INSTALLATION, OPERATION, PARTS LIST, AND MAINTENANCE MANUAL

A C D E

GORMAN-RUPP

OM-00734-0E05

May 1, 1981

Engine Driven Self-Priming Centrifugal Pump

Model 16C20-5034

THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

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

This pump is a 10 Series, semi-open impeller, self-priming centrifugal model designed for pumping liquids with specified entrained solids.

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

or

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

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

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

NOTE

Instructions to aid in installation, operation, 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 ENGINE DRIVEN PUMPS. REFER TO THE MANUAL ACCOMPANYING THE ENGINE BEFORE ATTEMPTING TO START THE ENGINE.

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.

Do not attempt to pump volatile or flammable 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 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.

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, 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 perform all duties indicated. Note the direction of rotation indicated on 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. The bail is intended for use in lifting the pump assembly **only**; disconnect suction and discharge hoses and piping from the pump when lifting the pump by the bail.

Make sure that hoists and other lifting equipment are of sufficient capacity to safely handle the pump assembly. If chains or 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.

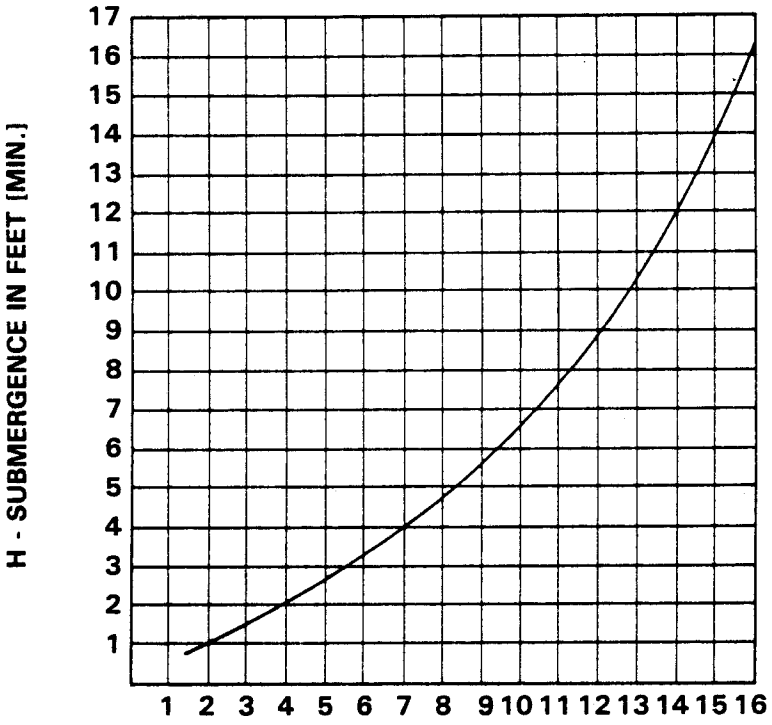
NOTE

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.



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

Figure 1. Recommended Minimum Suction Line Submergence Vs. Velocity

OPERATION

WARNING

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

PRIMING

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

This 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.

OPERATION

Lines With a Bypass

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

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

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

Lines Without a Bypass

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

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

Leakage

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

Overheating

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

WARNING

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

Strainer Check

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

Pump Vacuum Check

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

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

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 intermediate 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

WARNING

Before attempting to open or service the pump:

