
**INSTALLATION, OPERATION,
AND MAINTENANCE MANUAL**
WITH PARTS LIST



10 SERIES PUMPS

MODEL
14A2-TS2 S/G



The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

TABLE OF CONTENTS

INTRODUCTION	I-1
WARNINGS - SECTION A	A-1
INSTALLATION - SECTION B	B-1
Pump Dimensions	B-1
PREINSTALLATION INSPECTION	B-2
POSITIONING PUMP	B-2
Lifting	B-2
Mounting	B-2
Clearance	B-3
SUCTION AND DISCHARGE PIPING	B-3
Materials	B-3
Line Configuration	B-3
Connections to Pump	B-3
Gauges	B-4
SUCTION LINES	B-4
Fittings	B-4
Strainers	B-4
Sealing	B-4
Suction Lines In Sumps	B-5
Suction Line Positioning	B-5
DISCHARGE LINES	B-6
Siphoning	B-6
Valves	B-6
Bypass Lines	B-6
OPERATION - SECTION C	C-1
PRIMING	C-1
STARTING	C-2
OPERATION	C-3
Lines With a Bypass	C-3
Lines Without a Bypass	C-4
Leakage	C-4
Liquid Temperature And Overheating	C-4
Strainer Check	C-4
Pump Vacuum Check	C-5
STOPPING	C-5
Cold Weather Preservation	C-5
PUMP TROUBLESHOOTING - SECTION D	D-1
PUMP MAINTENANCE AND REPAIR - SECTION E	E-1
PERFORMANCE CURVE	E-1
PUMP MODEL - PARTS LIST	E-3
PUMP END ASSY - PARTS LIST	E-5
PUMP AND SEAL DISASSEMBLY AND REASSEMBLY	E-6
Back Cover Removal	E-6
Suction Check Valve Removal	E-7
Pump Casing Removal	E-7
Impeller Removal	E-7
Seal Removal	E-8
Stub Shaft Removal	E-8
Stub Shaft Installation	E-9
Seal Installation	E-9
Impeller Installation And Adjustment	E-11
Pump Casing Installation	E-11
Suction Check Valve Installation	E-12
Back Cover Installation	E-13
Final Pump Reassembly	E-13
LUBRICATION	E-13
Seal Assembly	E-13
Engine	E-14

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 designed to handle dirty water containing specified entrained solids. The basic material of construction for wetted parts is gray iron, with ductile iron impeller and steel wearing parts. The pump is powered by an air-cooled Lister diesel engine, model TS2.

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

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

<p>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.</p>

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. Shut down the engine and take precautions to en-
//     sure 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 dirty water containing
// specified entrained solids. Do not attempt to pump vol-
// atile, corrosive or flammable liquids which may damage
// the pump or endanger personnel as a result of pump fail-
// ure.
//
////////////////////////////////////

```

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 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.
//
////////////////////////////////////

```

WARNINGS

WARNING

```

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

```

WARNING

```

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

```

WARNING

```

////////////////////////////////////
//                               //
// 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. //
//                               //
////////////////////////////////////

```

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. //
//                               //
////////////////////////////////////

```


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. (See Section E, Page 1). If the pump is fitted with a Gorman-Rupp double grease lubricated seal, the maximum incoming pressure must be reduced to 10 p.s.i..

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

Pump Dimensions

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

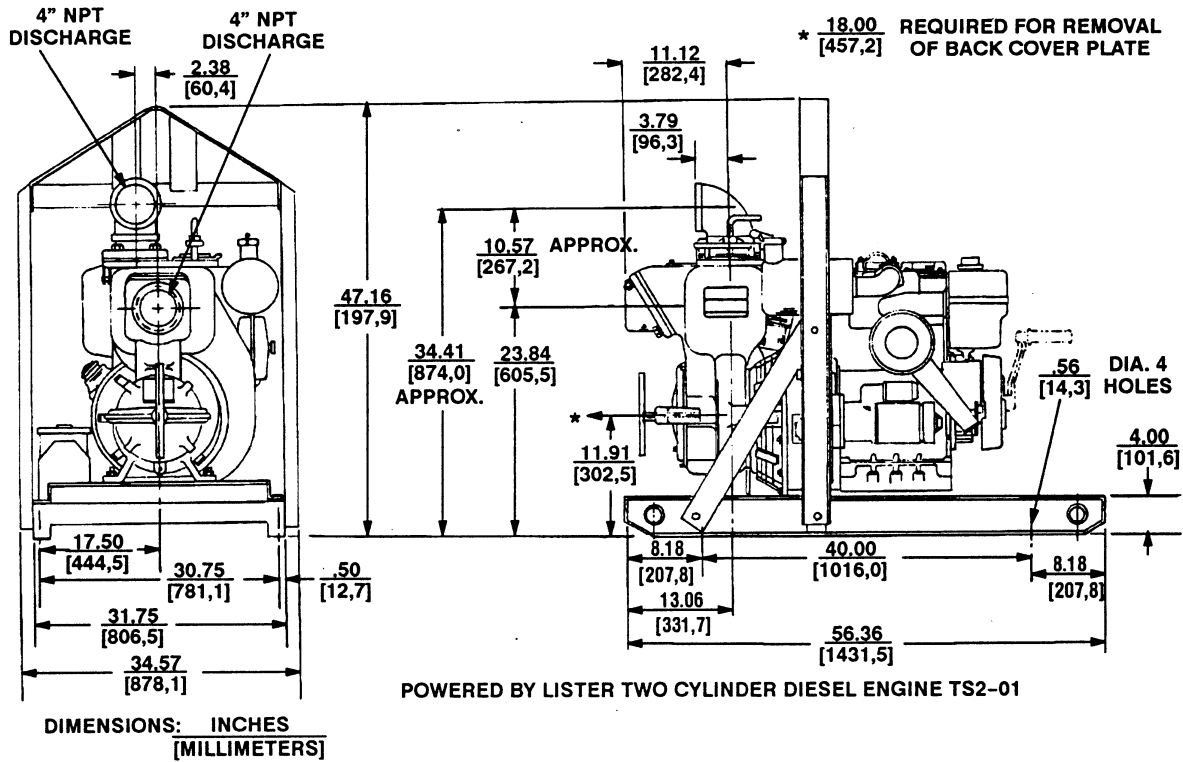


Figure 1. Pump Model 14A2-TS2 S/G

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.

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 **4,500 pounds**. This pump weighs approximately **890 pounds**, not including the weight of accessories and wheel kit. 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

INSTALLATION

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°.

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.

Clearance

When positioning the pump, allow a clearance of at least **18 inches** in front of the back cover assembly to permit removal of the back cover, and of the rotating assembly, which must be removed through the back of 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.

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 2 inch diameter spherical solids.

Sealing

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

Suction Lines In Sumps

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

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

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

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

Suction Line Positioning

The depth of submergence of the suction line is critical to efficient pump operation. Figure 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).

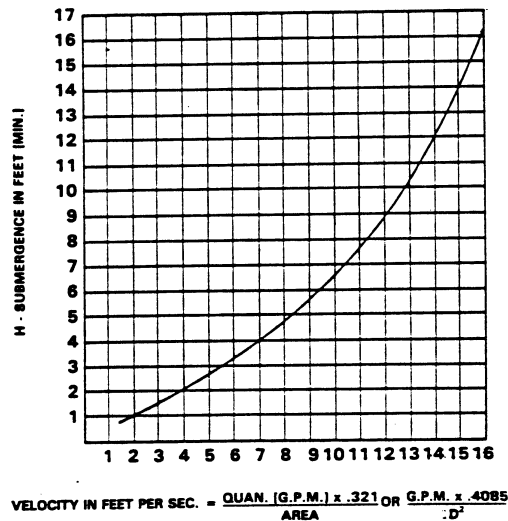


Figure 2. Recommended Minimum Suction Line Submergence Vs. Velocity

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.

OPERATION

OPERATION - SECTION C

WARNING

