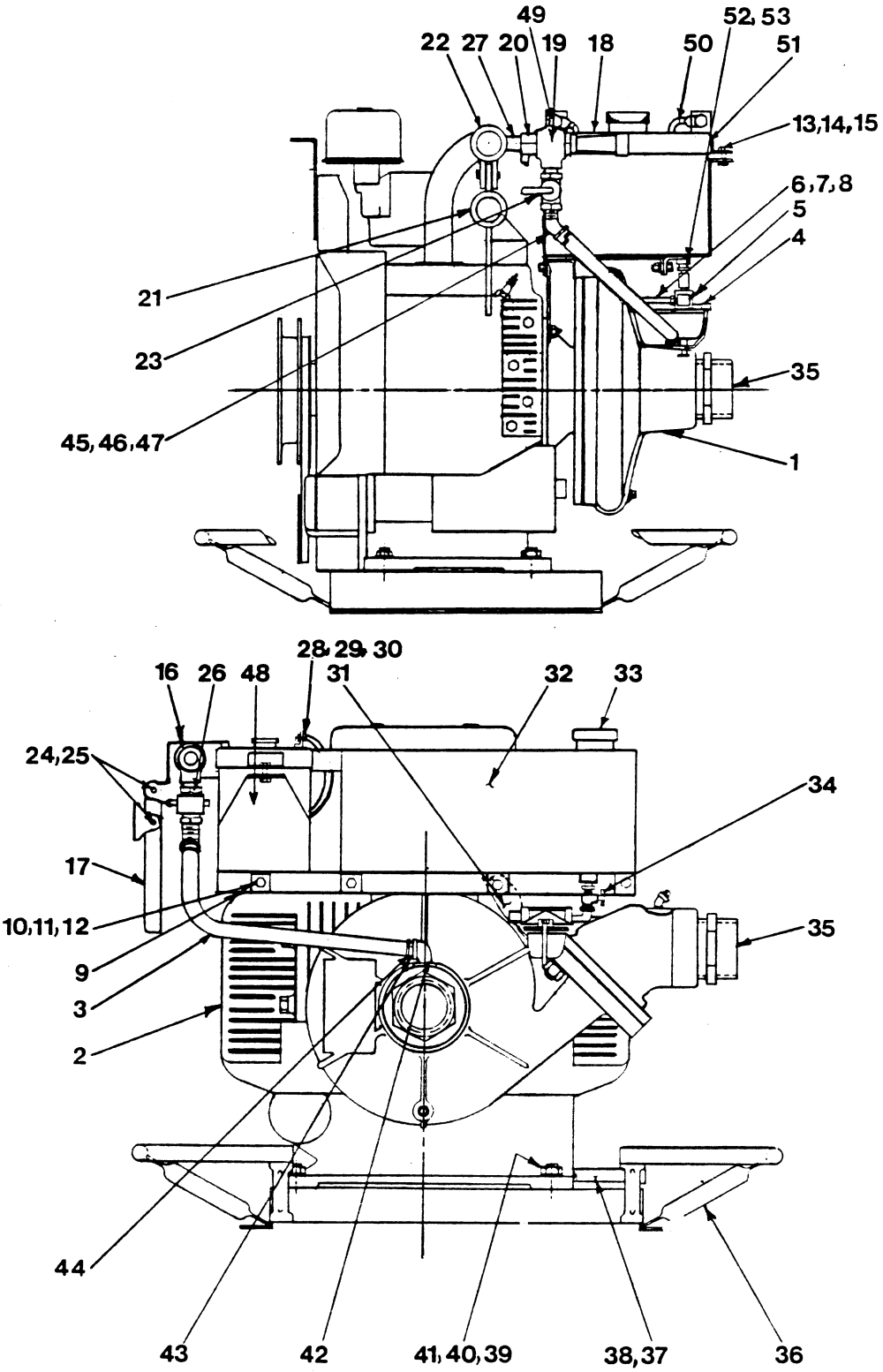


Figure 1. Pump Model 62 1/2D1-CCKB FF

PARTS LIST
PUMP MODEL 62 1/2D1-CCKB FF
(From S/N 521468 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
1	PUMP END	62 1/2D1 (FIGURE 2)		1
2	ONAN CCKB ENGINE	211-D1	-----	1
3	EXH PRIMER HOSE	31412-128	-----	1
4	FUEL FILTER	S1701	-----	1
5	MALE ELBOW	S513	-----	1
6	TUBING	W4060	14990	1
7	NUT	S512	-----	2
8	ELBOW	S2143	-----	1
9	MOUNTING ASSY	12436	15990	1
10	HEX HD CAPSCREW	B0503	15991	7
11	LOCKWASHER	J05	15991	7
12	HEX NUT	D05	15991	7
13	HEX HD CAPSCREW	B0504	15991	2
14	LOCKWASHER	J05	15991	2
15	HEX NUT	D05	15991	2
16	EXH PRIMER ASSY	GRP15-11	-----	1
17	-LEVER	1458-A	15990	1
18	-VENTURI	2345-B	14000	1
19	-EJECTOR BODY	3552	14000	1
20	-JET	3645-B	14000	1
21	-VALVE	1467	10010	1
22	-VALVE BODY	1466	10010	1
23	-GAS COCK	S2	-----	1
24	-COTTER PIN	M0406	15990	2
25	-SPRING WASHER	S165	-----	2
26	-PIPE NIPPLE	T06	15070	1
27	-PIPE NIPPLE	T08	15070	1
28	CARRIAGE BOLT	AB0503	15991	1
29	FLAT WASHER	K05	15991	1
30	HEX NUT	D05	15991	1
31	BRACE	12434	15990	1
32	FUEL TANK	10990-A	24000	1
