



# REED ROCK MASTER A40HP TRAILER CONCRETE PUMP

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## PREVENTATIVE MAINTENANCE

How good is any of the equipment you own? It is only as good as it is **MAINTAINED**. Even the finest equipment manufactured requires attention and care. The **02 MODEL A40HP** is no different. A good well planned and carried out preventative maintenance program will enhance a properly operating unit as well as the safety of those operating and using the equipment.

It is very important to establish a good maintenance program. Costly repairs and loss of revenue can often be avoided by planning ahead, setting a regular schedule and exercising good preventative maintenance techniques.

The following section is offered as a guide and depicts a start for developing your own preventative maintenance program for the **MODEL A40HP** concrete pump. The program is depicted and broken into sections of **INSPECTION** and **LUBRICATION**.

### NOTE

*All points noted herein regarding the maintenance and checks are not intended to replace any local or regional regulations which may pertain to this type of equipment. It should also be noted that the list and schedule is not considered to be inclusive. Interval times may vary due to the climate and/or conditions associated with the location area in which the equipment will be used.*

### ⚠ CAUTION

*It is your responsibility to always insure that the applicable safety precautions are strictly observed when performing the inspections and maintenance checks. Make certain any components that are found to be defective are replaced or those in need of adjustments or repair are corrected before operating the machine.*



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## **SCHEDULED INSPECTION**

The main purpose of accomplishing scheduled inspections is to identify and detect any potential malfunction before it can expand into a major problem. The list presented herein should be inspected and checked on a regular basis. In so doing, it will help ensure a good, safe unit performance.

### **1. TRAILER**

- Frame integrity, visually check welds, cracks
- Torsion axle secure
- Wheels and tires, lug nuts tight, tire inflation
- Electric brakes, breakaway switch connected
- Front jack stand handle turns easily, smoothly
- Manual jacks slide freely, lock pins in place
- Lighting good condition operational

### **2. ENGINE**

- Inspect mountings, bolts, brackets
- Oil level proper, any leaks
- Fuel system, tank mounting, filter condition, leaks, damaged lines
- Battery hold down, condition, tightness of cables
- Key switch, indicator lights operable
- Throttle control functional
- Air cleaner and muffler securely mounted





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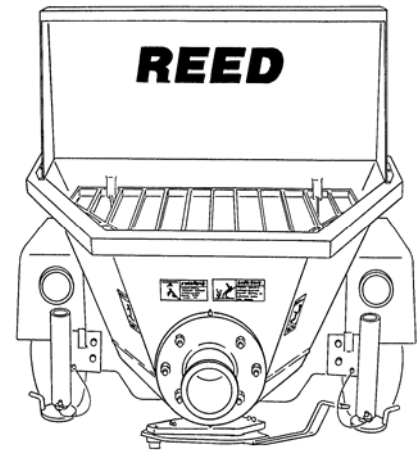
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## 3. PUMP CELL

- Visually check for structural damage, cracked welds
- Hydraulic drive cylinders in good condition, secure, no leakage
- Material cylinders secure, tie rods tight
- Water box structurally sound, clean, cover in place
- S-tube shift mechanism structurally sound, all pins and retainers in place
- Hydraulic shift cylinders in good condition
- Bearing housing, seals etc. in good condition
- Hydraulic hoses secure no leaks

## 4. HOPPER ASSEMBLY

- Visually check for structural damage, cracked welds
- S-tube secure, in good condition
- Check condition of wear plate, wear ring, seals
- Check connection of S-tube to outlet, seals, bearing
- Hopper drain is functional



## 5. MAIN CONTROL

- Control box in good condition, not damaged
- All toggles in good condition, stay in position or momentarily return to center
- Control identification in good condition, legible
- Gauges in good condition

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## 6. REMOTE CONTROL

- Control console in good condition, not damaged
- Switch in good condition
- Umbilical cord in good condition, no cuts, securely mounted to box



WIRE REMOTE CONTROL



RADIO REMOTE CONTROL

## 7. HYDRAULIC SYSTEM

- Hydraulic tank securely mounted, covers tight
- Filler cap and strainer in place, level sight gauge in proper condition
- Check filter condition indicators
- Hydraulic oil cooler securely mounted, connections tight
- Check accumulator condition, mounting brackets & clamps
- Hydraulic fluid to proper level and clean
- All hoses and tubing secure, no leak



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## LUBRICATION

The **MODEL A40HP** concrete pump is equipped with several components that because of the application require frequent lubrication. These areas involve the S-tube shifting mechanism, swing components, the shift and outlet bearings and agitator. To insure the economical service and the long life of these components, grease fittings are installed at each point.

### **⚠ WARNING**

*Rapid wear and probable component breakdown will result if the unit is operated with inadequate lubrication. Follow the recommended interval and if need be increase the interval when above normal usage takes place.*

### **Lubrication Points (refer to next page for photographic diagrams)**

- **Swing Tube Shift Mechanism**
  - Quantity 1 at cylinder barrel pivot
  - Quantity 1 at bell crank
  - Quantity 2 at swing tube shaft bearing housing
- **Swing Tube Outlet**
  - Quantity 2 on outlet bearing housing
- **Agitator/Remixer**
  - Quantity 1 on non-hydraulic motor end
  - Quantity 1 on hydraulic motor end

Recommended Lubricant: **GENERAL PURPOSE GREASE, SHELL ALVANIA EPLFH2 or EQUAL**

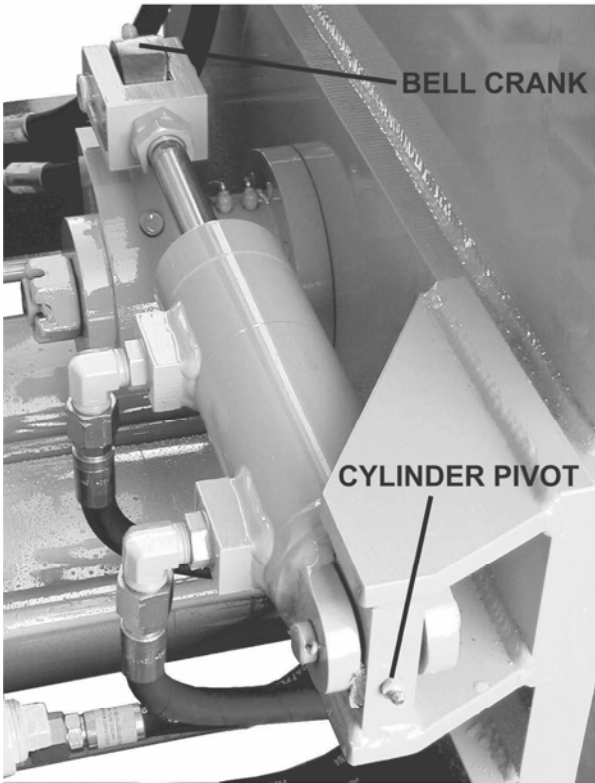
Recommended Interval: **DAILY, BEFORE START-UP AND AS REQUIRED DURING OPERATION**

### **LUBRICANT AND INTERVAL**

The lubricant that is recommended is generally the best choice, however, should this lubricant be unavailable in your area, consult your local supplier for an equivalent.

### LUBRICATION POINTS

#### SWING TUBE SHIFT MECHANISM



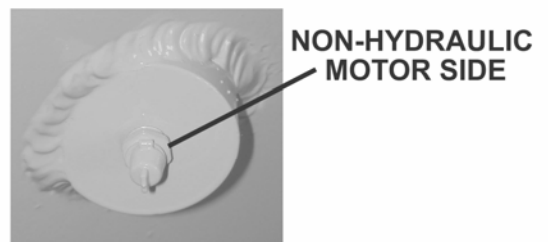
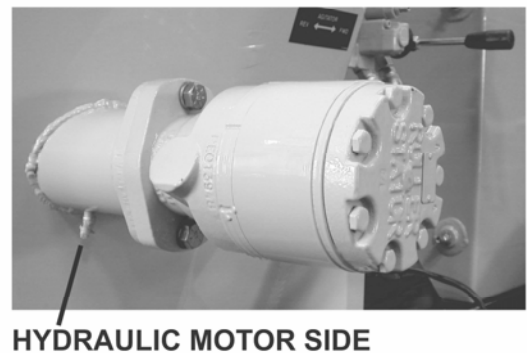
#### SWING TUBE FLANGE BEARING



#### SWING TUBE OUTLET

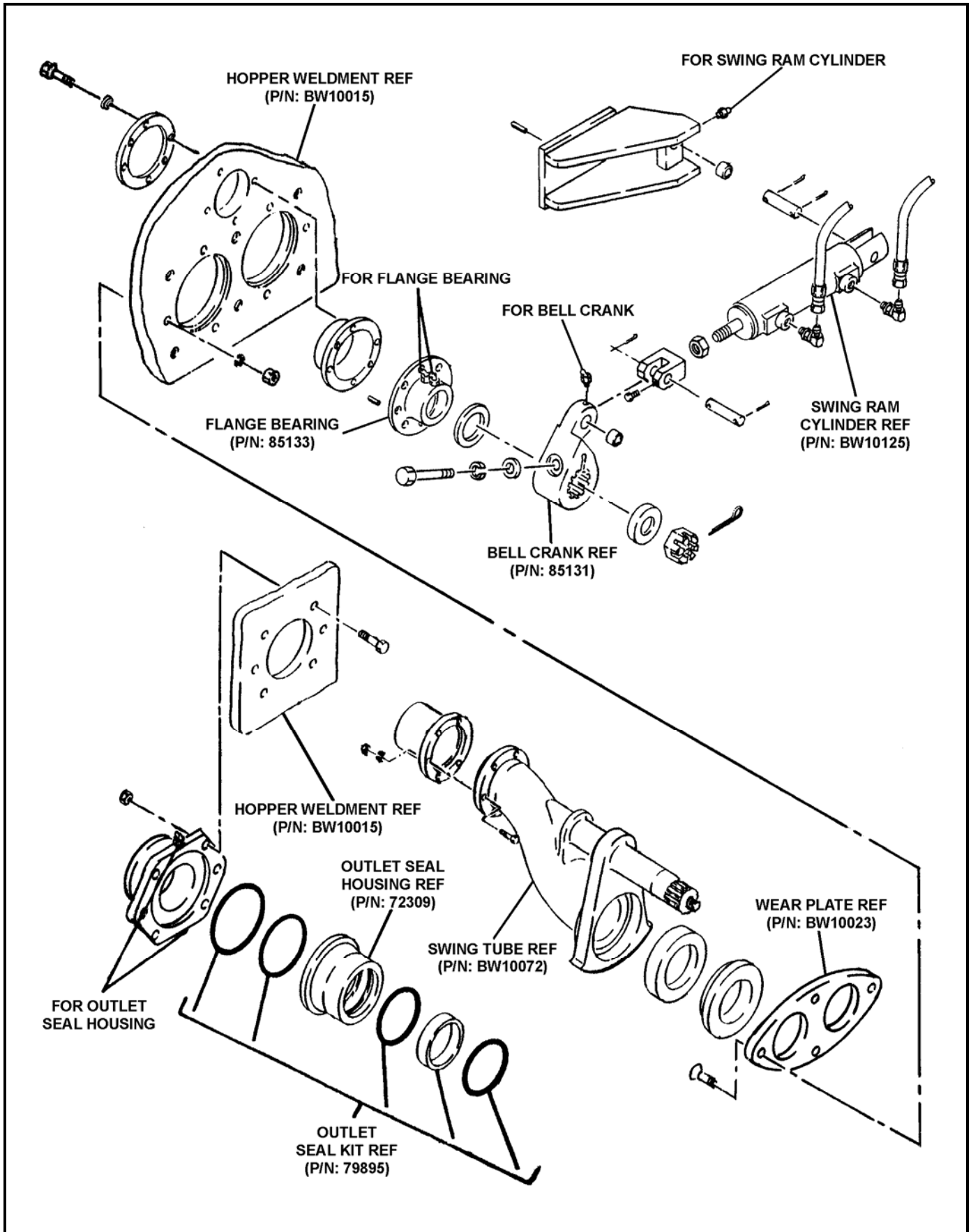


#### AGITATOR / REMIXER





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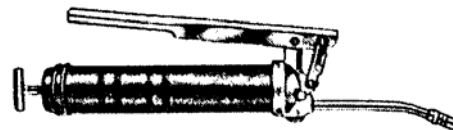
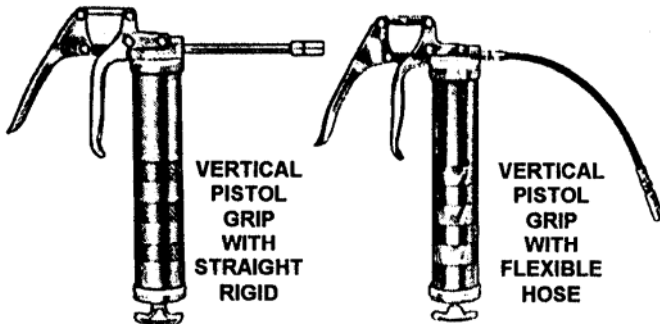
On the same basis, recommended lubrication intervals are based on normal use, in normal environmental conditions. User is **CAUTIONED** to adjust the lubrication interval accordingly to meet each individual condition and usage. If the swing tube bearing housings become extremely hot or lubricant becomes a liquid and oozes out around the bearing or seal, the area should be relubricated.