```

////////////////////////////////////
//
// This pump is designed to handle dirty water containing //
// specified entrained solids. Do not attempt to pump vol- //
// atile, corrosive or flammable liquids which may damage //
// the pump or endanger personnel as a result of pump fail- //
// ure. //
// //
////////////////////////////////////

```

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 2300 RPM. //
// //
////////////////////////////////////

```

PRIMING

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

This pump is self-priming, but the pump should never be operated unless there is liquid in the casing.

CAUTION

<p>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.</p>

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 as necessary.

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.

NOTE

This pump is self-priming, however, it is **not** suited for unattended reprime applications. In the event of suction check valve failure and loss of prime, the pump casing **must** be refilled through the fill cover or fill plug.

STARTING

Consult the operations manual furnished with the engine.

WARNING

```

////////////////////////////////////
//
// Consult the operations manual furnished with the engine //
// before attempting to crank start the engine. When //
// starting, make sure footing is firm and dry and other //
// personnel are clear of the crank rotation plane. To //
// avoid kickback injury, keep legs and upper body out of //
// crank rotation plane and grasp the crank handle with THE //
// THUMB UNDER THE HANDLE (See Figure 1). //
// //
////////////////////////////////////

```

Since the engine can be started using a hand crank, be sure to follow all safety precautions to prevent possible injury due to engine kickback.

OPERATION

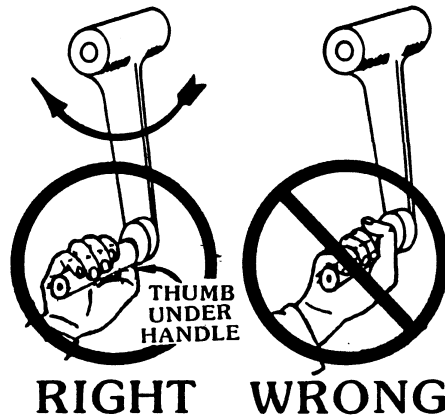


Figure 1. Crank Starting

OPERATION

CAUTION

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

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 110°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

Warning text enclosed in a double-slash border. The text reads: '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.' The text is surrounded by a border of double slashes (//).

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.

OPERATION

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. (See Section E, Page 1). If the pump is fitted with a Gorman-Rupp double grease lubricated seal, the maximum incoming pressure must be reduced to 10 p.s.i..

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, shut down the engine and take precautions 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. Shut down the engine and take precautions to en-
//     sure 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	Not enough liquid in casing.	Add liquid to casing. See PRIMING.
	Suction check valve contaminated or damaged.	Clean or replace check 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.

