DUPPS

Instruction Manual
for:

DUPPS
3600B Series
Dewatering Press

- Installation
- Operation
- Maintenance
- Repair

Publication So. 80-9401

Introduction

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 cur authorized distributor:

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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

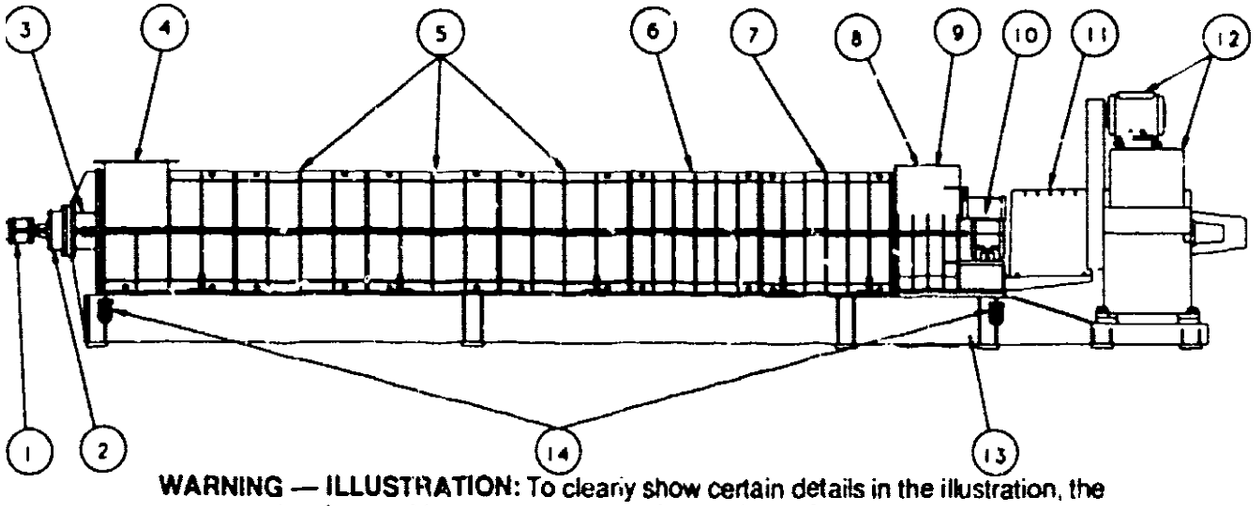
The Dupps Dewatering Press is designed to remove liquid from paper waste sludge. The Dewatering Press performs one operation in the dewatet-ing process. producing a dry cake which is suitable for further processing in other equipment.

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 snaft 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 IO 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 1.1-1 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

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igure 1.1-1
'upps 3600B Series Dewatering Press

1.2 Specifications

Gen Specifications

See the Installation information section of this chapter for overall dimensions and required clearances for the Dupps 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 3620B: 31,000 lb
Model 3616B: 28,000 lb

Component Specifications

Press Shaft

Wright, lb (Feed end / Drive en.! / Total):

Model 3624B: 4000 / 5300 / 9300
Model 3620B: 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

1/16 min

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 Roat Allowance, 4 (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 2750L1-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
Inlet/Outlet size:

Steam (Optional)

500 lb/hr (min) at 100 psig (max)
Inlet size: 3 NPTF
Condensate drain: 1 ½ NPTF

Before the initial start-up of the dewatering press, an authorized Dupps field service technician must bc 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 cffcct.

Utility Requirements

Utilities requirements arc 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-l. The figure also lists the materials required for proper connection to the facility supply and drain.

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.

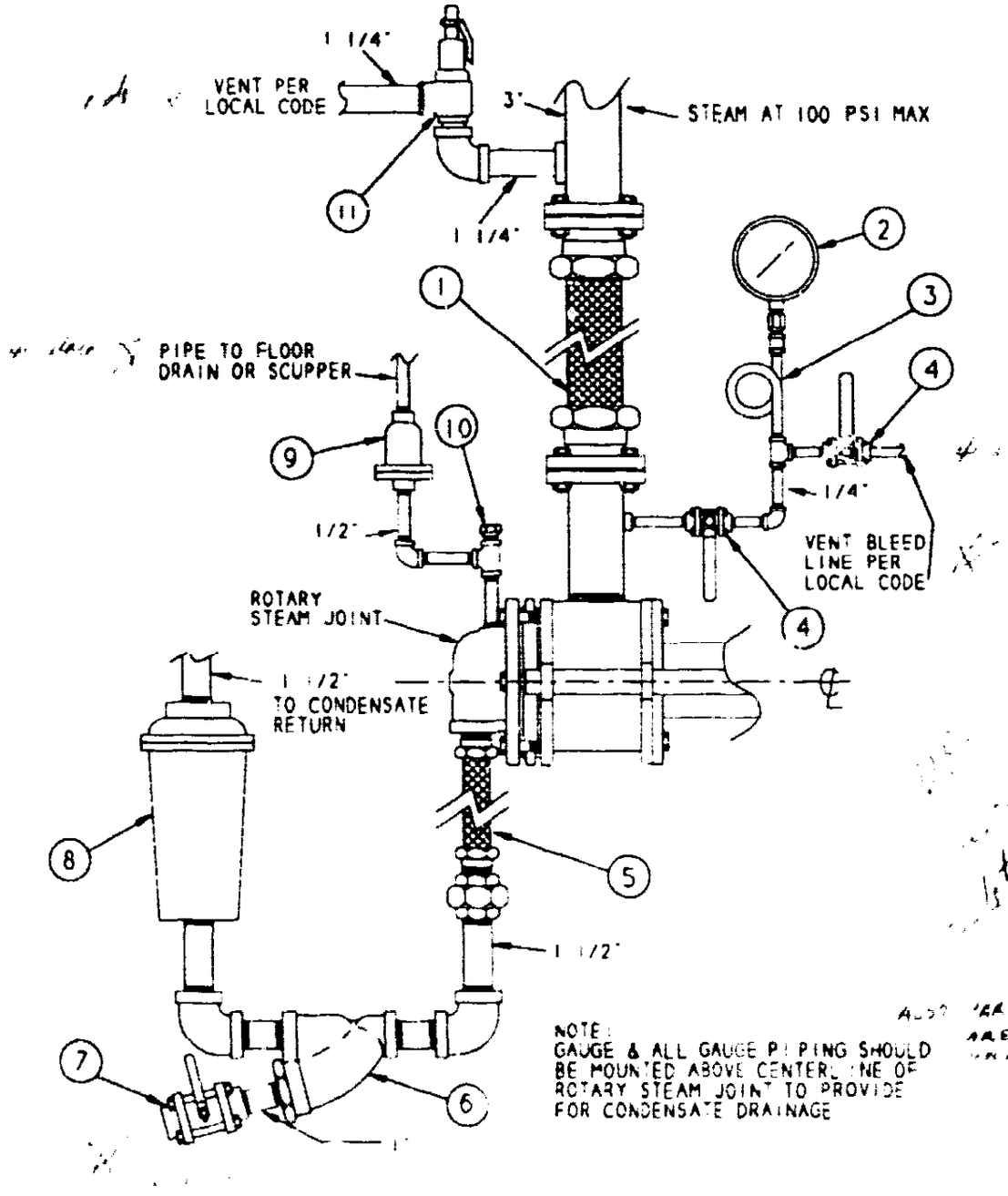
The rotary steam joinr must have steam flowing through it during operation. Incoming steam lubricates the steam joint's inrcmrl carbon seals. Operating the rotary steam joint without steam will ruin the seals and render the rotary joint inoperable. Therefore, if the press is to bc operated without steam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

Feed Hopper Connection

The maximum allowable weight that can be supported by the press feed hopper is 41(X) pounds. Ihc device used to feed rhe press must be designed and supported so that, when it is full of material, rhe 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 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.



1	3" OAL SS Braided Hose w/Flanges	7	1" Ball Valve (strainer blowout)
2	Gage 0-200 PSIG	8	1½" #215 Armstrong Steam Trap (inv bucket)
3	Pigtail 180 ¼" Std Tubing	9	½" Erwel #as-225 Thermostatic Air Vent
4	¼" Ball Valve	10	½" Johnson #VB8-51-BR-TSE Vacuum Breaker
5	1½" OAL SS Braided Hose w/NPT Nipples	11	1¼" Kunkle #6010FF Pressure Relief Valve
6	1½" "y" Strainer		

Figure 1.3-1
Rotary Steam Joint Piping

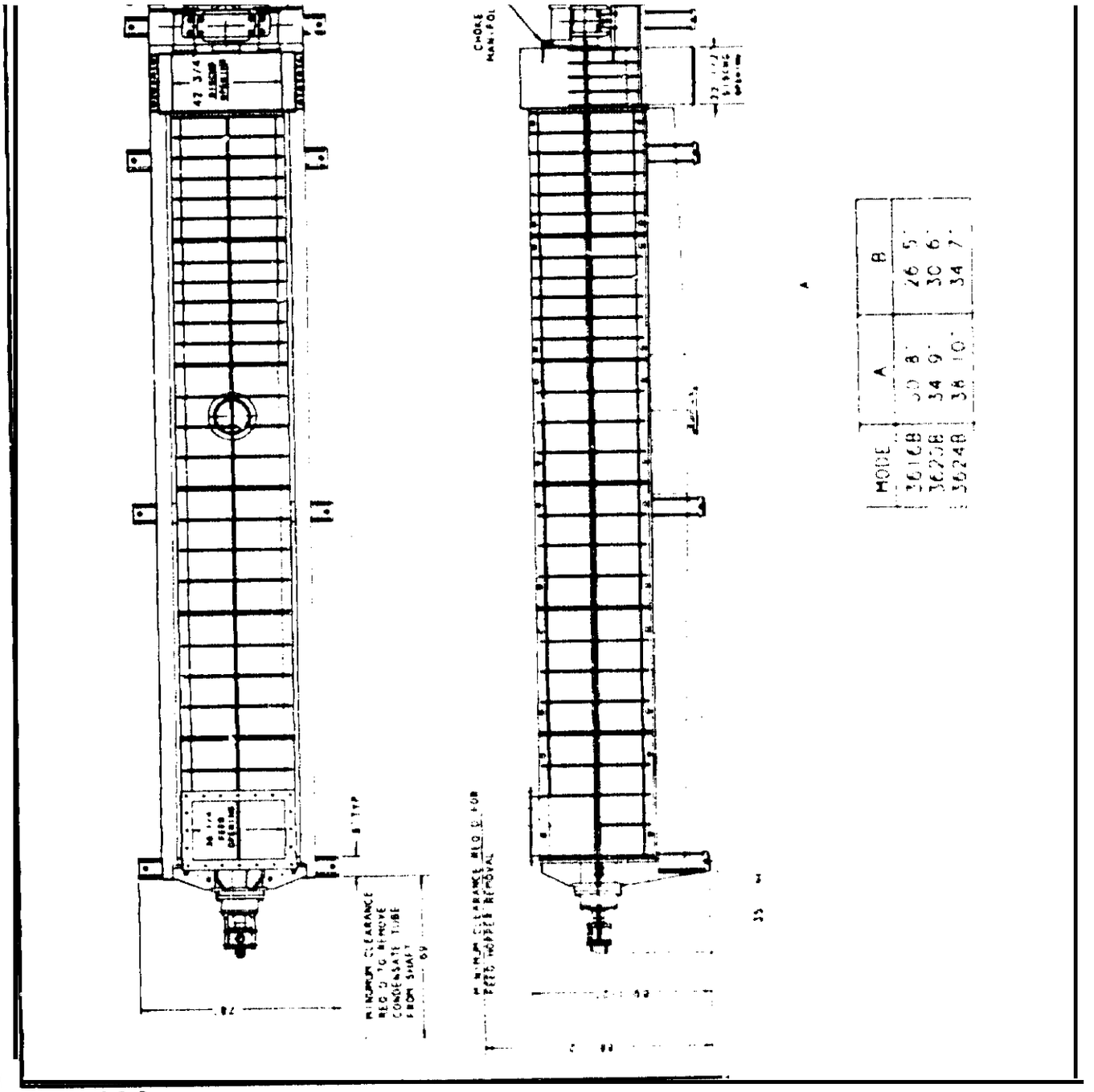


Figure 1.3-2
3600B Series Dewatering Press Working Clearances

CAUTION:
Do not operate the press at input torques above those specified. Failure to follow this instruction will result in damage to 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.

Working Clearances

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

Lifting the Press

CAUTION:
Remove the gear box before lifting the press with an overhead device. Attach the lifting device at the four points provided. Use a spreader beam to obtain a vertical lift at all four lift points. Failure to follow this instruction can result in damage to 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 thr Dupps 3600B Series dewatering presses are in listed in the Specifications section of this chapter.

USC 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 Shlpping Braces

Four shipping braces protect the cages and cage adjustment assemblies from damage during shipment. The braces arc 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'. arc 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 IO the torque values specified in the Specifications section of this chapter.

6. Jam nuts arc provided, but not assembled when the shipping braces arc installed. They arc 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 IWO 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 rhc hub gap settings and alignment tolerances given in rhc Specifications section of this chapter. Refer to the manufacturers' gearbox and coupling installation instructions in Appendix C for alignment procedures.

CAUTION:
Set the gap between the hubs of the drive coupling to the gap width listed in the Specifications section in this chapter. Failure to follow this instruction could result in damage to the press,

Gearbox Lubrication

The gear box features oil dams to hold lubricant in the bearings when the shafts arc 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 rhc first time, remove the inspection cover and flood rhc oil troughs and rhc input shaft bearings with oil. Install the inspection plate

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

fer 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 rhc gear box 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.

Cage and Shaft Alignment

CAUTION:
Check and adjust clearance between the cages and the shaft flighting. This work must be performed with a Dupps authorized field service technician present. Failure to follow this instruction could result in damage to the press.

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 abut recommended lubricants. lubrication schcdulcs, and procedures.

2.1 Routine Cleaning and Inspection

WARNING:
Turn off the Dewafering 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 o.f the Dcwatcring 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.

COMPONENT	INTERVAL	PROCEDURE
Air FLR Unit (Filter /Lubricator /Regulator)	Daily	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.
Air and Steam Lines	Daily	Inspect all compressed air and steam supply lines and connections for leaks.
Seals, Gaskets, O-Rings	Daily	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.
Drain Pan and Facility Drain	Daily	Inspect for blockage. Remove obstructions.
Drive Belts	Weekly	Remove cover on belt housing. Check belt condition and tension. Replace worn or damaged belts. Re-install housing cover.
Cage Jacking Screws	Weekly	If screws are loose, adjust screen to flight clearance and tighten jacking screws. Refer to "Service Instructions" chapter for details.
Thrust Bearing Seal Drain	Monthly	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
Condensate Return Line	Weekly	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.
Cage Clearance	1 to 3 Months	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
Press Shaft	1 to 3 Months	Check the wall thickness with an ultrasonic thickness tester Record measurements on the Sounding Sheet for this press The time interval between subsequent "soundings" 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

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.

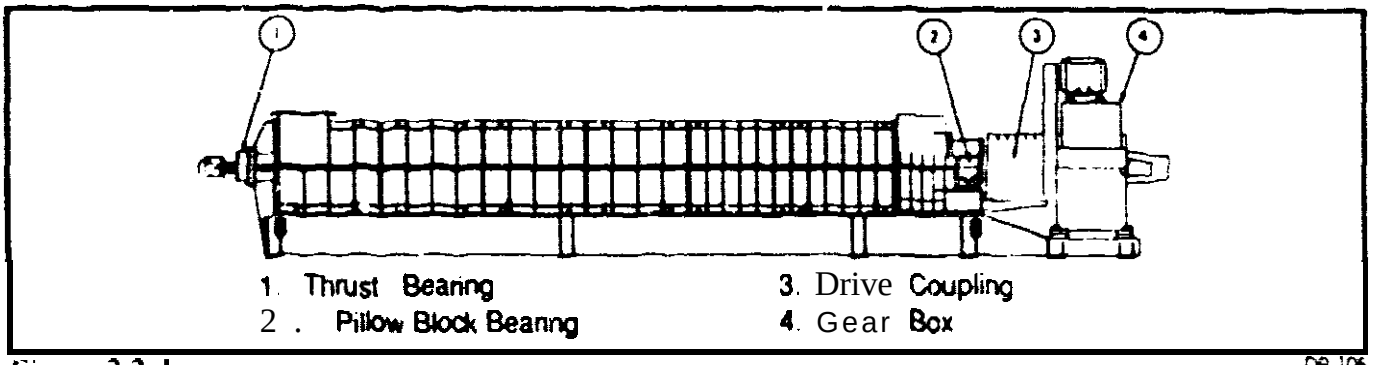


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Figure 2.2-1
Lubrication (Component Locations)

Recommended Lubricants

Figure 2.2-2 lists recommended lubricants to use for each press component. Dupps' experience with Mobil products has hccn 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 conunuing product development, the Dupps Company cannot evaluate and ccniiy specific brands of lubricants. The lubricant supplier should certify equivalency to rhe reference products listed in this manual.

Mobil lubricants with prefix SHC (example: SHC 1500) have a synthetic hydrocarbon base. Note that synthetic lubricants from different manufacturers could have different chemical m&cup. making them incompatiblc with each other. Do not mix synthetic based lubricants from different manufacturers in !he same unit or component.

Lubrication Schedule

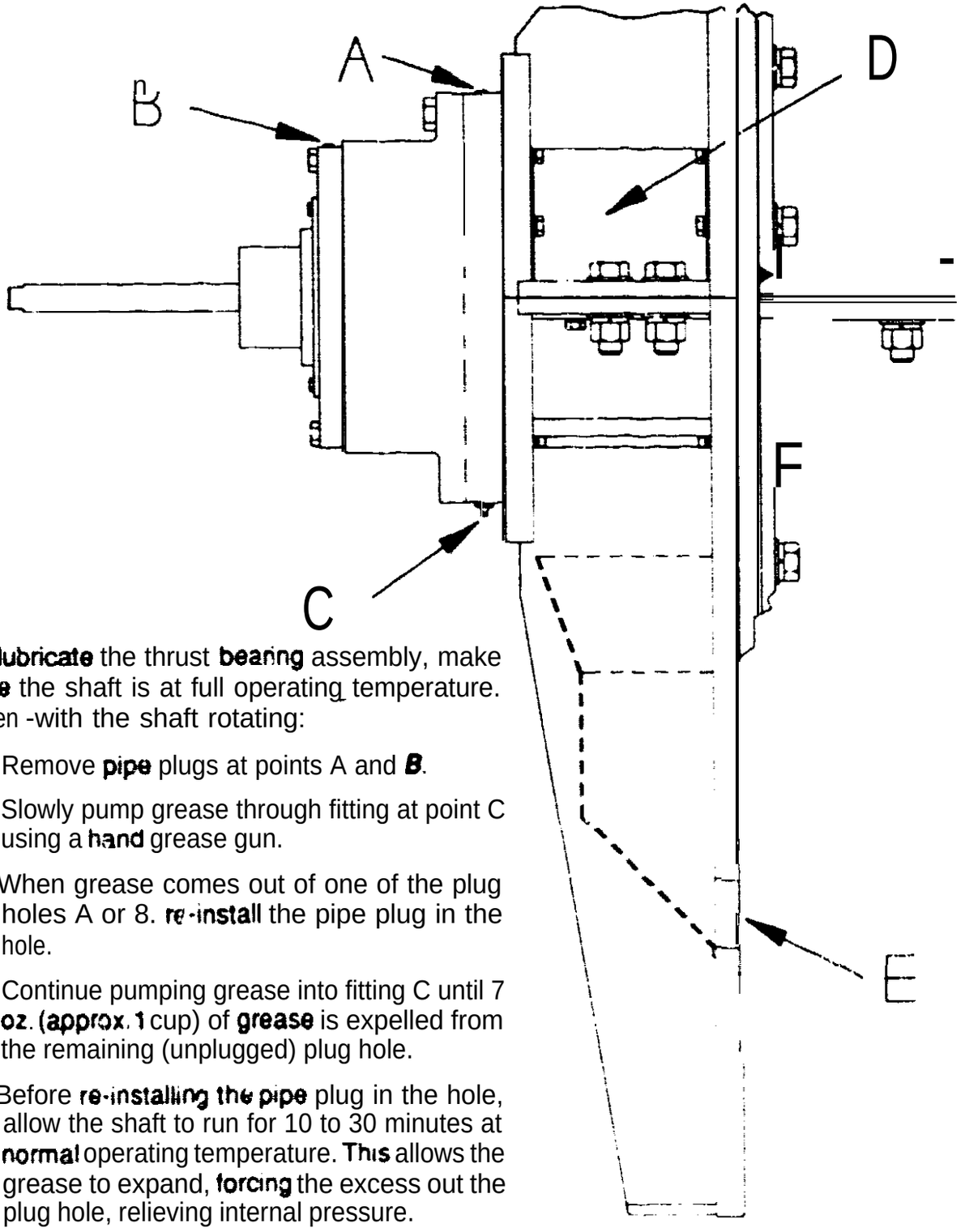
The chart in Figure 2 2-3 gives the lubrication schedule for the press. The chart also describes the procedure fur lubricating each of the components.

COMPONENT	LUBRICANT SPECIFICATION
Thrust Bearing	Mobilith® SHC 1500 grease. or equivalent
Preload Bearing	Mobilith SHC 1 500 grease, or equivalent
Gear Coupling	Mobilux® EP 0 grease or equivalent
Gear Box	Mobilgear® 632 or or equivalent
Pillow Block Brg	Mobilith SHC 1500 grease or equivalent
Air Ft R unit	Mobil® DTE 26 ad or equivalent
	Mobil, Mobilith Mobilgear and Mobilux are trademarks of the Mobil Oil co

Figure 2.2-2
Lubricant Specifications

COMPONENT	INTERVAL	PROCEDURE
Air FLR Unit (Filter Lubricator Regulator)	*Daily*	Check oil level in lube reservoir; add *d (see* Figure 2.2-2; to maintain indicated level.
Thrust Bearing	*'4 week*	Use the procedure given in Figure 2.2-4
Gear Coupling	: Week	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.
Gear Box	1 Week	Check oil level when drive is stopped and at ambient temperature. Add specified lubricant to level marked on dipstick.
Thrust Bearing	*6* Months	Disassemble, clean, and repack bearings with fresh grease.
Pillow Block Bearing	*6 Months*	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 until 7 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.
Gear Coupling	*6 Months*	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 "Specifications" section of Chapter 1) Remove the grease fitting and re-install the plug. Install the coupling guard.
Gear Box	*6* Months	Drain and refill to level marked on dipstick with specified lubricant. The oil capacity of the gear box required is listed in the "Specifications" section of Chapter 1
Gear Box Input & Output Seals	6 Months	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

igure 2.2-3
ubrication 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 8. re-install 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 re-installing 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 mth grease. Water should drain freely through hole *E* into the drain pan

Figure 2.2-4
Thrust Bearing Lubrication

Chapter 3

Troubleshooting

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.

PROBLEM	CAUSE	REMEDY
evel in feed hopper is ris- ng (Press being overfed).	Feed rate too high.	Reduce feed rate.
	Press speed too low.	Increase press speed.
	Choke pressure too high.	Reduce choke pressure.
iquid not draining through age screens.	Clogged drain screens.	Clean screens.
	Flighting-to-screen clearance too great.	Adjust fiightiito-screen clearance.
	Drive belt slipping.	Tighten loose belt: if belts are worn. install new belts.
	Cages out of alignment.	Adjust cage screen-to-ttiihting clearance. See the "Service Instructions" chapter.
	Worn press shalt flighting.	Rebuild shaft flighting. See the "Service Instructions" chapter.
ow cake output.	Feed rate too low.	Increase feed rate.
	Choke pressure too high.	Reduce choke pressure.
	Press speed too low.	Increase press speed.
choke retrading frequently.	Drive motor overloaded.	Reduce choke pressure and/or increase press speed.
cake too dry.	Choke pressure loo high.	Reduce choke pressure.
	Plug length too long.	Reduce plug length.'
	Press speed too low.	Increase press speed.
eed stopping frequently	Drive motor overloaded.	Reduce choke pressure and/or Increase press speed.
Contact factory representative before making plug length adjustments.		

igure 3.1-1
roubleshooting Chart

...more

PROBLEM	CAUSE	REMEDY
Cake too wet.	Press speed too high.	Reduce press speed.
	Cages out of alignment	Adjust cage screen-to-flighting clearance. See the "Service Instructions" chapter.
	Worn press shaft flighting.	Rebuild shaft flighting. See the "Service Instructions" chapter.
	Choke pressure too low.	Look for leaks in compressed air lines: defective choke control valve; insufficient air supply.
	Plug length too short.	Increase plug length.*
	Choke malfunctioning due to worn or damaged choke ring or pneumatic cylinders.	Replace choke ring; repair pneumatic cylinders.
Drive motor stops under load. (It may be necessary to manually clean out the press before the press will re-start.)	Choke pressure too high and/or choke not relieving under high motor load.	Check choke pressure and operation of motor overload choke controls.
	Press speed too low for feed characteristics.	Increase press speed.
Discharge cake OK but choke moves too slowly or erratically.	Insufficient supply of compressed air.	Make sure choke pressure regulator is set correctly. Repair any leaks in compressed air lines or pneumatic cylinders.
Unusual noise or vibration.	Loose covers, housings, or guards; loose sheaves or drive belts.	Tighten all loose fasteners. Replace missing fasteners.
	Foreign material in press	Small amount of small material will pass through the press. Remove large material by removing cage(s) to gain access. Find and eliminate the scum of the material.
	Gear box malfunction.	Repair gearbox.
	Worn thrust bearing or pillow block bearing.	Replace the worn bearing(s).
	Shaft flighting contacting cage screens.	Adjust cage screen-to-flighting clearance. see "Service Instructions" chapter.
* Contact factory representative before making plug length adjustments.		

Figure 3. I -*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.

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.

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

1. Turn the choke off. See CAUTION
2. Stan the cake discharge handling equipment.
3. **Turn** on **the steam** supply to the **press,** if so quipped.
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 est iblished,** use 1 **rpm** as a starting point.
6. Set the PRESS SPEED **selector** IO **VARI.**
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 rhc feed hopper.
10. **Operating** conditions will determine whether further adjustments to rhe **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 bc sufficient **to keep** the **press** shaft flightin; in the **feed hopper** covered **with** incoming material **without** overfeeding **the** hopper. A co .it 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** 'ne 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 pnss 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

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

Normal Shutdown

The normal shutdown procedure allows sufficient time to clear ail 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 todischarge 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.

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

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 rhc problem.

NOTE: Clear the material out of the press as soon as possible after shutting down. if the press is left shut down iii 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 manufactures of these components. Contact your **authorized** Dupps 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** thot listed in Chapter 1. If this is the case, the actual cleamce 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 S **heet** 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.

h. 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

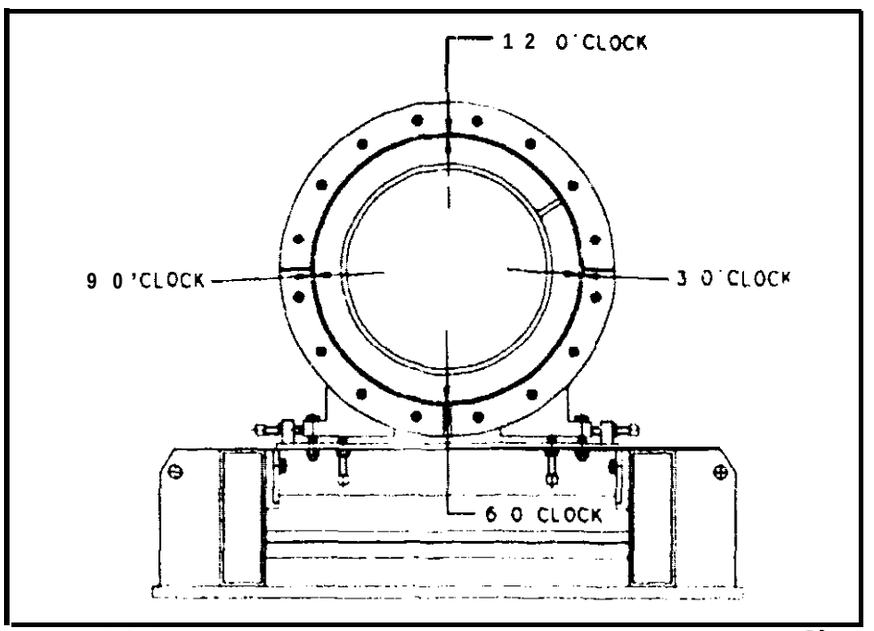
Some of the steps in the procedure for the discharge cages are different from those used for the primary and intermediate cages This is because the discharge cage mounting lugs arc different from those on rhe rest of the cages. This section gives a brief description of the procedure for adjusting the 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:



igure 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 rhc 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

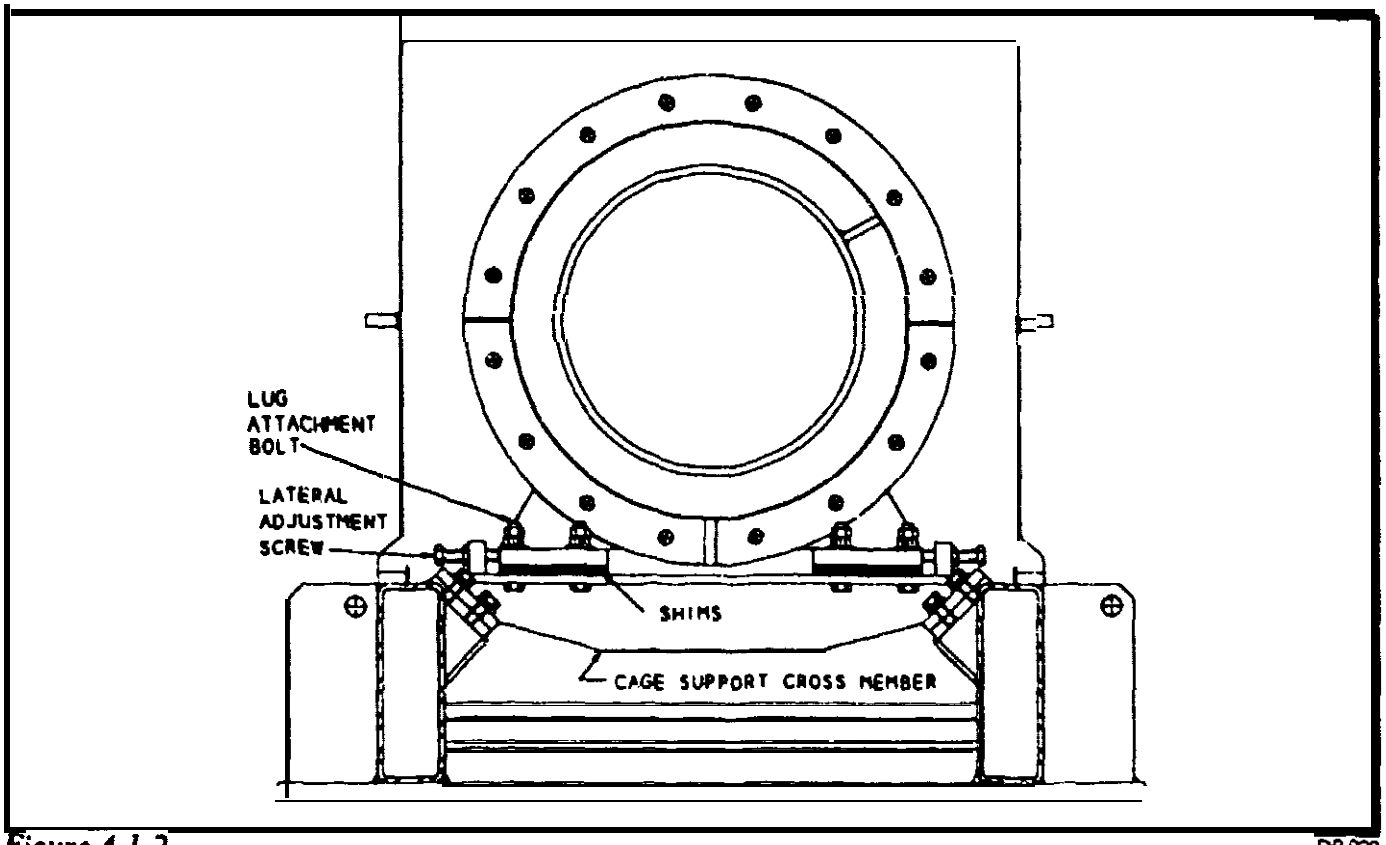


Figure 4.1-2
Adjustment Screws -Discharge Cage

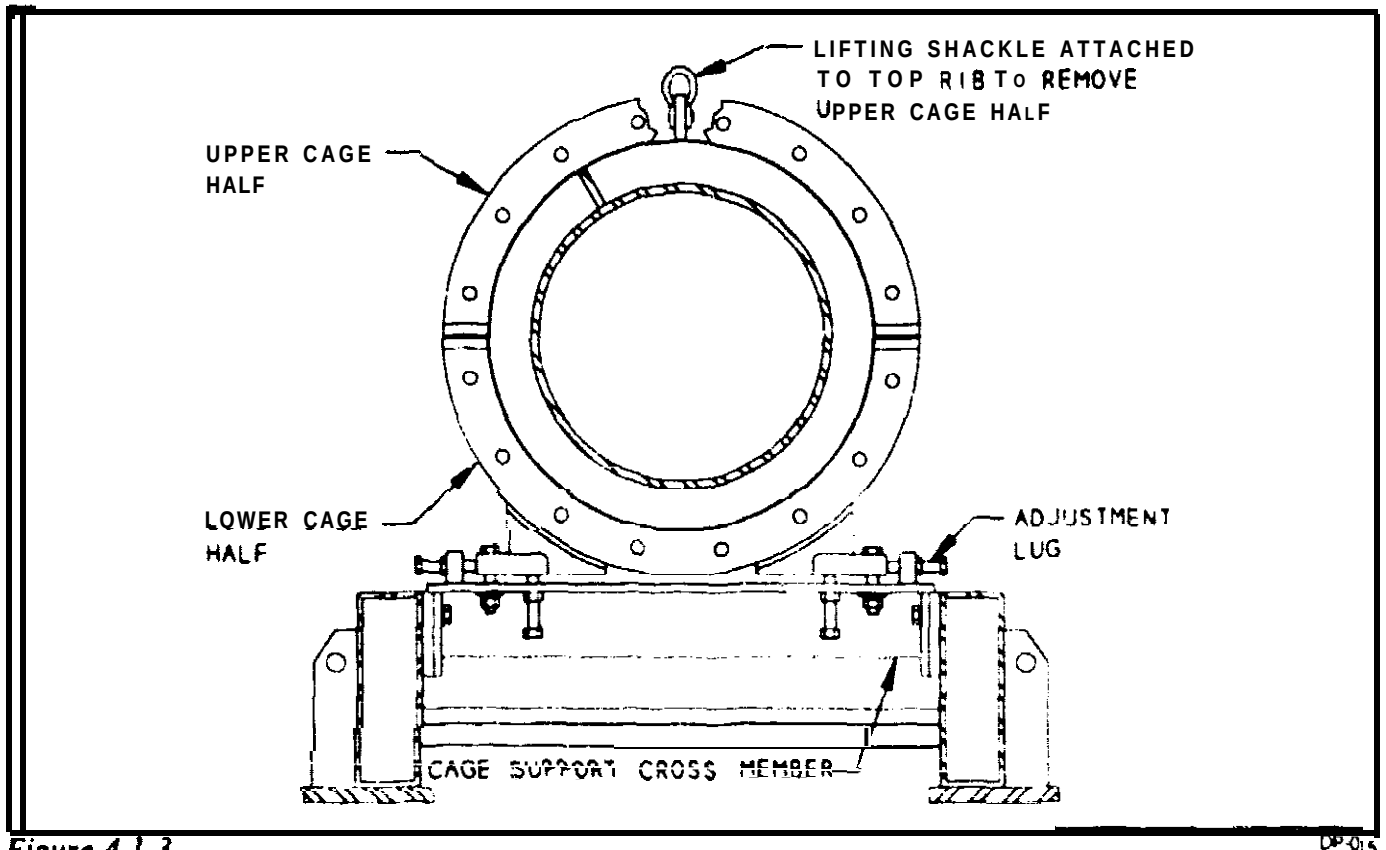


Figure 4.1-3
cage Lifting Shackle

vertically. *Use the procedure in Step 3 for discharge cages. USC 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** *½ turn (both sides).*