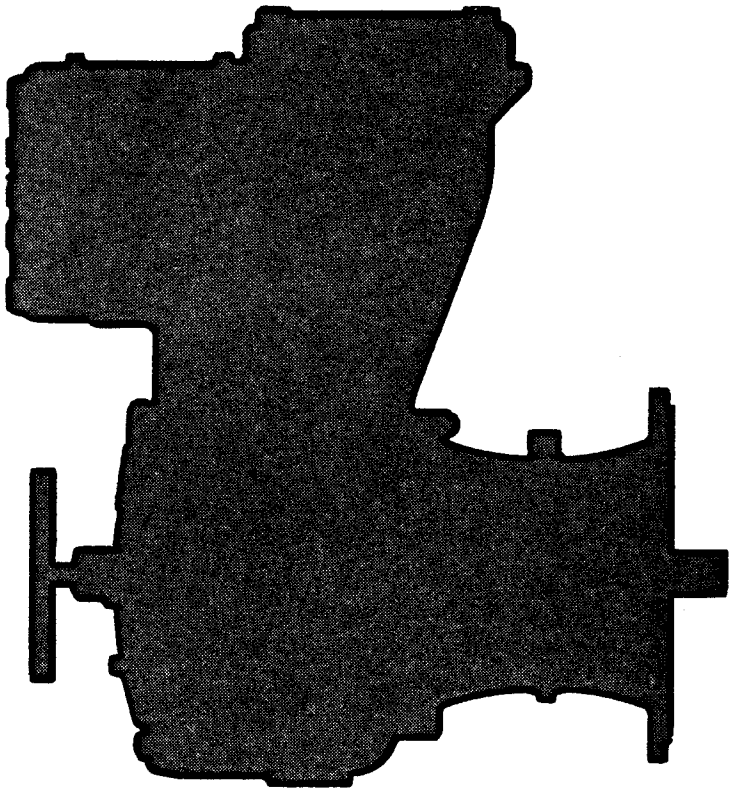
1. Consult pump service manual.
2. Disconnect the power source to ensure that the pump will remain inoperative.
3. Allow the pump to cool if overheated.
4. Close suction and discharge valves.
5. Drain pump.

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 DE-LIVER RATED FLOW OR PRESSURE	Air leak in suction line.	Correct leak.
	Suction intake not sub-merged 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.
	Discharge head too high.	Install bypass line.
	Suction lift too high.	Reduce suction lift.

Trouble	Possible Cause	Probable Remedy
PUMP STOPS OR FAILS TO DELIVER 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.	Reduce speed of power source.
	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.
BEARINGS RUN TOO HOT	Bearing temperature is high, but within limits.	Check bearing temperature frequently 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.

Engine Driven Self-Priming Centrifugal Pump

Model 16C20-5034



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 without disturbing the piping. Maintenance and replacement of these three parts will maintain the peak operating efficiency of the pump.