33	FUEL TANK CAP	8690	00000	REF
34	SHUT-OFF VALVE	26661-391	-----	1
35	COUPLING	2469	14000	2
36	BASE	12433	24000	1
37	PIPE NIPPLE	T0812	15070	1
38	PIPE COUPLING	AE08	11990	1
39	HEX HD CAPSCREW	B0707	15991	4
40	LOCKWASHER	J07	15991	4
41	HEX NUT	D07	15991	4
42	STREET ELBOW	RS06	11990	1
43	PIPE NIPPLE	2434	15070	1
44	HOSE CLAMP	S887	-----	1
45	HOSE CLAMP	S887	-----	1
46	PIPE NIPPLE	2434	15070	1
47	STREET ELBOW	AGS06	11990	1
48	BATTERY BOX	10991	15990	1
49	*NEG CABLE ASSY	5795-AT	24040	1
50	*POS CABLE ASSY	5795-CQ	24040	1
51	BATTERY BOX COVER	11870	24000	1
52	REDUCING BUSHING	AP0402	15990	1
53	STREET ELBOW	RS02	11990	1
NOT SHOWN:				
	*BATTERY	S1680	-----	1
	CARRIAGE BOLT	AB0503	15991	1
	FLAT WASHER	K05	15991	1
	HEX NUT	D05	15991	1
	REDUCING BUSHING	AP2420	11990	1
	NAME PLATE	2613-BF	13990	1
	DRIVE SCREW	BM#04-03	15990	4
	*PRESSURE GAUGE	S180	-----	1
	DISCHARGE STICKER	6588-BJ	00000	1
	SUCTION STICKER	6588-AG	00000	1
	EXH PRIME DECAL	6588-AS	00000	1
	INSTRUCTION TAG	38817-045	-----	1
	BATTERY TAG	6588-S	00000	1
	STRAINER	2184-A	-----	1
	EXH PRIMER TAG	6588-X	-----	1