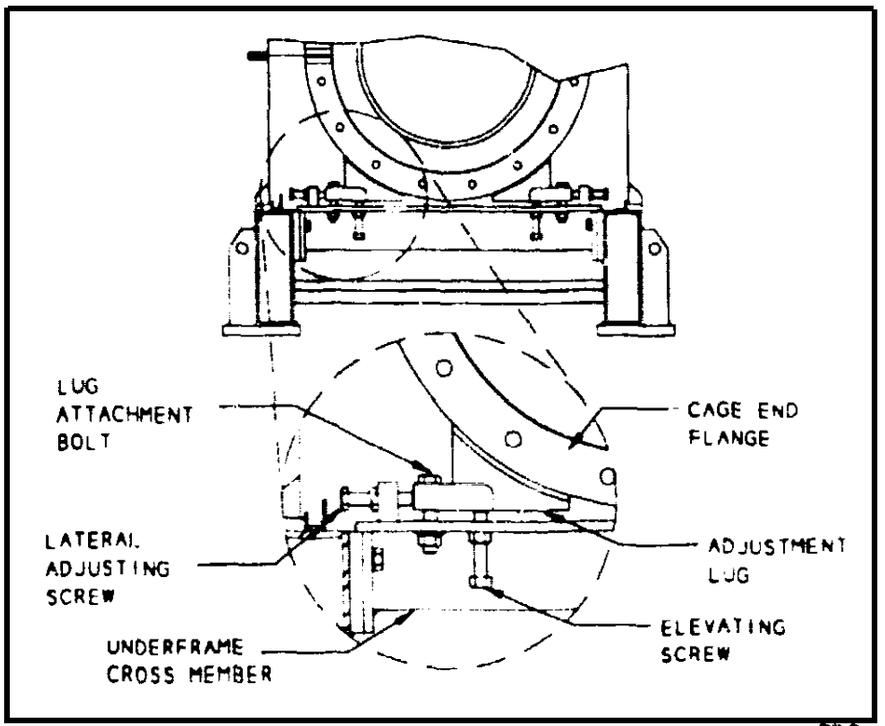
   b. **Loosen** the **bolts** in the end flanges of **the** cage(s) being adjusted.

   c. Set the clearance at the **BOTTOM** (6 o'clock) first. as it is more critical. Raise or lower the cage by addiig 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 sup for vertical alignment of PRIMARY AND **INTERMEDIATE** CAGES.



igure 4.1-4
age Adjustment Screws — 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 adjusdng 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. Tum 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 bc 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 rums. 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 lb-ft.

6. When the cages are properly rligncd with the shaft flighting, check the screen-tc-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

Usc the following procedure to remove or add cage shims:

1. Loosen the cage split flange bolts on the cage being adjusted. See Figure 4. I-5. Some of the bolt holes in the shims arc slotted to permit shim removal or installation without having to remove all the bolts. Only two of the bolts have to be removed IO get the shims in or out.

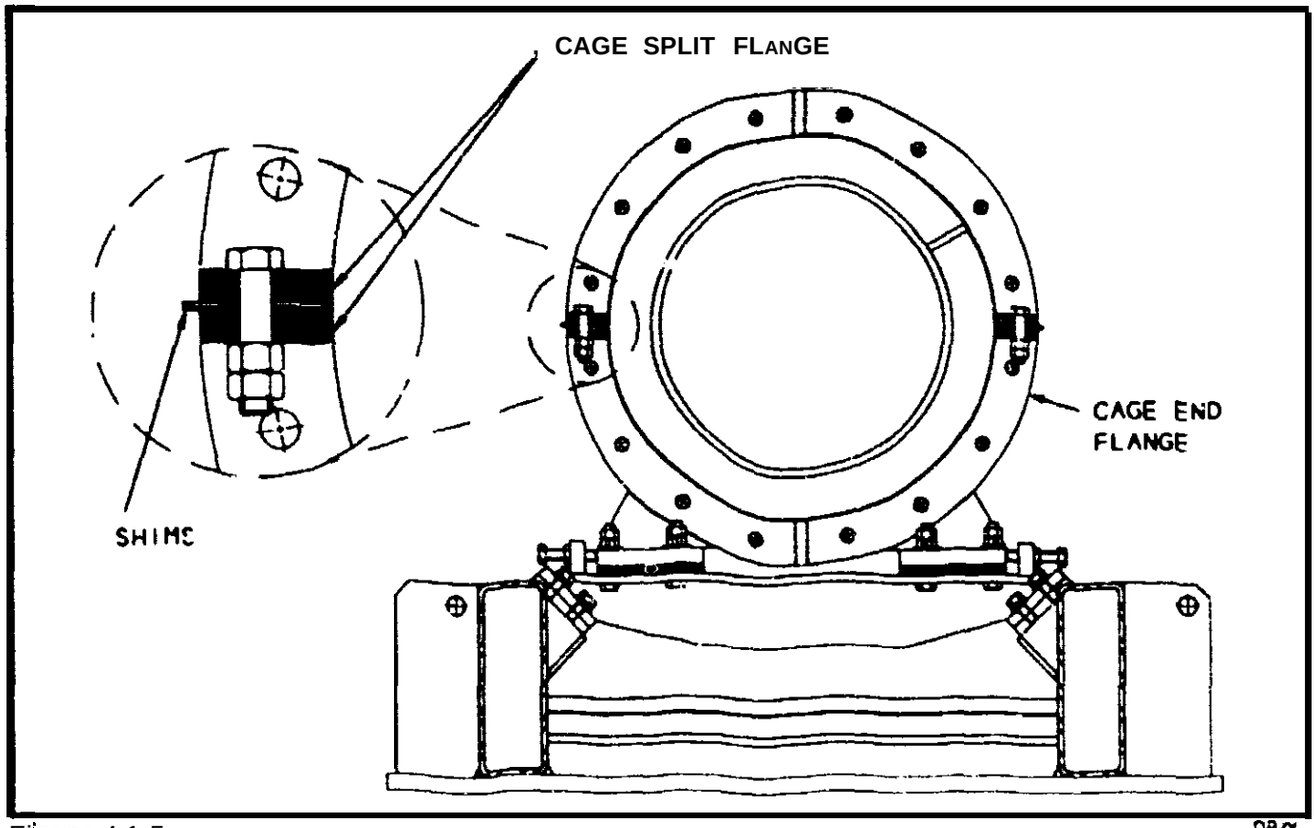


Figure 4.1-5
Cage Split Flange and Shims

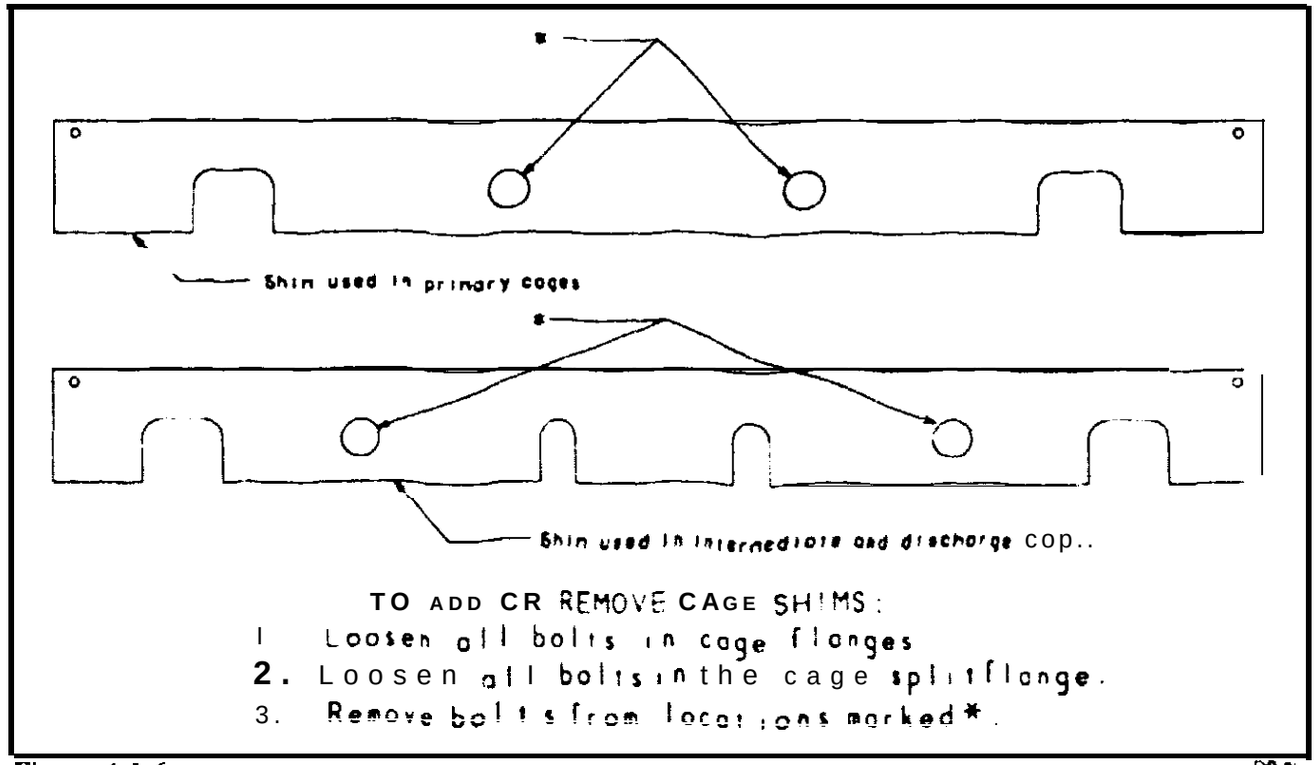


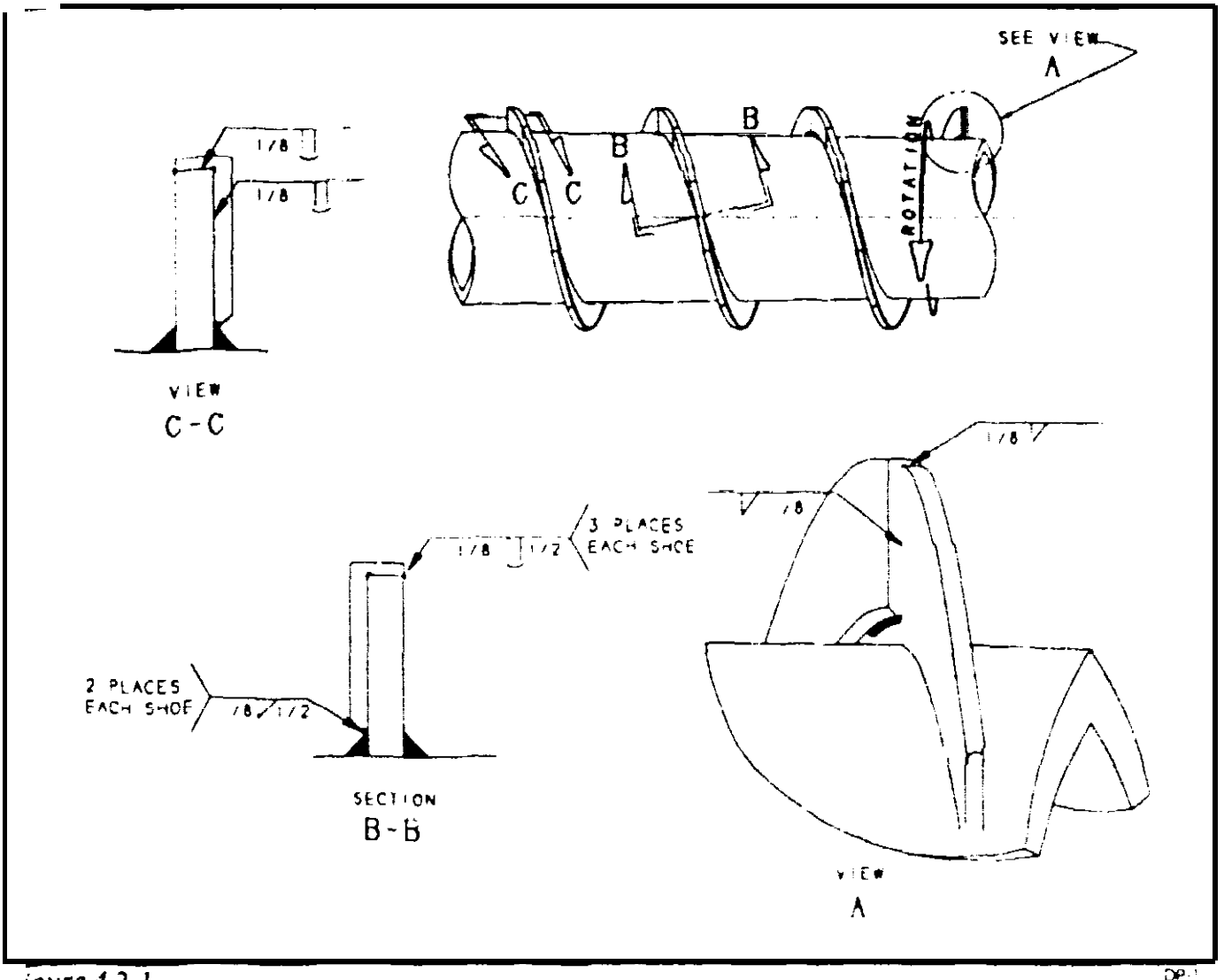
Figure 4.1-6
Split Flange Adjustment Shims

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 arc listed in the "Introduction" section of Chapter 5. Install and tighten the jam nuts.

4.2 Shaft flighting Wear Shoes

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 ngion. 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.Z-1.



igure 4.2-1
ress Shaft Replaceable Flight Facing

To compensate for worn flighting, remove shims from the cage split flanges as explained in the 'Cage Adjustments" section of this chapter. If the fighting wears down to the stage where the correct cage-to-flighting clearance cannot be obtained with all the cage shims removed, then rhc 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 fight. This can be done with an air-ax, disc grinder, or otha suitable &vice. 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-I.

1. Begin at the discharge end of the shaft. Position the new wear shoe on the base flighting as shown in Figure 4.2-I.
2. Tack-weld each new facing shoe in position on the base flighting as shown in Figure 4.2-I.

NOTE: ***Do not*** apply more weld material rhan 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. Usc 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.)

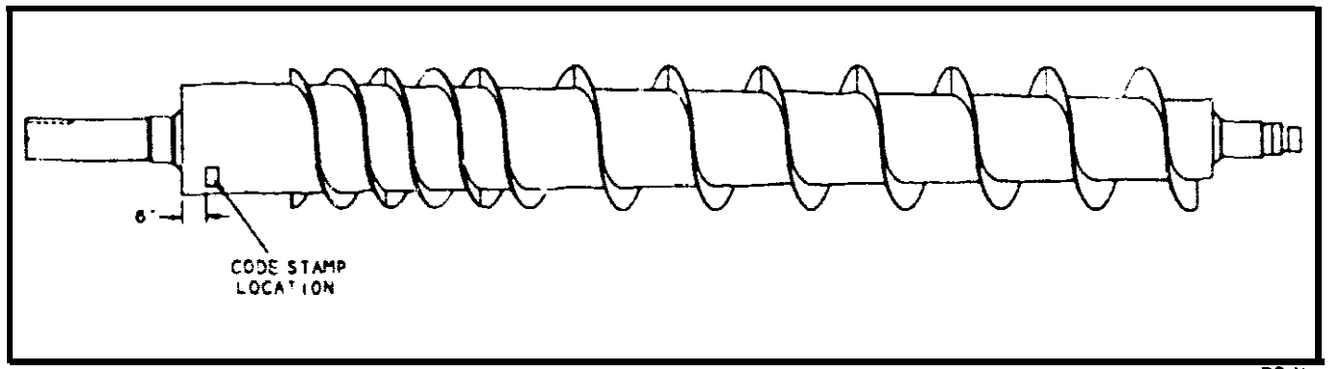


Figure 4.3-I
Press Shafi Code Stamp Location

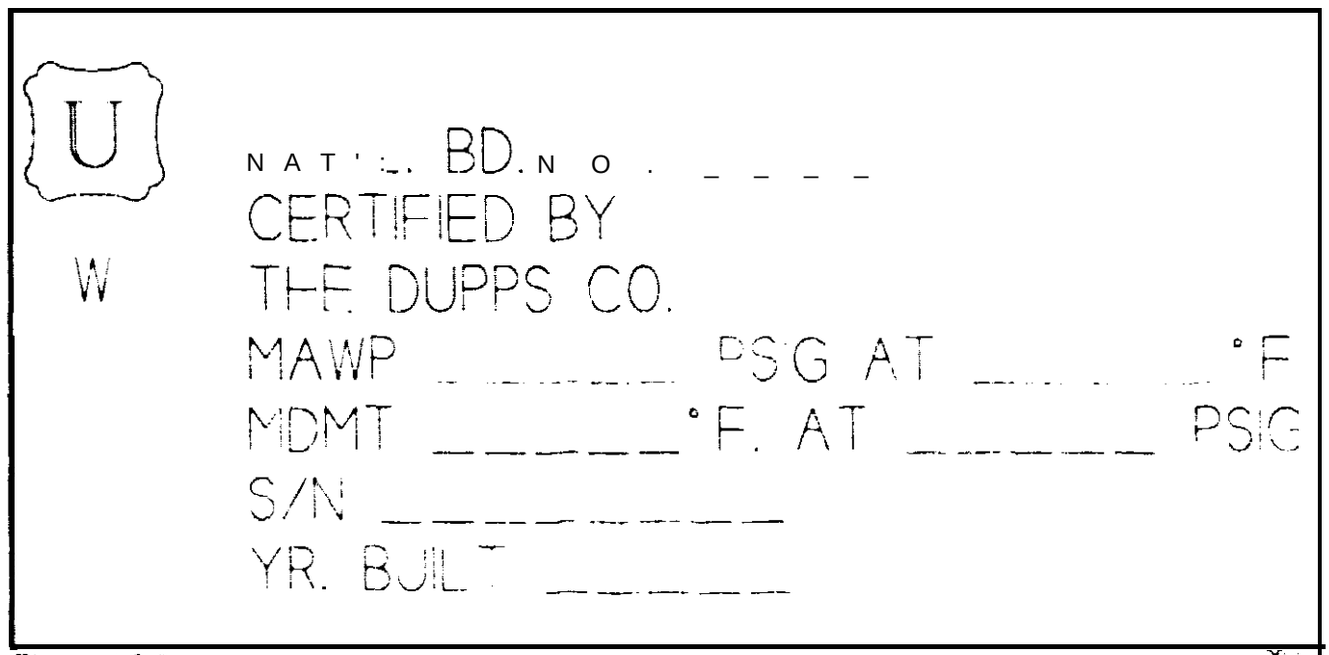


Figure 4.3-2
Press Shaft Code Stamp

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 fur 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 proc's 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 IO the press shaft (gearbox output torque) is listed in the Specifications section of Chapter I. Two figures are shown: one for single flighting and one fordouhle flighting. The press may be operated continuously at the input torque indicated for the shaft configuration installed in the press.

CAUTION:
Da not operate the press al input torques above those specified. Failure to follow this instruction will result in damage to the press.

The standard shaft configuration of the Dupps Dcwatering Press has a single lead flight from inlet tochokc. Applications requiring input torque higher than that shown for single-flightcd shaft require double flighting on rhc last two flight pitches at rhc choke end of the shaft. Additional flighting is normally added as a field modification, if ii 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 IO 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 dlyncss.

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.

Flightc i n g

Replacement of the wear facing shoes described elsewhere in this chapter does not requite 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 lo 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. Rclicvc residual air and steam pressure from lines See DANGER

Wear suitable safety equipment when performing service on the press (eye protection, protective head gear, 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 bolted joints 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

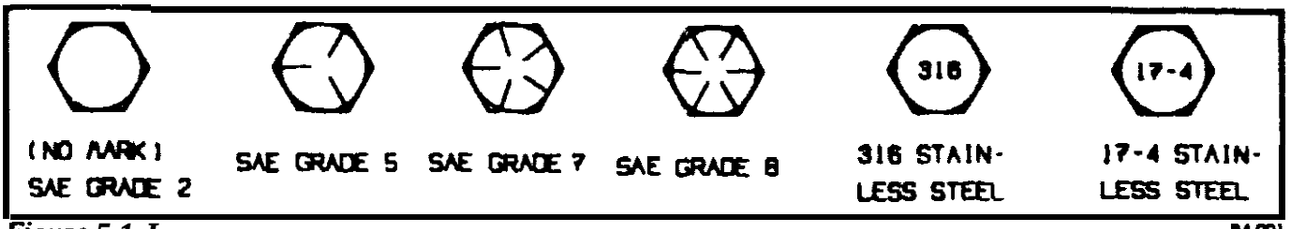


Figure 5.1-I
Bolt Head Markings

IM-001

maintenance or repairs to the torque value specified under the heading 'Fastener Torque Specifications' in this section of the chapter.

Stainless Steel Fasteners

Stainless steel fasteners cxibit a high degree of seizure 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 Toqw 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.

Location/Application	Thread	Dry	Lubed
Thrust Bearing			
Housing to Feed Hopper	7/8-9	(A) 260	200
End Plate to Housing	5/8-11	(A) 150	112
Gear Coupling (Zurn special FA-208)			
Flange Bolts	1 1/4-12	800	600
Seal Retainers	3/8-16	50	38
Pillow Block Bearing			
Pillow Block Mounting	1 1/2-6	1100	825
Pillow Block Cap	1 1/4-7	405	308
Rotary Steam Joint			
Head bolts	5/16-12	28	21
Feed Hopper Bolts			
Hopper Cage Split Flange	1-8	300	300
Bulkhead Split Flange	1-8	325	325
Hopper Cage to Bulkhead	1-8	(A)	325
Hopper Cage to Primary Cage	1-8	300	300
Primary & Intermediate Cage Bolts			
Split Flange	1-8	300	300
End Flange	1-8	300	300
Cross Member to Underframe	3/4-10	160	160
Discharge Cage Bolts			
Split Flange	1 1/4-7	(A)	600
End Flange to Adjacent Cage	1-8	300	300
End Flange to Discharge Box	1 1/4-7	600	600
Cross Member to Underframe	1-8	300	300
Cross Member to Cage Lug	1-8	300	300
Discharge Box & Choke			
Discharge Box Split Flange	1 1/4-7	600	600
Discharge Box to Underframe	1 1/4-7	600	600
Choke Air Cyl to Disch Box	5/8-11	120	90
Choke Backing Ring to Cyl Rod	1 1/2-6	(B)	300
Choke face to Backing Ring	1/2-13	(C)	10

(A) Anti seize compound required When anti seize compound is used "Lubed" torque values ✱ ✦ ✡

(B) Loctite No 277 required

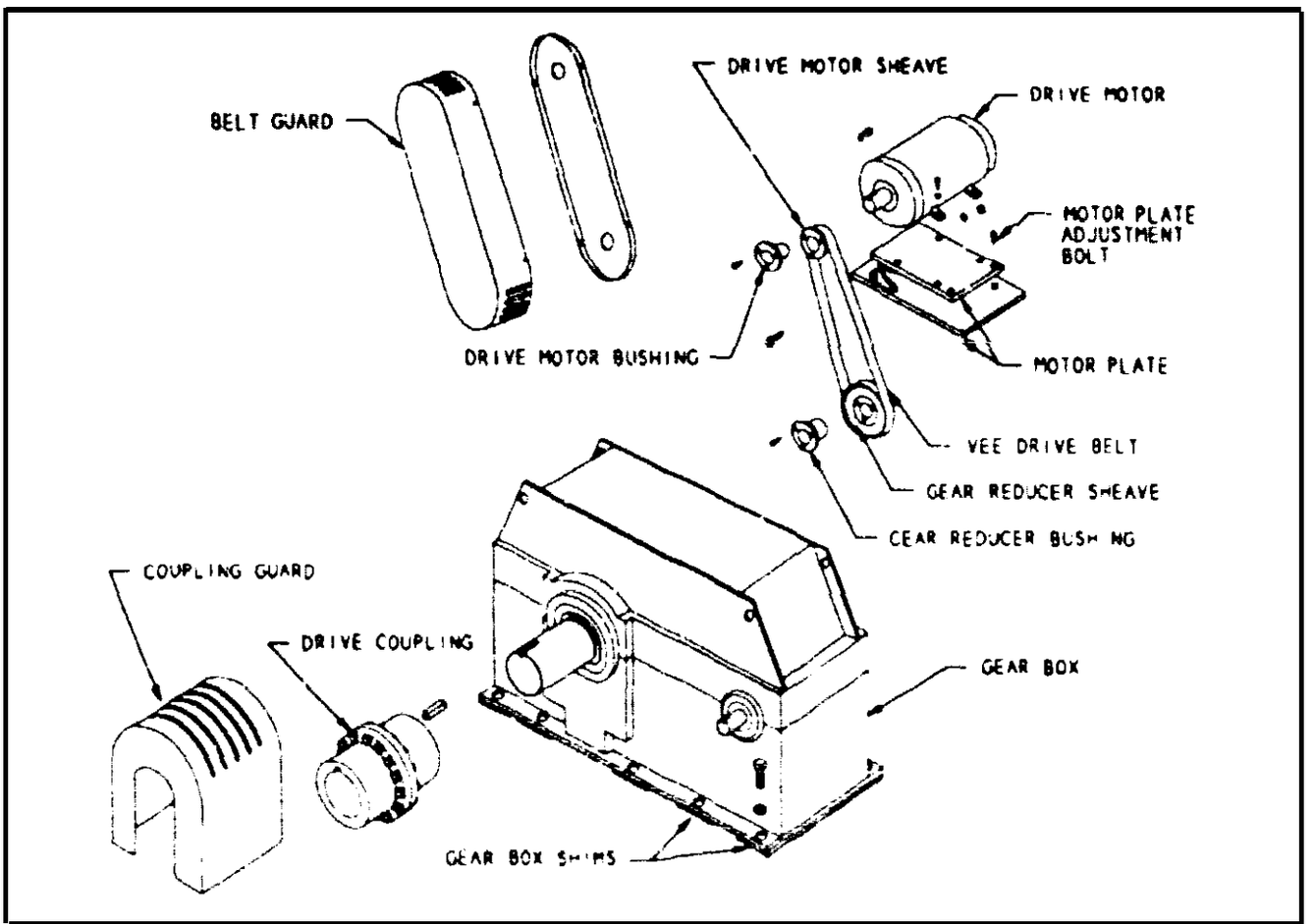
(C) Loctite No 242 required

Figure 5.1-2

5.2 Main Drive Assembly

An electric motor mounted above the gear box nuns 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 arc specified in Chapter 2. Fastener torque specifications arc provided in Uk 'Introduction' section ot this chapter.



igure 5.2-1
Main Drive Assembly

Motor Drive and Gear Box Removal

Lx the following procedure to remov e the motor drive and gear reducer. Refer to Figure 5.2-1

1. Remove the front half of the belt guard
2. Loosen the motor plate adjusting bolts, and remove rhc 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-I 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&l by applying-a bead of RTV silicone sealant IO the joint, including the key and kcyway. 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 arc 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 IO the frame

b 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 IO 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.
14. Install the coupling guard.

5.3 Rotary Steam Joint

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.

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 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.

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

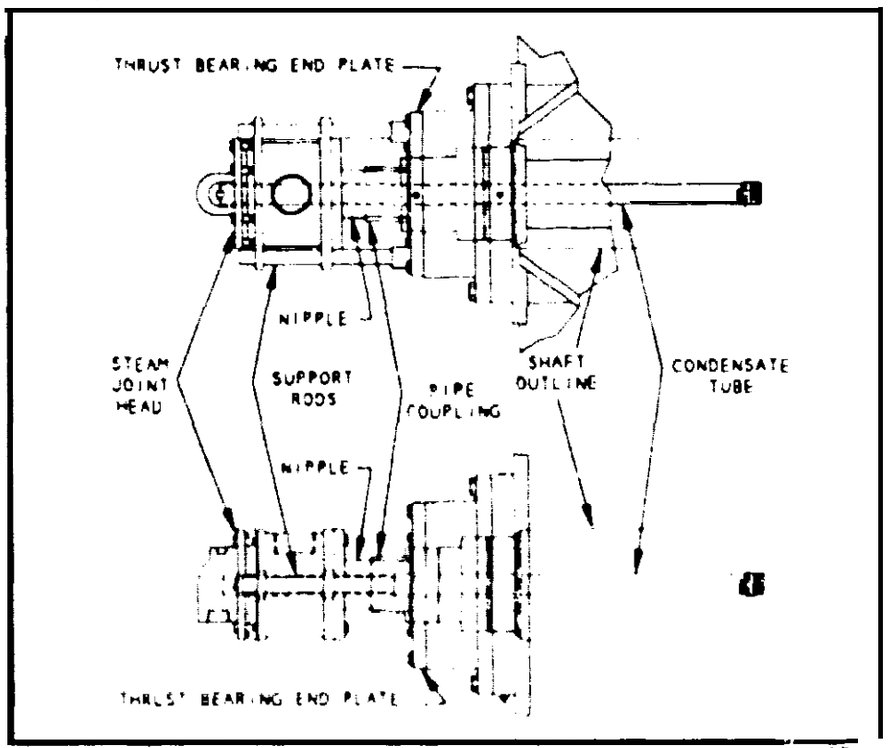


Figure 5.3-1
Rotary Steam Joint

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.

