
10 SERIES™

INSTALLATION, OPERATION, PARTS LIST, AND MAINTENANCE MANUAL



THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO
GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA

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INTRODUCTION

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

This pump is a 10 Series, semi-open impeller, self-priming centrifugal model with a suction check valve. The pump is flex-coupled to a gearbox driven by a Deutz BF6L turbocharged diesel engine. It is designed for handling wastewater, mud and slurries containing specified entrained solids. The basic material of construction for wetted parts is gray iron with ductile iron wearing parts and stainless steel impeller shaft.

For information or technical assistance on the engine or gearbox, contact the manufacturers or their local representatives.

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	or	Gorman-Rupp of Canada Limited
P.O. Box 1217		70 Burwell Road
Mansfield, Ohio 44901-1217		St. Thomas, Ontario N5P 3R7

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

NOTE

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

CAUTION

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

WARNING

```

////////////////////////////////////
//
// These instructions must be followed to avoid causing in- //
// jury or death to personnel, and describe the procedure //
// required and the injury which could result from failure //
// to follow the procedure. //
// //
////////////////////////////////////

```


WARNINGS

WARNINGS - SECTION A

THESE WARNINGS APPLY TO 10 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. Switch off the engine ignition and remove the key //
// 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 wastewater, mud or //
// slurries containing specified entrained solids. Do not //
// attempt to pump volatile, flammable, or corrosive liq- //
// uids which may damage the pump or endanger personnel as //
// a result of pump failure. //
// //
////////////////////////////////////

```

WARNING

```

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

```

WARNING

```

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

```

WARNINGS

WARNING

```

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

```

WARNING

```

//////////////////////////////////////////////////////////////////
//
// Overheated pumps can cause severe burns and injury. If //
// overheating of the pump occurs: //
// //
// 1. Stop the pump immediately. //
// 2. Allow the pump to cool. //
// 3. Refer to instructions in this manual before re- //
// starting the pump. //
// //
//////////////////////////////////////////////////////////////////

```

WARNING

```

//////////////////////////////////////////////////////////////////
//
// Do not attempt to disengage any parts of an overheated //
// pump unit. Vapor pressure within the pump casing can //
// eject these parts with great force when they are disen- //
// gaged. Allow the pump to cool before servicing it. //
// //
//////////////////////////////////////////////////////////////////

```

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. Suction and discharge //
// hoses and piping MUST be removed from the pump when //
// lifting the pump by the bail. //
// //
//////////////////////////////////////////////////////////////////

```

WARNING

```

//////////////////////////////////////////////////////////////////
//
// Fuel used by internal combustion engines presents an ex- //
// treme 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. //
// //
//////////////////////////////////////////////////////////////////

```


WARNINGS

WARNING

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

WARNING

```
////////////////////////////////////  
//  
// Never tamper with the governor to gain more power. The //  
// governor establishes safe operating limits that should //  
// not be exceeded. The maximum continuous operating speed //  
// is 2200 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.

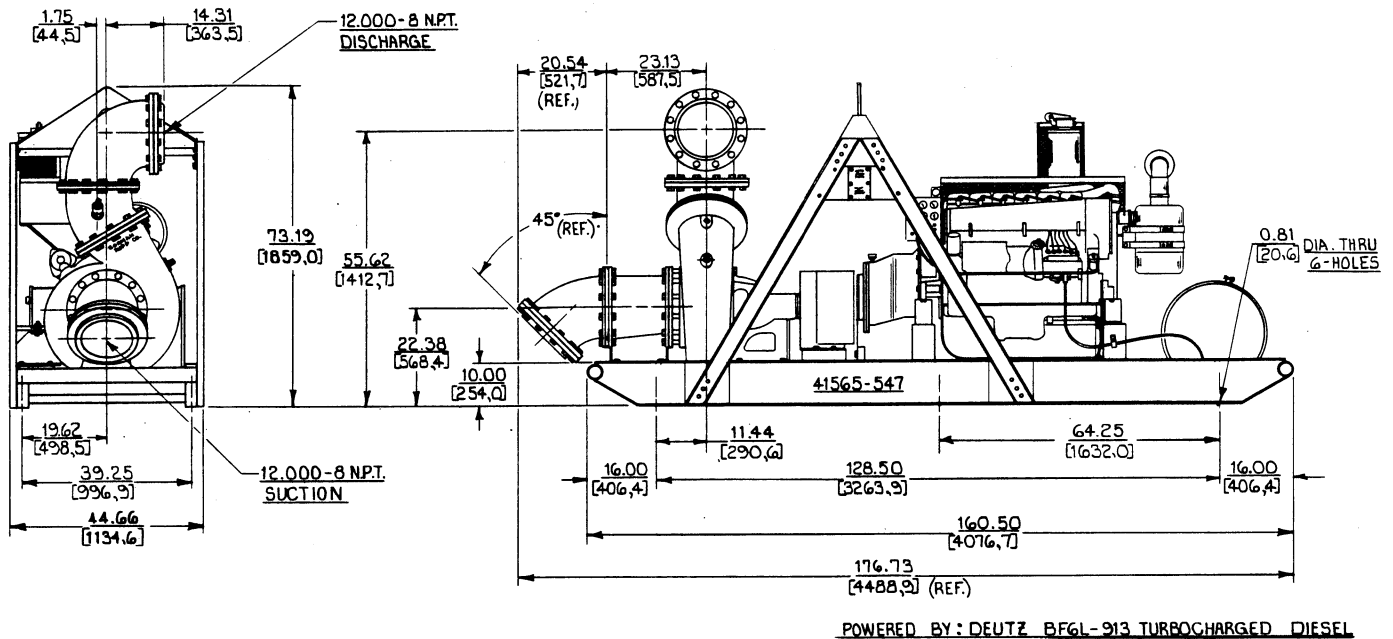
Pump Dimensions

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

OUTLINE DRAWING

— SUCTION LINE NOTE —

FOR SELF PRIMING APPLICATION AVOID HORIZONTAL SUCTION LINES. IF USED, MAX. ACCEPTABLE RUN IS 72.00 [1828.8]. PREFERRED INSTALLATION WOULD ANGLE SUCTION LINE DOWNWARD WITH 45° ELBOW AS SHOWN. LONG HORIZONTAL SUCTION LINES REDUCE EFFICIENCY BY CREATING INCREASED PRIMING TIME, INCREASED OPERATIONAL TIME IN A PARTIAL PRIME CONDITION, SURGING AND DECREASED SHAFT AND BEARING LIFE.



POWERED BY: DEUTZ BF6L-913 TURBOCHARGED DIESEL

DIMENSIONS
TOP - INCHES
BOTTOM - [MILLIMETERS]

Figure 1. Pump Model 112A20-B-BF6L

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 and engine for cracks, dents, damaged threads, and other obvious damage.
- b. Check for and tighten loose bolts, nuts, capscrews, and other attaching hardware. Since gaskets tend to shrink after drying, check for and tighten loose nuts and capscrews securing mating surfaces.
- c. Carefully read all tags, decals, and markings on the pump assembly, and follow the instructions indicated.

INSTALLATION

- d. Check all lubricant levels and lubricate as necessary. Refer to LUBRICATION in the MAINTENANCE AND REPAIR section of this manual and perform duties as instructed.
- e. If the pump and engine have been stored for more than 12 months, some of the components or lubricants may have exceeded their maximum shelf life. These **must be inspected or replaced** to ensure maximum pump service.

If the maximum shelf life has been exceeded, or if anything appears to be abnormal, contact your Gorman-Rupp distributor or the factory to determine the repair or updating policy. **Do not** put the pump into service until appropriate action has been taken.

POSITIONING PUMP

Lifting

Use lifting equipment with a capacity of at least **25,750 pounds**. This pump weighs approximately **5,150 pounds**, not including the weight of accessories and customer installed options and accessories. Customer installed equipment such as suction and discharge piping **must** be removed before attempting to lift.

CAUTION

The pump assembly can be seriously damaged if the cables or chains used to lift and move the unit are improperly wrapped around the pump.

Mounting

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

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 **intermittant operation only**; however, the engine manufacturer should be consulted for continuous operation at angles greater than 15°.

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

SUCTION AND DISCHARGE PIPING

Materials

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

INSTALLATION

Never use a suction line smaller than the pump inlet connection. This pump is designed to accept a standard 12 inch pipe flange.

If a horizontal suction line must be used, the **maximum** acceptable length is 6 feet. The preferred installation would angle the suction line down to the source of the liquid at a 45° angle.

CAUTION

Use of long horizontal suction lines increase partial prime operation time which results in erratic performance and reduced pump life.

The **maximum** vertical suction lift for this pump is 15 feet. The pump is not designed to prime or operate at a higher lift.

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 7/8 inch diameter spherical solids.

Sealing

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

INSTALLATION

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).

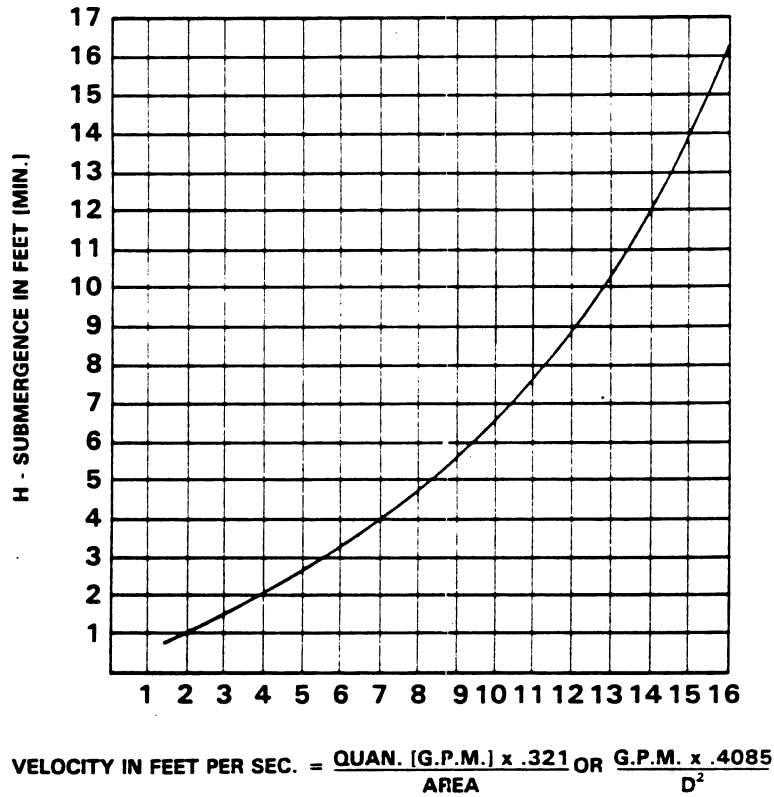


Figure 2. Recommended Minimum Suction Line Submergence Vs. Velocity

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.

CAUTION

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

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.

ALIGNMENT

The alignment of the pump and its power source is critical for trouble-free mechanical operation. The driver and pump must be mounted so that their shafts are aligned with and parallel to each other.

When mounted at the Gorman-Rupp factory, driver and pump are aligned before shipment. Misalignment can occur in transit and handling. Pumps should be checked, and realigned if necessary, before being put into operation. Before checking alignment, tighten the hardware securing the pump to the base.

WARNING

