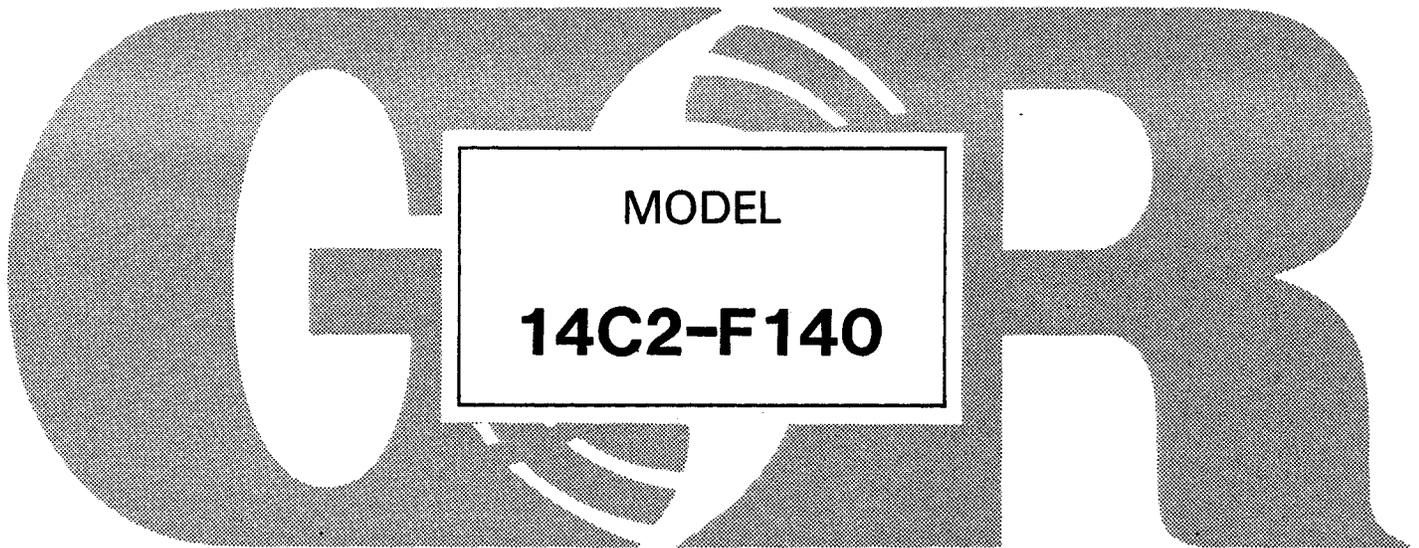


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# **10**SERIES™

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





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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 pump 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 close-coupled to a four cycle, four cylinder Ford gasoline engine, model LSGP-423.

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**

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 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 secure before opera- //
// tion. //
// //
////////////////////////////////////

```

WARNING

```

////////////////////////////////////
// Do not operate the pump without intermediate guards in //
// place. Exposed rotating parts can catch clothing, fin- //
// gers, 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

```

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

```

---

---

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 2400 RPM. //  
// //  
////////////////////////////////////
```



INSTALLATION

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.

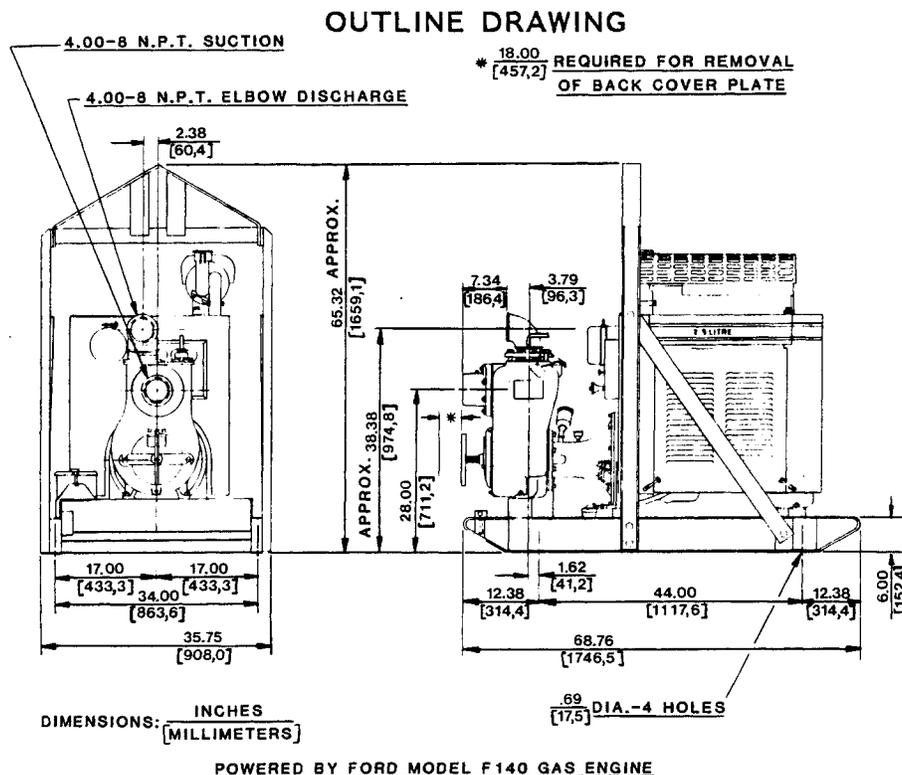


Figure 1. Pump Model 14C2-F140

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## 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 **7,000 pounds**. This pump weighs approximately **1,400 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

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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°.

### 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.

---

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## 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 3 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).

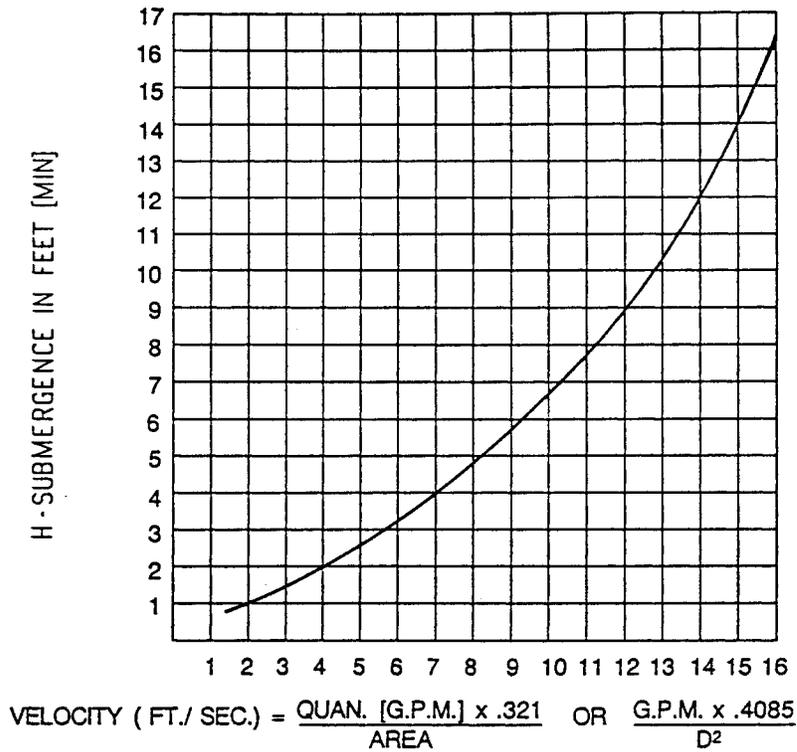


Figure 2. Recommended Minimum Suction Line Submergence Vs. Velocity

## 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.

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**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 - 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 2400 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

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 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.

OPERATION

CAUTION

|   |
|---|
| <p>Pump speed and operating condition points must be within the continuous performance range shown on the curve. See Section E, Page 1.</p> |
|---|

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.

---



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---

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

Lines Without a Bypass

Open all valves in the discharge line and start the power source. Priming is indicated by a positive reading on the discharge pressure gauge or by 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