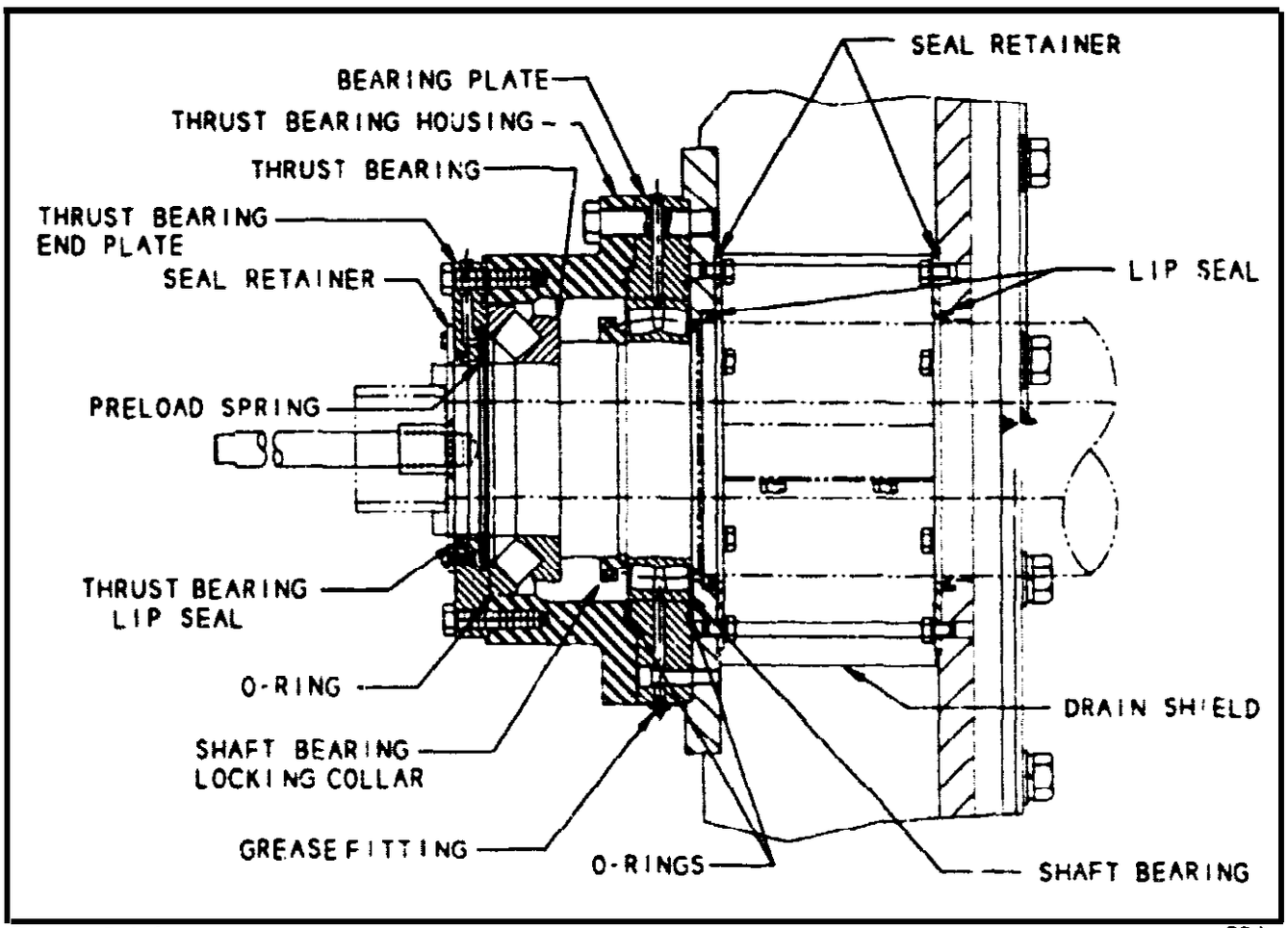
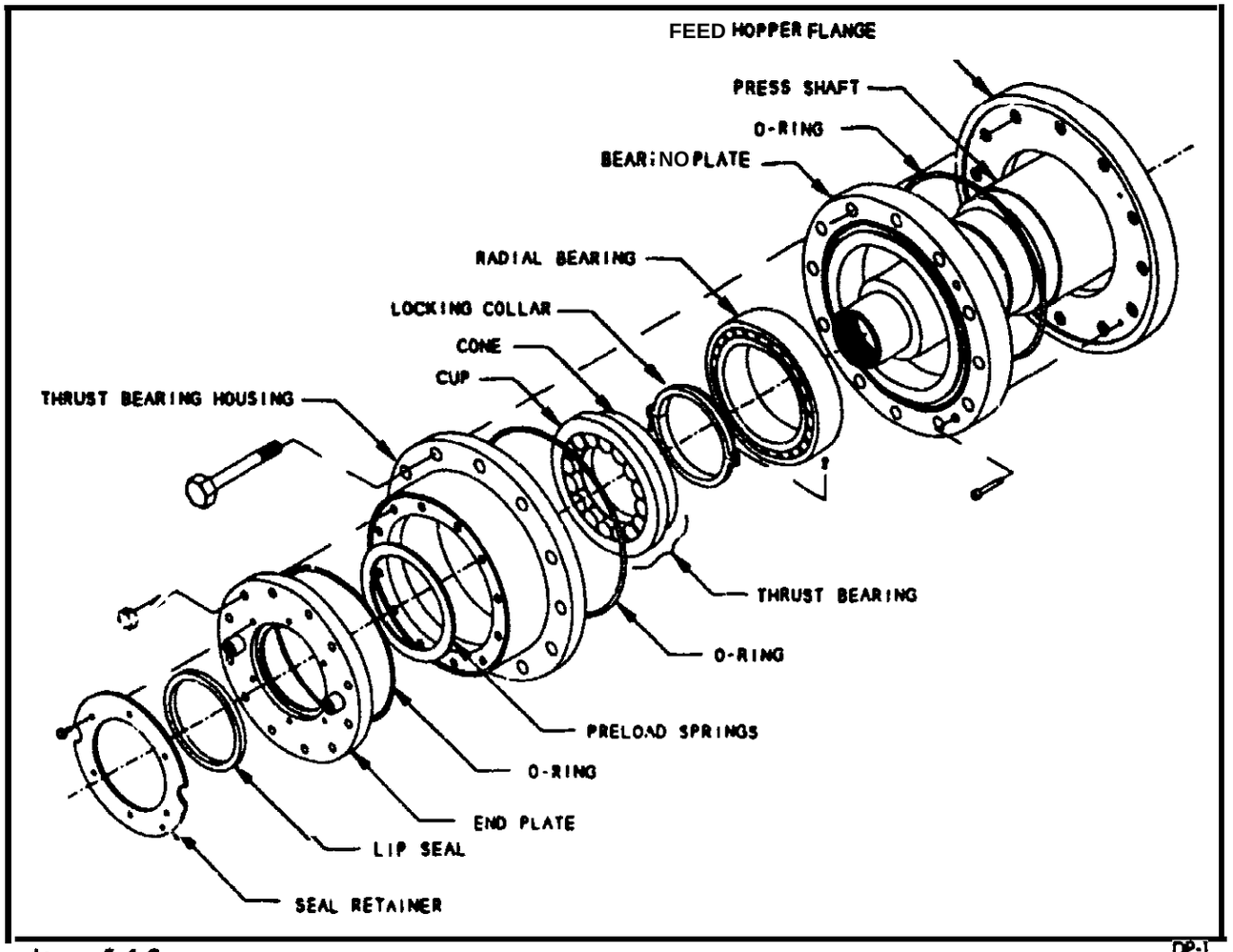


Figure 5.4-1
Thrust Bearing *Assembly*

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 ½–13 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 bcdring assembly. Figure 5.4-2 shows an exploded view of the assembly.



igure 5.4-2
cploded View — Thrust *Bearing Assembly*

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

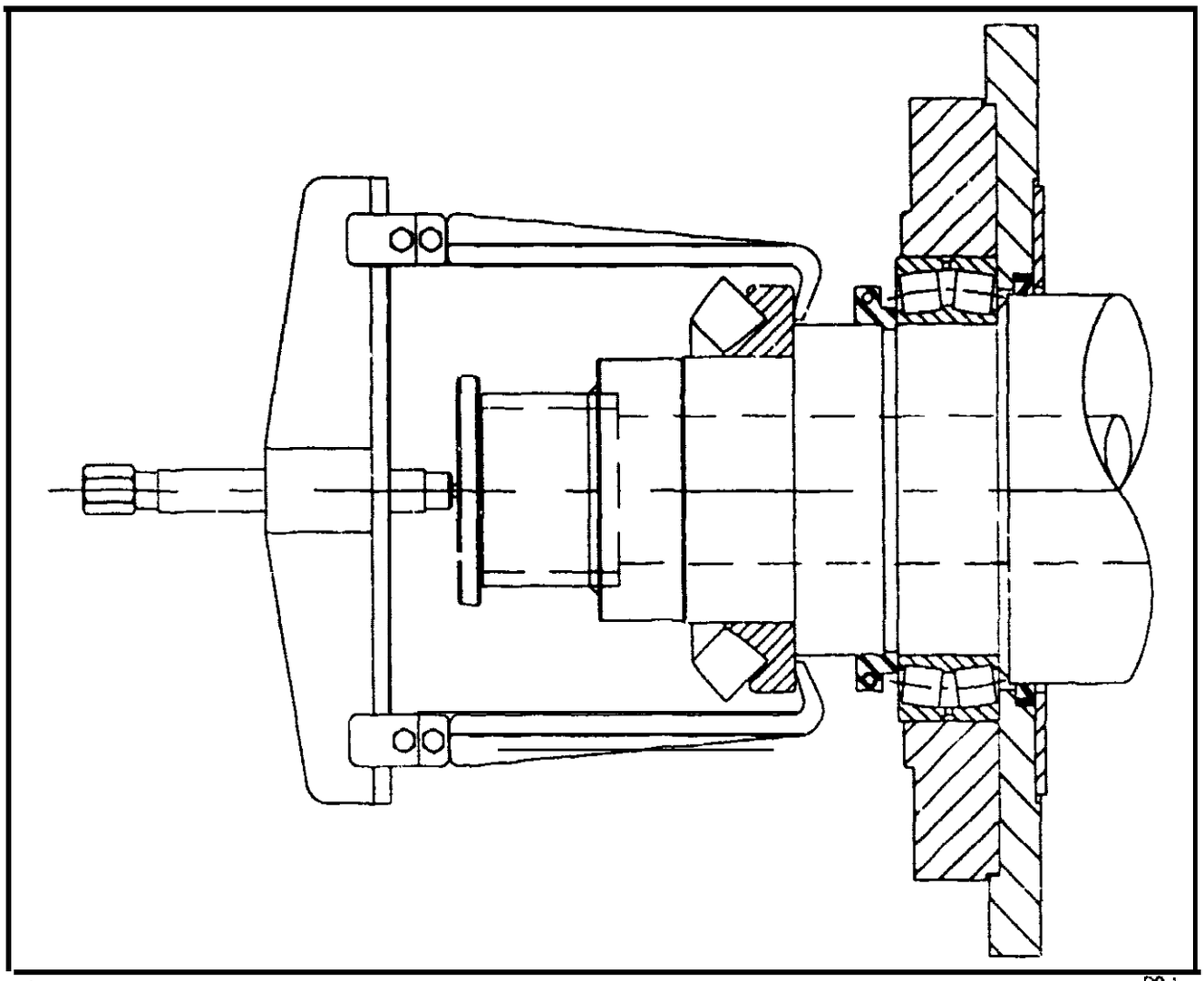
2. The preload springs act against the thrust bearing end plate. Before removing the end plate, loosen all the end plate mounting screws equally, a few turns at a time. This will relieve the spring load against the end plate. Then remove the end plate and the preload springs from the bearing housing.

   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 beating 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.



igure 5.4-3
rrangement of Bearing ***Puller on Press Shaft***

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 arc removed.

7. **Install a ½–13 UNC eye bolt into 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 inro **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 6 of the removal procedure) while installing the radial bearing and bearing plate.

WARNING:
Wear heat resistant. insulated gloves when handling hot parts. Failure to follow this instruction can result in serious personal injury.

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.

WARNING:
Wear heat resistant, insulated gloves when handling ho! parts. Failure to follow this instruction can result in serious personal injury.

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 4 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.

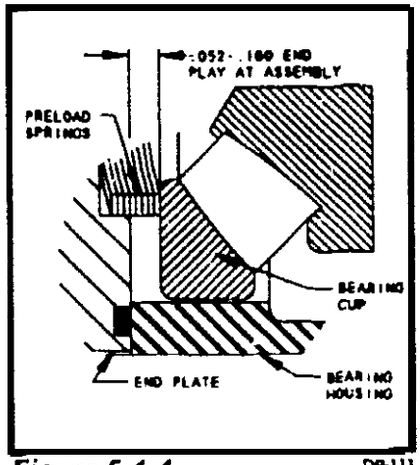


Figure 5.4-4
Checking Thrust Bearing End Play

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

16. Check for correct orientation of the lube phtg 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-sieze 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.

5.5 Feed Hopper

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 dram out of the hopper cage is conveyed toward the high pressure end of the press by the flighting on he 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 tbe thrust tearing assembly. The bulkhead contains a seal cavity between the feed hopper ad the thrust bearing assembly. The seal cavity isolates the thrust bearing assembly from the wet material. The seal cavity is not enclosed. This feature pen-nits seal replacement without disassembly of the thrust bearing or the feed hopper.

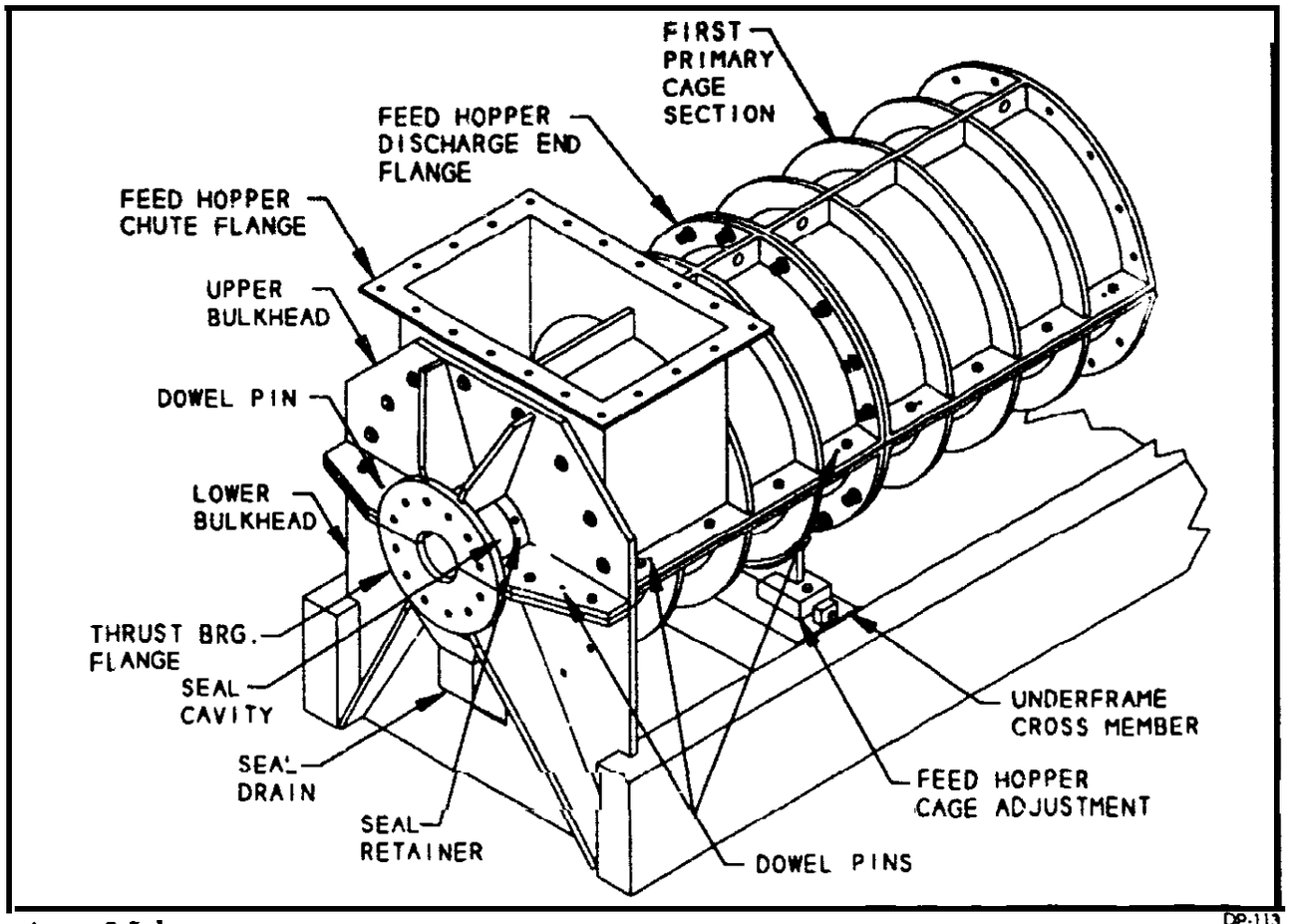
When performing the procedures &Scribed in this section. refer to the 'Specifications' section of Chapter 1 for component weights. setup dimensions. etc. Fastener torque specifications are provided in the 'Introduction' section of this chapter.

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 forremoving 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 ¼ 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 hsve 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



igure 5.5-1
eed Hopper and First Primary Cage

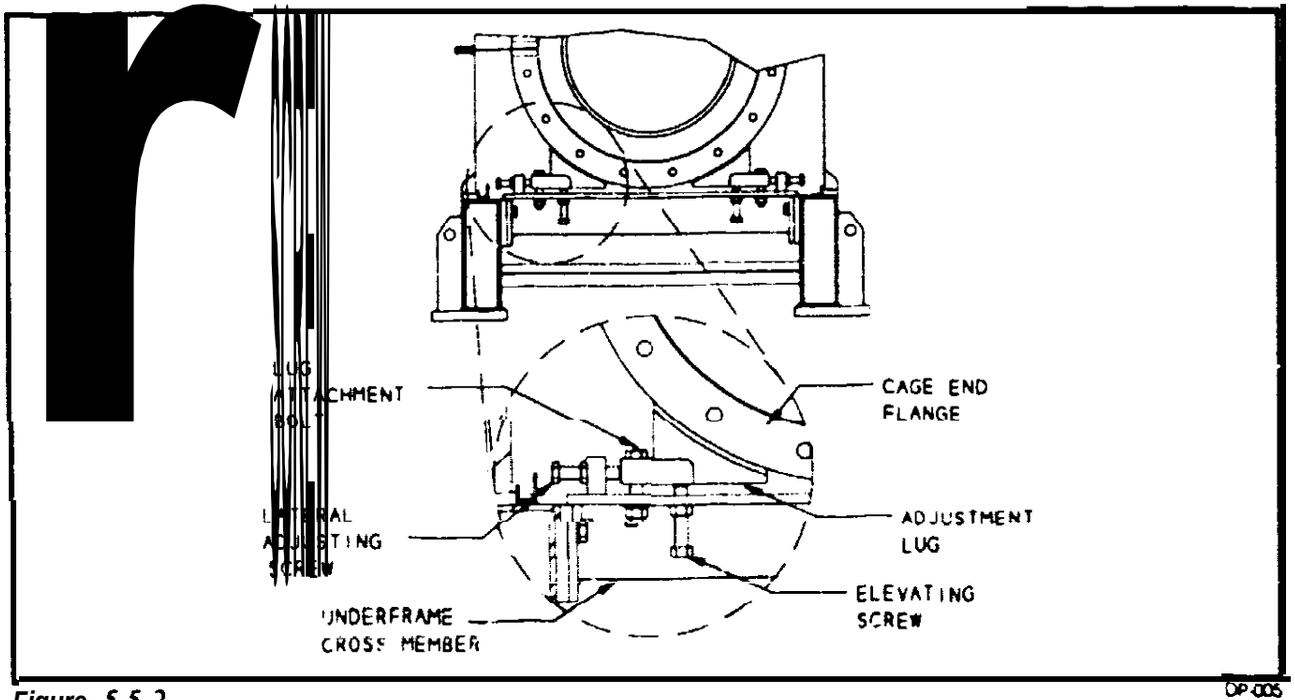


Figure 5.5-2
Cage Adjustment and Cross Member

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 IO the drain pan.

6. Reposition the lifting device to raise the cage out around the shaft. Remove the cage by lifting it out IO 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 dra 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.

CAUTION:
Coat the threads of the screws that attach the feed hopper end flange to the bulkhead with anti-seize compound before assembly. Tighten the screws to the specified torque value. Failure to follow this instruction can result in damage to the press.

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

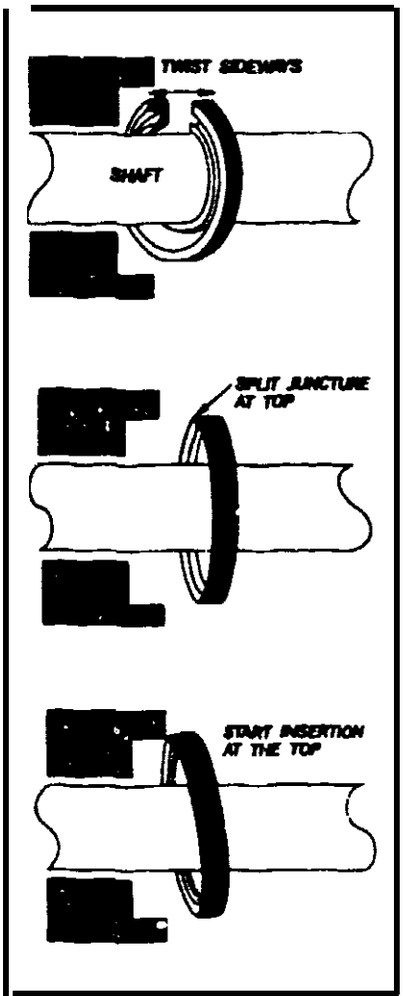
If necessary (i.e., to remove the press shaft), the top half of the bulkhead section may be removed. It is important to remove the thrust bearing assembly first, to unload the preload springs. Then the hearing housing may be removed from the feed hopper flange. The procedure for removing the thrust bearing 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 sea! and remove it from the shaft. The split should be located at the top of the shaft.

Install the new seal as follows:



igure 5.5-3
eal Installation

1. Apply a **small amount of grease to the shaft area where the seal lip** ***will engage. Do not apply grease or oil w the seal outer &meter 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 w 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 bon 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 **essing** the **seal** into the cavity until the entire **seal** has **been started nto** 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.

5.6 Choke

The choke assembly, shown in Figure 5.6-l. 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.

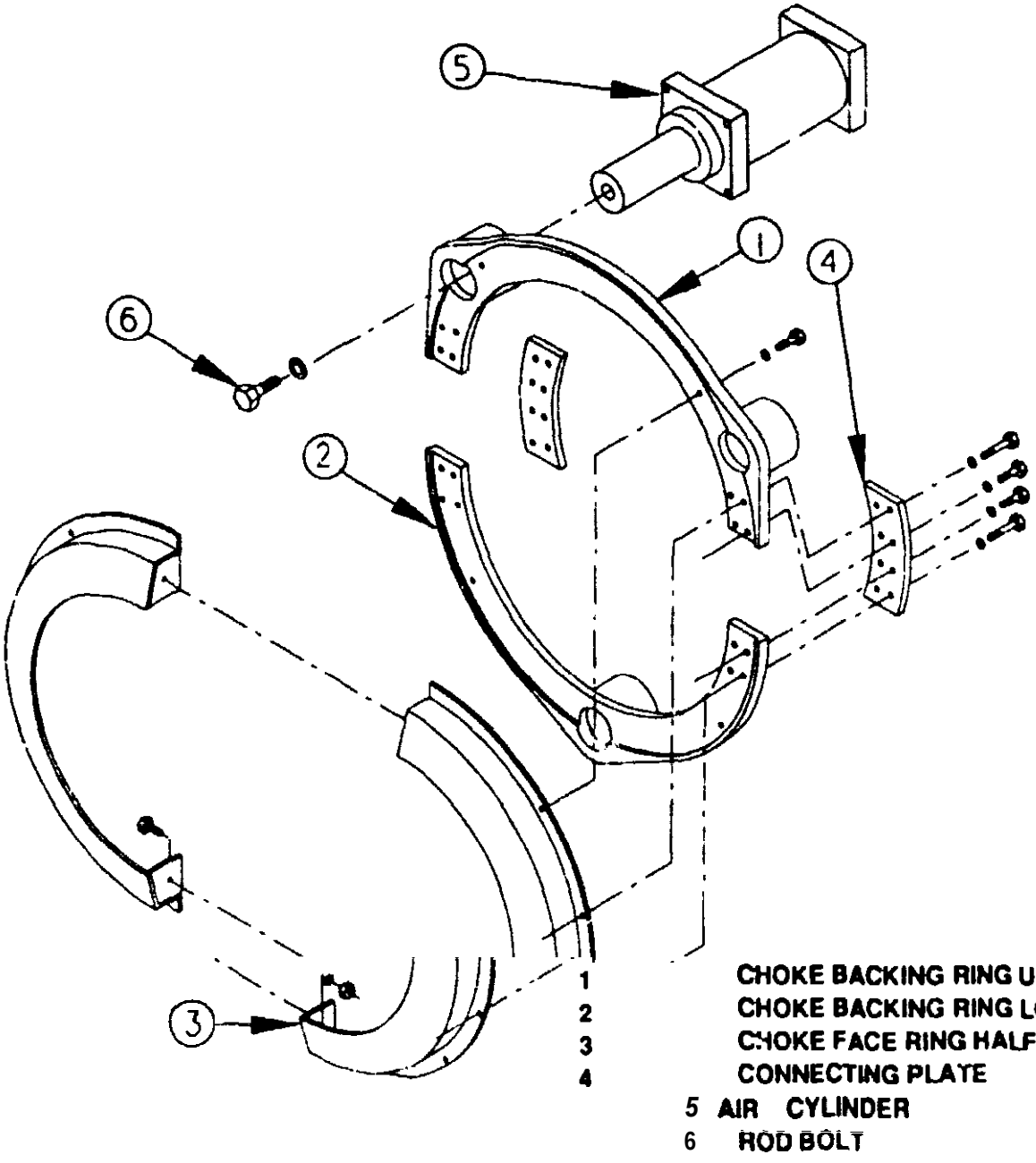


Figure 5.6-l
Choke Assembly

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 the face ring and the air cylinders.

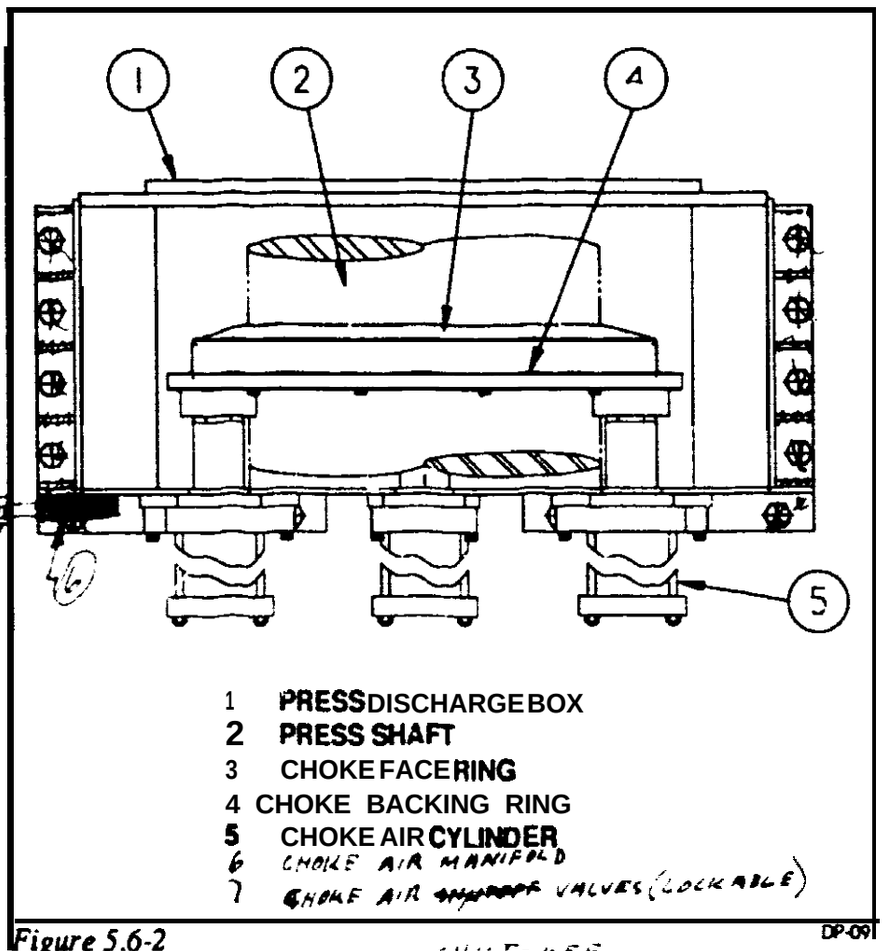


Figure 5.6-2
Discharge Box — Top View

When performing the procedures describe in thii section. refer to the 'Specifications' section of Chapter 1 for component weights, setup dimensions. etc. Fastener torque specifications arc 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 arc 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-l to remove the choke face fmm 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.

WARNING:
Relieve all residual pressure from the choke cylinders and piping, and disconnect the compressed air supply lines from the choke manifold before performing any service on the discharge box or choke Failure to follow this instruction can result in serious personal injury.

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 ½–13 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. Usc 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 ½–1 3 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 IO 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 thr 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 arc recessed into the choke backing ring.

WARNING:
Wear heat resistant, insulated gloves when handling hot parts. Failure to follow this instruction can result in serious personal injury.

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 IO its mounting position on rhc outside of the discharge box. Install and tigh:cn the mounting screws.

3. After all the cylinders are mounted IO the dirharge box. assemble the choke hacking ring to the piston rods of the cylinders.

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

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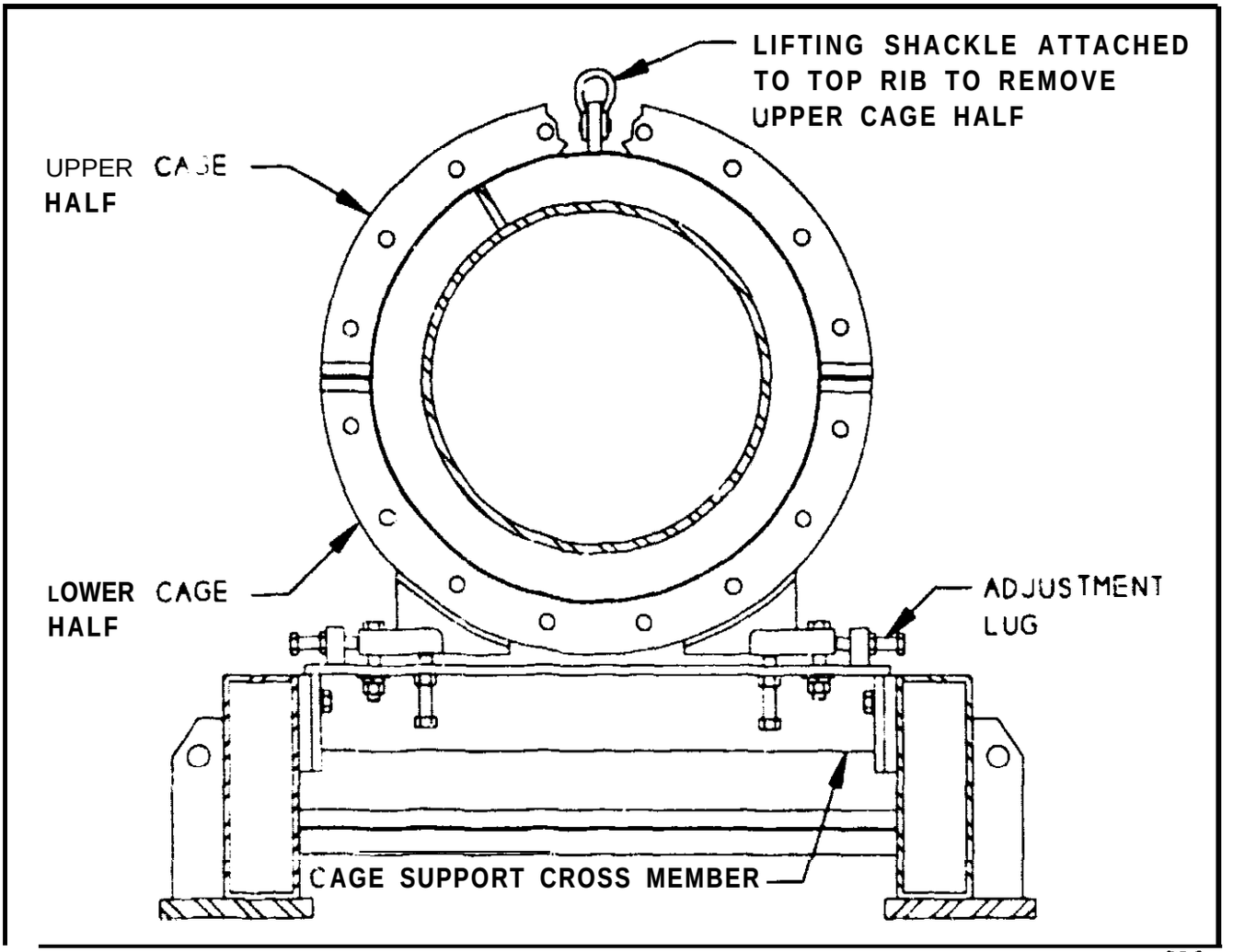
5. Place the choke face into position on the backing ring. Apply Loctite® No. 242 to each of the attaching screws. Install and tighten the attaching screws.