SECTIONAL DRAWING

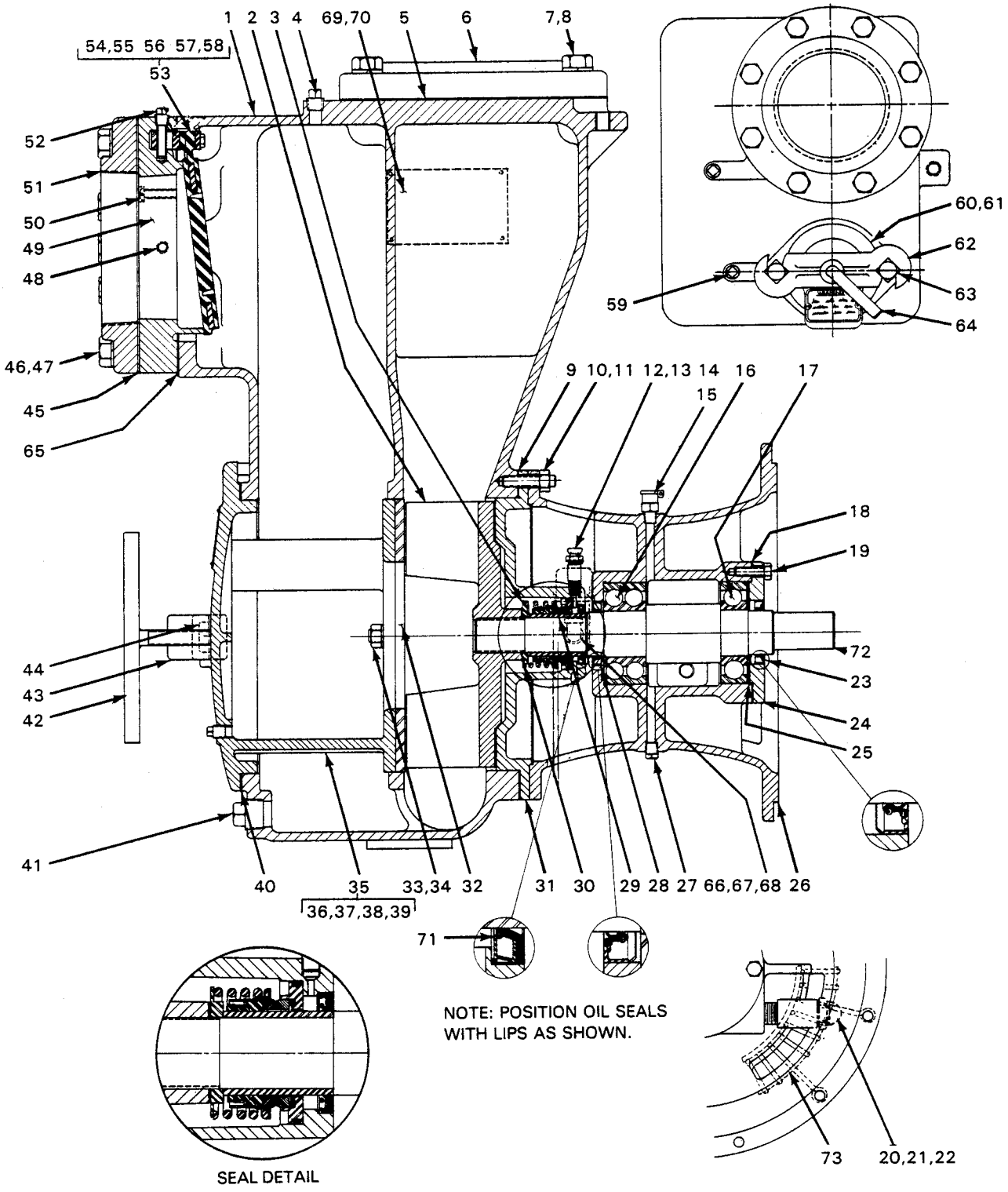


Figure 1. Pump Model 16C20-5034

PARTS LIST

PUMP MODEL 16C20-5034

(From S/N 740693 up)

