

THERMO BLACK CLAWSON INC.

A Thermo Fibertek company

ULTRA PRESSURE™ SCREEN MANUAL

Installation, Operation, Maintenance, and Service Parts

MODELS: I, II, AND III

Deliver manuals to:

**FOR
REFERENCE
ONLY**

Attention:

Prepared for:

Mill:

Customer order number:

Number of manuals:

Shop order number

Serial number

Read this manual carefully to learn how to operate and service your equipment correctly; failure to do so could result in personal injury or equipment damage. Keep this manual readily accessible and legible to anyone doing maintenance on or operating this equipment.

Thank you for purchasing a Thermo Black Clawson product.

ULTRA PRESSURE SCREEN

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This manual is for general information and guidance. For specific information concerning parts or items refer to the Certified Print of the equipment.

Your Black Clawson unit will provide many years of dependable service when installed, operated, and maintained according to our recommended procedures. The instructions contained in this manual are recommended procedures for installing, operating, and maintaining your unit. Correct installation of the unit is critical. Reasonable operation and maintenance will not compensate for poor installation.

All information, illustrations, and specifications in this manual are based on the latest information available at the time of publication.

WE RESERVE THE RIGHT TO MAKE CHANGES AT ANY TIME WITHOUT NOTICE.

BLACK CLAWSON COMPANY

Shartle Division

605 Clark St., Middletown, OH 45042-0160

Phone: (513) 424-7400

TOLL FREE 24 HOUR EMERGENCY

SERVICE 1-800-448-5422

ULTRA PRESSURE SCREEN

SAFETY

This manual is a guide for safe and trouble-free installation and operation of your Black Clawson equipment. Follow the recommendations in this manual to ensure the safety of your personnel along with the dependable operation of your Black Clawson equipment. Your particular situation may require additional procedures and safety measures.

You—the purchaser of this equipment—are responsible for ensuring that your personnel are trained in the safe operation and maintenance of this unit. We recommend that your personnel obtain refresher sessions covering safety, operation, and maintenance procedures periodically throughout the life of your Black Clawson equipment.

Note: Black Clawson offers qualified field service instructors to help train your operators and maintenance personnel.

FOLLOW THE SAFETY INFORMATION CONTAINED IN THIS MANUAL.

RECOGNIZE SAFETY INFORMATION This is the international SAFETY ALERT SYMBOL. When you see this symbol on your equipment or in this manual, be alert to the potential for personal injury. Follow recommended precautions and safe operating practices.



UNDERSTAND SIGNAL WORDS

FOR REFERENCE

DANGER - Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. The signal word is to be limited to the most extreme situations.



WARNING - Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION - Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



NOTE: - Contains important information about the care of your unit.



ULTRA PRESSURE SCREEN

SAFETY

FOLLOW THESE SAFETY STEPS

- Carefully read all safety messages in this manual and on your machine safety signs.
- Do not operate equipment until it has been fully integrated into the system.
- Do not perform service or maintenance work on this equipment until all sources of energy have been locked out and any stored energy has been relieved—unit is at zero mechanical state (ZMS).
- Keep safety signs in good condition, clean, and legible.
- Replace missing or damaged safety signs.

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- Learn how to operate the machine and how to use controls properly.
- Do not let anyone operate the machine without instruction.
- Keep your machine in proper working condition.
- Do not modify the equipment without authorization from Black Clawson. Unauthorized modifications may impair the function, shorten the machine life, and/or render built-in safety features useless.
- Inspect unit before starting and make sure that the following conditions are met:
 - ◆ All guards and covers are in good condition and fastened in place.
 - ◆ No parts are loose, worn, damaged, or missing.
 - ◆ All personnel are clear of the equipment.

ULTRA PRESSURE SCREEN

SAFETY

PRACTICE SAFE MAINTENANCE

- Keep equipment area clean and dry.
- Keep all equipment parts in good condition and properly installed.
- Understand service procedures before you do the work.
- Replace worn, broken or missing parts.
- Do not operate damaged equipment—fix damage immediately.



PROTECTIVE CLOTHING

Wear close fitting clothing and safety equipment appropriate to the job.

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Consult applicable federal, state, and local codes for proper installation and guarding.



ULTRA PRESSURE SCREEN

SAFETY

SAFETY GUIDELINES: Do not use or service this equipment until you **read and understand** these guidelines and instructions.

If you have any questions, contact your supervisor.

HAZARD AREAS	WHAT COULD HAPPEN	HOW TO PREVENT IT
Stock leaks from pipe connections, blind flanges, body joints, open access doors, etc.	 WARNING Skin contact with stock might result in chemical or thermal skin reaction such as <u>skin irritation or scalding</u> .	Lock out unit. Follow shut down and start up guidelines. Be sure you have locked out all energy sources. Tighten or replace loose, leaking connections.
Valves - air and electrically operated.	 WARNING <u>Amputation or severe injury</u> to fingers, hands, or arms could result. FOR REFERENCE ONLY	Lock out valves and their energy sources and ensure that equipment is at zero mechanical state (ZMS). NOTE: Controls may not be independent. Extreme care must be used when isolating power sources. Be sure of what will shut down when energy sources are locked out. Other automatic equipment connected to source will also shut down. Do not insert fingers, hands, arms, head or any appendage into such devices.
Motor/drive units	 WARNING <u>Electrical shock</u> could result. Also, <u>amputation or severe injury</u> to fingers, hands, or arms could result.	Do not expose electrical units to water. Shut down and lock out unit before cleaning or servicing. Do not operate the unit with covers, hoods, or guards removed. Note: Manual rotation of rotating elements may be required with enclosures removed. Be sure all personnel are clear of unit before manually rotating rotor.

ULTRA PRESSURE SCREEN

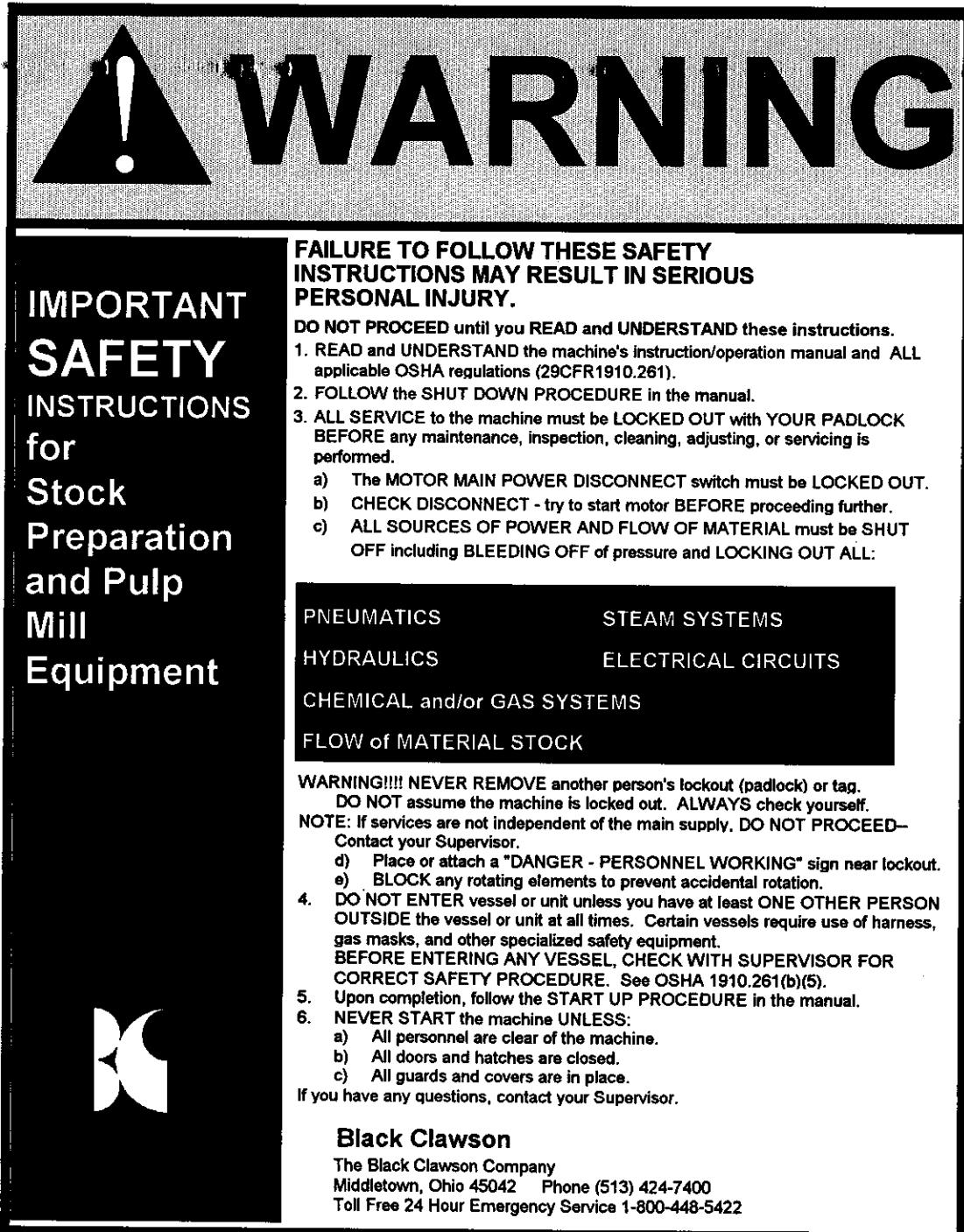
HAZARD AREA	WHAT COULD HAPPEN	HOW TO PREVENT IT
Exceeding design pressure of unit	 WARNING Seals, gaskets, or vessel might fail and cause <u>severe personal injury</u> .	Know the correct operating pressure of the equipment, provided in the manual and on the certified drawings. Adhere to proper operating procedures.
Discharged debris from trash chamber outlet	 WARNING <u>Cuts, abrasions, skin irritation, and scalding could occur.</u>	Wear eye protection and protective clothing.
V-belts/sheaves, drive shafts	 WARNING <u>Amputation or severe injury could occur.</u>	Do not operate unit with guards removed. Be sure unit is shut down and lock-outs are in place before installing removed guards.

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SAFETY

Black Clawson provides a laminated safety sign, pictured below, for this equipment. It is shipped with the unit and should be posted in plain view on or near the equipment at installation and kept clean.



SAFETY

The development, implementation and enforcement of safe operating/maintenance procedures has been, and continues to be, the best method of accident prevention. Hazardous procedures should be identified and eliminated through ongoing safety training programs.

Stock preparation equipment requires periodic inspection, maintenance, and repairs. Operating areas should be open enough to safely perform such work.

To be safe, use the following safety methods:

- Lock-outs for zero mechanical state during repairs.
 - Stock flow meters to detect plugged stock lines.
 - Stock piping systems which permit unit lockout and are equipped with lines for bypass of stock.
 - Adequate lifting devices available to perform maintenance functions.
 - Proper guarding and protective clothing in areas of hot stock or steam lines.
 - Company procedures for entering confined spaces.
 - Mechanical assists during internal inspections and maintenance.
 - Inspections for damage and wear each time a unit is opened.
- NOTE: Damage or wear should be corrected immediately to assure safe, reliable, continuous operation.**
- Adherence to start-up procedures.

Before servicing any unit, the following procedures are required:

- Shut down stock pumps or divert stock flow.
- Make sure pressure is relieved.
- Activate and post lock out devices.
- De-activate remote control systems.
- Ensure that unit is at zero mechanical state.
- Follow company's procedures for entering confined spaces, if applicable.