```

////////////////////////////////////
//                               //
//  When checking alignment, disconnect the power source to //
//  ensure that the pump will remain inoperative.           //
//                               //
////////////////////////////////////
```

INSTALLATION

The axis of the drive unit must be aligned to the axis of the pump shaft in both the horizontal and vertical planes. Most couplings require a specific gap or clearance between the driving and the driven shafts. Refer to the coupling manufacturer's service literature for information.

This pump is furnished with a flexible coupling. To check alignment, use a feeler gauge or a taper gauge between the coupling halves every 90 degrees. The coupling is in alignment when the hubs are the same distance apart at all points.

To check parallel adjustment, lay a straightedge across both coupling halves at the top, bottom, and side. The coupling is in horizontal parallel alignment when the straightedge rests evenly on both halves of the coupling. Use a feeler gauge between the coupling and the straightedge to measure the amount of misalignment.

Coupling and alignment adjustments may be made by loosening the hold-down bolts and shifting the driver and/or pump, or by shimming as required.

CAUTION

Adjusting the alignment in one direction may alter the alignment in another direction. Check each procedure after altering alignment.

WARNING

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

OPERATION

OPERATION - SECTION C

WARNING

```

////////////////////////////////////
//
// This pump is designed to handle wastewater, mud or //
// slurries containing specified entrained solids. Do not //
// attempt to pump volatile, flammable, or corrosive liq- //
// uids which may damage the pump or endanger personnel as //
// a result of pump failure. //
// //
////////////////////////////////////

```

CAUTION

The pump end is designed to operate at 1250 RPM through a gearbox with a 1.76:1 ratio at a maximum input speed of 2200 RPM. Make certain that input speed does not exceed this RPM. Operation at higher RPM can cause pump components to be damaged or destroyed.

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 should never be operated unless there is liquid in the casing.

CAUTION

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

Add liquid to the pump casing when:

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 pump casing has evaporated.

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

OPERATION

WARNING

```

////////////////////////////////////
//                               //
// After filling the pump casing, reinstall and tighten the //
// fill plug. Do not attempt to operate the pump unless //
// all connecting piping is securely installed. Otherwise, //
// liquid in the pump forced out under pressure could cause //
// injury to personnel. //
//                               //
////////////////////////////////////

```

To fill the pump, remove the pump casing 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 operations manual furnished with the engine.

OPERATION

Gearbox Check

Check the gearbox lubrication before operation, and periodically thereafter. See the gearbox manufacturer's literature for recommendations.

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.

OPERATION

Lines Without a Bypass

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

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

Leakage

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

Liquid Temperature And Overheating

The **maximum** liquid temperature for this pump is 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 the pump casing with cool liquid.

WARNING

