Instruction Manual
for:
DUPPS
3600B Series
Dewatering Press

- Installation
- Operation
- Maintenance
- Repair

Publication No. 80-9401
This manual contains specifications, operating and service procedures, and illustrated parts listings for the Dupps 3600B Series Dewatering Presses.

This manual includes information that pertains to all Dupps 3600B Series Dewatering Presses. However, each individual press is uniquely configured for its specific application. The Configuration Sheet in this section of the manual lists specifications and part numbers for your press.

The service procedures in this manual describe regular maintenance, troubleshooting, disassembly, and assembly of selected press components. Appendix C includes information provided by the manufacturers of commercial components that are not covered in the service instructions. Contact your authorized Dupps service representative or the component manufacturer before performing service procedures that are not described in this manual.

Carefully read the instructions and safety precautions given in this manual. Do not service the press until you have read this manual thoroughly.

At the time of writing, this manual was completely up-to-date. However, due to continual design improvement, some descriptions and/or illustrations in this manual could vary slightly from the machine delivered to you. If you have questions regarding safety, construction, or service of this machine, please contact your authorized distributor:

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Appendix A Recommended Tools for Oupps Dewatering Press

A.1 Recommended Tools
- Wrenches
- General Tools
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Chapter 1

Description and General Specifications

This chapter of the manual contains three sections. Section 1.1 provides a brief description of the dewatering press and how it extracts liquid from water-laden material. Section 1.2 contains specifications for the press and most of its component parts, including utility requirements, lifting weights, capacities, etc. Section 1.3 provides installation requirements and instructions.

1.1 Process Description

The Dupps Dewatering Press is designed to remove liquid from paper waste sludge. The Dewatering Press performs one operation in the dewatering process, producing a dry cake which is suitable for further processing in other equipment.

Pre-thickened sludge material enters the press through the feed hopper. In the feed hopper, some of the water in the material drains out due to the force of gravity. Flights on the rotating press shaft convey the material toward the discharge box at the other end of the press. As the material approaches the discharge end of the press, it is compressed between the increasing root diameter of the press shaft and the screens surrounding the shaft. The resulting high pressure forces more water out of the material.

A pneumatically controlled, adjustable choke at the press discharge allows the operator to control the amount of pressure exerted on the cake. The dried cake discharges through the choke opening into the discharge box.

The liquid that is pressed out of the cake collects in the drain pan, which is part of the press underframe. The liquid is discharged through a flanged opening in the drain pan.

Figure 1.1 identifies the major press components.
WARNING — ILLUSTRATION: To clearly show certain details in the illustration, the press may be shown with some covers, guards, or other safety equipment removed or in the open position. Be sure all covers and guards are in place before operating the press. Failure to follow this instruction can result in serious personal injury.

1. Rotary Steam Joint
2. Thrust Bearing
3. Bearing Drain
4. Feed Hopper
5. Primary Cages
6. Intermediate Cage
7. Discharge Cage
8. Discharge Box
9. Choke
10. Pillow Block Bearing
11. Drive Coupling
12. Motor and Gearbox
13. Press Underframe
14. Lifting Shackles

Figure 1.1-1
APP 3600B Series Dewatering Press
1.2 Specifications

**General Specifications**

See the Installation information section of this chapter for overall dimensions and required clearances for the Dupp 3600B Series Dewatering Press. Full specifications for each press component are listed in the Configuration Sheet in the Introduction section of this manual.

**Weights for Lifting**

This section lists the weights for the 3600B Series presses. These weights are approximate. They should be used as an aid for estimating the required capacity of lifting equipment needed to move the press.

The weights of the individual components of the press are given under the heading Component Specifications. Some procedures require assembled components to be lifted; for example: the shaft with bearings mounted. In these cases, be sure to add up the weights of all the components to find the total load to be lifted.

**Press Weights**

With gear box & oil:
- Model 3624B: 56,000 lb
- Model 36208: 52,000 lb
- Model 3616B: 49,000 lb

With gear box removed:
- Model 3624B: 35,000 lb
- Model 36208: 31,000 lb
- Model 3616B: 28,000 lb

**Component Specifications**

**Press Shaft**

Wright, lb (Feed end / Drive end / Total):
- Model 3624B: 4000 / 5300 / 9300
- Model 36208: 3700 / 4000 / 7700
- Model 3616B: 2800 / 4000 / 6800

Torque capacity, input (maxi):
- Single Flighted: 1.3 million in-lb
- Double Flighted: 1.8 million in-lb
Feed Hopper & Cages

Weight, total (2 halves)
  Feed Hopper: 1750 lb
  Cage: 1750 lb

Cage-to-Flight Radial Clearance
  \( \frac{1}{16} \) min
  \( \frac{1}{8} \) max

Choke

Weights
  Face ring: 120 lb
  Backing ring: 220 lb
  Air cylinder (each): 200 lb

Gearbox

Type: Falk 2177YN4

Weight
  Dry: 16,500 lb
  W/ oil: 18,000 lb
  W/ oil, motor & drive: 21,000 lb

Lubricant
  Capacity: 225 US gal (1700 lb)
  Type: Mobilgear 632 oil

Gear Coupling

Type: Zum special FA-209
Weight: 1500 lb

Hub Gap (inch): 2.10 / 1.98

Misalignment, max at setup
  Angular: .058 inch
  Parallel: .035 inch

Lubricant
  Capacity: ! 2.5 L'S pt
  Type: Mobilux EP 0 grease
**Pillow Block Bearing**

Weights
- Complete Assy: 660 lb
- Bearing: 125 lb
- Adapter w/Nut: 35 lb
- Housing: 500 lb

*Internal clearance* (inch): .009 / .006

End Rotat *Allowance, (min)*: 1 ¼ inch

Lute type: Mobilith SHC 1500 grease

**Thrust Bearing**

Weights
- Beating housing: 290 lb
- Bearing plate: 100 lb
- Radial Bearing: 27 lb,
- Thrust Bearing: 30 lb

Lube type: Mobilith SHC 1500

**Rotary Steam Joint**

Type: Johnson 275OL1-NAR

Weight: 100 lb

**Utility Requirements**

**Electrical (w/ 50 hp motor)**

Volts: 460
Amps: 62
Hertz: 60

**Compressed Air**

Start-up: 40 scfm at 100 psig
Operating: 5 scfm at 100 psig

**Steam (Optional)**

500 lb/hr (min) at 100 psig (max)
Inlet size: 3 NPTF
Condensate drain: 1 ½ NPTF
1.3 Installation Information — 3600B Series

Before the initial start-up of the dewatering press, an authorized Dupps field service technician must be called in to oversee the mechanical installation and alignment procedures. The field service technician will ensure that the installation is performed according to the pre-start checklist, and that the checklist is properly filled out to keep the warranty in effect.

Utility Requirements

Utilities requirements are listed in the Specifications section of this chapter.

Steam Connection

The piping required for the steam inlet and condensate drain is shown schematically in Figure 1.3-1. The figure also lists the materials required for proper connection to the facility supply and drain.

The rotary steam joint must have steam flowing through it during operation. Incoming steam lubricates the steam joint’s inrerior carbon seals. Operating the rotary steam joint without steam will ruin the seals and render the rotary joint inoperable. Therefore, if the press is to be operated without steam applied to the shaft, remove the rotary steam joint before putting the press into service. See CAUTION. Removal of the steam joint is explained in the Component Disassembly and Assembly chapter.

Feed Hopper Connection

The maximum allowable weight that can be supported by the press feed hopper is 4100 pounds. The device used to feed the press must be designed and supported so that, when it is full of material, the weight on the feed hopper does not exceed this limit. The foundation loading is increased by an amount equal to any load added by the feed device.

Torque Limits

The maximum allowable input torque to the press shaft (gearbox output torque) is listed in the Specifications section of this chapter. Two figures are shown for single fluting and one for double fluting. The press may be operated continuously at the input torque indicated for the shaft configuration installed in the press.

CAUTION:
If the press is to be operated without steam applied to the shaft, remove the rotary steam joint before putting the press into service. Failure to follow this instruction will damage the steam joint.
1 3" QAL SS Braided hose w/flanges
2 Gage 0-200 PSIG
3 Pigtail 180 1/2" Std Tubing
4 1/4" Ball Valve
5 1 1/2" QAL SS Braided Hose w/NPT Nipples
6 1 1/2" "Y" Strainer
7 1" Ball Valve (strainer blowout)
8 1 1/2" #215 Armstrong Steam Trap (inv bucket)
9 1/2" Erwel #as-225 Thermostatic Air Vent
10 1/2" Johnson #VB8-51-BR-TSE Vacuum Breaker
11 1 1/4" Kunkle #6010FF Pressure Relief Valve

Figure 1.3-1
Rotary Steam Joint Piping
The standard shaft configuration of the Dupps Dewatering Press has a single lead flight from inlet to choke. Applications requiring input torque higher than that shown for single-flighted shaft require double flighting on the last two flight pitches at the choke end of the shaft. Additional flighting is normally added as a field modification. It is required. Operating the press above the specified shaft torque limits could result in damage to the press. The control system should be designed and operated to protect the press from electrical or mechanical overload. See CAUTION.

Working Clearances

Figure 1.3-2 shows minimum working clearances required to perform maintenance on the press.

Lifting the Press

The press can be lifted by means of an overhead device attached to the lifting shackles at the four lift points provided in the underframe. The lift points are identified in Figure 1.1-1. Remove the gear box before lifting the press in this manner. If the gear box is mounted on the underframe when the press is lifted, the cantilevered weight of the gearbox could damage the underframe. See CAUTION. The weights of the Dupps 3600B Series dewatering presses are in listed in the Specifications section of this chapter.

Use a spreader beam to obtain vertical lifting at all four lift points. Make sure the chains or cables used for lifting do not contact the cage covers. This condition could result in damage to the covers or their supporting framework.

Removal of Shipping Braces

Four shipping braces protect the cages and cage adjustment assemblies from damage during shipment. The braces are welded to the underframe at the locations of the innermost cage adjustment assemblies and bolted to the cages at the split flange. The words, "REMOVE BRACE SHIPPING ONLY", are stenciled on each brace.

After moving the press to its final position:
1. Remove the bolts securing the braces to the cage flange
2. Cut the welds that secure the braces to the underframe
3. Remove and discard the braces.
4. Apply anti-seize compound to the flange bolts and re-install the flange bolts through the cage flanges. Assemble the lock washers and nuts to the bolts.
5. Tighten the bolts to the torque values specified in the Specifications section of this chapter.

6. Jam nuts are provided, but not assembled when the shipping braces are installed. They are usually wired to the cage near the shipping braces. Install and tighten the jam nuts.

Securing Press Underframe to Foundations

Before securing the press underframe to its foundations, install the coupling halves and gearbox in the order listed below. This is the procedure used to establish coupling alignment at the factory. If this procedure is not followed, proper alignment of the gearbox and coupling may not be possible.

1. Install the two halves of the coupling on the press shaft and the gearbox output shaft.

2. Set the gearbox in position on the press underframe.

3. Secure the press underframe to the foundation.

4. Align the coupling using the hub gap settings and alignment tolerances given in the Specifications section of this chapter. Refer to the manufacturers' gearbox and coupling installation instructions in Appendix C for alignment procedures.

Gearbox Lubrication

The gearbox features oil dams to hold lubricant in the bearings when the shafts are not turning. Since the gearbox has been idle for an extended period during shipment these oil dams could be empty. Starting the unit with dry bearings will result in early bearing failure. Therefore, prior to starting the unit for the first time, remove the inspection cover and flood the oil troughs and the input shaft bearings with oil. Install the inspection plate.

Check the level of the lubricant in the gearbox. If the level is low, add oil to the level marked on the dipstick.

Refer to the Maintenance and Lubrication chapter of this manual for recommended lubricants. See the manufacturer's literature in Appendix C for further information on gear box maintenance.

Drive Coupling Lubrication

The drive coupling is shipped in two pieces. One half is attached to the press shaft and the other half is attached to the output shaft of the gearbox. After installing the gear box and joining the coupling halves, fill the coupling with lubricant before putting the press into service. For first-time lubrication at installation, follow the instructions for drive coupling.
lubrication at six month intervals. **These instructions are found in the** Maintenance and Lubrication chapter of this manual.

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**Cage and Shaft Alignment**

A small clearance between the press shaft **flighting** and the inside surface of the cage **screens** is critical to proper functioning of the press. Although the cages were aligned with the shaft at the factory, they often become misaligned during shipping, handling, and installation. Therefore, the cages must be aligned after the press is installed on its permanent foundation and before start-up. The initial cage alignment procedure is described in the Service Instructions chapter of this manual. To keep the warrant in effect, be sure to have a factory authorized service technician present to supervise the work.

---

**Cleaning Precautions**

If an abrasive cleaning procedure, such as sandblasting, is to be performed on or around this equipment, take steps to protect the equipment from the abrasive cleaning agents. These abrasive materials remain suspended in the air for long periods after cleaning. When these materials settle out of the air, they can get into bearings, seals, and other critical machine components, causing serious damage. If planning such a procedure, contact the factory for specific recommendations.
Chapter 2

Maintenance and Lubrication

This chapter provides specific recommendations for periodic maintenance. It also gives detailed information about recommended lubricants, lubrication schedules, and procedures.

2.1 Routine Cleaning and Inspection

**WARNING:**
Turn off the Dewatering Press main circuit breaker and lock if before performing maintenance. Failure to follow this instruction can result in serious personal injury.

**Before performing service** on the press, turn off the Dewatering Press main circuit breaker and lock it to prevent the press from being started during service operations. See WARNING.

**Cleaning**

Clean the press using the following procedure prior to inspection or service:

1. Clean the press with water spray.
2. Remove all dirt and debris from the press.
3. Spray the drain pan clean, remove any obstructions in the drain pan and facility drain.

**Inspection Schedule**

Figure 2.1-1 lists inspection requirements.
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<td>Air FLR Unit (Filter/Lubricator/Regulator)</td>
<td>Daily</td>
<td>Check oil level in lube reservoir; add oil (specified in “Lubrication section”) to maintain indicated level. Open drain valve to blow water from filter/sePARATOR and drip leg.</td>
</tr>
<tr>
<td>Air and Steam Lines</td>
<td>Daily</td>
<td>Inspect all compressed air and steam supply lines and connections for leaks.</td>
</tr>
<tr>
<td>Seals, Gaskets, O-Rings</td>
<td>Daily</td>
<td>Check for leaks around the thrust bearing, pillow block, drive coupling, and gear box. Tighten fasteners at leaking joints. If a leak persists, install a new seal.</td>
</tr>
<tr>
<td>Drain Pan and Facility Drain</td>
<td>Daily</td>
<td>Inspect for blockage. Remove obstructions.</td>
</tr>
<tr>
<td>Drive Belts</td>
<td>Weekly</td>
<td>Remove cover on belt housing. Check belt condition and tension. Replace worn or damaged belts. Re-install housing cover.</td>
</tr>
<tr>
<td>Cage Jacking Screws</td>
<td>Weekly</td>
<td>If screws are loose, adjust screen to tight clearance and tighten jacking screws. Refer to “Service Instructions” chapter for details.</td>
</tr>
<tr>
<td>Thrust Bearing Seal Drain</td>
<td>Monthly</td>
<td>Check thrust bearing seal drain for blockage. The drain directs any liquid or grease leaking past the shaft seals back to the drain pan. Check the drain for grease or other obstructions. Remove obstructions to allow free drainage.</td>
</tr>
<tr>
<td>Condensate Return Line</td>
<td>Weekly</td>
<td>Check the strainer in the condensate return line for debris that has been flushed out of the system. Check frequently after initial start-up. Most of this debris will eventually be flushed out, requiring less frequent inspections.</td>
</tr>
<tr>
<td>Cage Clearance</td>
<td>1 to 3 Months</td>
<td>Check the flight-to-screen clearance. Adjust, if necessary. Refer to “Service Instructions” chapter for details. The time interval between subsequent clearance measurements can be more than 3 months if the wear rate is low.</td>
</tr>
<tr>
<td>Press Shaft</td>
<td>1 to 3 Months</td>
<td>Check the wall thickness with an ultrasonic thickness tester. Record measurements on the Sounding Sheet for this press. The time interval between subsequent “sounding” can be established after wear characteristics are known. The minimum shaft wall thickness is listed on the Configuration Sheet for this press. See “Service Instructions” chapter of this manual for more information.</td>
</tr>
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Figure 2.1.1
Inspection Schedule
2.2 Lubrication

The various major components on the dewatering press that require regularly scheduled lubrication are shown and identified in Figure 2.2-1.

![Diagram of dewatering press components](image)

**Figure 2.2-1**
Lubrication (Component Locations)

**Recommended Lubricants**

Figure 2.2-2 lists recommended lubricants to use for each press component. Dupps' experience with Mobil products has been good, and most of the lubricants named here are products of the Mobil Oil Corporation. The use of equivalent lubricants is acceptable. However, with the large number of lubricant manufacturers and continuing product development, the Dupps Company cannot evaluate and certify specific brands of lubricants. The lubricant supplier should certify equivalency to the reference products listed in this manual.

Mobil lubricants with prefix SHC (example: SHC1500) have a synthetic hydrocarbon base. Note that synthetic lubricants from different manufacturers could have different chemical makeup, making them incompatible with each other. Do not mix synthetic based lubricants from different manufacturers in the same unit or component.

**Lubrication Schedule**

The chart in Figure 2.2-3 gives the lubrication schedule for the press. The chart also describes the procedure for lubricating each of the components.

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>LUBRICANT SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrust Bearing</td>
<td>Mobilith® SHC 1500 grease or equivalent</td>
</tr>
<tr>
<td>Preload Bearing</td>
<td>Mobilith SHC 1500 grease or equivalent</td>
</tr>
<tr>
<td>Gear Coupling</td>
<td>Mobilith® EP C grease or equivalent</td>
</tr>
<tr>
<td>Gear Box</td>
<td>Mobilgear® 632 or equivalent</td>
</tr>
<tr>
<td>Pillow Block Brg</td>
<td>Mobilith SHC 1500 grease or equivalent</td>
</tr>
<tr>
<td>Air Fld unit</td>
<td>Mobilith® DTE 26 ad or equivalent</td>
</tr>
</tbody>
</table>

Mobil, Mobilith, Mobilgear, and Mobilux are trademarks of the Mobil Oil Co.