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

ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	VOLUTE CASING	12583	10010	1
2	★IMPELLER	12584	11000	1
3	★SEAL ASSEMBLY	12461	–	1
4	PIPE PLUG	P-04	11990	1
5	★DISCHARGE FLANGE GASKET	1679-G	18000	1
6	DISCHARGE FLANGE	1758	10010	1
7	HEX HEAD CAPSCREW	B-1208	15991	8
8	LOCKWASHER	J-12	15991	8
9	★VOLUTE GASKET SET	34-G	18000	1
10	STUD	C-0809	15991	8
11	HEX NUT	D-08	15991	8
12	SEAL AIR VENT FITTING	S-2162	–	1
13	PIPE COUPLING	AE-02	11990	1
14	CLOSE NIPPLE	T-02	15070	1
15	OIL HOLE COVER	26717-068	–	1
16	★BALL BEARING	S-1169	–	1
17	★BALL BEARING	S-1077	–	1
18	★BEARING CAP GASKET	5413-G	18000	1
19	HEX HEAD CAPSCREW	B-0604	15991	4
20	SIGHT GAUGE	S-1471	–	1
21	CLOSE NIPPLE	T-12	15070	1
22	PIPE COUPLING	AE-12	11990	1
23	★OIL SEAL	25258-622	–	1
24	BEARING CAP	4185-A	10010	1
25	WAVY WASHER	23963-327	–	1
26	INTERMEDIATE	38263-614	–	1
27	INTERMEDIATE DRAIN PLUG	P-06	11990	1
28	★OIL SEAL	25258-622	–	1
29	★SHAFT SLEEVE	11907	17030	1
30	★IMPELLER SHIM SET	5091	17090	1
31	SEAL PLATE	38272-517	–	1
32	★WEAR PLATE ASSEMBLY	2545	15990	1
33	HEX NUT	D-08	15991	2
34	LOCKWASHER	J-08	15991	2
35	★BACK COVER ASSEMBLY	42111-935	–	1
36	COVER PLATE	12585	10010	1
37	WARNING PLATE	2613-EV	13990	1
38	DRIVE SCREW	BM#04-03	15990	4
39	PIPE PLUG	P-04	11990	1
40	★BACK COVER GASKET	7668-G	20000	1
41	VOLUTE DRAIN PLUG	P-16	11990	1
42	BACK COVER SCREW	2536	24000	1
43	BACK COVER CLAMP	12586	11000	1
44	MACHINE BOLT	A-1010	15991	2
45	★SUCTION FLANGE GASKET	1679-G	18000	1
46	HEX HEAD CAPSCREW	B-1214	15991	8
47	LOCKWASHER	J-12	15991	8
48	PIPE PLUG	P-04	11990	1
49	CHECK VALVE SEAT	11402-C	10010	1
50	ROUND HEAD MACHINE SCREW	X-0506	14990	2
51	SUCTION FLANGE	1758	10010	1
52	★CHECK VALVE PIN	11645	17010	1
53	★CHECK VALVE ASSEMBLY	46411-064	–	1
54	ADAPTER	NOT AVAILABLE		
55	MOLDED CHECK VALVE	NOT AVAILABLE		
56	SPACER SLEEVE	NOT AVAILABLE		
57	BACK UP PLATE	NOT AVAILABLE		
58	HEX HEAD CAPSCREW	NOT AVAILABLE		