```

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

```

---

---

## Strainer Check

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

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

## Pump Vacuum Check

With the pump inoperative, install a vacuum gauge in the system, using pipe dope on the threads. Block the suction line and start the pump. At operating speed the pump should pull a vacuum of 20 inches or more of mercury. If it does not, check for air leaks in the seal, gasket, or discharge valve.

Open the suction line, and read the vacuum gauge with the pump primed and at operating speed. Shut off the pump. The vacuum gauge reading will immediately drop proportionate to static suction lift, and should then stabilize. If the vacuum reading falls off rapidly after stabilization, an air leak exists. Before checking for the source of the leak, check the point of installation of the vacuum gauge.

## STOPPING

Never halt the flow of liquid suddenly. If the liquid being pumped is stopped abruptly, damaging shock waves can be transmitted to the pump and piping system. Close all connecting valves slowly. On engine driven pumps, reduce the throttle speed slowly and allow the engine to idle briefly before stopping.

### CAUTION

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

After stopping the pump, switch off the engine ignition key 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 approx-

---

---

imately 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.

## 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                                   | 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 check valve or foot valve clogged or binding.           | Clean valve.   |
|   | 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.                          |

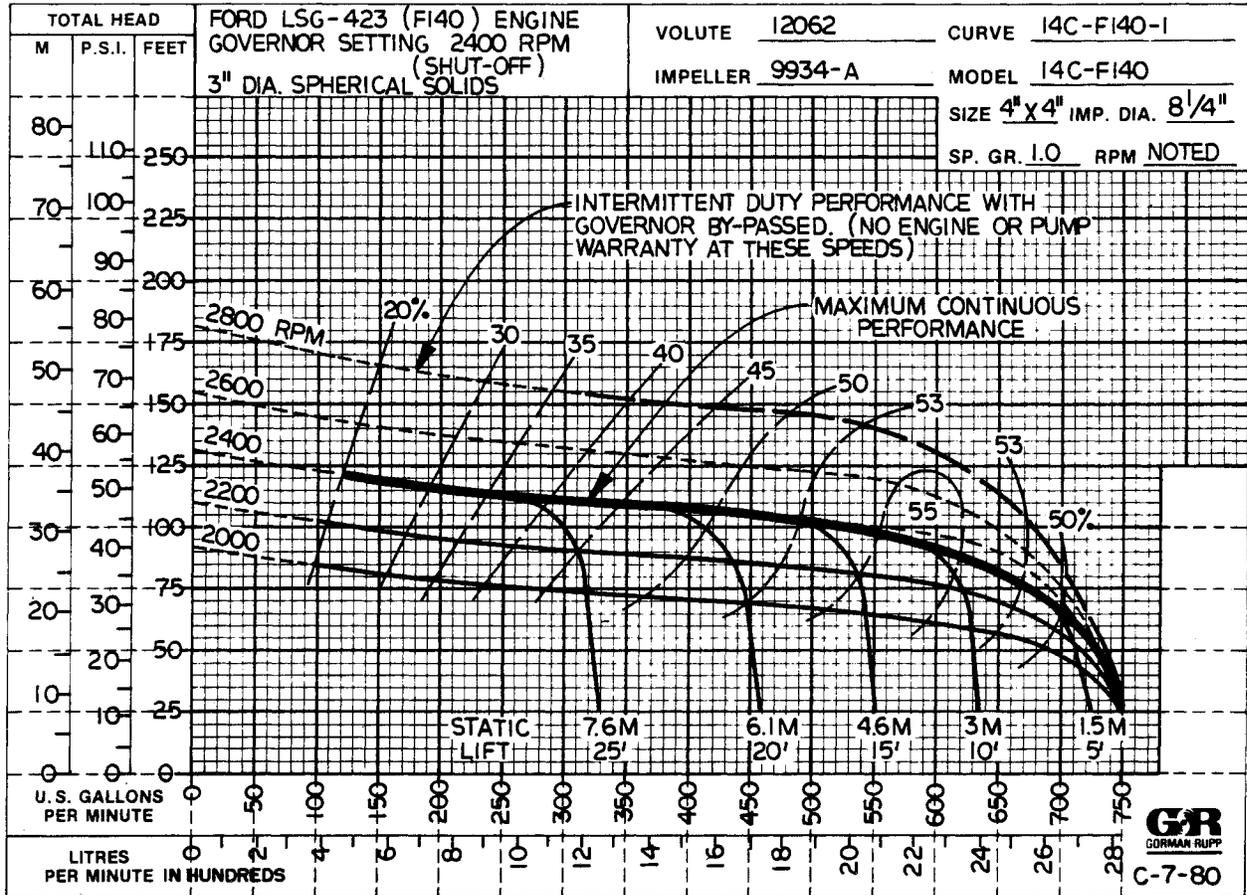
| TROUBLE  | POSSIBLE CAUSE   | PROBABLE REMEDY  |
|--|--|--|
| PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE(cont.) | <p>Lining of suction hose collapsed.</p> <p>Impeller or other wearing parts worn or damaged.</p> <p>Impeller clogged.</p> <p>Pump speed too slow.</p> <p>Suction lift or discharge head too high.</p> <p>Leaking or worn seal or pump gasket.</p> <p>Strainer clogged.</p> | <p>Replace suction hose.</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>   |



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 14C2-F140

\*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.

SECTIONAL DRAWING

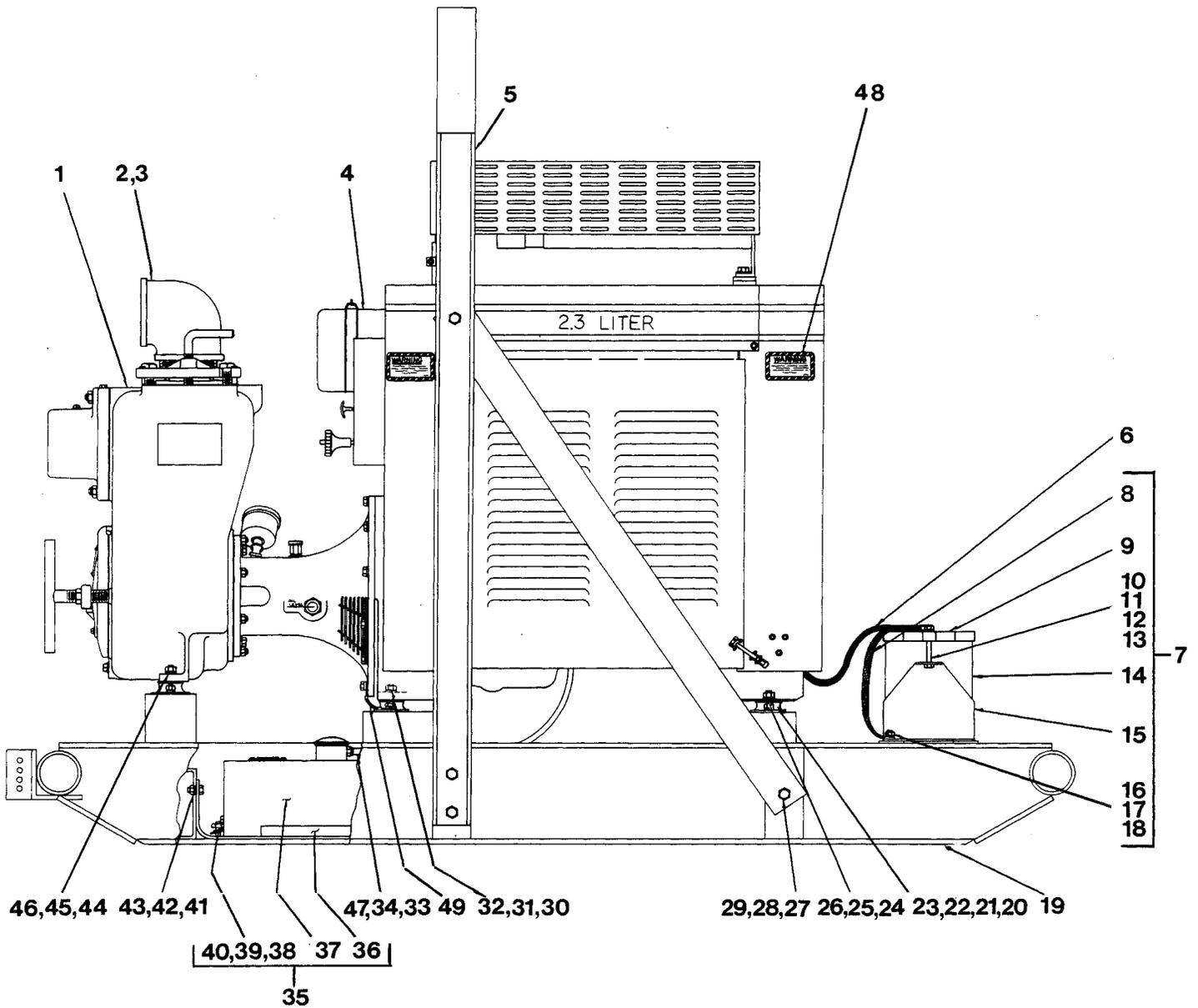


Figure 1. Pump Model 14C2-F140

**PARTS LIST**  
**Pump Model 14C2-F140**  
 (From S/N 936269 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          | 14C2-(F140) | -----     | 1   | 26       | HEX NUT                         | D08         | 15991     | 2   |
| 2        | PIPE NIPPLE       | T64         | 15070     | REF | 27       | HEX HD CAPSCREW                 | B1006       | 15991     | 8   |
| 3        | PIPE ELBOW        | R64         | 11990     | REF | 28       | LOCKWASHER                      | J10         | 15991     | 8   |
| 4        | FORD LSGP-423 ENG | 29118-022   | -----     | 1   | 29       | HEX NUT                         | D10         | 15991     | 8   |
| 5        | HOIST BAIL        | 13351-BA    | 24000     | 1   | 30       | HEX HD CAPSCREW                 | B0812       | 15991     | 2   |