**Figure 2.2-2**
Lubricant Specifications
<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>INTERVAL</th>
<th>PROCEDURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air FLR Unit Filter Lubricator Regulator</td>
<td>Daily</td>
<td>Check oil level in lube reservoir; add $d$ (see Figure 2.2.2) to maintain indicated level.</td>
</tr>
<tr>
<td>Thrust Bearing</td>
<td>4 weeks</td>
<td>Use the procedure given in Figure 2.2.4.</td>
</tr>
<tr>
<td>Gear Coupling</td>
<td>1 week</td>
<td>Check the coupling for grease leakage around the hubs and at the flange. If significant leakage is noticed, lubricate the coupling by following the instructions below for six-month interval.</td>
</tr>
<tr>
<td>Gear Box</td>
<td>1 week</td>
<td>Check oil level when drive is stopped and at ambient temperature. Add specified lubricant to level marked on dipstick.</td>
</tr>
<tr>
<td>Thrust Bearing</td>
<td>6 months</td>
<td>Disassemble, clean, and repack bearings with fresh grease.</td>
</tr>
<tr>
<td>Pillow Block Bearing</td>
<td>6 months</td>
<td>Remove the pipe plug in the bearing cap. With the shaft rotating, add specified lubricant through the grease fitting in the base of the bearing housing up to 3 oz (approx. 1 cup) of grease is expelled from the hole in the cap. Before re-installing the cap plug, allow the shaft to operate for 10 to 30 minutes at full operating temperature. This allows the grease to expand, forcing the excess out the plug hole, relieving internal pressure. Install the pipe plug in the cap.</td>
</tr>
<tr>
<td>Gear Coupling</td>
<td>6 months</td>
<td>Remove the coupling guard to gain access to the coupling. With the shaft at full operating temperature, remove the plugs from the sleeves of the gear coupling. Install a grease fitting into one of the holes and pump in grease. Fill until new grease begins to flow out one of the holes. Then, plug the hole and continue filling. Continue this procedure until all the holes are plugged. The displaced volume of grease will be approximately equal to the capacity of the coupling (see the &quot;Specifications&quot; section of Chapter 1). Remove the grease fitting and re-install the plug. Install the coupling guard.</td>
</tr>
<tr>
<td>Gear Box</td>
<td>6 months</td>
<td>Drain and refill to level marked on dipstick with specified lubricant. The oil capacity of the gear box required is listed in the &quot;Specifications&quot; section of Chapter 1.</td>
</tr>
<tr>
<td>Gear Box Input &amp; Output Seals</td>
<td>6 months</td>
<td>Purge contaminated grease from seals as follows: Slowly pump NLGI #2 grease with a hand grease gun until fresh grease flows out along the shaft. Wipe off purged grease. CAUTION: Rapid greasing with a power grease gun can force grease inward past the seals and plug the drain system causing seal to leak.</td>
</tr>
</tbody>
</table>

Figure 2.2.3

Lubrication Schedule and Procedures
To lubricate the thrust bearing assembly, make sure the shaft is at full operating temperature. Then, with the shaft rotating:

1. Remove pipe plugs at points A and B.
2. Slowly pump grease through fitting at point C using a hand grease gun.
3. When grease comes out of one of the plug holes A or B, reinstall the pipe plug in the hole.
4. Continue pumping grease into fitting C until 7 oz (approx. 1 cup) of grease is expelled from the remaining (unplugged) plug hole.
5. Before reinstalling the pipe plug in the hole, allow the shaft to run for 10 to 30 minutes at normal operating temperature. This allows the grease to expand, forcing the excess out the plug hole, relieving internal pressure.
6. Run water into the seal cavity D to make sure the seal cavity and drain are not clogged with grease. Water should drain freely through hole E into the drain pan.
### 3.1 Troubleshooting Procedures

Figure 3.1-1 lists problems that can occur while the press is operating. If a problem occurs during start-up check **power**, compressed air, and **steam supplies to the press**. Clean and inspect the press (refer to the **Maintenance** and Lubrication chapter) before attempting to isolate the cause of a malfunction.

*Probable causes are* listed for each problem. In most cases the remedy is obvious from the statement of the cause.

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed rate too high.</td>
<td><strong>Choke</strong> pressure too high.</td>
<td>Reduce feed rate. Increase press speed. Reduce choke pressure.</td>
</tr>
<tr>
<td>Press speed too low.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Choke pressure too high.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive belt slipping.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cages out of <strong>alignment</strong>.</td>
<td>Worn press shaft <strong>flighting</strong>.</td>
<td></td>
</tr>
<tr>
<td>Choke retraction frequently.</td>
<td><strong>Drive motor</strong> overloaded.</td>
<td>Reduce choke pressure and/or increase press speed.</td>
</tr>
<tr>
<td>Feed stopping frequently</td>
<td><strong>Drive motor</strong> overloaded.</td>
<td>Reduce <strong>choke pressure</strong> and/or Increase press speed.</td>
</tr>
</tbody>
</table>

![Figure 3.1-1 Troubleshooting Chart](image-url)
<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cages out of alignment</td>
<td>Adjust cage screen-to-flighting clearance.</td>
</tr>
<tr>
<td></td>
<td>Worn press shaft flighting.</td>
<td>Replace cage screen-to-flighting clearance.</td>
</tr>
<tr>
<td></td>
<td>Choke pressure too low.</td>
<td>Replace cage screen-to-flighting clearance.</td>
</tr>
<tr>
<td></td>
<td>Plug length too short.</td>
<td>Increase plug length.*</td>
</tr>
<tr>
<td></td>
<td>Choke malfunctioning due to worn or damaged choke ring or pneumatic</td>
<td>Complete the following:</td>
</tr>
<tr>
<td></td>
<td>cylinders.</td>
<td>Replace cage screen-to-flighting clearance.</td>
</tr>
<tr>
<td>Drive motor stops under load.</td>
<td>Choke pressure too high and/or choke not relieving under high motor</td>
<td>Check choke pressure and operation of motor overload choke controls.</td>
</tr>
<tr>
<td></td>
<td>load.</td>
<td>Increase press speed.</td>
</tr>
<tr>
<td>Discharge cake OK but choke</td>
<td>Insufficient supply of compressed air.</td>
<td>Make sure choke pressure regulator is set correctly. Repair any</td>
</tr>
<tr>
<td>moves too slowly or erratically</td>
<td></td>
<td>leaks in compressed air lines or pneumatic cylinders.</td>
</tr>
<tr>
<td>Unusual noise or vibration.</td>
<td>Loose covers, housings, or guards; loose sheaves or drive belts.</td>
<td>Tighten all loose fasteners. Replace missing fasteners.</td>
</tr>
<tr>
<td></td>
<td>Foreign material in press.</td>
<td>Small amount of small material will pass through the press. Remove</td>
</tr>
<tr>
<td></td>
<td></td>
<td>large material by removing cage(s) to gain access. Find and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>eliminate the scum of the material.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Repair gearbox.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace the worn bearing(s).</td>
</tr>
<tr>
<td></td>
<td>Gear box malfunction.</td>
<td>Adjust cage screen-to-flighting clearance.</td>
</tr>
<tr>
<td></td>
<td>Worn thrust bearing or pillow block bearing.</td>
<td>See &quot;Service Instructions&quot; chapter.</td>
</tr>
<tr>
<td></td>
<td>Shaft flighting contacting cage screens.</td>
<td></td>
</tr>
</tbody>
</table>

* Contact factory representative before making plug length adjustments.

Figure 3.1-1 (continued)
Troubleshooting Chart
3.2 Operation — Start-up

**WARNING:**
Make sure all covers and guards are properly installed before starting the press. Stop the press before attempting to clear obstructions from the press. Failure to follow this instruction can result in serious personal injury.

**CAUTION:**
Be sure the choke is off before starting the press. Failure to follow this instruction can result in damage to the press.

---

**Before** putting the press into operation, make sure the press is properly lubricated and in good working order (See the Cleaning, inspection and Lubrication chapter.) and all covers and guards are properly installed. Make sure the press is clean and free of obstructions. Stop the press before attempting to clear obstructions from the press. See WARNING.

Use the following sequence for normal start-up and operation.

1. Turn the choke off. See CAUTION
2. Start the cake discharge handling equipment.
3. Turn on the steam supply to the press, if so equipped.
4. Pull out the PRESS START/STOP button to start the press.
5. Adjust the press speed to normal operating speed. If a "normal" speed has not been established, use 1 rpm as a starting point.
6. Set the PRESS SPEED selector to VARl.
7. Start the press feed system to begin feeding material into the press feed hopper.
8. When cake appears at the discharge end of the press, turn the choke on. Adjust the choke pressure to 10 psi.
9. Check the cake being discharged. If the cake is thin or discharges in spurts, increase the press feed rate until the incoming material covers the shaft flighting in the feed hopper.
10. Operating conditions will determine whether further adjustments to the press are necessary. The desired output rate and consistency of discharge cake can be obtained by balancing the press speed, choke pressure, and feed rate as described below:
   a. The feed rate must be sufficient to keep the press shaft flighting; in the feed hopper covered with incoming material without overfeeding the hopper. A constant level of material in the feed hopper is best for proper operation. The feed rate is directly affected by the press speed. For example, an increase in press speed requires a corresponding increase in feed rate.
   b. The press speed and choke pressure together determine the consistency (dryness) of the discharge cake. In general, dry cake results from low press speed and high choke pressure; and wet cake results from high press speed and low choke pressure.
c. Press speed and choke pressure also determine press output rate. Low press speed and high choke pressure reduce the rate of output; high press speed and low choke pressure increase the output rate. Under certain conditions, it may be necessary to sacrifice discharge cake dryness to obtain the desired output rate.

11. If the desired consistency or output cannot be achieved, shut the press down (see "Shutdown Procedures" in this chapter) and refer to the section in this chapter headed "Troubleshooting" or contact your Dupps service representative.

12. Plug Length. The section of the press shaft between the end of the shaft flighting and the discharge box is referred to as the plug. The length of the plug directly affects cake dryness. Generally, the longer the plug is, the dryer the cake will be.

The plug length on each press is adjusted by start-up personnel to give the best cake dryness for each application. If feed characteristics change after start up, the plug length may need to be adjusted to give the best press performance and cake dryness. For more information, see "Shaft Repairs and Alterations" section in the "Service Instructions" chapter of this manual.
3.3 Shutdown Procedures

This section gives procedures for normal and emergency shutdown of the press.

Normal Shutdown

The normal shutdown procedure allows sufficient time to clear all material from the press.

1. Stop the feed system.
2. Turn off the steam supply to the press shaft.

NOTE: Turn off the steam immediately after stopping the feed system. Steam applied to the shaft will cause the cake plug to harden at the discharge opening. The hardened cake plug could prevent the press from re-starting. In this event, the cake plug must be removed manually prior to restarting the press.

3. Continue to operate the press with the choke on until all material has been processed through the press.
4. Turn the choke off and allow sufficient time for the press to discharge any residual material.
5. Stop the press and turn off the cake discharge handling system.

Emergency Shutdown

Use the emergency shutdown procedure if operator safety is at risk; or if the press is not operating correctly (excessive noise or vibration), or stops suddenly while in operation.

1. Push in the PRESS START/STOP button. This action stops the press and the feed system simultaneously.
2. Stop the cake discharge handling system.
3. Turn the choke off.
4. Turn off compressed air and steam supply connected to the press. Relieve air and steam pressure from lines. See DANGER.
5. Turn off the Dewatering press main circuit breaker and lock it out.
6. Refer to the Troubleshooting section of this chapter to locate and correct the cause of the problem.

DANGER:
Relieve air and steam pressure from lines prior to maintenance. Failure to follow this instruction can result in serious personal injury or death.

NOTE: Clear the material out of the press as soon as possible after shutting down. If the press is off, shut down a loaded condition for an extended period of time (12 hours or more, depending on conditions), the material in the press can dry out, making the press difficult or impossible to start.
Chapter 4

Service Instructions

WARNING:
Contact your authorized Dupps service representative before performing service procedures that are not described in this manual. Failure to follow this instruction can result in serious personal injury.

This chapter contains maintenance and repair service procedures for the Dupps Dewatering Press. Refer to the Specifications section of Chapter 1 for specific data such as set-up dimensions and weights of components for lifting purposes. See the ‘Introduction’ section of Chapter 5 for the proper fastener torques.

Procedures for some commercial components are not covered in this chapter. Appendix C contains specific instructions provided by the manufacturers of these components. Contact your authorized service representative before attempting to perform service procedures that are not covered in this manual; or in the vendors’ supplements in Appendix C. See WARNING.

4.1 Cage Adjustments

With most process materials, the press will perform properly as long as the radial clearance between the cage screens and the press shaft flighting is maintained to ensure proper drainage. The minimum and maximum cage-to-flighting clearance is listed in the ‘Specifications’ section of Chapter 1. Processing some materials, however, may require less clearance than that listed in Chapter 1. If this is the case, the actual clearance settings used will be noted on the Configuration Sheet. If the Configuration Sheet does not agree with the standard clearance listed in Chapter 1, use the Configuration Sheet data.

Although the clearance should be equal at all points around the shaft flighting, proper clearance in the bottom half of the cages is more important than in the top cage half. Furthermore, proper clearance is generally more critical in the primary cages than in the intermediate and discharge cages.

Two important reasons for checking and aligning the cages are:

1. The cage alignment was performed at the factory during assembly of the press. Shipping, handling, and installation usually result in loss of these critical alignments. Therefore, when the press is installed (or moved) the cages must be re-aligned after if is installed on its permanent foundation. The installation alignment procedure requires removal of the top half of all the cages, so the clearance can be measured with a feeler gauge along the entire length of the shaft.
flighting. If done properly, the initial alignment should not have to be performed again unless the press is removed from the foundation, or the shaft replaced.

2. The clearance between the cage screens and the press shaft flighting increases in service because the flighting diameter is reduced by wear. The wear rate depends upon a number of variables, but the abrasiveness of the material being processed is the most significant. If press performance deteriorates due to excess clearance, the screen-to-flighting clearance can be reduced to restore performance.

The cages are provided with two means of adjustment:

1. **Vertical** (up/down) and lateral (side-to-side) adjustment of the cage position is provided at each point where the cage is attached to the underframe cross member. This provides the means of keeping the cage concentric with the shaft.

2. Removing shims from the horizontal split flange of each cage reduces the radial clearance between the cage screen and the shaft flighting.

**Measuring the Screen-to-Flighting Clearance**

The clearance between the screen and the flighting can be measured by either of two methods. Which method to use depends upon whether the press is partially disassembled or not at the time of checking.

a. If the clearance is being checked with the top half of the cages removed, use a feeler gauge inserted between the shaft flighting and the screen. This method is used to set the cage alignment at the time of initial installation or cage replacement.

b. If the cages are in place, measure with a depth gauge (a pin or wire) inserted through the screen and subtract the screen thickness to determine the clearance. At the 3 and 9 o'clock positions, measure the clearance below the split flange because the clearance in the lower half of the cage is more important than the clearance in the upper half. This method should be sufficient for performing checking and adjusting for wear of the flighting.

**General Adjustment Procedure**

Some of the steps in the procedure for the discharge cages are different from those used for the primary and intermediate cages. This is because the discharge cage mounting lugs are different from those on the rest of the cages. This section gives a brief description of the procedure for adjusting the screen-to-flighting clearance. Details of this procedure are given in the two sections that follow. One section details the steps for discharge cages and one for the rest of the cages.
The general procedure for adjusting the cages is:

1. Check the clearance at the 12, 3, 6, and 9 o'clock positions. (Use the top of the cage as the 12 o'clock position.)

2. Set the proper clearance on the bottom half of all the cages. Begin at the discharge end and work back to the feed end.

3. Check the clearance in all the bottom cage halves at the 3, 6, and 9 o'clock positions. When these are determined to be correct, tighten all the cage lug attachment bolts.

4. Check the clearance at the 12 o'clock position. Adjust to specification by removing (or adding) shims between the split flanges. Since the cage is pinned at the split flange, the clearance at the 3 and 9 o'clock positions of the upper cage half was determined in Step 2.

**Aligning the Cages to the Press Shaft**

Use the following procedure to align the primary and intermediate cages to the shaft:

![Diagram](image)

**Figure 4.1-1**

*Age to Flighting Clearance*

1. Measure the distance from the shaft flighting to the cage screen with a depth gauge or feeler gauge, as previously described. Measure the clearance at the 12, 3, 6, and 9 o'clock positions (see Figure 4.1-1) at each end of each cage section.

2. If measurements taken at the 12 and 6 o'clock position, are both between the minimum and maximum listed in the Specifications section of Chapter 1 (except as previously noted for certain materials). If either measurement is not within this range, align the cage
Figure 4.1-2
Adjustment Screws - Discharge Cage

Figure 4.1-3
Cage Lifting Shackle
vertically. Use the procedure in Step 3 for discharge cages. Use the procedure in Step 4 for primary and intermediate cages.

3. Use this step for vertical alignment of DISCHARGE CAGES.

   a. Refer to Figure 4.1-2. Remove the attachment bolts on both (left and right) cage lugs. Loosen the jam nuts and back off the lateral adjusting screws 1/2 turn (both sides).

   b. Loosen the bolts in the end flanges of the cage(s) being adjusted.

   c. Set the clearance at the BOTTOM (6 o'clock) first, as it is more critical. Raise or lower the cage by adding or removing shims between the cage lug and the underframe cross member to obtain the correct screen-to-flight clearance.

      To add or remove shims, lift the cage by means of an overhead lifting device and shackle attached to the lifting hole in the upper cage half. Refer to Figure 4.1-3. If the upper cage half has been removed from the press, lift the cage by means of a sling under the lower cage half.

   d. When vertical alignment is correct, install the lug attachment bolts. Do not tighten the lug attachment bolts until after making any necessary lateral adjustments (see Step 5).

4. Use this step for vertical alignment of PRIMARY AND INTERMEDIATE CAGES.
a. Refer to Figure 4.14. **Loosen** the jam nuts on **the** elevating screws. Loosen the attaching bolts on both (left and right) adjustment lugs. Loosen the jam nuts and back off the **lateral** adjusting screws ½ turn (both sides).

b. Loosen the bolts in the end flanges of the cage(s) being adjusted.

c. Set the clearance at **the BOTTOM** (6 o'clock) **first**, as it is more critical. Turn the elevating **screws** to raise or lower the cage. **Alternate** between the two screws of the same cage, turning each **screw** a half turn at a time. Check screen to flighting **clearance** frequently to avoid over correction.

d. When vertical alignment is **correct**, tighten the elevating **screw** jam nuts.

5. Check **the** horizontal cage **clearance** (3 and 9 o'clock positions) **In the BOTTOM** half of **the cages**. The diameter of the cage cannot be changed horizontally. **Therefore** adjust the cage position to obtain **equal clearance** on both **sides**.

a. Loosen the bolts in the end flanges of the cage(s) **being adjusted**

b. Turn the **lateral adjusting screws** to move **the** cage in the required direction to achieve the **correct** clearance amount.

For example, to move from left to right, first back off the right side **screw** about two turns. Then turn the **left side screw** in the direction of tightening. Check screen to flighting **clearance** frequently to avoid over correction. if the lug **becomes** tight against the right side **before** alignment is achieved, repeat the process until the cage clearance is equal on both sides. Tighten the right side screw.

c. When horizontal clearance is equal on both sides, tighten the jam nuts on the lateral adjusting screws; tighten the lug attachment **bolts** to 300-400 lb-ft.

6. When the cages are properly aligned with the shaft **flighting**, check the screen to **flighting** clearance at the top (12 o’clock). **If the clearance is more** than the minimum listed in the “Specifications” section of Chapter 1, reduce the cage diameter by **removing** shims from the split flanges **between** the cage halves. The **procedure** is **described** in the following section.

---

**Removing or Adding Cage Shims**

Use the following procedure to remove or add cage shims:

1. **Loosen the cage split flanges only on the cage being adjusted.** See **Figure** 4.1-5. Some of the bolt holes in the shims are slotted to permit shim removal or installation **without** having to remove all **the bolts.** Only two of the bolts have **to be** removed to get the shims in or out.
Figure 4.1-5
Cage Split Flange and Shims

Figure 4.1-6
Split Flange Adjustment Shims

TO ADD CR REMOVE CAGE SHIMS:
1. Loosen all bolts in cage flanges
2. Loosen all bolts in the cage split flange
3. Remove bolts from locations marked *
The locations of the bolts that must be removed are indicated in Figure 4.1-6.

2. **Loosen the bolts in the end flanges of the cage being adjusted.**

3. **Remove an equal number of** shims from both horizontal flanges of the cage.

4. Apply anti-seize compound to the **threads of the** fasteners that were **removed.**

5. Tighten the cage split flange bolts. Fastener torques are listed in the **"Introduction" section** of Chapter 5.

6. Tighten the end flange bolts. Fastener torques are listed in the **"Introduction" section** of Chapter 5. **Install and tighten** the jam nuts.
The press shaft is subject to wear from abrasion. Such wear is usually noticeable only near the discharge end of the shaft, due to the high pressure on the material in that region. As the shaft flighting wears, its outer diameter becomes smaller. As a result, the clearance increases between the flighting and the inner surface of the cage screen. Near the discharge end of the shaft, a hardened facing strip reduces the rate of wear of the flighting. The facing strip consists of a series of helical segments called shoes that are welded to the base flighting. The hardened shoe covers both the outer edge and the face of the base flighting. See Figure 4.2.1.