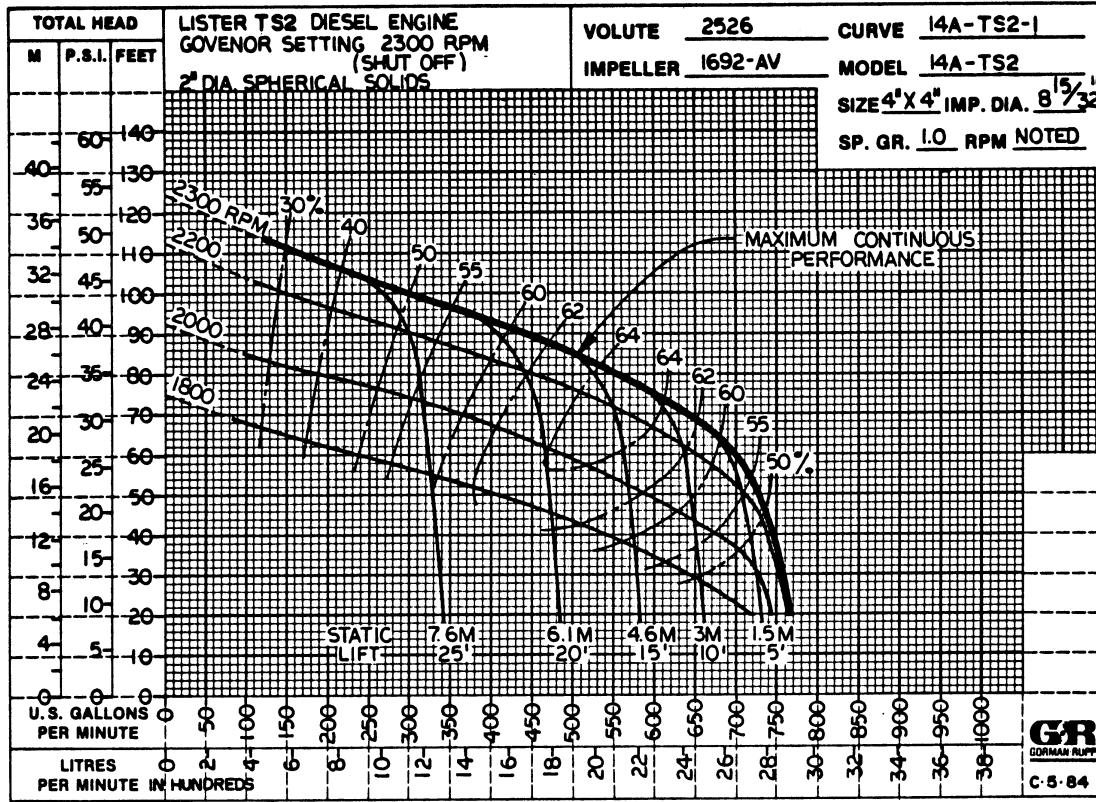
TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE(cont.)	<p>Impeller or other wearing parts worn or damaged.</p> <p>Impeller clogged.</p> <p>Pump speed too slow.</p> <p>Suction lift or discharge head too high.</p> <p>Leaking or worn seal or pump gasket.</p> <p>Strainer clogged.</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>Check piping installation and install bypass line if needed. See INSTALLATION.</p> <p>Check pump vacuum. Replace leaking or worn seal or gasket.</p> <p>Check strainer and clean if necessary.</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>Check engine output.</p> <p>Adjust discharge valve.</p> <p>Dilute if possible.</p>
PUMP CLOGS FREQUENTLY	<p>Discharge flow too slow.</p> <p>Suction check valve or foot valve clogged or binding.</p> <p>Discharge line clogged or restricted; hose kinked.</p>	<p>Open discharge valve fully to increase flow rate, and run engine at maximum governed speed.</p> <p>Clean valve.</p> <p>Check discharge lines; straighten hose.</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>