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.



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ure 5.7-1
d View of Cage Assembly

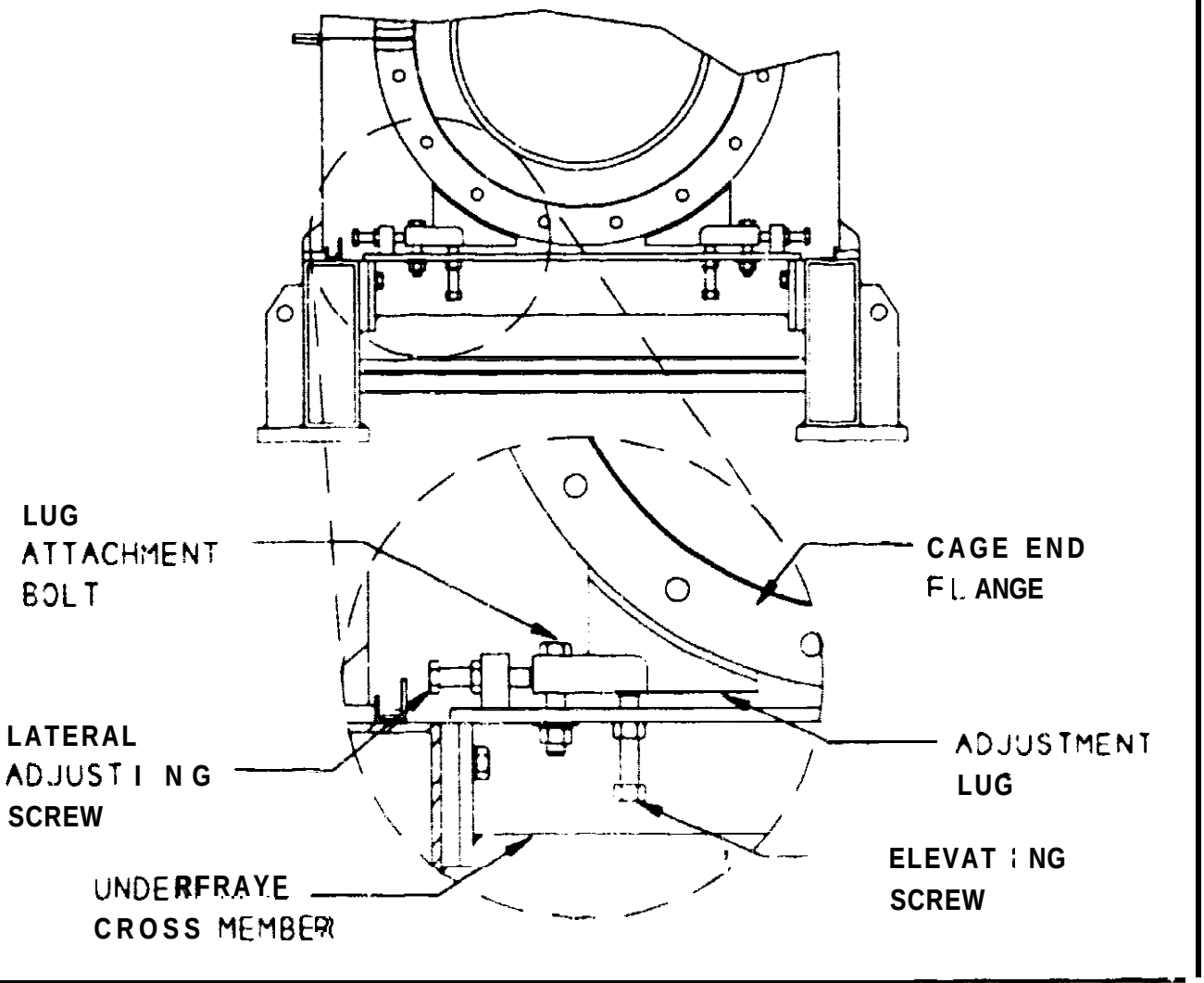
As shown in Figure 5.7-1, the cages are split horizontally along the axis of the press shaft. The two halves of the cages are bolted together at the split flange. Shims in the split flange provide a means of adjusting the clearance between the screens and press shaft flighting. When the clearance becomes 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.

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

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 bc 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 ¼ inch.
3. At each cage adjustmcnr location (underframe cross member), from the cage being removed to the discharge box:



igure 5.7-2
age Adjustment Screws

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 hoks provided in the iongitudinal top rib of the cage (see Figure 5.7-1). Connect a suitable lifting device to the shackles. [illegible]. Remove tbc 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 singk 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 arc 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 nn 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 :hc cage(s).

Usc the foliowing procedure to remove the cage lower half from the press:

1. Rcmovc 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. Rcmovc 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 Strp I

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-I and 3.7-2):***

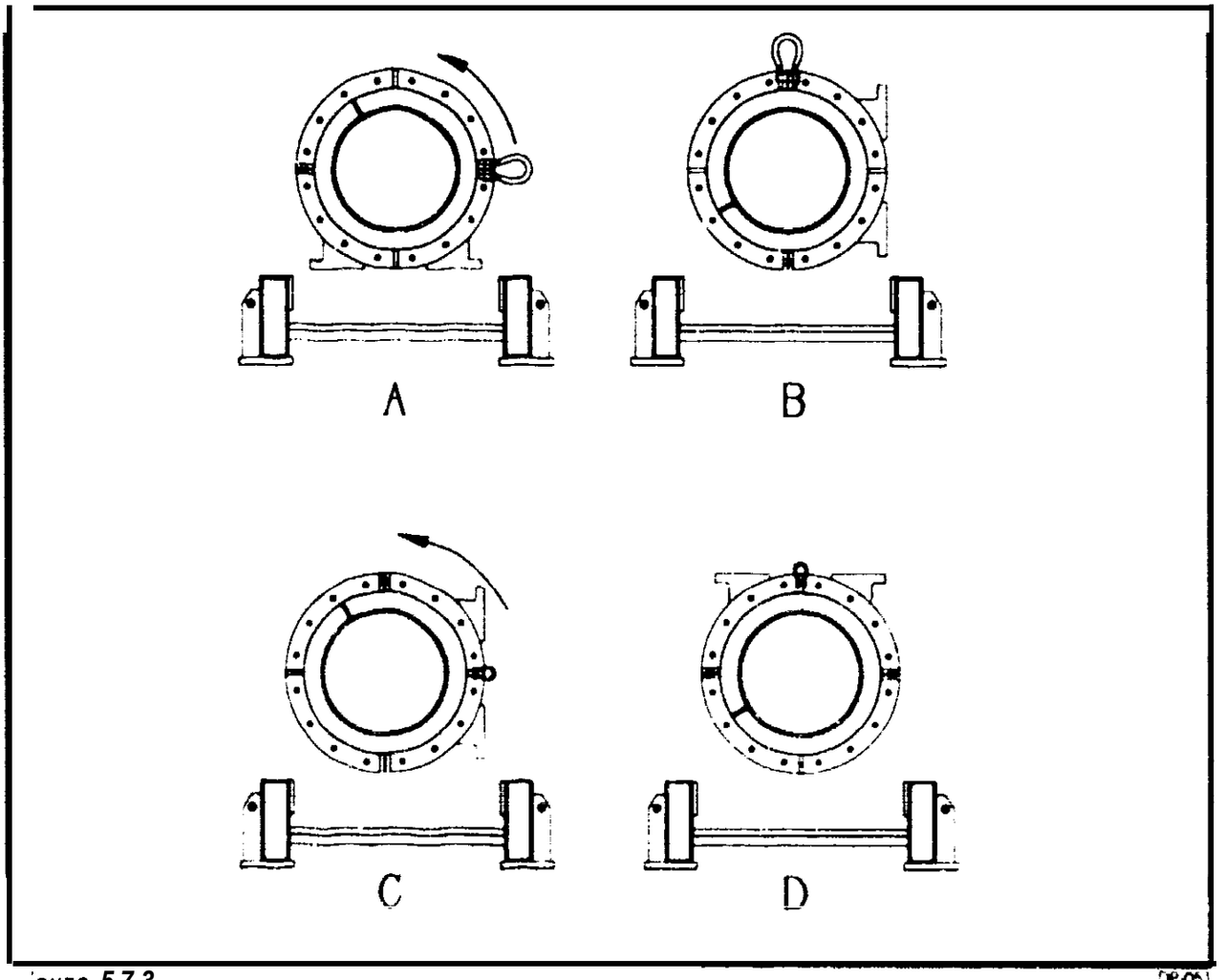
   a. **Loosen** both **lateral** adjusting screws.

   b. Rcmovc **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** twoofthc bolt hoks 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).



gure 5.7-3
eps in ***Removing a Lower*** Cage ***Half***

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 Fii 5.7-3. B).

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

Installing New Screens

If it is necessary to install new screens in the cage halves, grind the existing welds io remove the old screen. Weld the new screen to the cage frame with I-inch tack welds on 3-inch centers, using suitabk 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 tim, starting at the feed hopper end of the press.

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.

The mating halves of each cage arc machined togctha as a single piece at the factory, and must be used togcthcr. 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.

CAUTION 2:
Be sure the cage assemblies have the correct orientation. Failure to follow this instruction can result in damage to the machine.

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. Bc 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 io the shaft flighting as described in the 'Service Instructions" chapter. Be sure to tighten the fasteners properly.

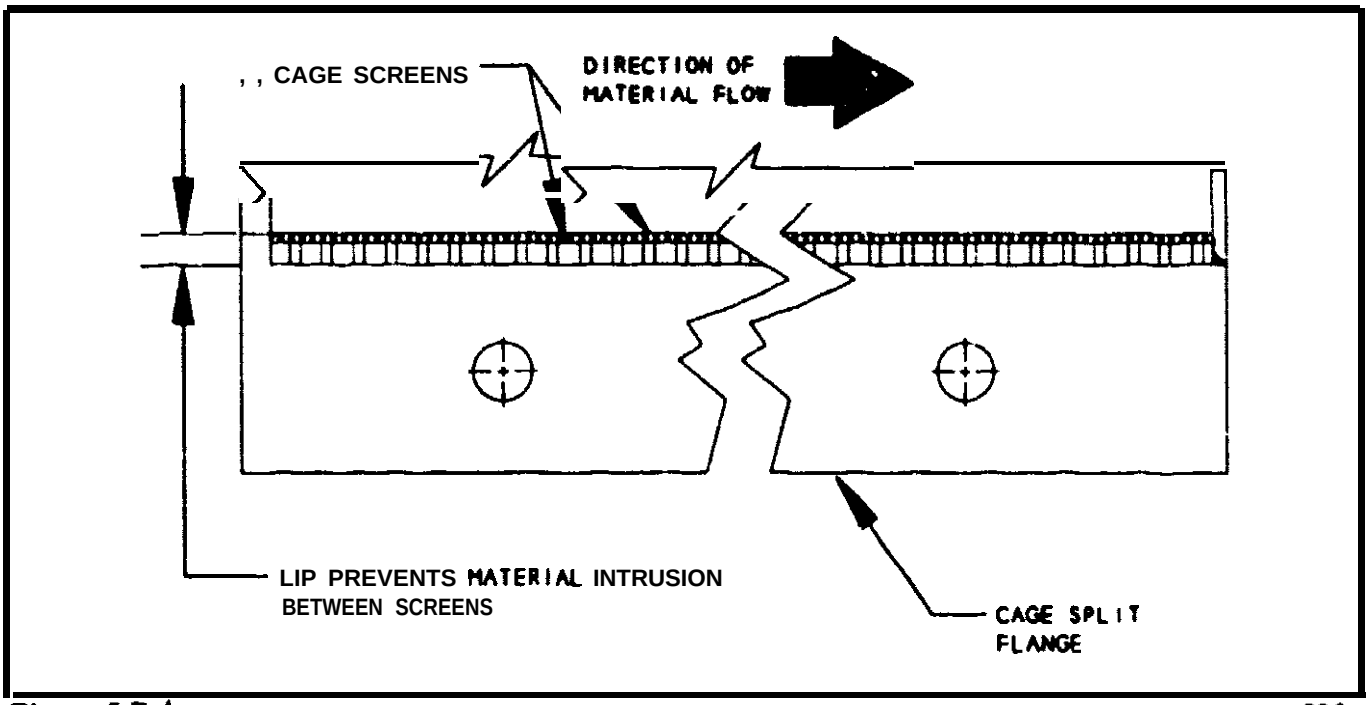


Figure 5.7-4
Orientation of Cages

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 diatnctcr increases pressure on the matcria!. 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 sphaical 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 bc steam heated to improve cake dryness. Steam feed and condensate discharge for the shaft ate 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, rcfcr 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 tine 'Specifications' section of Chapter 1 for component weights, setup dimensions. etc. The lubricants used in each component are specified in Chapter 2. Fasrencr torque specifications are provided in the "Introduction" section of this chapter.

Press Shaft Removal

Usc the following procedure to rcmovc the press shaft:

1. Remove the choke face and the upper half of the choke backing ring. See the "Choke" scction 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 rhc gear coupling (refer to the 'Main Drive' section of this chapter).
5. Remove the pillow block lip seals. Next, rcmovc the nuts that attach the cap (upper half) of the pillow block housing to the base (lower half). Install an cyc bolt in rhe lifting hole provided in the top center of rhc cap. Use a suitable overhead lifting device to remove the pillow block housing cap.

C A M :
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 liig 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 thii 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. Rcfcr to the 'Pillow Block Bearing' section in this chapter.
11. If the shaft flighdng 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. Asscmblc the pillow block bcaringon 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.

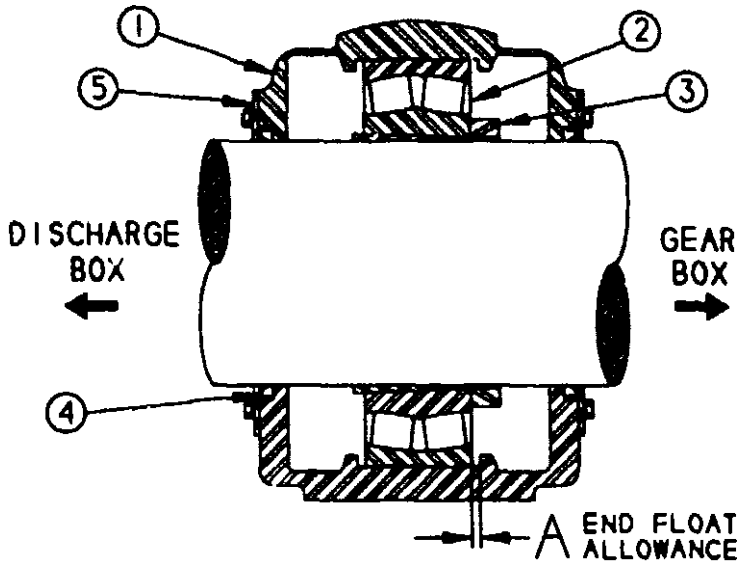
NOTE: Continue to support the feed end of the shaft until after the thrust bearing is assembled.

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 rhc 'Pillow Block Bearing' section of this chapter.
7. Asscmblc the feed hopper, thrust bearing assembly, discharge box. choke, and cages as described clsewhcrc in this chapter.
8. Align the drive coupling according IO the coupling manufacturer's specifications. Attach the IWO 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.

5.9 Pillow Block Bearing

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.



1 **HOUSING**
2 *BEARING*
3 **ADAPTER WITH NUT**
4 *SEAL*
5 **SEAL RETAINER**

Figure 5.9-1
Pillow Block Bearing

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.

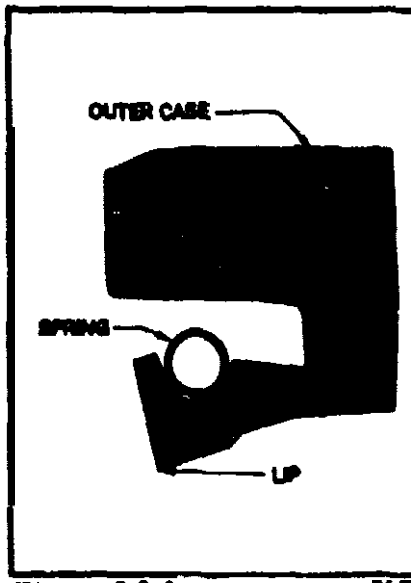


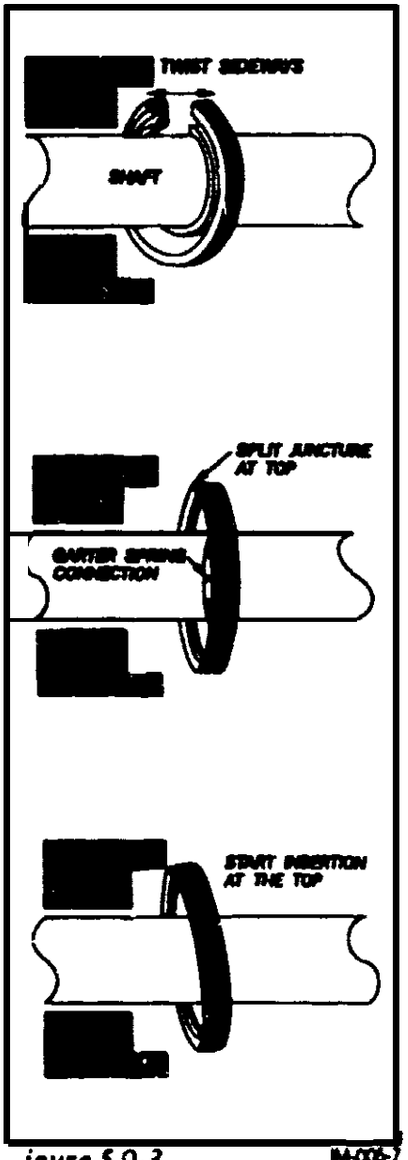
Figure 5.9-2
Seal Detail

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.



igure 5.9-3
eal Installation

2. 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 lip 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.

5.9-1

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 ¼ 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

Figure 5.9-4 M-002
Tightening the Bearing Nut with an Impact Spanner

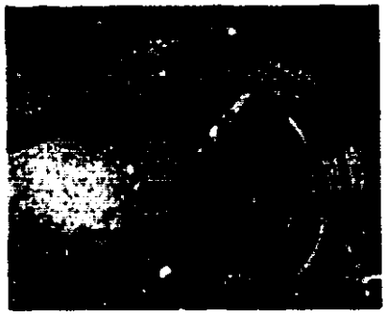


Figure 5.9-5 M-003
Checking Radial Internal Clearance

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 gear box) 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 Ctivs 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.

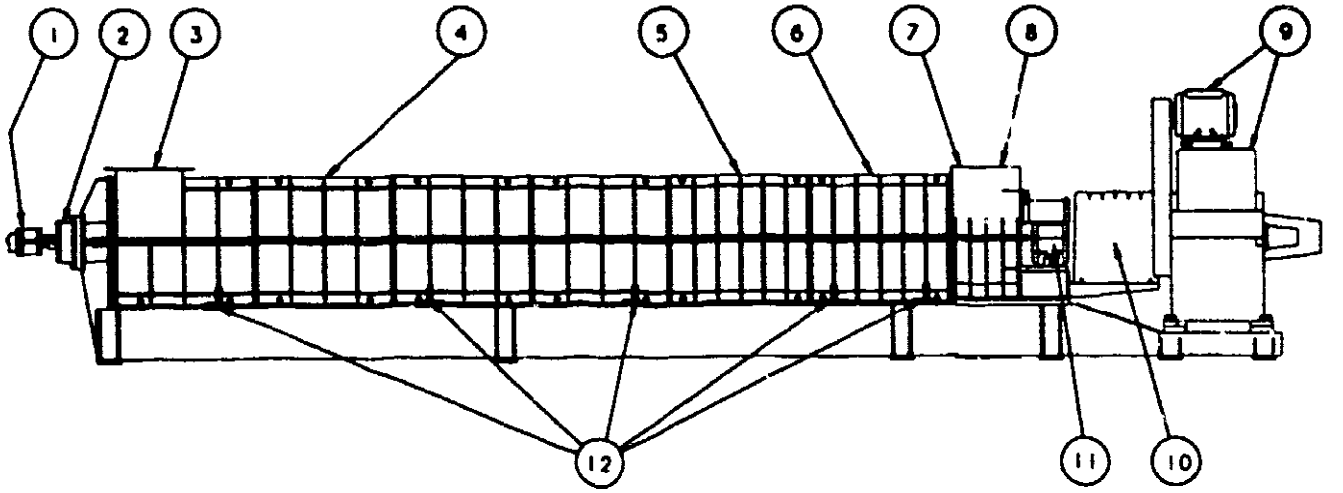
6.2 Spare Parts List

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.



1	Steam Joint	Figure 6.1-9	7	Discharge Box	Figure 6.1-3
2	Thrust Bearing	Figure 6.1-I	6	Choke Assembly	Figure 6.1-5
3	Feed Hopper	Figure 6.1-3	9	Motor and Gear Box	Figure 6.1-2
4	Primary Cage	Figure 6.1-3	10	Drive Coupling	Figure 6.1-2
5	Intermediate Cage	Figure 6.1-3	11	Pillow Block Bearing	Figure 6.1-8
6	Discharge Cage	Figure 6.1-3	12	Cage Adjustment	Figure 6.1-6 & 6.1-7

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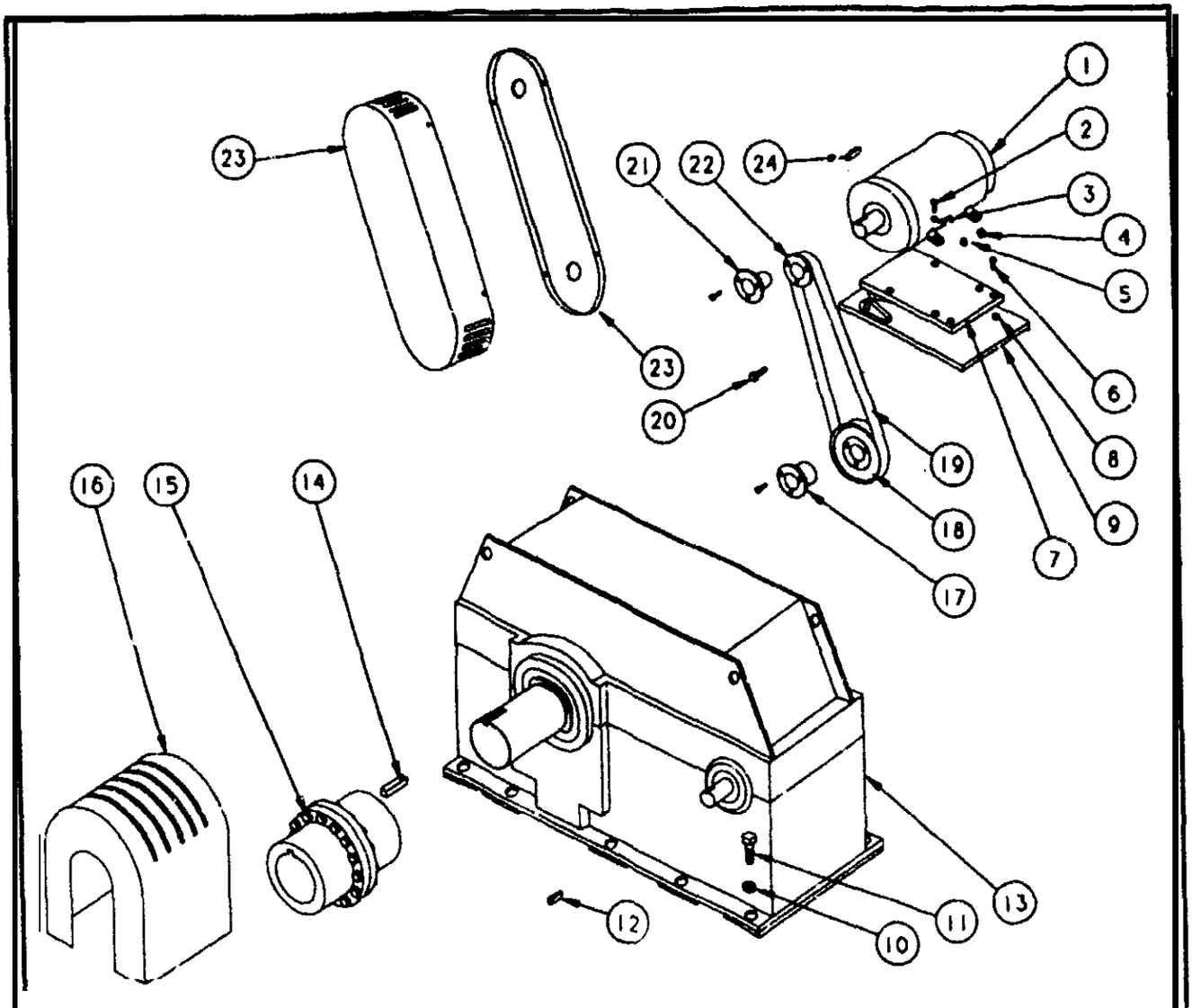
Figure 6.1-i
Dupps Series 3600B Dewatering Press

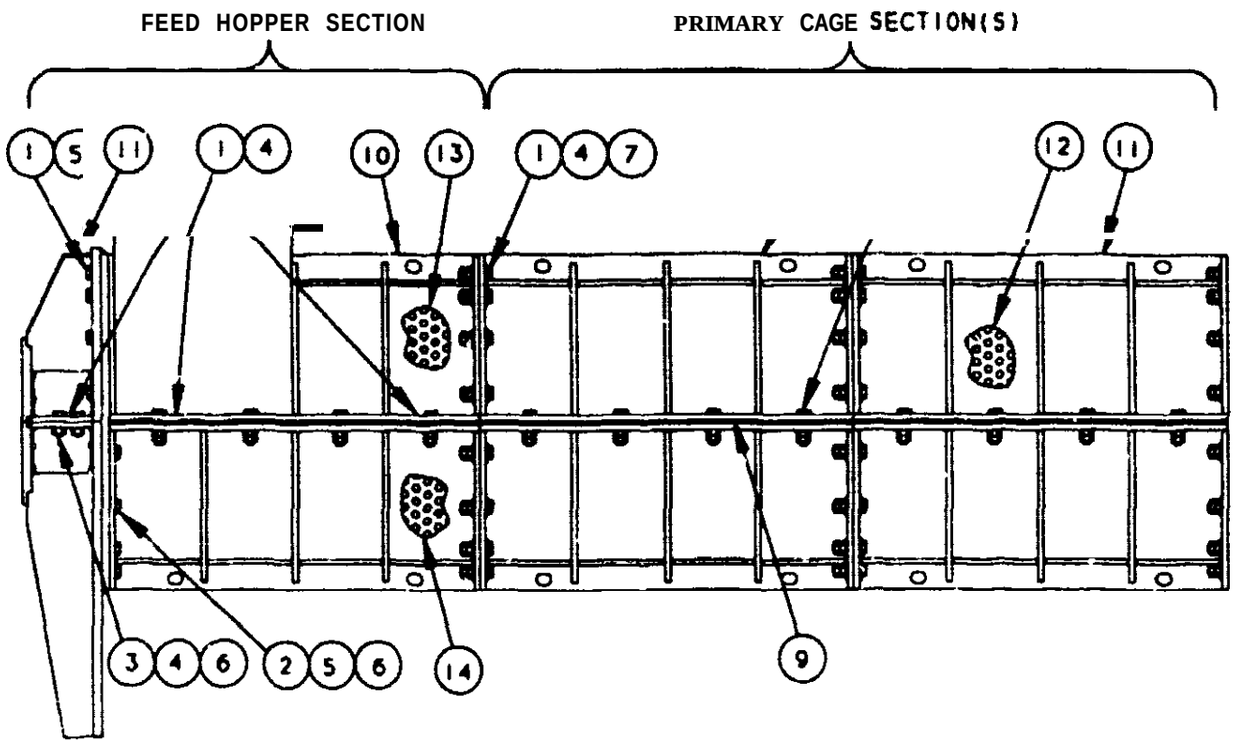
6.1 Illustrated Parts Lists

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.