If the **MODEL A40HP** has been stored or exposed to environmental conditions of extreme low humidity, high dust level, elevated temperatures or heavy rainfall, lubrication of components may be required more frequently than under normal conditions.

### NOTE

*External non-bearing surfaces should be wiped clean of extruded or spilled surplus grease and oil with a clean, but lint free cloth to prevent damaging dust and abrasive accumulation on lubricant wet surfaces.*

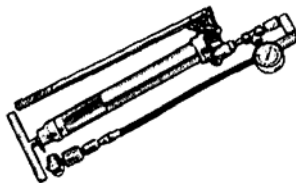
#### GENERAL PURPOSE GREASE GUNS



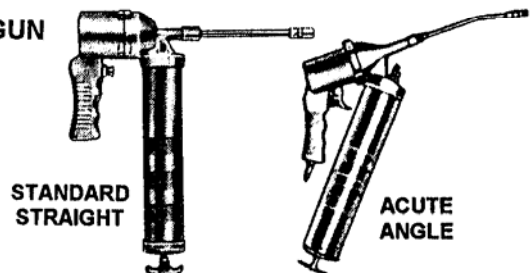
#### HAND HELD ELECTRIC GREASE GUN



#### EXTREME PRESSURE GREASE GUN



#### AIR POWERED GREASE GUN



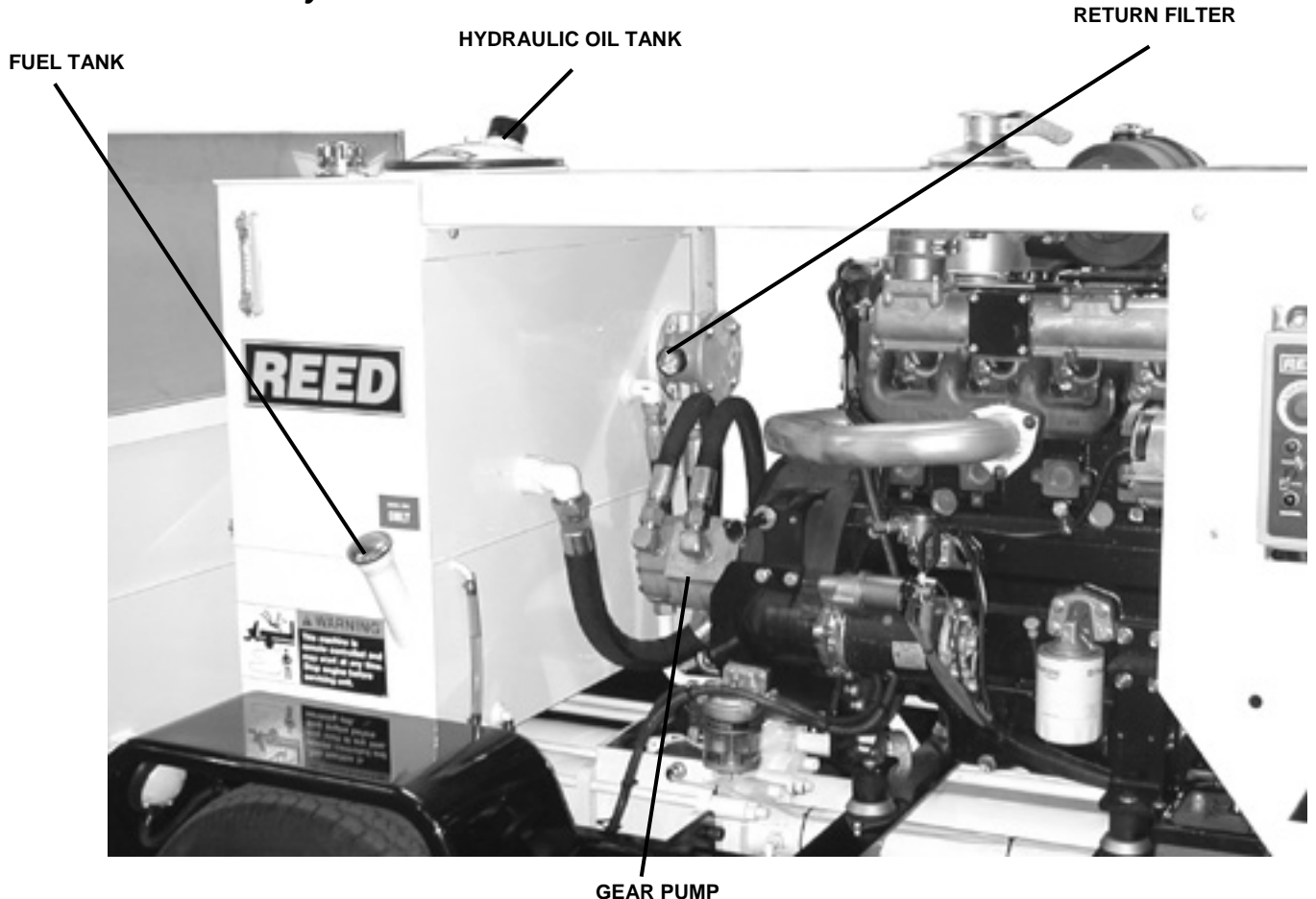


### HYDRAULIC SYSTEM MAINTENANCE

The **REED MODEL A40HP** utilizes a diesel engine as the main source of power, which drives the main hydraulic pump. The hydraulic pump is used to supply the flow and develop the necessary pressure to operate the concrete pump. As with any operational system, it is only as good as it is maintained. The hydraulic system is a critical system and it is for this reason that it is **IMPORTANT** that it receive extra care and good maintenance. This section is offered to alert you and guide you in maintaining the hydraulic system.

#### ⚠ CAUTION

**CONTAMINATION is the downfall of most hydraulic systems and a major contributor leading to system malfunctions. Extreme care must be exercised to prevent dirt from entering the system. Make it a habit to ALWAYS cap or plug open ports and hydraulic lines.**





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## HYDRAULIC TANK

The hydraulic tank has a capacity of 40 GALS (190L) and is located just forward of the hopper. It is equipped with a filler breather unit, access cover. A sight gauge is installed on the left side of the tank and is used to determine the fluid level inside the tank. The tank is also equipped with drain valve.

Filtration is by a return line filter located on the front of the tank. An oil cooler is adjacent to the engine cooling unit. This cooler is used to cool the oil prior to entering the tank.

## SYSTEM MAINTENANCE ITEMS

The following are specific items for care and maintenance of the hydraulic system.

- **FLUID LEVEL** Check level daily with sight gauge provided. Maintain level at full mark. Add through filter.
- **TANK BREATHER** Clean every 50 hours of operation. Remove from tank, clean with solvent and air blow dry.
- **RETURN LINE FILTER** One (1) 10-micron filter; change after first 50 Hours of operation. Thereafter change every 150 hours of operation or when condition gauge indicates to do so.
- **HYDRAULIC TANK** Change oil in tank every 1000 hours of operation or yearly whichever comes first.

### NOTE

*After fluid loss for any reason, filter replacement, component removal etc., sufficient fluid must be added to properly maintain required level in tank.*

## HYDRAULIC FLUID

The **MODEL A40** utilizes in its hydraulic system a fluid manufactured by the SHELL OIL CO. and is designated as TELLUS #46. It is to be used in ambient temperatures of 39 - 90° F (4 - 32° C). The normal fluid temperature will range from 100 - 167° F (38 - 75° C).

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For ambient temperatures of 90° F (32° C) and above use fluid designated as a ISO rating of 68. Use ISO 32 for ambient temperatures of 32° F (4° C) and below.

## **⚠ WARNING**

USE ONLY SHELL TELLUS 46 or equal hydraulic fluid and NEVER MIX with other type fluids. Always use a CLEAN fluid. Using impure or other type of fluids not specified will contaminate the hydraulic system and can lead to eventual system malfunction or damage and possibly deteriorate the hydraulic seals.

## **ADDING HYDRAULIC FLUID**

As previously indicated, a hydraulic systems worst enemy is **CONTAMINATION**. Exercise extreme care when adding fluid to the hydraulic tank.

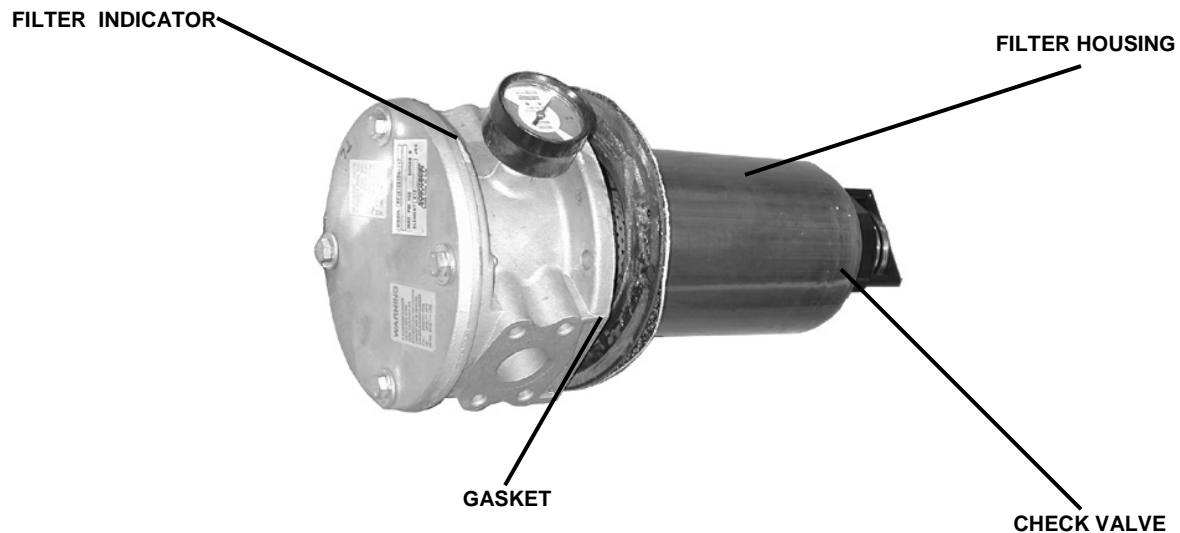
- To prevent any dirt or water from entering the hydraulic tank, thoroughly clean area around top of filter.
- Use fresh clean hydraulic fluid. If a hand pump is used to transfer the fluid, check that pump filter is clean. If pouring of fluid from a container, pour it through a fine wire mesh screen, 200 mesh or finer.

## **⚠ WARNING**

*Do not use a cloth for straining fluid as lint is harmful to the hydraulic system.*

## **FILTER SERVICING**

The purpose of installing hydraulic filters in the system is to provide a means of continuous hydraulic fluid filtration in an effort to prevent recirculation of abrasive solids which will cause rapid wear of component breakdown.



The **MODEL A40HP** hydraulic filter system consist of a return filter located on tank's side. The filter is equipped with a condition indicator gauge which should be checked periodically and the element changed when gauge reads 25PSI or higher..

To service/change the filter elements, the following is offered:

- Shut off machine. On pump circuit allow accumulator system to depressurize
- Wipe clean any dirt and grime from around filter housing.
- Remove the four (4) bolts holding on top plate of filter.
- There is a check valve in the filter housing, so the only oil lost will be that in the housing.
- Carefully remove cover so as not to damage the gasket.
- Remove element and discard.
- Replace with new element and replace cover.
- Start up machine and observe for leakage.