MAINTENANCE AND REPAIR

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 14A2-TS2 S/G**

*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

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

SECTION DRAWING

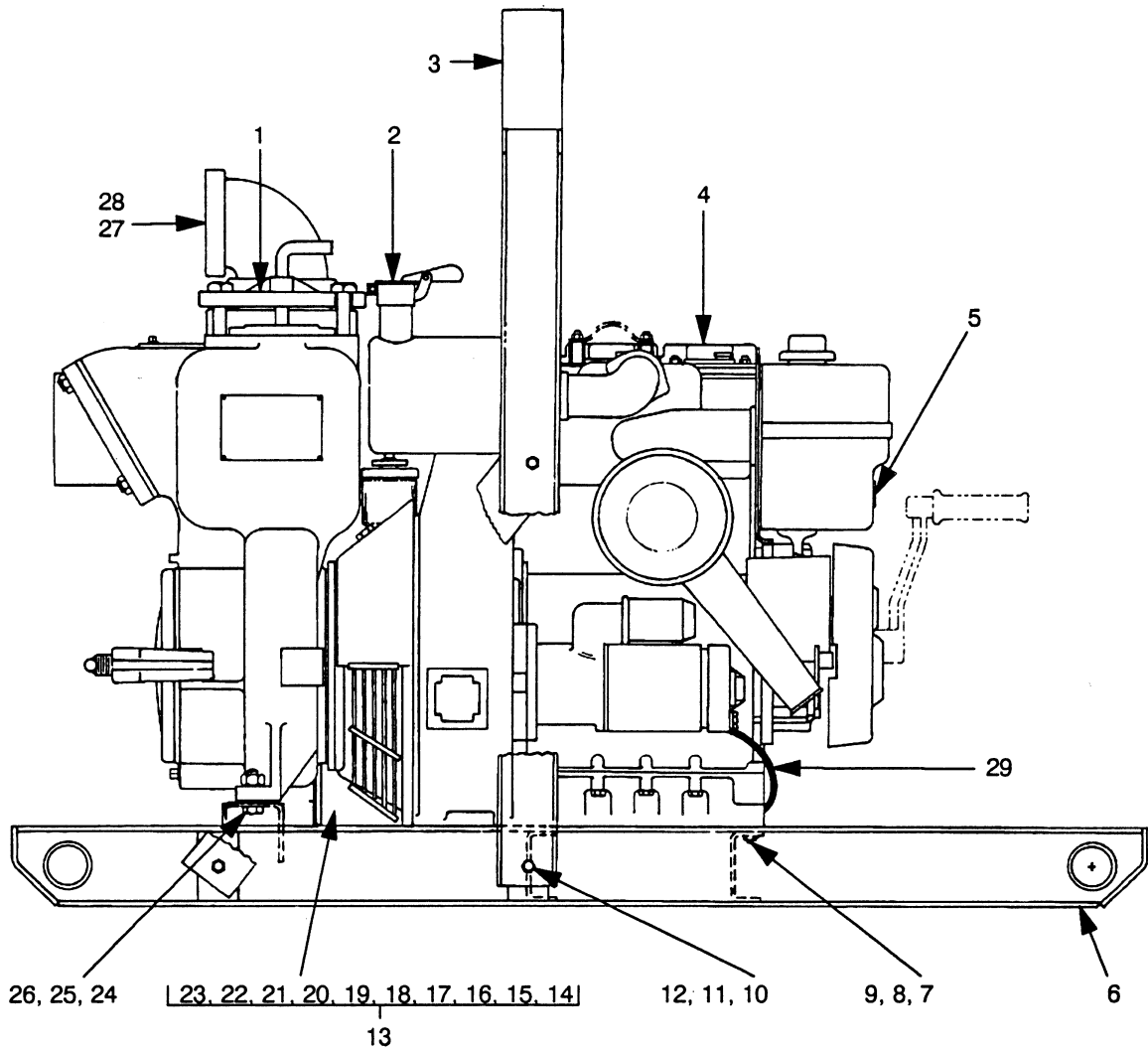


Figure 1. Pump Model 14A2-TS2 S/G

PARTS LIST
Pump Model 14A2-TS2 S/G
 (From S/N 815300 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	MAT'L CODE	QTY
1	PUMP END	14A2-(TS2 S/G)	-----	1
2	WEATHER CAP	S1331	-----	1
3	HOIST BAIL ASSY	13351BH	24000	1
4	LISTER ENGINE	29231-144	-----	1
5	WARNING DECAL	38817-058	-----	1
6	COMBINATION BASE	41566-104	24150	1
7	HEX HD CAPSCREW	B0810	15991	4
8	LOCKWASHER	J08	15991	4
9	HEX NUT	D08	15991	4
10	HEX HD CAPSCREW	B1006	15991	6
11	LOCKWASHER	J10	15991	6
12	HEX NUT	D10	15991	6
13	BATTERY BOX ASSY	GRP40-02C	-----	1
14	-BATTERY TAG	38818-338	-----	1
15	-GRND CABLE ASSY	5795AC	24040	1
16	-HEX HD CAPSCREW	B0612	15991	2
17	-FLAT WASHER	K06	15991	2
18	-HEX NUT	21765-314	-----	2
19	-BATTERY FRAME	8355B	24000	1
20	-BATTERY	SEE OPTIONS		
21	-BATTERY BOX	8356B	24000	1
22	-HEX HD CAPSCREW	B0604	15991	4
23	-HEX NUT	21765-314	-----	2
24	HEX HD CAPSCREW	B0807	15991	2
25	LOCKWASHER	J08	15991	2
26	HEX NUT	D08	15991	2
27	PIPE NIPPLE	T64	15070	REF
28	PIPE ELBOW	R64	11990	REF
29	* POS CABLE ASSY	47311-410	-----	1
NOT SHOWN:				
	WARNING DECAL	38816-096	-----	1
	GRD WARNING STK	38816-063	-----	1
OPTIONAL:				
	* 12V BATTERY	S1338	-----	1
	WHEEL KIT	GRP30-231A	-----	1

* INDICATES PARTS RECOMMENDED FOR STOCK
 Above Serial Numbers Do Not Apply To Pumps Made In Canada.