*INDICATES PARTS RECOMMENDED FOR STOCK

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

CANADIAN SERIAL NO ..... AND UP

SECTIONAL DRAWING

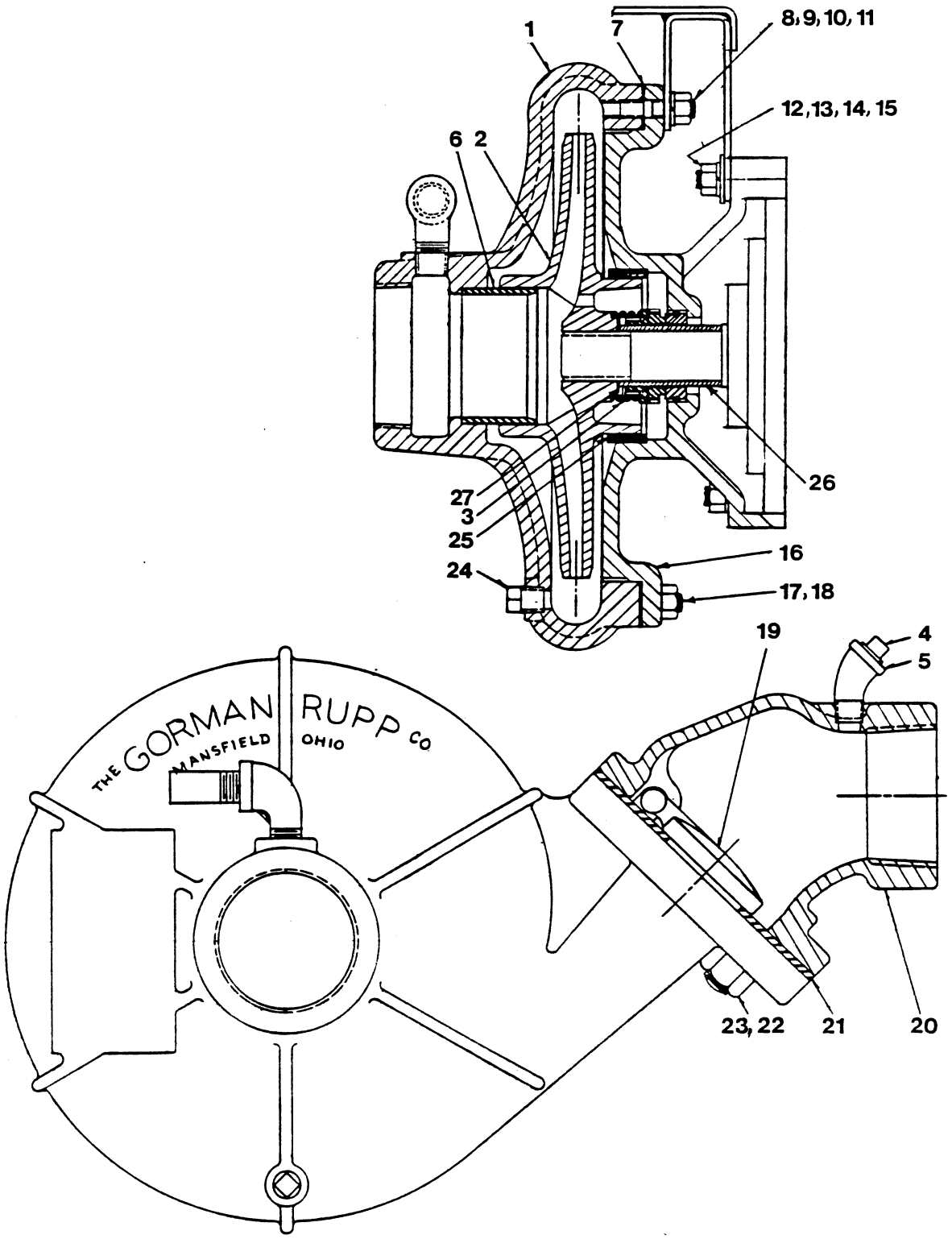


Figure 2. Pump End Assembly 62 1/2D1

PARTS LIST
PUMP END ASSEMBLY 62 1/2D1

ITEM NO.		PART NAME	PART NUMBER	MATL CODE	QTY
1		PUMP CASING	11013	13040	1
2	*	IMPELLER	11014	13047	1
3	*	MECHANICAL SEAL	25271-886	-----	1
4		PIPE PLUG	P04	11990	1
5		STREET ELBOW	AGS04	11990	1
6	*	WEAR RING	11017	14050	1
7	*	CASING GASKET	11013-G	18000	1
8		STUD	C0606	15991	2
9		LOCKWASHER	J06	15991	2
10		HEX NUT	D06	15991	2
11		FLAT WASHER	K06	15991	2
12		STUD	C0609	15991	4
13		LOCKWASHER	J06	15991	4
14		HEX NUT	D06	15991	4
15		FLAT WASHER	K06	15991	4
16		INTERMEDIATE	12423	13040	1
17		STUD	C0605 1/2	15991	10
18		HEX NUT	D06	15991	10
19		CHECK VALVE ARM	6324	14000	1
20		CHECK VALVE BODY	6323	13000	1
21	*	CHECK VALVE GASKET	6323-G	19080	1
22		STUD	C1009	15991	4
23		HEX NUT	D10	15991	4
24		CASING DRAIN PLUG	P04	11990	1
25	*	BALANCE RING	62-ZL6	14000	1
26	*	SHAFT SLEEVE	2146-G	17030	1
27	*	ADJUSTING SHIM SET	2-X	17090	1
OPTIONAL:					
		FRONT DISCH CHK VLV ELBOW	2145	13000	1

*INDICATES PARTS RECOMMENDED FOR STOCK

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 views (see Figures 1 and 2) and the accompanying parts lists.

Before attempting to service the pump, remove the suction and discharge hoses and disconnect the 12-volt battery to ensure that the engine will remain inoperative.

For service information on the engine, consult the literature provided with the engine, or contact your local Onan engine representative.

WARNING

Before attempting to open or service the pump:

1. Familiarize yourself with this manual.
2. Disconnect the spark plug wires or battery cables 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.

Discharge Check Valve Disassembly

(Figure 2)

Remove the nuts (23) and separate the check valve body (20) from the pump casing. Pull the rubber gasket (21) from the flange studs (22) and pull the check valve arm (19) from the valve body. Unscrew the fire hose adaptor (35, Figure 1) and pressure gauge if required.