| 6        | POS CABLE ASSY    | 6926-Q      | 24040     | 1   | 31       | LOCKWASHER                      | J08         | 15991     | 2   |
| 7        | BATTERY BOX ASSY  | GRP40-02    | -----     | 1   | 32       | HEX NUT                         | D08         | 15991     | 2   |
| 8        | -GRND CABLE ASSY  | 5795-AC     | 24040     | 1   | 33       | MALE CONNECTOR                  | S1344       | -----     | 1   |
| 9        | -BATTERY FRAME    | 8355-B      | 24000     | 1   | 34       | HOSE ASSY                       | 12618-F     | -----     | 1   |
| 10       | -HEX HD CAPSCREW  | B0610       | 15991     | 2   | 35       | FUEL TANK AND<br>GUARD ASSEMBLY | 46711-041   | -----     | 1   |
| 11       | -FLAT WASHER      | K06         | 15991     | 2   | 36       | -TANK GUARD                     | 42381-046   | 24150     | 1   |
| 12       | -LOCKWASHER       | J06         | 15991     | 2   | 37       | -FUEL TANK                      | 46711-042   | 24150     | 1   |
| 13       | -HEX NUT          | D06         | 15991     | 2   | 38       | -FLAT WASHER                    | K06         | 15991     | 6   |
| 14 *     | -12V BATTERY      | S1338       | -----     | 1   | 39       | -LOCKWASHER                     | J06         | 15991     | 6   |
| 15       | -BATTERY BOX      | 8356-B      | 24000     | 1   | 40       | -HEX NUT                        | D06         | 15991     | 6   |
| 16       | -HEX HD CAPSCREW  | B0604       | 15991     | 2   | 41       | HEX HD CAPSCREW                 | B0604       | 15991     | 10  |
| 17       | -LOCKWASHER       | J06         | 15991     | 2   | 42       | LOCKWASHER                      | J06         | 15991     | 10  |
| 18       | -HEX NUT          | D06         | 15991     | 2   | 43       | HEX NUT                         | D06         | 15991     | 10  |
| 19       | COMBINATION BASE  | 41566-645   | 24150     | 1   | 44       | HEX HD CAPSCREW                 | B0813       | 15991     | 2   |
| 20       | MOUNTING ISOLATOR | 24631-601   | -----     | 6   | 45       | LOCKWASHER                      | J08         | 15991     | 2   |
| 21       | HEX HD CAPSCREW   | B0604       | 15991     | 12  | 46       | HEX NUT                         | D08         | 15991     | 2   |
| 22       | LOCKWASHER        | J06         | 15991     | 12  | 47       | PIPE PLUG                       | P08         | 11990     | 1   |
| 23       | HEX NUT           | D06         | 15991     | 12  | 48       | WARNING DECAL                   | 38816-132   | -----     | 2   |
| 24       | HEX HD CAPSCREW   | B0812       | 15991     | 2   | 49       | GRND CABLE ASSY                 | 5795-AS     | 24040     | 1   |
| 25       | LOCKWASHER        | J08         | 15991     | 2   |          |                                 |             |           |     |

\*INDICATES PARTS RECOMMENDED FOR STOCK

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

CANADIAN SERIAL NO ..... AND UP

SECTIONAL DRAWING

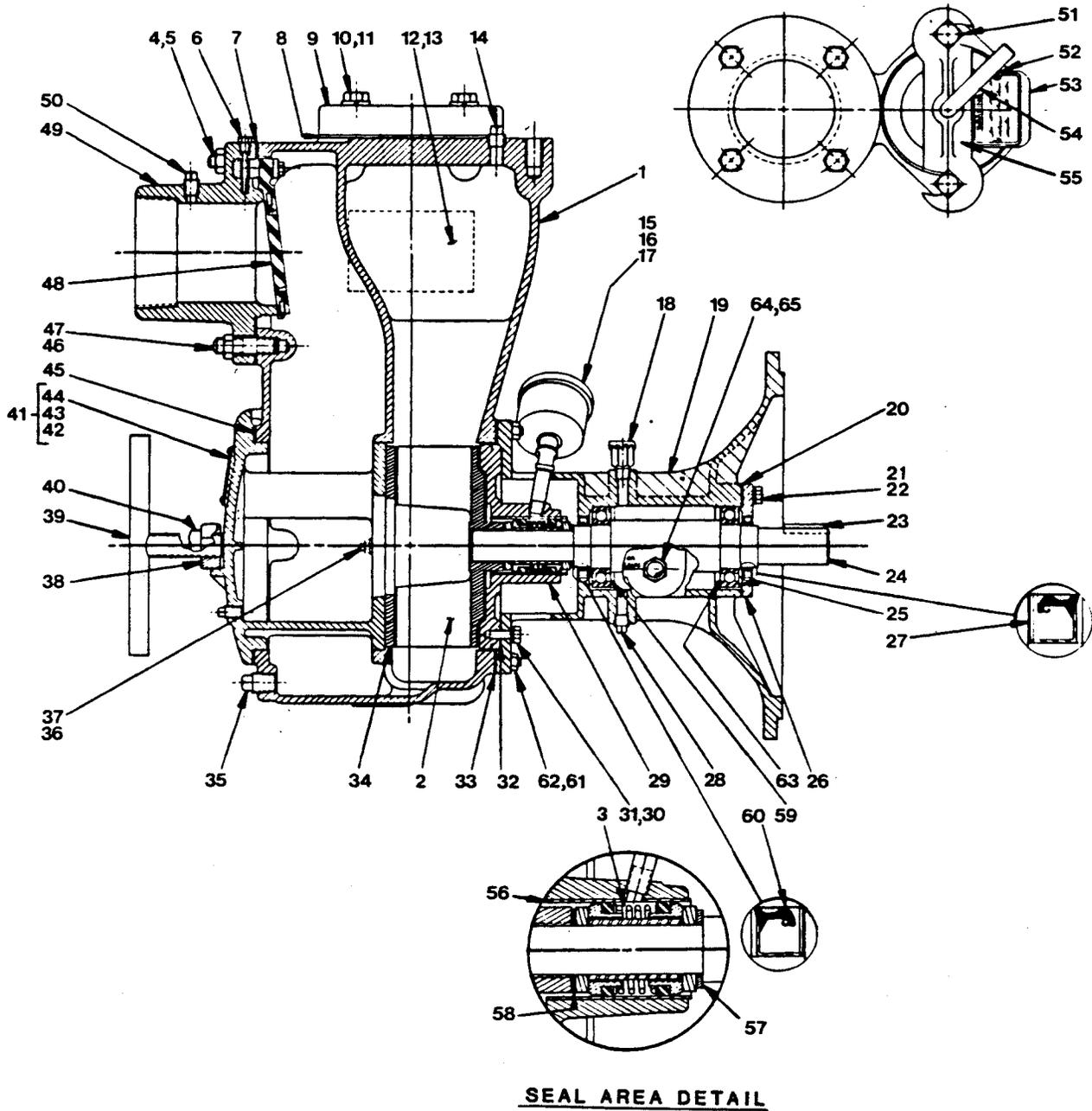


Figure 2. Pump End Assy 14C2-F140

**PARTS LIST**  
**Pump End Assy 14C2-F140**

| ITEM NO. | PART NAME            | PART NUMBER | MATL CODE | QTY | ITEM NO. | PART NAME          | PART NUMBER   | MATL CODE | QTY |
|----------|----------------------|-------------|-----------|-----|----------|--------------------|---------------|-----------|-----|
| 1        | PUMP CASING          | 12062       | 10010     | 1   | 40       | MACHINE BOLT       | A1012         | 15991     | 2   |