CANADIAN SERIAL NO. AND UP

SECTIONAL DRAWING

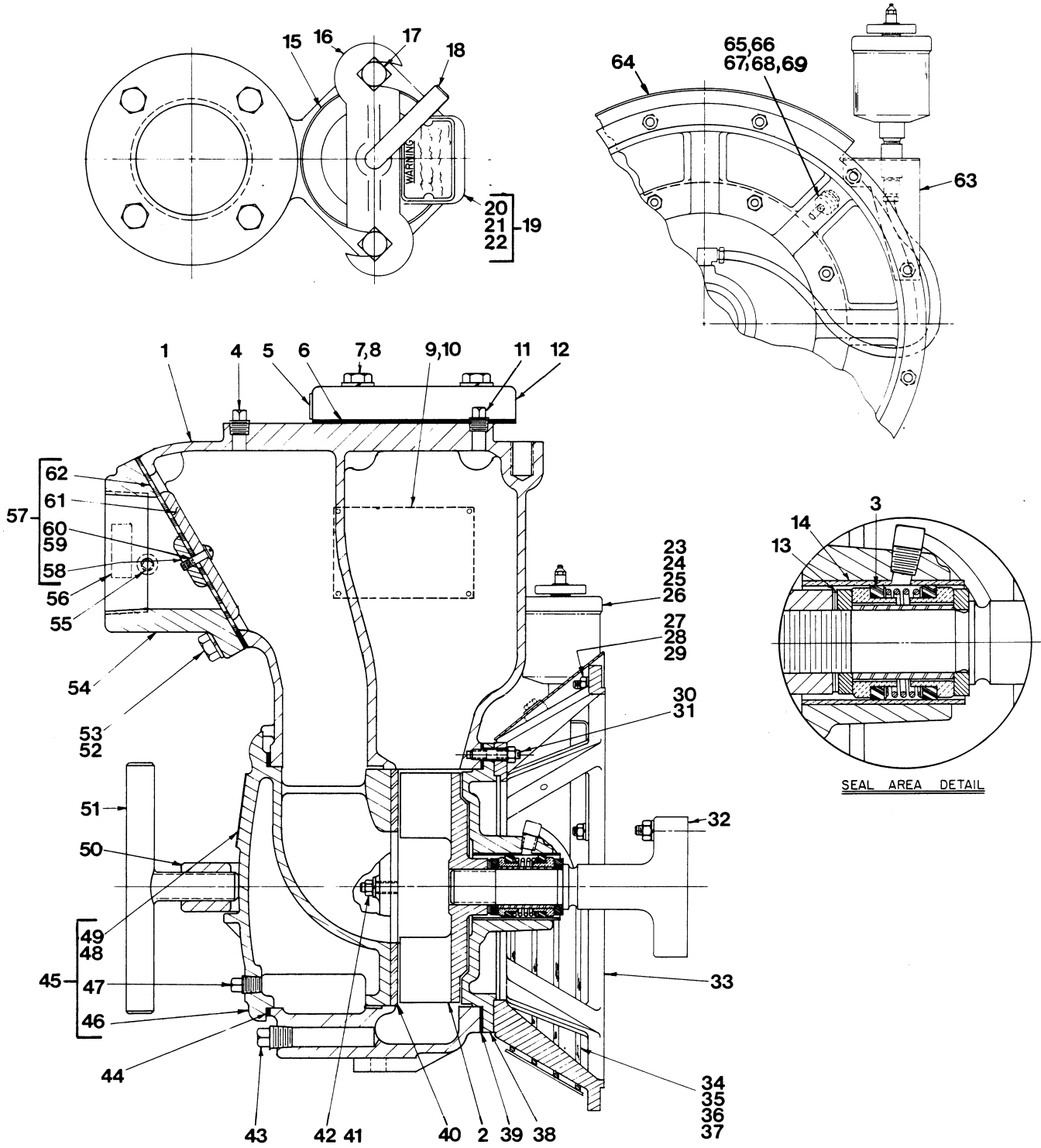


Figure 2. Pump End Assy 14A2-(TS2 S/G)

MAINTENANCE AND REPAIR

PARTS LIST
Pump End Assy 14A2-(TS2 S/G)

ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY	ITEM NO.	PART NAME	PART NUMBER	MATL CODE	QTY
1	PUMP CASING	2526	10010	1	38	SEAL PLATE ASSY	2948-A	10010	1
2	*IMPELLER	1692-AV	11060	1	39	*CASING GASKET SET	2474-G	18000	1
3	*GREASE SEAL ASSY	GS1250	-----	1	40	*WEAR PLATE ASSY	2605	15990	1
4	PIPE PLUG	P06	11990	1	41	LOCKWASHER	J06	15991	2
5	DISCH STICKER	6588-BJ	00000	1	42	HEX NUT	D06	15991	2
6	*FLANGE GASKET	1674-G	18000	1	43	CASING DRAIN PLUG	P08	11990	1
7	HEX HD CAPSCREW	B1008	15991	4	44	*COVER GASKET	2527-G	19090	1
8	LOCKWASHER	J10	15991	4	45	COVER PLATE ASSY	42111-926	-----	1
9	NAME PLATE	38818-023	13990	1	46	-COVER PLATE	NOT AVAILABLE		1
10	DRIVE SCREW	BM#04-03	15990	4	47	-CVR DRAIN PLUG	P06	11990	1
11	PIPE PLUG	P04	11990	1	48	-WARNING PLATE	2613-EV	13990	1
12	DISCH FLANGE	271	10010	1	49	-DRIVE SCREW	BM#04-03	15990	4
13	*IMP ADJ SHIM SET	37-J	17090	REF	50	COVER CLAMP BAR	2528	11010	1
14	*SEAL LINER	2205	14080	REF	51	COVER CLAMP SCREW	2536	24000	1
15	*COVER GASKET	50-G	19210	1	52	HEX HD CAPSCREW	B1007	15991	4
16	CLAMP BAR	38111-004	11010	1	53	LOCKWASHER	J10	15991	4
17	MACHINE BOLT	A1014	15991	2	54	SUCTION FLANGE	1736	10010	1
18	CLAMP BAR SCREW	31912-009	15000	1	55	ACCESSORY PLUG	P04	11990	1
19	*COVER PLATE ASSY	42111-344	-----	1	56	SUCTION STICKER	6588-AG	00000	1
20	-COVER PLATE	NOT AVAILABLE		1	57	CHECK VALVE ASSY	9915	-----	1
21	-WARNING PLATE	38816-097	13990	1	58	* -CHK VLV WEIGHT	19	10010	1
22	-DRIVE SCREW	BM#04-03	15990	2	59	-RD HD MACH SCRW	X0404	17000	2
23	GREASE CUP	S1509	-----	1	60	-LOCKWASHER	J04	17090	2
24	MALE CONNECTOR	26171-013	-----	1	61	* -CHK VLV WEIGHT	2936	10010	1
25	TUBING	31411-243	19550	1	62	* -CHECK VLV GSKT	131-D	19070	1
26	MALE ELBOW	26171-038	-----	1	63	MTG BRACKET ASSY	41881-360	24150	1
27	STUD	C0606	15991	12	64	SHIELD	34921-002	15020	1
28	HEX NUT	D06	15991	12	65	RUBBER WASHER	S157	-----	2
29	LOCKWASHER	J06	15991	12	66	STUD	C0405	15991	2
30	STUD	C0607	15991	8	67	LOCKWASHER	J04	15991	2
31	HEX NUT	D06	15991	8	68	FLAT WASHER	K04	15991	2
32	STUB SHAFT	38531-008	11010	REF	69	HEX NUT	D04	15991	2
33	ADAPTOR	38262-504	11060	1	NOT SHOWN:				
34	GUARD	42381-036	24150	1		STRAINER	2690	24000	1
35	HEX HD CAPSCREW	B0403	15991	2		GRD WARNING STKR	38816-063	-----	1
36	LOCKWASHER	J04	15991	2		DISCH NIPPLE	T64	15070	1
37	FLAT WASHER	K04	15991	2		DISCH ELBOW	R64	11990	1
						GREASE CUP DECAL	6588-BD	-----	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 view(s) (see Figures 1 and 2) and the accompanying parts list(s).