REF	PART NO.	PART NAME	REF	PART NO.	PART NAME
1	CONFIG	Motor (by others)	13	CONFIG	Gear Box
2	,18839	5/8–11 - 1¼ Hx Hd Cap Scr, Gr5	14	119641	Key, Output Shaft
3	104283	5/8" Med Lockwasher	15	CONFIG	Drive Coupling
4	118906	¾–10 Hex Nut, Gr8	16	128019	Coupling Guard
5	102437	¾" Med Lockwasher	17	CONFIG	Bushing, Drive Sheave
6	106017	1–8 x 6 Hx Hd Scr, Spcl	18	CONFIG	Drive Sheave
7	123669	Plate, Motor	19	CONFIG	Drive Belts
8	102309	1–8 Hex Nut, Gr2	20	102223	¾–10 x 3 Hx Hd Cap Scr, Gr5
9	119876	Plate, Reducer	21	107695	Bushing, Motor Shaft
10	119639	2¼" Med Lockwasher	22	CONFIG	Motor Sheave
11	119638	2¼–4½ x 3¾ Hx Hd Cap Scr, Gr5	23	124155	Belt Guard
12	114355	Key, Input Shaft	24	114355	Key, Motor Shaft

Figure 6.1-2
Main Drive Assembly



REF	PART NO.	PART NAME
1	118781	1-8 x 4 HxpHdr, 316SS
2	119222	1-8 x 3 Hx Hd Cap Scr, 316 SS
3	118706	1-8 x 2½ Hx Hd Cap Scr, 316 SS
4	118752	1-8 Hex Nut, 316SS
5	118804	1-in Flat Washer, 316 SS
6	118753	1-in Lockwasher, 316SS
7	121415	1-in Flat Washer, 2¼ OD, 316 SS
8	129943	½ x 2½ Alignment Pin
9	122817	Shim, Primary Cage (12 per cage)
10	CONFIG	Fd Hopper Cage Set w/ screens
11	CONFIG	Primary Cage Set w/ screens
12	CONFIG	Inner Screen (2 per cage)
13	CONFIG	Fd Hopper Upper Screen
14	CONFIG	Fd Hopper Lower Screen

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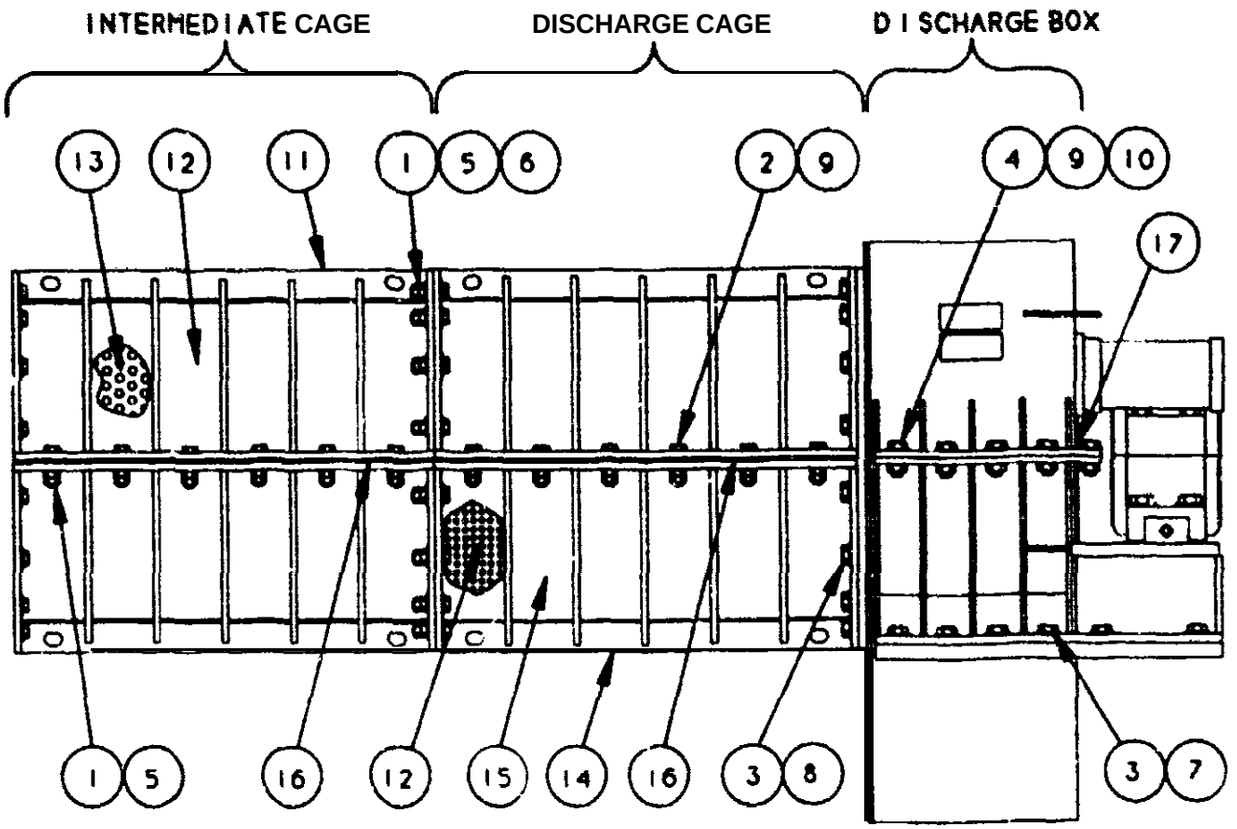
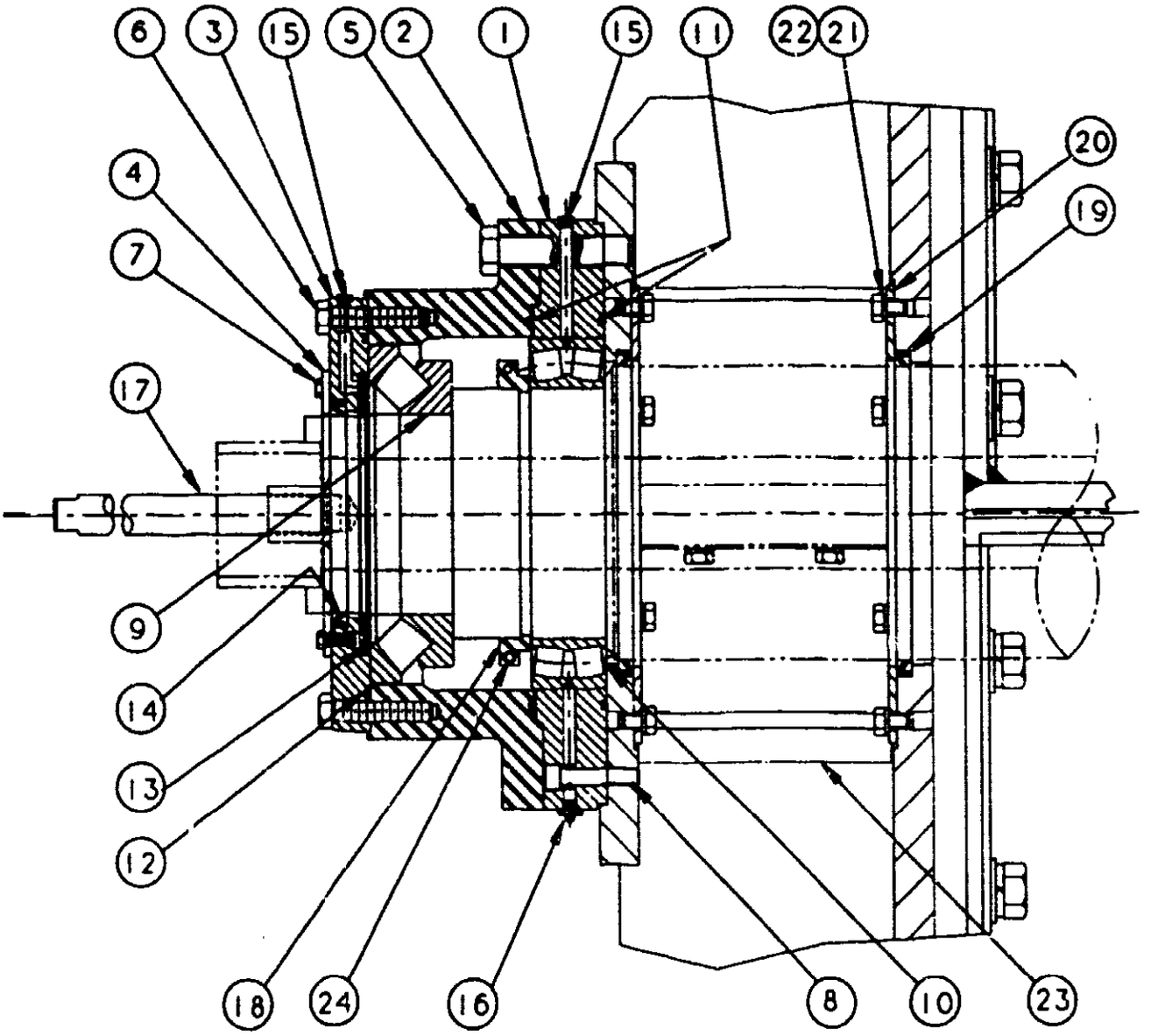
gure 6.1-3A
Feed Hopper and Primary Cages



REF	PART NO.	PART NAME
1	118751	1-8 x 4 Hx Hd Cap Scr, 316SS
2	121227	1⅛-7 x 5 Hx Hd Cap Scr, 316SS
3	121414	1⅛-7 x 3 Hx Hd Cap Scr, 316SS
4	123188	1¼-7 x 3½ Hx Hd Cap Scr, 316SS
5	118752	1-8 Hex Nut, 316SS
6	121416	1-in Flat Washer, 2½ OD, 316SS
7	121415	1¼ Flat Washer, 316SS
8	121417	1¼ Flat Washer, ¼ Thk, 316SS
9	121228	1¼-7 Hex Nut
10	121617	1¼-in Lockwasher, 316SS

REF	PART NO.	PART NAME
11	CONFIG	Intermed Cg Set w/ Screens
12	CONFIG	Inner Screen (2 per cage)
13	CONFIG	Intermed Back-Up Screen (2 per cage)
14	CONFIG	Disch Cage Set w/ Screens
15	CONFIG	Disch Back-up Screen (2 per cage)
16	119571	Cage Shim, Int & Disch (16 per cage)
17	☐	Disch Box Seal Assy (a thru d)
a	129022	Seal Retain Plate (2 pcs)
b	120719	⅜-16 x ¾ Hx Hd Cap Scr, 316SS (8)
c	118893	⅜ Lockwasher, 316SS (8)
d	123056	Rubber Seal

Figure 6.1-3B
Intermediate Cage, Discharge Cage and Discharge Box



REF	PART NO.	PART NAME	REF	PART NO.	PART NAME
1	128671	Bearing Plate	13	128725	Preload Spring (8 req'd)
2	128663	Thrust Bearing Housing	14	128726	Lip Seal, Thrust Bearing
3	128691	End Plate, Thrust Bearing	15	102722	⅛ - in. Socket Pipe Plug
4	128707	Retainer, Thrust Bearing Seal	16	124431	⅛ - in. Grease Fitting
5	102237	⅞–9 x 4½ Hx Hd Cap Scr, Gr5	17	128729	Support Rod, Steam Joint
6	104207	⅝–11 x 2½ Hx Hd Cap Scr, Gr8	18	130049	Locking Collar, Shaft Bearing
7	102180	⅜–16 x ¾ Hx Hd Cap Scr, Gr2	19	128728	Lip Seal, Feed Hopper
8	128727	½–13 x 2½ Soc Hd Cap Scr	20	128788	Retainer, Feed Hopper Seal
9	128683	Thrust Bearing, Spherical Roller	21	119900	½–13 x ¾ Hx Hd Cap Scr, 316 SS
10	128682	Shaft Bearing, Spherical Roller	22	118898	½ - in. Med Lockwasher, 316 SS
11	121692	O-ring, 381, 90 Dur Viton	23	128995	Drain Shield, Feed Hopper
12	128724	O-ring, 379, Viton	24	130051	⅜–16 x 1 Soc Hd Cap Screw

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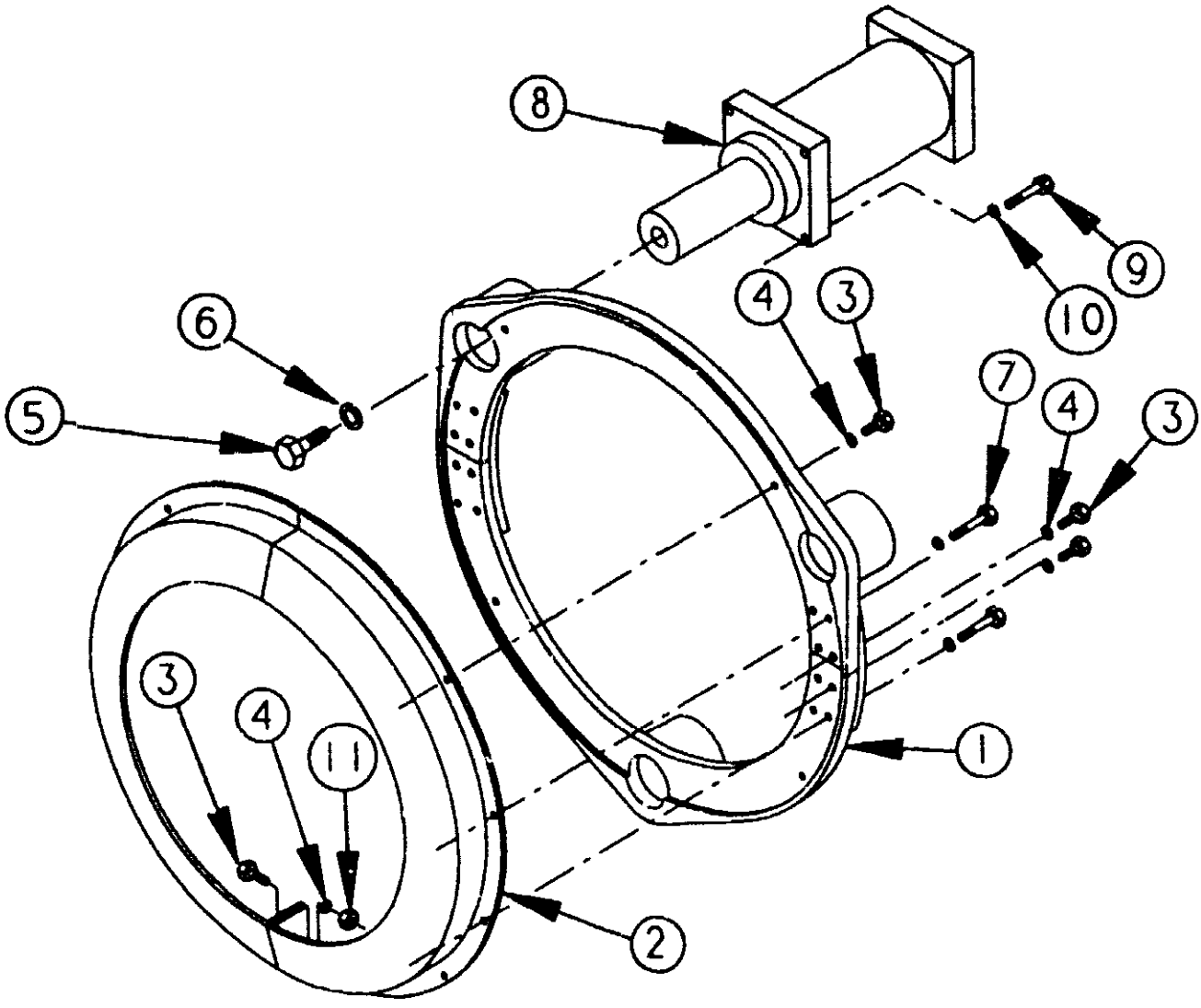
igure 6.1-4
hrust Bearing Assembly



REF	PART NO.	PART NAME	REF	PART NO.	PART NAME
1	128552	Choke Backing Ring Assy, 316 SS	7	117094	½-13 x 2¼ Hx Hd Cap Scr, 316 SS Air Cylinder
2	(102364)	½-13 x 1½ Hx Hd Cap Scr, 316 SS	9	119435	⅝-11 x 2¾ Soc Hd Cap Scr
4	118898	½" Lockwasher, 316 SS	10	119436	⅝-11 Hi-Collar Lockwasher
5	125860	1½-6 x 3¼ Hx Hd Cap Scr, 316 SS	11	118897	½-13 Hex Nut, 316 SS
6	125861	1½" Med. Lockwasher, 316 SS			

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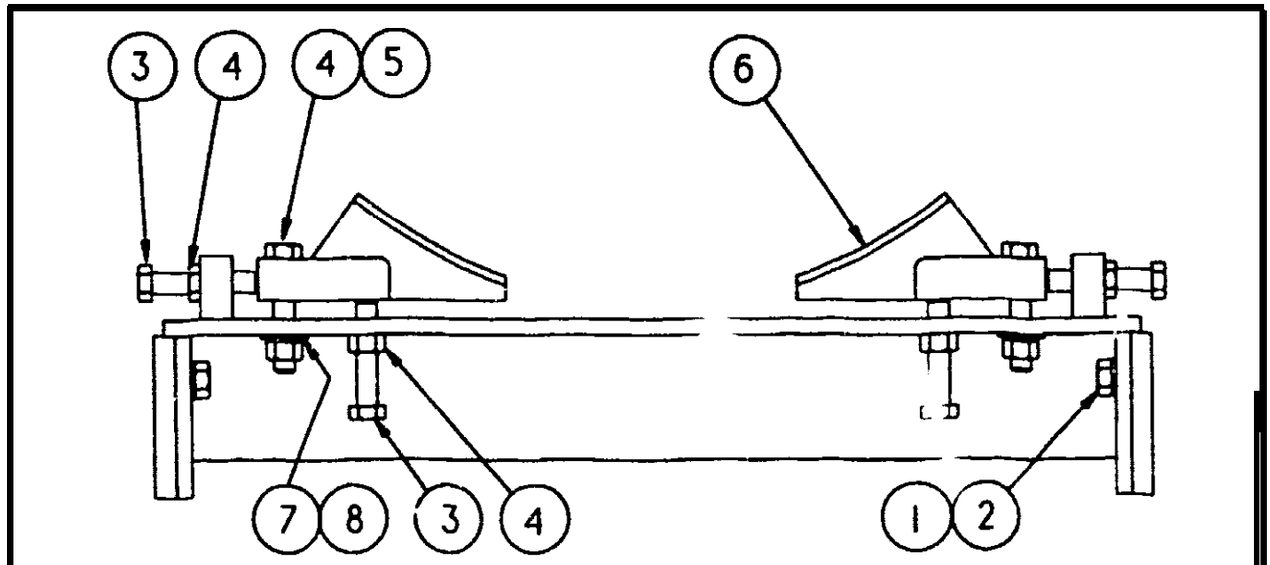
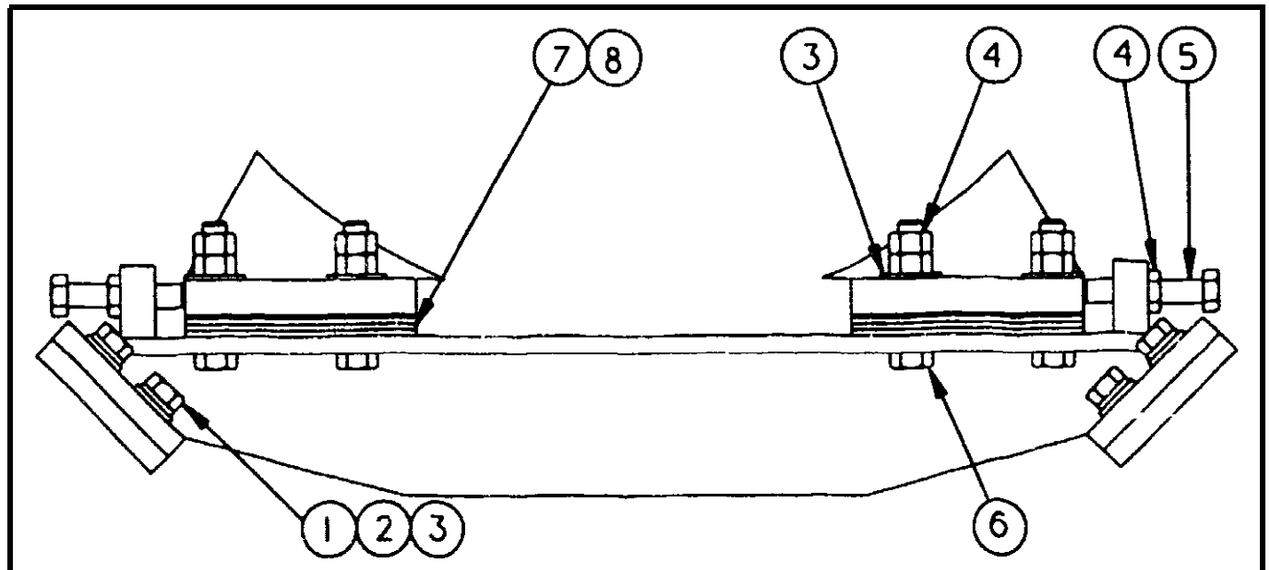
igure 6.1-S
hoke Assembly



REF	PART NO.	PART NAME
1	118675	¾–10 x 1¾" Hx Hd Cap Scr, 316 SS
2	118903	¾" Med. Lockwasher, 316 SS
3	119440	1–8 x 5 Hx Hd Set Screw, 316 SS
4	118752	1-8 Hex Nut, 316 SS
5	119913	1–8 x 5 Hx Hd Cap Scr, 316 SS
6	120263	Adjust Lug, Primry/Intermed
7	118753	1" Lockwasher, 316 SS
8	118804	1" Flat Washer, 316 SS

igure 6.16 W-11

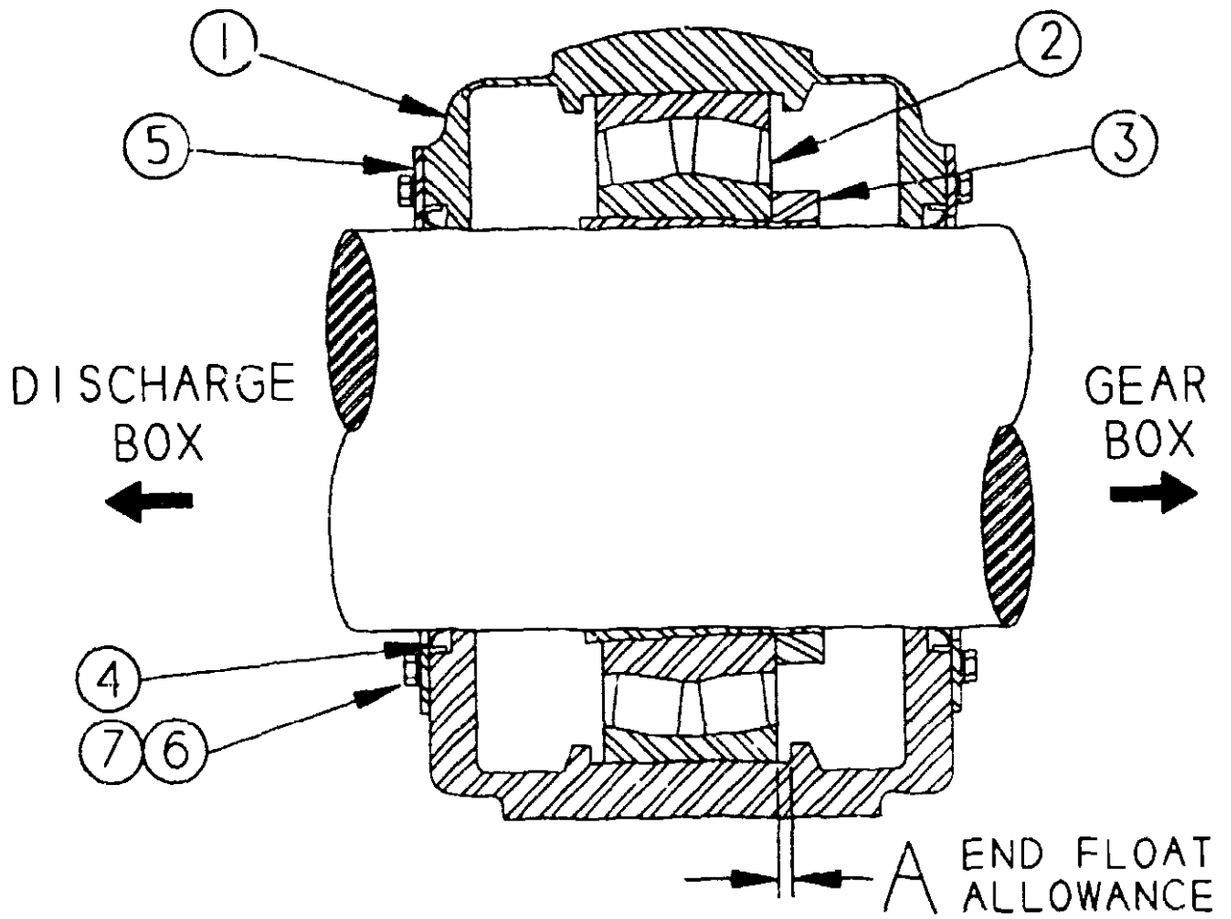
rimary & Intermediate Cage Adjustment Assembly



REF	PART NO.	PART NAME
1	119518	1–8 x 2¼ Hx Hd Cap Scr, 316 SS
2	118753	1" Lockwasher, 316 SS
3	118804	1" Flat Washer, 316 SS
4	118752	1-8 Hex Nut, 316 66
5	119440	1–8 x 5 Hx Hd Set Screw, 316 SS
6	119913	1–8 x 5 Hx Hd Cap Scr, 316 SS
7	121239	Shim, Cage Block, 1/16"
8	121238	Shim, Cage Block, ⅛

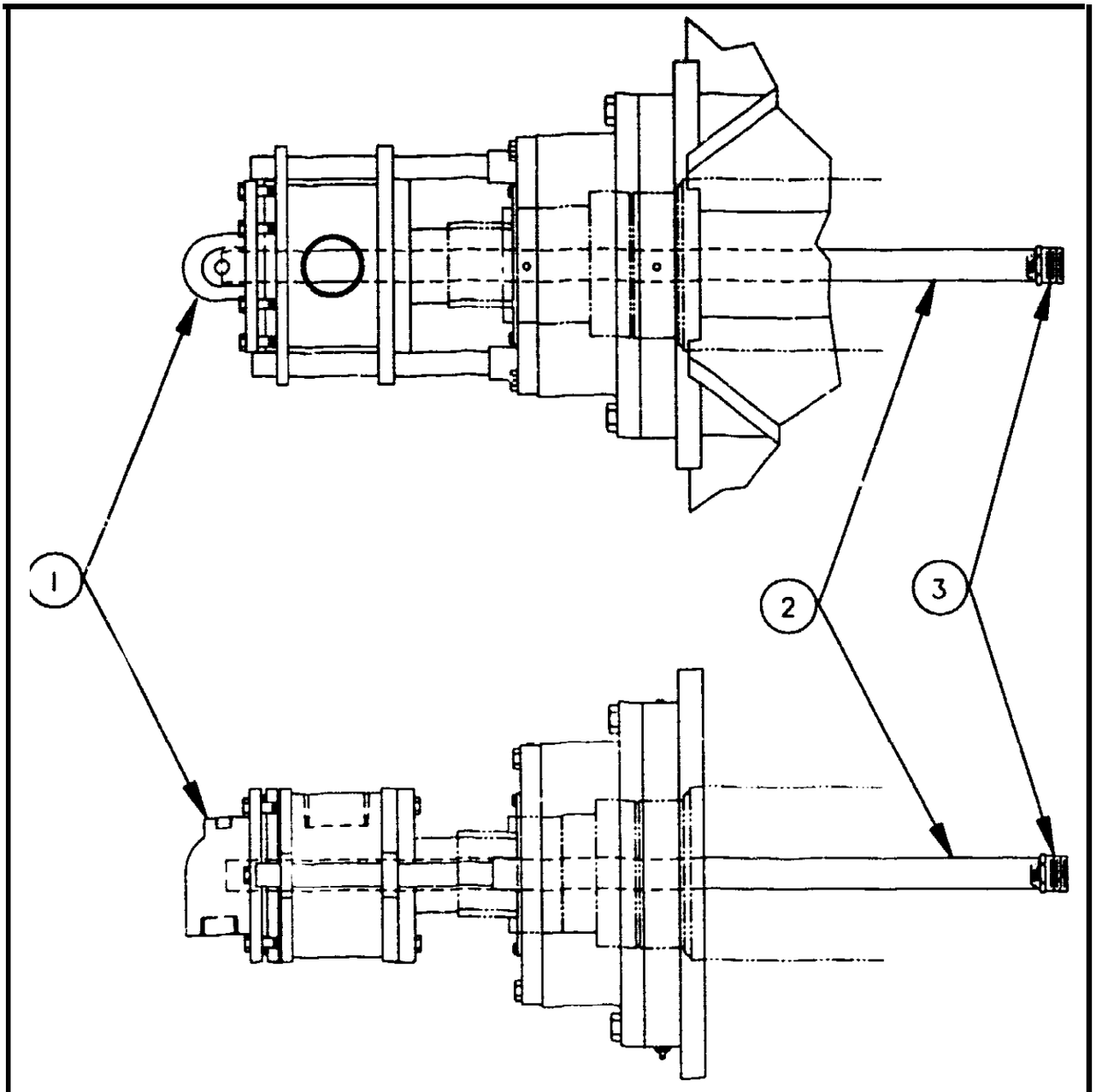
igure 6.1-7 DP-035

Discharge Cage Adjustment Assembly



REF	PART NO.	PART NAME	REF	PART NO.	PART NAME
	116822	Pillow Block Assembly (incl 1 - 7)	4	124645	Lip Seal
1	110853	Housing, Pillow Block	5	124867	Seal Retainer
2	110910	Bearing, Spherical Roller	6	102181	3/8-16 x 1 Hex Hd Cap Scr, Gr5
3	110911	Bearing Adapter w/ Nut	7	104319	3/8" Med Lockwasher

igure 6.1-8
illow Block Bearing



REF	PART No.	PART NAME
1	120231	3½" Steam Joint
2	129095	Condensate Tube
3	119588	1½ x 1¼ Pipe Bushing, 316 SS

W-1

igure 6.1-P
eam Joint

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.

FIG	REF	PART NO	PART NAME	QTY	S	C
6 1-2	19	121383	Drive Belts	3	S	C
6.1-3A	9	122817	Cage Shims, Primary	12	S	
6 1-3A	12	CONFIG	Inner Screen	2	S	
6.1-3B	12	CONFIG	Inner Screen	2	S	
6 1-3B	13	CONFIG	Intermed Back-up Screen	2	S	
6 1-3B	15	CONFIG	Disch Cage Back-up Screen	2	S	
6 1-3B	16	119571	Cage Shims, Intermediate & Discharge	6	S	
6 1-4	9	128583	Thrust Bearing, Spherical Roller	1	S	C
6 1-4	10	128582	Shaft Bearing, Spherical Roller	1	S	C
6 1-4	11	121692	O-ring 381, 90 Dur Viton	2	S	C
6 1-4	12	128724	O-ring, 379, Viton	1	S	C
6 1-4	13	128725	Preload Spring	6	S	C
6 1-4	14	128726	Lip Seal, Thrust Bearing	1	S	C
6 1-4	19	128728	Lip Seal, Feed Hopper	2	S	C
6 1-5	2	CONFIG	Choke Face	1	S	
6 1-5	8	125692	Air Cylinder	3	S	
6 1-7	7	121239	Shim, Cage Block, 1/16"	4	S	
6 1-7	8	121238	Shim, Cage Block, 1/8	4	S	
6 1-8	2	110910	Bearing, Spherical Roller	1	S	C
6 1-8	4	124645	Lip Seal	2	S	C
	—	120653	Rotary Steam Joint Repair Kit	1	S	
	—	127968	Air Cylinder Repair Kit	3	S	
	—	CONFIG	Wear Shoe, Disch Flight 17 4PH (Standard)	10	S	

Figure 6.2-1
Spare Parts List

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.

PART NO.	PART NAME	VENDOR	DESCRIPTION
110853	Pillow Block Housing	Mether	SAF 55056-21
110910	Pillow Block Bearing	FAG	23056BK.MB.C3
110911	Bearing Adapter w/ Nut	Mether	SNP 3056-10-8
120231	Rotary Steam Joint	Johnson	2750L-NAR
121383	V-Belt	Gripnotch	5VX 13 `0
121692	O-ring, 381, 90 Dur Viton		
124645	Seal	Johns-Manvl	R-1050-11346 RUP
128582	Bearing	FAG	23940S MB.C5
128583	Bearing	FAG	29332E
128724	O-ring, 379, Viton		
128725	Wave Spring	Smalley	SSB-0886
128726	Lip Seal	Garlock	23X7789
128728	Lip Seal	Garlock	23X6676
128724	O-ring, 379, 90 Dur Viton		

Figure 6.3-1
Commercial Purrs 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.

½-in Drive Sockets:
Sockets: 7/16 and 3/4.
Ratchet handle and breaker bar.

¾-in Drive Sockets:
Sockets: 1⅛, 1½, 2, 2¼
Ratchet handle and breaker bar.

Open End Wrenches:
5/16 and 7/16 (2 each).
1'4 and 3½ (1 each).
Adjustable: 12-inch and 16-inch (1 each).