**▲ CAUTION**

***DO NOT ATTEMPT TO WASH OUT FILTER ELEMENT.  
These are disposable types and more harm can be  
done than it is worth.***

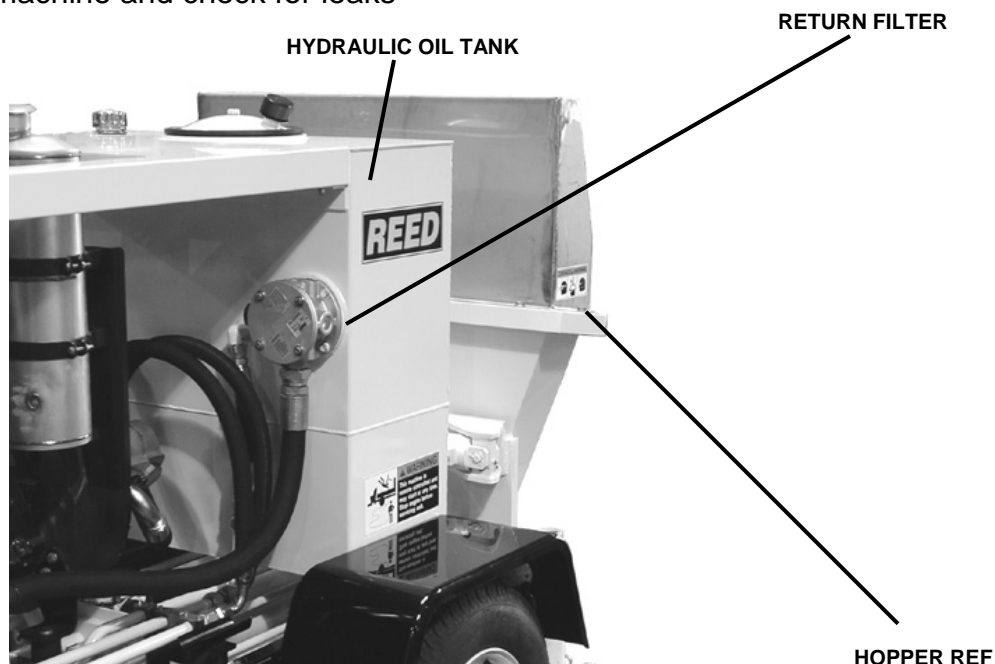
## CLEANING THE HYDRAULIC TANK

The hydraulic tank should be drained and cleaned after 1000 hours of operation or yearly whichever comes first. This will assist in keeping the systems clean and in proper condition. To accomplish this the following is offered.

- Shut off machine. On pump circuit allow accumulator system to depressurize

Place a suitable size container under the hydraulic tank drain fitting located at back of tank facing the hopper. **NOTE:** The tank has a capacity of 40gals (160 L). Make sure your drain container is large enough. Remove drain plug.

- Remove the access cover on the hydraulic tank being careful not to damage the gasket
- After tank has drained, flush the inside of the hydraulic tank with clean solvent and wipe clean with lint free cloths. **DO NOT USE PAPER TOWELS.** Remove any particles from tank bottom.
- Install the tank drain plug and access cover with gasket
- Clean the filler breather with solvent and air blow dry
- Change the hydraulic system filter element (see previous page)
- Refill the hydraulic tank with new **CLEAN** hydraulic fluid, **SHELL TELLUS 46**
- Start machine and check for leaks





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## DESCRIPTION OF HYDRAULIC SYSTEM

The hydraulic system of the **MODEL A40HP** consists of two separate circuits and although integrated, each is designed to perform a particular function within the operation of the concrete pump. The two circuits utilized are:

- **Main Pump Circuit** - It controls the function for operation of the hydraulic drive cylinder and material cylinders.
- **S-tube Shift Circuit** - It controls the function for operation of shifting the S-tube from one material cylinder to the other during concrete pumping.

For the purpose of making the operation of each circuit easier to understand, they are being described separately.

### SPECIFICS – PRESSURES

- Main System Max. Pressure = 3000 PSI (207 Bar)
- Main System Relief Pressure = 3000 PSI (207 Bar)
- S-tube Shift System Relief Pressure = 2300 PSI (159 Bar)
- Accumulator Pre-Charge Pressure = 900 PSI ( 62 Bar)

### SYSTEM FILTRATION

The hydraulic tank has a capacity of 40 gals (160L) of **SHELL TELLUS #46** hydraulic fluid. The system return fluid must pass through a 10-micron filter element before returning to the tank and after passing through the oil cooler.

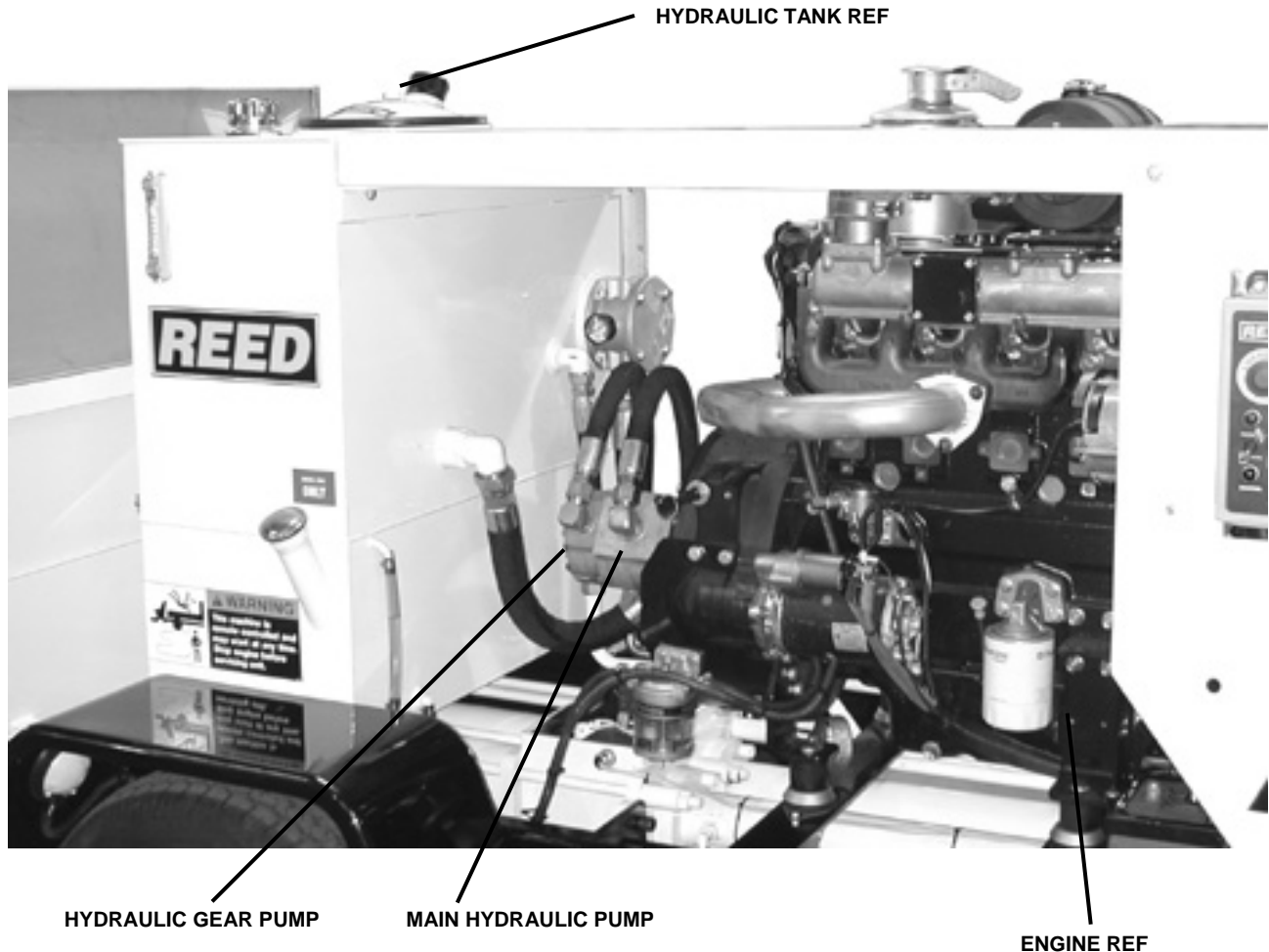
### MAIN PUMP CIRCUIT (Refer To Hydraulic Schematic)

The **MODEL A40HP** is designed to pump concrete like material from the hopper to the placement site. To accomplish this requires the use of two (2) material cylinders that are driven by two (2) hydraulic cylinders and the material pumping action is the result of the two cylinders operating or stroking on an alternate basis. In other words, when one cylinder is retracting it is drawing into the material cylinder tube the material from the hopper. The other cylinder, which has its material cylinder already full, is extending. This causes the material to be pushed through the swing tube and out into the delivery line.

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This action continually takes place. This is the purpose of the **MAIN PUMP** circuit, to provide the hydraulic power for this operation.

The **MAIN PUMP CIRCUIT** is of the **OPEN LOOP** type. Meaning, that the hydraulic pump directs the fluid to one hydraulic cylinder to extend and the oil from the retracting cylinder is directed back to the tank.



To meet the volume and pressure requirements of the main pump circuit a hydraulic pump is used. The **MODEL A30** uses a gear type pump, while the **MODEL A40HP** uses a piston type load-sensing hydraulic pump.

In the case of the **MODEL A40HP**, the **VOLUME OUTPUT** works as a function of R.P.M..

The main hydraulic pump is driven directly by the Perkins diesel engine. When the engine is started and running and the **PUMP** switch is in the **OFF** position, the oil is directed through the main valve back to tank through the cooler. This condition exists regardless of whether the engine is at idle or maximum **RPM**.



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The main pump circuit is equipped with a manifold block installed at the **HEAD** side of the drive cylinders. This manifold is drilled and ported to accommodate the relief valve, check valve, and the pilot operated cycle valve. The cycle valve is a directional spool valve with electro hydraulic solenoid operation. Its purpose is to direct the flow of oil to one or the other hydraulic drive cylinders.

The pump will produce flow in proportion to the amount by which the RPM has been raised. Since the **PUMP** switch is **OFF**, the flow from the hydraulic pump is directed to the cycling valve, however, it is not needed and thus returns to the hydraulic tank by way of the cooler.

To energize the cycling circuit, the **PUMP** switch must be **ON**. When this is done, an electrical signal is generated which in turn energizes the coils of the main cycling pilot valve, which also activates the swing tube shift circuit. (Described later)

## Where, how, and why is this electrical signal generated?

It was previously noted that the material pumping action is the result of the two material cylinders cycling on an alternate basis. This alternating cycling is controlled by an electrical signal that is generated at the end of each material cylinder's suction, (retraction stroke).

A proximity sensor, one for each material cylinder, is installed in the flush box. As the piston coupler passes under the proximity sensor, it generates an electrical signal that is sent to the Can-Bus logic controller. The controller is a **REED** proprietary solid state device, designed to control the alternating action of the material cylinders and in turn the movement of the swing tube. The signal from the controller is used to energize the coils of the main cycling pilot valve.

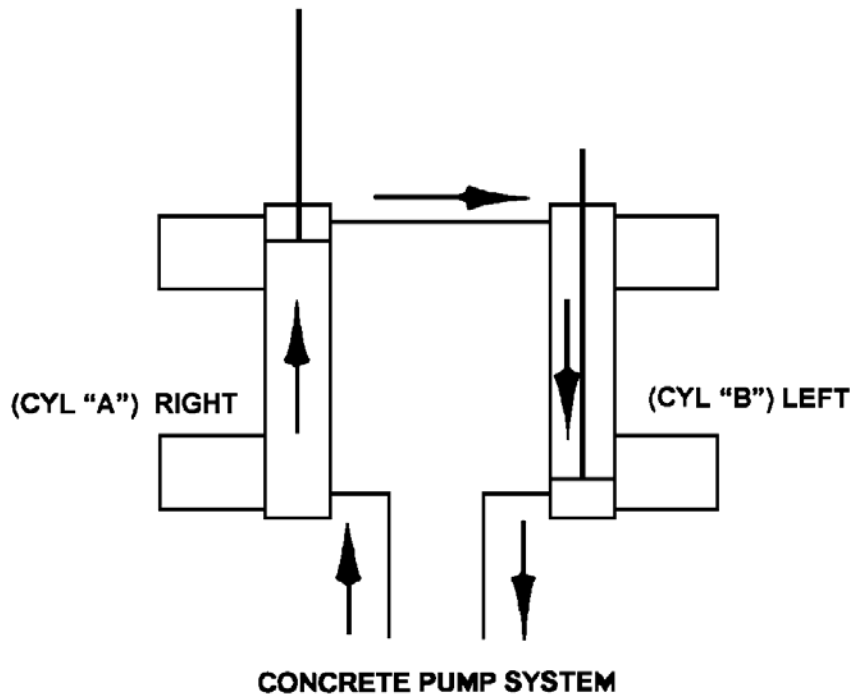
## CIRCUIT OPERATIONAL SEQUENCE

In the operational sequence of the **MAIN PUMP CIRCUIT** and with the engine started and throttle adjusted, the main pump is idling. When the **PUMP** switch is placed **ON**, the hydraulic drive cylinders begin to cycle. The cylinder to receive the flow from the hydraulic pump via the cycling valve, is the cylinder whose coupler has triggered the proximity sensor while in the retracted position and is ready to extend. At full extension the other cylinder is totally retracted and the coupler activates the proximity sensor which via the Can-Bus logic controller, shifts the pilot valve spool, allowing the oil to pilot the main cartridge, which sends oil to the head side of retracted cylinder. This alternating cycling takes place continuously until the **PUMP** switch is turned **OFF**.

It can be noted in the schematic and the diagram below that the main pressure and flow is only directed to one side of the hydraulic drive cylinder. In this instance, it is directed to the barrel or piston side of the cylinder.

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The hydraulic drive cylinders are identical and because only one cylinder is pressurized at a time, a means is required to assist in the retraction of the opposite cylinder. This is accomplished by connecting the rod sides of the cylinders together. In so doing, the hydraulic fluid that exists in the rod side of the extending cylinder (**CYL A**) is transferred and directed to the rod side of the other cylinder (**CYL B**) causing it to retract. The oil in the barrel of **CYL B** is then forced out and has a free flow through the cycling valve back to the hydraulic tank or return system.