Before attempting to service the pump, shut down the engine and take precautions to ensure that the engine will remain inoperative and close all valves in the suction and discharge lines.

For engine disassembly and repair, consult the literature supplied with the engine, or contact your local Lister engine representative.

WARNING

```

////////////////////////////////////
//
// Before attempting to open or service the pump:
//
// 1. Familiarize yourself with this manual.
// 2. Shut down the engine and take precautions to en-
// sure 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

```

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

```

Back Cover Removal

(Figure 2)

The impeller, wear plate, check valve, and seal assembly can be serviced after the back cover assembly (45) has been removed.

Before removing the assembly, remove the casing drain plug (43) and drain the pump. Clean and reinstall the drain plug.

Loosen the cover clamp screw (51) and clamp bar (50) securing the back cover. Pull the back cover and assembled wear plate (40) from the pump casing (1). Remove the back cover gasket (44).

MAINTENANCE AND REPAIR

Inspect the wear plate and, if replacement is required, remove the hardware (40 and 41) securing it to the back cover.

Suction Check Valve Removal

(Figure 2)

Remove the suction piping, and disengage the hardware (52 and 53) securing the suction flange (54) and check valve assembly (57) to the pump casing (1).

Inspect the check valve parts for wear or damage. If replacement is required, disengage the hardware (59 and 60) and separate the valve weights and gasket.

Pump Casing Removal

(Figure 1)

To service the impeller or seal assembly, disconnect the discharge piping. Remove the hardware (24, 25 and 26) securing the pump casing to the base (17).

(Figure 2)

Remove the nuts (31) securing the pump casing and seal plate (38) to the adaptor (33). Install a standard 5/8-11 UNC lifting eye in the tapped hole in the top of the pump casing. **Be sure** to screw the eye into the casing until fully engaged. Use a hoist and sling of suitable capacity to separate the pump casing from the intermediate.

WARNING