To compensate for worn flighting, remove shims from the cage split flanges as explained in the ‘Cage Adjustments’ section of this chapter. If the flighting wears down to the stage where the correct cage-to-flighting clearance cannot be obtained with all the cage shims removed, then the shaft flighting must be restored to its original diameter. This is done by replacing the worn wear shoes with new ones.
Removing the Old Wear Shoes

It is not necessary to remove the shaft from the press to replace the flight facing. To gain access to the renewable flight facing, remove one (two, if necessary) upper cage half from the discharge end of the press. Cage removal is described in the ‘Component Disassembly and Assembly’ chapter.

Remove the old wear shoes as follows:

1. Remove the weld metal holding the worn flighting shoes to the base flight. This can be done with an air-ax, disc grinder, or other suitable device. Take care not to damage the base flight during this operation.

2. Be sure to remove all wear shoe weld metal from the base flighting with a disc grinder. It is important to install the new flight shoes on clean, smooth base flighting.

Installing New Wear Shoes

The procedure that follows is to be used to weld 17-4PH stainless wear shoes, which are used on most press applications. The shoe material is listed on the Configuration Sheet for this press. If it is not 17-4PH, contact your authorized Dupps service representative for the correct welding procedure.

To weld new 17-4PH wear shoes to the base flighting, use a SMAW welder, with %-inch 30SL electrode. Part temperature should be above 70°F. No additional preheat is required. Weld at 100 - 200 Amps, keeping heat input low. Use the procedure below and Figure 4.2-1.

1. Begin at the discharge end of the shaft. Position the new wear shoe on the base flighting as shown in Figure 4.2-1.

2. Tack-weld each new facing shoe in position on the base flighting as shown in Figure 4.2-1.

NOTE: Do not apply more weld material than specified; this practice increases the difficulty of subsequent flight removal.

3. The gap between adjacent wear shoes should be about 1/16 inch wide or less and does not require welding. If the gap is larger than 1/16 inch, fill the gap with suitable stainless steel welding material. Use the minimum amount of welding material.
4.3 Shaft Inspection, F&pairs, and Alterations

The steam-heated shafts used in the Dupps Dewatering Presses are designed and built according to the ASME code for un-fired steam pressure vessels. Accordingly, each shaft bears the "U" code stamp and vessel serial number. The location of the stamp is shown in Figure 4.3-1. A representation of the stamp, without any data filled in, is shown in Figure 4.3-2. (Note: The shaft serial number is not the same as the serial number of the press itself. The press serial number is stamped on a nameplate attached to the discharge box.)

![Figure 4.3-1](image1)

**Press Shaft Code Stamp Location**

![Figure 4.3-2](image2)

**Press Shaft Code Stamp**

It is the responsibility of the organization making repair or alteration to provide for inspection, documentation, and certification of the work; and to ensure prior acceptance of the procedures for the work in accordance with the National Board Inspection Code (NBIC).
Shaft Wall Thickness Inspection

When the press is operating, the shaft is subjected to the following stresses:

- Internal steam pressure.
- Bending deflection.
- Torsional deflection.

In addition, the shaft is subject to surface wear from abrasive process materials. Over time, the surface wear will result in thinning of the shaft wall and loss of shaft rigidity. With a very thin wall, the shaft could deflect enough to rub the cage screens. If the shaft becomes excessively thin, it could fail catastrophically. Consequently, the shaft wall thickness should be measured after the first three months of operation to determine if there is a high rate of wear. If the wear rate is low, the frequency of measurement may be extended to six-month intervals, or more. The frequency of checking is often determined by the insurance underwriter.

Measure the wall thickness by "sounding" with an ultrasonic thickness tester. Record the measurements on the Sounding Sheet for this press so the rate of wear can be monitored. The minimum wall thickness is listed on the Configuration Sheet for this press. A copy of the Configuration Sheet can be found in the front of this manual.

Maximum Shaft Drive Torque

The maximum allowable input torque to the press shaft (gearbox output torque) is listed in the Specifications section of Chapter 1. Two figures are shown: one for single flighting and one for double flighting. The press may be operated continuously at the input torque indicated for the shaft configuration installed in the press.

The standard shaft configuration of the Dupps Dewatering Press has a single lead flight from inlet to choke. Applications requiring input torque higher than that shown for single-flighted shaft require double flighting on the last two flight pitches at the choke end of the shaft. Additional flighting is normally added as a field modification, if it is required. Operating the press above the specified shaft torque limits could result in damage to the press. The control system should be designed and operated to protect the press from electrical or mechanical overload. See CAUTION.

Changing the Plug Length

The plug is the section of the press shaft between the end of the shaft flighting and the discharge box. The length of the plug directly affects cake dryness. Generally, the longer the plug is, the dryer the cake will be.
The plug length on each press is adjusted by start-up personnel to give the best cake dryness for each application. If feed material characteristics change, the plug length may have to be adjusted to obtain the best press performance and cake dryness.

Adjustment of the plug length is a sensitive procedure that must be performed only by factory trained, NBIC certified personnel. If plug length adjustment is necessary, contact your authorized Dupps service representative.

**Flighting**

Replacement of the wear facing shoes described elsewhere in this chapter does not require NBIC approval because (providing all welding is done on the base flighting, and not on the shaft wall) it does not involve welding on the pressure vessel.
Chapter 5

Component Disassembly and Assembly

5.1 Introduction

**WARNING:**
Contact your authorized Dupps service representative or the component manufacturer before performing service procedures not described in this manual. Failure to follow this instruction can result in serious personal injury.

**DANGER:**
Turn the Dewatering Press main circuit breaker OFF and lock it. Shut off steam and air supplies to the press. Relieve residual air and steam pressure from lines before performing service on the press. Failure to follow these instructions can result in serious personal injury or death.

This section describes disassembly and assembly procedures for the major components of the Dewatering Press. Service procedures for some commercial components are not covered in this chapter. Appendix C contains specific instructions provided by the manufacturers of these components. Before performing service procedures that are not described in this manual, contact your authorized Dupps service representative. See WARNING.

**Personal Safety**

Before performing service on the press, turn the Dewatering Press main circuit breaker OFF and lock it. Shut off steam and compressed air supplies to the press. Relieve residual air and steam pressure from lines. See DANGER.

Wear suitable safety equipment when performing service on the press (eye protection, protective headgear, etc.). Use a suitable lifting device to lift heavy components. Weights of major press components are listed in the Specifications section of Chapter 1.

**Threaded Fasteners**

Standard hex head cap screws and bolts are manufactured in several classes of materials. The heads of these screws and bolts are marked to identify the strength class of the screw or bolt. These standard head markings and the corresponding material classes are shown in Figure 5.1-1. Replace damaged or lost fasteners only with a fastener of the same material.

When the press is operating, the bolts and nuts in the press structure are subjected to a high level of cyclical loading. Under these conditions, threaded fasteners can work loose or fail from fatigue if they are not tightened properly. Tighten fasteners that are loosened or removed during
maintenance of repairs to the torque value specified under the heading 'Fastener Torque Specifications' in this section of the chapter.

Stainless Steel Fasteners

Stainless steel fasteners exhibit a high degree of seizing due to galling of the threads. For this reason — and for better joint performance — use of anti-seize compound is recommended on all stainless steel fasteners. This is especially important where the internal threads are in a tapped hole (as opposed to a nut). Whereas a damaged nut can be discarded, a threaded hole must be repaired before the joint can be re-assembled.

Fastener Torque Specifications

The table in Figure 5.1-2 lists the threaded fasteners in the press and their corresponding torque values. Requirements for thread locking compounds and anti-seize compound are also noted.
<table>
<thead>
<tr>
<th>Location/Application</th>
<th>Thread</th>
<th>Dry</th>
<th>Lubed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thrust Bearing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing to Feed Hopper</td>
<td>3/8-11</td>
<td>1/2-16</td>
<td>200</td>
</tr>
<tr>
<td>End Plate to Housing</td>
<td>3/8-11</td>
<td>1/2-16</td>
<td>140</td>
</tr>
<tr>
<td><strong>Seal Coupling (Turn a special FA-208)</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Range Bolts</td>
<td>1 1/4-12</td>
<td>500</td>
<td>600</td>
</tr>
<tr>
<td>Seal Retainers</td>
<td>3/8-16</td>
<td>50</td>
<td>38</td>
</tr>
<tr>
<td><strong>Pillow Block Bearing</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Pillow Block Mounting</td>
<td>1 1/4-6</td>
<td>1100</td>
<td>825</td>
</tr>
<tr>
<td>Pillow Block Cap</td>
<td>1 1/4-7</td>
<td>405</td>
<td>308</td>
</tr>
<tr>
<td><strong>Rotary Steam Joint</strong></td>
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<td></td>
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</tr>
<tr>
<td>Head Bolts</td>
<td>3/8-12</td>
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<td>21</td>
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<tr>
<td><strong>Feed Hopper Bolts</strong></td>
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</tr>
<tr>
<td>Hopper Cage Split Flange</td>
<td>1-8</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Bulkhead Split Flange</td>
<td>1-8</td>
<td>325</td>
<td>325</td>
</tr>
<tr>
<td>Hopper Cage to Bulkhead</td>
<td>1-8</td>
<td>(A)</td>
<td>325</td>
</tr>
<tr>
<td>Hopper Cage to Primary Cage</td>
<td>1-6</td>
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<td>End Flange</td>
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<tr>
<td>Cross Member to Underframe</td>
<td>3/4-10</td>
<td>160</td>
<td>160</td>
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<tr>
<td><strong>Discharge Cage Bolts</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Split Flange</td>
<td>1 1/4-7</td>
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<td>600</td>
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<tr>
<td>End Flange to Adjacent Cage</td>
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<td>300</td>
<td>300</td>
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<tr>
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<td>600</td>
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<tr>
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<td>300</td>
<td>300</td>
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<tr>
<td>Cross Member to Cage Lug</td>
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<td>300</td>
</tr>
<tr>
<td><strong>Discharge Box &amp; Choke</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Discharge Box Split Flange</td>
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<td>600</td>
<td>600</td>
</tr>
<tr>
<td>Discharge Box to Underframe</td>
<td>1 1/4-7</td>
<td>600</td>
<td>600</td>
</tr>
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<td>Choke Air Cyl to Disch Box</td>
<td>3/8-11</td>
<td>120</td>
<td>90</td>
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<tr>
<td>Choke Backing Ring to Cyl Rod</td>
<td>1 1/2-6</td>
<td>(B)</td>
<td>300</td>
</tr>
<tr>
<td>Choke Base to Backing Ring</td>
<td>3/16-13</td>
<td>(C)</td>
<td>10</td>
</tr>
</tbody>
</table>

(A) Anti-seize compound required when anti-seize compound is used "Lubed" torque values. * * *

(B) Locite No 277 required

(C) Locite No 242 required

Figure 5.1.2
5.2 Main Drive Assembly

An electric motor mounted above the gear box runs the gear box input shaft through an enclosed multiple V-belt drive. The gear box is mounted on the press underframe. A double engagement gear coupling connects the gear box output shaft to the press shaft.

When performing the procedures described in this section, refer to the "Specifications" section of Chapter I for component weights, setup dimensions, etc. The lubricants used in each component are specified in Chapter 2. Fastener torque specifications are provided in the 'Introduction' section of this chapter.

Motor Drive and Gear Box Removal

1. Remove the front half of the belt guard
2. Loosen the motor plate adjusting bolts, and remove the drive belts
3. Remove the motor shaft bushing and sheave
4. **Remove the motor from the motor plate.**

5. Remove the coupling guard. **Remove the** lube plugs in the gear coupling and **drain** the lubricant from the coupling.

6. Remove the bolts that fasten the two **flanged** sleeves of the gear coupling. Separate the coupling flanged sleeves.

7. **Remove the** screws attaching the **gear** box to the base.

8. Using **the lifting** rings provided on top of the gear box, attach a suitable lifting device to **the** drive unit.

9. Remove the gear box from the base. Note the markings on the shims under the **gear** box. The shims must **be returned to the same** locations during reassembly to insure that the **gear coupling** is properly aligned.

---

**Motor Drive and Gear Box Installation**

Use the following procedure and **Figure 5.2-1** to install **the gear box** and motor drive components.

1. If the **coupling** hub was **removed from** either shaft, install the gear coupling hub(s) and key(s) **Use** the coupling manufacturer's **recommended** procedures, included in Appendix C.

**NOTE:** The **keyways** must **be scaled** to prevent leakage of coupling lubricant. This can be accomplish by applying-a **bead of RTV** silicone sealant to the joint, including the key and keyway, on the ends of both shafts after mounting the coupling hubs.

2. Return the gear box shims to their original locations noted in step 9 of disassembly.

3. Using a suitable lifting device, place the gear box into position on the base. Install **the screws** and washers that attach the gear box to the base. **Do not tighten** the screws.

4. Check **the** alignment of the gear coupling. The alignment specifications are listed in the 'Specifications' section of Chapter 1. The **vertical** offset and angular alignment may be adjusted by m-shimming between the **gear** box and base.

5. **Tighten** the screws that attach the gear box to the frame.

6. Attach the two halves of the gear coupling by attaching the **flanged sleeves**. Be **sure** to use the correct coupling bolts and a new **gasket.** **Tighten** the nuts to the specified torque value.

7. **Install the motor plate** and **drive motor**

8. **If the rear half of the belt** guard was removed from the **gear** box, re-install it.

9. Install the **keys** in the motor shaft and **gear** box input shaft.

10. Mount the sheaves and install **the** sheave bushings.
11. **Install the drive belts.** Tension the drive belts by turning the adjustment belts on the motor plate. Tighten the jam nuts.

12. **Install the front** half of the belt guard

13. Fill the coupling with lubricant. This must be done with the shaft at full operating temperature to prevent blowing the seals in the coupling. See the Lubrication section in Chapter 2.

5.3 Rotary Steam Joint

The rotary stem joint directs steam into the feed end of the press shaft. Condensate from the steam returns through the steam joint. The internal seals of the rotary steam joint are lubricated by the incoming steam.

The rotary steam joint must have steam flowing through it during operation. Incoming steam lubricates the steam joint's internal carbon seals. Operating the rotary steam joint without steam will ruin the seals and render the rotary joint inoperative. Therefore, if the press is to be operated without steam applied to the shaft, remove the rotary steam joint before putting the press into service.

NOTE: The statements in the above paragraph refer to continuous, regular operation of the steam joint. The joint will tolerate short periods (up to an hour) of operation with the steam turned off, such as during start-up, shut-down, or during maintenance.

Use the following procedure to remove the rotary steam joint from the press. Refer to Figure 5.3-1 and the manufacturer's parts list illustration in Appendix A.

CAUTION: If the press is to be operated without steam applied to the shaft, remove the rotary steam joint before putting the press into service. Failure to follow this instruction will damage the steam joint.

1. Remove the head from the end of the rotary steam joint to gain access to the condensate tube packing gland.

2. Loosen the packing gland locknut, then loosen the gland 1 to 2 turns.
3. Arrange a sling around the body of the steam joint. Attach the sling to a suitable lifting device to support the weight of the steam joint. The weight of the rotary steam joint is listed in the "Specifications" section of Chapter 1.

4. Disconnect the steam joint nipple from the coupling on the end of the press shaft.

5. Remove the steam joint by sliding it — supported by the sling attached previously — off its support rods. The condensate tube will remain in the shaft.

6. Unscrew the condensate tube from its connection inside the press shaft. Be careful not to mar the polished sealing surface at the end of the tube.

   If the rotary steam joint is being permanently removed (press to be operated without steam supply to the shaft), then also do the following:

   1. Remove the steam joint support rods by unscrewing them from their mounting holes.

   2. Install a pipe plug in the pipe coupling on the end of the press shaft.

To install the rotary steam joint, reverse the removal procedure.
5.4 Thrust Bearing Assembly

The thrust bearing assembly is mounted on the feed hopper end flange. The assembly contains a radial type, two-row, spherical roller bearing and a spherical roller thrust bearing. A cross section of the assembly is shown in Figure 5.4-1. The radial bearing supports the weight of the press shaft. The thrust bearing takes up the axial load on the shaft which results from pushing material through the screens. A preload spring — a stacked set of spring-type washers — keeps a light load on the thrust bearing when there is no load from the process material. A grease fitting is provided for injecting fresh lubricant.

See the "Specifications" section of Chapter 1 for lifting weights of the components, setup dimensions, etc.

Removing the Thrust Bearing Assembly

It is not necessary to remove the press shaft to remove the thrust bearing assembly. The bearing plate, thrust bearing housing, and thrust bearing end plate each have a series of \( \frac{9}{16} \)-inch UNC tapped holes in their faces. Jack screws may be installed in these holes to make removal of these parts easier.
use the procedure below and Figures 5.4-1 and 5.4-2, to remove the thrust bearing assembly. Figure 5.4-2 shows an exploded view of the assembly.

1. Remove the rotary steam joint. Refer to the ‘Rotary Steam Joint’ section of this chapter.

2. The preload springs act against the thrust bearing end plate. Before removing the end plate, loosen all the end plate mounting screws equally, a few turns at a time. This will relieve the spring load against the end plate. Then remove the end plate and the preload springs from the bearing housing.

   If the end plate seal is in good condition, it may be n-used. In this case, it need not be removed from the thrust plate. If the seal is to be replaced, remove the seal retainer from the thrust bearing end plate and pry the old seal out of the thrust plate.

3. Remove the thrust bearing cup (outer race) from the housing.
4. Using a sling attached to a suitable overhead lifting device, remove the thrust bearing housing.

5. Using a suitable bearing puller, remove the thrust bearing cone (ii race and rollers) from the shaft. A suggested puller arrangement is shown in Figure 5.4-3.

![Diagram of Bearing Puller on Press Shaft](image)

6. Attach a suitable overhead lifting device to the press shaft. Use the lifting device to support the end of the shaft (access to the shaft is through the feed hopper seal cavity) so the shaft will not drop when the bearing plate fasteners are removed.

7. Install a 1/2-13 UNC eye bolt in the hole provided in the top of the bearing plate. Attach the eye bolt to a suitable overhead lifting device.

8. Remove the bearing plate from the feed hopper flange.

9. Remove the bearing locking collar from the press shaft. The collar is locked into a groove in the shaft. To remove it, separate the two halves
of the collar by removing the two screws from the ring. Note that the application of heat may be required to break down the thread locking compound (Loctite® No. 272) that is used on the screws.

10. Remove the two-row radial bearing from the shaft.

### Installing the Thrust Bearing Assembly

Use the following procedure to install the thrust bearing assembly. Use new lip seals and O-rings. Refer to the ‘Introduction’ section of this chapter for the proper fastener tightening torques.

1. Support the end of the press shaft (see Step 8 of the removal procedure) while installing the radial bearing and bearing plate.

2. Heat the radial bearing to 250-270° F in an oil bath to expand the inner race so it will slip onto the shaft. Wear heat resistant, insulated gloves when handling hot parts. See WARNING.

3. Rapidly push the heated bearing onto the shaft. Position the bearing squarely against the shoulder.

4. Assemble the two halves of the bearing locking collar onto the shaft with the collar’s internal lip in the shaft groove. Apply Loctite No. 272 to the threads of the screws, then attach the two halves of the collar together by installing the screws.

5. Pack the radial bearing rollers with the specified grease, or equivalent (Chpater 2).

6. Install a new O-ring in the bearing plate. Lift the bearing plate into position using the eye bolt and lifting device which were used in Step 7 of the removal procedure. Install the bearing plate on the bearing outer race and fasten it to the feed hopper flange with the socket head cap screws.