```

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

```

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.

Strainer Check

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

Pump Vacuum Check

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, switch off the engine ignition or take other action to ensure that the pump will remain inoperative.

Cold Weather Preservation

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

If the pump will be idle for more than a few hours, or if it has been pumping liquids containing a large amount of solids, drain the pump, and flush it thor-

OPERATION

oroughly with clean water. To prevent large solids from clogging the drain port and preventing the pump from completely draining, insert a rod or stiff wire in the drain port, and agitate the liquid during the draining process. Clean out any remaining solids by flushing with a hose.

BEARING TEMPERATURE CHECK

Bearings normally run at higher than ambient temperatures because of heat generated by friction. Temperatures up to 160°F are considered normal for bearings, and they can operate safely to at least 180°F.

Checking bearing temperatures by hand is inaccurate. Bearing temperatures can be measured accurately by placing a contact-type thermometer against the housing. Record this temperature for future reference.

A sudden increase in bearing temperatures is a warning that the bearings are at the point of failing to operate properly. Make certain that the bearing lubricant is of the proper viscosity and at the correct level (see LUBRICATION in MAINTENANCE AND REPAIR). Bearing overheating can also be caused by shaft misalignment and/or excessive vibration.

When pumps are first started, the bearings may seem to run at temperatures above normal. Continued operation should bring the temperatures down to normal levels.

PUMP TROUBLESHOOTING - SECTION D

WARNING

```

////////////////////////////////////
//
// Before attempting to open or service the pump:
//
// 1. Familiarize yourself with this manual.
// 2. Switch off the engine ignition and remove the key
//    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.
//
////////////////////////////////////
    