```

////////////////////////////////////
//                               //
// Do not attempt to lift the complete pump unit using the //
// lifting eye. It is designed to facilitate removal or //
// installation of individual components only. Additional //
// weight may result in damage to the pump or failure of //
// the eye bolt. //
//                               //
////////////////////////////////////

```

Remove any leveling shims used under the casing mounting feet. Tie and tag the shims for ease of reassembly.

Impeller Removal

(Figure 2)

Turn the cross arm on the automatic lubricating grease cup (23) clockwise until it rests against the cover (see Figure 4). This will prevent the grease from escaping when the impeller is removed.

To loosen the impeller (2), tap the vanes in a counterclockwise direction (when facing impeller) with a block of wood or a soft-faced mallet. Unscrew the impeller and replace it if cracked or badly worn. Use caution when removing the impeller; tension on the seal spring will be released as the impeller is unscrewed.

Slide the impeller adjusting shims (13) off the shaft (32). For ease of reassembly, tie and tag the shims, or measure and record their thickness.

Seal Removal

(Figure 2)

To remove the seal assembly (3), remove the grease cup and piping (23, 24, 25 and 26) from the seal plate (38), and slide the seal plate and seal parts off the shaft as a single unit. **Be careful** not to drop or damage any seal parts.

Carefully remove the stationary and rotating seal elements, packing rings, seal spring, and shaft sleeve from the seal plate.

NOTE

The seal assembly may be removed without completely disassembling the pump by removing the impeller through the back cover opening and using a stiff wire with a hooked end to pull the seal parts out of the seal plate.

Inspect the seal liner (14) for wear or grooves which could cause leakage or damage to the seal packing rings. The seal liner is a press fit in the seal plate (38), and does not normally require replacement. If replacement is necessary, see **Seal Installation**.

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

Stub Shaft Removal

(Figure 2)

Inspect the stub shaft (32) for distortion, nicks, scratches, or thread damage. Dress small nicks and burrs with a fine file or emery cloth. Replace the shaft if defective.

To remove the shaft, disengage the hardware (35, 36, 37, 65, 66, 67, 68 and 69) and remove the guard (34) and shield (64). Remove the hardware (28 and 29) and separate the adaptor (33) and bracket (63) from the engine bellhousing.

Remove the hardware (supplied with the engine) securing the stub shaft to the engine crankshaft.

Stub Shaft Installation

(Figure 2)

If the stub shaft (32) was removed, secure the replacement shaft to the engine crankshaft with the hardware supplied with the engine. Secure the adaptor (33), guard (34) and shield (64) to the engine bellhousing with the hardware (35, 36, 37, 65, 66, 67, 68 and 69). Secure the bracket (63) to the engine bellhousing with the hardware (28 and 29).

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 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. Clean and polish the seal spacer sleeve, or replace it if there are nicks or cuts on either end. If any components are worn, replace the complete seal; **never mix old and new seal parts.**

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

To ease installation of the seal, lubricate the packing rings and seal liner 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).

MAINTENANCE AND REPAIR

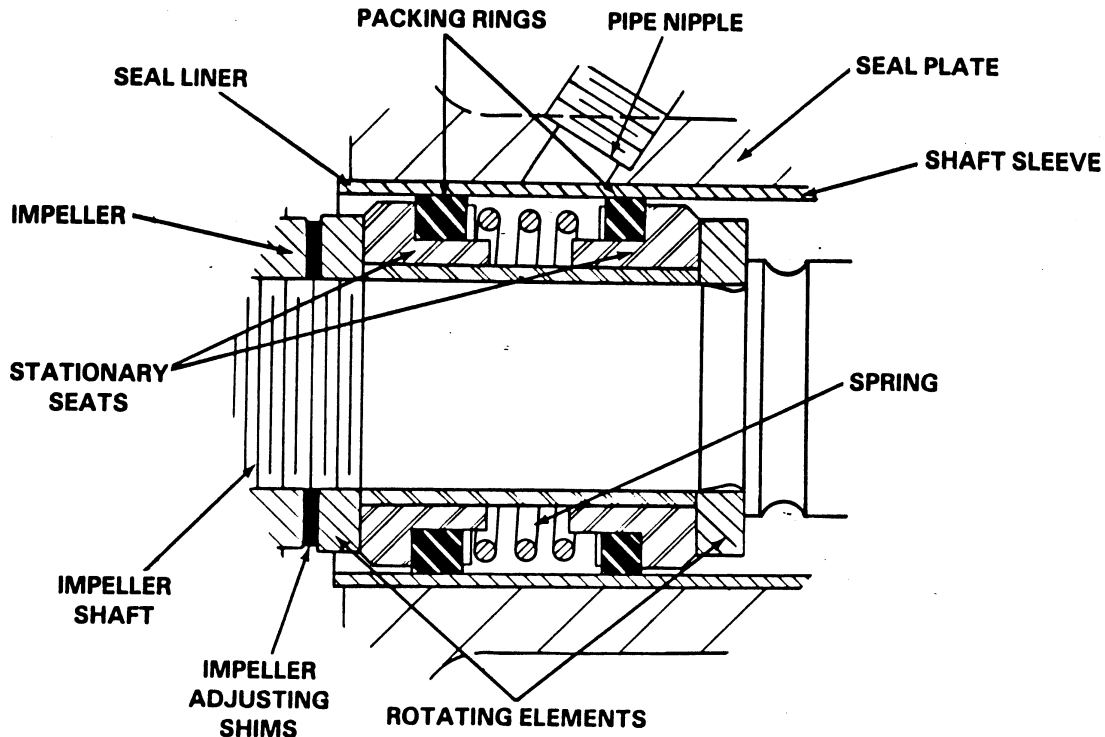


Figure 3. GS1250 Seal Assembly

CAUTION

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

Inspect the seal plate, seal liner, and stub shaft for burrs or sharp corners, and remove any that exist. Replace the seal liner (14) if wear or grooves exist which could cause leakage or damage to the seal packing rings. If the seal liner must be replaced, position the seal plate (38) on the bed of an arbor (or hydraulic) press and use a new sleeve to force the old one out. After the new liner is installed, drill a 1/4 inch diameter hole through it to permit the flow of lubricant to the seal. **Be careful** to center the drill in the threaded hole so not to damage the threads. Deburr the hole from the inside of the seal liner after drilling.

Slide the seal plate onto the shaft until fully seated against the adaptor (33). Be sure the threaded seal lubricant hole is positioned up. Temporarily secure the seal plate to the adaptor with two 3/8-16 UNC x 1 1/2 inch long capscrews and nuts (not supplied).

Slide the inboard rotating element onto the shaft until it seats squarely against the shaft shoulder.

MAINTENANCE AND REPAIR

Subassemble the inboard stationary seat, packing ring, and stationary washer. Press this subassembly into the lubricated seal liner until the seal faces contact. A push tube cut from a length of plastic pipe would aid this installation. The I.D. of the tube should be approximately the same size as the I.D. of the seal spring.

Install the spacer sleeve and seal spring.

Subassemble the outboard stationary seat, packing ring, and stationary washer. Press this subassembly into the seal liner and install the outboard rotating element.

Reinstall the automatic grease cup and piping (23, 24, 25 and 26).

Lubricate the seal as indicated in LUBRICATION, after the impeller has been installed.

Impeller Installation And Adjustment

(Figure 2)

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

Slide the same thickness of impeller adjusting shims (13) as previously removed onto the shaft and screw the impeller on until tight.

A clearance of .013 to .025 inch between the impeller and the seal plate is necessary for maximum pump efficiency. Measure this clearance, and add or remove impeller shims until it is reached.

Pump Casing Installation

(Figure 2)

Remove the hardware temporarily securing the seal plate to the adaptor.

Install the same thickness of casing gaskets (39) as previously removed, and secure the pump casing and seal plate to the adaptor with the nuts (31). Do not fully tighten the nuts (31) until the impeller face clearance has been set.

NOTE

If the pump has been completely disassembled, it is recommended that the back cover assembly be reinstalled at this point. The back cover assembly must be in place to adjust the impeller face clearance.

A clearance of .026 to .038 inch between the impeller and the wear plate is also recommended for maximum pump efficiency. This clearance must be set after installing the back cover, by adding or removing gaskets in the pump casing gasket set (39) until the impeller binds against the wear plate when the shaft is turned.

NOTE

Pre-load the engine crankshaft toward the pump when setting the face clearance.

After the impeller binds against the wear plate, remove the pump casing, and add approximately .012 inch of gaskets.

NOTE

An alternate method of adjusting the face clearance is to reach through the discharge port with a feeler gauge and measure the gap. Add or subtract pump casing gaskets accordingly.

When the face clearance has been properly set, tighten the nuts (31), and secure the casing to the base with the hardware (24, 25 and 26, Figure 1). Be sure to reinstall any leveling shims used under the casing mounting feet.

If a lifting eye was used to move the pump casing, **be sure** to remove the eye from the casing before putting the pump back into service.

WARNING