7. Remove the overhead support for the press shaft. Also remove the lifting eye bolt from the bearing plate.

8. Heat the thrust bearing cone (inner race and rollers) to 250-270° F in an oil bath to expand the inner race so it will slip onto the shaft. Wear heat resistant, insulated gloves when handling hot parts. See WARNING.

9. Rapidly push the heated bearing onto the shaft. Position the bearing squarely against the shoulder.

10. Pack the rollers of the thrust bearing with the specified grease, or equivalent (Chapter 2).

11. Attach the sling and lifting device (used in Step 8 of the removal procedure) to the thrust bearing housing. Before mounting the housing, install a new O-ring into the groove in the face of the housing flange.
12. Install the bearing housing. Lighten the mounting screws.

13. Install the thrust bearing cup (outer race) into the bearing housing. Check the end play setup dimension between the thrust bearing cup and the end of the housing, as shown in Figure 5.4-4. This may be measured with a feeler gauge between the cup and a straight edge placed across the end plate mounting surface.

14. Install a new O-ring and lip seal in the end plate. Also install the lip seal retainer. Lubricate the lip seals with the grease used in the bearing.

15. Install the wavy washer preload springs into the recess in the thrust bearing end plate.

16. Check for correct orientation of the lube plug in the end plate. After installation, the lube plug should be aligned with the plug in the bearing plate, which is already mounted. Being careful not to damage the secondary lip seals, place the bearing housing on the press shaft.

17. Apply anti-seize compound to the threads of the end plate attaching screws. Install and evenly tighten the screws to the specified torque value.

18. Lubricate the bearings. Refer to the lubrication instructions in the ‘Maintenance and Lubrication” chapter for the proper procedure.
Material enters the press through the top of the feed hopper. Liquid drains out through the feed hopper screens and collects in the drain pan in the underframe. Material that does not drain out of the hopper cage is conveyed toward the high pressure end of the press by the flighting on the rotating shaft.

The feed hopper cage assembly is similar to a primary cage assembly, except that the feed hopper has a flanged opening in the mp for connecting a feed chute. At the feed end of the feed hopper, a two-piece, reinforced bulkhead supports the thrust bearing assembly. The bulkhead contains a seal cavity between the feed hopper and the thrust bearing assembly. The seal cavity isolates the thrust bearing assembly from the wet material. The seal cavity is not enclosed. This feature permits seal replacement without disassembly of the thrust bearing or the feed hopper.

When performing the procedures &scribed in this section, refer to the 'Specifications' section of Chapter 1 for component weights, setup dimensions, etc. Fastener torque specifications are provided in the 'Introduction' section of this chapter.

**Feed Hopper Upper Cage Removal**

One or both of the feed hopper cage sections may be removed while the shaft and the thrust bearing assembly remain in the press. The procedure for removing the cage section of the feed hopper is similar to that for the other cages. (See the "Cages" section of this chapter.)

Before disassembling the feed hopper, remove any chutes attached to it. Use the procedure given in this section to remove the feed hopper cage section. Refer to Figure 5.5-1.

1. Remove the bolts that attach the discharge end of the feed hopper cage to the first primary cage.

2. Loosen the bolts in the lower half of the discharge end flange of the feed hopper cage. Back the nuts off at least 1/4 inch.

3. At each cage adjustment location (underframe cross member):
   a. Loosen the lateral adjusting screw and the elevating screws (See Figure 5.5-2). Discharge cages have no elevating screws.
   b. Remove the lug attachment bolts.

4. Loosen the discharge box mounting screws. Move the discharge box toward the gear box. This will separate the end flanges where the bolts were loosened in Step 2. Make sure the flange nuts (Step 2) are backed off far enough to permit the amount of movement required to separate the flanges.
Figure 5.5.1
Feed Hopper and First Primary Cage

Figure 5.5.2
Cage Adjustment and Cross Member
5. **Remove the screws that attach the end flange of the upper half of the feed** hopper cage to the bulkhead.

6. Remove the bolts and dowel pins from the split flange of the feed hopper cage.

7. Attach lifting shackles through the holes provided in the longitudinal top rib of the feed hopper cage (see Figure 5.7-1). Connect a suitable lifting device to the shackles. Remove the slack from the lifting device.

8. Using the lifting device attached in Step 7, lift the upper half of the feed hopper cage from the machine.

9. Remove the shims from the split flange. Set them aside for reassembly.

---

**Feed Hopper Lower Cage Removal**

In removing the lower section of the feed hopper cage, the cage section is lowered into the space between the frame tails. From this position, it is lifted up and out around the shaft (between the press shaft and the frame rail).

1. Remove the feed hopper upper cage. Use the procedure previously given in this section under "Feed Hopper Upper Cage Removal". After the upper cage is removed, the lower cage should still be in position, supported by the feed hopper bulkhead and the adjacent primary cage through the bolts in its end flanges.

2. Remove the feed hopper cage support cross member from the underframe.

3. Use a lifting sling to support the feed hopper cage while removing the end flange fasteners. Attach the sling to a suitable overhead lifting device. Raise the lifting device to remove the slack from the sling.

4. Remove the fasteners from the end flanges of the feed hopper cage.

5. Using the lifting device installed in Step 3, ease the feed hopper cage down to the drain pan.

6. Reposition the lifting device to raise the cage out around the shaft. Remove the cage by lifting it out to one side of the press, between the shaft and the underframe side tail.

---

**Feed Hopper Re-Assembly**

Assemble the feed hopper by the procedure that follows.

1. Set the lower half of the feed hopper cage on the drain pan under the press shaft.
2. Using a sling attached to a suitable overhead lifting device, as in Step 3 of the disassembly procedure, raise the feed hopper cage up under the press shaft.

3. Loosely install the end flange fasteners that attach the feed hopper's lower cage half to the adjacent primary cage and to the bulkhead. Note that all screws in the bulkhead must be lubricated with anti-seize compound before they are installed. See CAUTION. The loosely installed fasteners will temporarily support the lower half of the cage while the upper half is being set in place.

4. Place the shims (removed during disassembly) in place on the split flange.

5. Using a suitable lifting device, set the feed hopper upper cage half in place on top of the lower section.

6. Install the four dowel pins into the feed hopper split flange.

7. Install the bolts into the split flange. Tighten the nuts to the specified torque value.

8. Install the cage adjustment cross member between the side tails of the underframe.

9. Adjust the cage as described in the ‘Service Instructions’ chapter.

Removing the Feed Hopper Bulkhead Section

If necessary (i.e., to remove the press shaft), the top half of the bulkhead section may be removed. It is important to remove the thrust bearing assembly first, to unload the preload springs. Then the housing may be removed from the feed hopper cage. The procedure for removing the thrust bearing assembly is in the “Thrust Bearing Assembly” section of this chapter.

Shaft Seals — Feed Hopper Seal Cavity

The seal cavity is open on top to provide access to the shaft seals without the necessity of disassembling the thrust bearing. Remove the two lower shields for access to the bottom of the cavity. The seals are split-ring type. Each is held in its housing by a two-piece retainer. To replace each seal:

1. For the seal that is to be replaced, remove the retainer screws and seal retainer.

2. Pry the seal out of its housing and slide it back on the shaft.

3. Split the seal and remove it from the shaft. The split should be located at the top of the shaft.

Install the new seal as follows:
1. Apply a small amount of grease to the shaft area where the seal lip will engage. Do not apply grease or oil on the seal outer diameter or the bore surface.

2. Separate the cut ends of the new seal sideways so the seal forms a helix, as shown in Figure 5.5-3. Do not try to form the seal into a "V" shape. Separate the ends far enough that the seal can slip over the shaft. Make sure the seal lip void faces into the seal housing.

3. Push the seal toward the seal housing until it touches. Make sure the split ends are well aligned.

4. Start inserting the seal into the housing bore with the split juncture at top. Compress the OD slightly, until the split juncture is inserted about half its width. Then, working away from the split, continue compressing the seal into the cavity until the entire seal has been started into the cavity recess. Then tap evenly all around the back face of the seal until it is completely seated.

5. Install both halves of the seal retainer and evenly tighten all the retainer screws.

6. Repeat the procedure for the other seal.
The choke assembly, shown in Figure 5.6-1, is located in the discharge box. It surrounds the press shaft but does not make contact with it. The choke assembly has a replaceable face ring attached to a backing ring. Both rings are split in two across their centers so they can be taken apart and removed from the press without removing the press shaft.
The backing ring is supported by the three air cylinders that control the choke's axial position. The air cylinders are mounted to the discharge box. See Figure 5.6-2. This section describes removal and installation of the face ring and the air cylinders.

When performing the procedures described in this section, refer to the 'Specifications' section of Chapter 1 for component weights, setup dimensions, etc. Fastener torque specifications are provided in the Introduction section of this chapter.

### Removing the Choke Face

The choke face must be detached from the choke backing ring in order to gain access to the rod bolts on the ends of the air cylinders. The choke face is split into two semicircular segments which are bolted together. If the choke face is damaged or worn out, the two ring segments can be separated and removed from the discharge box.
Use the following *procedure* and *Figure 5.6-1* to *remove the choke face* from the press:

1. **Retract** the choke; then turn off the *compressed* air supply. **Make sure** the choke is fully **retracted** before disconnecting the air supply.

2. Relieve all *residual* air pressure from the choke cylinders and piping. **Disconnect** the *compressed* air supply where it enters the choke air manifold. Be **sure** both the ON and OFF air lines are disconnected, so the choke is completely disabled. See WARNING.

3. Remove the screws that attach the choke face to the backing ring. Note that two of the eight *screws* that fasten the backing ring brace are longer than the others, and they thread into the choke face. Slide the face **ring** away from the backing ring to provide access to the back (open) side of the face ring.

4. Rotate the choke face approximately **90°** on the press shaft. The split across the choke face should now be approximately vertical.

5. Working through the back side of the choke face, remove only one of the two bolts that attach the halves of the choke face together. Then rotate the choke face approximately **180°** on the press shaft to gain access to the other bolt. Do not remove the second *bolt* until both halves of the choke face are supported by a *suitable* lifting device.

6. Install a **1/2-13 UNC** eye bolt in one of the screw holes in the choke face mounting flange in each segment of the choke face. Attach a suitable *overhead* lifting device to each eye bolt. The purpose of the lifting device is to support the two halves of the choke face while the remaining bolt is removed.

7. Remove the last bolt holding the two choke face segments together. Use the previously installed lifting device to lift the choke face out of the discharge box. While **guiding** the two segments around the press shaft.

---

**Installing the Choke Face**

Use the following procedure and *Figure 5.6-1* to *assemble* and install the choke face:

1. Install a **1/2-13 UNC** **cyc bolt** in one of the screw holes in the choke face mounting flange in each segment of the choke face. Attach a suitable *overhead* lifting device to each eye bolt. The purpose of the lifting device is to support the two halves of the choke face in position on the press shaft while the first bolt is being installed.

2. Use the lifting device attached in the previous step, lower the choke face into the discharge box. Guide each segment of the choke face into position around the press shaft with the "face side" towards the choke opening of the discharge box and the flange side towards the choke backing ring.
3. **Install** — but do not tighten — the **bolt and nut that attach the two segments** of the choke face to each other. Rotate the choke face on the press shaft approximately 180° and install the other attaching bolt, nut, and lockwasher. Tighten both bolts.

4. Remove the eye bolts that were installed for lifting. Place the choke face into position on the backing ring. Apply Loctite® No. 242 to each of the attaching screws. Install the attaching screws and tighten them to the specified torque value.

5. Connect the compressed air lines that were disconnected at the beginning of the disassembly procedure.

### Removing the Choke Air Cylinders

To remove one or more of the choke air cylinders, refer to Figure 5.6-1 and use the following procedure:

1. Remove the choke face from the choke backing ring using Steps 1 through 3 of the procedure described under the heading, “Removing the Choke Face”. This provides access to the air cylinder rod end bolt heads which are recessed into the choke backing ring.

2. Heat the rod end bolt of the cylinder to be removed to 400°F to break down the Loctite® on the threads. Then remove the bolt while hot. Wear heat resistant, insulated gloves when handling hot parts. See **WARNING**.

3. Place a lifting sling on the air cylinder to be removed. Attach the sling to a suitable overhead lifting device.

4. Remove the air cylinder mounting screws.

5. **Use the** lifting device attached in Step 3 to remove the cylinder and lower it to the floor.

### Installing the Choke Air Cylinders

1. Place a lifting sling on the air cylinder to be installed. Attach the sling to a suitable overhead lifting device.

2. Raise the cylinder to its mounting position on the outside of the discharge box. Install and tighten the mounting screws.

3. After all the cylinders are mounted to the discharge box, assemble the choke backing ring to the piston rods of the cylinders.

4. **Apply Loctite® No. 277** to the threads of the rod end bolts. Install the bolts and lockwashers. Tighten the bolts to the specified torque.

*“Loctite® is a trademark of the Loctite Corporation*
5. Place the choke face into position on the backing ring. Apply Loc-tite® No. 242 to each of the attaching screws. Install and tighten the attaching screws.

6. Connect the compressed air lines that were disconnected at the beginning of the disassembly procedure.
5.7 Cages

The press shaft is enveloped by fine-mesh drainage screens that separate liquid from the compressed material. The screens are part of the cage assemblies. The heavy cages hold the screens in place and provide a stiff structure. The shorter models of the Dewatering Press have fewer primary (low compression) cage assemblies than the long models. The intermediate and discharge screens are reinforced with backup screens to withstand the higher pressure in these regions.

As shown in Figure 5.7-1, the cages are split horizontally along the axis of the press shaft. The two halves of the cages are bolted together at the split tangl. Shims in the split tangl provide a means of adjusting the clearance between the screens and press shaft flighting. When the clearance becomes too great due to worn flighting, it can be reduced by removing some of the shims. Adjustment screws — located on the cage mounting cross members of the underframe — provide alignment of the cage assemblies to the press shaft. Cage alignment and shimming procedures are described in the "Service Instructions" chapter of this manual.
Removing the Upper Half of a Cage Assembly

The upper half of the cage(s) may be removed while the lower half remains in the press. This may be necessary to manually remove debris, replace flight facing, or to remove the shaft from the press.

1. Remove the bolts from the end flanges of the upper half of the cage assembly to be removed.

2. Loosen the bolts in the Iowa half of the discharge end flange of the cage being removed. Back the nuts off at least 1/4 inch.

3. At each cage adjustment location (underframe cross member), from the cage being removed to the discharge box:

![Diagram of cage assembly](image-url)
4. Loosen the discharge box mounting screws. Move the discharge box toward the gear box. This will separate the flanges where the bolts were loosened in step 2.

5. Remove the bolts and dowel pins from the split flange of the cage to be removed.

6. Attach lifting shackles through the hooks provided in the longitudinal top rib of the cage (see Figure 5.7-1). Connect a suitable lifting device to the shackles. Each cage half has two hooks. Remove the slack from the lifting device.

7. Use the lifting device to lift the upper half of the cage from the machine.

Removing the Lower Half of a Cage Assembly

The procedure described in this section assumes that a single cage is to be removed (such as to repair a damaged cage). This procedure requires rotating the cage on the press shaft to an upside down position while the two halves are still bolted together. In this position, the lower half may be detached and lifted off from overhead.

The feed hopper cage section cannot be turned upside down on the shaft due to interference between the hopper flange and the feed end bulkhead. Therefore, this procedure does not apply to the feed hopper cage section. For feed hopper cage removal, see the "Feed Hopper" section of this chapter.

NOTE: If the shaft is to be removed from the press, it is usually easier to remove the upper halves of all the cages; then remove the shaft; and finally, remove the lower halves of the cage(s).

Use the following procedure to remove the cage lower half from the press:

1. Remove the bolts from the end flanges of the cage assembly to be removed.

2. At each cage adjustment location (underframe cross member) from the cage being removed to the discharge box:
   a. Loosen the lateral adjusting screw and the elevating screw (See Figure 5.7-2). If this is a discharge cage, it has no elevating screws.
   b. Remove the lug attachment bolts.

3. Loosen the discharge box mounting screws. Move the discharge box toward the gear box. This will separate the flanges where the bolts were removed in Step 1.

4. If the cage half being removed is not equipped with an adjustment lug, start with Step 6.
3. Loosen the discharge box mounting screws. Move the discharge box toward the gear box. This will separate the flanges where the bolts were removed in Step 1.

4. If the **cage half being removed** is not **equipped** with an **adjustment lug**, start with Step 6.

5. If the **cage being removed** is **equipped** with an **adjustment lug** (see Figures 5.7-1 and 3.7-2):
   a. **Loosen** both **lateral** adjusting screws.
   b. **Remove** the lug **attachment** bolts.
   c. **Back off** the elevating **screws** (on discharge cage, **remove** shim) so they are no longer supporting the cage.
   d. **Remove** the cage support **cross member** from the underframe.

6. Attach lifting **shackles through** two of the bolt holes in the split flange on the same side of the cage. Attach a **suitable overhead lifting device** to the shackles (see Figure 5.7-3. A).
7. Carefully lift up on the cage with the lifting device attached in Step 6. The cage should rotate about the press shaft approximately 90 degrees. The split flange should now be approximately vertical (see Fig. 5.7-3, B).

8. Attach the lifting shackles to the bottom longitudinal rib (see Figure 5.7-3, C) and attach the lifting device to the shackles.

9. Using the lifting device attached in Step 6, roll the cage into the position shown in Figure 5.7-3, D.

10. Install bolts through two of the holes in each end flange of the upper cage half (the cage half that is now in the bottom position). These bolts are installed to prevent the cage half from falling into the drain pan when the split flange bolts are removed. Thread a nut onto each bolt hand tight.

11. Remove the bolts and dowel pins from the cage split flange.

12. Using the lifting device already attached, lift the lower cage half off the press.

Installing New Screens

If it is necessary to install new screens in the cage halves, grind the existing welds to remove the old screen. Weld the new screen to the cage frame with 1-inch tack welds on 3-inch centers, using suitable stainless steel welding material.

Installing Cage Assemblies

Installing the cages by reversing the removal procedure. If more than one cage has been removed, install one cage at a time, starting at the feed hopper end of the press.

The mating halves of each cage arc machined together as a single piece at the factory, and must be used together. For this reason, both halves of each cage are numbered. The cage number is stamped on the split flanges near the end flange. Be sure the two halves of each assembled cage have the same cage number. See CAUTION 1.

The cages are designed for material flow through the cage in one direction only. An internal lip at the feed end of each cage (shown in Figure 5.7-4) prevents material from migrating between the cage frame and the screen. This situation could cause separation of the screen from the frame. The discharge end of the cage has no internal lip. Be sure this internal lip is at the feed end of the cage when the cage is installed. See CAUTION 2.

After reassembly, align the cages to the shaft flighting as described in the "Service Instructions" chapter. Be sure to tighten the fasteners properly.

CAUTION 1:
Be sure both halves of the assembled cage have the same cage number. Failure to follow this instruction can result in damage to the press.

CAUTION 2:
Be sure the cage assemblies have the correct orientation. Failure to follow this instruction can result in damage to the machine.
Figure 5.7-4
Orientation of Cages

LIP PREVENTS MATERIAL INTRUSION BETWEEN SCREENS

DIRECTION OF MATERIAL FLOW

CAGE SCREENS

CAGE SPLIT FLANGE
5.8 Press Shaft

The press shaft consists of a tapered shaft with constant-diameter flighting. When the shaft is turning, the flighting pushes the material through the press. As the material advances toward the discharge end of the shaft, the increasing shaft root diameter increases pressure on the material. This pressure forces the water out through the screens.

An electric motor drives the shaft through a speed reducing gear box at the discharge end of the press. The shaft is supported on two spherical roller bearings. One is part of the thrust bearing assembly located in the feed hopper. The other is in a pillow block mounted on a bracket on the discharge box (between the discharge box and main drive coupling).