```

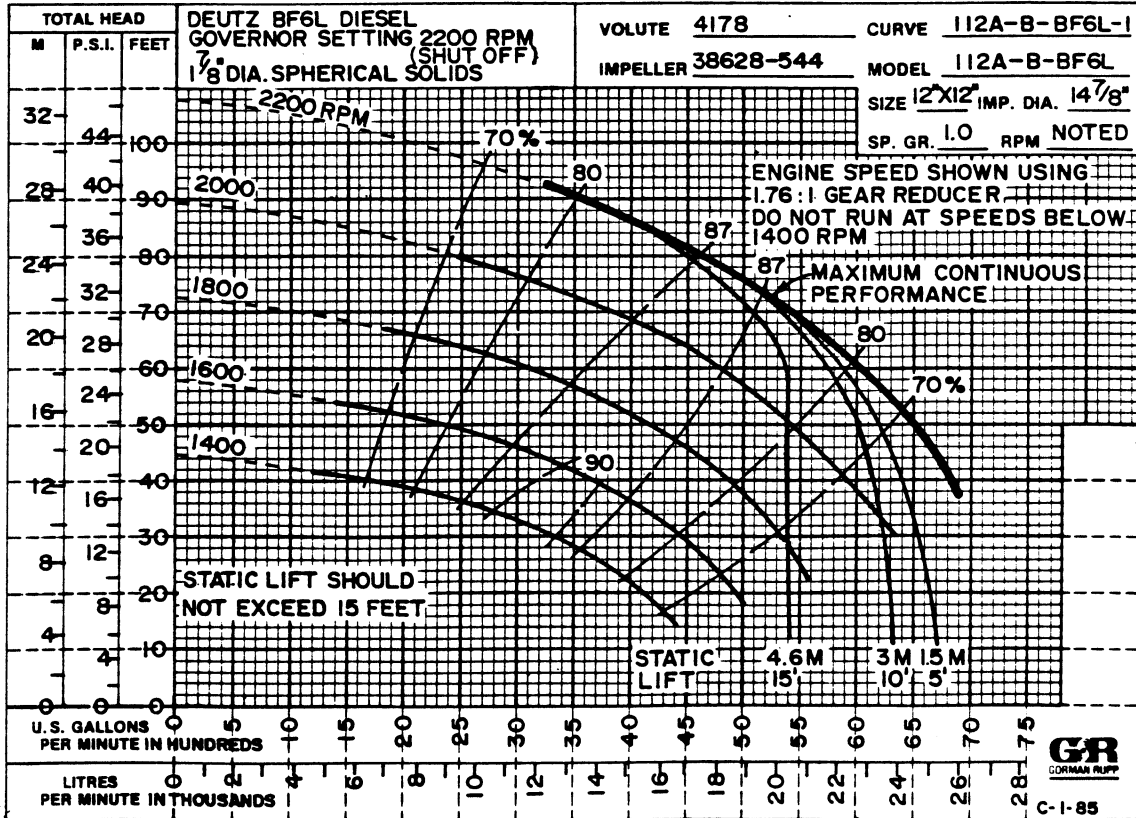
TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP FAILS TO PRIME	<p>Air leak in suction line.</p> <p>Lining of suction hose collapsed.</p> <p>Leaking or worn seal or pump gasket.</p> <p>Suction lift or discharge head too high.</p> <p>Strainer clogged.</p>	<p>Correct leak.</p> <p>Replace suction hose.</p> <p>Check pump vacuum. Replace leaking or worn seal or gasket.</p> <p>Check piping installation and install bypass line if needed. See INSTALLATION.</p> <p>Check strainer and clean if necessary.</p>
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE	<p>Air leak in suction line.</p> <p>Lining of suction hose collapsed.</p> <p>Leaking or worn seal or pump gasket.</p> <p>Strainer clogged.</p>	<p>Correct leak.</p> <p>Replace suction hose.</p> <p>Check pump vacuum. Replace leaking or worn seal or gasket.</p> <p>Check strainer and clean if necessary.</p>

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE(cont.)	<p>Suction intake not submerged at proper level or sump too small.</p> <p>Impeller or other wearing parts worn or damaged.</p> <p>Impeller clogged.</p> <p>Pump speed too slow.</p> <p>Discharge head too high.</p> <p>Suction lift too high.</p>	<p>Check installation and correct submergence as needed.</p> <p>Replace worn or damaged parts. Check that impeller is properly centered and rotates freely.</p> <p>Free impeller of debris.</p> <p>Check engine output; consult engine operation manual.</p> <p>Install bypass line.</p> <p>Measure lift w/vacuum gauge. Reduce lift and/or friction losses in suction line.</p>
PUMP REQUIRES TOO MUCH POWER	<p>Pump speed too high.</p> <p>Discharge head too low.</p> <p>Liquid solution too thick.</p> <p>Bearing(s) frozen.</p>	<p>Check engine output.</p> <p>Adjust discharge valve.</p> <p>Dilute if possible.</p> <p>Disassemble pump and check bearing(s).</p>
PUMP CLOGS FREQUENTLY	<p>Liquid solution too thick.</p> <p>Discharge flow too slow.</p> <p>Suction check valve or foot valve clogged or binding.</p>	<p>Dilute if possible.</p> <p>Open discharge valve fully to increase flow rate, and run engine at maximum governed speed.</p> <p>Clean valve.</p>

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
EXCESSIVE NOISE	<p>Cavitation in pump.</p> <p>Pumping entrained air.</p> <p>Pump or drive not securely mounted.</p> <p>Impeller clogged or damaged.</p>	<p>Reduce suction lift and/or friction losses in suction line. Record vacuum and pressure gauge readings and consult local representative or factory.</p> <p>Locate and eliminate source of air bubble.</p> <p>Secure mounting hardware.</p> <p>Clean out debris; replace damaged parts.</p>
BEARINGS RUN TOO HOT	<p>Bearing temperature is high, but within limits.</p> <p>Low or incorrect lubricant.</p> <p>Suction and discharge lines not properly supported.</p> <p>Drive misaligned.</p>	<p>Check bearing temperature regularly to monitor any increase.</p> <p>Check for proper type and level of lubricant.</p> <p>Check piping installation for proper support.</p> <p>Align drive properly.</p>

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 112A20-B-BF6L

*Based on 70°F clear water at sea level with minimum suction lift. Since pump installations are seldom identical, your performance may be different due to such factors as viscosity, specific gravity, elevation, temperature, and impeller trim.

If your pump serial number is followed by an "N", your pump is **NOT** a standard production model. Contact the Gorman-Rupp Company to verify performance or part numbers.

CAUTION

The pump end is designed to operate at 1250 RPM through a gearbox with a 1.76:1 ratio at a maximum input speed of 2200 RPM. Make certain that input speed does not exceed this RPM. Operation at higher RPM can cause pump components to be damaged or destroyed.