59	PIPE PLUG	P-04	11990	1
60	COVER PLATE ASSEMBLY	42111-344	–	1
61	★COVER PLATE GASKET	50-G	19210	1
62	CLAMP BAR	38111-004	–	1
63	MACHINE BOLT	A-1014	15991	2
64	CLAMP BAR SCREW	31912-009	–	1
65	★CHECK VALVE SEAT GASKET	11402-G	21020	1
66	BOTTLE OILER	S-1933	–	1
67	PIPE ELBOW	R-02	11990	1
68	PIPE NIPPLE	T-0220	15070	1
69	NAME PLATE	2613-D	13990	1
70	DRIVE SCREW	BM#04-03	15990	4
71	★OIL SEAL	S-1935	–	1
72	★IMPELLER SHAFT	38514-807	–	1
73	INTERMEDIATE GUARD	42381-031	–	1
NOT SHOWN:				
	WARNING DECAL	38816-096	–	1
	INTERMEDIATE GUARD	42381-032	–	1
	GM 5034 ENGINE	206-G1	–	1
	GROUND CABLE	5795-AC	24040	1
	STRAINER	7823-A	24000	1
	FUEL OUT ASSEMBLY	10765	24030	1
	BASE ASSEMBLY	41566-610	–	1
	FUEL LINE RETURN	12641	–	1
	HOISTING BAIL	13351-AW	24000	1
	HEX HEAD CAPSCREW	B-0604	15991	10
	HEX HEAD CAPSCREW	B-1006	15991	4
	HEX HEAD CAPSCREW	B-1009	15991	2
	HEX HEAD CAPSCREW	B-1014	15991	4
	HEX HEAD CAPSCREW	B-1205	15991	4
	HEX NUT	D-06	15991	10
	HEX NUT	D-10	15991	10
	HEX NUT	D-12	15991	4
	LOCKWASHER	J-06	15991	10
	LOCKWASHER	J-10	15991	10
	LOCKWASHER	J-12	15991	4
	FLAT WASHER	K-12	15991	4
	PIPE PLUG	P-02	11990	1
	PIPE PLUG	P-08	11990	1
	REDUCER ELBOW	Q-0604	11990	1
	PIPE ELBOW	R-96	11990	1
	PIPE NIPPLE	T-96	15070	1
	BATTERY BOX ASSEMBLY	GRP40-04	–	1
	BATTERY TAG	6588-S	00000	1
	BATTERY BOX COVER	4896-X	24000	1
	BATTERY BOX	10478	24000	1
	BATTERY	S-0978	–	2
	GROUND CABLE ASSEMBLY	5795-CR	24040	1
	HEX HEAD CAPSCREW	B-0604	15991	1
	HEX HEAD CAPSCREW	B-0605	15991	1
	HEX HEAD CAPSCREW	B-0624	15991	2
	HEX NUT	D-06	15991	4
	LOCKWASHER	J-06	15991	4
	FLAT WASHER	K-06	15991	6
	FUEL TANK & GUARD ASSEMBLY	46711-033	–	1
	FUEL TANK	46711-034	–	1
	FUEL TANK GUARD ASSEMBLY	42381-017	–	1
	HEX NUT	D-06	15991	4
	LOCKWASHER	J-06	15991	4
	FLAT WASHER	K-06	15991	4
	CABLE ASSEMBLY	6926-S	24040	1
	FUEL LINE ASSEMBLY	9072	–	1
	FUEL RETURN ASSEMBLY	14294	24030	1
	TUBE FITTING	S-0634	–	1
	CONNECTOR	S-1447	–	1
	PIPE COUPLING	AE-04	11990	1
	STREET ELBOW	RS-04	11990	1