The press shaft can be steam heated to improve cake dryness. Steam feed and condensate discharge for the shaft are both at the feed hopper end of the shaft.

This section describes the procedure for removing and installing the press shaft. Before making any repairs or alterations to the press shaft, refer to the "Shaft Inspection, Repairs, and Alterations" section of the "Service Instructions" chapter of this manual.

When performing the procedures described in this section, refer to the 'Specifications' section of Chapter 1 for component weights, setup dimensions, etc. The lubricants used in each component are specified in Chapter 2. Fastener torque specifications are provided in the "Introduction" section of this chapter.

Press Shaft Removal

Use the following procedure to remove the press shaft:

1. Remove the choke face and the upper half of the choke backing ring. See the "Choke" section of this chapter for the correct procedure.
2. Remove the thrust bearing assembly.
3. Remove the top half of each of the following components: feed hopper, discharge box, and all the cages. The removal procedure for each is described elsewhere in this chapter.
4. Separate the two halves of the gear coupling (refer to the 'Main Drive' section of this chapter).
5. Remove the pillow block lip seals. Next, remove the nuts that attach the cap (upper half) of the pillow block housing to the base (lower half). Install an UNC bolt in the lifting hole provided in the top center of the cap. Use a suitable overhead lifting device to remove the pillow block housing cap.
CAM:
Keep lifting slings away from the thin cladding on the ends of the wetted portion of the shaft. Failure to follow this instruction could result in damage to the press shaft.

6. Attach a suitable overhead lifting device to the shaft. Be careful to avoid placement of lig slings close to the ends of the wetted portion of the shaft. This area, about 3 inches long, is covered only by a thin, sheet metal cladding. Lifting in this area will result in damage to the press shaft. See CAUTION.

7. Using the lifting device already attached, remove the shaft from the machine.

8. Remove the coupling half from the press shaft. Follow the coupling manufacturer’s instructions in Appendix C.

9. Mark the mounting position of the pillow block bearing on the shaft. If a new press shaft is being installed, mark the pillow block bearing position on the new shaft, according to that of the old shaft.

10. Remove the pillow block bearing. Refer to the ‘Pillow Block Bearing’ section in this chapter.

11. If the shaft flighting is worn, install new flighting. See Chapter 4, or contact your authorized Dupps service representative.

Press Shaft Installation

To install the press shaft, use the following procedure:

1. Assemble the pillow block bearing on the shaft in the position marked during disassembly. See also Step 6 below and the ‘Pillow Block Bearing’ section of this chapter.

2. Mount the drive coupling half on the press shaft. See the ‘Main Drive Assembly’ section of this chapter and the coupling manufacturer’s instructions in Appendix C.

3. Mount the choke in position on the shaft.

4. Attach a suitable overhead lifting device to the shaft.

5. Using the lifting device previously attached, place the shaft into position.

NOTE: Continue to support the feed end of the shaft until after the thrust bearing is assembled.

6. The pillow block bearing must “float” axially in the housing when the press is operating to accommodate thermal growth of the shaft. Therefore, proper positioning of the bearing in the housing is important. See the ‘Pillow Block Bearing’ section of this chapter.

7. Assemble the feed hopper, thrust bearing assembly, discharge box, choke, and cages as described elsewhere in this chapter.

8. Align the drive coupling according to the coupling manufacturer’s specifications. Attach the two halves of the drive coupling. See Appendix C and the ‘Main Drive Assembly’ section of this chapter.
9. Fill the coupling with lubricant. See the "Lubrication" chapter for lubrication details.

10. Install the coupling guard.
A tapered bore, double row, spherical roller bearing in a sealed pillow block housing supports the discharge end of the press shaft. The bearing is mounted on the shaft by a tapered adapter sleeve and nut. Figure 5.9-1 shows a cross section through the pillow block. The pillow block is mounted on a bracket which is part of the discharge box.

When performing the procedures described in this section, refer to the “Specifications” section of Chapter 1 for component weights, setup dimensions, etc. The lubricants used in each component are specified in Chapter 2. Fastener torque specifications are provided in the “Introduction” section of this chapter.

Pillow Block Seals

The pillow block grease seals are split so they may be replaced without removing the press shaft. To replace the seals, use the following procedure. The parts are identified in Figure 5.9-1. Figure 5.9-2 shows the seal cross section.

Remove the old seal as follows:
1. Remove both halves of the seal retainer.
1. Pry the old seal out of the housing and slide it back on the shaft, away from the housing.

3. Remove the garter spring from the inside tip of the seal. With the garter spring removed, split the seal and remove it from the shaft.

4. The garter spring has a hook on one end and a loop on the other. Unhook the ends and remove the garter spring.

Install the new seal as follows:

1. Place the garter spring for the new seal on the shaft.

2. Apply a small amount of grease to the shaft area where the seal lip will engage. Do not apply grease or oil to the seal outer diameter or the bore surface.

3. Separate the cut ends of the new seal sideways so the seal forms a helix, as shown in Figure 5.9-3. Do not try to form the seal into a "U" shape. Separate the ends far enough that the seal can slip over the shaft. Make sure the seal lip void faces the bore cavity.

4. Insert the garter spring into the lip carrier groove. The hook-and-loop connection must be at least 45° from the split juncture. See Figure 5.9-3. Then push the seal toward the bore cavity until it touches. Make sure the split ends are well aligned.

5. Start inserting the seal into the cavity with the split juncture at top. Compress the OD slightly, until the split juncture is inserted to about half its width. Then, working away from the split, continue pressing the seal into the cavity until the entire seal has been started into the cavity recess. Then tap evenly all around the back face of the seal until it is completely seated.

6. Install both halves of the seal retainer and evenly tighten all the retainer screws.

7. Repeat the procedure for the other seal.

### Pillow Block Bearing Removal

Remove the pillow block bearing by the following procedure, referring to Figure 5.9-1.

1. Remove the gearbox. Use the procedure described in the "Main Drive Assembly" section of this chapter.

2. Remove the coupling half from the press shaft. Follow the coupling manufacturer's instructions in Appendix C.

3. Remove the pillow block seals. See "Pillow Block Seals" in this section of the manual.
4. Remove the four nuts that attach the upper half (cap) of the pillow block housing to the lower half (base). Install an eye bolt in the lifting hole provided in the top center of the cap. Use a suitable overhead lifting device to remove the pillow block housing cap.

5. Mark the mounting position of the bearing adapter sleeve on the shaft. Mark also the position of the pillow block base on the mounting bracket. These marks will be used to position the bearing during reassembly.

6. Place a lifting sling around the shaft between the pillow block and the discharge box. Attach the sling to a suitable overhead lifting device.

7. Using the lifting device attached in step 6, lift the shaft to remove the weight of the shaft from the pillow block bearing.

8. Remove the screws that attach the base of the pillow block to the mounting bracket.

9. Remove the locking key from the adapter nut; then remove the nut.

10. Remove the bearing from the sleeve. Due to the limited distance available to raise the shaft (Step 7), the bearing will probably not clear the shoulder in the pillow block housing. Therefore, it may be necessary to slide the pillow block base on its mounting bracket, toward the end of the shaft, along with the bearing. Removing the shim under the pillow block will provide additional clearance.

11. Remove the bearing adapter.

---

**Pillow Block Bearing Installation**

Use the procedure that follows and Figure 5.9.1 to install the pillow block bearing.

1. Place the bearing adapter on the shaft with the threads toward the drive end of the shaft.

2. Install the bearing onto the sleeve. The bearing has a tapered bore; make sure the large end of the bore goes on first.

**NOTE:** The distance available to raise the shaft (Step 7 of the removal procedure) is limited to about 1/4 inch. If the pillow block base is on the mounting bracket before the bearing is slid into place, the outer race will probably not clear the base. Therefore, it may be necessary to lift the pillow block base into position under the bearing, and then slide the bearing and pillow block base into position together.

3. Position the adapter sleeve on the shaft according to the marks made in Step 5 of the disassembly procedure.

4. Attach the pillow block base in the position marked on the mounting bracket in Step 5 of the disassembly procedure. Be sure to re-use any
shims that were under the pillow block. Tighten the screws to the specified torque value.

NOTE: When the steam heated shaft warms up during operation, its length will increase due to thermal expansion. To allow for this thermal growth, the bearing floats axially towards the gearbox in the pillow block. Make sure the bearing is installed with the specified “end float” allowance, dimension "A" in Figure 5.9-1. The actual amount of float is specified in the ‘Specifications’ section of Chapter 1.

5. Install the bearing adapter nut. The face of the nut with the tapped holes (for the locking key) must be facing away from the bearing.

6. Use an impact spanner wrench to tighten the adapter nut. See Figure 5.9-4. With a feeler gauge, check the radial internal clearance (the space between the outer race and the uppermost roller). See Figure 5.9-5. Continue to tighten the nut until the internal clearance is reduced to the specified amount. See the ‘Specifications’ section of Chapter 1.

7. Engage the locknut key in the keyway and attach the locking key to the bearing adapter nut.

8. Install the housing cap and the cap nuts. Tighten the cap nuts to the specified torque value.

9. Install the grease seals in the pillow block. See the procedure under “Pillow Block Seals” in this section of the manual.

10. Install the gearbox, coupling, coupling guard, motor drive, etc. See the ‘Main Ctlvs Assembly’ section of this chapter.
Chapter 6

Illustrated Parts Lists

This chapter contains tabulated parts lists for the Dupps Dewatering Press. The three sections in this chapter contain the following:

6.1 Illustrated Parts Lists
The lists in this section identify all the parts in the press. The PART NO column contains Dupps part numbers for repair parts. The word "Config" in the PART NO column means the part number depends upon the configuration of your specific press. In these cases, the part number may be obtained from the Configuration Sheet in the front of this manual. More information is given for spare parts in the next section.

6.2 Spare Parts List
Selected parts in this list are flagged as recommended spares. This list also identifies commercial components, which are cross-referenced in the next section.

6.3 Commercial Parts List
This section provides a cross-reference to the commercial components in the press and their respective vendors and vendor's part number.

Figure 6.1-1 identifies the major sub-assemblies of the press and provides a key to the figure containing the parts listing for each sub-assembly.
6.1 Illustrated Parts Lists

The parts lists include REF numbers keyed to the illustrations in the section. The PART NAME column gives the part description. Specific Dupps part numbers are given for service parts.
**Figure 6.1-2**

*Main Drive Assembly*

<table>
<thead>
<tr>
<th>REF PART NO.</th>
<th>PART NAME</th>
<th>R. E. F</th>
<th>REF PART NO.</th>
<th>PART NAME</th>
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<tr>
<td>1</td>
<td>Motor  (my others)</td>
<td>13</td>
<td>CONFIG</td>
<td>Face Reel</td>
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<tr>
<td>2</td>
<td>19639  5/8-11 - 1 1/2 Hex Cap Scr, Gr5</td>
<td>14</td>
<td>119641</td>
<td>Key, Output Shaft</td>
</tr>
<tr>
<td>3</td>
<td>104283  5/8&quot; Med Lockwasher</td>
<td>15</td>
<td>128019</td>
<td>Drive Coupling</td>
</tr>
<tr>
<td>4</td>
<td>118906  3/4-10 Hex Nut, Gr5</td>
<td>16</td>
<td>128019</td>
<td>Coupling Guard</td>
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<td>5</td>
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<td>17</td>
<td>179591</td>
<td>Bushing, Drive Sheave</td>
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<tr>
<td>6</td>
<td>108017  1-8 x 8 Hex Hd Scr, Spcl</td>
<td>18</td>
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<td>Drive Sheave</td>
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<td>7</td>
<td>123869  Plate, Motor</td>
<td>19</td>
<td>179591</td>
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<tr>
<td>8</td>
<td>102309  1-8 Hex Nut, Gr2</td>
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<td>102223</td>
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<td>119876  Plate, Reducer</td>
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<td>10</td>
<td>119639  2 1/2&quot; Med Lockwasher</td>
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<td>12</td>
<td>114355  Key, Input Shaft</td>
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<td>124155</td>
<td>Belt Guard</td>
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Note: The table lists the parts and their corresponding parts numbers and descriptions. The diagram illustrates the main drive assembly with labels for each part.
<table>
<thead>
<tr>
<th>REF</th>
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<td>118722</td>
<td>1-8 x 3 Hx Hd Cap Scr 316 SS</td>
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<td>1-8 x 2 1/2 Hx Hd Cap Scr 316 SS</td>
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<td>Fed Hopper Cage Set w/screens</td>
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<td>118804</td>
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<td>13</td>
<td>CONFIG</td>
<td>Fed Hopper Upper Screen</td>
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<td>121416</td>
<td>1-in Flat Washer, 1 1/4 CC, 316 SS</td>
<td>14</td>
<td>CONFIG</td>
<td>Fed Hopper Lower Screen</td>
</tr>
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</table>

Figure 6.1-3A
Feed Hopper and Primary Cages
Intermediate Cage, Discharge Cage and Discharge Box
Figure 6.1-4  
Hrast Bearing Assembly
**Figure 6.1-S**

**Motor Assembly**

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<th>REF</th>
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<th>PART NO.</th>
<th>PART NAME</th>
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<td>Choke Backing Ring Assy, 316 SS</td>
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<td>117084</td>
<td>1/2-13 x 2 1/2 Hx Hdl Cap Scr, 316 SS</td>
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<td>119435</td>
<td>5/8-11 x 2 9/16 Soc Hdl Cap Scr</td>
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<td>06391-45</td>
<td>1/4-20 x 1 1/2 Hx Hdl Cap Scr, 316 SS</td>
<td>10</td>
<td>119436</td>
<td>5/8-11 Hi-Cotter Lockwasher</td>
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<td>118866</td>
<td>1/2&quot; Lockwasher, 316 SS</td>
<td></td>
<td>118597</td>
<td>1/2-13 Hex Nut, 316 SS</td>
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<td>5</td>
<td>125860</td>
<td>1 1/4-6 x 3 3/4 Hx Hdl Cap Scr, 316 SS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>125861</td>
<td>1 1/4&quot; Med. Lockwasher, 316 SS</td>
<td></td>
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</table>
Figure 6.10
Primary & Intermediate Cage Adjustment Assembly

<table>
<thead>
<tr>
<th>REF</th>
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<th>PART NAME</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>116675</td>
<td>( \frac{1}{4} )-10 x ( \frac{1}{2} )&quot; Hd Cap Scr, 316 SS</td>
</tr>
<tr>
<td>2</td>
<td>116903</td>
<td>( \frac{1}{2} )&quot; Med. Lockwasher, 316 SS</td>
</tr>
<tr>
<td>3</td>
<td>119440</td>
<td>1-8 x 5 Hx Hd Set Screw, 316 SS</td>
</tr>
<tr>
<td>4</td>
<td>116752</td>
<td>1-8 Hex Nut, 316 SS</td>
</tr>
</tbody>
</table>

Figure 6.1-7
Discharge Cage Adjustment Assembly

<table>
<thead>
<tr>
<th>REF</th>
<th>PART NO.</th>
<th>PART NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>116516</td>
<td>1-8 x 2( \frac{1}{4} )&quot; Hd Cap Scr, 316 SS</td>
</tr>
<tr>
<td>2</td>
<td>116763</td>
<td>1&quot; Lockwasher, 316 SS</td>
</tr>
<tr>
<td>3</td>
<td>118804</td>
<td>1&quot; Flat Washer, 316 SS</td>
</tr>
<tr>
<td>4</td>
<td>116752</td>
<td>1-8 Hex Nut, 316 SS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REF</th>
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<th>PART NAME</th>
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<tr>
<td>5</td>
<td>119913</td>
<td>1-8 x 5 Hx Cap Scr, 316 SS</td>
</tr>
<tr>
<td>6</td>
<td>120383</td>
<td>Adjust Lug, Prim/Intermed</td>
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<tr>
<td>7</td>
<td>119753</td>
<td>1&quot; Lockwasher, 316 SS</td>
</tr>
<tr>
<td>8</td>
<td>118804</td>
<td>1&quot; Flat Washer, 316 SS</td>
</tr>
<tr>
<td>REF</td>
<td>PART NO.</td>
<td>PART NAME</td>
</tr>
<tr>
<td>-----</td>
<td>----------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>110853</td>
<td>Housing, Pillow Block</td>
</tr>
<tr>
<td>2</td>
<td>110910</td>
<td>Bearing, Spherical Roller</td>
</tr>
<tr>
<td>3</td>
<td>110911</td>
<td>Bearing Adapter w/ Nut</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Figure 6.1-8
Pillow Block Bearing

A END FLOAT ALLOWANCE

DISCHARGE BOX

GEAR BOX

1

2

3

4

5

6

7

Figure 6.1-8
Figure 6.1-P

Figure 6.1-P

120231  3 1/2" Steam Joint
129095  Condenser Tube
116588  1 1/2 x 1 1/4 Pipe Bushing, 316 SS
6.2 Spare Parts

This section gives Dupps part numbers for service and repair parts. The "S" and "C" columns are used to identify recommended spare parts and commercial parts respectively. Recommended spare parts should be stocked at your facility, in the quantities shown, to reduce downtime for maintenance. Commercial parts are cross-referenced in the next section of this chapter.

<table>
<thead>
<tr>
<th>FIG</th>
<th>REF</th>
<th>PART NO</th>
<th>PART NAME</th>
<th>QTY</th>
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<th>C</th>
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<tr>
<td>6.1-2</td>
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<td>121393</td>
<td>Drive Belts</td>
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<tr>
<td>6.1-3A</td>
<td>9</td>
<td>122617</td>
<td>Cage Shim, Primary</td>
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<td>6.1-3A</td>
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<td>6.1-3B</td>
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<td>CONFIG</td>
<td>Inner Screen</td>
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<td>6.1-3B</td>
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<td>Inserted Back-up Screen</td>
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<td>6.1-3B</td>
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<td>Disch Cage Back-up Screen</td>
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<td>6.1-3B</td>
<td>16</td>
<td>119571</td>
<td>Cage Shim, Intermediate &amp; Discharge</td>
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<tr>
<td>6.1-4</td>
<td>9</td>
<td>128563</td>
<td>Thrust Bearing, Spherical Roller</td>
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<td>C</td>
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<td>6.1-4</td>
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<td>Shaft Bearing, Spherical Roller</td>
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<td>C</td>
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<td>6.1-4</td>
<td>11</td>
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<td>C</td>
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<tr>
<td>6.1-4</td>
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<td>O-ring 379, Vibon</td>
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<td>S</td>
<td>C</td>
</tr>
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<td>6.1-4</td>
<td>13</td>
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<td>Preload Spring</td>
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<td>S</td>
<td>C</td>
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<tr>
<td>6.1-4</td>
<td>14</td>
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<td>Lip Seal, Thrust Bearing</td>
<td>1</td>
<td>S</td>
<td>C</td>
</tr>
<tr>
<td>6.1-4</td>
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<td>128728</td>
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<td>2</td>
<td>S</td>
<td>C</td>
</tr>
<tr>
<td>6.1-5</td>
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<td>6.1-5</td>
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<td>6.1-7</td>
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<td>12139</td>
<td>Shim Cage Block, 1/4&quot;</td>
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<td>S</td>
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<td>6.1-7</td>
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<td>121239</td>
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<td>6.1-8</td>
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<td>Bearing, Spherical Roller</td>
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<td>S</td>
<td>C</td>
</tr>
<tr>
<td>6.1-8</td>
<td>4</td>
<td>124645</td>
<td>Lip Seal</td>
<td>2</td>
<td>S</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>120653</td>
<td>Rotary Steam Joint Repair Kit</td>
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<tr>
<td></td>
<td>127568</td>
<td>Air Cylinder Repair Kit</td>
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<td></td>
<td>CONFIG</td>
<td>Wear Shoe, Disch Right 17 4PH (Standard)</td>
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</table>
6.3 Commercial Parts

This section provides a cross-reference between the Dupps part number and the Vendor's part number for commercial parts used in the dewatering press. Many of these parts can be obtained locally.