Other Wrenches:
Torque wrench(es) coveing the range: 160 lb-ft to 1050 lb-ft.
36-in pipe wrench (2 each).
Spanner Wrench: 4-in to 6½-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 ¾ or ½ drive, with ¾-to-½ drive adapter.
Thickness gauges (std feeler gauge set)
Dial calipers with end ground to go through inner screen.
Drift pin with ¼ to ⅜ 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,
1/8-in 316L stainless welding rods,
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

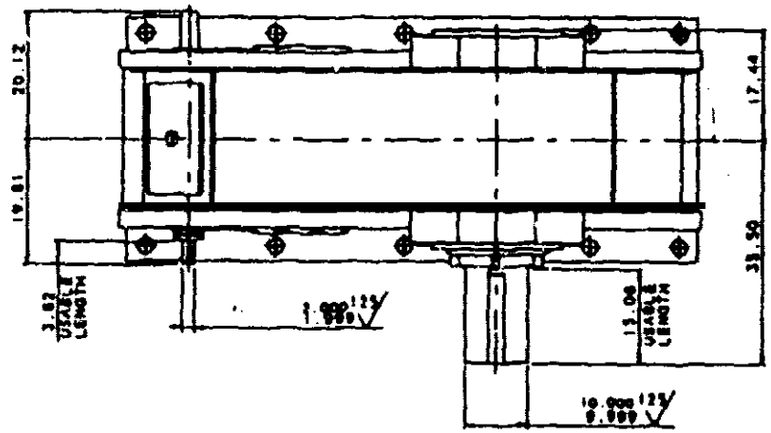
Vendor Information

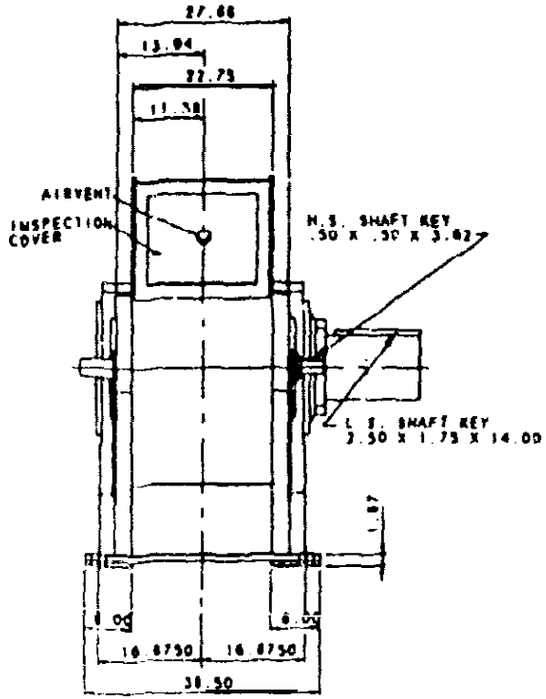
This appendix contains service information provided by the manufacturers of certain commercial components used on the Dupps Dewatering Press. Contact the vendor or your Dupps service representative before performing service procedures that are not included in these instructions. Below is a list of literature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

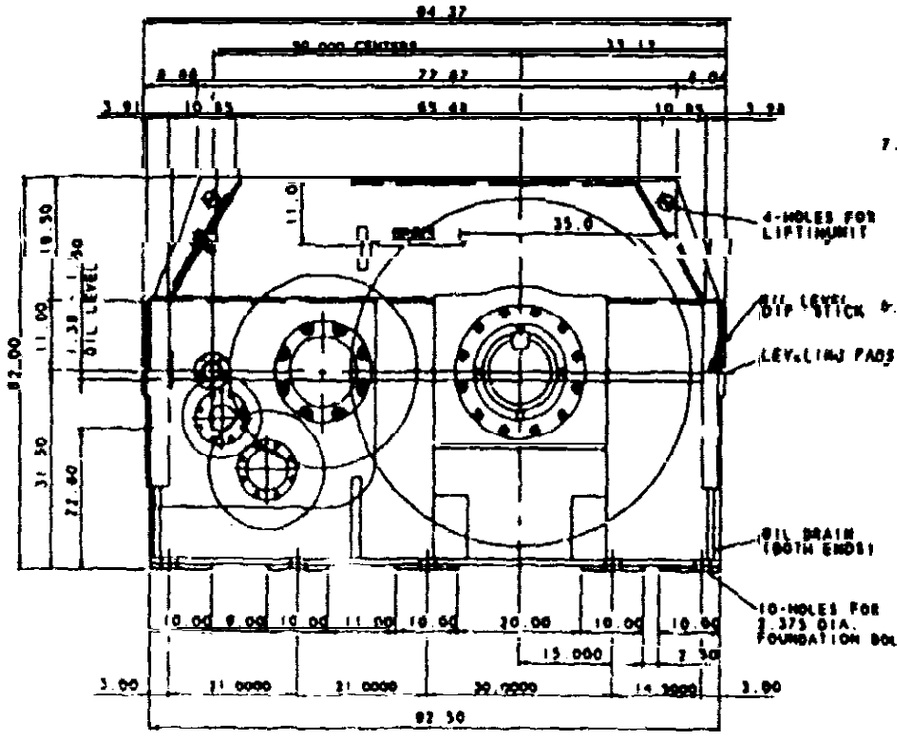
Mfr.	Pub no.	Product	Subject
Falk	Dwg. 515119	Gear Box	Parts List
Falk	128-010	Gear Box	Lubrication Specifications
Falk	148-050	Gear Box	Installation & Maintenance
Falk	143-130	Gear Box	Oil Seal Installation
Zurn	MA-216343	Coupling	Parts List
Zurn	104-SHA	Coupling	Installation/Maintenance
Johnson	none	Steam Joint	Parts List, 3½-in 2750L1-NAR
Johnson	IS-N-2	Steam Joint	Installation, Type N Joint
Johnson	IS-101	Steam Joint	Aligning Johnson Joints
Mobil	PDS I-61	Synthetic Grease	Product Data Sheet
Rexroth	Dwg. SK-3616	Air Cylinder	Parts List

CERTIFIED PRINT FOR:

PURCHASER: DUPPS CO.
UNIT SIZE: 2177YN4-S
H.S. SHAFT: 927/617 RPM
L.S. SHAFT: 1.20/0.80 RPM
RATIO: 772.1:1
SERVICE RATING: 20/13.3 HP
SERVICE FACTOR: 1.75



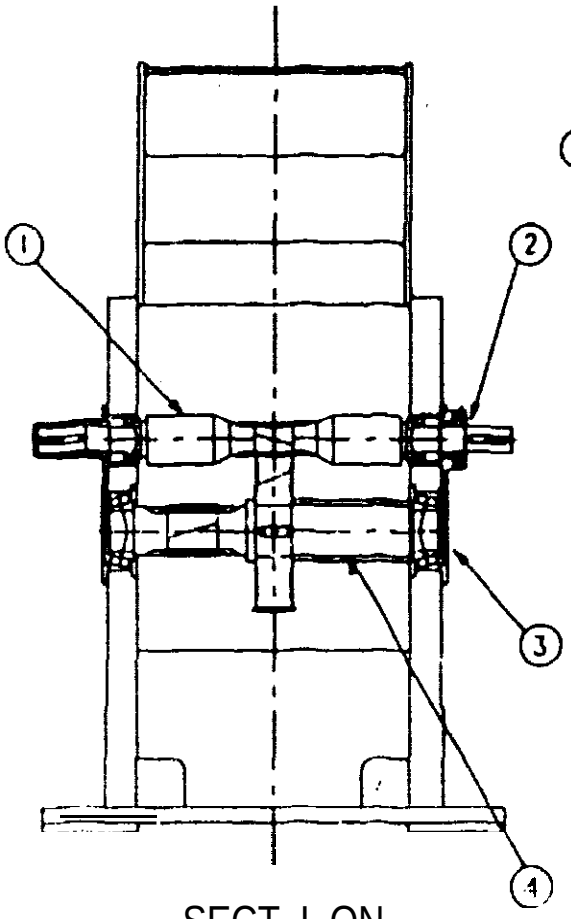




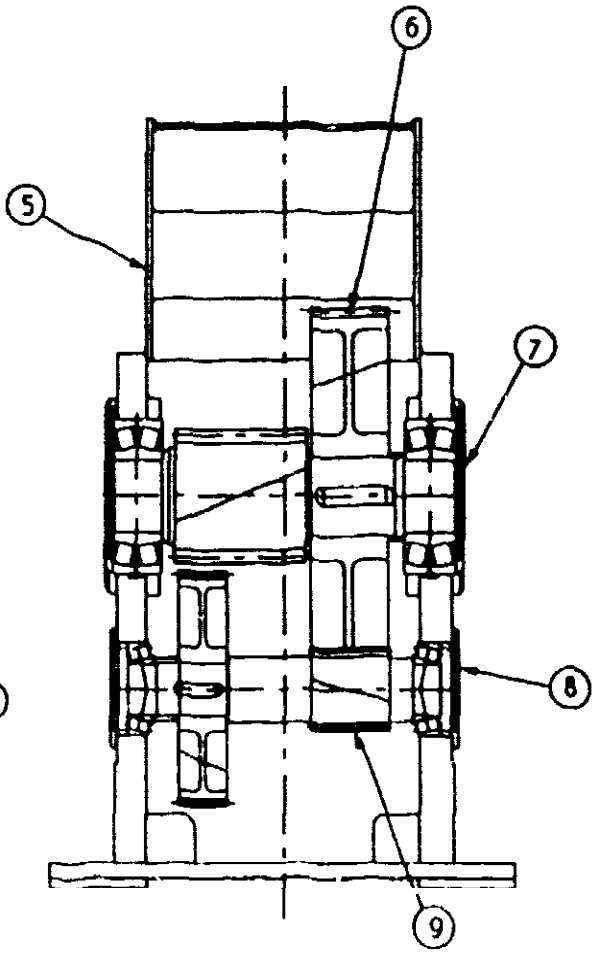
ASSEMBLY INSTRUCTIONS:

1. BEARING ADJUSTMENTS TO BE AS FOLLOWS:
   1.1 H.S. SHAFT: 0.007-0.011
   1.2 1ST. INT.: 0.004-0.008
   1.3 2ND. INT.: 0.003-0.006
   1.4 3RD. INT.: 0.030-0.049
   1.5 L.S. SHAFT: 0.050-0.080
2. L.S. BEARINGS ARE TO BE PINNED.
3. THEORETICAL SHIM PACK .014 TO .070 ON EACH SIDE.
4. COAT BASE SPLIT WITH PERMATEX #3 BEFORE ASSEMBLING COVER TO BASE.
5. TIGHTEN BOLTS AND CAPSCREWS PER DRAWING #1102484.
6. OIL SEALS:
   6.1 COAT SEAL BORE IN CASE WITH PERMATEX #3.
   6.2 APPLY A COAT OF #2 LITHIUM SOAP BALL BEARING GREASE BETWEEN LIPS OF SEAL.
   6.3 FACE GARTER SPRING INWARD.
   6.4 ASSEMBLE SEAL TO SHAFT. EXTREME CARE MUST BE TAKEN NOT INJURE THE SEAL WIPING AREA OR TO MAR THE SEALING AREA OF THE SHAFT.
7. PAINT
   UNIT SURFACE PREPARATION SHALL BE SSPC-SP6 (COMMERCIAL BLAST). IMMEDIATELY AFTER SURFACE PREPARATION. STEEL SHALL RECEIVE ONE COAT OF SOUTHERN COATINGS, 646-9842, EPOXY-PRIMER OR APPROVED MANUFACTURER'S EQUAL.
8. [illegible] BEARINGS ARE TO BE MOUNTED ONTO THE SHAFTS AFTER THE 1ST AND 2ND INT ASSEMBLIES HAVE BEEN LOWERED INTO THE BASE.
   8.1 EXTEND THE BEARING JOURNALS THROUGH THE BORES AND MOUNT THE BEARINGS. CARE MUST BE TAKEN NOT TO DAMAGE THE BEARING BORES AND PINION AND GEAR TEETH.

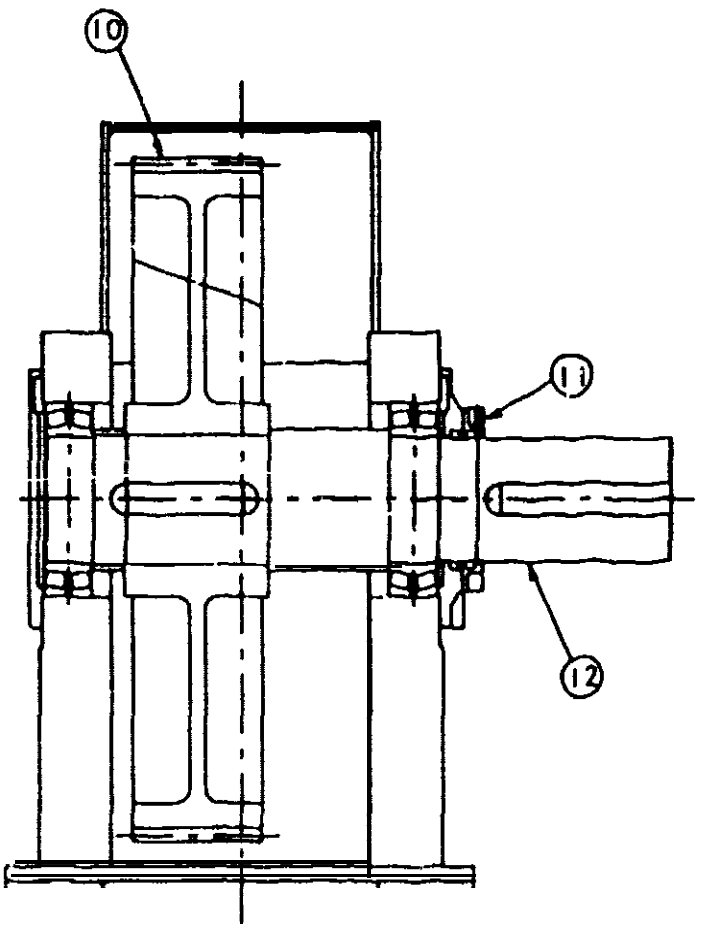
OUTLINE ASSEMBLY DRAWING
FALK 2177YN4-S GEAR REDUCER
SOURCE: FALK DWG. NO. 515119
SHEET 11 OF 31



SECTION
-A-A-



SECTION
"B-B"



SECTION
"C-C"

OUTLINE ASSEMBLY DRAWING
FALK 2177YN4-S GEAR REDUCER
SOURCE: FALK DWG. NO. 515119
SHEET 12 OF 31

SECTION "A-A"

①	1228151	1	PINION-H.S.
	921526	2	BEARING-H.S.. TIMKEN-HM607046/HM607010 ●
	909722	1	KEY-SQUARE H.S. EXT. .50x.50x3.62
②	319803	1	GUARD-SHAFT-H.S.
	319803	1	CAGE SEAL-H.S.
	345878	1	CAGE SEAL-TANDEM H.S.
	913753	2	SEAL-OIL, CRW-10992 ●
	900487	8	CAPSCREW-HEX. HEAD GRADE 5 .250-20X0.75
	900488	4	CAPSCREW-HEX. HEAD GRADE 5 .250-20X1.00
	905000	4	NUT-FIN. HEX. .250-20
	906000	12	LOCKWASHER-SPRING .250
	913512	2	FITTING-LUBE .125-27
	914000	2	PLUG-PIPE SQUARE HEAD .125-27
	900472	10	CAPSCREW-HEX. HEAD GRADE 5 .375-16X1.00
	906002	10	LOCKWASHER-SPRING .375
	709307	1	KIT-SHIM GASKET PARTS H.S.
	2106173	2	SPACER
③	238103	2	COVER END-1ST. INT.
	914015	2	PLUG-PIPE HEX. SOCK. .375-18
	900473	16	CAPSCREW-HEX. HEAD GRADE 5 .500-13X1.25
	906004	16	LOCKWASHER-SPRING .500
	709316	1	KIT-SHIM GASKET PTS 1ST INT
④	1228152	1	PINION-1ST INT.
	909836	1	KEY-SQUARE H.S. GEAR .75x.75x2.00
	1228153	1	GEAR-H.S.
	2106171	1	SPACER-1ST. INT.
	921531	2	BEARING-1ST INT.. TIMKEN-6559C/6535 ●

SECTION "B-B"

⑤	515088	1	BASE-HOUSING
	515089	1	COVER-HOUSING
	900177	20	BOLT-FIN. HEX. HEAD 1.12-7 X 13.00
	900179	4	BOLT-FIN. HEX. HEAD 2.25-4 X 19.50
	243224	8	DOWEL-TAPER SCREW
	236466	1	COVER-INSPECTION
	709382	1	GASKET-COVER PARTS
	900190	14	CAPSCREW-HEX. HEAD GRADE 5 .50-13 x 1.00
	906402	14	WASHER-PLAIN COPPER .500
	412567	2	EMBLEM-FALK
	917824	8	DRIVE SCREW-RD HD SL #12 X .50
	1220915	1	NAMEPLATE
	1196425	1	LUBRICATION PLATE AGMA AGMA #6 & 7
	917809	8	DRIVE SCREW-RD HD SL #4 X .18
	914008	2	PLUG-PIPE SQUARE HEAD 2.00-11 1/2
⑥	1228154	1	PINION-L.S.
	909583	1	KEY-SQUARE 2ND INT. GEAR 1.38x1.00x5.00
	284218	1	GEAR-2ND INT.
	1100128	1	SPACER
	918110	2	BEARING-L.S.. TORRINGTON-22330-W33/CJ ●
	1106012	2	PIN-BEARING
⑦	238030	2	COVER END-L.S. PINION
	914015	2	PLUG-PIPE HEX. SOCK. .375-18
	900119	16	CAPSCREW-HEX. HEAD GRADE 5 .750-10X1.75
	906008	16	LOCKWASHER-SPRING .750
	709323	1	KIT-SHIM GASKET PARTS LS PIN.
⑧	238105	2	COVER END-2ND. INT.
	914015	2	PLUG-PIPE HEX. SOCK. .375-18
	900473	16	CAPSCREW-HEX. HEAD GRADE 5 .500-13X1.25
	906004	16	LOCKWASHER-SPRING .500
	709317	1	KIT-SHIM GASKET PARTS 2ND INT
	1100130	2	SPACER
⑨	284494	1	PINION-2ND INT.
	909745	1	KEY-SQUARE 1ST INT. GEAR 1.00x1.00x3.00
	281984	1	GEAR-1ST INT.
	1100129	1	SPACER-2ND. INT.
	921443	2	BEARING-2ND INT.. TIMKEN-HM221449/HM221410 ●

SECTION "C-C"

⑩	1228156	1	OEM-'...
	0000KEY	1	KEY-SQUARE L.S. GEAR 2.00x2.00x9.00
	2106172	1	SPACER
⑪	2106242	1	CAGE SEAL-L.S.
	2106243	1	CAGE SEAL-TANDEM L.S.
	2907336	2	SEAL-OIL. JOHN MANVILLE-9183 LVP,ALT 9482 LVP ●
	900473	8	CAPSCREW-HEX. HEAD GRADE 5 .500-13X1.25
	900281	2	CAPSCREW-HEX. HEAD GRADE 5 .500-13X1.75
	905004	2	NUT-FIN. HEX. .500-13
	906004	10	LOCKWASHER-SPRING .500
	913512	1	FITTING-LUBE .125-27
	914014	1	PLUG-PIPE HEX. HEAD .250-18
	900193	24	CAPSCREW-HEX. HEAD GRADE 5 .875-9X2.25
	906010	24	LOCKWASHER-SPRING .875
	709330	1	KIT-SHIM GASKET PARTS L.S.S.
	321023	1	COVER END-L.S.S.
	914015	1	PLUG-PIPE HEX. SOCK. .375-18
⑫	1228155	1	SHAFT-L.S.
	909884	1	KEY-FLAT L.S. EXT. 2.50x1.75x14.0
	919105	1	BEARING-L.S.. SKF-23052-W33/C3 ●
	1134228	2	PIN-BEARING L.S.

NOTE: ● DENOTES COMMERCIALLY AVAILABLE PART.

OUTLINE ASSEMBLY PARTS LIST
FALK 2177YN4-S GEAR REDUCER
SOURCE: FALK DWG. NO. S15119
SHEET 13 OF 31

Lubricants listed in this manual are typical products ONLY 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 lubricant for ambient temperatures of 15° to 125°F (–9° to 52°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 ambient starting temperature from Table 2.

Extreme Pressure Lubricants (Table 3)

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

CAUTION

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

EP & AW LUBRICANTS AND INTERNAL BACKSTOPS – *Do not use EP lubricants or lubricants with anti-wear additives or lubricant formulations including sulfur, phosphorus, chlorine, lead derivatives, graphite or molybdenum disulfides in units equipped with internal cartridge type backstops. Some oils in Table 2 may contain anti-wear additives. Oils in Table 3 do contain several 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 4 on Page 2.

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 (all season) 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 splash lubrication systems.

Consult The Falk Corporation for drives that use pumps or slingers to distribute the lubricant. Usable temperature ranges can sometimes be widened if specific application conditions are known.

Normal Climate Conditions

For temperatures of 15°F (–9°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 backstops. Synthetic lubricants may reduce friction coefficient and may contain anti-wear additives or formulations including sulfur, phosphorus, chlorine, lead derivatives, graphite or molybdenum disulfides. Some oils in Table 1 may contain these derivatives.*

TABLE 1 – POLYALPHAOLEFIN TYPE SYNTHETIC LUBRICANTS★

AGMA Viscosity Grade			2	4	5	6
ISO Viscosity Grade		32	68	150	220	320
Viscosity at 104°F (40°C)	SSU	135-164	284-347	626-765	918-1122	1335-1632
	cSt	28.8-35.2	61.2-74.8	135-165	198-242	288-352
Ambient Temperature Range °F±		–30 to +10	–15 to +50	0 to +80	+10 to +125	+20 to +125
Manufacturer		Lubricant				
Mobil		SHC 624●	SHC 626●	SHC 629●	SHC 630● Mobilgear SHC 220✱	SHC 632● Mobilgear SHC 320✱
Chevron		Tegra 32●	Tegra 68●		Syngear 220✱	

★ Minimum viscosity index of 135.
. With complete application information, temperature range can sometimes be extended, consult Factory.
. 250°F (121°C) maximum operating temperature.
✱ 200°F (93°C) maximum operating temperature (contains sulfur-phosphorus EP).

OIL CHANGES

PETROLEUM LUBRICANTS – For normal operating conditions, change oil every six months or 2500 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. Where applicable, grease bearings and seals when changing oil.

SYNTHETIC LUBRICANTS – Synthetic lube 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 lube with ambient temperature change, if required. Refer to Table 1.

TABLE 2 – PETROLEUM USED R & O GEAR OILS (Maximum operating temperature of lubricants: 200°F (93°C)

AGMA Viscosity Grade			2	3	4	5	6
ISO Viscosity Grade		46	68	100	150	220	320
Viscosity at 104°F (40°C)	SSU	193-235	284-347	417-510	626-765	918-1122	1335-1632
	cSt	41.4-50.6	61.2-74.8	90-110	135-165	198-242	288-352
Manufacturer		Lubricant	Lubricant	Lubricant	Lubricant	Lubricant	Lubricant
Amoco Oil Co		Ind Oil #46	Ind Oil #68	Ind Oil #100	Ind Oil #150	Ind Oil #220	Ind Oil #320

TABLE 3—EXTREME PRESSURE LUBRICANTS
(Maximum operating temperature 200°F (93°C)

Manufacturer	Lubricant
Amoco Oil Co.	Permagear EP
Atlantic Richfield Co.	Pennant NL
Chevron U.S.A., Inc.	NL Gear Compound
Cities Service Co.	Cago EP Compound
Conoco Inc.	Gear Oil
Exxon Co. U.S.A.	Spartan EP
Gulf Oil Corp.	EP Lubricant HD Series
Gulf Canada Limited	Ultima EP
E.E Houghton & Co.	MP Gear Oil
Imperial Oil Ltd.	Spartan EP
Kendall Refining Co.	Kendall NS-MP
Keystone Div. Pennwalt Corp.	WG-Series
Mobil Oil Corp.	Mobilgear
Phillips Petroleum Co.	Philube AB Purpose Gr. Oil
Shell Oil Co.	Omala Oil
Shell Canada Limited	Omala Oil
Standard Oil Co.	Gearep
Sun Oil Co.	Sunep 1000 Series
Texaco Inc.	Meropa
Texaco Canada Inc.	Meropa
Union Oil Co. of Calif. (East & West)	Extra Duty NL Gear Lube

TABLE 4—GREASES FOR BEARINGS AND GREASE PURGED SEALS 0° to 200°F (−18 to 93°C)

Manufacturer	Lubricant
Amoco Oil Co.	Amolith Grease No. 2
Ashland Oil, Inc.	Multilube Lithium Grease
Atlantic Richfield Co.	Litholine H EP 2 Grease
Chevron U.S.A., Inc.	Industrial Grease Medium
Cities Service Co.	Premium Lithium Grease No. 2
Conoco Inc.	EP Conolith Grease No. 2
Exxon Company, U.S.A.	Unirex N2
Gulf Oil Corp.	Gulfcrown Grease No. 2
Gulf Canada Limited	Gulfcrown Medium
E.E Houghton & Co.	Cosmolube 2
Imperial Oil Ltd.	Unirex N2L
Kendall Refining Co.	Multi-Purpose Lithium Grease L-421
Keystone Div. Pennwalt Corp.	81 Light
Mobil Oil Corp.	Mobilux 2
Phillips Petroleum Co.	Philube IB & LB
Shell Oil Co.	Alvania Grease 2
Shell Canada Limited	Alvania Grease R2
Standard Oil Co.	Factogard EP2
Sun Oil Co.	Prestige 42 Grease
Texaco Inc.	Premium RB Grease
Texaco Canada Inc.	Marfak MP2
Union Oil Co. of Calif. (East & West)	Unoba EP

TABLE 5—VISCOSITY RECOMMENDATIONS◆

Unit Description	Classification Symbol (Unit Type)	Unit Size	SYNTHETIC HYDROCARBONS — Cold Climates				P&O PETROLEUM OILS — Normal Climates			
			−30° to +10°F (−34° to −12°C)		−15° to +50°F (−26° to +10°C)		15° to 60°F (−9° to +16°C)		50° to 125°F (10° to 52°C)	
			ISO-VG	AGMA	ISO-VG	AGMA	ISO-VG	AGMA	ISO-VG	AGMA
Parallel Shaft and Horizontal Right Angle ● Roller Bearings Fabricated Steel Housings	YI	50-135, 2050-2135	32		68	2	100	3	220	5
	YFI	1080-1135	32		68	2	100	3	220	5
	YI	140-165, 2140-2165	32		68	2	150	4	220	5
	YFI	1140-1195	32		68	2	150	4	220	5
	Y2 & YB2	50-195	32		68	2	150	4	220	5
	Y2 & YB2	2050-2245	32		68	2	150	4	220	5
	Y3, YB3 & 4	50-135, 2050-2135	32		68	2	150	4	220	5
	Y3, YB3 & 4	140-195, 2140-2245	32		68	2	220	5	320	6
Vertical Right Angle ● Fabricated Steel Housings	YBX2	50-135, 2070-2135	32		68	2	100	3	220	5
	YBX3	50-135, 2070-2135	32		68	2	150	4	220	5
	YBX2	140-195, 2140-2195	32		68	2	150	4	220	5
	YBX3	140-195, 2140-2195	32		68	2	220	5	320	6
Parallel Shaft ● Sleeve and Roller Bearings Cast Iron Housings	GHC, GHF	5	32		68	2	100	3	220	5
	GDA, GDF	6-9	32		68	2	150	4	220	5
	GRA, GRF	10-13	32		68	2	150	4	220	5
Right Angle ● Horizontal and Vertical Cast Iron Housings	2000 GHBI	2050-2120	32		68	2	100	3	220	5
	GHB	3-5	32		68	2	100	3	220	5
	GDB	6-9	32		68	2	150	4	220	5
	GRB	10-12	32		68	2	150	4	220	5
	GDX	4,5	32		68	2	100	3	220	5
	GDX, GRX	6-12	32		68	2	150	4	220	5
	DK	3 & 5	32		68	2	150	4	220	5
Parallel Shaft Semi-High Speed ● Sleeve, Roller and Ball Bearings	YHFI	1080-1135	32		68	2	100	3	220	5
	YHI	2050-2125	32		68	2	100	3	220	5
	YH2	2050-2175	32		68	2	150	4	220	5
	GHCH	5	32		68	2	68	2	100	3
	GHCH	6-13	32		68	2	100	3	150	4
	S Press Lube	All Sizes	32		68	2	46‡	1‡	68	2
	S Splash Lube		32		68	2	100	3	150	-
Parallel Shaft High Speed ● Sleeve Bearings	O, P, YOA, YPA	All Sizes	32		68	2	46‡	1‡	68	1
Motoreducers Concentric Shaft Speed Reducers Shaft and Flange Mounted Drives	All F & E Types All FC & C Types All J Types	All Sizes	32		68	2	150	4	220	5

◆ Consult Factory for viscosity recommendations when ambient temperatures are higher than 125°F (52°C), or when units are operating in extremely humid, chemical, or dust laden atmospheres.

‡ Lubricant inlet temperature to gear unit must not exceed 100°F (38°C) when using an AGMA No. 1 oil (193 to 235 SSU at 104°F; 41.4-50.6 cSt at 40°C) in a pressure lubrication system.

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 Falk 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 whrh it was sold. Such product is expressly no+ warranted against failure or unsatisfactory operation resulting from dynamic vibration, imposed upon it by rhe drive system in which it is installed unless the nature of such vibrations has bee" 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 Falk Corporation Welding on the unit may cause distortion of the how"9 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, parts and application approval

TIGHTENING TORQUES-Fasteners – See Page 2.

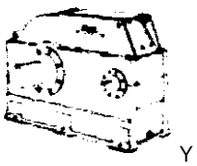
GREASE LUBRICATED BEARINGS – See Page 3.

STORED AND INACTIVE UNITS-See Page 4.

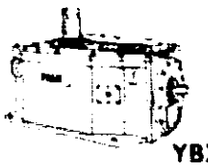
MOUNT HORIZONTALLY CAUTION: Mount unit with base hori zontal unless it he's been specifically ordered for mounting in another position If it is necessary to mount the unit i" a different po sit. a" fr. m that for which it was ordered consult Tire Falk Corporation for changes necessary to provide proper lubrication

FOUNDATION. GENERAL To facilitate oil drainage elevate the unit foundation above the surrounding floor level as illustrated If desired replace the unit oil drain plug with a valve but provide a guard to protect the valve from accidental breakage

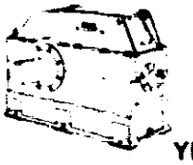
When an outboard bear ing is used. mount unit and outboard bearing on a continuous foundation or bedplate and dowel both in place



Y

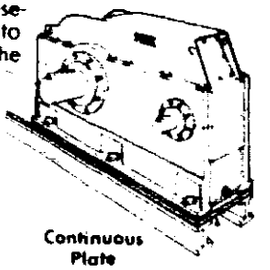


YBX



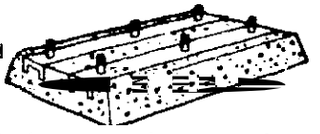
YB

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



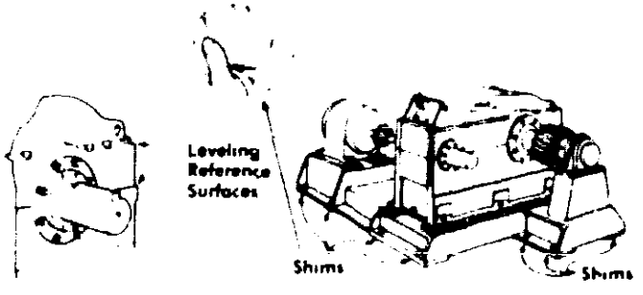
Continuous Plate

FOUNDATION, CONCRETE -- If a concrete foundation is used, allow the concrete to ret firmly before bolting down the unit. For the best type of mounting, grout structural steel mounting pod, into the mounting base, as illustrated rather than grouting the unit di-rectly into the concrete.



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

UNIT ALIGNMENT – Align unit with driven equipment by placing broad, flat shims under all mounting pad,. Start at the low speed shaft side and level across the length and then the width of the unit Check with a feeler gouge to make certain that all pads are supported to prevent distortion of housing when unit is bolted down After unit is aligned with driven machine and bolted down align prior move, to unit input shaft See Page 2 for coupling alignment



If equipment is received from Falk mounted on a bedplate, the components were accurately aligned at falk with the bedplate mounted on a large flat assembly plate Shim under rhe bedplate foot pod, until the bedplate is level and all feet are I" the same plane

Check the high speed shaft coupling alignment If the coupling is misaligned rhe bedplate is shimmed incorrectly Reshim bedplate and recheck 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, jackscrew supports for the 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

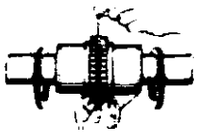
DO NOT drive coupling hub, pinion, sprocket or pulley onto the shot,. An endwise blow on the shah may damage gears and bearing,.

—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 on furnished with backstops. After completing the electrical connection, check motor and unit shaft rotations. 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 stomped on the coupling Refer to Manual 428-010 for Steelflex couplings and Manual 458-010 for Gear couplings for lubricant requirements and a listing of typical lubricants meeting Falk specifications.



Steelflex Illustrated

The following instructions apply to coupling alignment:

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

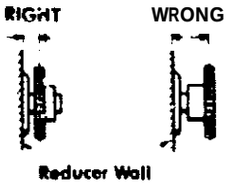
Offset Alignment Align shafts of driving and driven units so that a straightedge will rest squarely on both coupling hub, as shown to the right and also at 90° intervals Tighten foundation bolts of the connected equipment and recheck alignment and gap

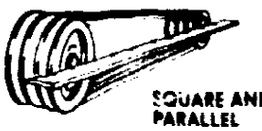
Steelflex Illustrated

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.

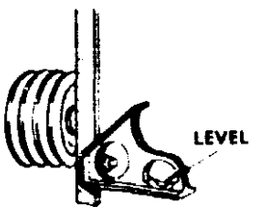
OUTBOARD BEARING -- Mount the outboard bearing and unit on a common foundation so that they will shift as an assembly if settling should occur. Bring the outboard bearing to the correct horizontal position with broad flat shims under the mounting pad. Align accurately so that the load is equally divided between the two unit bearings and the outboard bearing. Mount a stop bar 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 overtighten belts 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 fate of the sprockets or sheaves as illustrated. Check horizontal shah alignment by placing one kg of a square against the face of the sheave or sprocket with the spirit level on the horizontal kg of the square.





SQUARE AND PARALLEL



TIGHTENING TORQUES

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

Tightening Torques — lb-in. — DO NOT LUBRICATE FASTENERS

Thread Dia-UNC	Metal to Metal	Metal to Concrete	Thread Dia-UNC	Metal to Metal	Metal to Concrete
.250-20	90	70	1.250-7	12600	10000
.3125-18	185	145	1.375-6	16500	13000
.375-16	330	255	1.500-6	22100	17500
.500-13	825	640	1.750-5	23700	18700
.625-11	1640	1280	2.000-4½	37000	29000
.750-10	2940	2290	2.250-4½	52000	41000
.875-9	4560	3560	2.500-4	72000	56000
1.000-8	6800	5600	2.750-4	98000	77000
1.125-7	8900	7000	3.000-4	125000	99000

LUBRICATION

UNIT **LUBRICATION— Read and carry out all instructions on lubrication plate and heed "ll warning tags**. Determine minimum and maximum ambient temperatures in which the drive is to operate and read the SAL or AGMA lubricant number for those temperature conditions from the lubrication plate on the unit Select a 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 light 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 not thin out and lose its lubricating qualities

If a unit operates in the sun 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 point on the unit. If neither is possible, a heat exchanger or other coding device may be required to prevent the sump temperature from exceeding the allowable maximum of 200°F (93°C).

EXTREME PRESSURE LURRKANT-DO NOT **use extreme pressure lubricant** in **units equipped with an internal backstop.** Units sometimes ore severely overloaded due to a change in design of the driven machine, or a change in the nature of the material that is being processed This also occurs when power requirements ore in excess of that originally estimated. As a result, the gear teeth may show signs of distress in the nature of scuffing, scoring or pitting. For applications of this nature, on extreme pressure lubricant is recommended. This give, added protection to the gear teeth and may retard scoring and scuffing. 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 ore listed in Manual 128-010.