With this arrangement of connecting the two cylinders together, it is possible for various reasons, such as leakage around the piston seals that more oil exists on the rod side of the cylinder than is required. When this condition exists, some hydraulic oil remains at the rod end of the cylinder being extended while the other cylinder is fully retracted. As a result the cylinder cannot be totally extended and thus it **SHORT STROKES** which will also happen eventually to the other cylinder.

This condition can be corrected by actuating the **STROKE CHANGE** switch on the electrical control box to the change position and **HOLD**, whichever cylinder is extending is forced down, until the extended cylinder is fully bottomed out. Hydraulically, this is accomplished by use of the check valves installed on both cylinders. By holding the **STROKE CHANGE** switch, you have interrupted the cycle and are forcing more oil into the barrel of the extending cylinder. This oil is then directed by means of the check valve at the rod end of the extending cylinder, putting more oil on the rod side which is then transferred to the rod side of **OTHER CYL**. Since that cavity is full, pressure is built up in the rod side of **OTHER CYL**, which unseats the barrel side check valve forcing the excess oil back to the tank. Once the extending cylinder is at full stroke, regular operation can continue.



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## NOTE

*In addition to piston leakage, a **SHORT STROKE** condition may result from incorrect proximity sensor location or leaking check valves.*

As protection to the **MAIN PUMP CIRCUIT** against excessive pressure, a relief valve has been installed and is set to open at 3000 PSI, main system pressure. Thus when the system pressure reaches 3000 PSI, the relief valve opens directing the oil back to the tank.

### **S-TUBE SHIFT CIRCUIT (Refer to Hydraulic Schematic)**

In the foregoing description of the Main Pump Circuit, we learned that the hydraulic drive cylinders operate on an alternating basis causing the material cylinders to do the same. Since there is only one outlet for the pumping material, a means is required to transfer the material from the material cylinder to the outlet and into the delivery line. To accomplish this a component referred to as the swing tube or “**S**” - tube is installed in the hopper. Since there are two material cylinders and one **S-tube**, the **S-tube** must be shifted from one material cylinder to the other, whichever one is loaded with the pumping material. Thus the incorporation of the, **S-TUBE SHIFT CIRCUIT**.

The S-tube shift hydraulic circuit is of the **UNLOADING CIRCUIT** type, meaning that when the **PILOT** control valve is in the **NEUTRAL** position electrically non operational (unactuated), the **UNLOADING CIRCUIT** passages of the valves are open, allowing the hydraulic fluid to return to the tank. With the engine running the hydraulic pump is operating, producing a flow of oil which, with no control energized, will pass through the **UNLOADING CIRCUIT** on its way back to tank.

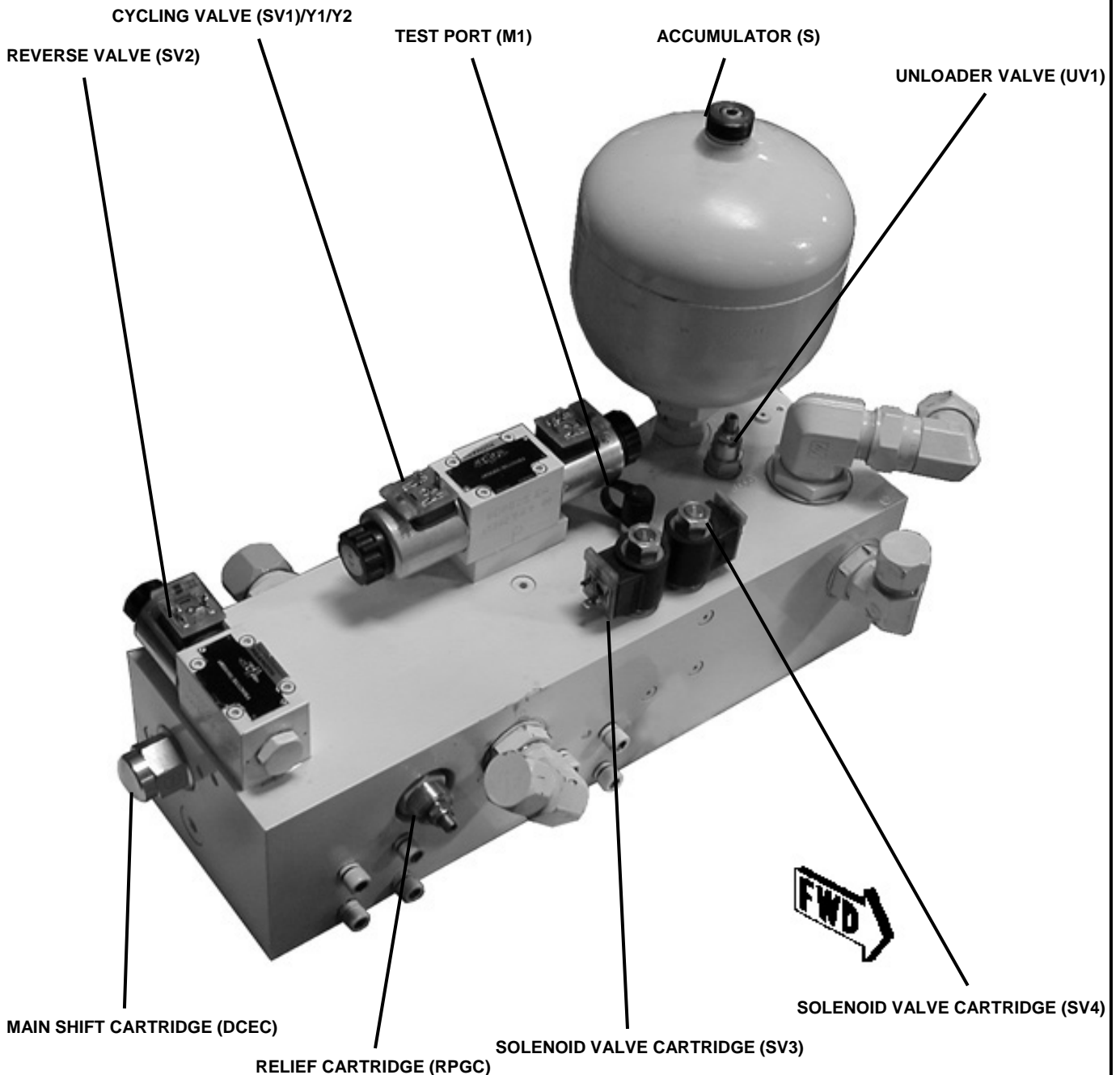
## NOTE

***THE ACCUMULATOR AND CYL. ARE FULLY CHARGED AND READY TO WORK WHEN THE “E” STOP CURCUIT IS DEACTIVATED!!!***

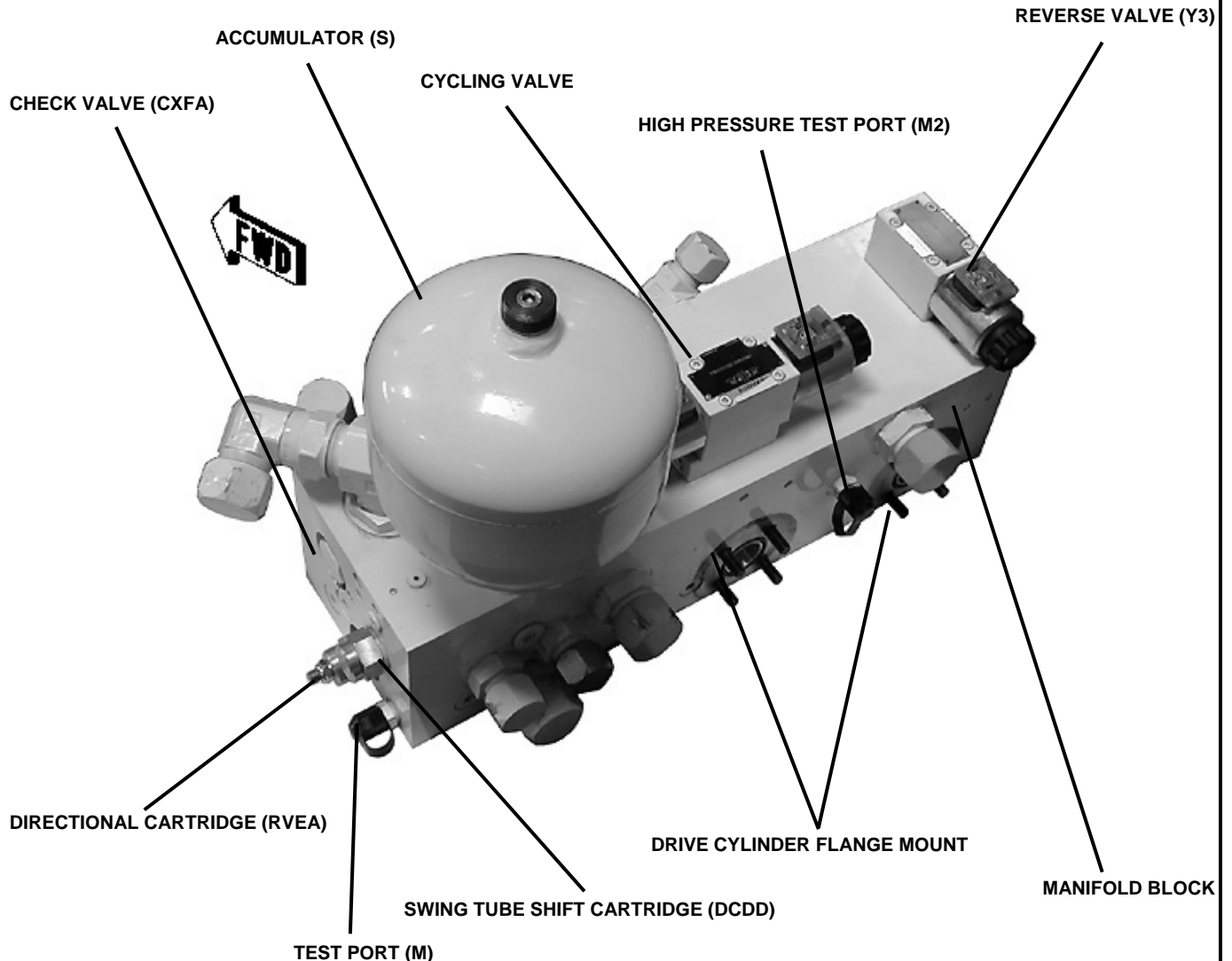
To meet the flow and pressure requirements of the shift circuit, one section of a tandem pump is used. The **TANDEM HYDRAULIC PUMP** is of the gear pump design, having a fixed displacement meaning it is designed to constantly produce the same displacement at pre-set maximum engine RPM. The tandem gear pump is direct connected to the engine. In addition to the hydraulic pump, the swing tube shift circuit consists of an unloader manifold, an accumulator. The following is offered to describe the function of each in the system.

### SHIFT CIRCUIT MANIFOLD

Like the main hydraulic circuit, the shift circuit is incorporated into the manifold block. This block is flange mounted to the drive cylinders. It contains a shift cartridge, relief cartridge, (2) two solenoid valve cartridge, and unloading valve cartridge. The directional cartridge valve is mounted in the block. Each of these components is designed to perform a particular function in the swing circuit as explained in the following descriptions:

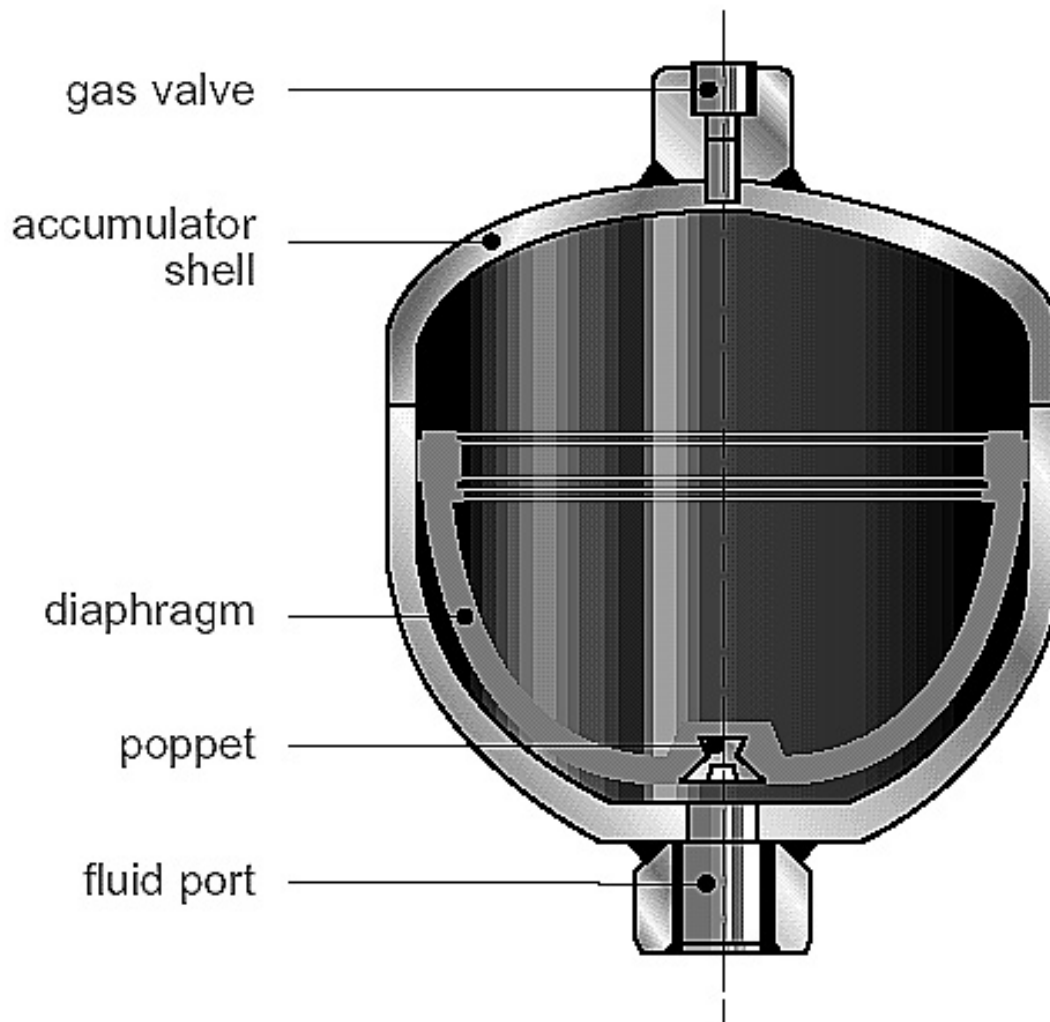


- **RELIEF CARTRIDGE** - This cartridge is located on the top side of the manifold block and is used to protect the system from excessive pressure and to limit the amount of pressure being applied to the accumulator and is set at 2300 PSI (158 Bar)
- **DIRECTIONAL CARTRIDGE** - This cartridge is used to direct the flow of oil from the accumulator to one or the other end of the shift cylinder based on the hydraulic signal it receives from the cycling valve as is the main cycle cartridge.
- **UNLOADER VALVE** - This cartridge is used to divert the pump flow from going to the accumulator once its capacity has been reached, directing it back to tank. It becomes operational when the differential setting has been reached (Working value).



- **SOLENOID VALVE CARTRIDGE** – (Y4 Refer to the schematic) Referred to as a dump valve, it is designed into the shift circuit as a **SAFETY VALVE**. Its purpose is to automatically relieve the pressure in the accumulator through an orifice. The valve is controlled by, the Can-Bus logic controller, the valve **OPENS** when the “E” Stop switch is **PUSHED IN**. This prevents the unintentional shifting of the S-tube when the pump is in an “E” Stop condition.
- **SOLENOID VALVE CARTRIDGE-** (Y5 Refer to the schematic) The second valve is also used as a dump valve and is used to direct pilot flow back to the tank when the **PUMP ON SWITCH** is off.

### ACCUMULATOR





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The accumulator is incorporated into the shift circuit to provide instant pressure and volume for the shifting of the swing tube, which cannot be obtained under normal circumstances. An accumulator is a hydraulic reservoir that retains the hydraulic fluid under high pressure.

To accomplish this, the accumulator contains a rubber bladder on the inside of the reservoir. This bladder prior to the installation of the accumulator on the machine must be pre-charged to a certain pressure using a **DRY NITROGEN GAS ONLY!** In this pre-charge operation, the bladder is expanded much like a balloon and is retained in that state. In the application of the shift circuit, the hydraulic fluid is pumped into the accumulator at a higher pressure than that inside the bladder. This compresses the bladder building up high pressure within the accumulator that is retained until released.

## CIRCUIT OPERATIONAL SEQUENCE

In the operational sequence of the shift circuit with the engine at full **RPM**, the tandem pump is operating, producing its rated displacement. The flow is going through the system and is being dumped or directed back to the tank by the unloader cartridge.

When the **PUMP CYCLE** switch is placed to **ON**, an electrical signal closes the solenoid cartridge (**Y5**). When this occurs the hydraulic fluid is now directed to the **UNLOADER CARTRIDGE** stopping the flow back to tank. When the pressure in the shift circuit reaches the setting of the relief cartridge, which in this application is 2300 PSI (160 Bar), the relief opens and activates the unloader valve. The valve then shifts and directs the flow from the pump back to the tank through the relief in lieu of continuing to pressurize the accumulator. The check valve then prevents the fluid in the accumulator from going back to the pump line or draining back through the circuit.

In the Main Pump Circuit description it was described how an electrical signal was generated by the proximity sensor which was sent to the Can-Bus controller and used to control the alternating action of the hydraulic drive cylinders. This same signal is also used to shift the swing tube so that its movement is synchronized with that of the hydraulic drive cylinder, shifting the swing tube to the material cylinder, which is ready to extend (normal forward operation).

The electrical signal activates the solenoid operated pilot valve, shifting the cartridge spool to the appropriate side. The accumulator then releases, exhausting the fluid, which is then directed to the appropriate side of the shift cylinder. As soon as the shift is made the accumulator is refilled immediately and the sequence starts all over again.

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## **ADJUSTMENT PROCEDURES**

It is not unusual that over a period of time due to usage, troubleshooting, making repairs or replacement of parts that certain components may require periodic adjustments to maintain the factory type performance. This section of the manual is offered to assist you in making the necessary adjustments.

### **ADJUSTMENTS TO HYDRAULIC SYSTEM**

The **MODEL A40HP** concrete pump has undergone an extensive quality control inspection and testing phase during the manufacturing process prior to being shipped. All the required settings and adjustments to provide an efficient and safe operating machine have been made. The various pressure settings and adjustments should **NOT BE ALTERED**. However, it may be necessary through the course of using the machine or replacement of parts to check and reset the pressure settings to the factory established guidelines. This should only be done by **QUALIFIED MAINTENANCE PERSONNEL** who understand the systems. The following is offered to assist in accomplishing the task.

#### **NOTE**

*The unit is equipped with a test port, which is used to install a test gauge. To perform the following checks and adjustments, the following test gauges may be required.*

The **TEST GAUGE KITS** are available from the **REED** Parts Department.

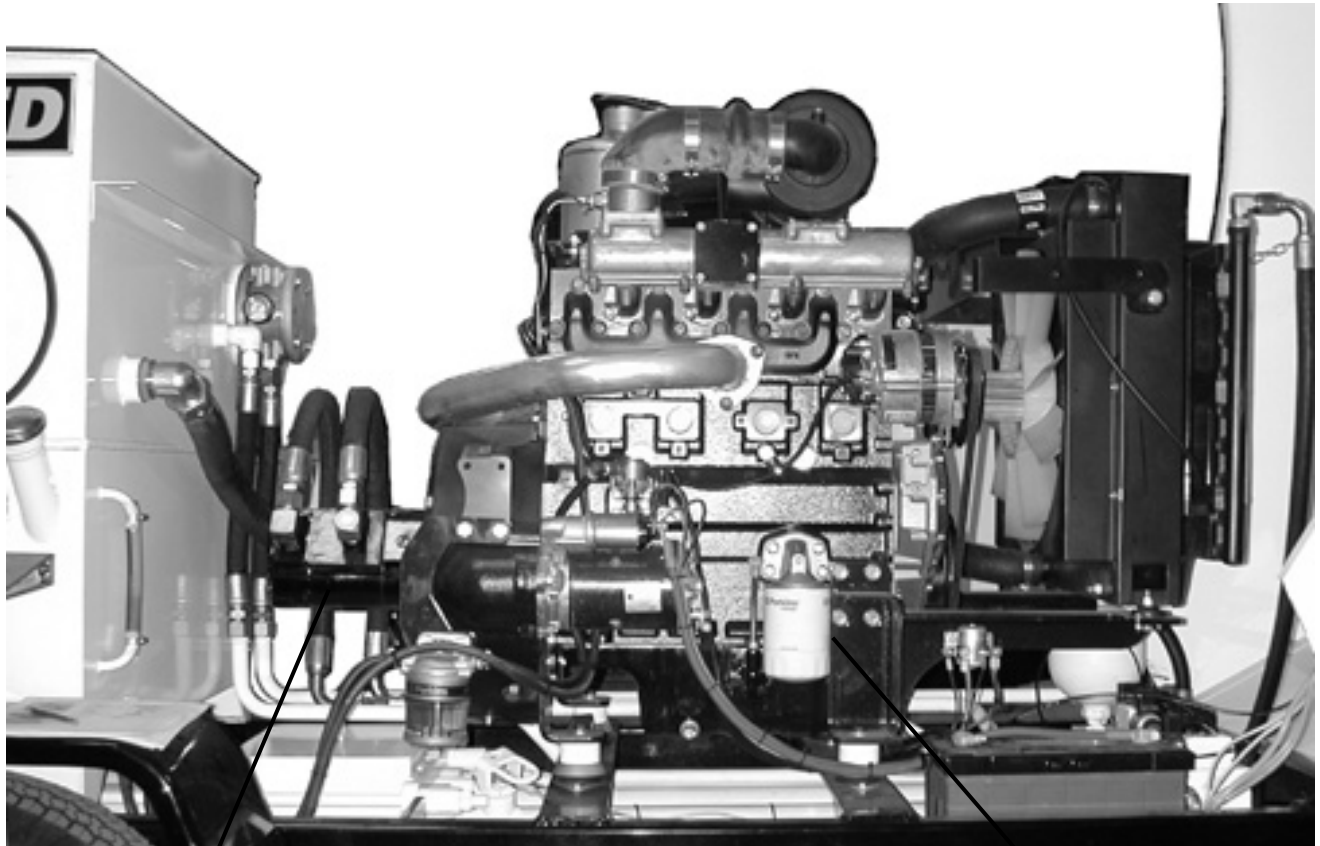
#### **⚠ WARNING**

**DO NOT ACTUATE PUMP SWITCH.**

#### **A. SETTING MAIN RELIEF PRESSURE**

##### **PUMP GAUGE 6000PSI.**

- Run engine at max **RPM** clear “E” Stop if active, turn pump on, hold the stroke change switch until one or the other drive cylinder reaches the end position. At this time you can read the relive setting on the 6000 psi gauge.



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- The setting should read 3000 psi.
- If the pressure is correct then all is well.
- If the setting has been changed or is not to this spec., then an adjustment must be made.
- Using a 9/16 Wrench, loosen the jam nut on the main relive cartridge **RPGC** to **INCREASE** the pressure valve turn the 5/32" allen screw **IN**, and turn **OUT** to **DECREASE**.
- Make adjustment in small increments and monitor gauge.
- After pressure has been adjusted to proper setting, tighten locknut.
- Turn engine **OFF**.





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## **⚠ WARNING**

**DO NOT ACTUATE PUMP SWITCH UNTIL ALL  
HANDS ARE CLEAR.**

### **3. SHIFT CIRCUIT SYSTEM PRESSURE – SET @ 2000 PSI/140 BAR SHIFT RELIEF PRESSURE – 2300 PSI/160 BAR**

The S-Tube Shift Circuit is located on the manifold block curb, side. It contains the relief and unloader valve. These cartridge valves are used to protect and limit the pressure being applied to the accumulator and are used to adjust and set the **SHIFT** system pressure. To check and adjust the pressure the following is offered:

#### **A. CHECKING THE RELIEF PRESSURE**

- Start engine and adjust **THROTTLE** to maximum RPM.
- Loosen locknut on the unload cartridge valve **QCDB**.
- Using an allen wrench, turn set screw all the way **IN**.
- Monitor the accumulator pressure gauge. Gauge should read 2300 PSI. This indicates the **RELIEF VALVE** setting. If gauge reads otherwise, then an adjustment is necessary.

#### **B. SETTING SHIFT CIRCUIT PRESSURE**

- Loosen locknut on **RELIEF VALVE**.
- Actuate **PUMP** switch to **ON** position.
- Monitor accumulator gauge while adjusting relief set screw **IN** to increase pressure or **OUT** to decrease pressure so that gauge reads 2300 PSI.
- Shift **UNLOADER** valve will also need to be reset. With allen wrench, adjust set screw **OUT** until pressure on gauge reads 2000 PSI.
- With adjustment made, tighten lock nut on **UNLOADER**.



## **ADJUSTMENT TO SWING TUBE**

It is important from an operational standpoint that the swing tube shift properly from side to side and that it is properly adjusted to prevent leakage particularly at high pressure and high volume pumping. On a properly adjusted swing tube, the shifting motion from one material cylinder to the other shall be smooth providing a very light scraping noise. The gap between the swing tube and the wear plate installed on the hopper shall be almost non-existent, but not so tight that it impedes a smooth movement.