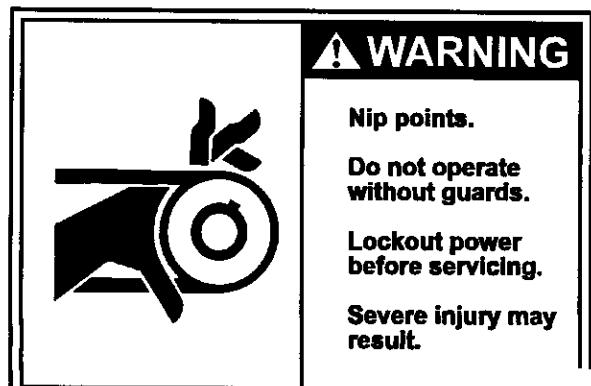
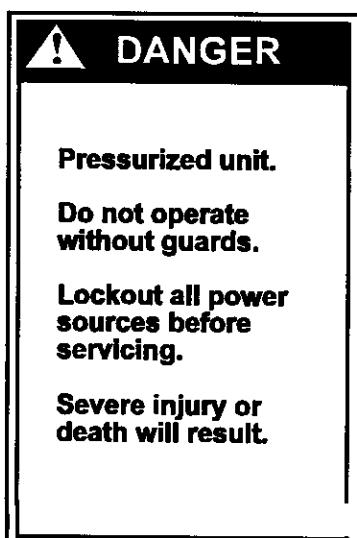
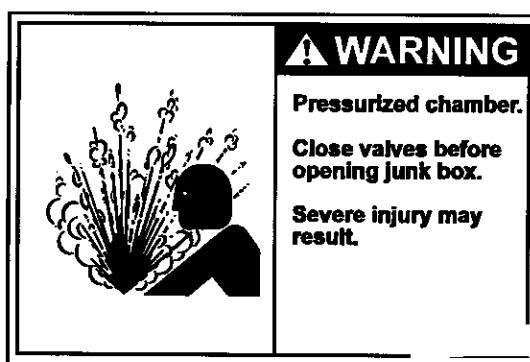
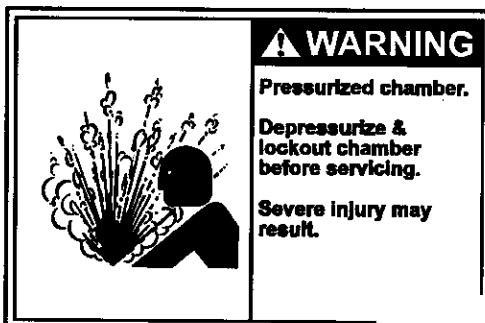
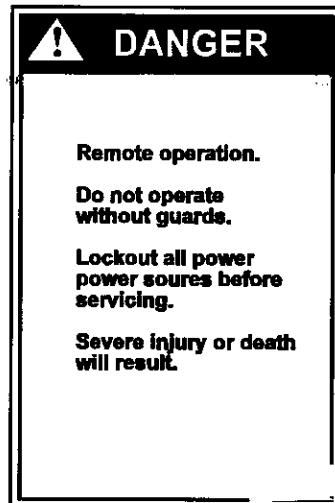
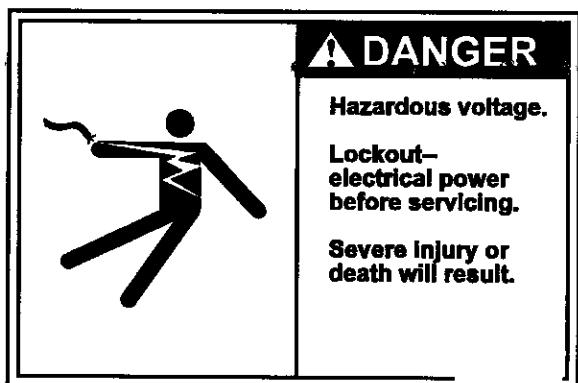
NOTE: Black Clawson accepts no responsibility for use of its products other than the specific application for which it was designed. Any usage other than the product's intended application will render Black Clawson free and harmless from any safety and/or liability claims that may result from the application or deviation from the product's intended usage.

ULTRA PRESSURE SCREEN

SAFETY

SAFETY SIGNS - READ AND FOLLOW

The Black Clawson Company furnishes safety signs with each piece of equipment. These signs are factory installed and should remain on the unit for the life of the machine and should be kept clean and legible. Do not remove the signs unless replacement signs are in hand and installed immediately after old signs are removed. Replacement part numbers for each sign are supplied below. The following safety signs are attached to the unit.

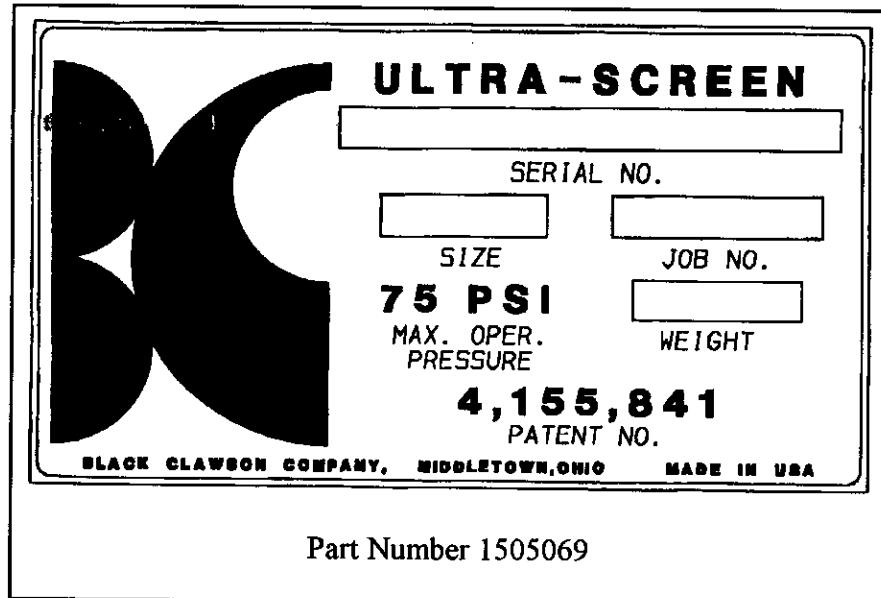


ULTRA PRESSURE SCREEN

EQUIPMENT IDENTIFICATION

Product identification numbers include the serial number, job or shop order number, and model number. They are provided to help identify this unit if it needs service.

Black Clawson needs these numbers when you order parts.



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ULTRA PRESSURE SCREEN

EQUIPMENT DETAIL

Your Black Clawson unit is designed to give trouble free operation with minimum maintenance. However, certain precautions and procedures must be observed in handling, installing, operating, and servicing the unit to obtain optimum performance.

The information in this manual should cover most situations. Should questions arise that are not covered in this manual, contact us for additional information:

Customer Service

The Black Clawson Company

Shartle Division

605 Clark Street

Middletown, OH 45042

Phone: (513) 424-7400

Fax: (513) 424-1168

(the 513 area code changes to 937 after September of 1996)

SERIAL NUMBERS

Serial numbers are assigned at the Shartle Division. This identifying number will be found on the nameplate. It will also appear on the Certified Drawings. When inquiring about service or maintenance problems, always provide the serial number, size, and type of unit.

RENEWAL PARTS

Orders for renewal parts should state the serial number(s) and include the item number, description, and part number shown on the parts list of the Certified Drawings. **Part numbers (except for safety signs) are not specified in this manual.** Refer to your Certified Drawings for part numbers.

ULTRA PRESSURE SCREEN

EQUIPMENT DETAIL

SCREENING TECHNOLOGY

Pressure screens operate under the theory that every contaminant rejected by a screen is done so either through "positive" or "probability" separation. "Positive" separation means that the contaminant cannot physically go through the screen cylinder openings, regardless of the orientation of the contaminant. The smaller the opening size, the greater the "positive" separation capability of the screen. Screens with equal cylinder openings have similar "positive" separation capability.

"Probability" separation suggests that it is possible to orient some contaminants in certain ways that prevent them from passing through the cylinder openings which means that the contaminant will be rejected. Some factors which influence "probability" separation are reject rate, consistency, pressure drop, design, stock temperature, stock pH, design of screen rotating element, speed of rotating element, screen basket configuration, and the location of the screen rotating element within the body.

CYLINDER/FOIL ACTION

As stock approaches the inside of the screen cylinder, a rotating element containing multiple foils comes into contact with the stock. Two functions are performed by a foil as it passes by a given area of the screen cylinder. First, a positive pulse is created by the leading edge of the foil, assisting the stock through the cylinder openings. Second, the foils are designed in such a manner that an even stronger negative pulse is created by the trailing edge of the foil. This positive/negative pulse action is what keeps the screen cylinder from plugging.

Rejected fiber and other contaminants exit at the top of the screen. Large heavy debris is removed at the bottom of the screen through a junk trap, which should be checked periodically.

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FACTORS AFFECTING SCREEN PERFORMANCE

FEED PRESSURE

The pump feeding the screen should be capable of supplying the required flow to the screen with a minimum inlet pressure as recommended.

FOIL RPM/PERIPHERAL SPEED

In general, an increase in foil RPM will result in increased screen capacity, but will also increase horsepower requirements. Peripheral speed of the foils is the speed at which the outer diameter of the rotating element is traveling. Peripheral speed is expressed in feet per minute. It is calculated by the following formula: $\text{Foil RPM} \times 3.1416 \times \text{diameter of rotating assembly (in feet)}$.

ULTRA PRESSURE SCREEN

EQUIPMENT DETAIL

FACTORS AFFECTING SCREEN PERFORMANCE (CONTINUATION)

PRESSURE DROP (ΔP)

Pressure drop (also known as Delta P) is defined as the decrease in pressure, measured in pounds per square inch, from the feed pressure to the accept pressure. It is a measure of the reduction in pressure across the screen cylinder. In general, as foil speed is increased, the screen can operate at higher pressure drops (giving increased capacity) before plugging. The foil speed is predetermined for specific application and connected horsepower. Operators should monitor the pressure drop, and through experience, learn the maximum pressure drop before plugging occurs.

REJECT RATE

Reject rate is determined by the following formula: $(ODT/D \text{ rejects} \div ODT/D \text{ feed}) \times 100$. Reject rate partially determines the screen's throughput and the accepted stock quality. A higher reject rate can improve stock quality, while a lower reject rate might reduce stock quality. Reject rate is usually predetermined by the customer and Black Clawson to best suit each application prior to operation.

Reject flow can be monitored by a flow meter/flow controller arrangement, a hand indicator controller (HIC), or by simple observation, whichever is preferred by the customer. In certain cases, a timer might also be used to periodically purge the rejects.

While a high reject rate can generally improve stock quality, too high of a reject rate can cause fiber fractionation. This is not a typical application for the Ultra-V screen, so you should consult Black Clawson before attempting to increase the reject rate during production. The Ultra-VC, with the larger reject connection, is designed specifically for fractionating applications. Black Clawson will make recommendations for proper flows.

CONSISTENCY

Consistency (O.D. basis) also affects the throughput of a screen. For a given speed, the consistency range in which a screen can operate varies with the size and type of openings in the cylinder. In general, the smaller the openings, the lower the optimum consistency.

It is very important to operate the screen within its specified consistency range. If the consistency is too low, production is low and the hydraulic capacity of the screen might be reached, limiting any further increases in flow. If the consistency is too high, production drops off considerably.

CYLINDER OPENING SIZE

With all other factors being equal, the size of the openings in the cylinder will affect the accept quality and throughput of the screen. Smaller openings provide greater positive separation capability, giving better accept quality. Smaller openings also decrease the capacity of the screen. Black Clawson has provided the best recommendation for screen cylinder configuration based on the information received before the purchase of the screen. We have tried to provide the best balance between accept quality and screen capacity.

ULTRA PRESSURE SCREEN

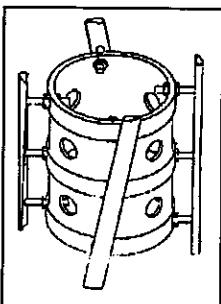
EQUIPMENT DETAIL

FACTORS AFFECTING SCREEN PERFORMANCE (CONTINUATION)

INSIDE CYLINDER SURFACE

The contour of the inside surface of a screen cylinder also affects the accept quality and throughput. In general, the more turbulence created by the surface of the cylinder, the higher the capacity and the lower the accept quality for a given hole or slot size. Black Clawson offers a variety of different cylinder designs that are suited for different applications.

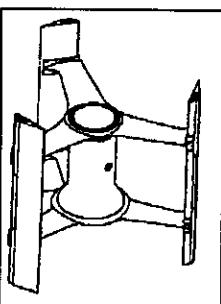
The Black Clawson Ultra Pressure Screen is a high speed, pressurized centrifugal screen. The screening function is accomplished through a single perforated cylinder having holes or slots, and facilitated by a rotating element. The rotating element may be either foil or drum style.



FOIL/STUD ROTORS

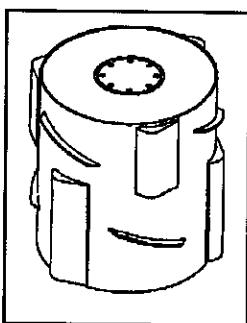
Conventional foil/stud design rotor. Adjustable foil arrangement for all types of cylinder applications.

REPLACEMENT
ONLY



LOW POWER (LP) ROTORS

The LP rotor is a newly designed profile with high strength struts. Replaceable profile bars are easily maintained without rotor removal. LP rotors consume 25-30% less power in fine screening applications compared to foil/stud design rotors.



NON-STRINGING (NS) ROTORS

NS rotors are designed for pressure screen applications where coarse debris can string up on foil/stud style rotors. This new design eliminates surfaces where stringing can occur. NS rotors consume 25-30% less power in high debris environments compared to foil/stud design rotors.

ULTRA PRESSURE SCREEN

SHIPMENT CHECK

CARRIER

Black Clawson units and accessory equipment are shipped by truck.

SHIPPING PAPERS

One set of shipping papers is attached to the shipment in a place where it is easily seen by those who unload it. A copy of these papers was mailed to your receiving department.