| 2        | *IMPELLER            | 9934-A      | 11060     | 1   | 41       | *BACK COVER        | 42111-929     | -----     | 1   |
| 3        | *GREASE SEAL ASSY    | GS1250      | -----     | 1   |          | PLATE ASSY         |               |           |     |
| 4        | STUD                 | C1011       | 15991     | 2   | 42       | -WARNING PLATE     | 2613-EV       | 13990     | 1   |
| 5        | HEX NUT              | D10         | 15991     | 2   |          | -DRIVE SCREW       | BM#04-03      | 15990     | 4   |
| 6        | CHECK VLV PIN        | 11557       | 17010     | 1   | 43       | *-BACK CVR PLATE   | NOT AVAILABLE |           | 1   |
| 7        | *SUCTION FLANGE GSKT | 11389-G     | 19370     | 1   | 44       | -PIPE PLUG         | P04           | 11990     | 1   |
| 8        | *DISCH FLANGE GSKT   | 1674-G      | 18000     | 1   | 45       | *BACK COVER GSKT   | 2527-G        | 19090     | 1   |
| 9        | DISCH FLANGE         | 271         | 10010     | 1   | 46       | STUD               | C1010         | 15991     | 6   |
| 10       | HEX HD CAPSCREW      | B1008       | 15991     | 4   | 47       | HEX NUT            | D10           | 15991     | 6   |
| 11       | LOCKWASHER           | J10         | 15991     | 4   | 48       | *4" CHECK VLV ASSY | 46411-062     | -----     | 1   |
| 12       | NAME PLATE           | 38818-023   | 13990     | 1   | 49       | SUCTION FLNG       | 12065         | 10010     | 1   |
| 13       | DRIVE SCREW          | BM#04-03    | 15990     | 4   | 50       | PIPE PLUG          | P04           | 11990     | 1   |
| 14       | PIPE PLUG            | P04         | 11990     | 1   | 51       | MACHINE BOLT       | A1014         | 15991     | 2   |
| 15       | HVY PIPE NIPPLE      | THA0408     | 15070     | 1   | 52       | *FILL COVER GSKT   | 50-G          | 19210     | 1   |
| 16       | PIPE ELBOW           | AG04        | 11990     | 1   | 53       | *FILL COVER ASSY   | 42111-344     | -----     | 1   |
| 17       | GREASE CUP           | S1509       | -----     | 1   |          | PLATE ASSY         |               |           |     |
| 18       | AIR VENT             | S1703       | -----     | 1   | 54       | CLAMP BAR SCREW    | 31912-009     | 15000     | 1   |
| 19       | INTERMEDIATE         | 38263-617   | 10010     | 1   | 55       | CLAMP BAR          | 38111-004     | 11000     | 1   |
| 20       | *BRG CAP GSKT        | 6404-G      | 18000     | 2   | 56       | *SEAL LINER        | 2205          | 14080     | REF |
| 21       | HEX HD CAPSCREW      | B0604       | 15991     | 4   | 57       | SPACER WASHER      | 37-H          | 15990     | 1   |
| 22       | LOCKWASHER           | J06         | 15991     | 4   | 58       | *IMP ADJ SHIM SET  | 37-J          | 17090     | REF |
| 23       | *IMPELLER SHAFT KEY  | N0607       | 15990     | 1   | 59       | *INBOARD BEARING   | 23251-209     | -----     | 1   |
| 24       | *IMP SHAFT           | 38514-809   | 15010     | 1   | 60       | *OIL SEAL          | 25258-575     | -----     | 1   |
| 25       | *BRG ADJ SHIM SET    | 48261-037   | -----     | 1   | 61       | STUD               | C0606         | 15991     | 8   |
| 26       | BEARING CAP          | 38324-408   | 10010     | 1   | 62       | HEX NUT            | D06           | 15991     | 8   |