Clean the mating surfaces of both flanges and inspect all parts for wear or damage. If no further pump disassembly is required, refer to **Discharge Check Valve Reassembly**.

Exhaust Primer Disassembly

(Figure 1)

Loosen the hose clamps (44 and 45) and pull the rubber priming line (3) from the exhaust primer and pipe fittings (42 and 43). If necessary, remove the gas cock valve (23) and fittings (42 and 43) from the pump casing.

To separate the exhaust primer assembly (1) from the manifold, unscrew it from the reducing bushing. To disassemble the exhaust primer, remove the valve handle and unscrew the various primer components.

If no further pump disassembly is required, refer to **Exhaust Primer Reassembly**.

Pump Disassembly

(Figure 2)

After disconnecting the rubber priming line, remove the drain plug (24) to drain the pump. Clean and reinstall the plug.

Remove the nuts (18) and separate the pump casing (1) from the intermediate (16). Carefully remove the casing gasket (7) and clean the contacting surfaces of the flanges.

Inspect the wear ring (6) for severe erosion or damage. The wear ring is retained by a press fit in the pump casing. To remove the ring, apply heat to the outside of the casing, or split the ring. **Be careful** not to damage the pump casing.

To remove the impeller, insert a steel bar or drift pin between the vanes, and turn it in a counter-clockwise direction (when facing the impeller) while holding the engine crankshaft stationary. **Be careful** not to damage the impeller vanes. Use caution when unscrewing the impeller; tension on the seal spring will be released as the impeller is removed.

After the impeller is removed, inspect the balance ring (25) for wear or damage. The ring is retained by a press fit in the intermediate and must be heated or split to be removed. **Be careful** not to damage or mar the intermediate casting.

Seal Removal

(Figure 2)

Remove the impeller adjusting shims (27). Tie and tag the shims or measure and record their thickness for ease of reassembly.

Remove the seal spring, then slide the shaft sleeve and rotating portion of the seal off the engine shaft as a unit. Apply oil to the sleeve and work it up under the bellows. Slide the rotating portion of the seal off the sleeve.