Located inside the swing tube is a wear ring and it is designed to stay continually in contact with the wear plate providing the necessary sealing action for efficient operation. This is the scraping noise that should be heard. If there is a lack of the scraping noise or the swing tube shifts too freely this is usually the first indication that an adjustment is required,

To adjust the swing tube clearance:

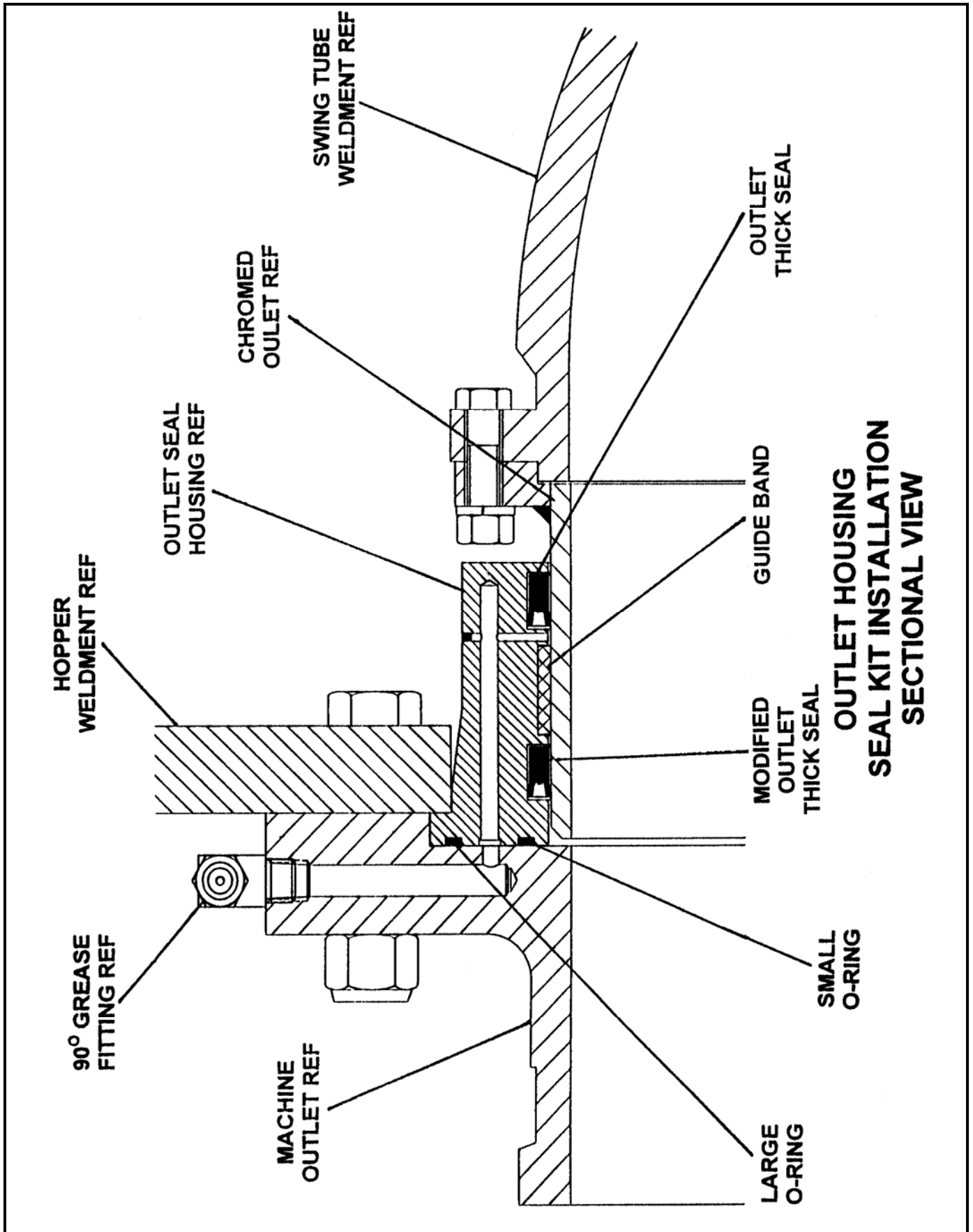
- Shut off engine. If unit was being run, allow a few minutes for the accumulator pressure to subside.
- Remove cotter pin from large castle nut on swing tube shaft.
- Tighten the castle nut approximately one-half turn.
- Start engine and adjust **THROTTLE** to a low **RPM**.
- Turn the pump on and allow the pump to cycle. You can use the **Stroke Change** switch to actuate the **SWING TUBE** and allow swing tube to shift from side to side a few times.
- If the scraping noise of the swing tube is slight and the tube shifts briskly from side to side, the adjustment is correct.
- If further adjustment is necessary, again tighten hex nut a little at a time. **DO NOT OVER TIGHTEN** or swing tube may bind while pumping material at high pressure.
- If the swing tube hesitates or stutters during the change over, the adjustment is too tight. Loosen lock nut a little at a time
- Once adjustment is finalized, replace cotter pin and cover.



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## **MAJOR COMPONENT REPLACEMENT**

It is a given fact that due to usage, improper maintenance and environmental conditions that certain parts will wear out over a period of time and will need to be replaced to continue efficient operation. When tell-tell signs indicate that a part is worn, do not delay in the replacement. Continued usage with worn parts may lead to the damaging of other parts.

This section of the manual is provided to assist you in replacing some of the major components that may be worn. A step by step procedure is offered. Please be aware that the possibility exists your machine may be slightly different. If you find this to be the case, contact the **REED** Service Department. They will be pleased to assist you.

### **SWING TUBE & COMPONENTS**

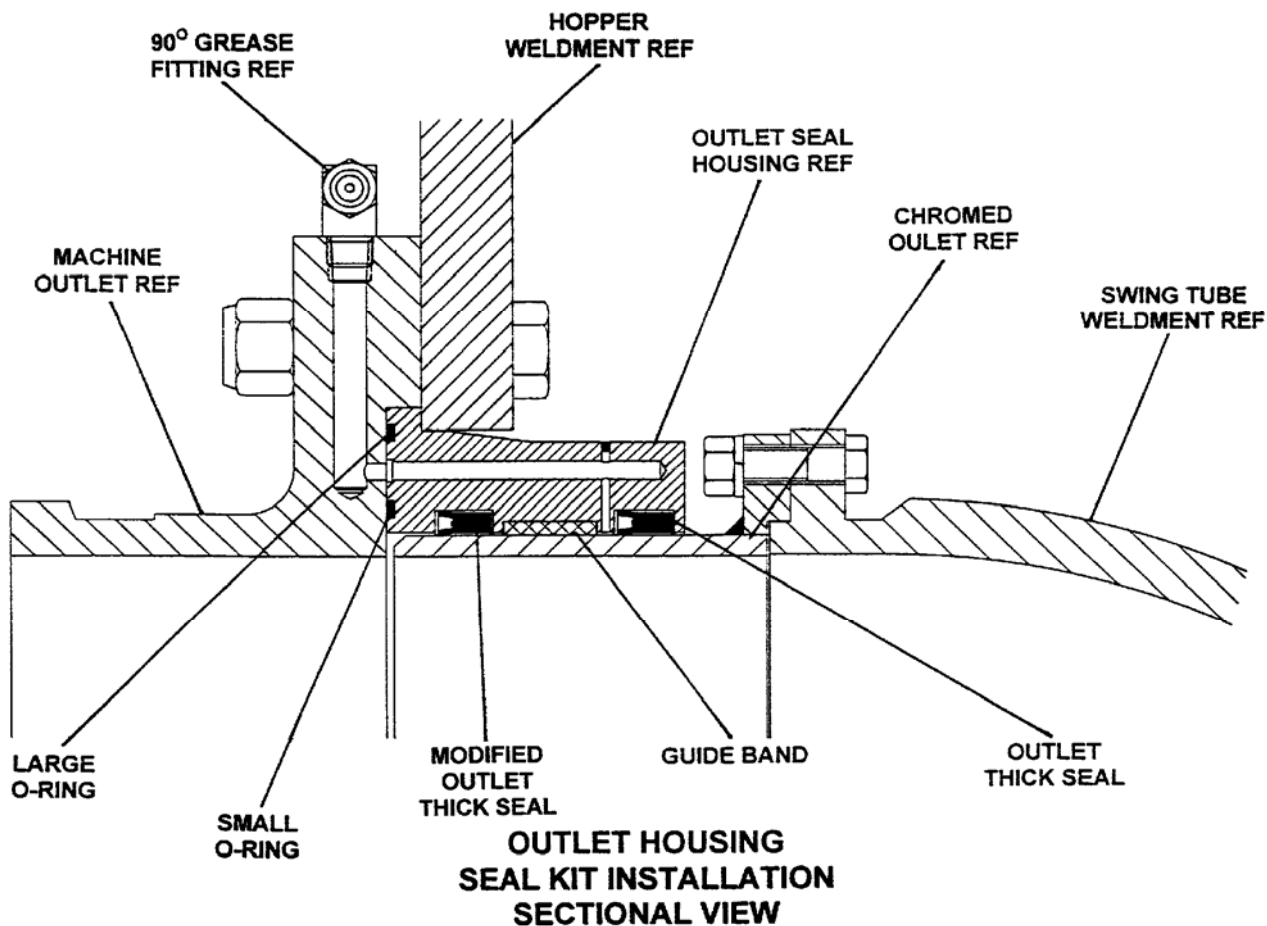
The sealing characteristics of the swing tube depends on metal to metal friction of the wear ring, located inside the swing tube, to the wear plate installed on the inside of the hopper at the material cylinders. This friction and the abrasiveness of the pumping material mixes will cause wear and a breakdown of the sealing action. As this breakdown occurs, periodic adjustments to the swing tube can be made as described in the **ADJUSTMENT SECTION**. This will help to improve the sealing quality, however, eventually the components will need to be replaced.

Some tell-tell signs or identifying symptoms that adjustment is needed or parts are worn might be:

- When deep grooves have developed on the face of the wear plate and/or on the wear ring.
- When the output volume at the end of the delivery line noticeably begins to decrease or eventually stops for no apparent reason.
- When the material being pumped is being forced back into the hopper under pressure.

### **WEAR RING AND WEAR PLATE REMOVAL/REPLACEMENT**

- Turn off engine to shut down the system. **BE SURE ACCUMULATOR PRESSURE IS RELEASED.**
- At the bell crank, remove cotter pin, castle nut, bell crank, and shift cylinder.

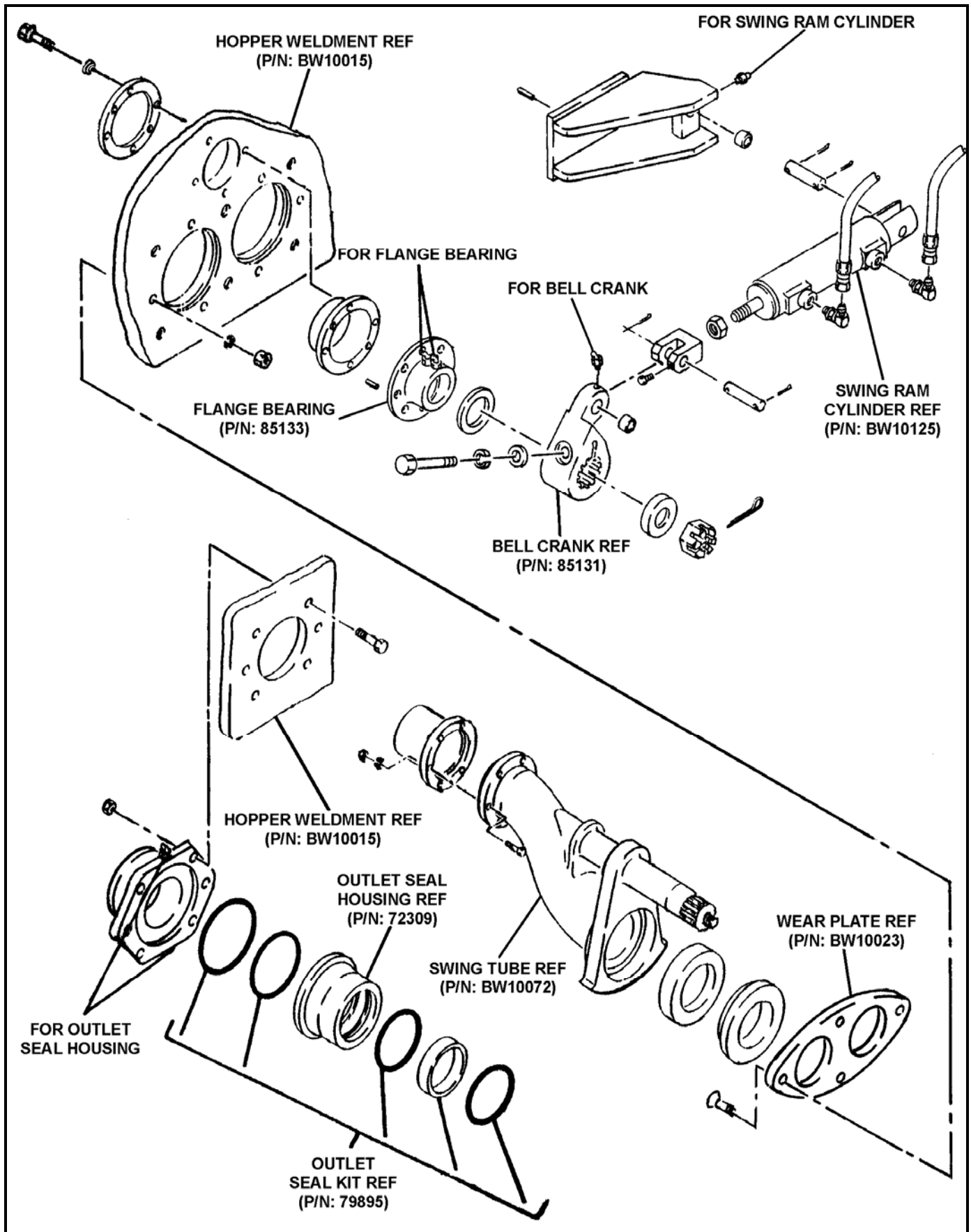


- Place a sling from an overhead hoist around the discharge end of swing tube to help support the tube.
- Unbolt outlet flange from hopper and remove, being careful not to damage any of the seals and o-rings.
- Work swing tube back toward the outlet. It may be necessary to nudge it with a pry bar. **EXERCISE CARE.** The swing tube only needs to be moved toward the outlet a sufficient distance to enable wear ring to be replaced.
- Remove wear ring and thrust ring from inside of swing tube.
- If it is necessary to replace the wear plate, this can be accomplished by backing out the mounting bolts located on the outside back the hopper. The bolts only have to be backed out a sufficient distance to enable wear plate to be removed. Maneuver the wear plate up through the gap between swing tube and hopper.
- Clean out the end of the swing tube where the wear ring will sit. Also clean the surface of the hopper where new wear plate will be installed.