```

////////////////////////////////////
//                               //
// Do not attempt to lift the complete pump unit using the //
// lifting eye. It is designed to facilitate removal or //
// installation of individual components only. Additional //
// weight may result in damage to the pump or failure of //
// the eye bolt. //
//                               //
////////////////////////////////////

```

Suction Check Valve Installation

Inspect the check valve parts, and replace as required. Assemble the check valve weights to the gasket (62) with the hardware (59 and 60).

Position the check valve assembly in the suction opening with the large weight (61) toward the inside of the casing, and the small weight (58) toward the suction flange (54). Secure the check valve assembly and suction flange to the pump casing with the hardware (52 and 53).

After installation, check the check valve assembly for free movement and a good seal.

Back Cover Installation

(Figure 2)

If the wear plate (40) was removed for replacement, carefully center it on the back cover and secure it with the hardware (41 and 42). The wear plate must be concentric to prevent binding when the back cover is installed. Torque the nuts to 17 ft. lbs.

Clean any scale or debris from the contacting surfaces in the pump casing that might prevent a good seal with the back cover. Replace the back cover gasket (44) and slide the back cover assembly into the pump casing. Be sure the wear plate does not bind against the impeller.

NOTE

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

Secure the back cover assembly by installing the clamp bar (50) and tightening the cover clamp screw (51). **Do not** over-tighten the clamp screw; it should be just tight enough to ensure a good seal at the back cover shoulder.

Final Pump Reassembly

(Figure 1)

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

Install the suction and discharge lines, and open all valves. Make certain that all piping connections are tight, properly supported and secure.

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

Fill the pump casing with clean liquid. Reinstall the fill plug and tighten it.

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

LUBRICATION

Seal Assembly

(Figure 2)

Fill the grease cup (23) through the grease fitting with No. 2 lithium base grease until grease escapes from the relief hole. Turn the grease cup arm counterclockwise until it is at the top of the stem; this will release the spring to apply grease to the seal (see Figure 4).

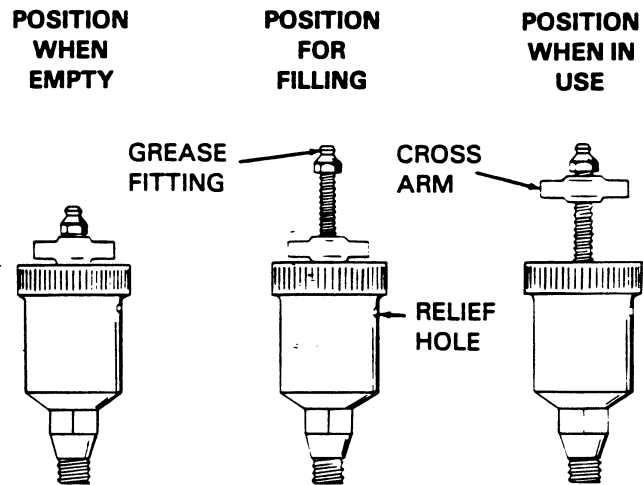


Figure 4. Automatic Lubricating Grease Cup

NOTE

Bleed off the seal cavity and supply lines to eliminate an air pocket in the seal area.

Engine

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

**THE GORMAN-RUPP COMPANY AND
GORMAN-RUPP OF CANADA LIMITED
12 MONTH LIMITED WARRANTY**

EXTENT AND DURATION OF WARRANTY

Coverage: The Gorman-Rupp Company or Gorman-Rupp of Canada Limited (herein individually referred to as "GR") each individually warrant that its products and parts shall be free from defects in material and workmanship for twelve (12) months from the date of purchase by the original end user.

Exceptions: This Limited Warranty shall not apply to the following products and parts: engines, motors, trade accessories and other products, components or materials not manufactured by GR. With respect to submersible pumps, the pump and motor are an integral unit and are therefore warranted as a unit. However, with respect to the electrical components in submersible pumps, this warranty is valid **only** when electrical controls for the pump have been specified and/or provided by GR. Wear and tear on any product resulting from normal use is not covered by this Limited Warranty.

LIMITATIONS

GR'S SOLE AND EXCLUSIVE WARRANTY WITH RESPECT TO ITS PRODUCTS AND PARTS IS THIS LIMITED WARRANTY. THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER EXPRESS AND/OR IMPLIED WARRANTIES, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE.

EXCLUSIVE REMEDY AND DAMAGES

The sole and exclusive remedy for breach of this Limited Warranty by GR, and the entire extent of its liability for such breach or for damages arising and/or resulting from the use of the products and parts covered by this Limited Warranty shall be as follows:

1. **Repair or replacement:** If inspection shows that any GR product or part covered under this Limited Warranty is defective in materials or workmanship, GR shall repair or replace the defective product or part at its option, without charge. You must have properly installed, maintained and used the product or part claimed to be defective in accordance with the maintenance schedule and/or manual which comes with the product. *No allowance will be made for labor, transportation or other charges incurred by you in connection with such repair or replacement.*
2. **To obtain the above remedy:**
 - a) Immediately notify GR at the address below of the claimed defect in materials or workmanship and provide the serial number or date code of the product and/or part and provide a copy of the invoice or bill of sale referencing the product and/or part by no later than the expiration date of the Limited Warranty period.
 - b) GR will advise whether inspection of the product and/or part will be necessary and whether and how repair or replacement will be effected. If inspection by GR is necessary, the product or part must be sent freight prepaid to GR at the address stated below. Return shipment of the repaired product or part will be F.O.B. the address stated below.
3. **Damages:** GR's liability for damages for breach of this Limited Warranty shall not exceed the amount of the purchase price of the product or part in respect to which damages are claimed. **IN NO EVENT SHALL GR BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES FOR BREACH OF THIS LIMITED WARRANTY OTHER THAN AS STATED HEREIN.**

Some states do not allow the exclusion or limitation of incidental or consequential damages. Accordingly, the above may not apply to you. This Limited Warranty gives you specific legal rights, and you may also have other rights which vary from state to state and province to province.

THE GORMAN-RUPP COMPANY
P.O. BOX 1217
MANSFIELD, OH 44901-1217
Phone: (419) 755-1011

GORMAN-RUPP OF CANADA LIMITED
70 Burwell Road
St. Thomas, Ontario N5P 3R7
Phone: (519) 631-2870