Slide a stiff wire with a hooked end along the shaft and pull the stationary seat from the intermediate bore.

NOTE

An alternate method of removing the stationary seat is to remove the hardware (13, 14 and 15)) and separate the intermediate (16) from the engine. Use a dowel to press the stationary seat from the intermediate.

Seal Installation

(Figures 2 and 3)

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 precautions printed on solvent containers.

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

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

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

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

To ease installation of the seal, lubricate the O-rings and shaft sleeve 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 3).

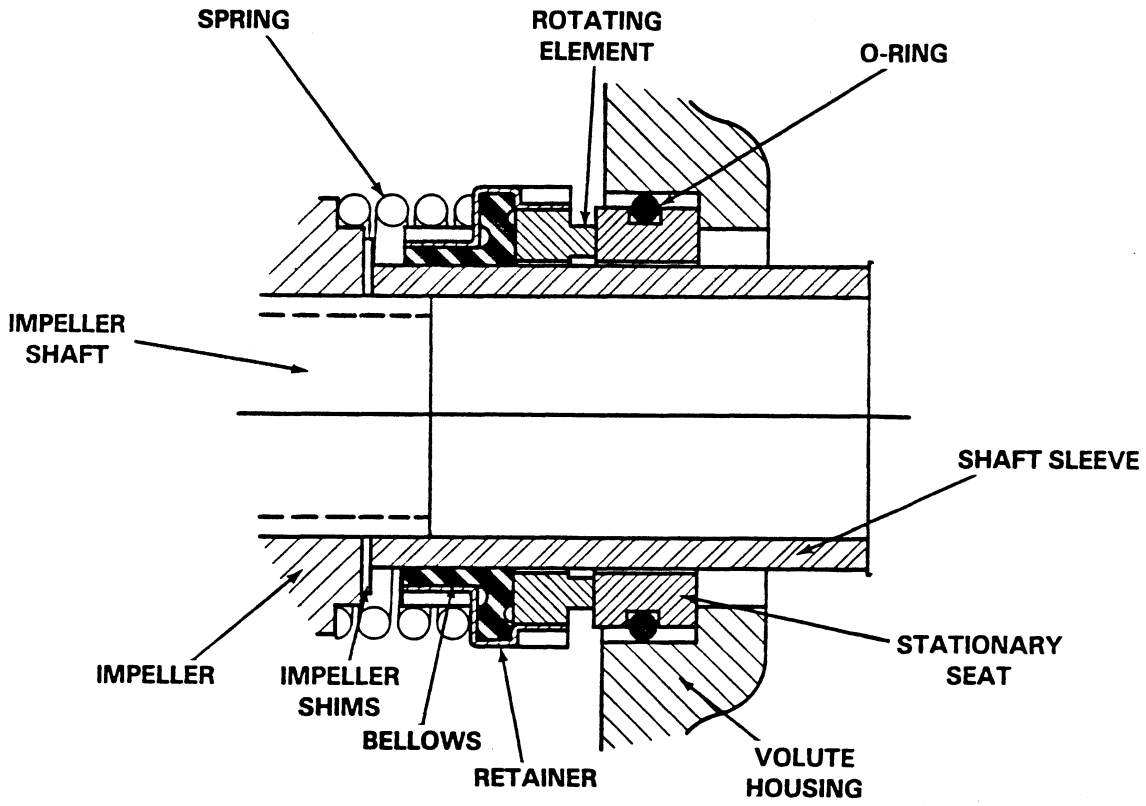


Figure 3. 25271-886 Seal Assembly

CAUTION

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

If the balance ring (5) was removed, the replacement ring should be pressed into the intermediate before installing the seal. Position the ring in the intermediate bore with the chamfered end toward the bore shoulder and press it into the bore until fully seated.

NOTE

The balance ring must be fully seated in the intermediate bore, otherwise binding and/or excessive wear could result.

If the intermediate was removed, lay it on a flat surface with the impeller side facing up. Subassemble the O-ring onto the stationary element and press this subassembly into the intermediate bore until it seats squarely against the shoulder. Secure the intermediate to the engine. **Be careful** not to damage the stationary seat on the shaft threads.