| 27       | *OIL SEAL            | 25258-575   | -----     | 1   | 63       | *OUTBOARD BEARING  | 23251-209     | -----     | 1   |
| 28       | INTERM DRAIN PLUG    | P06         | 11990     | 1   | 64       | PIPE PLUG          | P12           | 11990     | 1   |
| 29       | SEAL PLATE           | 6567-A      | 10010     | 1   | 65       | SIGHT GAUGE        | S1471         | -----     | 1   |
| 30       | HEX HD CAPSCREW      | B0604       | 15991     | 4   |          | NOT SHOWN:         |               |           |     |
| 31       | LOCKWASHER           | J06         | 15991     | 4   |          | INSTRUCTION LABEL  | 2613-DK       | -----     | 1   |
| 32       | *SEAL PLATE GSKT     | 6568        | 18000     | 1   |          | DISCH ELBOW        | R64           | 11990     | 1   |
| 33       | *CASING GSKT SET     | 2474-G      | 18000     | 1   |          | WARNING DECAL      | 38816-096     | -----     | 1   |
| 34       | *WEAR PLATE ASSY     | 12068       | 15990     | 1   |          | STRAINER           | 2690-C        | 24000     | 1   |
| 35       | CASING DRAIN PLUG    | P08         | 11990     | 1   |          | DISCH NIPPLE       | T64           | 15070     | 1   |
| 36       | LOCKWASHER           | J06         | 15991     | 2   |          | INTERM GUARD       | 42381-038     | 24150     | 2   |
| 37       | HEX NUT              | D06         | 15991     | 2   |          | SUCTION STICKER    | 6588-AG       | -----     | 1   |
| 38       | COVER PLATE CLAMP    | 12064       | 11000     | 1   |          | DISCH STICKER      | 6588-BJ       | -----     | 1   |
| 39       | COVER PLATE SCREW    | 2536        | 24000     | 1   |          |                    |               |           |     |

\*INDICATES PARTS RECOMMENDED FOR STOCK

SECTIONAL DRAWING

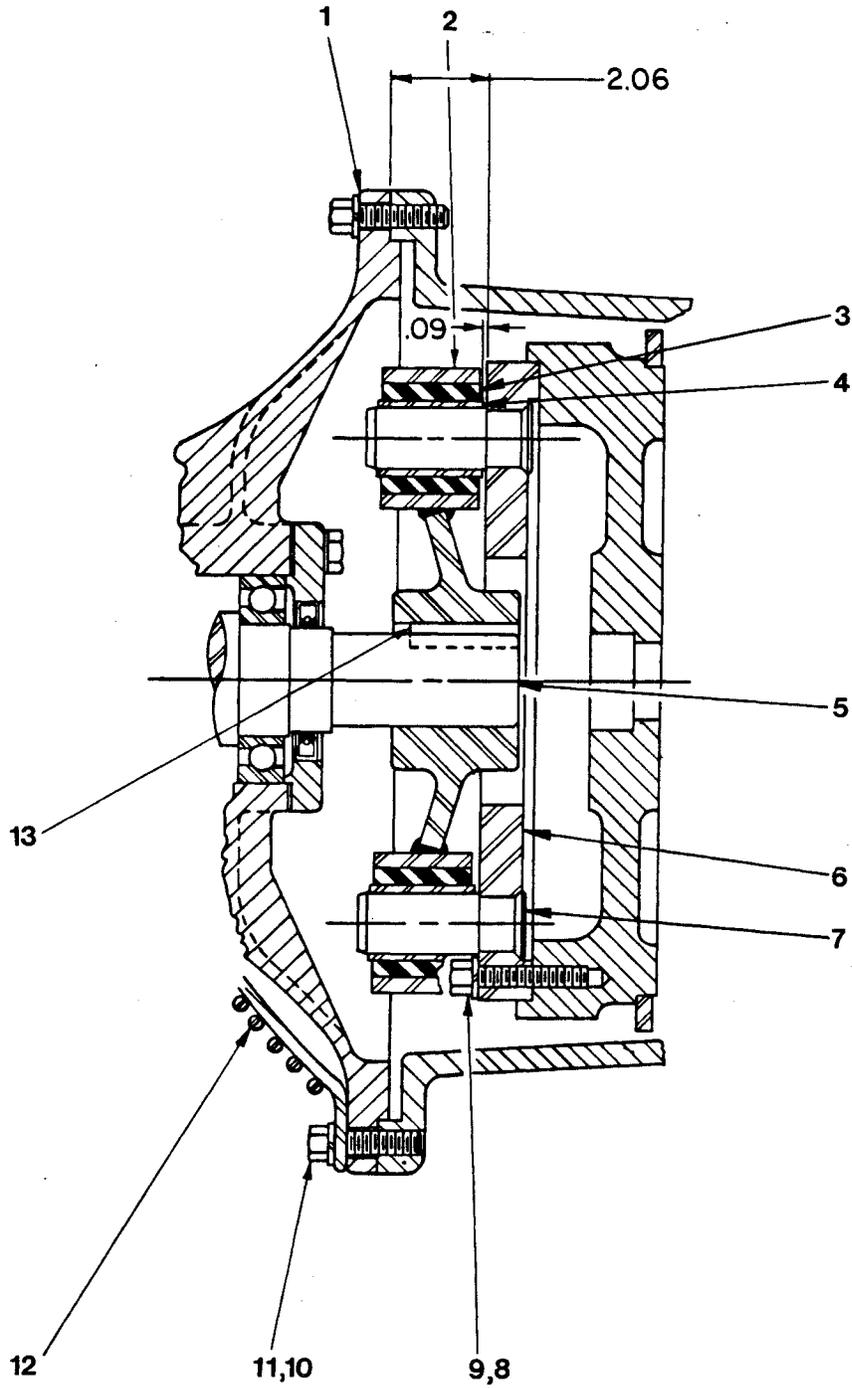


Figure 3. Drive Assembly For Pump Model 14C2-F140

**PARTS LIST**  
**Drive Assembly For Pump Model 14C2-F140**

| ITEM NO. | PART NAME            | PART NUMBER   | MATL CODE | QTY |
|----------|----------------------|---------------|-----------|-----|
| 1        | INTERMEDIATE         | 38263-617     | 10010     | 1   |
| 2        | DRIVE ARM ASSEMBLY   | 13817-C       | -----     | 1   |
| 3        | -DYNA FLEX JOINT     | S2110         | -----     | 2   |
| 4        | -SLEEVE              | NOT AVAILABLE | -----     | 2   |
| 5        | IMPELLER SHAFT       | 38514-809     | 15010     | REF |
| 6        | DRIVE PLATE ASSY     | 44131-007     | 24150     | 1   |
| 7        | -DRIVE PIN           | 13819         | 15030     | 2   |
| 8        | HEX HD CAPSCREW      | B0606         | 15991     | 6   |
| 9        | LOCKWASHER           | J06           | 15991     | 6   |
| 10       | HEX HD CAPSCREW      | B0605         | 15991     | 12  |
| 11       | LOCKWASHER           | J06           | 15991     | 12  |
| 12       | INTERMEDIATE GUARD   | 42381-038     | 24150     | 2   |
| 13       | * IMPELLER SHAFT KEY | N0607         | 15990     | REF |

\*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, 2 and 3) and the accompanying parts lists.

Most service functions may be performed by draining the pump and removing the back cover assembly. If major repair is required, the piping and/or engine must be disconnected.

Before attempting to service the pump, take precautions to ensure that the engine 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.
//
////////////////////////////////////