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## RE-ASSEMBLY

- Apply a small amount of general-purpose grease on the outside area of the wear ring and thrust ring. Install both pieces into swing tube.
- Slide the new wear plate down between the swing tube and hopper. Reinstall and tighten the bolts.
- Slide swing tube forward until wear ring is set against wear plate.
- Install outlet flange assembly being careful not to damage any of the seals. Tighten bolts.
- Reinstall bellcrank parts, shift cylinder, and castle nut. Remove sling.
- Adjust the swing tube. Refer to procedure outlined in **ADJUSTMENT SECTION**.

## SWING TUBE REPLACEMENT

The swing tube, like the wear plate and wear ring, is considered a wear item, meaning that it will eventually need to be replaced. When this situation is encountered, the following is offered to assist you in accomplishing the replacement.

### NOTE

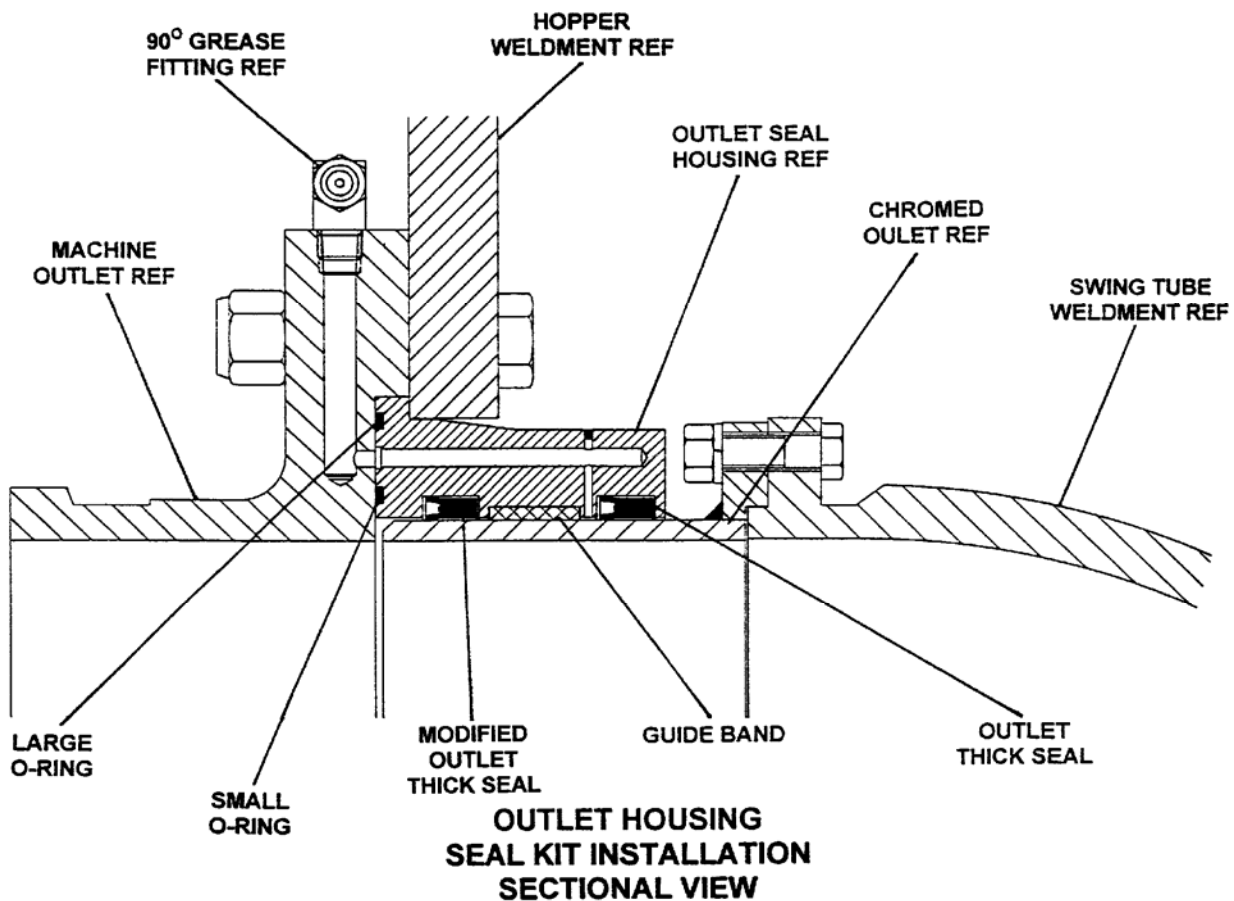
*The removal of the swing tube involves the disassembly of several other wear components. It is suggested that these be replaced as well.*

## REMOVAL

- Turn off engine to shut down the system. **BE SURE ACCUMULATOR PRESSURE IS RELEASED.**
- At the bell crank, remove the cotter pin, castle nut, bell crank, and shift cylinder.

REVISION:

- Place a sling from an overhead hoist around the discharge end of the swing tube to help support the tube.
- Unbolt outlet from swing tube and push outlet as far as possible toward hopper.
- Maneuver and work the swing tube toward the hopper outlet as far as it will go or until end of shaft is inside hopper.
- Using the hoist and sling, lift swing tube out of hopper.



## RE-ASSEMBLY

Before reassembly of the swing tube this is a good opportunity to clean out hopper of cured material, replace wear plate or do any maintenance on the material cylinders.

It is recommended that when the swing tube is replaced that all seals on the outlet and bearing housing be replaced as well as any other wear items. This is good preventative maintenance.





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- Reassemble the swing tube and components in basically the reverse order used in disassembly. Some important items to be noted are:
  - Make sure all components that are to be reused are cleaned from any residual material or grease.
  - Inspect all parts for damage such as nicks, scratches etc.
  - Smear a small amount of clean grease on all seals, polypacks and O-rings before installing.
  - Pay particular attention to the position and direction of seals when installing.
  - Make sure all bolts and nuts are tight.
  - Lubricate as required.
- Test movement of swing tube and make necessary adjustments following the procedure noted in the **ADJUSTMENT SECTION**.

## MATERIAL CYLINDER COMPONENTS

Two (2) material cylinders powered by two (2) hydraulic drive cylinders are arranged in the system to operate alternately. While one cylinder is drawing material into the cylinder tube from the hopper on the retraction stroke, the other cylinder is pushing the material out the swing tube and discharge on the forward stroke. Because of the abrasiveness of the material being pumped, it will be necessary to periodically replace the piston cups.

Some tell-tell signs and identifying systems of worn parts might be:

- A slurry of the material being pumped starts to appear in the flush box.
- The water or lubricating oil, if used, begins to rapidly lower the level without any sign of leakage from the box.
- Operation of the cylinder is rough and erratic.



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## **⚠ WARNING**

*Be sure pressure in accumulator shift circuit has been released before doing any work inside the hopper or inside the flush box.*

## **⚠ WARNING**

*Do not place hands in the water box or in adjacent area while motor is running. Always check that the pressure in the accumulator has been released before performing any work.*

### **PISTON CUP REMOVAL/REPLACEMENT**

- Cycle machine using appropriate controls until one of the cylinders is at full extension. Jog swing tube so that it is shifted over to other cylinder. This will expose fully extended piston.
- Turn off engine and allow pressure to subside.
- Remove the four (4) 3/8 – 20 x 1½” long bolts and lockwashers securing the piston plate, and piston cup to the piston adapter.
- Pry out the old piston cup and plate. Clean piston plate and inspect piston adapter, and clean if needed.
- Apply a good amount of grease on lip of piston cup. Tip should be facing hopper. Insert two (2) 3/8 – 20 x 4 long bolts through piston plate and cup in opposite holes. This will allow you to locate the cup in a correct position for lining up the holes.
- Screw the bolts by hand into the piston adapter. Start the piston cup into the cylinder and using a wooden dowel, tap the piston plate, which will force the piston cup into the material cylinder.
- With the cup against the adapter, insert two (2) of the original 3/8 – 20 x 1½” long bolts and tighten. Remove the two (2 ) long bolts and replace with the originals

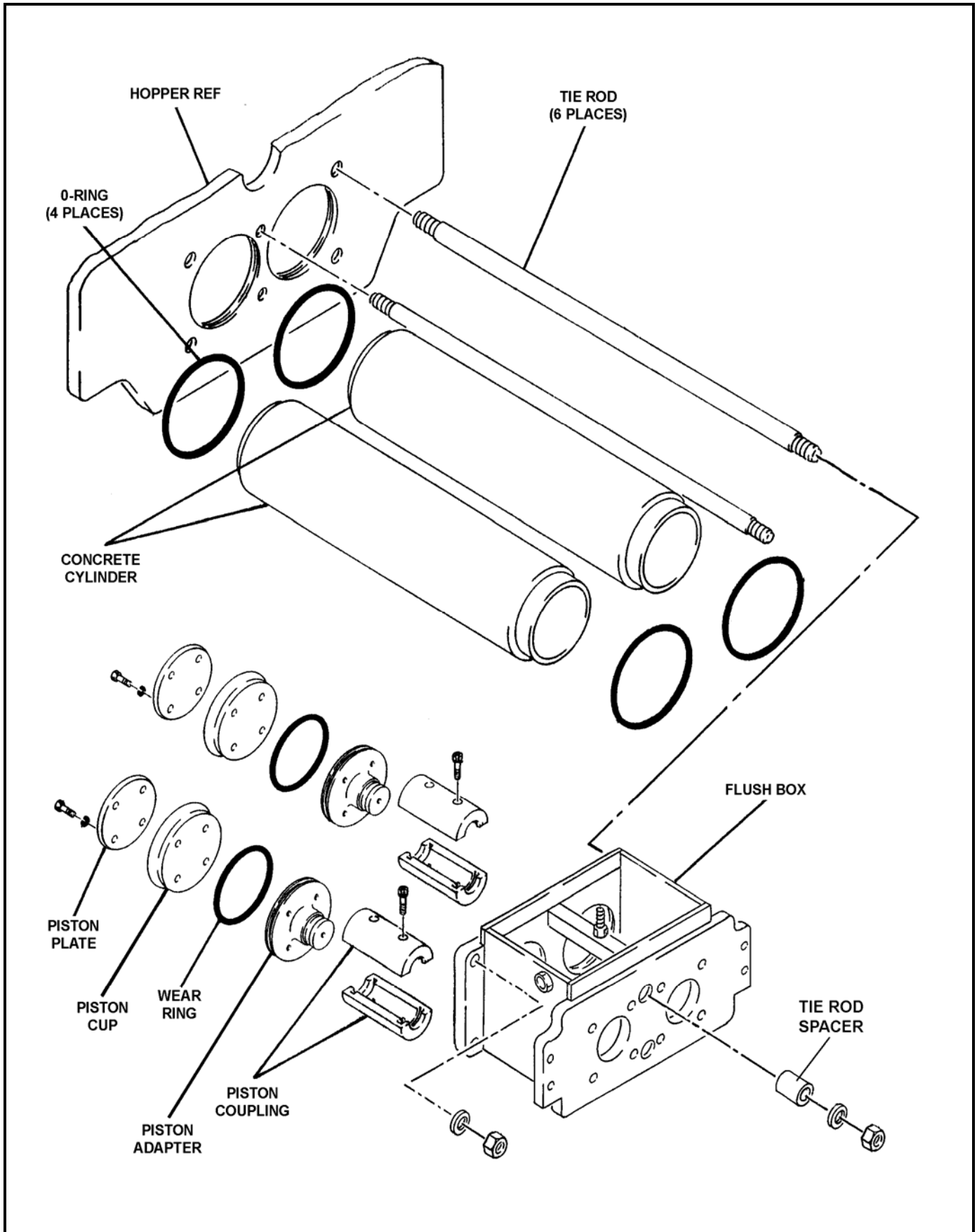
Replace piston cup in other cylinder in the same manner.