SECTIONAL DRAWING

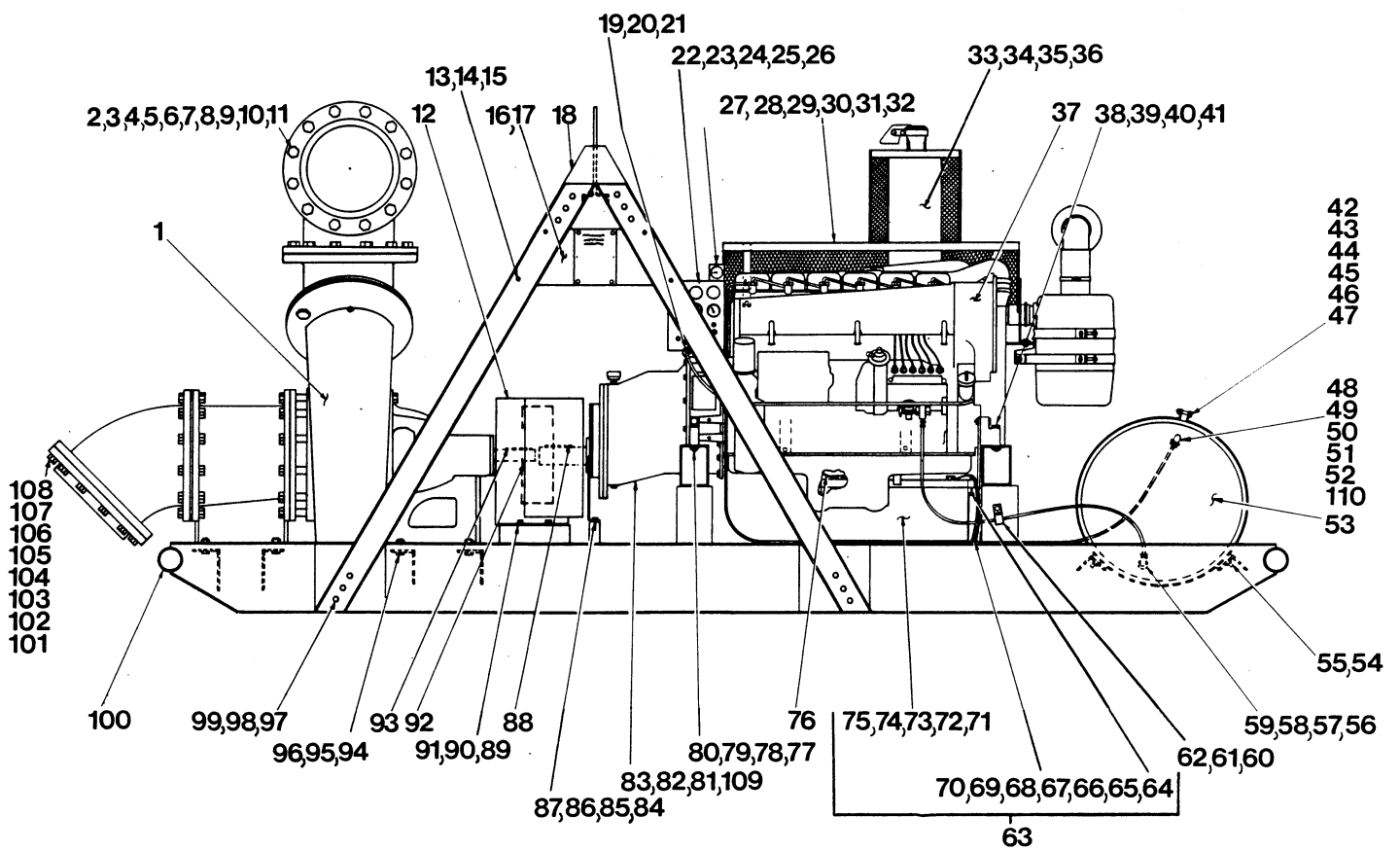


Figure 1. Pump Model 112A20-B-BF6L

MAINTENANCE AND REPAIR

PARTS LIST
Pump Model 112A20-B-BF6L
 (From S/N 805233 up)

If your pump serial number is followed by an "N", your pump is **NOT** a standard production model. Contact the Gorman-Rupp Company to verify part numbers.

ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY	ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	PUMP END ASSY	(SEE FIGURE 2)		1	56	90° ST ELBOW	RS00004	11990	1
2	FLANGED ELBOW	RF00192	10990	1	57	REDUCING BUSHING	AP01204	11990	1
3	*DISCH FLANGE GSKT	4991-G	18000	1	58	CONNECTOR	S01447	-----	1
4	HEX HD CAPSCREW	B01416	15991	12	59	FUEL LINE ASSY	9072-K	-----	1
5	HEX NUT	D00014	15991	12	60	HEX HD TAP SCREW	21281-472	-----	1
6	LOCKWASHER	J00014	15991	12	61	TACH CABLE BRKT	13295	15990	1
7	DISCH FLANGE	4491-A	10010	1	62	LOCKWASHER	J00004	-----	1
8	*DISCH FLANGE GSKT	4491-G	18000	1	63	BATT BOX ASSY	GRP40-08-B	-----	1
9	HEX HD CAPSCREW	B01416	15991	12	64	-HEX HD CAPSCREW	B00605	15991	2
10	HEX NUT	D00014	15991	12	65	-FLAT WASHER	K00006	15991	2
11	LOCKWASHER	J00014	15991	12	66	-LOCKWASHER	J00006	15991	2
12	COUPLING GRD ASSY	42342-040	-----	1	67	-HEX NUT	D00006	15991	2
13	HEX HD CAPSCREW	B00402	15991	8	68	-LOCKWASHER	J00006	15991	4
14	LOCKWASHER	J00004	15991	8	69	-HEX NUT	D00006	15991	4
15	HEX NUT	D00004	15991	8	70	-HEX HD CAPSCREW	B00605	15991	4
16	INSTRUCTION PLATE	38815-019	17990	1	71	-GRND CABLE ASSY	5795-AC	24040	1
17	MOUNTING PLATE	33433-019	15020	1	72	-BATTERY TAG	6588-S	-----	1
18	HOIST BAIL ASSY	44715-003	-----	1	73	-BATTERY BOX	42431-030	24000	1
19	CLIP	6006	15990	1	74	-BATT BOX LID	42113-012	24000	1
20	HEX HD CAPSCREW	22645-164	-----	12	75 *	-BATTERY	29331-506	-----	1
21	LOCKWASHER	21171-511	-----	12	76	*POS CABLE ASSY	6926-D	24040	1
22	HOSE/TACHOMETER	29277-004	-----	1	77	T TYPE LOCKWASHER	AK00008	15991	2
23	TACH BRACKET	34123-014	15020	1	78	HEX HD CAPSCREW	B00814	15991	2
24	WELL NUT	21757-036	-----	2	79	BEVELED WASHER	21167-011	-----	2
25	HEX HD CAPSCREW	B00405	15991	2	80	HEX NUT	D00008	15991	2
26	LOCKWASHER	J00004	15991	2	81	HEX HD CAPSCREW	22645-170	-----	8
27	HEX HD CAPSCREW	22645-839	-----	2	82	LOCKWASHER	21171-511	-----	8
28	LOCKWASHER	21171-510	-----	2	83	GEARBOX ASSY	24572-202	-----	1
29	HEX HD CAPSCREW	B00605	15991	1	84	HEX NUT	D00008	15991	2
30	LOCKWASHER	J00006	15991	1	85	HEX HD CAPSCREW	B00806	15991	2
31	HEX NUT	D00006	15991	1	86	LOCKWASHER	J00008	15991	2
32	HEAT SHIELD ASSY	42381-050	24150	1	87	SUPPORT PLATE	34144-034	15990	1
33	MUFFLER	29334-123	-----	1	88	KEY	N01020	-----	1
34	MUFFLER CLAMP	29334-265	-----	1	89	HEX HD CAPSCREW	B00405	15991	4
35	WEATHER CAP	S02021	-----	1	90	HEX NUT	D00004	15991	4
36	90° ELBOW	29334-335	-----	1	91	LOCKWASHER	J00004	15991	4
37	DUETZ BF6L ENGINE	29217-101	-----	1	92	COUPLING	24344-002	-----	1
38	BEVELED WASHER	21167-011	-----	2	93	KEY	N00616	-----	REF
39	T TYPE LOCKWASHER	AK00008	15991	2	94	HEX HD CAPSCREW	B01208	15991	8
40	HEX HD CAPSCREW	B00814	15991	2	95	LOCKWASHER	J00012	15991	8
41	HEX NUT	D00008	15991	2	96	HEX NUT	D00012	15991	8
42	FELT STRIP	9490-B	18030	2	97	HEX HD CAPSCREW	B01206	15991	12
43	FUEL TANK STRAP	41121-007	-----	2	98	LOCKWASHER	J00012	15991	12
44	HEX HD CAPSCREW	B00808	15991	2	99	HEX NUT	D00012	15991	12
45	FLAT WASHER	K00008	15991	2	100	COMBINATION BASE	41565-547	24150	1
46	LOCKWASHER	J00008	15991	2	101	ADAPTOR FLANGE	14275	10010	1
47	HEX NUT	D00008	15991	2	102	PIPE PLUG	P00032	-----	1
48	STREET ELBOW	RS00004	11990	1	103	LOCKWASHER	J00014	15991	24
49	REDUCING BUSHING	AP00402	15991	1	104	HEX NUT	D00014	15991	18
50	PIPE COUPLING	AE00002	11990	1	105	HEX HD CAPSCREW	B01416	15991	18
51	HOSE CLAMP	26518-642	-----	2	106	HEX HD CAPSCREW	B01412	15991	6
52	RET FUEL LINE	11308-C	-----	1	107*	SUCT FLG GSKT	4991-G	18000	2