WARNING

Check weights shown on shipping papers and determine if your crane or hoist can lift the heaviest item safely.

CHECK-OFF

As each part is unloaded, check it off shipping papers. Report shortages to Black Clawson within twenty-four hours. File damage claims against transportation company within twenty-four hours.

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UNLOADING PATTERN

Trucks are generally unloaded from back to front. Crane operator must be sure of a clear lift or the piece being lifted may swing against other parts and cause damage.

WOODEN BOXES (CRATES)

Clamps, bolts, nuts, cap screws, eyebolts, and other small parts are shipped in one or more wooden boxes. **NOTE:** Do not store these boxes outdoors.

BRACING MATERIAL

Leave wood blocks, steel strapping, and other bracing materials in place until hoisting sling is in place and piece is ready to be lifted.

ULTRA PRESSURE SCREEN

SHIPMENT CHECK

LIFTING

- Check to be sure that eyebolts and hooks are attached securely and have appropriate lift rating.
- Straighten the sling as slack is removed and make a test lift by allowing the weight of the piece to be supported by the crane while the piece itself is not more than an inch or two above the truck bed.
- Lift pieces carefully and smoothly; with cast parts, the flanges will break next to the cored holes if pieces are jerked suddenly by the crane.

ULTRA PRESSURE SCREEN

SHIPMENT CHECK

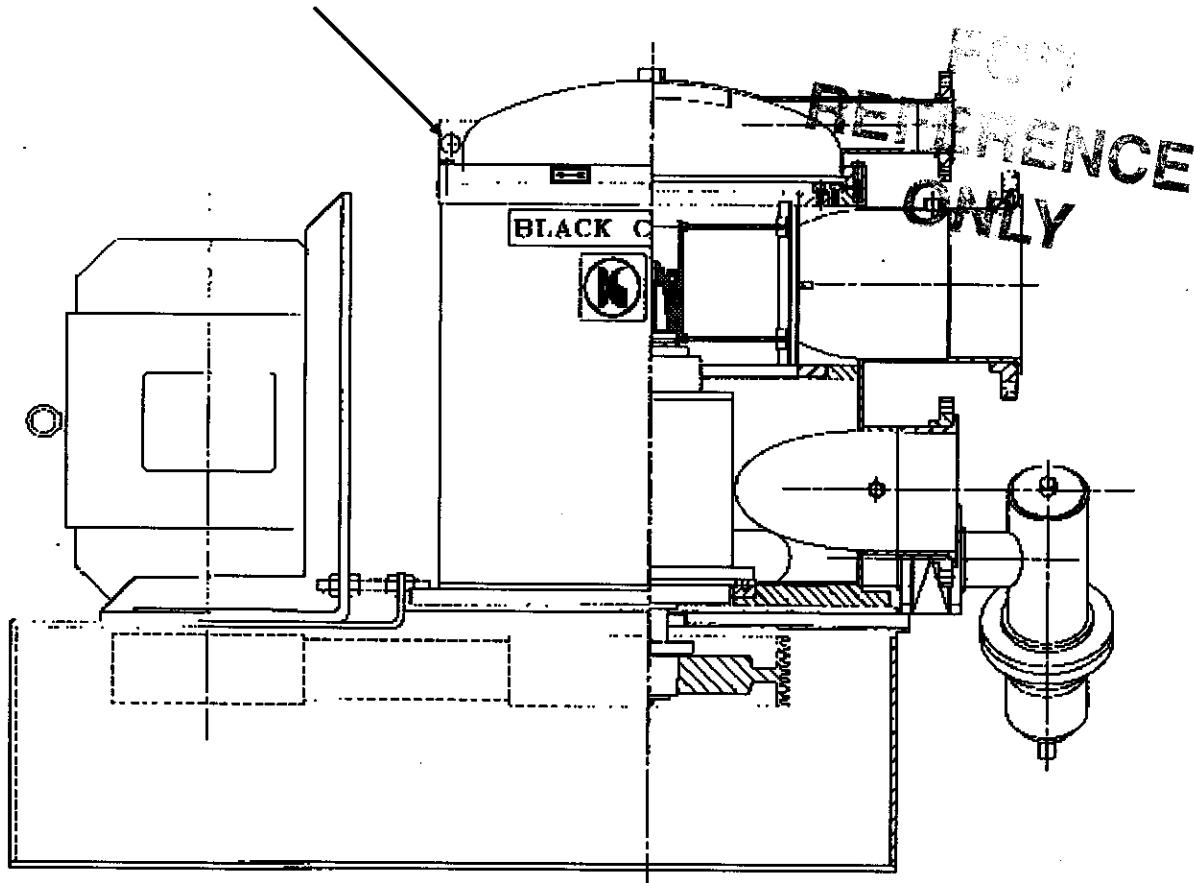
UNLOADING UNIT FROM TRUCK/MOVING UNIT INTO POSITION

1. Use properly sized rigging.
2. All lifting and rigging procedures must comply with federal, state, and local safety codes.

REMOVING SCREEN FROM SKID/MOVING SCREEN INTO POSITION

1. Use the shipping weight as a guide to determine lifting requirements. Verify that the lifting equipment to be used has a sufficient lift rating for the weight of the equipment.
2. ***Do not*** lift the unit by chaining or slinging around the inlet or outlet pipe connections.
3. ***Do not*** lift the complete unit with the lift lugs on the top cover. These lugs are designed for lifting the cover only.

COVER LIFTING LUG. FOR LIFTING THE COVER ONLY.

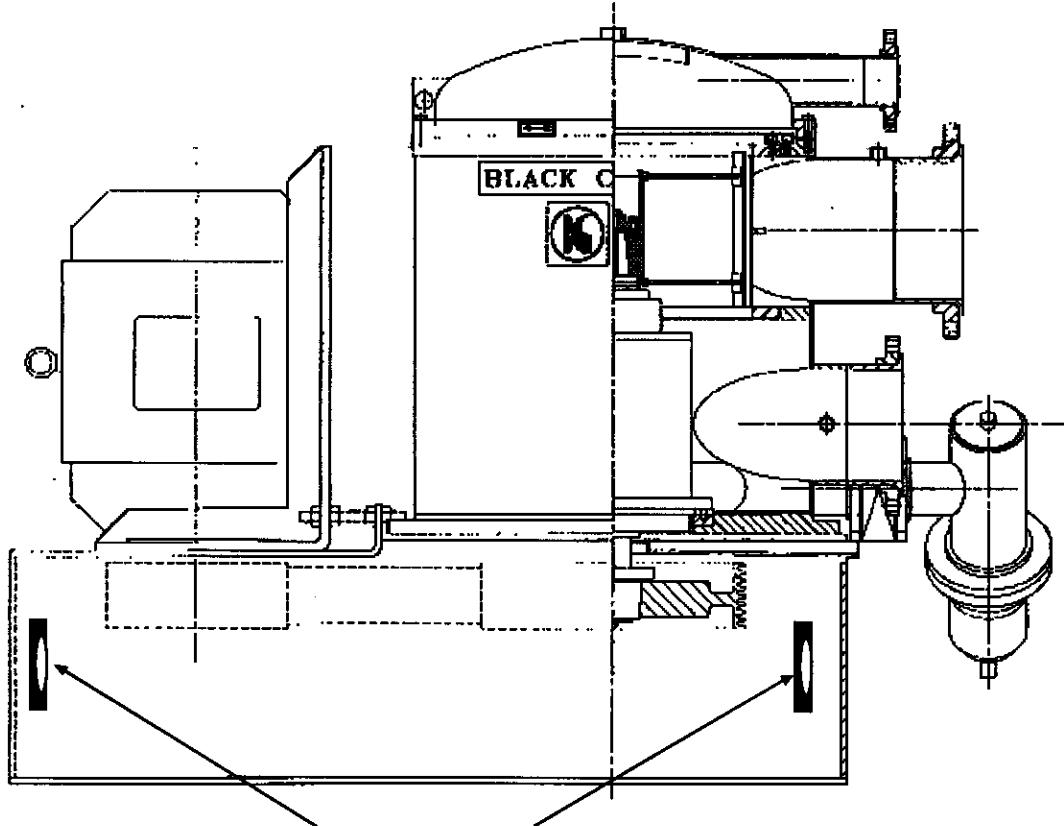


ULTRA PRESSURE SCREEN

SHIPMENT CHECK

REMOVING SCREEN FROM SKID/MOVING SCREEN INTO POSITION (CONTINUATION)

4. *Do* lift the screen by using the lifting lugs located at the four corners on the top of the base.



**LIFTING LUGS FOR LIFTING UNIT
(2 OF THE 4 LIFTING LUGS SHOWN)**

ULTRA PRESSURE SCREEN

STORAGE

Take the following precautions to minimize potential damage to the unit if outside storage is planned:

- Cover equipment with waterproof covering.
- Do not allow water to accumulate in or on the unit, especially if the weather conditions approach freezing (32° F) or below.
- Do not store items such as valves, cylinders, switches, etc., outside.
- Consult drive unit manual for any special storage requirements for the drive.

NOTE: At the time of installation, all protective coatings must be removed carefully to prevent damage to the seals, etc. Bearings must be flushed and lubricated with lubricants that are clean and meet the specifications for the bearing application.

Black Clawson assumes no liability as to specific storage requirements for equipment or components.

ULTRA PRESSURE SCREEN

INSTALLATION

BLACK CLAWSON UNITS ARE DESIGNED FOR SAFE OPERATION. ALL OPERATORS AND MAINTENANCE PERSONNEL SHOULD READ AND UNDERSTAND ALL SAFETY INFORMATION BEFORE USING OR SERVICING THE EQUIPMENT AND SHOULD HAVE ACCESS TO THIS INFORMATION AT ALL TIMES.

Do not modify the machine without authorization. Modifications could affect the function of the machine, shorten machine life, or render built-in safety features useless.

Never start the machine unless the following conditions are met:

- All personnel are clear of the machine.
- All doors and/or hatches are closed.
- All guards and covers are in place.

Do not exceed the maximum operating pressure. Maximum safe pressure of this unit is stated on the Certified Drawings.

Lock out machine before servicing. All energy sources and stock supply must be shut-off and locked out with your padlock before and during installation, maintenance, inspection, cleaning, or adjusting this unit. Unit must be at zero mechanical state (ZMS) before any service work is performed.



WARNING

Never remove another person's lock-out (padlock) or tag.

FOR
REPAIR
ONLY

Check disconnect. Try to start motor before servicing unit.

Bleed off pressure and lock out all pneumatic, hydraulic and steam systems, electrical circuits, chemical and gas systems, water, and stock flow.

Do not proceed if services are not independent of the main supply. Contact your supervisor.

FOLLOW INSTALLATION AND MAINTENANCE PROCEDURES IN THIS MANUAL ALONG WITH YOUR COMPANY'S SAFETY GUIDELINES.

ULTRA PRESSURE SCREEN

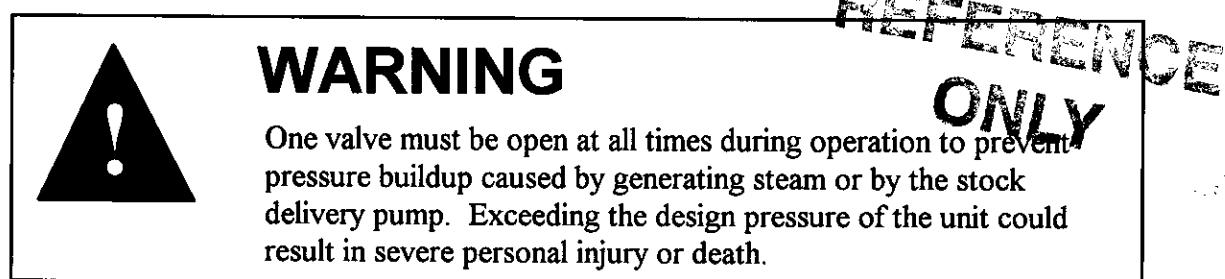
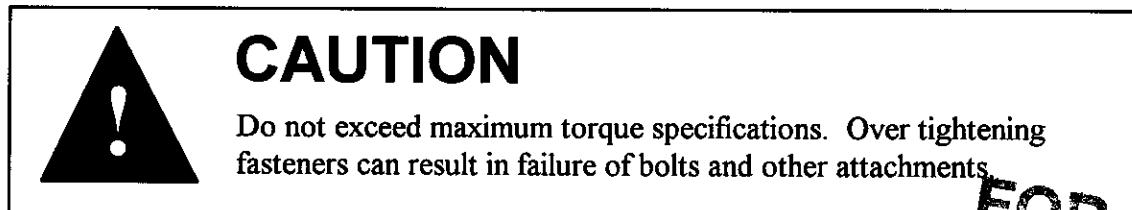
INSTALLATION

Use valves designed for lock-out and tagging. All valves used on this equipment should be designed to be locked out and tagged.