★INDICATES PARTS RECOMMENDED FOR STOCK

CANADIAN SERIAL NO. . . . . AND UP

SECTIONAL DRAWING

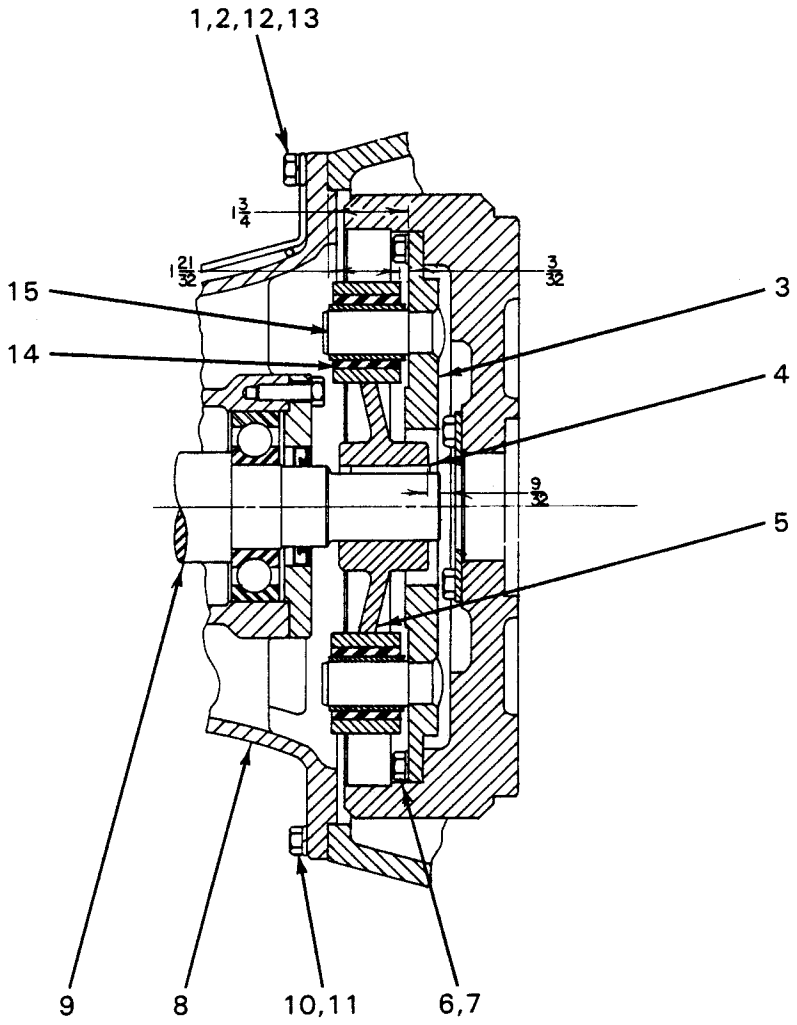


Figure 2. Drive Assembly 44162-033

PARTS LIST

DRIVE ASSEMBLY 44162-033

ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	HEX HEAD CAPSCREW	B-0606	15991	4
2	LOCKWASHER	J-06	15991	4
3	DRIVE PLATE ASSEMBLY	12320	15990	1
4	★SHAFT KEY	N-0607	15990	1
5	DRIVE ARM ASSEMBLY	13817-C	—	1
6	HEX HEAD CAPSCREW	B-0604	15991	8
7	LOCKWASHER	J-06	15991	8
8	INTERMEDIATE	38263-614	—	1
9	★IMPELLER SHAFT	38514-807	—	1
10	HEX HEAD CAPSCREW	B-0605	15991	8
11	LOCKWASHER	J-06	15991	8
12	INTERMEDIATE GUARD	42381-031	—	1
13	INTERMEDIATE GUARD	42381-032	—	1
14	★DYNA FLEX JOINT	S-2110	—	2
15	★DRIVE PIN	13819	15030	2

★INDICATES PARTS RECOMMENDED FOR STOCK

ENGINE SEPARATION

If it is necessary to separate the pump from the engine, disengage the hex head capscrews (1) securing the intermediate (8) to the engine housing, and separate the assemblies.

To remove the drive arm assembly (5), disengage the hex head capscrews (6) securing the drive plate assembly (3) and drive arm assembly to the engine, and separate the two assemblies from the engine. Slide the drive arm and drive plate off the shaft (9), retaining the shaft key (4).

The drive arm is secured to the drive plate by the drive plate pins; slip the drive arm off the pins to separate the unit.

ENGINE REASSEMBLY

Slip the drive arm on the drive plate pins, position the shaft key on the shaft, slip the drive arm and drive plate assemblies on the shaft, and secure the assemblies to the engine. The drive arm and drive plate must be positioned on the shaft in accordance with the dimensions shown in figure 2.

CAUTION

If the drive assembly is not properly positioned on the shaft, a preload condition can occur and cause premature thrust bearing failure.

Secure the intermediate to the engine housing.

PUMP AND SEAL DISASSEMBLY AND REASSEMBLY

This pump requires little service due to its rugged, minimum-maintenance design. If it becomes necessary to inspect and/or replace the wearing parts, however, follow these instructions, which are keyed to the sectional view (see figure 1) and the accompanying parts list.

Pump Disassembly

Disconnect the spark plug, or take other precautions to ensure that the engine will remain inoperative while the pump is being serviced, and close all connecting valves. Remove the volute drain plug (41) to drain the pump.

Support the pump body, and remove the hex nuts (11) securing the volute casing (1) to the seal plate (31) and the intermediate (26). Separate the assemblies. Inspect the wear plate (32), and replace it if scored or worn.

To loosen the impeller (2), tap the vanes in the direction of pump rotation with a block of wood or a soft-faced mallet or hammer. Unscrew the impeller, and replace it if cracked or badly worn.

Remove the impeller adjusting shims (30). For ease of reassembly, tag and tie the shims, or measure and record their thickness.

Seal Disassembly

Before removing the seal assembly, remove the seal drain plug to drain the seal cavity. Clean and replace the seal drain plug.