Subassemble the rotating element into the retainer and bellows, then slide this subassembly onto the shaft sleeve until the face of the rotating element is **just** flush with the chamfered end of the sleeve. Slide the sleeve onto the shaft until the seal faces contact. Continue to push the sleeve through the seal until it seats against the shaft shoulder.

Position the seal spring on the retainer, and proceed with **Pump Reassembly.**

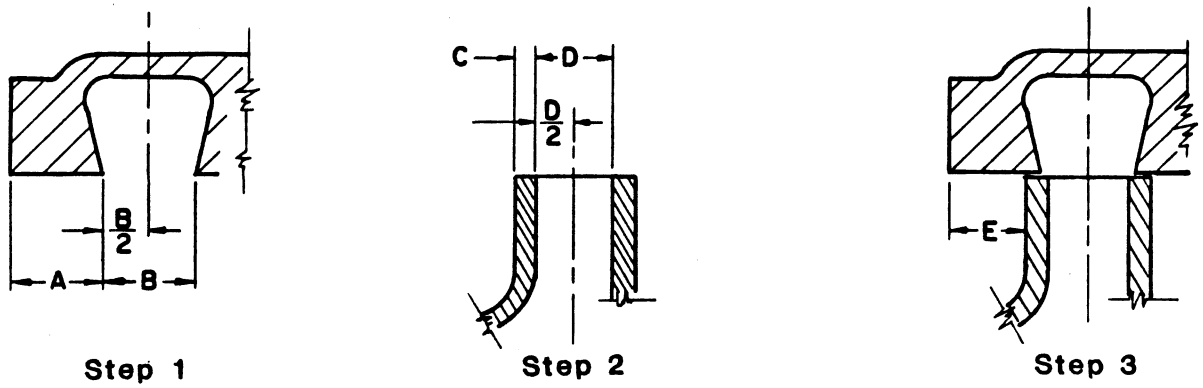
Pump Reassembly

(Figure 2)

Inspect the impeller and replace it if cracked or badly eroded. Install the same thickness of impeller adjusting shims (27) as previously removed, and screw the impeller onto the shaft until tight.

For maximum pump efficiency, the impeller must be centered within the volute scroll of the pump casing.

To verify the impeller positioning, measure the pump casing and impeller as shown in Figure 4. Use these measurements to calculate the required impeller location (dimension E). Add or remove impeller adjusting shims until dimension E is obtained.



$$\left(A+\frac{B}{2}\right)-\left(C+\frac{D}{2}\right)=E$$

Figure 4. Centering Impeller Within Volute Scroll

NOTE

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

If the wear ring (6) was removed, position the replacement ring in the casing bore so that the chamfer on the I.D. faces toward the impeller. Press it into the bore until fully seated against the casing shoulder.

NOTE

The wear ring must be fully seated in the casing bore, otherwise binding and/or excessive wear could result.

Install the casing gasket (7). Carefully guide the wear ring into the eye of the impeller and secure it with nuts (18).

Exhaust Primer Reassembly

(Figure 1)

Clean or replace the exhaust primer parts as required.

If the component parts for the exhaust primer assembly (16) were disassembled, screw them together as shown in Figure 1, then secure the exhaust primer assembly to the reducing bushing attached to the exhaust manifold. Reconnect the rubber priming line (3) to the exhaust manifold assembly and fittings (42 and 43) with the hose clamps (44 and 45).

Discharge Check Valve Reassembly

(Figure 2)

Position the pivot of the check valve arm (19) in the slot in the valve body (20). Install the rubber gasket (21) and secure the assembly to the casing with the nuts (23). Check for free operation of the valve arm. Inspect the pressure gauge and fire hose adaptor for wear or damage before installing them, and replace as required.

LUBRICATION

Seal Assembly

The shaft seal is lubricated by the liquid being pumped, and no additional lubrication is required.

Engine

Refer to the literature provided with the engine, or contact your local Onan engine representative.

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

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

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