Never operate unit without guards in place.

Tighten sheave bushings to manufacturer's specification. All factory installed attachments are tightened to industry standard torque specifications.

Check torque prior to start up. Tack welding of bolt heads is an accepted industry practice.



ULTRA PRESSURE SCREEN

INSTALLATION

PRE-INSTALLATION

It will save time if all pre-installation work is completed before the unit is received. This section can be used as a check-list for preparation and installation.

Black Clawson prepares the following documents for every piece of equipment. They provide critical information for equipment installation.

- **Certified Drawings** - prepared by Black Clawson upon receipt of your purchase order and your returned approval drawings.
- **Owner's Manual** - sent with Certified Drawings.
- **Shipping List** - one is sent with the shipment and one is mailed to the mill the day shipment is made.

FOUNDATION

Refer to the Certified Drawings for foundation information.

EQUIPMENT PLACEMENT

Certified Drawings show space requirements for equipment operation and the anchor bolt plan. Adequate equipment clearances must be considered in your equipment layout.

Consideration should be given to maintenance and installation requirements.

When equipment has to be lowered through an opening in the floor above, be sure that it is in correct foundation position before the unit is erected.

NOTE: Check the Certified Drawings to determine if any unusual clearance problems will arise while moving the unit through the mill.

LIFTING EQUIPMENT

We have attempted to ensure that the unit weights (not including crating weight) are on the Certified General Assembly Drawings for each piece of equipment. If the weight is not on the drawing, contact Black Clawson. Verify that the hoist or crane at the mill has adequate load capacity to lift the unit safely. If it does not, it will be necessary to lease lifting equipment or contract for the services of a rigger.

ELECTRICAL REQUIREMENTS

Be sure that power cables and controls are properly sized, and can be routed to the unit with a minimum of bends and turns. Verify that the available electricity is correct for the equipment it is to operate.

ULTRA PRESSURE SCREEN

INSTALLATION

PRE-INSTALLATION

PIPING

Check Certified Drawings for pipe sizes. Be sure that correct sizes of pipe, fittings, and adapters will be available when the piping is installed. It is essential that all piping be well supported. Also, expansion loops or joints should be properly installed in the connecting pipes to allow for linear expansion. Piping must not be connected to the unit until the grout has hardened and the foundation bolts have been tightened.

LEVELING INSTRUMENTS

Use a sensitive, graduated tube spirit level, reading to 10 seconds per graduation (0.006 inch per foot), with a screw adjustment. The level in an ordinary machinist's square is not accurate enough for the installation of this equipment.

ULTRA PRESSURE SCREEN

INSTALLATION

Black Clawson assumes no responsibility for the site preparation and/or construction required for the installation of this equipment. An adequate foundation, determined from the machine weight and floor loading conditions, must be provided.

The general guidelines suggested in this manual are for those individuals involved in installing the unit. It is the responsibility of the customer's erection crew or agents to maintain "As Built" specifications during the installation of the unit. If you have any problems or questions concerning the installation of this equipment, please contact the Black Clawson Field Service Department.

CUSTOMER SUPPLY

The customer is to furnish all foundations, anchor bolts, steel shims, piping, etc. Refer to quotations and Certified Drawings for a complete listing of parts and hardware furnished by Black Clawson.

FOR
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ONLY

FOUNDATION SURFACES

- Clean all loose concrete chips and dust from foundation.

ANCHOR BOLT POCKETS

- Remove all debris and dust from anchor bolt pockets before installing sleeves.

SHIM PACKS

- Steel shims will be required to level the unit before it is grouted in place. Mill supply must include 3" x 3" shims.

ANCHOR BOLTS

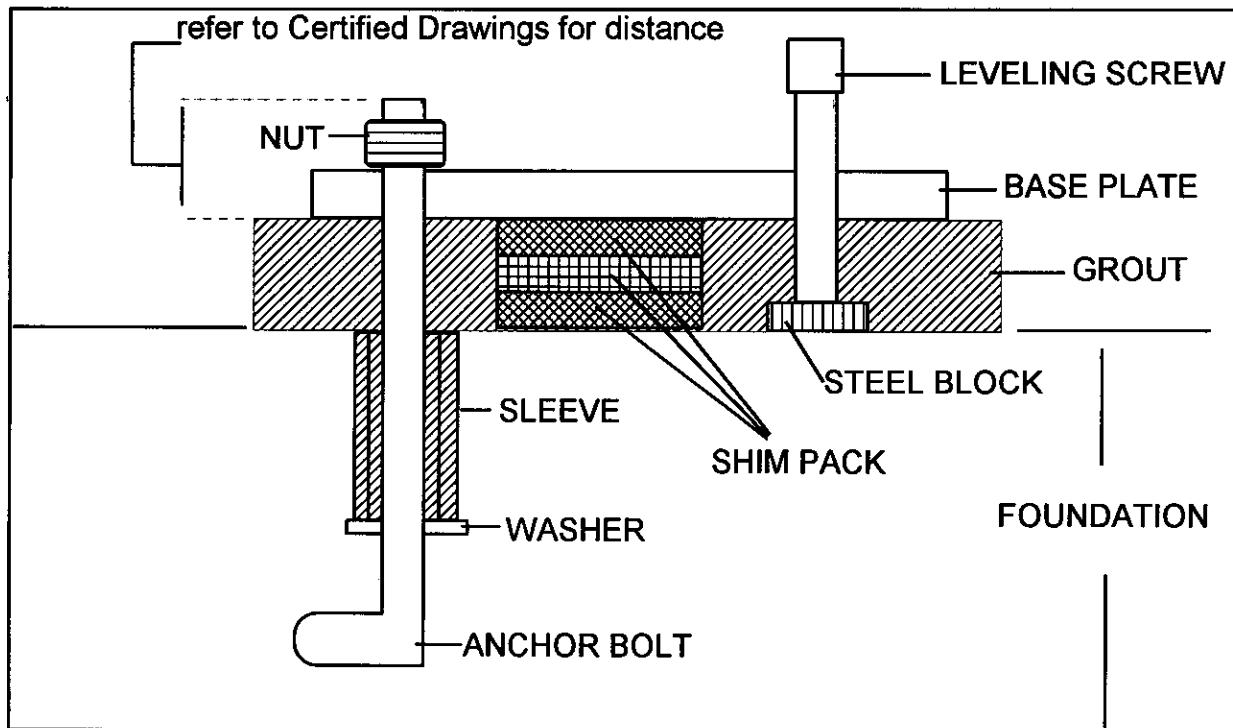
- Bolts must be sufficient length to project at least $\frac{1}{4}$ " through the nut when the unit is bolted down. Allow for grout, thickness of soleplate/footpads, and thickness of nut when determining proper bolt length. See sketch below for typical anchor bolt arrangement. Your Certified Prints call out the anchor bolt sizes, typical spacing, and layout. Black Clawson recommends that anchor bolts be encased by using sleeves (as shown) to make allowance for minor deviations in mounting hole location. Several sleeve types are commercially available.

ULTRA PRESSURE SCREEN

INSTALLATION

GROUT

- All grout design and placement of grout is the responsibility of the customer. Deviations from standard grouting practice could result in structural failure. Piping must not be connected to the unit until the grout has thoroughly hardened and the foundation bolts have been tightened. All couplings should be final aligned after the piping is completed.



TYPICAL ANCHOR BOLT METHOD

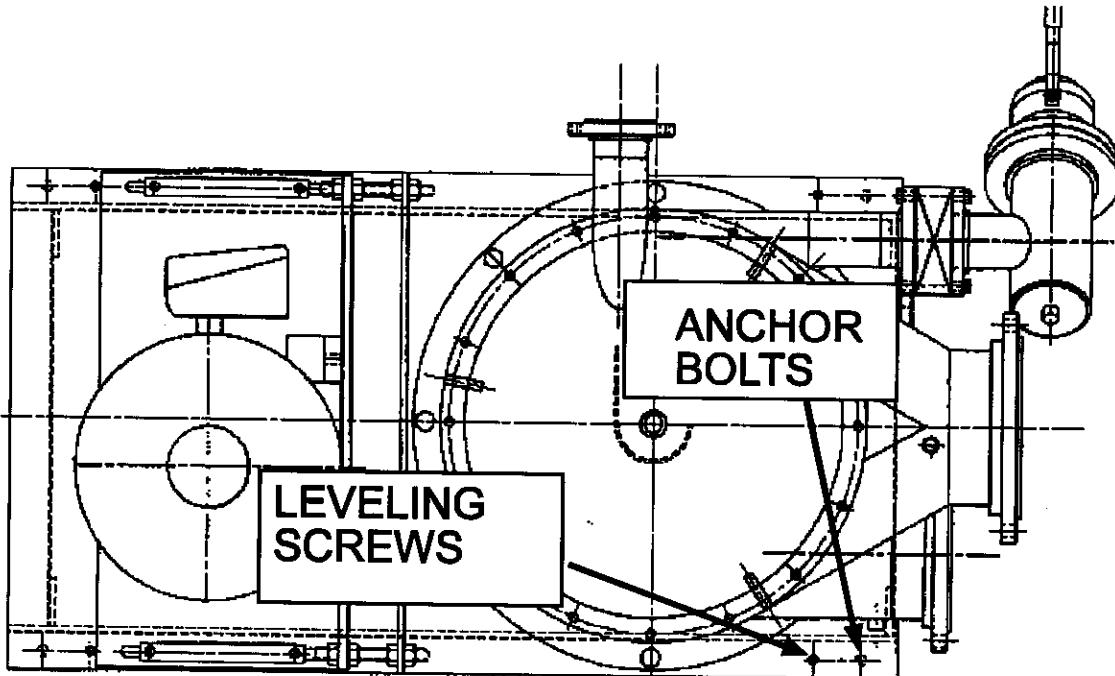
ULTRA PRESSURE SCREEN

INSTALLATION

LEVELING THE UNIT

The screen is shipped to the mill completely assembled (i.e., rotor, cylinder, and mechanical seal installed). Unit should be lifted off of the skid (see Section 4-2) and placed into position over the anchor bolts. Refer to your certified drawings for correct placement and orientation of the unit on the foundation. Unit needs to be leveled before grouting into place.

1. Place 3" x 3" x 1/2" thick steel plate on the foundation under each leveling screw to provide a solid surface for the leveling screw to bear against during the leveling procedure.
2. Remove the top cover to gain access to a machined reference surface to properly level the unit.
3. Check for level in two directions, in line with the corners of the base.
4. Adjust the leveling screws on the base mounting pads to obtain a level condition within 1/16" in both directions.
5. Use steel shim under the mounting pads to support the screen in level position. Shims are permanent and remain in place after the screen is grouted.
6. Tighten the anchor bolts.
7. Recheck the unit for level and be sure that screen is securely supported on the shims, not by the leveling screws.
8. Remove the leveling screws.



TOP VIEW

ULTRA PRESSURE SCREEN

INSTALLATION

CLEARANCES BETWEEN FOILS AND CYLINDER

Verify that the clearances between the foils and the cylinder are correct, per charts in Section 8-6. If the clearance needs to be adjusted on a foil type rotor, follow the procedures in Section 8-6. If the clearance is not correct on a drum style NS rotor, contact Black Clawson. Clearances on this type of rotor are not adjustable.

REQUIRED CONNECTIONS

Sizes of all connections are shown on the certified drawings and are given in Section 3-3 of this manual. See Section 7-3 of this manual for screen control options, which will determine the piping and connection requirements.

INLET CONNECTION

Requirements depend on the type of control system selected.

ACCEPTS CONNECTION

Requires an automatic control valve. Other requirements depend on the ~~FOR~~ type of control system selected.

REJECTS CONNECTION

Requirements depend on the type of control system selected.

JUNK BOX

The junk box is provided as a heavy contaminant collection chamber. Reject material that gets inside the screen body is rejected into the junk box before it can get into the screen cylinder. The only connection is an optional NPT pipe fitting for flush-out water.

VENT COUPLING CONNECTION

This connection is supplied with a pipe plug. Optional vent set-up by customer is to remove the pipe plug and install a valve with piping.

ELECTRICAL CONNECTION

See motor installation manual for specific requirements.

SPECIAL PIPING CONSIDERATIONS

- Avoid substantial drop legs on the accept line. If this is not possible, then a vacuum breaker should be installed.
- Keep length of reject line to a minimum and as direct as possible.
- Avoid unnecessary elbows, bends, and fittings as they increase friction losses in the piping.