```

#### 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 (41) has been removed.

Before removing the assembly, remove the casing drain plug (35) and drain the pump. Clean and reinstall the drain plug.

Loosen the cover clamp screw (39) and clamp bar (38) securing the back cover. Pull the back cover and assembled wear plate (34) from the pump casing (1).

---

---

## Suction Check Valve Removal

### (Figure 2)

After the back cover assembly has been removed, reach through the opening and hold the check valve assembly (48) in place while removing the check valve pin (6). Slide the assembly out of the suction port and remove it.

#### NOTE

If the check valve assembly or any components require replacement, the complete assembly must be replaced. Individual parts are not sold separately.

The check valve assembly may also be serviced by removing the suction flange (49). Remove the hex nuts (5 and 47) securing the suction flange to the pump casing, and pull the flange and assembled check valve from the suction port. Remove the check valve pin (6), and remove the check valve.

Inspect the suction flange gasket (7) for wear or damage, and replace as required.

## Impeller Removal

### (Figure 2)

Turn the cross arm on the automatic lubricating grease cup (17) clockwise until it rests against the cover (see Figure 5). This will prevent the grease from escaping when the impeller is removed.

To loosen the impeller (2), immobilize the shaft (24) and 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 (58) off the impeller shaft. For ease of re-assembly, tag and tie the shims, or measure and record their thickness.

## Seal Removal

### (Figure 2)

Carefully remove the stationary and rotating seal elements, packing rings, seal spring, and the shaft sleeve, using a stiff wire with a hooked end if necessary.

Remove the seal washer (57).