53	FUEL TANK ASSY	46711-035	-----	1	108	SUCT FLANGE	4991-A	10010	1
54	LOCKWASHER	J00008	15991	4	109	HEX HD CAPSCREW	21632-599	-----	1
55	HEX NUT	D00008	15991	4	110	HOSE BARB FITTING	26523-441	-----	1

*INDICATES PARTS RECOMMENDED FOR STOCK

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

CANADIAN SERIAL NO AND UP

SECTIONAL DRAWING

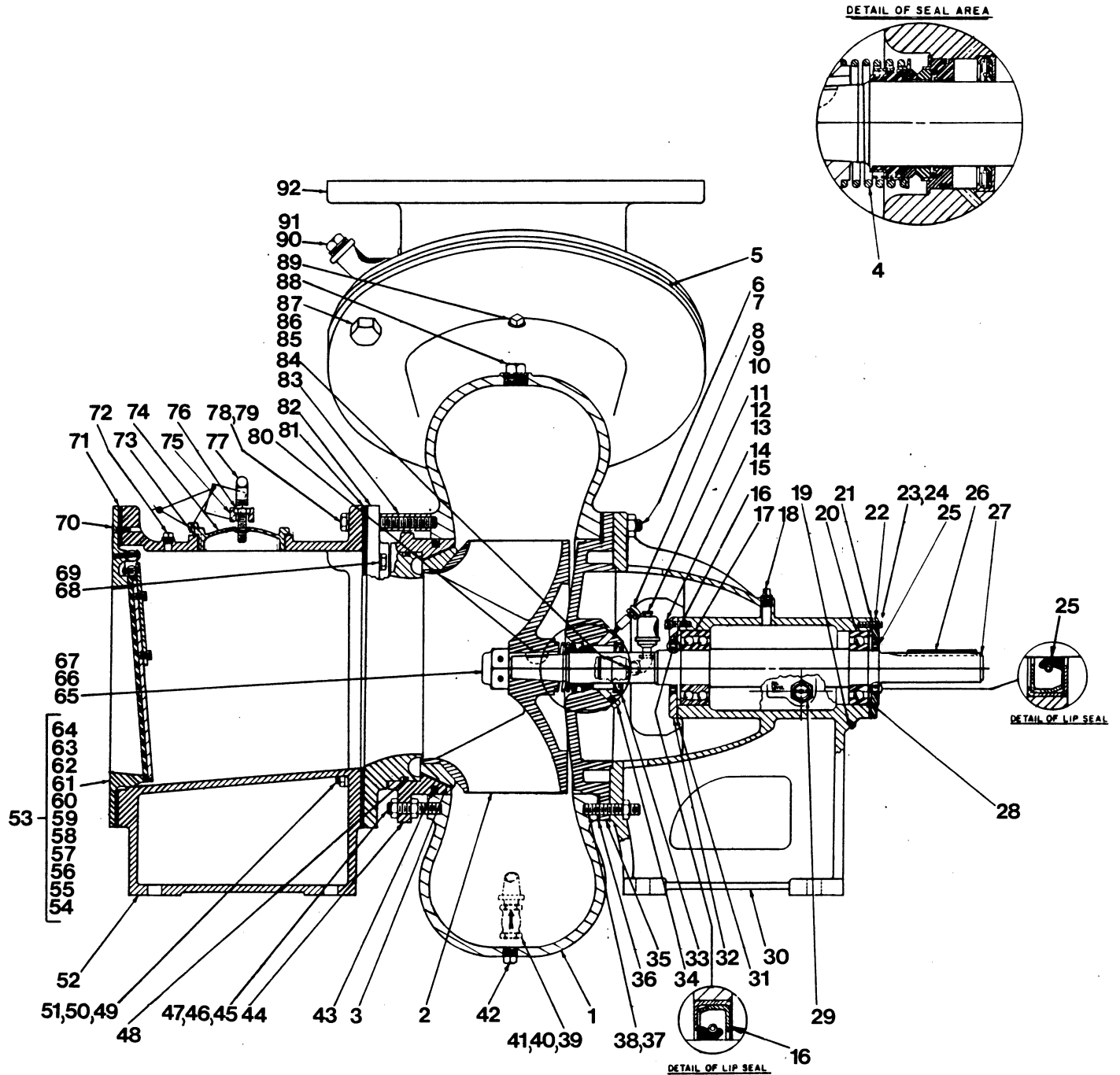


Figure 2. Pump End Assy 112A20-B

PARTS LIST
Pump End Assy 112A20-B

ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY	ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	PUMP CASING	4178	10010	1	50	LOCKWASHER	J00010	15991	2
2	IMPELLER ASSY	46151-012	24110	1	51	HEX NUT	D00010	15991	2
3	*-WEAR RING	12734	11010	REF	52	CHK VLV FLANGE	14270	10010	1
4	SEAL ASSY	12590-B	-----	1	53	CHECK VALVE ASSY	14284	-----	1
5	*DISCH FLANGE GSKT	4991-G	18000	1	54	-BRG PIVOT	14274	17080	2
6	STUD	C01011	15991	10	55	-CHK VLV SHAFT	14282	17010	2
7	HEX NUT	D00010	15991	10	56	-DRY SLEEVE BRG	S02282	-----	4
8	AIR VENT	S02162	-----	1	57	-GROOVED PIN	21142-433	-----	4
9	PIPE COUPLING	AE00002	11990	1	58	-FLANGED SEAT	14273-A	10010	1
10	PIPE NIPPLE	T00002	15070	1	59	-BUT HD CAPSCREW	CM00404	15990	2
11	BOTTLE OILER	S01933	-----	1	60	-BUT HD CAPSCREW	CM00403	15990	2
12	PIPE ELBOW	R00002	11990	1	61	-LOCKWASHER	J00004	15991	4
13	PIPE NIPPLE	T00206	15070	1	62	-HEX HD CAPSCREW	B00402	15991	4
14	HEX HD CAPSCREW	B00605	15991	6	63	-VALVE PLATE	14283	15990	1
15	LOCKWASHER	J00006	15991	6	64	*-VALVE ASSY	14281	24010	1
16	*OIL SEAL	25227-629	-----	1	65	ALLEN HD SETSCREW	GA00601 1/2	17090	2
17	*BALL BEARING	23421-461	-----	1	66	*NYLON INSERT	31111-003	23050	2
18	VENTED PLUG	38649-009	11990	1	67	IMPELLER NUT	4190-B	10090	1
19	PIPE PLUG	P00004	11990	1	68	HEX HD CAPSCREW	B01006	15991	2
20	*BALL BEARING	S01077	-----	1	69	LOCKWASHER	J00010	15991	2
21	*BEARING GASKET	5413-G	18000	1	70	SOC HD CAPSCREW	F00404	15991	2
22	BEARING CAP	4185-A	10010	1	71	CHK VLV GSKT	14273-G	20000	1
23	HEX HD CAPSCREW	B00605	15991	4	72	PIPE PLUG	P00004	11990	1
24	LOCKWASHER	J00006	15991	4	73	FILL COVER GSKT	38681-817	20000	1
25	*OIL SEAL	25227-629	-----	1	74	FILL CVR PLT ASSY	48271-020	-----	1
26	*SHAFT KEY	N00616	15990	1	75	CLAMP BAR	12370	11000	1
27	*IMPELLER SHAFT	38516-202	-----	1	76	HEX HD CAPSCREW	B00808	15991	2
28	*BRG ADJ SHIM SET	8546	15990	1	77	CLAMP BAR SCREW	8618	24000	1
29	SIGHT GAUGE	S01471	-----	2	78	HEX HD CAPSCREW	14432	15990	8
30	PEDESTAL	3233-D	10010	1	79	LOCKWASHER	J00010	15991	8
31	*BEARING GSKT	4184-G	18000	1	80	*WOODRUF KEY	AV01210	15990	1
32	BEARING CAP	4184-A	10010	1	81	*FLANGE GSKT	4991-G	18000	1
33	*OIL SEAL	S01917	-----	1	82	SUCT PLATE	12737-A	11010	1
34	PIPE PLUG	P00002	11990	1	83	SPACER	14278	15020	8
35	SEAL PLATE	4179-E	10010	1	84	RD HD MACH SCREW	X00404	17090	2
36	CASING GSKT	4180-G	18000	1	85	HEX HD CAPSCREW	B01414	15991	12
37	STUD	C01013	15991	2	86	HEX NUT	D00014	15991	12
38	HEX NUT	D00010	15991	2	87	LOCKWASHER	J00014	15991	12
39	CHECK VALVE	S02283	-----	1	88	PIPE PLUG	P00024	11990	1
40	PIPE NIPPLE	T00012	15070	1	89	ACCESSORY PLUG	P00006	11990	1
41	STREET ELBOW	RS00012	11990	1	90	STREET ELBOW	AGS00032	11990	1
42	CASING DRAIN PLUG	P00012	11990	1	91	PIPE PLUG	P00032	11990	1
43	*WEAR RING O-RING	S01914	-----	1	92	ADAPTOR FLANGE	14275	10010	1
44	*WEAR RING	12736	11010	1	NOT SHOWN:				
45	STUD	12739	15010	4	DRIVE SCREW	BM#04-03	15990	4	
46	HEX NUT	D00010	15991	4	STRAINER	4990-A	-----	1	
47	JAM NUT	AT00010	15991	4	NAME PLATE	38818-023	13990	1	
48	SUCT PLATE O-RING	S01991	-----	1	ROTATION DECAL	2613-CU	00000	1	
49	HEX HD CAPSCREW	B01009	15991	2					

*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, switch off the engine ignition and remove the key to ensure that it will remain inoperative and close all valves in the suction and discharge lines.

WARNING