**FOR
REFERENCE
ONLY**

ULTRA PRESSURE SCREEN

INSTALLATION

REQUIRED CONNECTIONS (CONTINUATION)

SPECIAL PIPING CONSIDERATIONS (CONTINUATION)

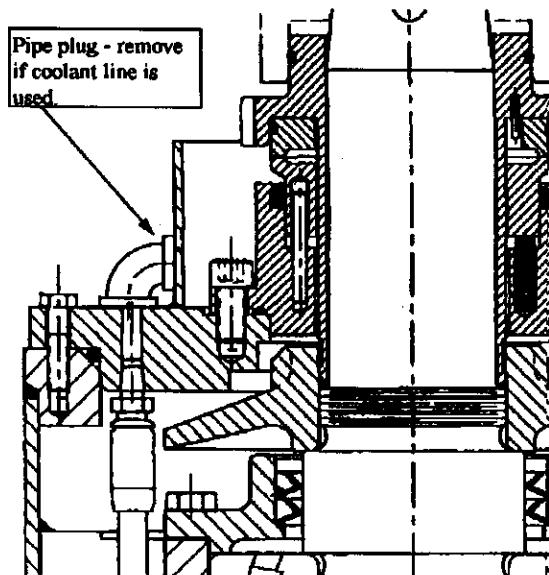
- Use individual reject lines on multiple unit installations.
- Install reject flow meters on each screen. This will ensure adequate reject flow from each screen.
- Place the accept control valve near the screen accept flange to ensure proper operation of the automatic purge cycle.
- Ensure that ~~all~~ piping is well supported so that no strain is placed on the unit.
- Do not connect piping to the unit until the grout has thoroughly hardened and the foundation bolts have been tightened.

SEAL COOLANT AND BEARING LUBRICATION

MECHANICAL SEAL COOLANT

The screen has been fitted with an internal line for coolant flow to the mechanical seal. ~~FOR
REFERENCE
ONLY~~
Coolant is highly recommended to prevent damage to the unit. Coolant line pressure must be at least 10 psi above the stock inlet pressure, otherwise stock will backflow through the coolant line and cause it to plug. Flow rate of coolant water should be 1 to 2 gpm.

The screen is shipped with a pipe plug at the discharge end of the coolant line. This will prevent stock from entering and clogging the coolant line if it is not being used. If coolant water will be used, the pipe plug must be removed from the point where the coolant line enters the coolant reservoir. The coolant line is piped to a bulkhead on the screen frame.

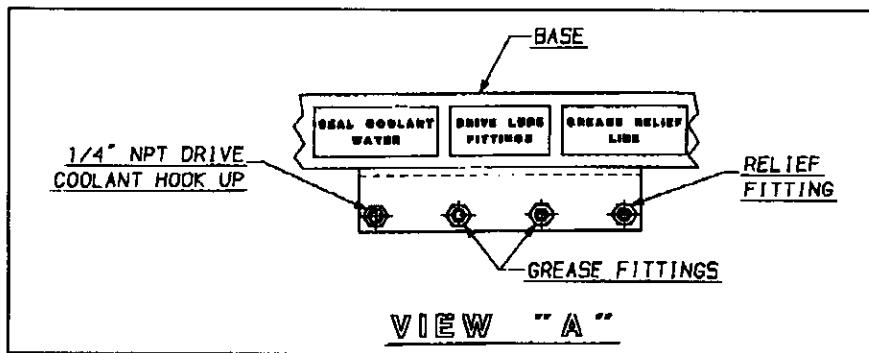


MECHANICAL SEAL ASSEMBLY

ULTRA PRESSURE SCREEN

INSTALLATION

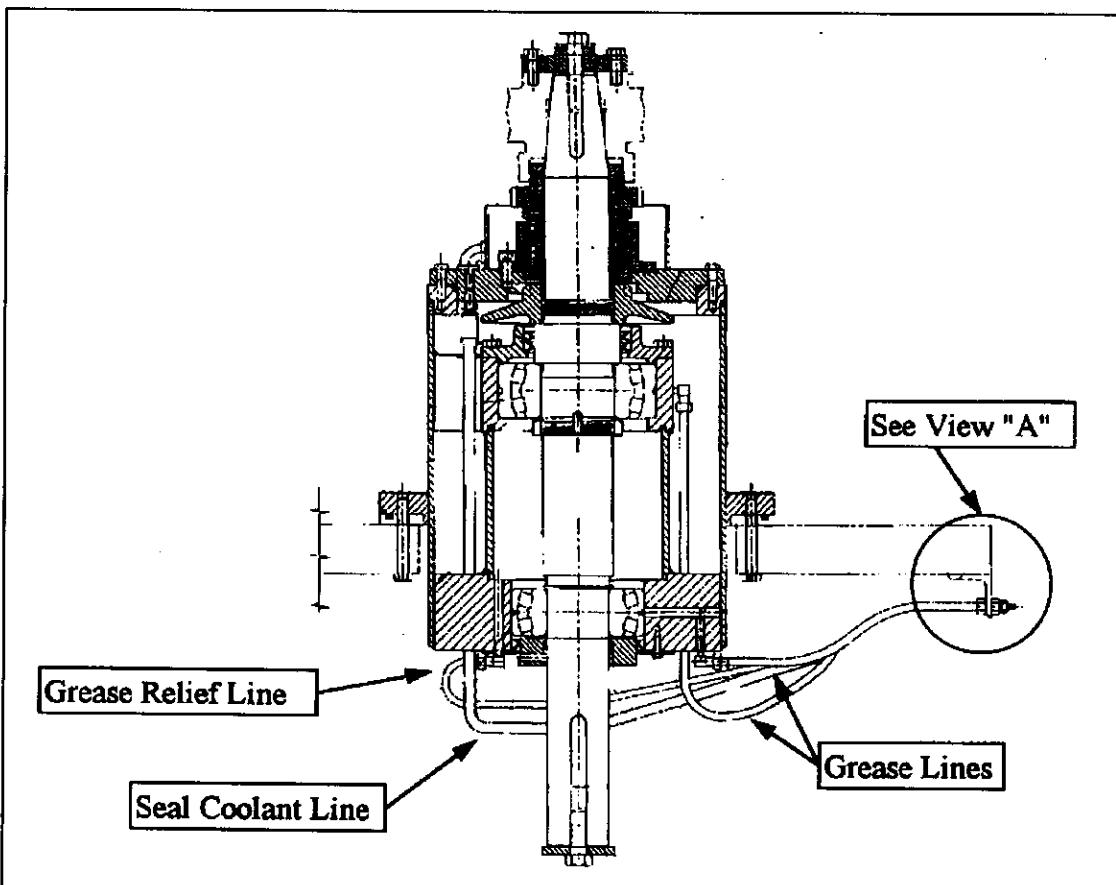
SEAL COOLANT AND BEARING LUBRICATION (CONTINUATION)



DRIVE HOUSING: GREASE CONNECTIONS

BEARING LUBRICATION

The bearing supporting the drive shaft are grease lubricated. The lubrication lines and a grease relief line are piped to a bulkhead on the screen frame. The drive is greased at the factory before shipment, however grease may have settled during shipment. Wipe the grease fittings and pump 15 - 20 strokes into each bearing prior to start-up.

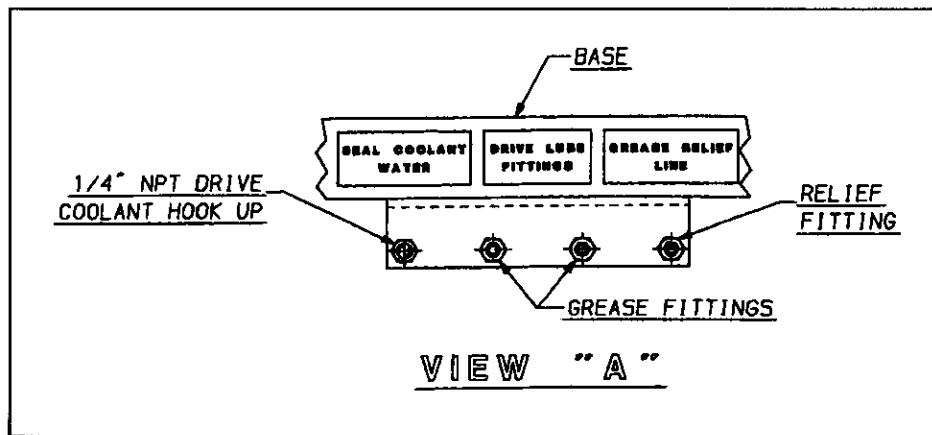


DRIVE ASSEMBLY

ULTRA PRESSURE SCREEN

INSTALLATION

SEAL COOLANT AND BEARING LUBRICATION (CONTINUATION)



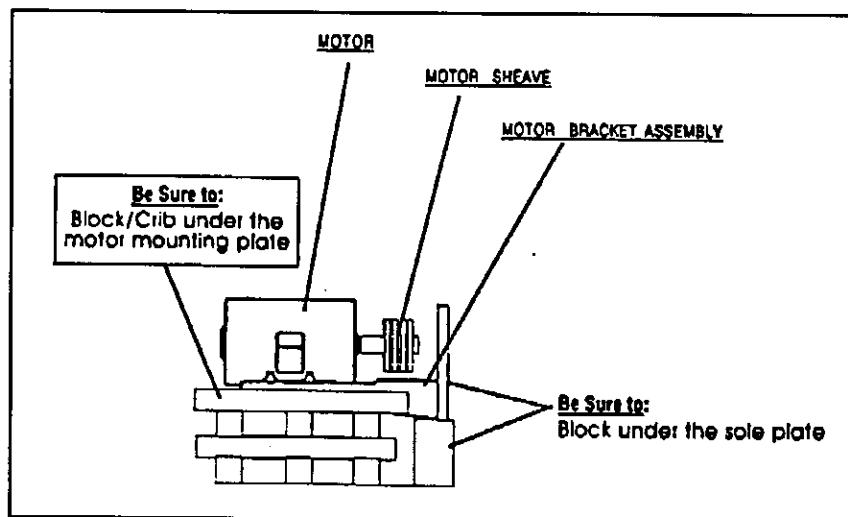
DRIVE HOUSING: GREASE CONNECTIONS

GREASE SPECIFICATION

Lithium base grease, NLGI 1½, ISO Viscosity 460. This grease shall not contain fillers such as resin, gesinous oils, soapstone, powdered mica, asbestos, clay, or any other type of grit. Following are some of the lubricants that meet the minimum requirements of this specification: Mobil - Mobilith SHC PM and Texaco - Starfak PM.

MOTOR MOUNTING

Depending on the horsepower and size of your motor, you might find it easier to attach the motor to the motor mounting bracket as shown in the sketch below before installing the motor mounting bracket assembly onto the screen foundation.



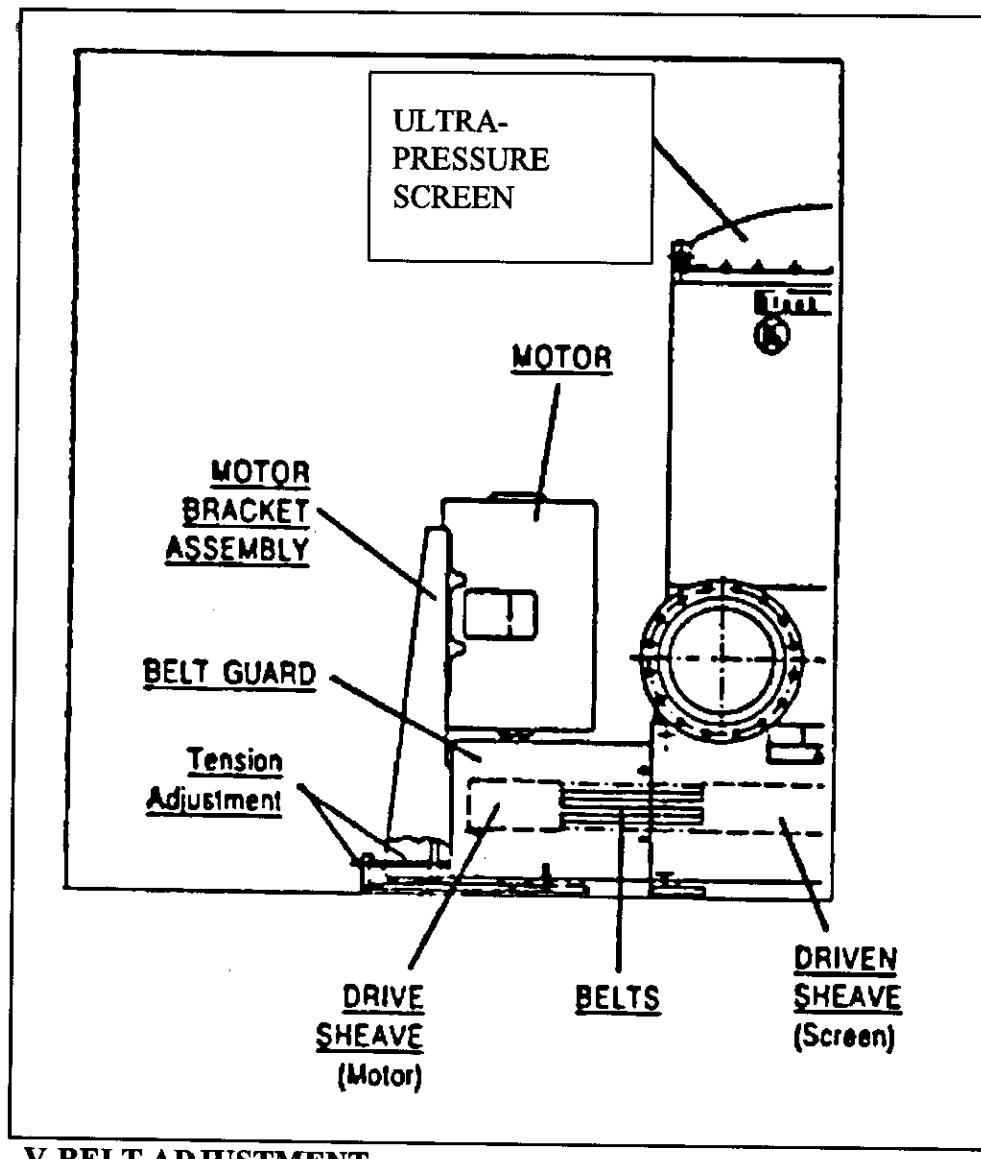
OVERVIEW OF MOTOR MOUNTING

ULTRA PRESSURE SCREEN

INSTALLATION

V-BELT ADJUSTMENT

Mount the motor onto the motor bracket and install the motor bracket on the foundation. Install the sheave on the motor shaft and align it with the sheave on the screen drive shaft. Adjust the belt tension by moving the motor bracket in the elongated holes until the tension is correct. Tighten the bolts to secure the motor bracket in place after belt tension has been set. See section 8-9 for more information on V-Belt adjustment.