Inspect the seal liner (56) 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 (29), and does not normally require replacement. If replacement is necessary, the seal plate must be removed. (See **Pump Disassembly**).

---

---

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

### Pump Disassembly

#### (Figure 2)

To service the seal plate, intermediate, bearings, or drive assembly, the pump end must be removed from the base. See Figure 1, and remove the hardware (44, 45, and 46) securing the pump casing to the base.

Remove the hex nuts (62) securing the pump casing (1) to the intermediate (19), and use a suitable hoist and sling to remove the pump casing. If shims have been used under the mounting feet to level the pump casing, tie and tag the shims for ease of reassembly. Remove the grease cup and piping (15, 16, and 17) from the seal plate (29).

Remove the hardware (30 and 31) securing the seal plate to the intermediate (19), and remove the seal plate and seal plate gasket (32).

### Separating Intermediate And Drive Assembly From Engine

#### (Figure 3)

If it is necessary to separate the intermediate and drive assemblies from the engine, support the intermediate using a hoist and sling. Remove the hardware (10 and 11) securing the intermediate (1) to the engine bellhousing. Separate the assemblies by pulling the intermediate straight away from the engine.

Use a bearing puller to remove the drive arm assembly (2) from the impeller shaft (5). Remove the shaft key (13).

As the assemblies are separated, the drive pins (7) will disengage from the drive arm assembly (8). The drive arm assembly and the key are a tight press fit onto the shaft (1), and will remain on the shaft.

It is not necessary to remove the drive plate assembly (6) from the engine flywheel unless the drive pins are bent or worn and must be replaced. To remove the drive plate assembly, remove the hardware (8 and 9) securing the assembly to the engine flywheel, and remove the drive plate.

The drive pins are secured into the drive plate by a tight press fit and peening. To remove the pins, drill through from the peened end and drive the pins out using a drift pin.

Inspect the dyna flex joints (3), and replace them if worn. The dyna flex joints are a press fit in the drive arm.

### Impeller Shaft And Bearing Disassembly

(Figure 2)

When the pump is properly operated and maintained, the intermediate 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.

Drain the bearing lubricant by removing the intermediate drain plug (28). Clean and reinstall the drain plug.

Remove the hardware (21 and 22) securing the bearing cap (26) to the intermediate (19), and remove the bearing cap, gasket (20), outboard oil seal (27), and bearing shim set (25). Tag and tie the bearing shims, or measure and record their thickness.

Place a block of wood against the impeller end of the shaft (24), and tap the shaft and assembled bearings out of the intermediate. Remove the inboard oil seal (60) from the intermediate.

Use a bearing puller to remove the inboard and outboard bearings (59 and 63) from the impeller shaft.

### Shaft and Bearing Reassembly And Installation

(Figure 2)

Clean the intermediate, 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 thread damage on the impeller end. Dress small nicks and burrs with a fine file or emery cloth. Replace the 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

Bearings must be kept free of all dirt and foreign material. Failure to do so will greatly shorten bearing life.

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

Dip the bearings in clean oil and, using an arbor press, press against the inner races until the bearings seat squarely against the shaft shoulders.

#### 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 inboard oil seal (60) into the intermediate with the lip positioned as shown in Figure 2.

Slide the shaft and assembled bearings into the intermediate bore until the inboard bearing (59) bottoms against the bore shoulder. **Be careful** not to damage the oil seal on the shaft threads.

#### CAUTION

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

Install the same thickness of bearing shims as previously removed.

#### NOTE

Shaft end play should be between .002 to .010 inch. Add or subtract shims (25) until the correct endplay is obtained.

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Press the outboard oil seal (27) into the bearing cap (26) with the lip positioned as shown in Figure 2. Install a new bearing cap gasket (20) and secure the bearing cap to the intermediate with the hardware (21 and 22).

Lubricate the bearings as indicated in LUBRICATION.

### Securing Intermediate And Drive Assembly To Engine

#### (Figure 3)

If the drive pins were removed from the drive plate assembly, install new pins by pressing them into the drive plate and peening the ends. Secure the drive plate assembly to the engine flywheel.

If the dyna flex joints (3) were removed, apply a thin coat of rubber lubricant to the replacement dyna flex joints, and press them into the drive arm until approximately 1/16 inch protrudes from the pump side of the drive arm.

Install the impeller shaft key (13), and press the drive arm assembly onto the impeller shaft.

Align the drive arm assembly so that the drive pins will engage the dyna flex joints, and secure the intermediate and intermediate guards to the engine bellhousing with the hardware (10 and 11).

### Pump Reassembly

#### (Figure 2)

Before securing the seal plate to the intermediate, inspect the bore of the seal liner (56) for wear or grooves which might cause leakage or damage to the seal packing rings. If the seal liner must be replaced, position the seal plate (29) 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 properly installed, a 1/4 inch diameter hole must be drilled through it to permit the flow of lubricant to the seal assembly. **Be careful** to center the drill in the threaded grease pipe hole and not damage the threads. Deburr the hole from the inside of the seal liner after drilling.

Install a new seal plate gasket (32) and secure the seal plate to the intermediate using the attaching hardware (30 and 31). Reinstall the automatic grease cup and piping (15, 16, and 17).

#### NOTE

It is recommended that the seal and impeller be reassembled at this time. It is best to adjust the back impeller clearance before installing the pump casing. See **Impeller Installation**.

Install the same thickness of pump casing gaskets (33) as previously removed and secure the casing to the intermediate with the nuts (62). Be sure to reinstall any leveling shims used under the pump casing mounting feet before installing the base mounting hardware.

---



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NOTE

The front impeller clearance must be adjusted after pump casing and back cover are fully reassembled by adding or subtracting pump casing gaskets (33). Do not secure the pump casing to the base until this operation is done.

Seal Reassembly

(Figure 2 and 4)

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 4).