```

////////////////////////////////////
//
// Before attempting to open or service the pump:
//
// 1. Familiarize yourself with this manual.
// 2. Switch off the engine ignition and remove the key
// 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.
//
////////////////////////////////////

```

Suction Check Valve Removal

(Figure 2)

Before attempting to service the check valve assembly (53), remove the casing drain plug (42) and drain the pump. Clean and reinstall the drain plug.

See Figure 1 and disconnect the suction piping from the adaptor flange (101). Disengage the hardware securing the suction flange (108) to the check valve flange (52, Figure 2) and remove the flange and gasket (107).

Remove the socket head capscrews (70) and separate the check valve assembly and gasket (71) from the check valve flange.

To service the check valve (64), remove the hardware (61 and 62) securing it to the valve plate (63).

Wear Ring Removal

(Figure 2)

See Figure 1 and remove the hardware (94, 95 and 96) securing the check valve flange to the base (100). Use a suitable hoist and sling to support the check valve flange. Disengage the hardware (78 and 79), remove the spacers (83), and separate the flange and suction plate (82) from the pump casing and wear ring.

If the suction plate or gasket (81) requires replacement, disengage the hardware (68 and 69) and separate the suction flange from the suction plate. Remove the gasket and clean the mating surfaces.

Disengage the nuts (46) and slide the wear ring and O-ring (43) from the pump casing. Inspect the wear ring for excessive wear and replace as necessary.

If no further disassembly is required, see **Wear Ring Installation**.

Pump Disassembly

(Figure 2)

The impeller assembly (2) and seal assembly (4) may be removed through the suction port without removing the discharge piping. However, due to the weight of the impeller and tight fit through the suction port, it is recommended that the discharge piping be removed and the pump casing (1) separated from the pedestal to provide better access.

Support the pump casing using a suitable hoist and sling. A lifting eye may be made for this purpose by welding an eye bolt of suitable size to a 1-1/2 NPT pipe plug and screwing it completely into the tapped hole in the top of the casing. **Be sure** the eye bolt and weld are adequate to support the casing.

WARNING

```

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

Remove the hardware (7 and 38) securing the pump casing to the pedestal. Pull the casing straight away from the pedestal to prevent binding on the impeller.

Remove the pump casing gasket (36) and clean the contacting surfaces.

Impeller Removal

Before removing the impeller, remove the bottle oiler and piping (11, 12 and 13) and drain the seal cavity. This will prevent oil from escaping when the impeller is removed.

Loosen the two setscrews (65) and remove the impeller nut (67).

The impeller is secured to the shaft by the woodruff key (80) and a taper fit. To remove the impeller, install two 3/8-16 UNC capscrews (not supplied) in the tapped holes in the impeller. Use a gear puller to preload the impeller and strike the puller shaft sharply with a hammer or mallet to break the impeller loose. Remove the impeller and key.

NOTE

If necessary, heat the impeller with a torch to aid removal.

Seal Removal

(Figure 2)

This pump is designed with two seals: a primary mechanical seal (4) located directly behind the impeller, and a secondary oil seal (33) located at the back of the seal oil cavity. If the liquid being pumped begins to leak past the oil seal, both seals should be replaced as soon as possible.

Remove the seal spring. Remove the air vent and piping (8, 9 and 10) from the seal plate (35). Remove the machine screws (84) and slide the seal plate, remaining mechanical seal components, and oil seal off the shaft as a unit. **Be careful** not to drop or damage the mechanical seal components when removing the seal plate.

Remove the retainer, bellows and rotating element from the seal plate. Go to the opposite side of the seal plate and use a screwdriver (or other suitable tool) to pry the oil seal from the bore. Be careful not to scratch or damage the bore. Press the stationary elements and stationary seat with O-rings from the seal plate bore.

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

Shaft And Bearing Removal And Disassembly

(Figure 2)

When the pump is properly operated and maintained, the pedestal should not require disassembly. Disassemble the shaft and bearings **only** when there is evidence of wear or damage.

CAUTION

Shaft and bearing disassembly in the field is not recommended. These operations should be performed only in a properly-equipped shop by qualified personnel.

Remove the key (26) from the shaft (27). Remove the pedestal drain plug (19) and drain the pedestal. Clean and reinstall the plug.

See Figure 1 and disengage the hardware (89, 90 and 91) and remove the coupling guard assembly (12). Remove the key and coupling (88 and 92). Remove the hardware (94, 95 and 96) securing the pedestal to the base.

Remove the hardware (23 and 24) and slide the outboard bearing cap (22) and oil seal (25) off the shaft. Inspect the oil seal and, if replacement is required, press it from the bearing cap. Remove the bearing cap gasket (21) and bearing adjusting shims (28).

Remove the hardware (14 and 15) and slide the inboard bearing cap (32) and oil seal (16) off the shaft. Inspect the oil seal and, if replacement is required, press it from the bearing cap. Remove the bearing cap gasket (31). Tie and tag the shims or measure and record their thickness for ease of reassembly.

Place a block of wood against the impeller end of the shaft and tap the shaft and assembled bearings out of the pedestal. Be careful not to damage the shaft threads.

Use a bearing puller to remove the inboard bearing (17) and outboard bearing (20) from the shaft.

Impeller Shaft and Bearing Reassembly And Installation

(Figure 2)

Clean the pedestal, impeller shaft and all component parts (except the bearings) with a soft cloth soaked in cleaning solvent. Inspect the parts for wear or damage and replace as necessary.

WARNING

```

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

```

Inspect the shaft for distortion, nicks or scratches or damaged threads on the impeller end. Dress small nicks and burrs with a fine file or emery cloth. Replace the impeller shaft if defective.

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

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

CAUTION

<p>Bearings must be kept free of all dirt and foreign material. Failure to do so will greatly shorten bearing life. DO NOT spin dry bearings. This may scratch the balls or races and cause premature bearing failure.</p>
--

The bearing tolerances provide a tight press fit onto the impeller shaft and a snug slip fit into the pedestal. Replace the shaft or pedestal if the proper bearing fit is not achieved.

Lubricate the shaft with light oil and position the bearings on the shaft. The loading groove on the inboard bearing (17) **must** face toward the impeller end of the shaft.

Use an arbor (or hydraulic) press to press the inboard bearing on until seated squarely against the shaft shoulder.

CAUTION

When installing the bearings onto the shaft, NEVER press or hit against the outer race, balls, or ball cage. Press ONLY on the inner race.

Press the outboard bearing (20) on until it seats squarely against the shaft shoulder.

Press the oil seal (16) into the inboard bearing cap (32) with the lip positioned as shown in Figure 2. Replace the bearing cap gasket (31) and secure the bearing cap to the pedestal with the hardware (14 and 15).

Slide the shaft and assembled bearings into the pedestal until the inboard bearing seats against the bearing cap. Be careful not to damage the oil seal.

CAUTION

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

Press the oil seal (25) into the bearing cap (22) with the lip positioned as shown in Figure 2. Replace the bearing cap gasket and install the same thickness of bearing adjusting shims (28) as previously removed.

NOTE

Shaft endplay is to be between .002 and .010 inch. Add or remove adjusting shims to establish correct endplay.

Refer to Figure 1 and secure the pedestal to the base with the hardware (94, 95 and 96). Install the key and coupling (88 and 92). Check the coupling alignment as described in **INSTALLATION**. Install the coupling guard (12) and secure with the hardware (89, 90 and 91).

Lubricate the bearings as indicated in **LUBRICATION**.

Seal Installation

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

WARNING

```

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

```

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

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

Inspect the seal components for wear, scoring, grooves, and other damage that might cause leakage. 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 bellows and stationary seat O-rings 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).