V-BELT ADJUSTMENT

ULTRA PRESSURE SCREEN

OPERATION

Many programmable solid state systems have the capability of simulating operation in a mode known as "Test Mode" or "Dry Run Mode". These modes allow a user to check a program and correct obvious programming errors with outputs disabled. Unexpected machine motion and possible damage to equipment is avoided. These modes can also be used to verify proper system operation after a repair.

Many programmable systems provide for "Force On" and "Force Off" of inputs and outputs. These functions can reduce troubleshooting and maintenance time by enabling personnel to bypass certain operations without physically operating switches on a machine.



WARNING

Use care when using "Force" functions to avoid exposing personnel to hazardous machine motions or process operations which might cause severe personal injury or death.

- Mechanical start-up involves the following steps, which must be carried out in sequence.
- FOR
REFERENCE
ONLY**
- Inspect the installation before the power is connected.
 - Disconnect motors and other devices that cause machine motion.
 - Test inputs.
 - Test outputs.
 - Enter and verify your program.
 - Test the system with motors and other motion-causing devices reconnected.
 - Go through a "dry run" of the application.

The purpose of these procedures is to isolate such problems as wiring mistakes, equipment malfunction, and programming errors in a systematic, controlled manner. Go through these procedures very carefully. Following a given set of steps will help avoid possible personal injury and equipment damage.



WARNING

During all phases of motion checkout, station a person ready to operate the power switch if necessary.

ULTRA PRESSURE SCREEN

OPERATION

Inspect and make sure of the following before starting the unit:

- All guards and covers are in good condition and fastened in place.
- No parts are loose, worn, damaged, or missing.
- All personnel are clear of the equipment.

A first-time checkout should include the following:

1. Verify that rotating element is installed before running stock through the unit. This will prevent potential damage to the drive shaft from exposure to the stock.
 2. Check the hold down bolts that hold the rotating element to the drive shaft. Make sure they are tight.
 3. Check the bolts that hold the cylinder in place. Make sure that they are tight.
 4. Check the clearance between the foils and screen cylinder. The clearance will vary with the speed of the rotating element and the design of the cylinder. See Section 8-6 for correct clearances and adjustment procedure.
 5. Verify that the coolant line for the mechanical seal has been connected (optional, but recommended) and that water is running to the seal, if the line is connected. Make sure that the plug is in place if the coolant line is not connected.
 6. Do not run the unit dry. The drive will generate heat and damage the mechanical seal.
 7. Verify correct rotation of the rotating element. The rotating element turns clockwise when viewed from the top.
 8. Wipe the two grease fittings and pump 15 - 20 strokes into each bearing. The housing has been filled at the factory; however, this might have settled during shipment. **You cannot see grease seep out.**
 9. Check the sheave alignment and adjust the motor bracket for proper belt tension.
- Be sure all foil attachment nuts are tightened and properly torqued to limits based on size and type of thread. (Standard foils only, not LP or NS rotors.)

ULTRA PRESSURE SCREEN

OPERATION

START-UP PROCEDURE

Note: We recommend that water be used instead of stock for the initial start-up and after maintenance of the unit.

1. Check all service connections to be sure that they are operating correctly.
2. Turn on seal water (if connected).



CAUTION

Do not operate unit dry. Failure to turn on seal water (or have stock or water running through the screen) can result in damage to the mechanical seal. Coolant flow must be at a minimum of 10 psi above the stock inlet pressure.

3. Verify that accept valve is closed.
4. Open reject valve to a minimum of 40% open.
5. Start the motor on the screen. **Note:** It is important that the screen is started before the stock supply pump is started. However, stock **must** be supplied within 20-30 seconds of starting screen drive motor.
6. Start the feed pump to the screen. You should have flow to the unit at this point. If you do not have flow within 20-30 seconds, shut down the system and determine the cause, then run start-up procedure from step one.

FOR
REFERENCE
ONLY



CAUTION

Minimum inlet pressure is 15-30 psi, depending on application, and the maximum is 75 psi. Operating the unit in excess of maximum design pressure could cause failure of seals or the body of the unit which could result in personal injury. Operating below the minimum pressure recommended for your application can cause the mechanical seal to run dry, resulting in damage or failure of the seal.

7. Slowly open the accept valve to a predetermined set point if you have flow to the unit. If the unit plugs, see control information, Section 7-3 of this manual.

SHUT DOWN PROCEDURE--NORMAL AND EMERGENCY

1. Close accept valve.
2. Stop both the stock supply pump and the screen motor at the same time. This is usually accomplished by interlocking the two controls.
3. Verify that motor supply pump and motor have stopped. Lock these out.
4. Drain junk box as described on the following page to empty and depressurize the unit.

ULTRA PRESSURE SCREEN

OPERATION

SHUT DOWN PROCEDURE--NORMAL AND EMERGENCY (CONTINUATION)

5. Shut off coolant water flow.
6. Lock out and tag out all sources of energy, stock, and water to the screen.

Note: For shut down periods of four hours or longer, flush the screen with white water to clear out stock which could plug the screen if it remained in the screen and dewatered.

JUNK BOX

The junk box should be purged occasionally to maintain efficient operation of the screen. In normal operation, the dump valve remains closed and the isolation valve is fully open. This allows the heavy rejects to drop into the junk box. The procedure for purging the heavy rejects follows.

NORMAL OPERATIONS

1. Leave screen running.



CAUTION

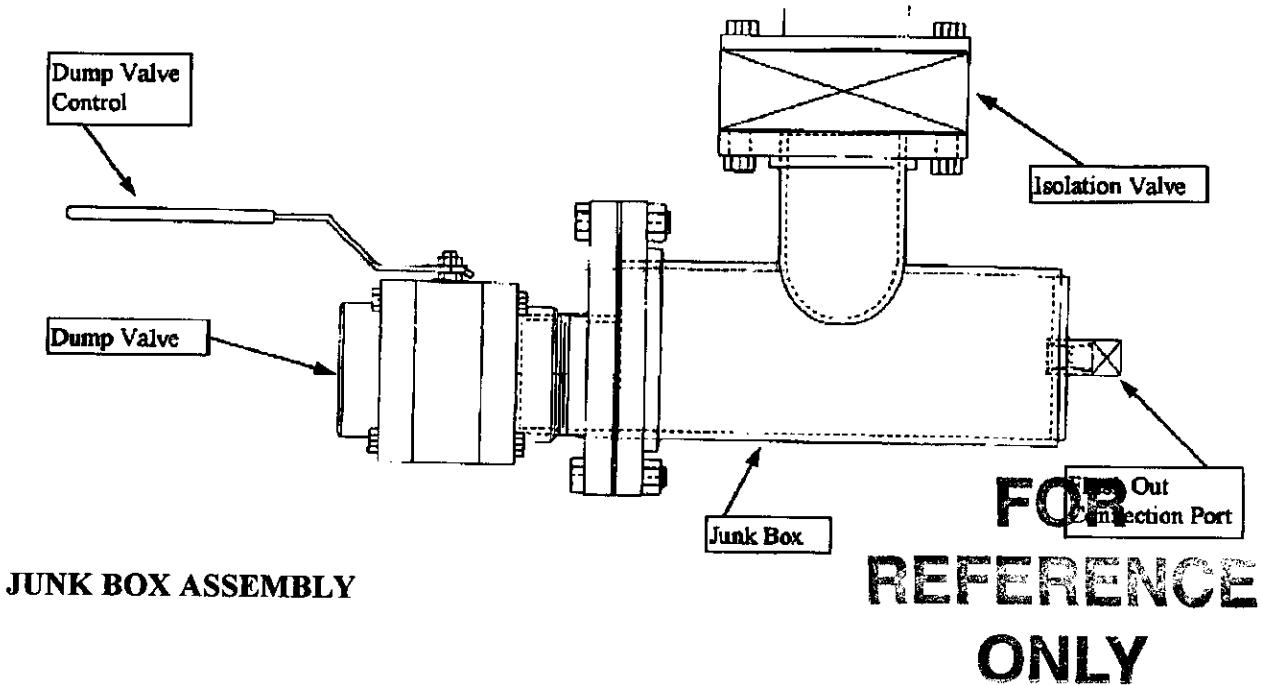
If the isolation valve is damaged or plugged and fails to close completely, contaminants will blow out of the junk box under pressure, which could cause personal injury. Make sure all personnel are clear of the junk box opening and are wearing appropriate safety equipment for protection from debris. If contents blow out under pressure, immediately close the dump valve, then follow procedure for complete shut down of the unit to repair the isolation valve.

2. **Fully** close the isolation valve.
3. Open the dump valve by turning the hand lever so that it is perpendicular to the junk box. The rejects should flow out of the junk box at atmospheric pressure.
4. Connect water to the flush out connection port.
5. Flush junk box until it is completely empty.
6. Close dump valve.
7. Open isolation valve to begin collection cycle again.

ULTRA PRESSURE SCREEN

OPERATION

NORMAL OPERATIONS (CONTINUATION)



OPERATION

Safety considerations are an important element of proper troubleshooting procedures. Actively thinking about safety of yourself and others, as well as the condition of your equipment is of primary importance. Several safety areas are discussed below.

POWER SUPPLIES

Before working on a power supply, always remove the AC power source at the main disconnect switch. When using more than one power supply, be sure to disconnect all of them.

MAIN POWER DISCONNECT

The main power disconnect switch should be located where operators and maintenance personnel have quick and easy access to it. Ideally, the disconnect switch is mounted on the outside of the enclosure so that it can be accessed without opening the enclosure. In addition to disconnecting electrical power, all other sources of power (pneumatic and hydraulic) should be de-energized before working on a panel controlled machine or process.

ACTIVATING DEVICES WHEN TROUBLESHOOTING

When troubleshooting, never reach into the machine to actuate a device. Unexpected machine motion could occur.

STAND CLEAR OF MACHINE

When troubleshooting any control panel problem, have all personnel remain clear of the machine. The problem could be intermittent, and sudden unexpected motion could occur. Have someone ready to operate an emergency stop switch in case it becomes necessary to shut off power to the machine.

PROGRAM ALTERATION

There are several causes of alteration to the user program, including extreme environmental conditions, electromagnetic interference (EMI), improper grounding, improper wiring connections and unauthorized tampering. If you suspect the memory has been altered, check the program against an approved version such as on the EEPROM memory module.

HARDWIRED CIRCUITRY

Circuits that are installed on the machine for safety reasons, including overtravel limit switches, stop push buttons, and interlocks, should always be hardwired in series so that when any one device opens, the master control relay is de-energized, thereby removing power to the machine. Never alter these circuits to defeat their function. Serious injury or machine damage could occur.

ULTRA PRESSURE SCREEN

OPERATION

SAFETY RECOMMENDATIONS FOR MAINTENANCE PERSONNEL

All maintenance work should be done by qualified personnel familiar with construction, operation, and hazards involved with the equipment.

Follow the appropriate work practices of NFPA 70E.