SYNTHETIC LUBRICANTS -- Syntnetic lubricants of the polyalphaolefin type how bee" used successfully in gear drive, to provide certain advantages beyond that available 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.

Splash Lubricated Units -- Standard Type Y units ore splash lubricated. The lubricant is picked up by the revolving elements and distributed to all bearings and gear meshes

Unit **with Heat Exchangers — Check immediately after starting to see that the** e **xternal** pump is **circulating** oil **properly. Install a shut-off or control valve** in **the water-line into the heat exchanger** to **regulate the water** Row **through the exchanger. Also install a water** flow **gauge between the control valve and the** ● .cho"gw to **determine actual** Row **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 93 1 for detailed instructions

OIL LEVELS Approximate capacities of oil are shown on the unit nameplate Prior to filling Types Y and YB reducers, remove the inspection plate and **FLOOD** THE OIL TROUGHS to insure a generous flow of oil to the bearings For Type YBX, remove sight gloss and flood oil passages This priming action lubricates and protects the bearings until sufficient oil is circulated by the rotating gears. After operating unit a few minutes, shut down ond recheck oil level **Add** oil to compensate for cooler, filter, etc. oil capacities

GREASE **LUBRICATED** SEALS-Type Y units are furnished with grease purged seals which minimize the entry of taconite and other abrasive dust, into the unit Units are shipped with NLGI #2 grease in the seal housing cavities unless otherwise specified If grease could contaminate the product, as in the food and drug industries, it should be removed

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

GREASE LUBRICATED BEARINGS When changing oil in the unit, grease t earings with a NLGI #2 bearing grease Regrease these bearing, 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 the oil level line and others BELOW If a grease fitting will become inaccessible after the unit is installed, replace the fitting with a pipe extension and the fitting so that the grease fitting will be in an accessible location after the unit is installed

DO NOT confuse the grease fittings for grease lubricated seals with those for grease lubricated bearings If seal I "inadvertently greased grease will appear along the shaft at the shaft cover

All right angle , S S bearings are grease lubricated Always remove the purge plug when provided when greasing bearings so that the old grease can escape Wipe off purged grease and 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 'or the drive.

PREVENTIVE MAINTENANCE

AFTER FIRST WEEK — Check alignment of the total system and realign where necessary. Also. tighten all external bolts and plugs where necessary. DO NOT readjust the internal gear or bearing settings in the reducer; these were permanently set at the Factory.

AFTER FIRST MONTH'S SERVICE -- Proceed as follows:

1. Operate unit until old sump oil reaches normal operating temperature. Shut the unit down and drain immediately.
2. Immediately flush unit with an 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 thru the unit or until clean oil Rows thru the dmi".
3. Close the drain ond 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 it is filtered thru a 100 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 the oil level plug, have the** oil **analyzed for water content. Moisture** in **the** oil **indicate heat** e **xchanger could be leaking! Also, replace the defective part immediately and change the oil.** DO NOT **fill above mark indicated** os **leakage** or undue **heating may result. Also check** coupling **alignment to make certain that** foundation **settling has caused** ● xcasive **misalignment. If unit is equipped with a fan, periodically clean accumulated foreign matter** from **the fan, fan guard and deflector to allow adequate** air flow.

OIL CHANGES — for normal operating conditions, change gear oils every 6 month, or 2500 operating hour,, 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 oil samples from the drive periodically and recommend econominal 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 0 10 lo, viscosity recommendations and typical lubricants meeting Falk specifications

GREASE PURGED SEALS Periodically (at least every six months), depending upon the frequency and degree d contamination, purge contaminated grease from seals by pumping fresh bearing grease through the seal until it flows out of the bottom pipe plug hole (Remove plug before purging) For units smaller than 100Y, 100YB and 2 100Y. 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 grease bearings with a NLGI #2 bearing grease

COUPLINGS Lubricate Falk Steelflex couplings in accordance with instructions in Manual 428 010 and Falk Gear couplings in accordance with instructions in Manual 458 010

DISMANTLING—CAUTION: Remove all external loads from unit before servicing unit or accessories. Service manuals and parts guides are available from the Factory and Falk Representatives. When writing, please give complete data from the nameplate on the unit; Model, M.O., Date, RPM, and Ratio.

SPARE AND REPAIR PARTS—When ordering parts, always give complete data from the nameplate on the Falk drive. This complete nameplate data will assure you of receiving the correct parts. If a new nameplate is received with the new parts (for example, when the drive ratio is changed), replace the old nameplate on the drive with the new nameplate for future reference.

STORED AND INACTIVE UNITS

Each drive is spin-tested with rust preventive oil that will protect parts against rust for a period of 4 months in an outdoor shelter or 12 months in a dry building after shipment from the Factory.

If a drive is to be stored, or is inactive after installation beyond the above periods, drain oil from housing and spray all internal parts with a rust preventive oil that is soluble in lubricating oil or add "Motorstor"* vapor phase rust inhibitor in the amounts tabulated below. Before operating, units which have been stored or inactive must be filled to the proper level with oil meeting the specifications given in Manual 128-010.

Periodically inspect stored or inactive units and spray, or add rust inhibitor, every six months or more often, if necessary. Indoor dry storage is recommended.

Units ordered for exied storage can be treated at the Factory with a special preservative and sealed to rust-proof paint periods longer than those cited above, if specified on the order.

The vent is replaced with a plug (vent is then attached to the unit) so that the protective rust inhibiting atmosphere is sealed inside the unit. Replace plug with vent when preparing unit for operation.

MOTORSTOR★ -Add to Stored or Inactive Units

m l TYPE	m l SIZE	MOTORSTOR★ PACES PER UNIT
All Y Types and 2000 GHZ	1000-1090, 2050-2090	2
	1100-1135, 2100-2135	6
	1140-1145, 2140-2145	10
	1150-1165, 2150-2165	20
	1170-1195, 2170-2195	45
t	2200-2235	130

• □®○◆◆ of Daubert Chemical Company, Chicago, Ill (Formerly known as "Nucle Oil")

INTRODUCTION

The following instructions cover replacement of shaft wok 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 ond may not agree in exact detail with all unit sizes. When or&ring parts or requesting information, specify the M.O. number, unit size, model numb. rpm, ra'o ad date stamped on the reducer nameplate.

Falk has developed several different types of seal assemblies (Figures 1thru 7), below and at right. Foot units operating in atmospheres laden with taconite or other similar severely abrasive dusts or in areas that ore 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 fii replacement only; is used when it is impractical to break shaft connections to replace solid ring mk, (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 seal(s) garter spring(s) is/are facing

TYPES Of SEAL ASSEMBLIES

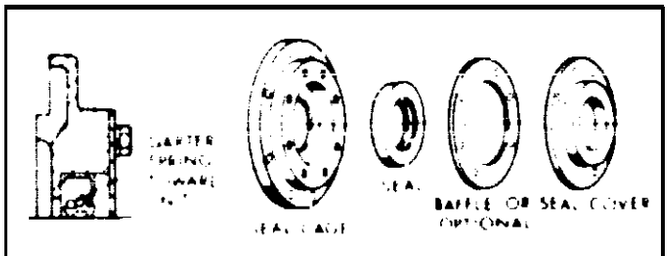
Single Seal humbly – Consists of a solid seal cage, one single or dual lip solid seal with one of the following baffle, seal cover or split cage, as illustrated in Figures 1, 2 & 6

Double Seal Assembly Consists of a solid seal cage, two single or dual lip solid seals and a 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 sho will match
2. Follow the corresponding instructions indicated in the drawing



igure 1 — Refer to Section I

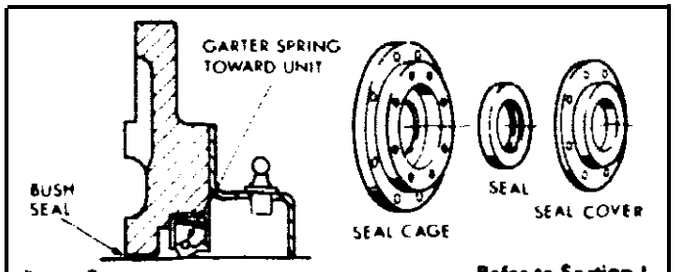


Figure 2 — Refer to Section I

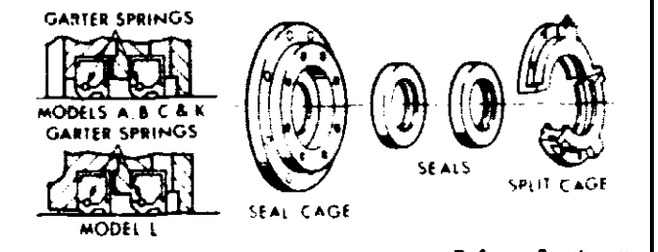


Figure 3 — Refer to Section II

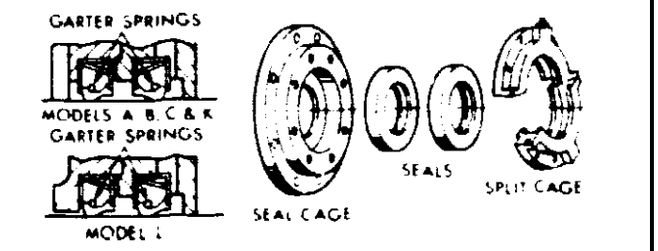


Figure 4 — Refer to Section II

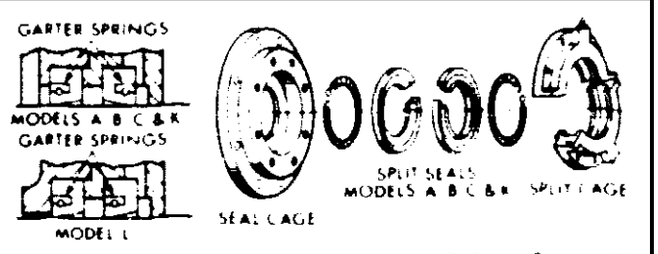


Figure 5 — Refer to Section III

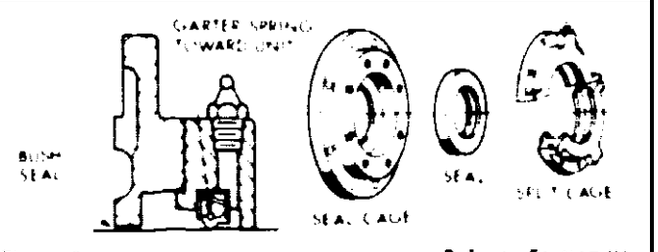


Figure 6 — Refer to Section IV

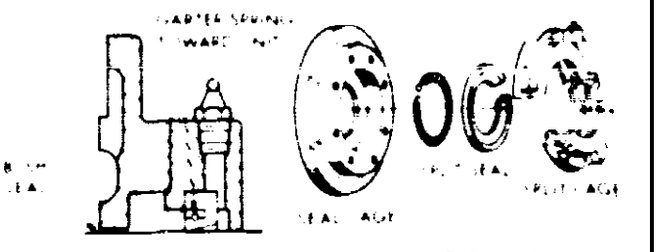


Figure 7 — Refer to Section IV

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 8.

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

5. Clean shaft seal rubbing surface. CAUTION: DO NOT "se 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 ore cut.
6. Remove old sealing compound from seal cage bore ond recoat with Permatex #3 or equivalent. Generously coat the seal lips and pocket between the lips with #2 boll bearing grease or SAE 40 oil.

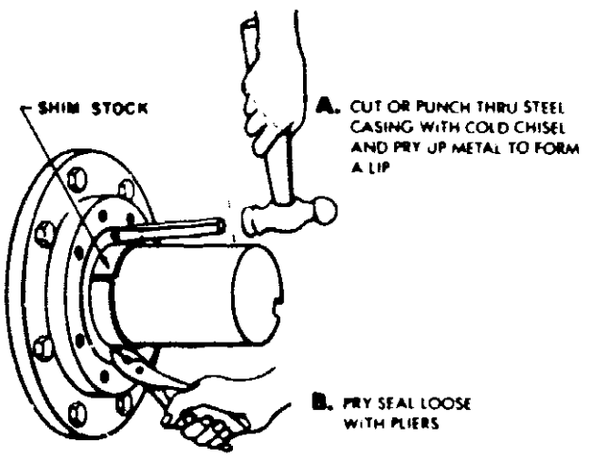


Figure 8

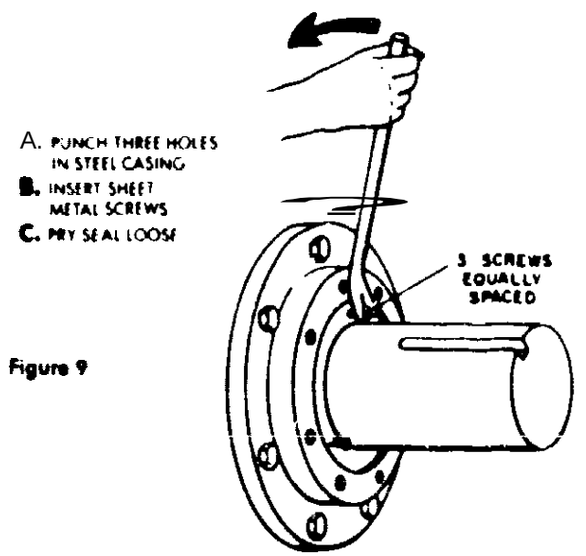


Figure 9

7. NOTE: Position the garter spring toward the inside of the unit as shown in Figures 1 & 2. Protect seal lips from the sharp edges of the keyway by wrapping a thin, strong paper around the shaft and coating it with grease before sliding the seal into position. Do not expand the seal lips more than .03" diameter.
8. Drive seal into seal cage with a square faced cylindrical tool such as a piece of tubing.
9. Install soal baffle or cover (Figure 1) or seal cover (Figure 2).
10. Coat seal cover (Figure 2) flange with Permatex #3 or equivalent and mount on seal cage. See PREVENTIVE MAINTENANCE Of GREASE PURGED SEALS, Page 3.
11. Reinstall the reducer and accessories as instructed in Service Manual 128.050.

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 inside of unit for both single lip seals. **Models A, B, C & K** – Garter spring d inner singie lip seal mull face toward the inside of "Pit and me outer 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 seal cages together See PREVENTIVE MAINTENANCE OF GREASE PUQGED SEALS. Page 3.
8. Reinstall the reducer ond accessories as instructed in Service Manual 128-050.

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 me outer seal is split, remove it If the outer seal is a solid ring, cut it off with a tin snips.
4. II me inner seal is split, pry it out at the split and remove it
5. If the inner seal is a sold ring, refer to Section I, Steps 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 b, the seal. New seals will leak if the seal rubbing surface on the shaft is altered or if ml lips ore cut.
7. Coat seal surface on shaft and seal rubbing surface with NLGI #2 bearing grease
8. Split seals ore 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

Continued next page

a 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.

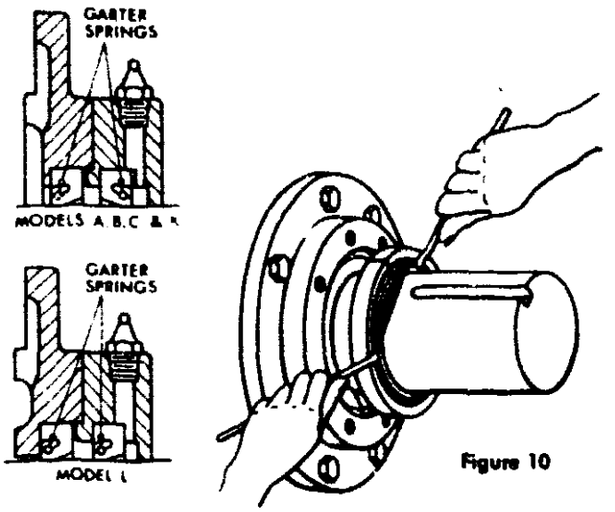


Figure 10

9. 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 heel d the seal and press the assembly evenly into the seal cage.
10. 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 *a.
11. Coat split seal cage bor ' flange face and joints with Permatex #3 or equivalent. Mount each half over outer seal and fasten halves together.
12. 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.
13. Reinstall the reducer and accessories as instructed in Service Manual 128-050.

SECTION IV, FIGURES 6 & 7

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 seal from shaft.
4. 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.
5. Coat seal surface on shaft and seal rubbing surface with NLGI #2 bearing grease.
6. Slide the seal on the shaft with the garter spring facing toward the unit. Refer to Section III, Steps 8 & 10 for split seal assembly.
7. Coat split seal cage bore flange face and joints with Permatex #3 or equivalent. Mount each half over outer seal and faste.. halves together.
8. Fasten split and solid seal cages together. See PREVENTIVE MAINTENANCE of GREASE PURGED SEALS, Page 3.
9. Reinstall the reducer and accessories as instructed in Service Manual 128-050.

REPLACEMENT OF SINGLE SEAL ASSEMBLY WITH GREASE PURGED SEAL ASSEMBLY—Models A thru K

To remove single seal assembly, refer to Section I, Steps 1 thru 5.

To mount dud seal assembly with solid seals, refer to Section II, Steps 4 thru 8.

To mount dual seal assembly with split seals, refer to Section III, Steps 6 thru 13.

PREVENTIVE 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 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 g- to flush out the dd along the shaft extension. Wipe off excess grease.

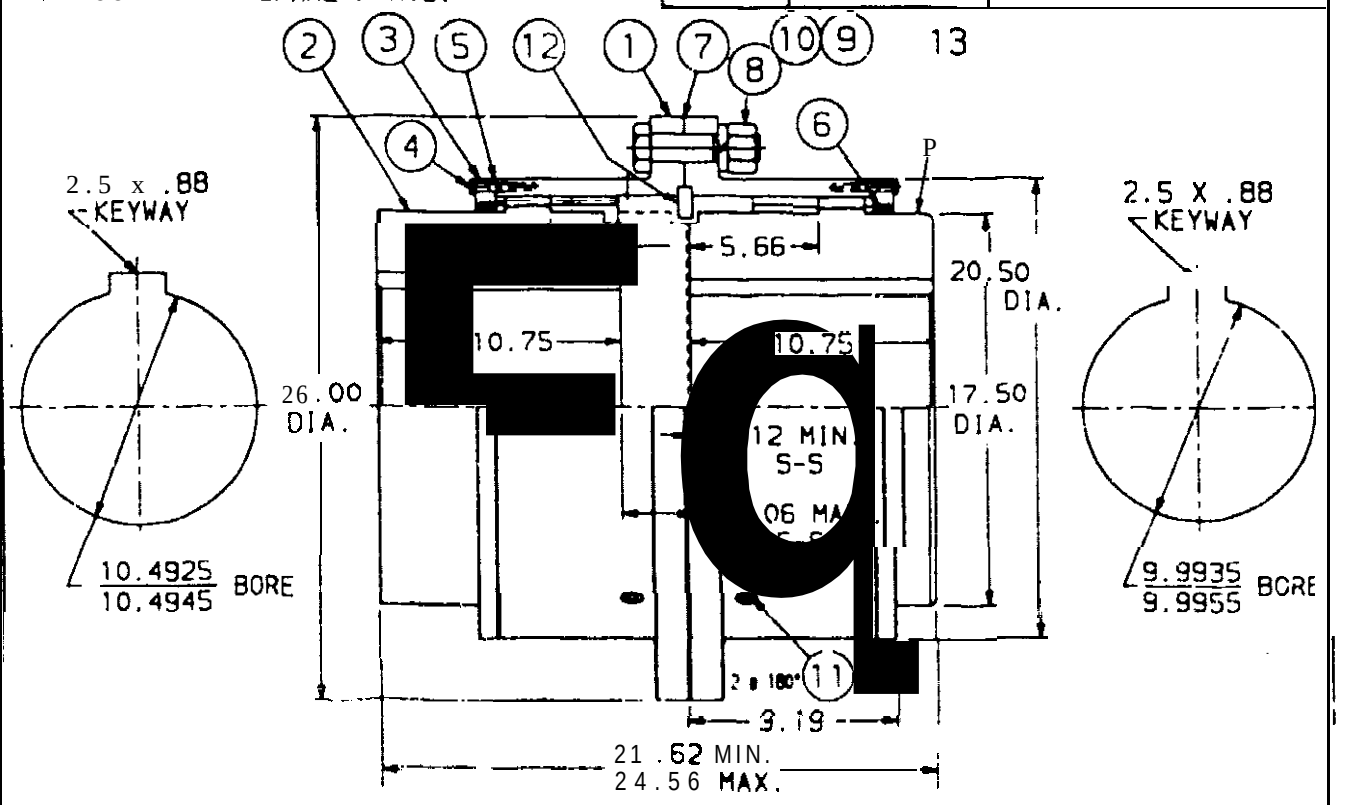
DIMENSIONS SUBJECT TO MANUFACTURING TOLERANCE

SPECIAL FA-209 2.93 MAX. TRAVEL
AMERIGEAR FULLY-CROWNED TOOTH FLEXIBLE COUPLING

Ⓐ LIST OF MATERIALS

ITEM NO.	NAME	PART NO.	NO. REQ'D.	ITEM NO.	NAME	PART NO.	NO. REQ'D.
1	SLEEVE	73578-2	2	7 *	FLG. GASKET	40257-46	1
2	HUB I	77391-1 I	1	8 *	BOLT	40987-7	18
3	SEAL RETAINER	73579-1	2	9 *	NUT	64771-2	16
4 *	RETAINER BOLT	40988-46	48	10 *	LOCKWASHER	42560-6	18
5 *	RETAINER GASKET	40257-189	2	11 *	LUBE PLUG	23752-4	4
6 *	O-RING	26524-42	2	12	THRUST PLATE	77394-1	1
				13	HUB	77390-1	1

* 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.
   EQUIVALENT PARALLEL OFFSET: .094 IN. @ .125-S: .105 IN. @ 1.375 S-5.
3. COUPLING CALCULATED WEIGHT: 1,489 LBS.
4. RECOMMENDED TIGHTENING TORQUE FOR FASTENERS ITEM #9; 800 FT.LBS. (DRY) 600 FT.LBS. (LUBED); ITEM #4; 50 FT.LBS (DRY) 37.5 FT.LBS. (LUBED)
5. RECOMMENDED INSTALLATION & LUBRICATION INSTR. SEE FORM 104-SMA.
6. RECOMMENDED QUATITIY OF LUBE: 6.24 QTS. (3.12 QTS. PER END). REF.: SK-14014

CUSTOMER: DUPPS COMPANY

Ⓐ CUSTOMER ORDER NO.:	Ⓐ Z.I.I. ORDER NO.:	CERTIFIED CORRECT	Ⓐ PRODUCT NUMBER
19068	471690		216343-090

ZURN / a step ahead of tomorrow

ZURN INDUSTRIES, INC.
MECHANICAL POWER TRANSMISSION GROUP
ERIE, PA U.S.A. 16502

DRAWING NUMBER: MA 216343

DRN. 03/03/93 BY. KJB CKD. DAP APPD. RCR LAST REV. A DATE 6-23-93 CHN. ---- APPD. GEAR

ZURN a step ahead of tomorrow

ZURN INDUSTRIES, INC.
MECHANICAL DRIVES DIV
ERIE. PA. U.S.A. 16514

Amerigear®

ZOO Series Flexible Couplings

Large Bore Couplings

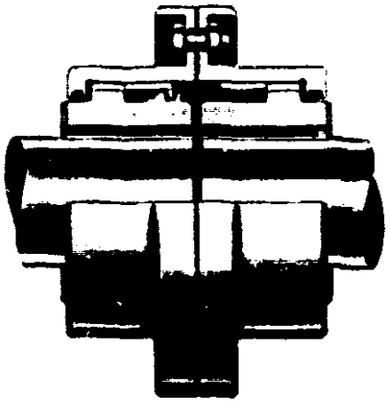
Installation, Lubrication and Maintenance Instructions

- 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.

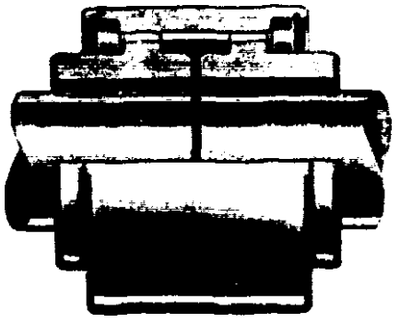
CAUTION Prevent accidental injury from this rotating equipment. Install suitable coupling guard before starting equipment

CAUTION Torque flange fasteners to tabulated values (see page 3)



Series F

Standard Flanged-Sleeve Flexible Coupling



Series C

Standard Continuous-Sleeve Flexible Coupling

Form No 104-SMA 5/83

Amerigear 200 Series

Flexible Couplings

Alignment and Installation Instructions

Purpose: The purpose of aligning equipment is to avoid transmission of unwanted S t - t o bearings, shafts, couplings, etc.

How: By providing minimum angularity and offset of shaft axis 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 norse, sudden overheating of bearings.

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

Took
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

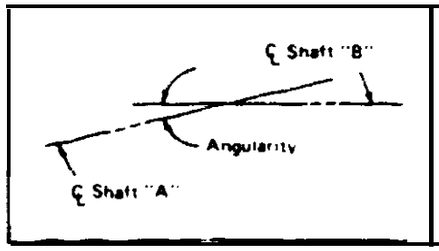


Figure 1 — Angularity is the acute angle formed at the intersection of the axes of the driving and the driven machine shafts. when shafts are exactly parallel, angular m' 'alignment is zero; but vertical w l..,rizontal displacement of axes may be present (See Fig. 2).

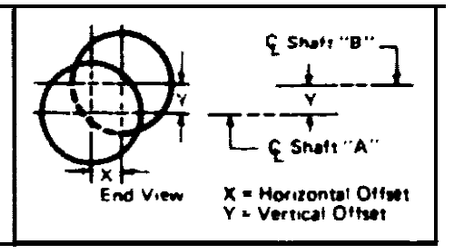


Figure 2 — Concentric alignment (also called offset alignment or parallel offset) is the relationship between the shaft axes in terms of vertical and horizontal displacements of the axis of one shaft from the axis of the other shaft.

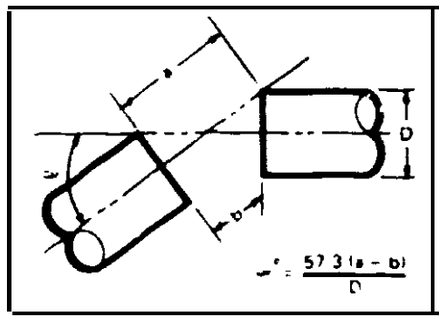


Figure 3 — To determine relative angular shaft-positions of driving and driven machines, measure at four points the space between the shaft ends. Choose the largest (a) and smallest dimension (b)

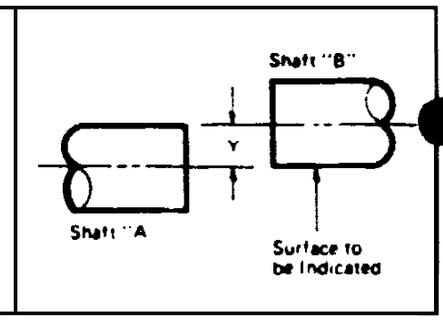


Figure 4 — To measure offsets with a dial indicator, attach the indicator to shaft "A," rotate shaft, and indicate to the periphery of shaft "B." To obtain actual displacements of shafts, divide dial indicator readings by 2

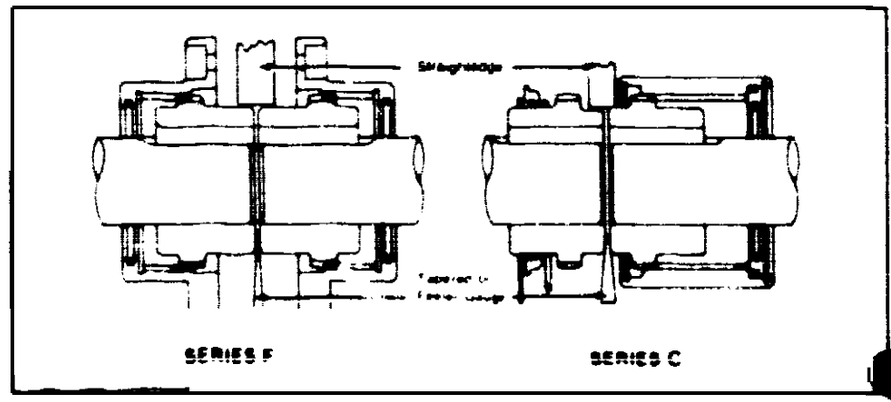
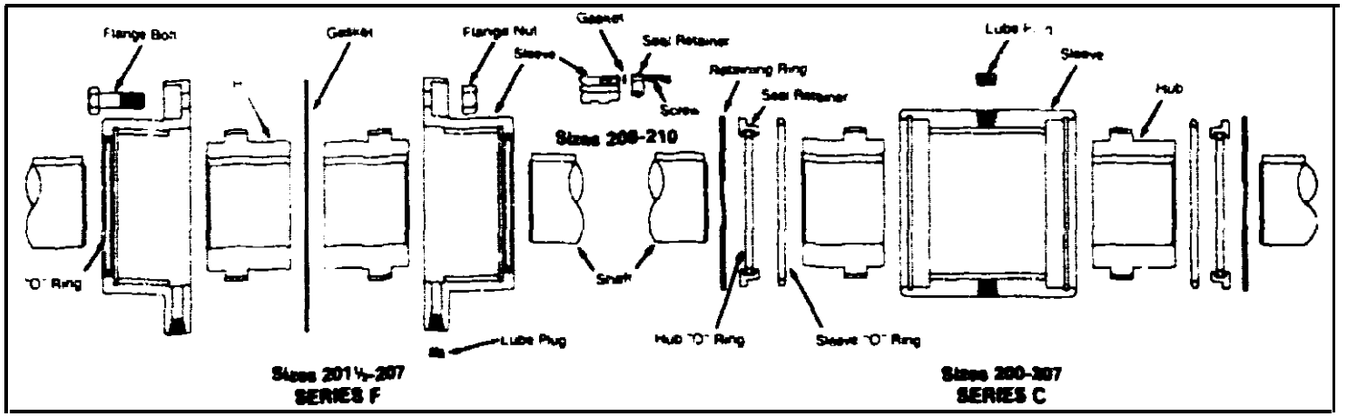


Figure 5 — Lay straightedge on one hub and measure gap between straightedge and other hub with feeler gauge. Measure at top, bottom, and both sides. Feeler gauge readings indicate actual displacements of shafts

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 Amerigear 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 208 and larger) Place sleeves for sizes 200-207 over shaft ends For sizes 208 and larger, place only 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 end 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 Uc shrink fit shaft mounted

For sizes 208 and larger, place retainer gaskets and sleeves over hubs and onto shafts

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

Step 4. After thoroughly coating hub and sleeve teeth with lubricant slip sleeves onto hubs, 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 "Flange Bolt Tightening Torque." For sizes 208 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 rigid hub will be mounted

Step 2. Check key fits and coat keys and keyways with oil resistant 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 mu are shrink fit shaft mounted

Step 3. Slip sleeve over hub mounted on longest shaft

Step 4. Align shafts allowing clearance as per tabulation or from Engineering Data. Dimension "D" Check gap with taper 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 i" 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 Seat retaining rings in grooves using a winding motion Recheck to assure retaining 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

	HUB SEPARATION			FLANGE BOLT TIGHTENING TORQUE FT. LBS.*	
SIZE	F & C	FS	CS	F Exposed	F Shrouded
200	125	078	125	10	10
201	125	078	125	10	10
201½	125	078	125	10	10
202	125	156	125	29	32
202½	188	188	188	125	69
203	188	188	188	125	69
203½	250	219	250	210	133
204	250	312	250	210	133
204½	312	344	312	210	133
205	312	344	312	313	232
205½	312	344	312	313	232
206	312	406	312	313	340
207	375	500	375	440	476
208	375	500	–	800	
209	500	562	–	800	
210	500	625	–	1,200	

*Tightening torque based on unlubricated threads If threads are lubricated derate torque to 75% of above values

Ameriiear 200 Series

Flexible Couplings

Maintenance and Lubrication

LUBRICANTS

LUBRICANT MANUFACTURER	GENERAL	MOIST/WET	HIGH TORQUE	150° - 300°F	CLASS III*
American Lubricants Co	Alubco Bison 1650	Same	Same	Same	Same
Amoco Oil Co	Amoco CPLG Grease or Amolith #2	Amoco CPLG Grease or Amolith #2	Amoco CPLG Grease or Amolith #2	Rykon EP-2	Amoco CPLG Grease
Atlantic Richfield Co	Litholene HEP 2	Litholene HEP 2	Same	Caldron EP-2	Caldron EP-2 or Pennant NL 220
Brooks Technology	Superplex or Beralene 350	Superplex or Beralene 350	Superplex or Beralene 350	Superplex or Beralene 350	Superplex Extra Light or Gearguard 460
Chevron, Inc	Duralith EP-2 NLGI 2	Duralith EP-2 NLGI 2	Duralith EP-2 NLGI 2	Duralith EP-2 NLGI 2	Gear Compound EP ISO 460
Citgo Petroleum Corp	Premium Lithium EP-2	Premium Lithium EP-2	Premium Lithium EP-2	P AP or EPrithium EP-2	Compound 460
Exxon Co	Pen-O-Led EP Grease	Rolubricant EP-300	Rolubricant EP-300	Unirex N2	Teresstic 460
Far Best Corp	Molyvis ST-200	-	Same	Same	Same
Fiske Bros Refining Co	Lubriplate 630AA	Lubriplate 630AA	Lubriplate 630AA	Lubriplate 1200-2	Lubriplate No 8
Hüls America, Inc	Anderol 786	Same	[redacted]	Same	Same
Kendall Refining Co	L-424 or All Purpose W/Moly L1-2M	L-424 or All Purpose W/Moly L1-2M	[redacted]	L-424 or All Purpose W/Moly L1-2M	Super Blu L-427
Mobil Oil Co	Mobilux EP-111	Mobilux EP-111	Mobilux EP-111	Mobil Temp 78	Mobilgrease 28
Pennzoil Co	Pennlith EP 711 or Pennlith EP 712	EP 711 or EP 712	EP 711 or EP 712	Pennzoil 707L or Pennlith EP 712	Maxol EP 460 or Pennzgear0
Sun Refining Co	Sunaplex 991 EP or Prestige 741 EP	Same	Same	Same	
Syn-Tech, Inc	3913-G1	3913-G1	3913-G1	3913-G1	3913-G
Texaco, Inc	Multifak EP-2	Multifak EP-2	Multifak EP-2	Thermatex EP-2	
UNOCAL 76	UNOBA EP-2	UNOBA EP-2	UNOBA EP-2	UNOBA EP-2	MP Gear Lube LS 85W/140

For low temp (-65°), Aeroshell #22 by Shell Oil Co. Anderol 786 by Hüls America, Inc

LUBRICANT QUANTITIES

Coupling Size	LUBRICATION SERIES F* Wt. Lbs.	SERIES F* Vol. Qts.	SERIES C Wt. Lbs.	SERIES C Vol. Qts.
200	020	010	015	008
201	045	025	036	020
201½	080	033	045	025
201½	140	070	080	040
202	200	110	080	040
202½	380	200	160	080
203	540	280	240	120
203½	820	430	240	120
204	1 080	580	440	240
204½	1 540	820	540	280
205	2 580	1 380	1 000	530
205½	3 120	1 680	1 120	590
206	3 480	1 880	1 020	540
207	7 040	3 780	2 700	1 440
208	9 160	4 840	5 580	2 970
209	11 700	6 240	7 620	4 080
210	14 140	7 540	9 500	5 060

Maintenance — The Amengear Coupling requires a minimum of maintenance. Nevertheless, to ensure a trouble-free life a few checks and proper lubrication should be performed at regular intervals.