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>PART NAME</th>
<th>VENDOR</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>110853</td>
<td>Pillow Block Housing</td>
<td>Mother</td>
<td>SAF 55066-21</td>
</tr>
<tr>
<td>110910</td>
<td>Pillow Block Bearing</td>
<td>FAG</td>
<td>23066BK.MB.C3</td>
</tr>
<tr>
<td>110911</td>
<td>Bearing Adapter w/Nut</td>
<td>Mother</td>
<td>SNP 3056-10-8</td>
</tr>
<tr>
<td>120231</td>
<td>Rotary Steam Joint</td>
<td>Johnson</td>
<td>2750L-NAR</td>
</tr>
<tr>
<td>121383</td>
<td>V-Belt</td>
<td>Griponch</td>
<td>5VX 13 °</td>
</tr>
<tr>
<td>121692</td>
<td>O-ring, 381, 90 Dur Viton</td>
<td>Johns-Manvl</td>
<td>R-1050-11348 RUP</td>
</tr>
<tr>
<td>124645</td>
<td>Seal</td>
<td>FAG</td>
<td>239405 MB C5</td>
</tr>
<tr>
<td>128562</td>
<td>Bearing</td>
<td>FAG</td>
<td>29332E</td>
</tr>
<tr>
<td>128563</td>
<td>Bearing</td>
<td>FAG</td>
<td>29332E</td>
</tr>
<tr>
<td>128724</td>
<td>O-ring, 370, Viton</td>
<td>Smalley</td>
<td>SSB-0866</td>
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<td>128725</td>
<td>Wave Spring</td>
<td>Garlock</td>
<td>23X7789</td>
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<tr>
<td>128726</td>
<td>Lip Seal</td>
<td>Garlock</td>
<td>23X6876</td>
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<td>Lip Seal</td>
<td>Garlock</td>
<td>23X6876</td>
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<tr>
<td>128724</td>
<td>O-ring, 370, 90 Dur Viton</td>
<td>Garlock</td>
<td>23X6876</td>
</tr>
</tbody>
</table>

Figure 6.3.1
Commercial Parts List
Appendix A

Recommended Tools for Dupps 3600B Dewatering Press

A.1 Recommended Tools

The following is a list of tools required for installation and service of the dewatering press. All wrench sizes are in inches, unless otherwise noted.

**Wrenches**

Depending on the particular installation, nuts and bolts could vary in size from those listed. A complete set of wrenches of each type (up through the largest size listed) is recommended.

1/2-In Drive Sockets:
- Sockets: 7/16 and 3/4
- Ratchet handle and breaker bar.

3/4-In Drive Sockets:
- Sockets: 1 1/8, 1 1/2, 2, 2 1/4
- Ratchet handle and breaker bar.

Open End Wrenches:
- 5/16 and 7/16 (2 each).
- 1 1/8 and 3 1/2 (1 each).
- Adjustable: 12-inch and 16-inch (1 each).

Other Wrenches:
- Torque wrench(es) covering the range: 160 lb-ft to 1050 lb-ft.
- 36-in pipe wrench (2 each).
- Spanner Wrench: 4-in to 6 1/2-in.
- Bearing nut impact spanner for 280mm bore bearing (SKF Part no 718911 or equivalent).
- Hex (Allen) Keys, small and large set up to 5/8.

**General Tools**

- Impact wrench 3/4 or 1/2 drive, with 3/4-to-1/2 drive adapter.
- Thickness gauges (std feeler gauge set)
- Dial calipers with end ground to go through inner screen.
- Drift pin with 1/4 to 3/8 taper.
Hammers: 10-lb sledge, brass, ball peen.
Come-alongs (2 each)
Hydraulic jacks, 10-ton (2 each).
Lifting shackles, 1500 lb min capacity (4 each),
Nylon slings or braided wire chokers, 1500 lb min capacity (3 each)
Arc welder with carbon air-arc attachment,
\( \frac{1}{8} \)-in 316L stainless welding rods,
\( \frac{3}{8} \)-in carbon rods for air-arc,
Hand-held disc grinder (pneumatic or electric)
Suitable lifting and transportation device (e.g., forklift) for cage removal.
One cage half weighs 875 pounds.
Appendix B

Storage of Inactive Dewatering Press

This appendix gives the preferred procedure for long-term storage of a new, uncommissioned dewatering press.

B.1 Storage Procedure

The press must be stored in a shelter to protect it from direct exposure to weather. A heated, dry enclosure is preferred.

Preparation for Storage

1. Plug and seal the inlet and outlet ports in the rotary steam joint.
2. Make sure the choke is in the fully retracted position. Plug and seal the ports in the choke air manifold.
3. Coat the drive coupling and other exposed metal surfaces on the drive with a rust-inhibitive coating.
4. Be sure the pillow block bearing and the thrust bearing assembly are filled with the recommended lubricants.

Maintenance During Storage

1. Maintain the gearbox and drive coupling according to the requirements published by the manufacturer(s). See Appendix A for manufacturers' publications.
2. Every three months, check the rust-inhibitive coating on exposed (unpainted) surfaces. Re-coat as necessary to prevent rust formation on the parts.
3. Every three months, purge the pillow block bearing and thrust bearing assembly of the old grease and refill with fresh grease.
4. Every three months, rotate the press shaft at least one full revolution to distribute grease in the bearings.
Appendix C

Vendor Information

This appendix contains service information provided by the manufacturers of certain commercial components used on the Dupps Dewatering Press. Contact the vendor or your Dupps service representative before performing service procedures that are not included in these instructions. Below is a list of literature included in this appendix:

<table>
<thead>
<tr>
<th>Mfr.</th>
<th>Pub no.</th>
<th>Product</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falk</td>
<td>Dwg. 515119</td>
<td>Gear Box</td>
<td>Parts List</td>
</tr>
<tr>
<td>Falk</td>
<td>128-010</td>
<td>Gear Box</td>
<td>Lubrication Specifications</td>
</tr>
<tr>
<td>Falk</td>
<td>146-050</td>
<td>Gear Box</td>
<td>Installation &amp; Maintenance</td>
</tr>
<tr>
<td>Falk</td>
<td>143-130</td>
<td>Gear Box</td>
<td>Oil Seal Installation</td>
</tr>
<tr>
<td>Zum</td>
<td>MA-216343</td>
<td>Coupling</td>
<td>Parts List</td>
</tr>
<tr>
<td>Zum</td>
<td>104-SHA</td>
<td>Coupling</td>
<td>Installation/Maintenance</td>
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<tr>
<td>Johnson</td>
<td>none</td>
<td>Steam Joint</td>
<td>Parts List, 3½-in 2750L1-NAR</td>
</tr>
<tr>
<td>Johnson</td>
<td>IS-N-2</td>
<td>Steam Joint</td>
<td>Installation, Type N Joint</td>
</tr>
<tr>
<td>Johnson</td>
<td>IS-101</td>
<td>Steam Joint</td>
<td>Aligning Johnson Joints</td>
</tr>
<tr>
<td>Mobil</td>
<td>PDS1-61</td>
<td>Synthetic Grease</td>
<td>Product Data Sheet</td>
</tr>
<tr>
<td>Rexroth</td>
<td>Dwg. SK-3616</td>
<td>Air Cylinder</td>
<td>Parts List</td>
</tr>
</tbody>
</table>
OUTLINE ASSEMBLY DRAWING
FALK 2177YN4-S GEAR REDUCER
SOURCE: FALK DWG. NO. 515119
SHEET (2 OF 3)
Lubricants listed in this manual are typical products ONIT and should not be construed as exclusive recommendations. 

NOTE: Recommendations shown in Tables 1 thru 4 apply to Falk gear drives listed in Table 5 on Page 2.

PETROLEUM LUBRICANTS

Petroleum-Based R & O Gear Oils (Table 2)

Industrial-type petroleum-based rust and oxidation inhibited (R & O) gear oils are the recommended lubricants for ambient temperatures of 115°F (-26°C) to 221°F (-32°C). Carefully follow instructions on the unit nameplate, warning tags and installation manuals furnished with the unit. 

Determine the required viscosity from Table 5 on Page 2. Select an oil with a pour point less than the expected minimum 6°C starting temperature from Table 2. 

Extreme Pressure Lubricants (Table 3)

For highly loaded units or for units located in excess of original estimates, industrial type petroleum extreme pressure lubricants are recommended. The EP lubricants currently recommended are of the sulfur-phosphorus type.

EP LUBRICANTS IN FOOD PROCESSING INDUSTRY — EP lubricants may contain toxic substances and should not be used in the food processing industry unless the lubricant manufacturer's approval is obtained.

EP & AF LUBRICANTS AND INTERNAL BACKSTOPS: Do not use EP lubricants or lubricants with anti-wear additives or lubricant form, lotions including sulfur, phosphorus, chlorine, lead derivatives, graphite or molybdenum disulfides in units equipped with internal cartridge type backstopping. Some oils in Table 2 may contain anti-wear additives. Oils in Table 3 do contain some of these additives.

VISCOSITY (IMPORTANT) — The proper viscosity grade of Extreme Pressure lubricants is the same as specified for R & O oils and is found in Table 5. For cold climate conditions, see section on synthetic lubricants.

BEARING & SEAL GREASES

Some units have one or more grease lubricated bearings and grease purged seals. Whenever changing oil in the unit, grease these parts with one of the NLGI #2 greases listed in Table 3. 

Some of these products are of the EP type and may contain toxic substances not allowed in the food processing industry. Check with lubricant manufacturer for approval.

SYNTHETIC LUBRICANTS

Synthetic lubricants of the polyalphaolefin type are recommended for cold climate operation, extended temperature range (oil section) operation and/or extended lubricant change intervals.

COLD CLIMATE CONDITIONS

The proper viscosity grade of synthetic lubricant is given in Tables 1 & 5. These recommendations apply to the enclosed gear drives in Table 5, on Page 2, that use single lubrication systems. Consult The Falk Corporation for drives that use pumps or sizers to distribute the lubricant. Usable temperature ranges can sometimes be widened if specific application conditions are known.

Table 1 — Polyalphaolefin Type Synthetic Lubricants

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Lubricant</th>
<th>Model</th>
<th>Viscosity at 15°C (59°F)</th>
<th>SAE Viscosity Grade</th>
<th>SAE Viscosity Grade</th>
<th>SAE Viscosity Grade</th>
<th>SAE Viscosity Grade</th>
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<tr>
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<td>4</td>
<td>3</td>
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<td>1</td>
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</table>

Normal Climate Conditions

For temperatures of 115°F (-26°C) and above, use viscosity grades as recommended in Table 5. Select a lubricant from Table 1. Usable temperature ranges can sometimes be widened if specific application conditions are known.

CAUTION

SYNTHETIC LUBRICANTS IN FOOD PROCESSING INDUSTRY — Synthetic lubricants may contain toxic substances and should not be used in the food processing industry without the lubricant manufacturer's approval.

SYNTHETIC LUBRICANTS AND INTERNAL BACKSTOPS: Do not use synthetic lubricants in units equipped with internal cartridge type backstopping. Synthetic lubricants may reduce friction coefficient and may contain anti-wear additives or formulators including sulfur, phosphorus, chlorine, lead derivatives, graphite or molybdenum disulfides. Some oils in Table 1 may contain these additives.

Table 2 — Petroleum R & O Oils (Maximum operating temperature of lubricants: 2C (93°C))

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Lubricant</th>
<th>Model</th>
<th>Viscosity at 104°F (30°C)</th>
<th>SAE Viscosity Grade</th>
<th>SAE Viscosity Grade</th>
<th>SAE Viscosity Grade</th>
<th>SAE Viscosity Grade</th>
<th>SAE Viscosity Grade</th>
<th>SAE Viscosity Grade</th>
<th>SAE Viscosity Grade</th>
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<tr>
<td>Amoco Oil Co</td>
<td>Ind Oil #86</td>
<td>Ind Oil #86</td>
<td>193-235</td>
<td>284-347</td>
<td>417-510</td>
<td>626-765</td>
<td>910-1122</td>
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<tr>
<td></td>
<td>Ind Oil #100</td>
<td>Ind Oil #100</td>
<td>414-50</td>
<td>613-74</td>
<td>90-110</td>
<td>135-165</td>
<td>146-242</td>
<td>238-252</td>
<td>238-252</td>
<td></td>
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</tr>
</tbody>
</table>

OIL CHANGES

PETROLEUM LUBRICANTS — For normal operating conditions, change oil every six months or 5000 hours, whichever occurs first. If the unit is operated in an area where temperatures vary with the season, change the oil viscosity to suit the temperature. Lubricant suppliers can test oil from the unit periodically and recommend economical oil change schedules for applicable grease bearings and seals when changing oil.

SYNTHETIC LUBRICANTS — Synthetic oil change intervals can be extended to 8000-10,000 hours based on operating temperatures and lubricant contamination. Laboratory analysis is recommended for optimum lubricant life and gear drive performance. Change oil with ambient temperature change, if required. Refer to Table 1.
### TABLE 3 — EXTREME PRESSURE LUBRICANTS
(Maximum operating temperature 200°F (93°C))

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Lubricant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoco Oil Co.</td>
<td>Pennwiper EP</td>
</tr>
<tr>
<td>Atlantic Richfield Co.</td>
<td>Pennroy EP</td>
</tr>
<tr>
<td>Chevron U.S.A., Inc.</td>
<td>NL Gear Compound</td>
</tr>
<tr>
<td>Ceps Service Co.</td>
<td>Ceps EP Compound</td>
</tr>
<tr>
<td>Camco Inc.</td>
<td>Gear Oil</td>
</tr>
<tr>
<td>Exxon Co. U.S.A.</td>
<td>Squenet EP</td>
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<tr>
<td>Gulf Oil Corp.</td>
<td>EP Lubricant HD Series</td>
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<td>Gullman EP</td>
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<tr>
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<td>MP Gear Oil</td>
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<td>Mobil All Purpose Grease Oil</td>
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<tr>
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<tr>
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</tr>
<tr>
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<td>Mobilgator</td>
</tr>
<tr>
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</tr>
<tr>
<td>Union Oil Co. of Calif (East &amp; West)</td>
<td>Mobilgator</td>
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### TABLE 4 — GREASES FOR BEARINGS AND GREASE PURGED SEALS 0°F to 200°F (-18 to 93°C)

<table>
<thead>
<tr>
<th>Manufacturer</th>
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<tbody>
<tr>
<td>Amoco Oil Co.</td>
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<tr>
<td>Amoco Oil Co.</td>
<td>Multilub Grease</td>
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<tr>
<td>Atlantic Richfield Co.</td>
<td>Lithium EP 2 Grease</td>
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<tr>
<td>Chevron U.S.A., Inc.</td>
<td>Industrial Grease Medium</td>
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<tr>
<td>Ceps Service Co.</td>
<td>Premium Lithium Grease No. 2</td>
</tr>
<tr>
<td>Camco Inc.</td>
<td>E Richmond Grease No. 2</td>
</tr>
<tr>
<td>Exxon Co. U.S.A.</td>
<td>Gulfstream Grease No. 2</td>
</tr>
<tr>
<td>Gulf Oil Corp.</td>
<td>Gulfstream Grease No. 2</td>
</tr>
<tr>
<td>Gulf Canada Limited</td>
<td>Gulfstream Grease No. 2</td>
</tr>
<tr>
<td>E E Houghton &amp; Co.</td>
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<tr>
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<td>Kendall Refining Co.</td>
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<td>Keystone Div Pennsalt Corp</td>
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</tr>
<tr>
<td>Union Oil Co. of Calif (East &amp; West)</td>
<td>Gulfstream Grease No. 2</td>
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</tbody>
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### TABLE 5 — VISCOSITY RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Unit Description</th>
<th>Classification Symbol (Unit Type)</th>
<th>Unit Size</th>
<th>100°F in +112°F (-34°F to -10°C)</th>
<th>150°F in +59°F (-9°F to +71°C)</th>
<th>56°F to 115°F (13°C to 46°C)</th>
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<tbody>
<tr>
<td>ISO-VB</td>
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<td>ISO-VB</td>
<td>ARMA</td>
<td>ISO-VB</td>
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<td>Synthetic Hydrocarbons</td>
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<td>100</td>
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<td>Petroleum Oils</td>
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<td>Normal Viscosity</td>
<td></td>
<td>220</td>
<td>5</td>
<td>322</td>
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</tbody>
</table>

### TABLE 6 — VISCOSITY RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Unit Description</th>
<th>Classification Symbol (Unit Type)</th>
<th>Unit Size</th>
<th>100°F in +112°F (-34°F to -10°C)</th>
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<tbody>
<tr>
<td>ISO-VB</td>
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<tr>
<td>Normal Viscosity</td>
<td></td>
<td>220</td>
<td>5</td>
<td>322</td>
<td>6</td>
</tr>
</tbody>
</table>

Notes:
- Contact factory for viscosity recommendations when ambient temperatures are higher than 125°F (52°C) or when units are exposed to high humidity, chemical, or steel dust, which may cause the lubricant to become contaminated.
- Lubricants must be selected to ensure that the temperature of the lubricant does not exceed 100°F (38°C) when using an AGMA No. 1 Oil (193 to 235 LSL) or 104°F (40°C) in a pressure lubrication system.
- Contact manufacturer for detailed lubrication recommendations.
INTRODUCTION

The following instructions apply to all standard Folk Speed Reducers shown at right, and also type GHB. If a unit is furnished with special features, refer to the supplementary instructions shipped with the unit.

Credit for long service and dependable operation of a gear drive is often given to the engineers who designed it, or the craftsmen who constructed it, or the sales engineer who recommended the type and size. Ultimate credit belongs to the mechanic on the job who worked to make the foundation rigid and level, who accurately aligned the shafts, and carefully installed the accessories, and who made sure that the drive received regular lubrication. The details of this important job are the subject of this manual.

WARRANTY - The Folk Corporation (the "Company") warrants that, for a period of one year from the date of shipment, the product described herein will deliver successfully its rated output as indicated on the nameplate, provided it is properly installed and maintained, correctly lubricated, and operated in the environment and within the limits of speed, torque, or other load conditions for which it was sold. Such product is expressed to be warranted against failure or unsatisfactory operation resulting from dynamic vibration, imposed upon it by the drive system which it is installed unless the nature of such vibration has been fully defined and expressly accepted in writing by the Company as a condition of operation.

CAUTION

Consult applicable local and national safety codes for proper guarding of rotating members.

Lock out power source and remove all external loads from unit before servicing unit or accessories.

INSTALLATION INSTRUCTIONS

FOR SATISFACTORY PERFORMANCE, CAREFULLY FOLLOW THESE INSTRUCTIONS

WELDING - Do not weld the gear unit housing or accessories without prior approval from the Folk Corporation. Welding on the unit may cause distortion of the hawg or damage to the bearings and gear teeth. Welding without prior approval could void the warranty.

NAMEPLATE - Operate unit only at horsepower, speed and ratio shown on nameplate. Before changing any one of these, submit complete nameplate data and new application conditions to the factory for correct oil level, parish and application approval.

TIGHTENING TORQUES - Fasteners - See Page 2.

GREASE LUBRICATED BEARINGS - See Page 3.

STORED AND INACTIVE UNITS - See Page 4.

MOUNT HORIZONTALLY - CAUTION: Mount unit with base horizontal unless it has been specifically ordered for mounting in another position. If it is necessary to mount the unit in a different position from that for which it was ordered, consult the Folk Corporation for changes necessary to provide proper lubrication.