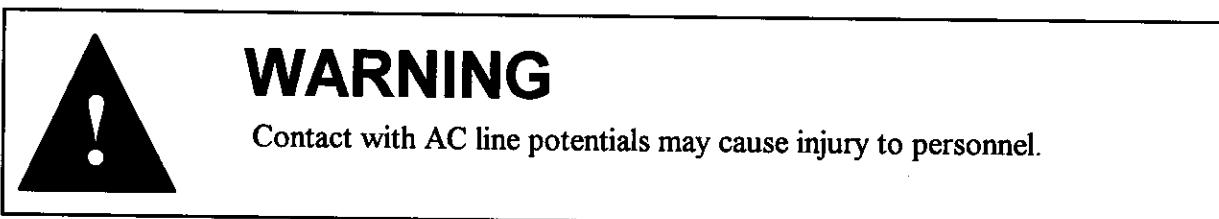
Make-Do testing devices such as incandescent lamps have low impedance. The low impedance of these devices can effectively change a voltage level from logic "1" condition to a logic "0" condition when attempting to make a measurement. Unexpected machine motion can result if an output to a controlled device is energized as a result. Neon lamps do not respond to voltages typically used in logic circuits (e.g. 32 VDC or less.) Use of a neon lamp tester could lead to false conclusions about the voltage present in a circuit.

High input impedance meters are required to obtain accurate voltage measurements in high impedance circuits. Unless otherwise specified by the manufacturer, a meter with an input impedance of ten (10) megohms or greater is recommended for making voltage measurements. The meter must also have sufficient sensitivity to measure logic level voltages; some meters do not respond to low voltages.

CONTROL PANELS

The control panels are designed using all NEMA and/or U.L. approved components suited for the environment in which it is being placed. Every effort is made to adhere to the N.E.C., OSHA, ANSI, and mill standards as they apply to your application.

The power feed should include an equipment grounding conductor to bond the enclosure to building earth ground.



Power feed should have a disconnect or breaker capable of being locked in the open position.

All field devices should be wired per Certified Installation Drawings furnished with the control panel.

The field wiring should be routed to separate the AC from the DC and/or low level signals.

ULTRA PRESSURE SCREEN

OPERATION

CONTROL PANELS (CONTINUATION)

All the electronic instruments were factory programmed to a fail safe state (if a component failure occurs). The panels include a power push button that, when pushed, will power down the main processor, closing all valves.

EDUCATION AND KNOWLEDGE LEAD TO SAFETY

Planning for an effective solid state circuit requires enough knowledge to make basic decisions that will render the system safe as well as effective. Everyone who works with a solid state control ~~should~~ should be educated in its capabilities and limitations. This includes in-plant installers, operators, service personnel, and system designers.

MAINTENANCE

Perform a general inspection of the equipment at least every three months or every 1000 hours of running time. Locating and eliminating minor problems will extend the service life of the unit.

PERIODIC INSPECTION

Perform a general inspection and tightening of the machine twice a year. Locating and eliminating minor problems will assure long and dependable service. In many instances it eliminates costly shut-downs and delays.



WARNING

Follow your prescribed safety procedures and those listed in this manual to prevent accidental starting while inspecting or servicing the unit

To prepare for a maintenance check, shut down the unit and bring it to zero mechanical state (ZMS) per the proper procedure. A wash down of internal parts and surfaces may be required.

FOR

COMPONENTS REQUIRING ROUTINE MAINTENANCE

COMPONENT	SERVICE	FREQUENCY
Foil cage assembly	<ul style="list-style-type: none">• Check clearances to cylinder• Check wear	Shut-down periods ONLY
Cylinder	<ul style="list-style-type: none">• Check for wear• Check for plugged holes	Shut-down periods
Mechanical seal	<ul style="list-style-type: none">• Check for leaks	Weekly
Bearings	<ul style="list-style-type: none">• Grease lubrication	Weekly
Drip pan	<ul style="list-style-type: none">• Inspect for mechanical seal leakage	Weekly
V-belts & sheaves	<ul style="list-style-type: none">• Check for proper tension, alignment and wear	Monthly
Junk box	<ul style="list-style-type: none">• Dump rejects	Minimum weekly (Might be more frequent on very dirty furnishes.)

Grease specification: Lithium base grease, NLGI 1½, ISO Viscosity 460. This grease shall not contain fillers such as resin, resinous oils, soapstone, powdered mica, asbestos, clay, or any other type of grit. Following are some of the lubricants that meet the minimum requirements of this specification: Mobil - Mobilith SHC PM and Texaco - Starfak PM.

ULTRA PRESSURE SCREEN

MAINTENANCE

TROUBLESHOOTING GUIDE

CONDITION	CHECK
Low capacity, frequent plugging	<ul style="list-style-type: none">Feed stock may have unusually high level of debris or stock flakesTarget Kappa number off specificationCylinder hole or slot contours worn and/or pluggedRotating element may not be running at correct speed for applicationWorn or damaged foilsSet points of automatic controls are incorrectFeed consistency is wrongReject rate is set incorrectly
Poor accept quality	<ul style="list-style-type: none">Cylinder hole or slot contours worn or damagedPressure drop is too highReject rate is off target - too lowLevel of debris in feed stock is unusually high
Excessive noise	<ul style="list-style-type: none">Incorrect clearances between rotating element and cylinderMechanical failure of bearings, mechanical seal, or cylinderHeavy debris in feed chamber
Low power consumption	<ul style="list-style-type: none">Low rpm caused by belt slippage
High power consumption	<ul style="list-style-type: none">Build-up of debris or stock in feed chamberMechanical failure of bearings, mechanical seal, or cylinderRotating element contacting cylinderPlugged reject valve or line - no flow
Excessive vibration	<ul style="list-style-type: none">Rotating assembly unbalanced or not seated properly on drive shaftInsufficient feed pressureLoose bolts on drive assemblyBearing failureExcessive bearing clearance

ULTRA PRESSURE SCREEN

MAINTENANCE

DISASSEMBLY OF SCREEN

See the table in Section 3-3 for the weight of screen sub-assemblies. Assistance should be available as necessary to handle the weight of these items.

1. Shut down screen per procedure in Section 7-2 of this manual.
2. Shut off, lock out, and tag out all sources of energy, stock, and water.
3. Break connection on reject valve.
4. Disconnect vent line (if piped).
5. Remove bolts on top cover.
6. Use overhead lifting device and lift lugs on top cover to remove cover.
7. Remove cover O-ring.
8. Wash down inside of screen.
9. Remove cylinder (see instructions, Section 8-4).
10. Remove rotating element (see instructions, Section 8-5).
11. Remove drive (see instructions, Section 8-8).
12. Disassemble mechanical seal if needed (see instructions, Section 8-7). ~~Drive~~ can be removed without disturbing the mechanical seal. Mechanical seal only needs to be disassembled if repairs are needed on the seal itself.)

**FOR
REFERENCE**

ASSEMBLY OF SCREEN

ONLY

1. Verify that all parts are in good working condition.
2. Clean all O-ring grooves and machined surfaces.
3. Assemble mechanical seal onto drive shaft (see instructions, Section 8-7).
4. Install drive into screen body (see instructions, Section 8-8).
5. Install rotating element onto drive shaft (see instructions, Section 8-5).
6. Put cylinder into screen body (see instructions, Section 8-4).
7. Spin the rotating element by hand to ensure that it will spin freely.
8. Check clearances of rotating element and cylinder.
9. Place top cover O-ring into position.
10. Bolt on the top cover.
11. Connect vent and reject piping.
12. Follow start-up procedure to put screen back into service.

ULTRA PRESSURE SCREEN

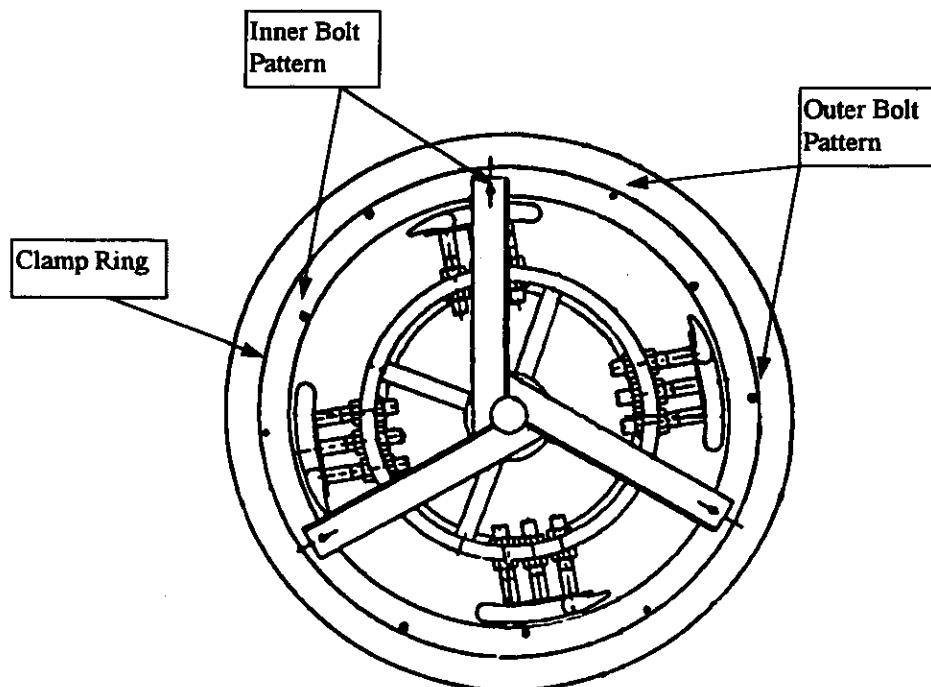
MAINTENANCE

SCREEN CYLINDER

The perforated cylinder is centered radially in the screen. Both ends of the cylinder are machined identically. This feature permits the cylinder to be flipped end for end, and extends the useful life of the cylinder. The cylinder is held in position by a clamp ring which is bolted to the top cylinder ring and to the upper locating ring in the screen body. **Note:** The clamp ring must be attached to the cylinder during removal and installation procedures.

CYLINDER PULLER

A cylinder puller is provided with each screen. The cylinder puller is attached to the clamp ring with three of the six bolts holding the clamp ring to the cylinder. When the puller is not attached, all of the cap screws must be installed to connect the clamp ring to the cylinder.



TOP VIEW SHOWING CYLINDER PULLER INSTALLED

ULTRA PRESSURE SCREEN

MAINTENANCE

REMOVAL OF CYLINDER

Note: Removal of the cylinder does not require removal of the rotating element.

1. Shut down screen per procedure in Section 7-2 of this manual.
2. Shut off, lock out, and tag out all sources of energy, stock, and water.
3. Remove the screen top cover, using the three lifting lugs and an overhead lifting device.
4. Wash out ~~the~~ interior of the screen.
5. Remove three of the six inner bolts on the clamp ring. Leave one bolt in place between every two bolts removed. **Note:** Do not remove all of the inner bolts or the cylinder will drop into the screen.
6. Attach puller to the screen cylinder clamp ring in the three open inner holes, using the three bolts you removed.
7. Remove all bolts on the outer bolt pattern of the clamp ring. These attach the cylinder to the screen body.
8. Insert outer bolts in threaded holes for jack bolts.
9. Use an overhead lifting device with the cylinder puller to remove the screen cylinder slowly. Do not force or pinch the cylinder, as damage to the cylinder surface or fit will occur.

ULTRA PRESSURE SCREEN

MAINTENANCE

INSTALLATION OF CYLINDER

1. Shut off, lock out, and tag out all sources of energy, stock, and water.
2. Clean and drain the interior of the screen.
3. Clean the two pilot fits on the top and bottom cylinder rings.
4. Clean the two pilot fits on the mating flanges inside the screen body.
5. Attach the cylinder puller to the screen cylinder clamp ring. (See procedure above.)
6. Place cylinder into position, making sure to align the outer holes in the cylinder clamp ring with the tapped holes in the screen body.
7. Make sure the cylinder has seated properly. The clamp ring should be flush with the screen body top seat ring.
8. Remove the cylinder puller.
9. Secure the cylinder in place with cap screws in the tapped holes.
10. Check the foil/cylinder clearances.

ULTRA PRESSURE SCREEN

MAINTENANCE

LIFTING/MOVING ROTATING ELEMENTS

Foil/Stud and LP rotors: Use an overhead lifting device and slings around the studs or struts.

NS rotors (Model I): Screw eyebolts into the tapped holes in the center hub area. Use an overhead lifting device and hooks or slings through the eyebolts.

NS rotors (Models II and III): These rotors have a center cap which is put in place after rotor installation to keep stock from filling and plugging the area around the drive shaft. One side of this ~~cap~~ has a lifting lug attached to it. After firmly attaching the cap to the rotor with the lifting lug exposed, use an overhead lifting device to lift and move the rotor. Another option is to remove the center cap completely and use eyebolts in the tapped holes. *The disadvantage to using the center cap lifting lug is that the cap cannot be in place when installing the rotor on the drive shaft because it blocks sight of the key and keyway.*

FOIL REPLACEMENT (FOIL/STUD STYLE ONLY)

The foils used in the foil/stud style rotor are weight matched in pairs, which must be located in positions 180° apart. When a foil needs to be replaced due to excessive wear, the matching foil must also be replaced at the same time. Failure to follow this important maintenance consideration might result in an unbalanced rotating assembly, which will cause excessive vibration and damage to the unit. Foils purchased from Black-Clawson are stamped with the weight on the end. The following table indicates the allowable weight variance.