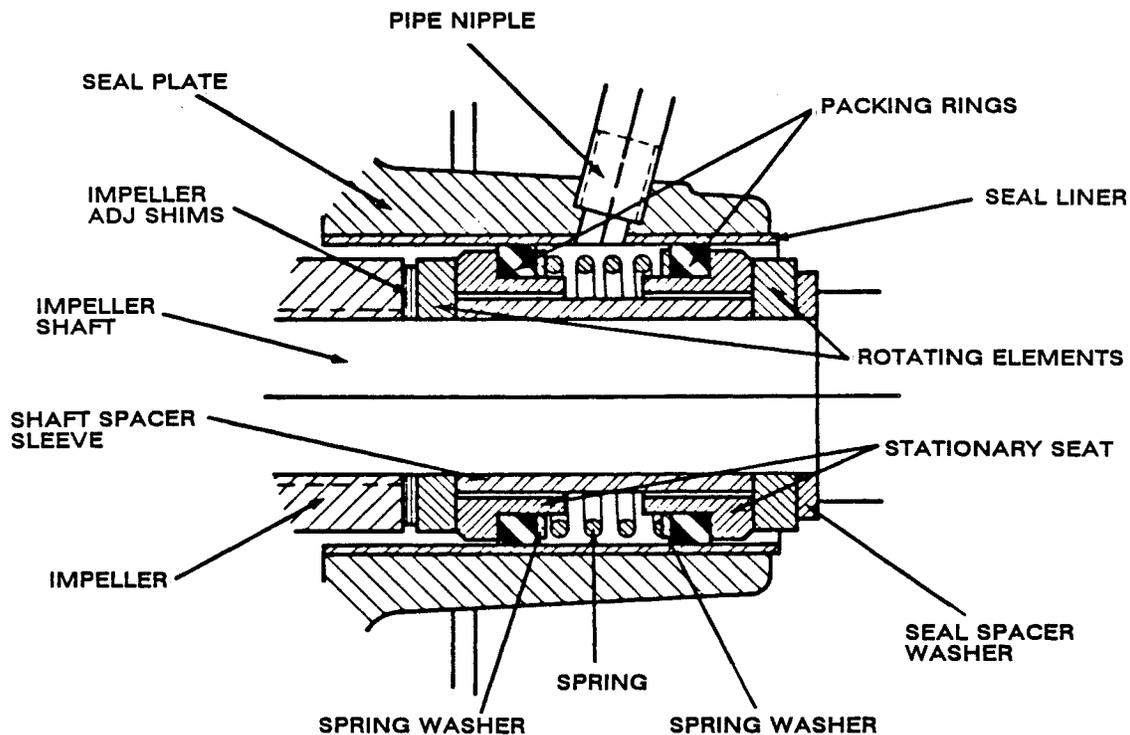


Figure 4. GS1250 Seal Assembly

#### CAUTION

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

Slide the seal spacer washer onto the shaft with the chamfered side facing the shaft shoulder.

Position the inboard rotating element on the shaft with the chamfered side facing the spacer washer and slide it on until fully seated.

#### NOTE

A push tube cut from a length of plastic pipe would aid this installation. The I.D. of the tube should be slightly larger than the O.D. of the shaft.

Subassemble the inboard stationary seat, packing ring, and spring washer and press the unit into the lubricated seal liner.

Install the shaft spacer sleeve and spring.

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Subassemble the outboard stationary seat, packing ring, and spring washer. Press this unit into the lubricated seal liner.

Install the outboard rotating element with chamfered side facing the impeller.

#### CAUTION

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

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

#### Impeller Installation

##### (Figure 2)

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

Slide the same number of impeller adjusting shims (58) as previously removed onto the shaft and screw the impeller on until tight.

A clearance of .020 to .040 inch between the impeller and the seal plate is necessary for maximum pump efficiency. Measure this clearance, and add or remove impeller shims until it is reached.

#### NOTE

If the pump has been completely disassembled, install a new pump casing gasket set and secure the pump casing to the intermediate at this time.

A clearance of .010 to .020 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 until the impeller binds against the wear plate when the shaft is turned. After the impeller binds, add .015 inch of gaskets.

#### NOTE

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

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## Suction Check Valve Installation

### (Figure 2)

Inspect the check valve assembly, and replace it if badly worn.

#### NOTE

The check valve assembly must be replaced as a complete unit. Individual parts are not sold separately.

Reach through the back cover opening with the assembled check valve and position the check valve adaptor into the mounting slot in the suction flange. Align the adaptor with the flange hole and secure the assembly with the check valve pin (6).

#### NOTE

If the suction or discharge flange was removed, replace the respective gaskets and apply "Permatex Aviation No. 3 Form-A-Gasket" or equivalent to the mating surfaces.

## Back Cover Installation

### (Figure 2)

Inspect the wear plate (34) and replace it if badly worn or grooved. To remove the wear plate, disengage the hardware (36 and 37).

Clean any scale or debris from the back cover shoulder and pump casing that might prevent a good seal. Replace the back cover gasket (45) and slide the back cover assembly into the pump casing. Be sure the wear plate does not bind against the pump casing.

#### 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 and tightening the cover clamp screw. **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 secure.

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

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

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

## LUBRICATION

### Seal Assembly

Fill the grease cup through the grease fitting with No. 2 lithium base grease until grease escapes from the relief hole. Turn the grease cup arm counter-clockwise until it is at the top of the stem; this will release the spring to apply grease to the seal (see Figure 5).

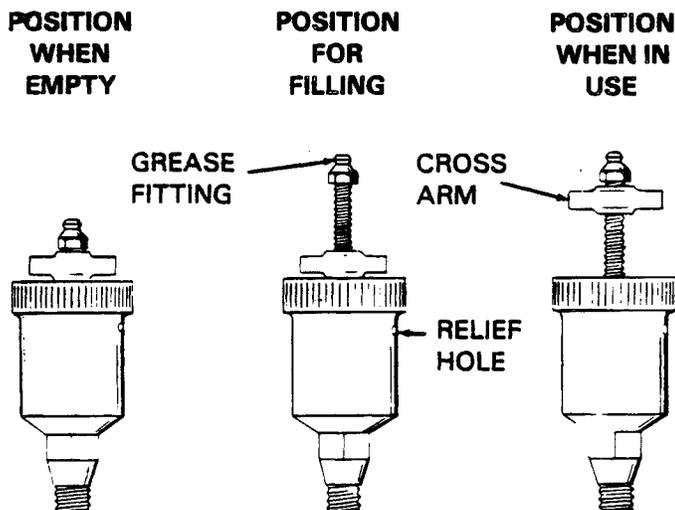


Figure 5. Automatic Lubricating Grease Cup

### Bearings

The intermediate was fully lubricated when shipped from the factory. Check the oil level regularly through the sight gauge (65) and maintain it at the midpoint of the gauge. When lubrication is required, add SAE No. 30 non-detergent oil through the air vent (18) hole. **Do not** over lubricate. Over-lubrication can cause the bearings to over-heat, resulting in premature bearing failure.

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Under normal conditions, drain the intermediate 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

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

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