Carefully remove the seal spring seat, the shaft sleeve (29), and the stationary and rotating seal elements, 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

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

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

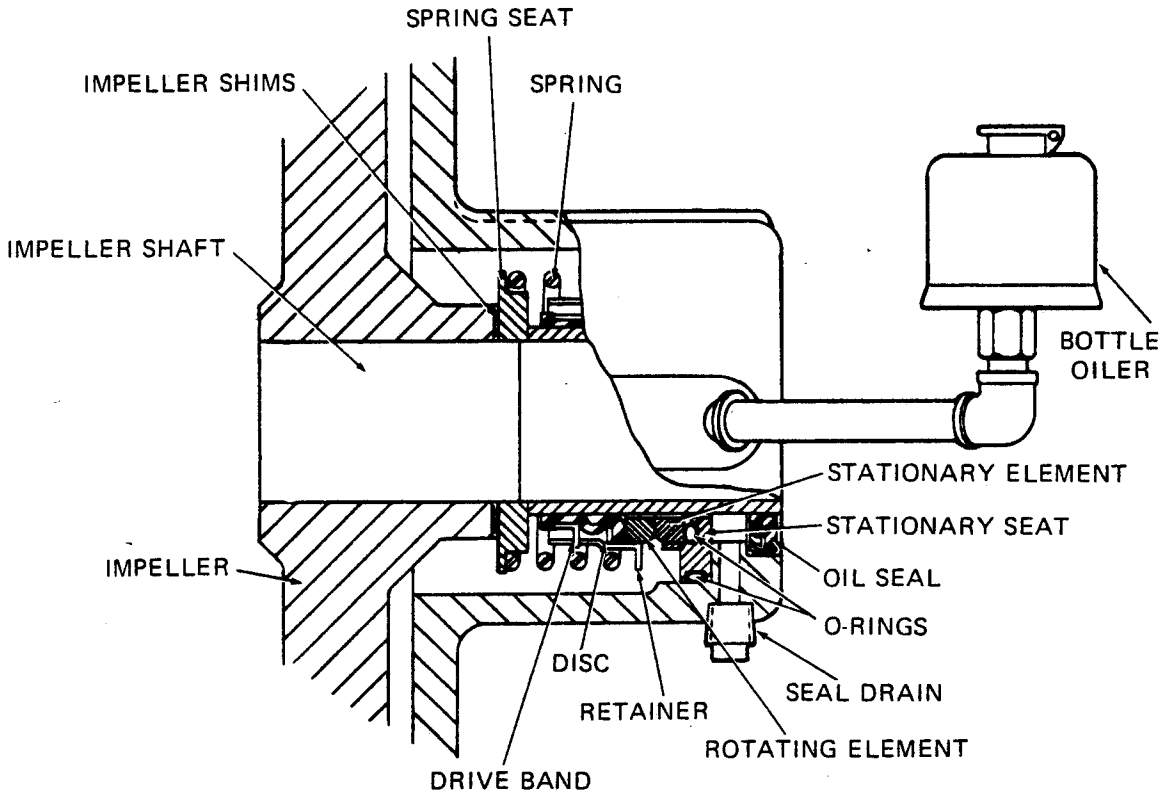


Figure 3. 12461 Seal Assembly

CAUTION

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

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

Lubricate the O-rings and bellows with soft grease or oil when installing the seal, and place a drop of light lubricating oil on the lapped faces. Assemble the seal as shown in figure 3.

Before starting the pump, fill the seal bottle oiler (66) with SAE No. 30 non-detergent motor oil. Open the seal vent fitting (12) when filling the bottle oiler.

Pump Reassembly

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 add or subtract impeller shims until it is reached.

Reassemble the volute casing to the seal plate and the intermediate, replacing the volute gasket set (9). 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.

Before starting the pump, clean and reinstall the volute drain plug (41), and fill the volute with liquid.

LUBRICATION

Bearings

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

When lubrication is required, remove the oil hole cover (15) and fill the bearing housing with a good grade of non-detergent SAE No. 30 motor oil to the midpoint of the oil level sight gauge (20).

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