FOUNDATION, GENERAL - To facilitate oil drainage, elevate the unit foundation above the surrounding floor level at least 1" as illustrated. It is desired, replace the unit oil drain plug with a valve to provide a guard to protect the valve from accidental breakage.

When an outboard bearing is used, mount unit and outboard bearing on a separate foundation or bedplate and drive both in place.

FOUNDATION, STEEL - When mounting unit on structural steel, it is recommended that an engineered design be utilized for a baseplate or bedplate to provide sufficient rigidity, to prevent induced loads from disturbing the housing and causing gear misalignment. In the absence of an engineered design, it is recommended that a baseplate with thickness equal to or greater than the thickness of the unit feet, be securely bolted to steel supports and extended under the entire unit as illustrated.

Motors and other components (whether mounted on motor plates or motor brackets) may become misaligned during shipment. ALWAYS check alignment after installation. Refer to Page 2 for coupling alignment instructions.

UNIT ALIGNMENT - Align unit with driven equipment by placing broad flush shims under all mounting pads. Start at the low speed shaft side and level across the length and then the width of the unit. Check with a feeler gauge to make certain that all shims are supported to prevent distortion of housing when unit is bolted down. After unit is aligned, flush shims and bolted down align perfectly. Keep unit input shaft high to avoid i dentical alignment.

If equipment is received from Folk mounted on a bedplate, the components were accurately aligned at the factory. Beware this bedplate and realign high speed coupling alignment if necessary. Realign motor
MOTOR BRACKETS - The weight, location and starting torque of the motor will cause some brackets to deflect downward and to twist. This movement is within allowable engineered limits for unit motor selections from the Falk bulletin. If the customer considers the movement excessive, jack-screw supports or 'V' bracket extension are available from Falk whether the motor was mounted by Falk or the customer. To compensate for deflection caused by heavy motors AND to get CORRECT COUPLING ALIGNMENT, use more shims under the rear motor feet than the front feet.

Motors and other components (whether mounted on motor plates or motor brackets) may become misaligned during shipment. ALWAYS check alignment after installation. Refer to coupling alignment instructions below.

SHAFT CONNECTIONS

COUPLING CONNECTION - The performance and life of any coupling depends largely upon how well the coupling is installed and serviced. Refer to the coupling manufacturer's manual for specific instructions.

CORRECT METHOD
Heat interference fitted coupling hubs, pinions, sprockets or pulleys to a maximum of 275°F (135°C) and slide onto unit shaft.

INCORRECT METHOD
DO NOT drive coupling hub, pinion, sprocket or pulley onto the shaft. An endwise blow on the shaft may damage the hub shafting.

— CAUTION —
DO NOT HAMMER

Provide suitable guards in accordance with OSHA standards.

BACKSTOP - To prevent damage to backstops due to incorrect motor shaft rotation at start up, couplings are NOT assembled when units are furnished with backstops. After completing the electrical connection, check motor and unit shaft rotation. Then complete alignment and assembly of coupling.

FALK COUPLINGS - Detailed installation manuals are available from the factory and your local Falk Representative or Distributor just provide size and type designations stamped on the coupling. Refer to Manual 425-010 or Steelflex coupling and Manual 458-010 for Gear couplings for lubrication requirements and a listing of typical lubricants meeting Falk specifications.

The following instructions apply to coupling alignment:

Gap and Angular Alignment if possible, "hot" mounting coupling hub, position the driving and driven units so that the distance between shaft end is equal to coupling gap. Align the shafts by placing a spacer block equal to thickness to required gap between hub faces, as shown above, and also at 90° intervals around the hub. Check with feelers.

Offset Alignment - Align shafts of driving and driven units so that a straightedge will rest squarely on both coupling hubs, as shown in the right and also at 90° intervals. Tighten foundation bolts of the connected equipment and recheck alignment and gap.

PINION MOUNTING - Mount the pinion as close to the unit as possible to avoid undue bearing load and shaft deflection. Refer to the Factory for pinion alignment instructions.

OUTBOARD BEARING - Mount the outboard bearing and unit on a common foundation so that they will shift as an assembly if setting should occur. Bring the outboard bearing to the correct horizontal position with broad flat shims under the mounting pad. Align accurately so that the load is equally divided between the two bearing units and the outboard bearing. Mount a stop block against the pillow block foot on the load side when large horizontal load components are exerted on the pillow block.

SPROCKET, PULLEY OR SHEAVE CONNECTION - Mount power take-offs as close to the unit housing as possible to avoid undue bearing load and shaft deflection. DO NOT over tighten bolts or chains. Adjust to manufacturer's specifications. Align the output shaft of the unit square and parallel with the driven shaft by placing a straightedge across the face of the sprocket or sheave as illustrated. Check horizontal shaft alignment by placing one kg of a square against the face of the sheave or sprocket with the spirit level in the horizontal kg of the square.

TIGHTENING TORQUES

Use the values specified in the table below for fastening motors "hot" Falk units. "Cold" accessories to the mounting surfaces with SAE Grade 5 or ASTM A449 non-lubricated fasteners. DO NOT use these values for "torquing" fasteners for fastening components with aluminum feet or with soft gaskets or vibration dampers on the mounting surface. Little tightening torque exceeds the capacity of the torque wrench, use a torque multiplier.

<table>
<thead>
<tr>
<th>Torque</th>
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<tr>
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<td>.005</td>
<td>.010-4-1</td>
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</table>

LUBRICATION

UNIT LUBRICATION - Read and carry out all instructions on lubrication plate and heed all warning tags. Determine minimum and maximum ambient temperatures in which the drives operate and read the SAL or AGMA lubricant number for those temperature conditions from the lubrication plate on the unit. Select lubricant from Manual 128-010 corresponding to the SAL or AGMA lubricant number.

OPERATING TEMPERATURE - If the unit is operated in an area where the temperatures vary with the season, change the oil viscosity to suit the season. For cold weather operation use a high viscosity oil that will circulate freely at all times. The pour point of the oil should be less than the minimum external temperature encountered. During hot weather, use a high viscosity oil that will thin out and lose its lubricating qualities.
If a unit operates in the sun or at ambient temperatures over 100°F (38°C), then special measures should be taken to protect the unit from solar energy. This protection can consist of a canopy over the unit or reflective paint on the unit. If neither is possible, a heat exchanger or other cooling device may be required to prevent the temperature from exceeding the allowable maximum of 200°F (93°C).

EXTREME PRESSURE LUBRICANTS DO NOT use extreme pressure lubricants in units equipped with an internal back-up seal. Units sometimes are severely overloaded due to a change in design of the driven machine, or a change in the nature of the material being processed. This also occurs when power requirements are increased, but capacity is not. As a result, geometrical tooth contact may cause distress in the nature of scoring, sticking or seizing. For applications of this nature, an extreme pressure lubricant is recommended. This adds protection to the gear teeth and may retard scoring and seizing. However, this is not a cure-all. Application, which are severely overloaded should be referred to the factory for further study and recommendations. Extreme pressure lubricants are listed in Manual 128-010.

SYNTHETIC LUBRICANTS - Synthetic lubricants of the polyalkylene type are used successfully in gear drives to provide certain advantages. Today, it is possible to have a gear lubricant that is 100% compatible with Mineral Oil or extreme pressure oil. Depending upon operating conditions, these advantages may include longer service life between lubricant changes, elimination of need to change lubricant to suit the season, operating capabilities beyond the high and low temperature limits of Mineral or EP oils.

Select synthetic lubricants in accordance with specifications in Manual 128-010.

Splatter Lubricated Units - Standard Type Y units are splatter lubricated. Lubrication is picked up by the revolving elements and distributed to all bearings and gear meshes.

Unit with Heat Exchanger - Check immediately after starting to see that the external pump is circulating oil properly. Installing the unit will cause any water in the water line to the heat exchanger to regulate the temperature of oil. Check to make sure the water flow is through the exchanger. Also install a water flow gauge to monitor the temperature. Determine actual flow rate. Discharge water to an OPEN DRAIN to prevent back pressure.

Pressure Lubricated Units - Check immediately after starting to see that the internal or external pump is circulating oil properly. Refer to Manual 148-931 for detailed instructions.

OIL LEVELS - Approximate capacity of oil is shown on the unit nameplate. To fill a Type S unit, remove the inspection plug and FLOOD THE OIL TRUCKS with a generous flow of oil to the bearings. For Type Y8C, remove sight glass and fill oil passages. This priming action lubricates and protects the bearings until the oil is circulated. Check the oil level after operating one minute and adjust to normal level. Oil to compensate for cooler, filter, etc. capacities.

GREASE LUBRICATED SEALS - Type Y units are furnished with grease purged seals which minimize the entry of foreign matter into the bearing and other abrasive dust. All units are equipped with NLGI #2 grease in the seal housings. Unless otherwise specified, if grease contaminated the product, the food and drug industries, it should be removed.

At least once every six months, or when the grease becomes contaminated, pump fresh grease to the old along the shaft extension where it can be wiped off.

GREASE LUBRICATED BEARINGS - When changing oil in the unit, grease is carried with a NLGI #2 bearing grease. Grease these bearings, as part of the standard maintenance program before installing a unit, note the location of all of the bearing grease fittings and grease labels for future maintenance reference. Note that some fittings may be above or below the oil level, and others below. If a grease fitting is below the oil level, remove plug or fitting and replace the fitting with a plastic extension and the fitting so the grease fitting will be in an accessible location after the unit is installed.

DO NOT confuse the grease fittings for grease lubricated bearings with those for grease lubricated bearings. If sealed and inadvertently greased will appear along the shaft or the shaft cover.

A tight angle, S.S. bearings are not greased. Always remove the purge plug when provided; when greasing bearings so that the old grease can escape. The new grease will replace the plug after greasing bearings.

OIL CAPACITIES

ADD OIL TO THE LEVEL MARKED ON THE UNIT DIPSTICK

LARGE SPEED REDUCERS - Oil capacities for the large speed reducers vary with the unit size, reduction, input speed and ratio. Refer to the factory for oil capacity of these units. Before starting any unit, fill with oil to level indicated on the drive.

PREVENTIVE MAINTENANCE

AFTER FIRST WEEK - Check alignment of the twisted system and realign where necessary. Also, tighten all external bolts and plugs where necessary. DO NOT adjust the internal gear or bearing settings in the reducer; these were permanently set at the factory.

AFTER FIRST MONTHS SERVICE - Proceed as follows:

1. Operate unit until oil sump reaches normal operating temperature. Shut the unit down and drain immediately.
2. Im mediately flush unit with oil of the same type and viscosity grade as the original charge. (Warmed to approximately 100°F [38°C] in cold weather). Rapidly pour or pump a charge equal to 25-100% of the initial fill through the unit and drain all oil through the drain. Close the drain and refill the unit to the correct level with new or reclaimed oil of the correct type and viscosity if determined to be in good condition by the supplier. Drain oil may be reused if filtered through a 10 micron or finer filter.

PERIODICALLY - Carefully check the oil level of the unit when it is stopped and at ambient temperature. Add oil if needed. If the oil level is above the high level mark on the dipstick or on the level plug, the oil level gauge has an oil in it. Carefully check the oil level of the unit. Oil in the unit may indicate it is time to change the gear oil, replace the defective part immediately and change the oil. DO NOT fill above mark indicated as leakage on undue heating may result. Also check coupling alignment to make sure foundation settings have not changed. Couplings are equipped with a fan, bearing and deflector to allow adequate air flow.

OIL CHANGES - For normal operating conditions, change gear oil every 6 months, or 2500 operating hours, whichever occurs first. Compounded oils may require more frequent changes. In dusty areas or where temperatures are high, more frequent changes may be required. Lubricant suppliers can test all samples from the drive periodically and recommend economical change periods based on the rate of lubricant contamination and degradation.

"""The drive is operated in an area where temperatures vary with the seasons, change the oil viscosity grade to suit the temperature."

Refer to Manual 128-010 for viscosity recommendations and typical lubricant meeting FALS specifications.

GREASE PURGED SEALS - Periodically (at least every six months), depending upon the frequency and degree of contamination, purge contaminated grease from the seals by pumping fresh bearing grease through the seal until it flows out of the bottom plug plug hole. Remove plug before purging. For units smaller than 100Y, 200Y and 2100Y with fans, remove the fan guard to expose the grease fitting and pipe plug.

BEARINGS - Some units have one or more grease lubricated bearings. See GREASE LUBRICATED BEARINGS when changing oil in the unit gear bearing with NFGL or 12 bearing grease.

COUPLINGS - Grease lubricated couplings, according to instructions furnished by the coupler manufacturer. For installations using non-magnetic couplings, refer to Manual 416-110.
DISASSEMBLING - CAUTION: Remove all external leads from unit before removing unit or components. Service manuals and parts guides are included with each manual. Five other manuals are listed on the back.

STORED AND INACTIVE UNITS

Each drive may be shipped with water-tight filling that will protect the drive from rust and water. The drive is to be stored or installed beyond the normal installation period. To prevent rusting during installation, the drive must be stored in a dry location.

SPACE AND REPAIR PARTS - When ordering parts, always give the full part number and description, e.g., 300100-0001, S/N 0001. All drives are delivered with a full set of parts, including

MOTORTESTER - Add to Stored or Inactive Units

Parts ordered for storage or installation must be handled of the Rotor with a special protective gear, such as a general-purpose or special-purpose protective gear, to prevent rusting and corrosion. If the protective gear is not used, rusting and corrosion may occur.
**INTRODUCTION**

The following instructions cover replacement of shaft work on Types Y, YB, YF and VBX speed reducers. These instructions also apply to the above mentioned unit types with features i.e., lowered foundation, Type YN and extra capacity low speed bearings, Type YT, etc. Drawings are representative and may not agree in exact detail with all units. When ordering parts or requesting information, specify the M.O. number, unit size, model number, rpm, etc. and date stamped on the reducer nameplate.

Folks have developed several different types of seal assemblies (Figures 1 thru 7), below and at right. Foot units operating in atmospheres laden with toronite or other similar severely abrasive dusts or in areas that are periodically hosed down with water under pressure, grease purgeable assemblies are recommended, (Figures 2 thru 7). This feature is being incorporated as standard on new model units along with a bush type ml. The split seal assembly, for emergency fill replacement only, is used when it is impractical to break shaft connections to replace solid ring ml, (Figures 5 & 7).

**CAUTION**

Lock out power source and remove all external loads from unit before servicing unit or accessories.
Consult applicable local and national safety codes for proper guarding of rotating members.

**GENERAL INSTRUCTIONS**

Before removing seals, clean external surfaces of reducer to prevent dirt from entering unit.
Record mounting dimensions of shaft accessories for reference when reassembling.

During disassembly note and record type of seals: single or dual lip, split or solid, single or dual seal used and direction seals are facing.

**TYPES OF SEAL ASSEMBLIES**

Single Seal Assembly - Consists of a solid seal cage, one single or dual lip solid seal, with one of the following baffle, seal cover or split cage, as illustrated in Figures 1, 2 & 6.

Double Seal Assembly - Consists of a solid seal cage, two single or dual lip solid seals and split cage, as illustrated in Figures 3 & 4.

Split Seal Assembly - Emergency Field Replacement Only Consists of a solid seal cage, one or two single lip split seals, and a split cage, as illustrated in Figures 5 & 7.

**SEAL ASSEMBLY IDENTIFICATION**

1. Identify your seal assembly by matching all the parts of the assembly with one of Figures 1 thru 7 below and at right. Make certain you match each part of the assembly as only one of the figures will match.

2. Follow the corresponding instructions indicated in the drawing.

---

**Figures**

1. Refer to Section I
2. Refer to Section II
3. Refer to Section II
4. Refer to Section II
5. Refer to Section III
6. Refer to Section IV
7. Refer to Section IV
SECTION I. FIGURES 1 & 2

1. Remove seal baffle or cover (Figure 1) or seal cover (Figure 2).

2. Slide a well lubricated piece of smooth brass shim stock under the seal lip to protect the shaft rubbing surface during removal.

DO NOT MAR REDUCER SHAFT

3. If solid seal cage has been removed from reducer, block up seal cage and press or drive out seal. Refer to appropriate Disassembly and Assembly Instructions for seal cage installation instructions.

4. If seal cage has not been removed from reducer, use one of the following procedures for seal removal:

   A. Cut through the steel casing of the seal in two places 180° apart with a small cold chisel and pry up the metal to form a lip. Grasp the lips alternately with pliers and remove seal, Figure 9.

   B. Punch three equally spaced holes in the steel casing of the seal. Insert three sheet metal screws so the heads remain outside the seal cage. Pry out seal, Figure 9.

5. Clean shaft seal rubbing surface. CAUTION: DO NOT use any abrasive materials on the rubbing surface polished by the seal. New seals will leak if the seal rubbing surface on the shaft is altered or if seal lips are cut.

6. Remove old sealing compound from seal cage bore and recut with Permatex #3 or equivalent. Generously coat the seal lips and pocket between the lips with #2 ball bearing grease or SAE 40 oil.

SECTION II. FIGURES 3 & 4

1. Remove fasteners holding split seal cage halves together and fasteners holding split seal cage to solid seal cage.

2. Carefully pry the split seal cage away from the solid seal cage.

3. Remove the exposed outer seal.

4. Refer to Section I, Steps 2 thru 8 to remove and reinstall the inner shaft seal.

5. Slide the outer seal on the shaft. DO NOT expand the seal lips more than .03" diameter.

   Figure 3 — Garter springs must face toward the inside of "nit for both dual lip seals.

   Figure 4 — Model L. — Garter spring must face toward the outside of unit for both single lip seals. Models A, B, C & K — Garter spring of inner single lip seal must face toward the outside of "nit.

6. Coat split seal cage bore flange face and joints with Permatex #3 or equivalent. Mount each half over outer seal and fasten halves together.

7. Pack chamber between inner and outer seal with NLGI #2 bearing grease. Fasten split and solid seals cages together. See PREVENTIVE MAINTENANCE OF GREASE PULLED SEALS. Page 3.


SECTION III. FIGURE 5

1. Remove fasteners holding the split seal cage halves together and fasteners holding the split seal cage to solid seal cage.

2. Carefully pry the split seal cage away from the solid seal cage.

3. If the outer seal is split, remove it. If the outer seal is a solid ring, cut it off with a tin snips.

4. If the inner seal is split, pry it out at the split and remove it.

5. If the inner seal is a solid ring, refer to Section I, Step 2 thru 4. Cut off loosened inner seal with a tin snips.

6. Clean the shaft seal rubbing surface. CAUTION DO NOT use any abrasive materials on the rubbing surface polished by the seal. New seals will leak if the seal rubbing surface on the shaft is altered or if seal lips are cut.

7. Coat seal surface on shaft and seal rubbing surface with NLGI #2 bearing grease.

8. Split seals are furnished with (A) integral finger type springs or (B) detachable garter springs.

   A. To mount the finger type seal, spread the seal and slip it over the shaft.

   B. To mount the garter type seal, slip the seal over the shaft and compress the seal lips around the shaft.
To mount split seals with the detachable garter spring, pass the spring around the shaft and connect the hook and eye ends. Spread the seal apart and slide it over the shaft. Form two welding rods into flat paddles with curved ends. Make certain that the hook and eye are not in line with the seal split, and then tuck the spring into the carrier groove with one paddle. Slide the other paddle around the groove until the spring is fully seated, as illustrated in Figure 10.

Figure 10

1. Apply a small amount of Permatex #3 to seal O.D. Install inner seal into seal cage with built-in finger or garter spring toward the inside of the unit. Position the seal split at an angle 45° above the housing split. Place paddles or screw drivers behind the seal to spread the assembly evenly into the seal cage.

2. Mount the outer seal on the shaft with built-in finger or garter spring facing the outside of the unit for Models A, B, C and K; mount seal with garter spring toward the inside of the unit for Model L. Position the seal split at an angle 45° above the housing.