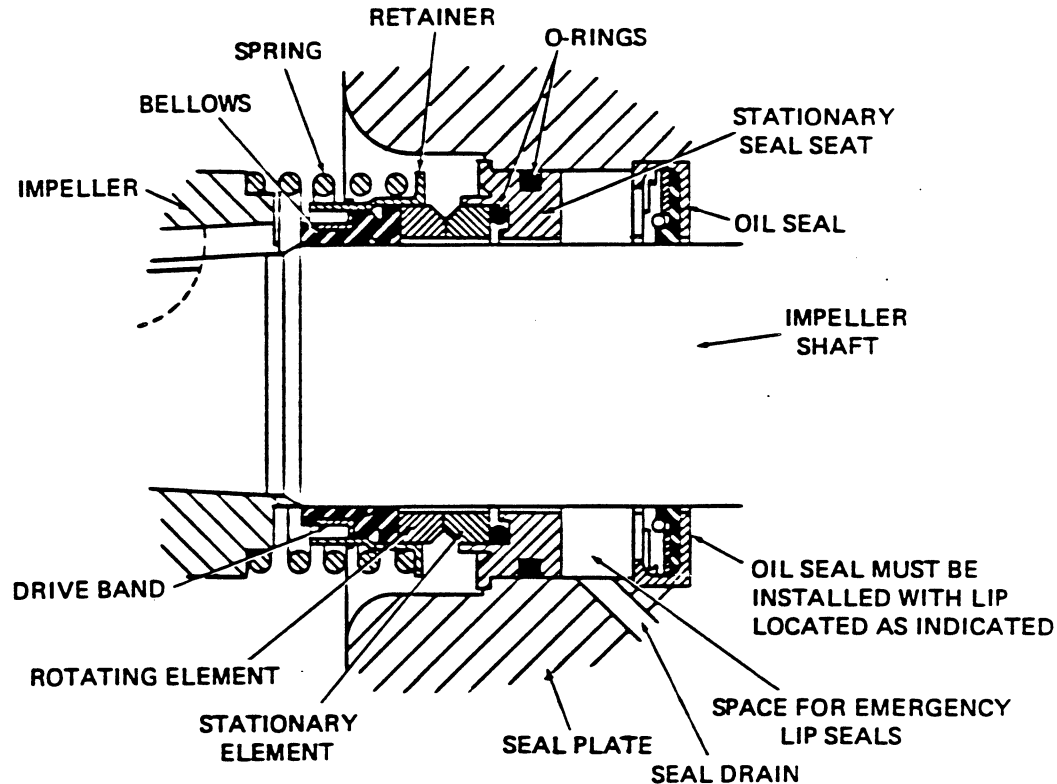


Figure 3. 12590-B Seal Assembly

CAUTION

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

Subassemble the stationary seat, O-rings and stationary seal element. Press the subassembly into the front of the seal plate so that the lip of the stationary seat sits squarely against the shoulder bore.

Press the oil seal (33) into the seal plate with the lip positioned as shown in Figure 2. Slide the seal plate, oil seal and stationary seal components onto the impeller shaft. **Be careful** not to damage the oil seal or stationary element on the shaft threads or keyway. Secure the seal plate to the pedestal with the machine screws (84).

Lubricate the shaft with water or a small amount of light oil and position the rotating subassembly (consisting of the rotating element, bellows and retainer) on the shaft as shown in Figure 3. Apply firm, steady pressure on the seal retainer until it slides onto the shaft and the rotating and stationary elements contact. Install the seal spring.

Reinstall the air vent and piping (7, 8 and 9) and bottle oiler and piping (11, 12 and 13). Lubricate the seal as indicated in **LUBRICATION** after the impeller is installed and the pump reassembled.

Impeller Installation

(Figure 2)

The wear ring (3) is welded to the impeller to form the impeller assembly. Inspect the impeller and wear ring for wear, damage or cracks. If the impeller is damaged, replace the entire assembly. If only the wear ring is damaged, machine or grind the old ring off and weld a new ring on.

Install the woodruff key (80) and press the impeller onto the shaft until fully seated.

Remove the setscrews (65) and inserts (66) from the impeller nut (67). Apply "Never-Seez" or equivalent to the shaft threads and screw the impeller nut onto the shaft. Torque the impeller nut to 300 ft. lbs. (3600 in. lbs.).

Apply "Loctite No. 35" or equivalent compound to the setscrews, install new inserts and torque the setscrews to 18 ft. lbs. (216 in. lbs.).

Pump Reassembly

(Figure 2)

Replace the pump casing gasket (36). Slide the pump casing over the impeller and secure it to the seal plate and pedestal with the hardware (7 and 38).

Wear Ring Installation

(Figure 2)

Replace the wear ring O-ring (43) and lubricate with water or light oil. Slide the wear ring (44) into the pump casing and secure with the hardware (46).

A clearance of approximately .015 inch between the wear ring and the impeller is recommended for maximum pump efficiency. This clearance may be measured through the suction port with feeler gauges and adjusted using the jam nuts (47) and hex nuts (46).

An alternate method of adjusting this clearance is to loosen the jam nuts and tighten the hex nuts evenly until the wear ring scrapes against the impeller when turned. Back the hex nuts off approximately 1/2 turn and secure the wear ring with the jam nuts.

Suction Check Valve Installation

(Figure 2)

Replace the flange gasket (81) and secure the suction plate to the check valve flange (52) with the hardware (68 and 69). Replace the suction plate O-ring (48) and lubricate with water or light oil. Slide the assembled check valve flange and suction plate into the wear ring. Install the spacers (83) and secure the flange and suction plate to the casing with the hardware (78 and 79). Secure the check valve flange to the base with the previously removed hardware (94, 95 and 96, Figure 1).

Secure the check valve (64) to the valve plate (63) with the hardware (61 and 62). Replace the flanged seat gasket (71) and secure the flanged seat to the flange with the socket head capscrews (70).

Final Pump Reassembly

(Figure 1)

Replace the flange gasket (107) and secure the flange (108) to the check valve flange with the previously removed hardware.

Reconnect the suction and discharge piping. Check to ensure that all piping and connections are tight, properly supported and secure.

Lubricate the mechanical seal assembly and pedestal as indicated in **LUBRICATION**.

Fill the pump with clear liquid and start the pump (refer to **Operation**, Section C).

LUBRICATION

Seal Assembly

(Figure 2)

Fill the seal bottle oiler (11) with SAE No. 30 non-detergent oil. Check the oil level regularly and refill as required.

Bearings

(Figure 2)

The pedestal was fully lubricated when shipped from the factory. Check the oil level regularly through the sight gauge (29) and maintain it at the midpoint of the gauge. When lubrication is required, remove the vented plug (18) and add SAE No. 30 non-detergent oil through the opening. **Do not** over-lubricate.

Over-lubrication can cause the bearings to overheat, resulting in premature bearing failure.

NOTE

The white reflector in the sight gauge must be positioned horizontally to provide proper drainage.

Under normal conditions, drain the pedestal once each year and refill with clean oil. Change the oil more frequently if the pump is operated continuously or installed in an environment with rapid temperature change.

CAUTION

Monitor the condition of the bearing lubricant regularly for evidence of rust or moisture condensation. This is especially important in areas where variable hot and cold temperatures are common.

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

Engine

Follow the engine manufacturer's recommendations as specified in the accompanying literature.

Gearbox

Follow the gearbox manufacturer's recommendations as specified in the accompanying literature.

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