Zurn 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 assured and it is not practical to disassemble coupling, remove both lube 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 lube 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 9001. This list is solely for our customers' 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.

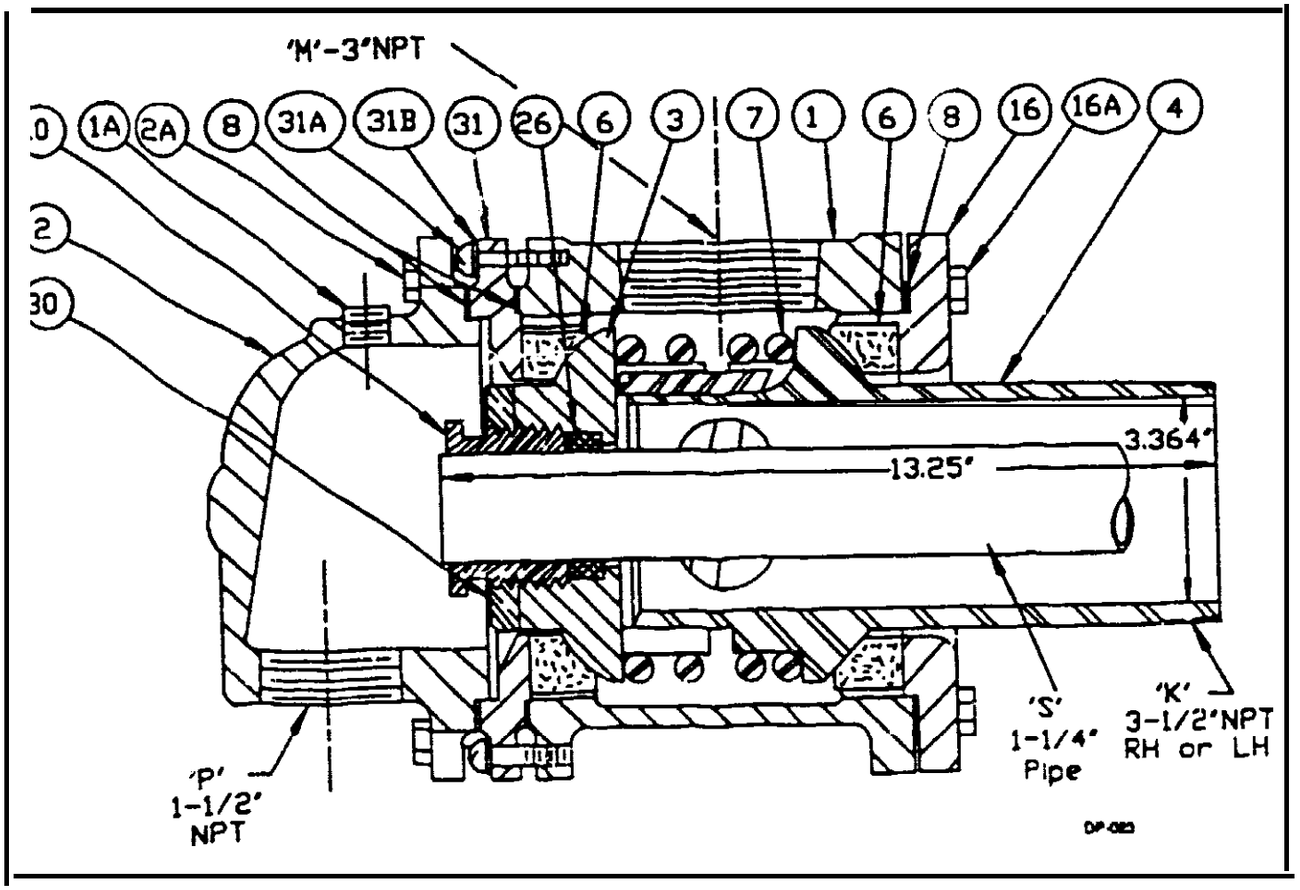
Series cs, CMS, CAS use one-half the

*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.
Teresstic 460 by Exxon. Lubriplate No 8 by Fiske Bros.

Printed in U.S.A.

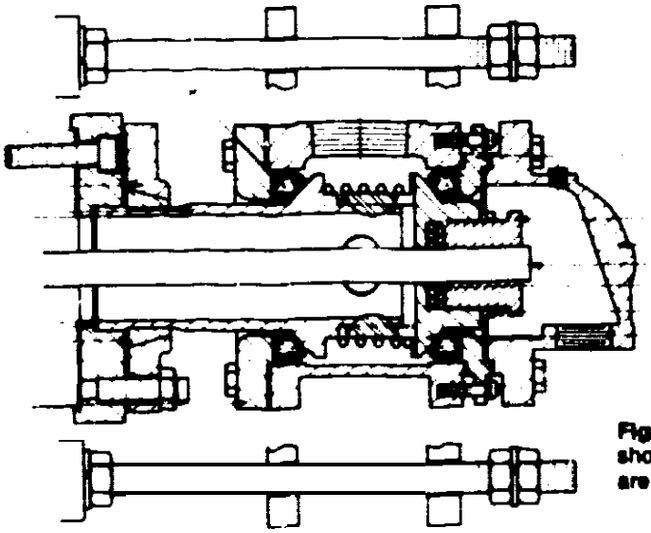
Parts List: Johnson 3½" Type 2750L1-NAR Rotary Joint



REF	QTY	PART NAME	COMPUTER NO.	JOCO PART NO.	MATERIAL
1	1	Body	16325434	J2751L1R	Cut Iron
1A	2	Pipe Plug	16046534	CSP660-0025-01	Steel
2	1	Head	16327224	J2752NA	Cast Iron
2A	6	Cap Screw	16662920	.562-12 x 3"	Grade 5
3	1	Thrust Collar	16329334	J2753N-2	Cast Iron
4	1	Nipple Assembly	16607164	J2754S2N	Ductile Iron
*6	2	Seal Ring	16114964	J2756GS	Carbon Graphite
*7	1	Spring	16333520	J2757S	Stainless Steel
*6	3	Gasket	16397264	SJ708	Asbestos
10	1	Gland	16315064	J2710	Brass
16	1	Wear Plate	16608484	J27516	Ductile Iron
16A	6	Cap Screws	16662334	.562-12 x 2"	Grade 5
*26	2	Packing	16648234	J2735-4	Preform Packing
30	1	Locknut	16316564	52730	Brass
31	1	Assembly Plate	16334584	J27531	Cast Iron
31A	2	Machine Screw	16653034	.312-18 x 1'	Stainless Steel
31B	2	Lock Washer	16674164	.312"	Plated Steel

* Included in repair kit, Duppes no. 120653

INSTALLATION INSTRUCTIONS
FOR TYPE N JOHNSON JOINTS



For rotating syphon or distribution pipe applications.
Cross section of Type N Joint shown with "Q" Nipple.

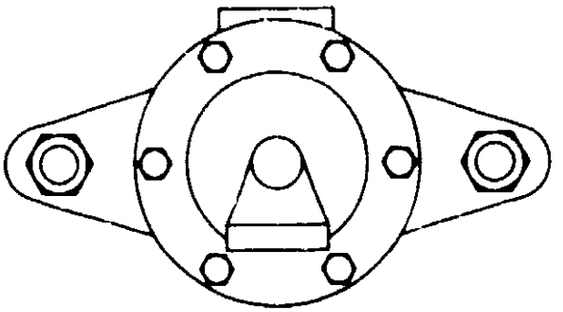


Figure 1 — Cross section of Type L-NARQ Johnson Joint shown with Quick Release Nipple. Body lugs and support rods are turned 90° from actual position.

STEP 1.
Check to make sure that all core sand, dirt, weld bea' ', pipe turnings, metal dust and other foreign matter has bee: removed from the piping, roll, dryer or cylinder before installing pmt. 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) rnto 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 wear 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 A97-16-3-13 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).

IMPORTANT: CONNECT THE HOSE AS CLOSE TO THE JOINT AS POSSIBLE. MINIMIZE THE USE OF FITTINGS AND PIPE, AS THIS INCREASED WEIGHT CAN AFFECT THE PERFORMANCE OF THE JOINT. PROVIDE SUITABLE SUPPORT FOR THE PIPE AND FITTING BEYOND THE HOSE.

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.

NOTE:

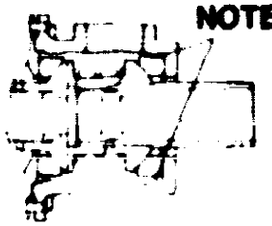


Figure 2 — Note how design of Type N Joint permits considerable lateral and angular movement without loss of efficiency

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-NAO, L-NA,L-NARO, L-NO, L-N, L-NRO, L-NR, L-NARHO, L-NARH, L-NROH, or L-NRH.
3. Type of construction (Super B, Regular)

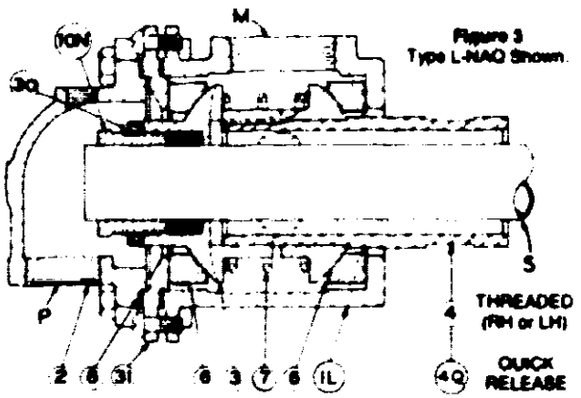


Figure 3
Type L-NAO Shown

With One Piece Body

Part No.	Description
1L	One Piece Body (150 psi)
a	Head (Specify A or N)
5	Thrust Collar (Specify "S" for Syphon Pipe Size)
4	Threaded Nipple (Specify Right or Left Hand)
4Q	Quick Release Nipple
6	Seal Ring
7	Spring
8	Gasket
10N	Gland (Specify "S" for Syphon Pipe Size)
30*	Lock Nut
31	Assembly Plate

*Joints 3½" and smaller use a screwed type gland with lock nut

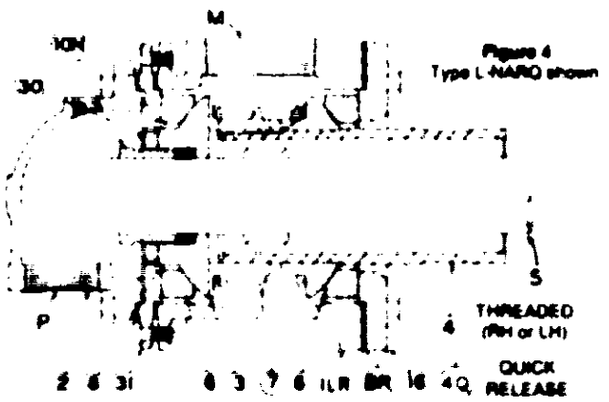


Figure 4
Type L-NARO shown

With Renewable Wearing Plate

Part No.	
1LR	Body (150 psi) with renewable wearing plate
1LRH	Body (250 psi) with renewable wearing plate
2	Head (Specify A or N for 150 psi AH or NH for 250 psi)
3	Thrust Collar (Specify "S" for Syphon Pipe Size)
4	Nipple (Specify Right Hand or Left Hand)
4Q	Quick Release Nipple
6	Seal Ring
7	Spring
8	Gasket
8R	Full Face Gasket
10N	Gland (Specify "S" for Syphon Pipe Size)
18	Renewable Wearing Plate
30*	Lock Nut
31	Assembly Plate

*Joints 3½" and smaller use a screwed type gland with lock nut

FLEXIBLE HOSE CONNECTIONS

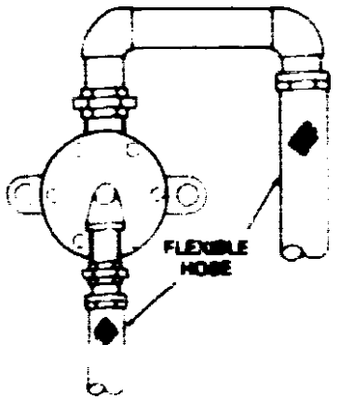


Figure 5 — Recommended use of flexible hose to install Type N Joints on Dryers, Cylinders or Rolls.

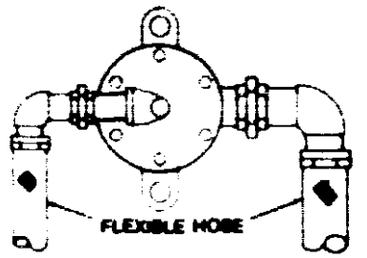


Figure 6 — Recommended use where joint body supports, lugs and rods are installed in a vertical plane.

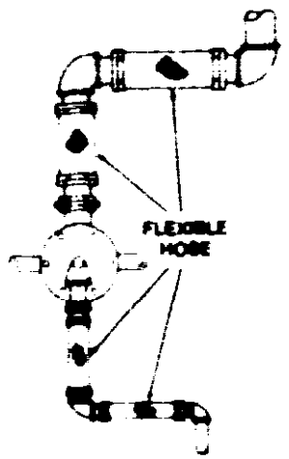


Figure 7 — Basic method of installing with length of flexible hose in vertical and horizontal leg

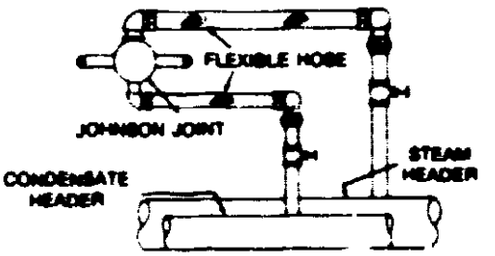
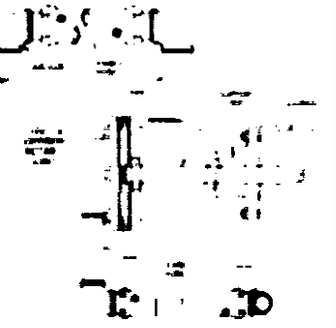
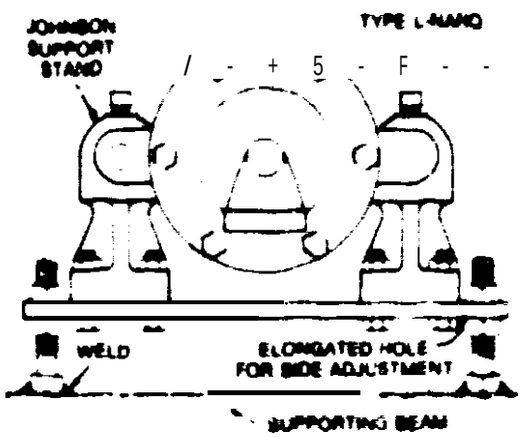


Figure 8 — Flexible hose installed in horizontal line to joint

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 endwise out away from the roll to compensate for seal ring wear





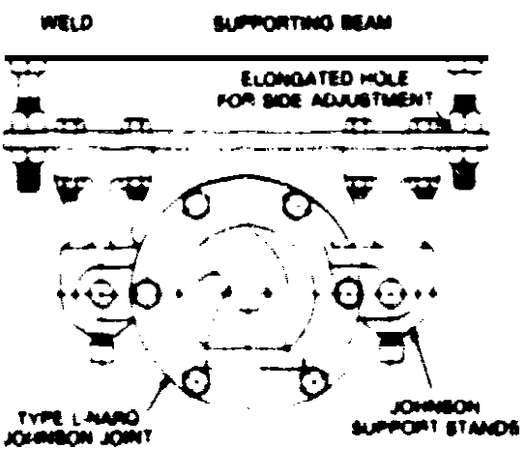


Figure 9 — Johnson Support Stands mounted on adjustable shelf, which is fastened above supporting beam (left) or suspended from it (right)

INSTALLATION INSTRUCTIONS

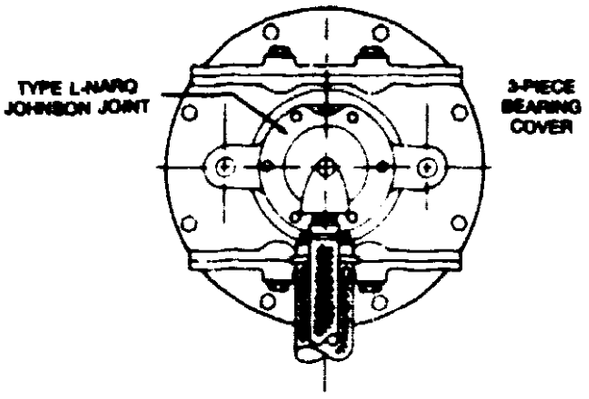


Figure 10 — Support rods fastened directly to 3-piece bearing covers. This arrangement permits inspection of the bearings, top and bottom, without removing the joint from the dryer.

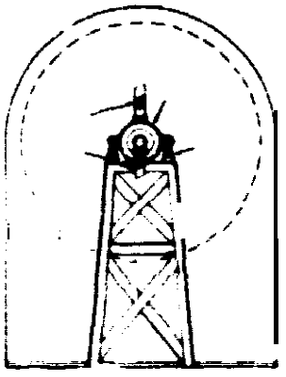


Figure 11 — Suggested support arrangement for Type N Joint installed on larger rotary steam tube dryer using Johnson Support Stands, Support Rods and Flexible Metal Hose.

RECOMMENDED MINIMUM HOSE LENGTHS

Hose Size	Minimum Length	- Lip
1/4"	la-	
3/8"	12"	250 psi
1/2"	12"	250 psi
3/4"	12"	250 psi
1"	15	250 psi
1 1/4"	18"	250 psi
1 I,?-		250 psi
2"	21"	250 psi
2 1/2"	24"	200 psi
a-	27"	160 psi

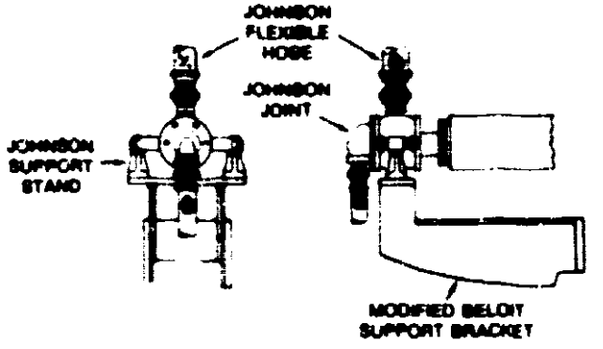


Figure 12 — Suggested installation of Type N Johnson Joint with Quick Release Nipple, Johnson Support Stands, Support Rods and Flexible Hose on Beloit enclosed gear Paper Machine Dryers. Note modified Beloit support bracket.

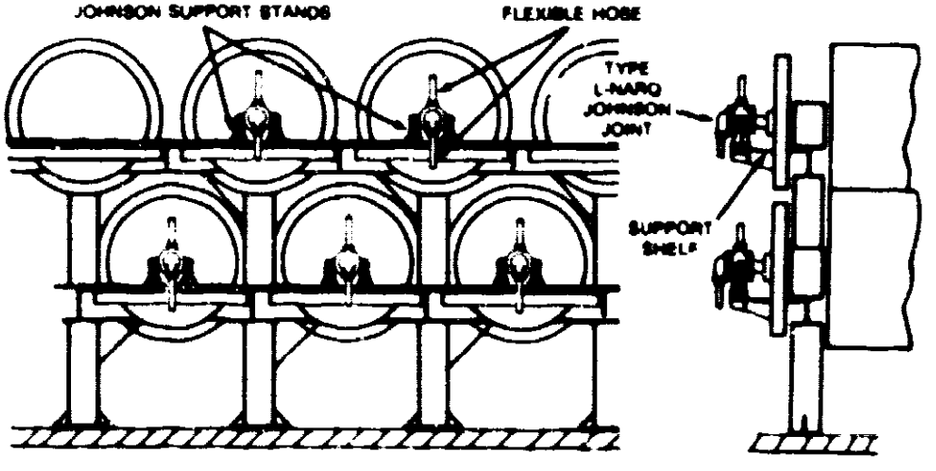


Figure 13 — Suggested method of supporting Type N Joints using Johnson Support Stands, Support Rods and Flexible Hose

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Litho in U.S.A. ZM-11-90

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.

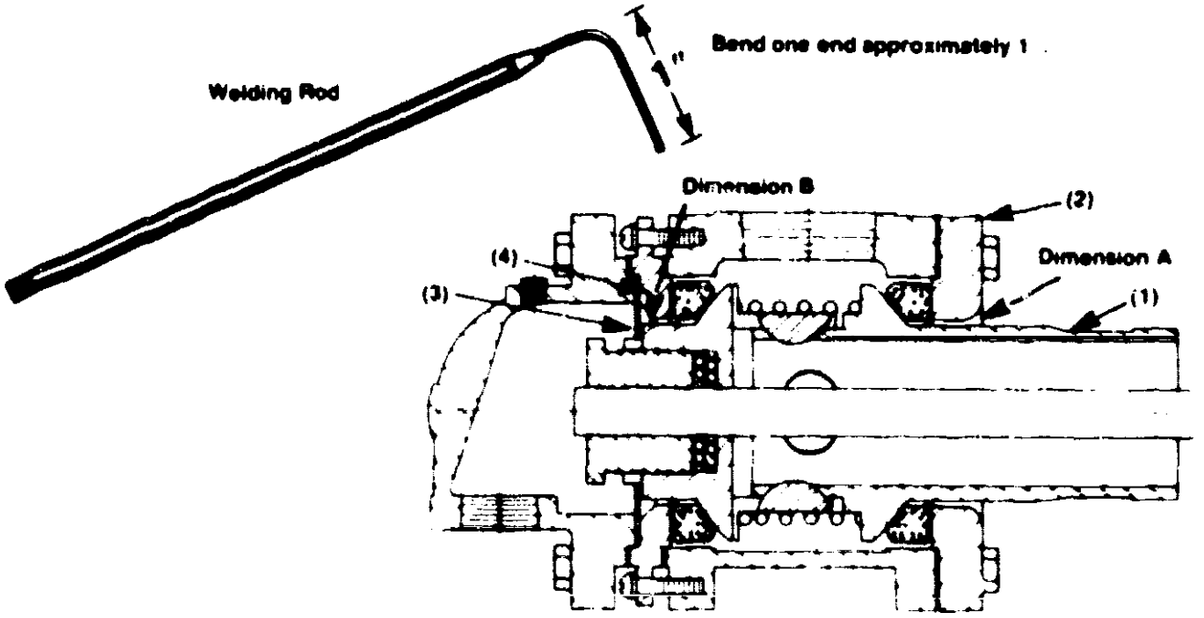
On Table 1. you will find the gauge diameter listed for each size rotary joint. As shown below, bend one end 90° approximately 1" from the end.

ROTARY JOINT CLEARANCE RELATION CHART
N-JOINTS

Size	A (Inboard) Nipple/Wear Plate	Gauge Size	B (Outboard) Thrust Collar/ Assembly Plate	Gauge Size
3/4" -2200	1/16	1/32	3/32	1/16
1" -2300	3/32	1/16	3/32	1/16
1 1/4" -2400	1/16	1/32	3/32	1/16
1 1/2" -2500	3/16	1/8	5/32	1/8
2" -2550	1/8	3/32	1/8	3/32
2 1/2" -2600	1/8	3/32	5/32	1/8
3" 2700	1/8	3/32	1/8	3/32
3 1/2" -2750	1/8	3/32	5/16	1/4
4" -2800	1/4	3/16	1/4	3/16
5" 950	1/2	3/8	1/16	3/8
6" 1000	1/4	3/16	1/4	3/16
7 1/2" 1075	1/8	3/32	1/2	7/16
8" 1100	1/4	3/16	1/4	3/16

Then using the appropriate size gauge check the clearance around the nipple lube (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 lube 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.



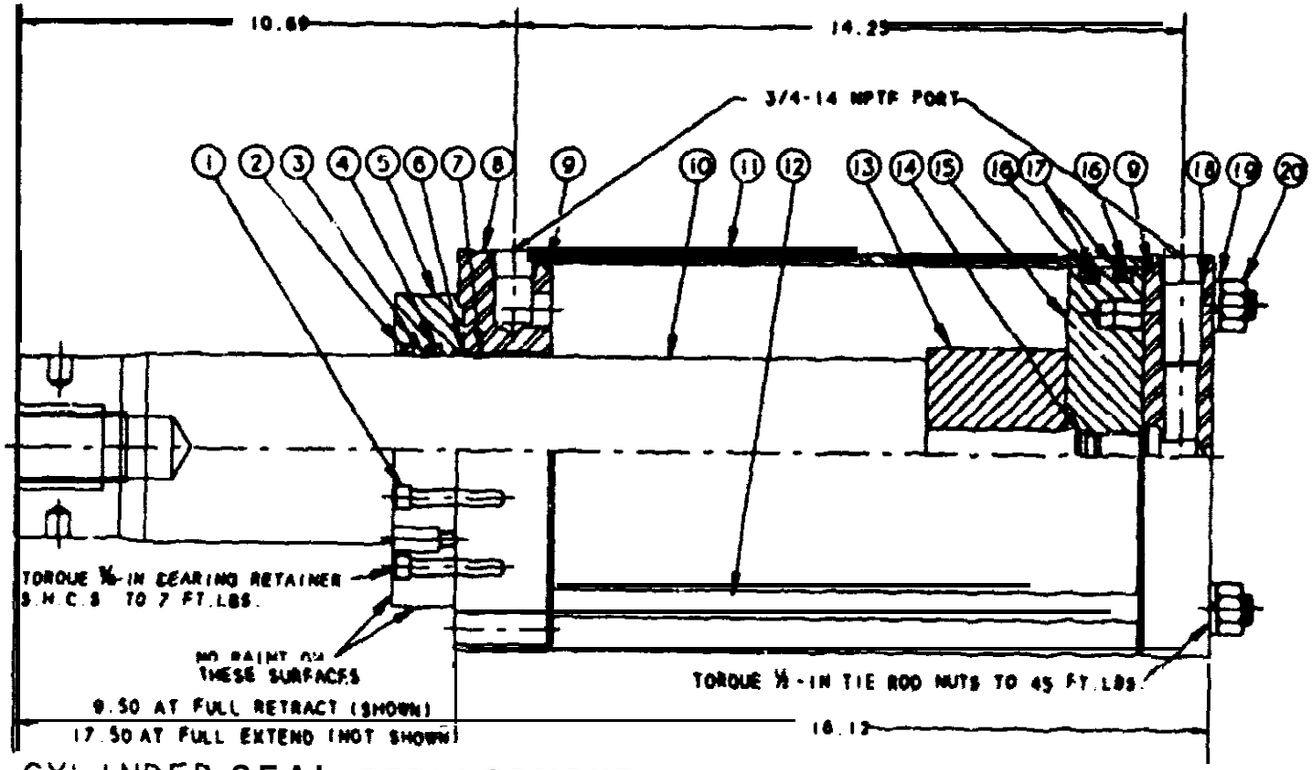
THE JOHNSON CORPORATION • THREE RIVERS, MICHIGAN U S A 49093
TELEPHONE (616) 278 1715 • CABLE ADDRESS JOCO • TELEX NO 0 2 2 . 4 4 5 : • FAX 616 279 59H

Printed in U S A 9/90

REF	DESCRIPTION	QTY.	PC. NO.
1	SCREW, SLC 5/8-11UNC-2A x 2.00	8	P49804-147
•2	WIPER, Rod	1	P49408-8
•3	RING, Teflon Bushing f/ Rod Seal	1	P49554-8
•4	PACKING, U f/ Rod Seal	1	P49553-8
5	RETAINER, Special Bearing	1	P174191
•6	RING, O f/ Rod Bearing Seal	1	P49708-158
•7	BEARING, DU Self-Lubricating 4" Rod	1	P48825
8	HEAD, Special f/ 8" PP Cylinder	1	P174189
•9	RING, O f/ 8" Tube Seal	2	P49708-285
10	ROD, 4" Special Piston	1	P174458-0080
11	TUBE f/ 8" PP-PH Cylinder	1	P110406-0110
12	ROD, 5/8" Tie	4	P106233-0110
13	TUBE, Stop	1	P402908-0030
•14	RING, O f/ Piston Seal	1	P49708-21
15	PISTON f/ 8" PP-PH Cylinder	1	P115434
•16	PACKING, U f/ Piston Seal	2	P49557-8
•17	RING, Teflon Bushing f/ Piston Seal	2	P49575-8
18	CAP, Base f/ 8" PP-PH Cylinder	1	P106124-0100
19	WASHER, 5/8" Lock	4	P49886-14
20	NUT, 5/8-11UNF-3B Hex. Gr. 8	4	P48773-2
•21	GREASE, 3 oz. Golden #2	1	P48311-3

• INDICATES PARTS INCLUDED IN COMPLETE CYLINDER REPAIR KIT AVAILABLE FROM THE DUPPS Co UNDER PART NUMBER 127958.

DUPPS PN 125892
REXROTH P174133
8 BORE PP-PH MES CYLINDER
4 - IN PISTON ROD (FEMALE BULLET END)
STOP TUBE (SPECIAL)



CYLINDER SEAL REPLACEMENT:

1 PISTON & PISTON ROD DISASSEMBLY:
- A. HEAT PISTON □□ APPROX ● □□ IN ORDER □□ BREAK-DOWN THE LOCTITE #277 COMPOUND.
- B UNSCREW PISTON FROM PISTON ROD.
- C. CLEAN MALE AND FEMALE THREADS.
- D. DISCARD O-RING AND CLEAN O-RING GROOVE

2 PISTON & PISTON ROD ASSEMBLY:
- A. CLEAN PISTON 000 THREADS AND PISTON THREADS WITH DEGREASER FLUID. ISOPROPYL ALCOHOL. TRICLOROETHELYNE OR EQUIVALENT
- 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 10 353.4 FT.LBS

3 PISTON & TUBE SEALS REPLACEMENT
- A ● ISON ROD SEALS: LUBRICATE ROD SEAL GROOVE. ROD WIPER GROOVE. O-RING GROOVE. PISTON ROD. ROD SEAL. ROD WIPER. AND O-RING WITH A THIN COAT OF GOLDEN GREASE #2 ● 1101 TO ASSEMBLY.
- B PISTON AND TUBE SEALS: LUBRICATE ● ISIOu SEAL GROOVES. TUBE TREPAN GROOVES. PISTON SEALS AND TUBE O-RINGS WITH A THIN COAT OF GOLDEN GREASE ● 2 PRIOR TO ASSEMBLY