3. Coat split seal cage bore flange face and joints with Permatex #3 or equivalent. Mount each half over outer seal and fasten halves together.

4. Pack chamber between inner and outer seal with NLGI #2 bearing grease. Fasten split and solid seal cages together. See PREVENTIVE MAINTENANCE OF GREASE PURGED SEALS, Page 3.

5. Reinstall the reducer and accessories as instructed in Service Manual 128-050.

MAINTENANCE OF GREASE PURGED SEALS

The option of adding grease is the purchaser’s. The use of this feature is recommended for units operating in abrasive atmospheric conditions, but it IS NOT RECOMMENDED where grease could contaminate the product as in the food and drug industries.

To make use of this feature, pump NLGI #2 bearing grease into the seal housing cavity through the seal grease fitting until grease appears on the shaft. At least once every six months, or when the grease becomes contaminated, pump in fresh grease to flush out the old along the shaft extension. Wipe off excess grease.
SPECIAL FA-209 2.93 MAX. TRAVEL
AMERIGEAR FULLY-CROWNED TOOTH FLEXIBLE COUPLING

LIST OF MATERIALS

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RECOMMENDED SPARE PARTS:

NOTES:
1. COUPLING RATING 2700 H.P. PER 100 R.P.M. 1275 MAX. R.P.M.
2. MISALIGNMENT: ±1/2° PER GEAR MESH.
3. EQUIVALENT PARALLEL OFFSET: 0.25 IN. P. 0.125 S. 0.625 IN. Q. 0.375 S. S.
4. COUPLING CALCULATED WEIGHT: 1,480 LBS.
5. RECOMMENDED MEDIAN TORQUE FOR FASTENERS ITEM 9: 800 FT-LBS (DRY) 600 FT-LBS (LUBED).
6. RECOMMENDED INSTALLATION & LUBRICATION INSTALLATION & LUBRICATION INSTL. SEE FORM 04-SHA.
7. RECOMMENDED QUANTITY OF LUBE: 0.24 QTS. (3.12 QTS. PER END).

CUSTOMER: ZURNE INDUSTRIES, INC.

ZURNE INDUSTRIES, INC.

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Installation, Lubrication and Maintenance Instructions

- For Standard Series F and C Flexible Couplings

- Class III, Series F Flexible Coupling components are serialized. Each hub and its mating sleeve are marked as end “A” or “B” and must be assembled accordingly.

NOTE: Amerigear Couplings are not lubricated when shipped. Follow the procedures contained herein.

CAUTION Prevent accidental injury from this rotating equipment. Install suitable coupling guard before starting equipment.

CAUTION Torque flange fasteners to tabulated values (see page 3)
**Amerigear 200 Series**
Flexible Couplings
Alignment and Installation Instructions

**Purpose:** The purpose of aligning equipment is to avoid transmission of unwanted stresses, shafts, couplings, etc.

**How:** By providing minimum angularity and offset of shaft axes at normal operating conditions (Figs. 1 and 2).

**Why:** To increase life of bearings, couplings, shafts, and seals. To get at the root of serious malfunctions involving shutdowns and costly repairs.

**When:**
1. During installation, before grouting
2. Immediately after initial operation
3. When final operating conditions and final temperature are attained
4. Seasonally
5. Whenever first symptoms of trouble occur — vibration, undue noise, sudden overheating of bearings.

**Practical Considerations:**
1. Verify shaft separation
2. Locate rotor in running position (for example, on sleeve bearing motors)
3. Anticipate thermal changes
4. Read instructions and review drawings

**Tools:**
1. Dial indicator with attaching device
2. Feeler gauges
3. Inside micrometer
4. Outside micrometer
5. Snap gauges
6. Straightedge

**Angular Misalignment Measurement:**
1. Measure at 4 points the space between the shaft ends (Fig 3)
2. Rotate both shafts 180° and repeat
3. Perform calculations for angle

**Offset Misalignment Measurement:**
1. Rotate shaft A (with dial indicator mounted) and note readings of shaft B offset (Fig 4)
2. Or use straightedge and feeler gauge (Fig 5)

**CAUTION:** Misalignment at installation should not exceed 1/3 of rated catalog misalignment.

**CAUTION:** Rotating equipment is potentially dangerous and could cause injury or damage if not properly protected. Follow applicable codes and regulations.

---

**Figure 1 —** Angularity is the acute angle formed at the intersection of the axes of the driving and driven machine shafts when shafts are exactly parallel. Angular misalignment is zero; but vertical and horizontal displacement of axes may be present (See Fig. 2).

**Figure 2 —** Concentric alignment (also called offset alignment or parallel offset) is the relationship between the shaft axes in terms of vertical and horizontal displacements of the axis of one shaft from the axis of the other shaft.

**Figure 3 —** To determine relative angular shaft positions of driving and driven machines, measure at four points the space between the shaft ends. Choose the largest (A) and smallest dimension (B).

**Figure 4 —** To measure offsets with a dial indicator, attach the indicator to shaft "A," rotate shaft, and indicate to the periphery of shaft "B." To obtain actual displacements of shafts, divide dial indicator readings by 2.

**Figure 5 —** Lay straightedge on one hub and measure gap between straightedge and other hub with feeler gauge. Measure at top, bottom, and both sides. Feelers gauge readings indicate actual displacements of shafts.
Installation and Lubrication Instructions

**Installation**

Disassemble coupling and clean all parts. Follow the appropriate 6 steps below and you are ready to go! Installed and lubricated in accordance with the instructions, your Ammco 200 Series coupling is prepared for a life of dependable, trouble-free service.

**Series F Installation**

**Step 1.** Lightly coat grease on "O" rings and insert "O" rings into grooves of sleeve (into grooves of seal retainer for sizes 206 and larger). Place sleeves for sizes 200-207 over shaft ends. For sizes 208 and larger, place the seal retainers with "O" rings inserted on shaft. Care should be taken not to damage seal on shaft key seat.

**Step 2.** Check key fits and coat keys and keyways with oil resistant sealing compound (Permatex No. 2) to prevent leakage. Install size 201 to 207 hubs on shafts with long ends flush with shaft ends. Install size 200 hub on shaft with short end flush with shaft. For shrink fits, apply heat to hubs uniformly, preferably submerged in oil not exceeding 350°F. Do not allow "O" ring seals to contact heated hubs.

**CAUTION:** Care must be taken to avoid personal injury in the heating and handling of coupling hubs that use shrink fit shaft mounted.

**Step 3.** Align shafts allowing clearance as per tabulation or in accordance with Dimension 'D' from Engineering Data. Check gap with lacer or feeler gauge at 90° points and align hubs with straightedge at 90° points.

**Step 4.** After thoroughly cleaning hub and sleeve teeth with lubricant, slip sleeves onto hub, carefully engaging teeth (do not damage seal surface). Place sleeve gasket between sleeves and align bolt holes.

**Step 5.** Secure sleeves, using care to tighten fasteners uniformly. See tabulation of "Flange Bolt Tightening Torque". For sizes 206 and larger, bolt seal retainers with gaskets to sleeves. Torque 3/8" bolts to 15 ft-lbs and 1/2" bolts to 37 ft-lbs.

**Step 6.** Remove both Dryseal lube plugs and add grease in the amount given in the Lubricant Quantity Table on page 4. Install lube plugs using Permatex No. 2 for sealing and seal securely.

**Series C Installation**

**Step 1.** For sizes 200-207, place retainer ring, seal retainer with "O" ring seated in retainer groove and sleeve "O" ring on each shaft. For sizes 208 and larger, place seal retainer with "O" ring inserted and gasket over shaft. For CS Series, place retainer ring on shaft on which CS nfid hub will be mounted.

**Step 2.** Check key fits and coat keys and keyways with oil resistant sealing compound to prevent leakage. Install hubs on shafts with short ends flush with shaft ends. For shrink fits, apply heat to hubs uniformly, preferably submerged in oil not exceeding 350°F. Do not allow "O" rings to contact heated hubs.

**CAUTION:** Care must be taken to avoid personal injury in the heating and handling of coupling hubs that use shrink fit shaft mounted.

**Step 3.** Slip sleeve over hub mounted on longest shaft.

**Step 4.** Align shafts allowing clearance as per tabulation or in accordance with Dimension 'D' from Engineering Data. Check gap with lacer or feeler gauge at 90° intervals. Also align hubs with straightedge at 90° points.

**Step 5.** Pack hub and sleeve teeth with grease. Force grease into shaft gap. Lightly coat grease on "O" rings. Slide sleeve over hubs to center position. Remove Dryseal lube plugs and add grease in the amount given in the Lubricant Quantity Table on page 4.

**Step 6.** For sizes 200-207, install sleeve "O" rings in sleeve counterbores—then press seal retainer assembly in place. Use fingertips or blunt tool. Seal retainer rings in grooves using a wiping motion. Recheck to assure retainer rings are positively seated. For sizes 208 and larger, bolt seal retainers to the sleeves. Torque 3/8" bolts to 15 ft-lbs and 1/2" bolts to 37 ft-lbs.

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* Tightening torque based on un lubricated threads. All data are lubricated derate torque to 75% of above values.*
# Ameriiear 200 Series Flexible Couplings
## Maintenance and Lubrication

### LUBRICANTS

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For low temp (-65°), Approach #22 by Shell Oil Co. Andover 783 by Huls America, Inc.

### LUBRICANT QUANTITIES

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Zumb suggests that the maximum interval between checks and relube be one year. This is only a guide, and the actual interval should be in accordance with good operating practices for application.

To disassemble Series F remove flange fasteners, separate sleeves, slide sleeves over hubs, clean out old lubricant, and inspect seals and gear teeth. Reassemble, starting with Step 3 under Series F installation instructions on the previous page.

To disassemble Series C, remove one snap ring, slide sleeves off hubs, clean out old lubricant and inspect seals and gear teeth. Reassemble, starting at Step No. 4 under Series C installation instructions on the previous page.

If proper alignment of shafts is ensured and it is not practical to disassemble coupling, remove both hub plugs and add grease in sufficient amount to overflow with lubricant holes in horizontal position. Recommended lubricants and quantities are listed on this page.

NOTE: Sizes 200 and 201 Series C are supplied without hub plugs -- lubricate per Series C, Step No. 5

The lubricants listed above are recommended by the lubricant manufacturers for the indicated conditions. Those shaded are reported by lubricant manufacturers to comply with the intent of AGMA 9000. This list is solely for your convenience and does not constitute an endorsement. The listing is not intended to be complete nor necessarily current due to continuous research and improvement by the various manufacturers.

- Series F, FM, FA use quantities as recommended
- Series FS, FMS, FAS use one-half the quantities recommended
- Series C, CM, CA use quantities as shown
- Series CS, CMS, CAS use one-half the quantities
- *Series F, Class III use quantities as recommended for Series F but limited to the greases shown in Class III column above or the following oils

- Citgo EP Compound 460 by Citgo Corp
- Teresate 460 by Exxon Lubricplate No. 8 by Fisk Bros
## Parts List: Johnson 3½" Type 2750L1-NAR Rotary Joint

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</table>

* Included in repair kit. Dupps no: 120653
INSTALLATION INSTRUCTIONS
FOR TYPE N JOHNSON JOINTS

STEP 1.
Check to make sure that all core sand, dirt, weld debris, pipe turnings, metal dust and other foreign matter has been removed from the piping, roll, dryer or cylinder before installing pump. This will help eliminate carbon seal ring scoring and damage to internal joint parts which could cause unnecessary downtime and maintenance.

Step 2.
Remove the head (A) from the joint leaving the assembly plate (B) attached. Remove the packing gland (C), locknut (D) and packing (E).

Make sure the pipe is clean and smooth where it seals in the packing gland.

IMPORTANT: THE INNER PIPE MUST BE STRAIGHT, TRUE AND ATTACHED WITHIN THE ROLL SO IT ROTATES WITHOUT WOBBLING THIS WILL PREVENT STRAINING INTERNAL JOINT PARTS WHICH COULD CAUSE LEAKAGE AND CARBON SEAL RING BREAKAGE.

Step 3.
Slide the Quick Release Nipple Flange (F) onto the rotary joint nipple (G) with its taper facing outward.

Step 4.
Place a new copper gasket (H) into the recess of the journal.

Step 5.
Slide the pint over the inner rotating syphon pipe, being careful when the pipe (I) passes through the opening in the thrust collar (J) not to damage either part. The inner rotating pipe should extend slightly beyond the gland when installed, but not enough to touch the joint head when it is re-installed.

Step 6.
Place the two split taper wedges into the recess of the nipple (K). Slide the Quick Release Nipple Flange over the wedges and secure to the journal flange studs with nuts provided. Tighten evenly. Note that the Quick Release Nipple Flange will not seat tightly against the face of the journal flange. When tight, there will be approximately 1/8" to 3/16" space between the flanges.

Step 7.
Using the packing (E) furnished, repack the internal pipe in the thrust collar (J). Tighten the packing gland (C) just enough to seal (approximately 30 ft. lbs.), but not so tight as to lock on the pipe. Then tighten the locknut (D) against the thrust collar.

IMPORTANT: THE ROTARY JOINT MUST BE FREE TO MOVE OUTWARD ALONG THE PIPE TO COMPENSATE FOR CARBON SEAL RING WEAR.
Step 8.
Using a suitable support, mount the rotary joint to it. Make sure components are in alignment, and that the rotating nipple and thrust collar are aligned squarely with the weld plate and assembly plate. If necessary, loosen supports and re-align joint. Gauge the running clearance between the nipple tube (G) and renewable wear plate (L). See drawing A97-18.3-13 for gauge size.

Step 9.
Re-attach the head (A) to the joint.

Step 10.
Connect piping to joint using Johnson bronze or stainless steel flexible metal hose. The hose(s) should be long enough so there is no binding or tension tending to move the joint off the journal centerline of the roll. The joint must be reasonably free to move outward to compensate for seal ring wear. (Refer to Johnson flexible metal hose Bulletin FMH.) When flanged hose is used, spool pieces in place of the hose are recommended for fabrication purposes (see spec sheet A97-PS-1615-4-1).


NEVER APPLY OIL OR GREASE TO THIS SERIES OF JOHNSON JOINTS. THE SATURATED STEAM, CONDENSATE OR LIQUID PASSING THROUGH IS THE ONLY LUBRICATION REQUIRED FOR THE CARBON-GRAPHITE PARTS.

MINIMIZE RUNNING JOHNSON JOINTS DRY. EXCESSIVE CARBON SEAL WEAR MAY OCCUR.

CAUTION
Check the rotary joint regularly to determine carbon seal ring wear using a seal ring wear indicator. Seal wear indicator tools are available from Johnson. Refer to installation drawing for seal ring wear check procedure. Should the carbon seal ring (6) wear away completely, the metal nipple can wear through into the joint body or wearing plate, and eventually through it requiring extensive part replacement.

PARTS LIST • TYPE N JOINTS

Information required to order repair parts includes:
1. Size and type of Nipple ("K," Quick Release or threaded).
2. Type of joint (L-NAR, L-NARAL, L-NARON, L-NARON, L-N, L-NAR, L-NARON, L-NAROM, or L-NRH).
3. Type of construction (Super B, Regular)

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**NOTE:**

Figure 2 — Note how design to Type N Joint permits considerable lateral and angular movement without loss of efficiency.
FLEXIBLE HOSE CONNECTIONS

Figure 5 — Recommended use of flexible hose to install Type N Joints on Dryers, Cylinders or Rolls.

Figure 6 — Recommended use where joint body supports, lugs and rods are installed in a vertical plane.

Figure 7 — Basic method of installing with length of flexible hose in vertical and horizontal leg.

Figure 8 — Flexible hose installed in horizontal line to joint.

WRONG WAY
To install Flexible Metal Hose on Johnson Joints
Expansion and contraction of the flexible metal hose and piping will place a tension on the joint and crowd it toward the roll. Joint must be free to move and be free from the roll to compensate for shaft ring wear.

Figure 9 — Johnson Support Stands mounted on adjustable shelf, which is fastened above supporting beam (left) or suspended from it (right).
Figure 10 — Support rods fastened directly to 3-piece bearing covers. This arrangement permits inspection of the bearings, top and bottom, without removing the joint from the dryer.

**RECOMMENDED MINIMUM HOSE LENGTHS**

<table>
<thead>
<tr>
<th>Hose Size</th>
<th>Minimum Length</th>
<th>Pressure</th>
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</thead>
<tbody>
<tr>
<td>1/4&quot;</td>
<td>12&quot;</td>
<td>250 psi</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>12&quot;</td>
<td>250 psi</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>12&quot;</td>
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<tr>
<td>2 1/2&quot;</td>
<td>24&quot;</td>
<td>250 psi</td>
</tr>
<tr>
<td>3&quot;</td>
<td>27&quot;</td>
<td>150 psi</td>
</tr>
</tbody>
</table>

Figure 11 — Suggested support arrangement for Type N Joint installed on larger rotary steam tube dryer using Johnson Support Stands, Support Rods and Flexible Metal Hose.

Figure 12 — Suggested installation of Type N Johnson Joint with Quick Release Nipple, Johnson Support Stands, Support Rods and Flexible Hose on Beloit enclosed gear Paper Machine Dryers. Note modified Beloit support bracket.

Figure 13 — Suggested method of supporting Type N Joints using Johnson Support Stands, Support Rods and Flexible Hose.

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ALIGNING JOHNSON JOINTS

Self-supported rotary joints such as Series W, S, SN, ELS, and ELSN are supported internally and do not require aligning during installation. However, bracket mounted and rod-supported rotary joints should be aligned to the centerline of the journal in order to realize maximum leak-free service.

After the joint is attached to the journal and loosely bolted to the support bracket you should check the alignment with a simple gauge made from common welding rod.

On Table 1, you will find the gauge diameter listed for each size rotary joint. As shown below, bend one end 90° approximately 1" from the end.

Then using the appropriate size gauge check the clearance around the nipple tube (1) where it passes through the body opening (2) followed by a check where the thrust collar (3) protrudes through the assembly plate (4).

Since both parts (nipple tube and thrust collar) rotate, the body housing must be centered around the rotating components. To achieve this alignment may require shimming or readjustment of the rotary joint support mechanism.
**Cylinder Seal Replacement:**

1. **Piston & Piston Rod Disassembly**
   - A. Heat piston (approx. 220°F) in order.
   - B. Break down the Loctite #277 compound.
   - C. Unscrew piston from piston rod.
   - D. Clean male and female threads.
   - E. Discard O-ring and clean O-ring groove.

2. **Piston & Piston Rod Assembly**
   - A. Clean piston rod threads and piston threads with degreaser fluid, isopropyl alcohol.
   - B. Place O-ring in O-ring groove on piston rod.
   - C. Apply Loctite #277 compound to male threads.
   - D. Torque piston onto piston rod to 353.4 ft-lbs.

3. **Piston & Tube Seal Replacement**
   - A. 1.5f0n rod seals, lubricate rod seal groove.
   - B. Rod-wipe groove O-ring groove piston rod.
   - C. Rod seal, rod wiper, and O-ring with a thin coat of golden grease.
   - D. Piston and tube seals lubricate, seal grooves, tube trap groove, piston seal, and tube O-rings with a thin coat of golden grease.
   - E. Prior to assembly.

---

**Parts List:**

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<tr>
<th>Ref.</th>
<th>Description</th>
<th>Qty.</th>
<th>PC No.</th>
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<tr>
<td>1</td>
<td>Screw SLC 5/8-11UNC-3A</td>
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<td>2</td>
<td>Wiper, Rod</td>
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<td>Washer, Teflon Bearing/1/2 Rod Seal</td>
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<tr>
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<td>Grease, 3 oz, Golden 02</td>
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</tbody>
</table>

*Indicates parts included in complete cylinder repair kit available from the Dupp's Co. under part number 127950.*