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## **PISTON ADAPTER GUIDE RING REMOVAL / REPLACEMENT**

Installed on the piston adapter, is a guide ring that is used as a support and wear ring for the material cylinders. This guide ring will need replacing from time to time and a tell-tail sign is if noise or chatter is heard from the material cylinders. This guide ring cannot be replaced from the hopper end, but must be done at the flush box end. To change the piston adapter guide ring, the following is offered:

- Cycle machine until one of the cylinders is completely retracted. Turn off engine and allow the pressure to subside.
- Drain all oil or water from the flush box.
- As a precaution, mark location of proximity sensor adjusting bracket. Remove proximity sensor cross bracket.
- Mark the end of the piston coupler so that on reassembly, it can be placed in the same relation.
- Unbolt and remove top half of coupler. Pull the piston assembly toward you.
- Inspect piston cup , clean up or if necessary replace.
- Remove old guide ring from adapter and smear some clean grease on the new guide ring. Make sure, that the adapter groove is clean, Install guide ring on adapter.
- Place piston cup assembly into material cylinder at an angle so that center of adapter is angling toward bottom of flush box.
- Pull up on adapter to square up piston assembly.
- Install coupler halves and bolt together.

Follow same procedure to remove and replace the guide ring on the other cylinder. After this installation proceed to:

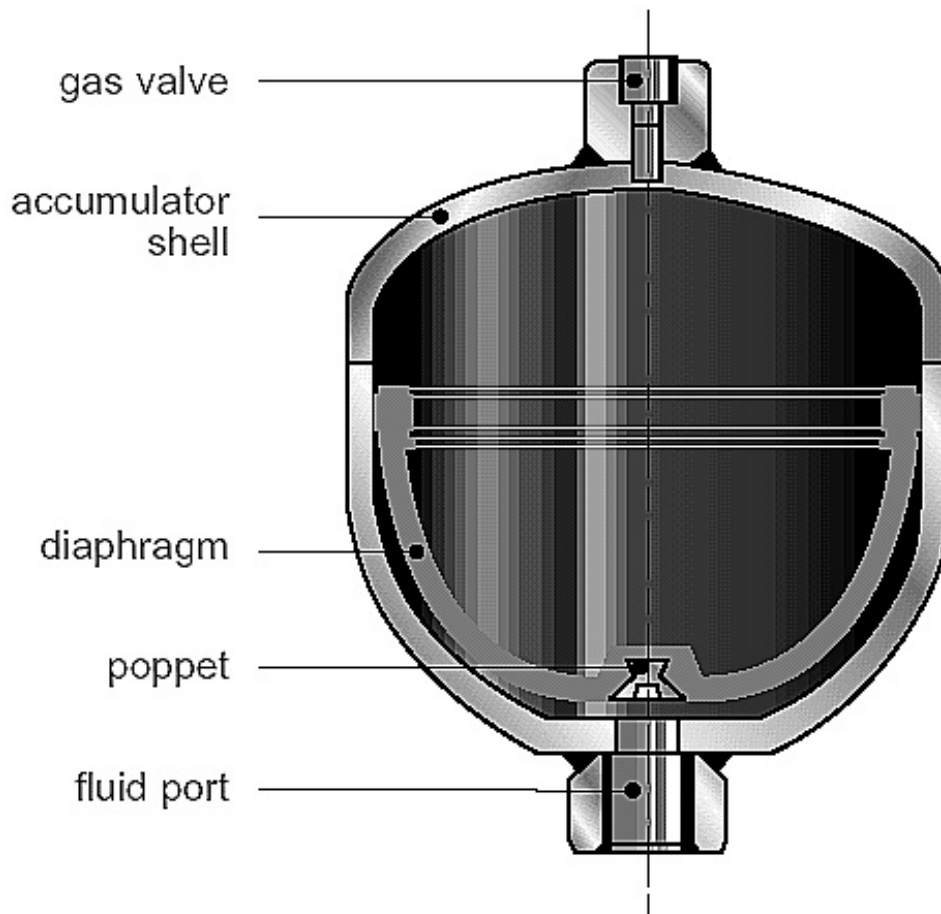
- Replace proximity sensor cross bar and check position of adjustment bracket to previous mark.
- Refill flush box with water or oil.

## ACCUMULATOR

It was noted in the **S-TUBE SHIFT CIRCUIT** description that the S-tube must shift alternately from one cylinder to the other in a synchronized operation. In addition this shift must be almost simultaneously. This instant pressure and volume cannot be provided by the system itself. To compensate for this an accumulator is used.

This is made up with an outer shell or tank, a rubber bladder installed inside the shell, a gas valve with port on top of the shell and a fluid port at the bottom of the shell complete with the necessary valves and seals.

To successfully work in the system and do the job intended the accumulator must first be pre-charged. This operation involved the induction of **DRY NITROGEN GAS** into the bladder to a pressure of 1100 PSI (75.8 BAR). This pressure will vary with each **REED** pump. Check the specifications noted in **MAINTENANCE SECTION, HYDRAULIC DESCRIPTION CHAPTER** of the appropriate manual. This dry nitrogen gas is inserted prior to installation of the accumulator and is used to inflate the bladder much like a balloon.



In operation of the accumulator in the hydraulic system, hydraulic fluid enters the accumulator through the fluid port and fills the area at the bottom between the inner wall of the shell and bladder. The hydraulic fluid enters at a higher pressure, 2000 PSI (140 BAR) than the gas pressure inside the bladder. At the appropriate time in the pump cycle, the cartridge valve of the shift circuit allows the fluid in the accumulator to be discharged and is directed to the shift cylinder. As soon as the fluid is dispersed the accumulator is refilled. This cycle is repeated time after time.

The accumulator is a critical component in the pump operation and at some point in time it will be necessary to service the accumulator which might involve recharging with nitrogen. or replacement. The following is offered to assist you in accomplishing this repair.

**⚠ WARNING**

***The hydraulic accumulator is PRESSURIZED VESSEL and only QUALIFIED TECHNICIANS should perform the necessary repairs. Always drain the fluid COMPLETELY from the accumulator before performing any work on the component.***

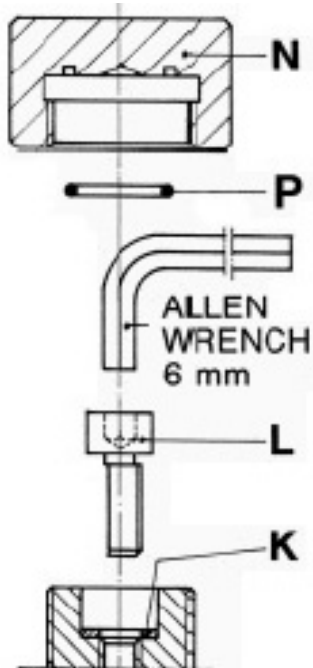
We recommend the following special tools to be on hand to facilitate any work being done on the accumulator:

- **Charging & Gauge Unit**
- **Gas Valve Core Tool**
- **Blunt Flathead Screwdriver**
- **Soft Faced Hammer**
- **Torque Wrenches**



**ACCUMULATOR CHARGE KIT  
(P/N:71460)**

### ACCUMULATOR PART FAMILIARIZATION



- N valve protection cap  
(where applicable)
- M O-ring  
(where applicable)
- L socket head cap screw (M8)
- K seal ring

### PRE-CHARGE PRESSURE

Pre-charge pressure as it relates to the accumulator is the insertion of dry nitrogen gas into the bladder, prior to installation or use. On a new machine the accumulator is pre-charged at the factory. When a replacement is shipped from the factory it is **NOT PRE-CHARGED**. A charged accumulator is a pressurized vessel thus it is against the law to ship by **AIR FREIGHT**.

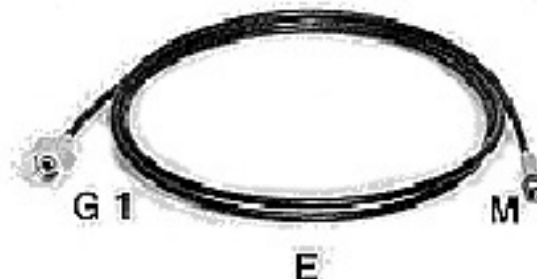
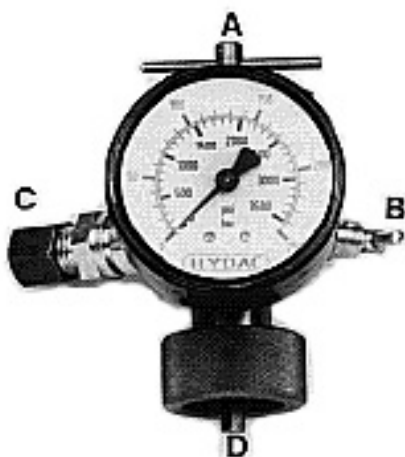
Periodically due to usage or leakage the bladder may loose some of the pre-charge which does affect the operation of the accumulator. As a result it is important that the pressure be checked at least once a year or when there is a noticeable change in the operation. The following is offered to assist you in servicing the accumulator.

### NOTE

*A Charging and Gauge Kit is required to perform maintenance on the accumulator. It is available from the REED Parts Department and you will find that it to be a good investment for your workshop*

## CHECKING PRESSURE

Prior to checking of the accumulator pre-charge pressure the machine must be shut-down and all hydraulic pressure and fluid in the accumulator has been relieved.



- A) "T" handle
- B) Manual bleed valve
- C) Check valve
- D) Cap nut
- E) Charging hose, including cap screw connection

- Unscrew the valve protection cap (**N**). Exercise extreme care not to damage the O-ring (**P**) when removing the cap.
- Before making the installation of the gauge unit to the accumulator, turn the "T" handle (**A**) counterclockwise until some resistance is felt. Check that the manual bleed valve (**B**) is closed. Hand tight only.
- Install gauge unit on the accumulator by screwing the cap nut (**D**) onto the gas valve. Hand tighten.
- Proceed to turn T-handle counterclockwise a maximum of 3 full turns from the full clockwise position.
- The gauge should then indicate the pre-charge pressure. Refer to specifications for correct pressure:
  - If pressure reading is **TOO LOW** then accumulator will need **RECHARGED**.
  - If pressure is **TOO HIGH** then it will be necessary to **RELEASE** pressure.





## **RELEASE OF PRESSURE**

When gauge indicates that the pre-charge pressure is too high proceed as follows to release some of the pressure within bladder.

- With gauging valve installed, carefully open the **MANUAL BLEED** valve (**B**), releasing some of the nitrogen gas.
- While doing this observe gauge until sufficient gas has been released and desired pressure has been reached.
- Close the manual bleed valve (**B**). Wait approximately 10 minutes for the pressure to stabilize, then recheck and if necessary adjust accordingly.
- To remove the gauging unit, turn “**T**” handle until resistance is felt to close the gas valve. Open manual bleed valve.
- Disconnect the gauging unit by unscrewing the cap from the gas valve. Screw on valve protection cap, hand tight.

## **INCREASE PRE-CHARGE PRESSURE**

In checking the pre-charge pressure if it is found to be too low then add nitrogen gas as follows:

- Install gauging unit as previously described. Turn “**T**” handle counterclockwise until needle on gauge begins to move then from this point turn it another full turn.

### **▲ WARNING**

***USE DRY NITROGEN GAS ONLY - NEVER USE OXYGEN OR AIR. THIS COULD CAUSE AN EXPLOSION.***

- Connect the charging hose to the cap screw adapter and to the nitrogen bottle discharge. It is recommended that the commercial nitrogen bottle be equipped with a regulator to adjust pressure. Full pressure may damage gauge.
- Open the shut-off on the nitrogen bottle and slowly fill the accumulator. Charging too quickly may damage the accumulator.

**NOTE**

*The gauge on the gauging unit during pre-charge registers the incoming line pressure and not necessarily the accumulator pressure while charging.*

- The accumulator pressure can be checked by first closing the shut-off valve on nitrogen bottle.
- Allow a few minutes for the temperature and pressure in the accumulator to stabilize.
- Check the accumulator pressure as previously described, then fill or release pressure as required.
- Close shut-off valve on the nitrogen bottle. Turn “T” handle clockwise to close gas valve.
- Open bleed valve, disconnect charging hose and remove gauging unit from accumulator. Reinstall hex cap and protective cap.