**Foil Weights - Allowable Variation
(foils located 180° apart)**

ONLY	
Screen Model (size)	Match weight in a pair within this tolerance
I, II, III	Two (2) ounces

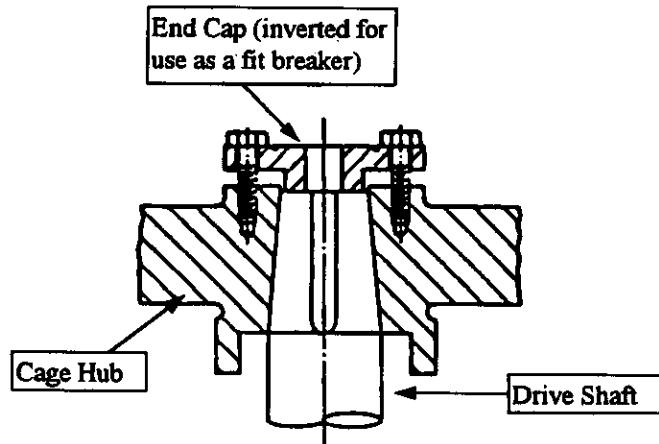
ULTRA PRESSURE SCREEN

MAINTENANCE

REMOVAL OF ROTATING ELEMENT

See the table in Section 3-3 for the weight of the screen rotors. Assistance should be available as necessary to handle the weight of these items.

1. Shut down screen per procedure in Section 7-2 of this manual.
2. Shut off, lock out, and tag out all sources of energy, stock, and water.
3. Remove all bolts from top cover.
4. Using the three lifting lugs provided, remove the top cover and o-ring.
5. Drain and clean inside of screen.
6. Remove cylinder. Follow procedure found in Section 8-4 of this manual. **Note:** The cylinder *does not* have to be removed in order to remove the rotating element. Removal is recommended to prevent damage.
7. Remove the thrust screw and sealing washer.
8. Remove the two cap screws holding the end cap in place.
9. Turn the cap over, putting the machined boss against the top of the drive shaft. See the illustration on the next page.
10. Install the outside cap screws back through the tapped holes in the cap and into the tapped holes in the cage hub. This will break the taper fit of the cage hub on the drive shaft. See illustration that follows.



ROTOR DISASSEMBLY

11. Carefully remove the rotor from the unit, using the lifting procedures described previously.

ULTRA PRESSURE SCREEN

MAINTENANCE

ASSEMBLY OF ROTATING ELEMENT

1. Verify that all sources of energy, stock, and water are shut off and locked out.
2. Thoroughly clean the drive shaft and the bore in the rotor hub.
3. Use an overhead lifting device and slings, as described previously, to lift the rotor onto the drive shaft.
4. Place the rotor over the drive shaft, making sure that the key and keyway are lined up.
5. Install the O-ring in the groove on the bottom of the end cap.
6. Place the end cap on top of the drive shaft.
7. Secure the end cap with the cap screws in the two tapped holes.
8. Place the seal washer on top of the end cap and secure it with the thrust screw. **Note:** Be sure that the cage is seated properly on the shaft and that the thrust screw is tight.
9. **NS rotors, Models II and III:** Install the "O"-ring around the center cap, place the center cap so that the lifting lug is down inside the rotor bore, install the attaching cap screws to secure the center cap.
10. Check foil/cylinder clearances. On LP style or foil/stud style rotors, adjust as necessary, following procedures in Section 8-6.

ULTRA PRESSURE SCREEN

MAINTENANCE

FOIL/CYLINDER CLEARANCE SETTINGS

When checking clearance between the rotor and the cylinder, it is important to measure at the correct point on both pieces. The correct area to measure is defined below for each type of rotor and each type of cylinder.

FOIL/STUD ROTOR

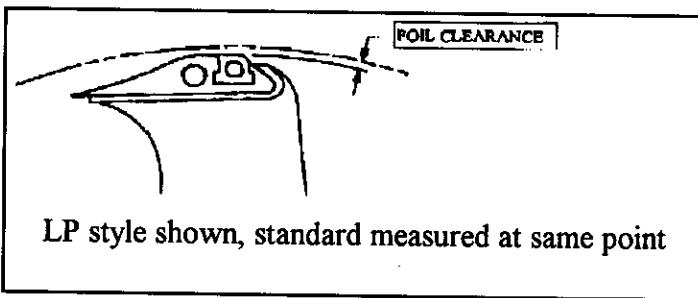
1. With smooth or mini contoured cylinder surface (PH, PS, PHL, PSL, PSP): Measure between closest point of foil blade and the inside surface of the cylinder. Clearance is based on foil rpm and screen size. See chart which follows on next page.
2. With beaded cylinders (PSB, LAZR): Measure between closest point of foil blade and the surface of the bead. Clearance for PSB or LAZR cylinders is based on foil rpm and screen size. See chart on next page for correct clearance.
3. With spiral rib cylinders (Any surface with spiral rib): Measure between closest point of foil blade and the surface of the rib. On spiral rib cylinders, clearance should be 0.060" - 0.070" (1.5 - 1.8 mm), regardless of foil rpm.
4. With Ultra cylinders (1/4" vertical bars on inside cylinder surface): Measure between closest point of foil blade and the surface of the vertical bar. Clearance should be 0.080" - 0.100" (2.0 - 2.5 mm), regardless of foil rpm.

**FOR
REFERENCE**

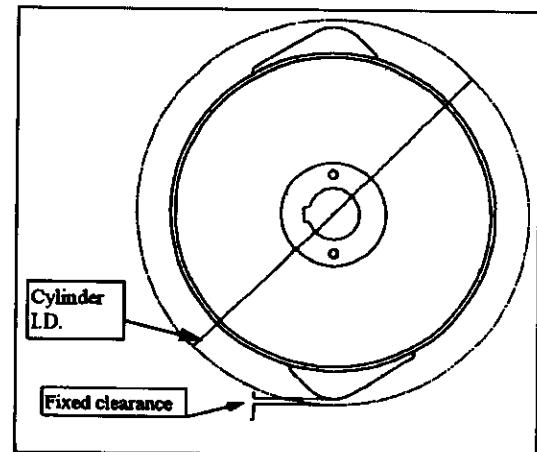
LP STYLE ROTOR

ONLY

1. With smooth or mini contoured cylinder surface (PH, PS, PHL, PSL, PSP): Measure between closest point of foil blade and the inside surface of the cylinder. Clearance is based on foil rpm and screen size. See chart which follows on next page.



LP I ROTOR



NS II ROTOR

ULTRA PRESSURE SCREEN

MAINTENANCE

FOIL/CYLINDER CLEARANCE SETTINGS (CONTINUATION)

NSII STYLE ROTOR

- With smooth, mini-contoured, or spiral rib: Measure between closest point of foil blade and the surface of the cylinder, (not the rib, if supplied). Clearance is factory preset at 0.450" - 0.500" regardless of foil rpm. **Clearance is not adjustable.**
- With Ultra cylinders (1/4" vertical bars on inside cylinder surface): Measure between closest point of foil blade and the surface of the cylinder, not the bar. Clearance is factory preset at 0.450" - 0.500" regardless of foil rpm. **Clearance is not adjustable.**

Clearance settings for standard or LP style rotors with smooth, mini-contoured, or beaded cylinders (PH, PS, PHL, PSL, PSP, LAZR, PSB)

Model	Peripheral speed (m/min)	Peripheral speed (ft/min)	Max. RPM	Clearance (mm)	Clearance (in)
I	762	2500	600	1.8 - 2.3	0.070 - 0.090
	1143	3750	900	3.0 - 3.5	0.120 - 0.140
	1524	5000	1195	4.0 - 4.5	0.170 - 0.190
II	762	2500	400	1.8 - 2.3	0.070 - 0.090
	1143	3750	600	3.0 - 3.5	0.120 - 0.140
	1524	5000	800	4.0 - 4.5	0.170 - 0.190
III	762	2500	320	1.8 - 2.3	0.070 - 0.090
	1143	3750	480	3.0 - 3.5	0.120 - 0.140
	1524	5000	640	4.0 - 4.5	0.170 - 0.190

NSIII STYLE ROTOR

Clearance in inches	Holes with UP* bars	Holes with smooth or small contoured surfaces (PH, PHL, PHP)	Slots with smooth or contoured surfaces (PS, PSL, PSP, PSB)
Standard	.5	.375	.250
Minimum	.375	.250	.187**

* measured from surface of cylinder--not top of bar

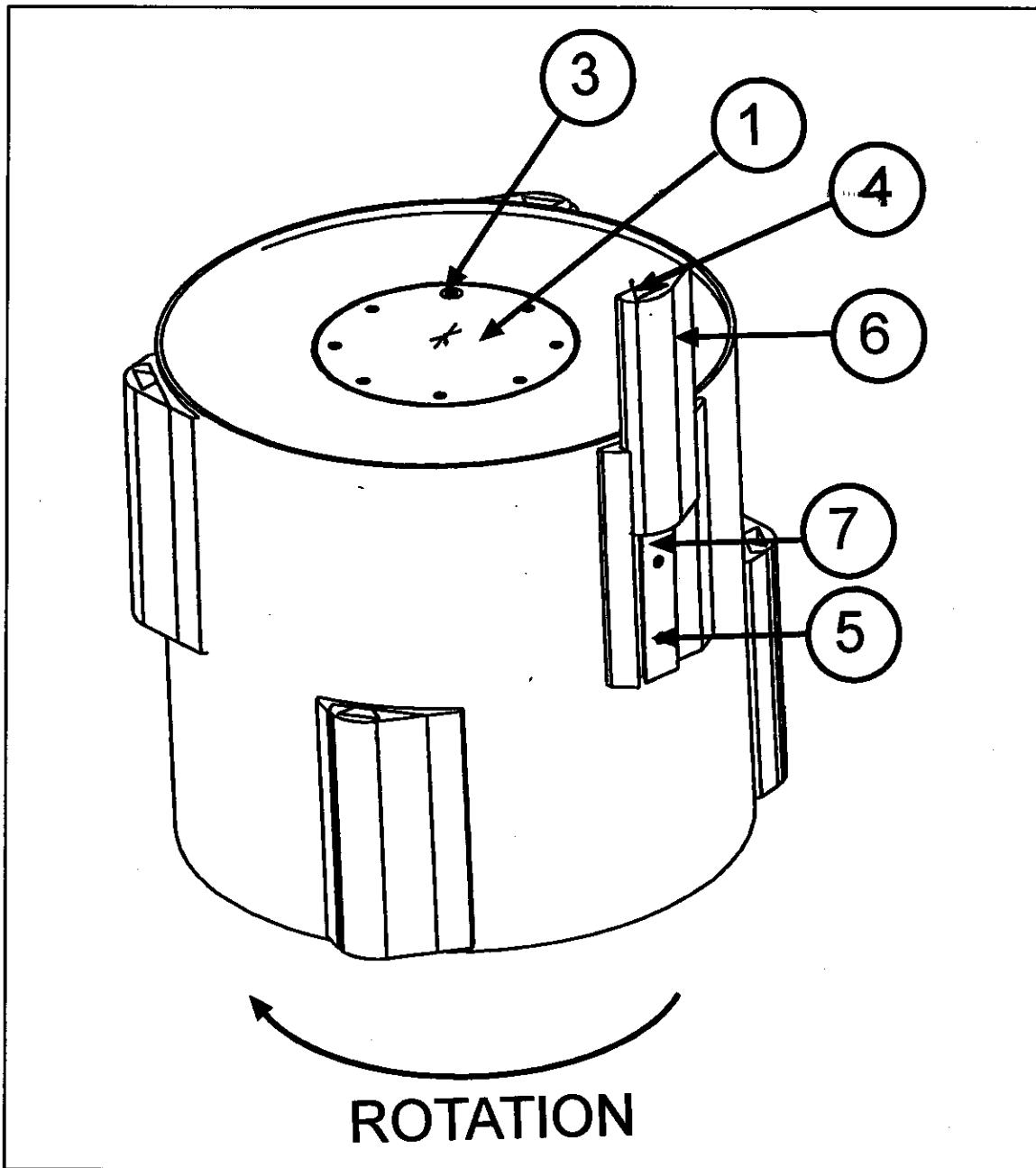
** would require an additional shim

ULTRA PRESSURE SCREEN

MAINTENANCE

FOIL/CYLINDER CLEARANCE SETTINGS (CONTINUATION)

NS III ADJUSTABLE



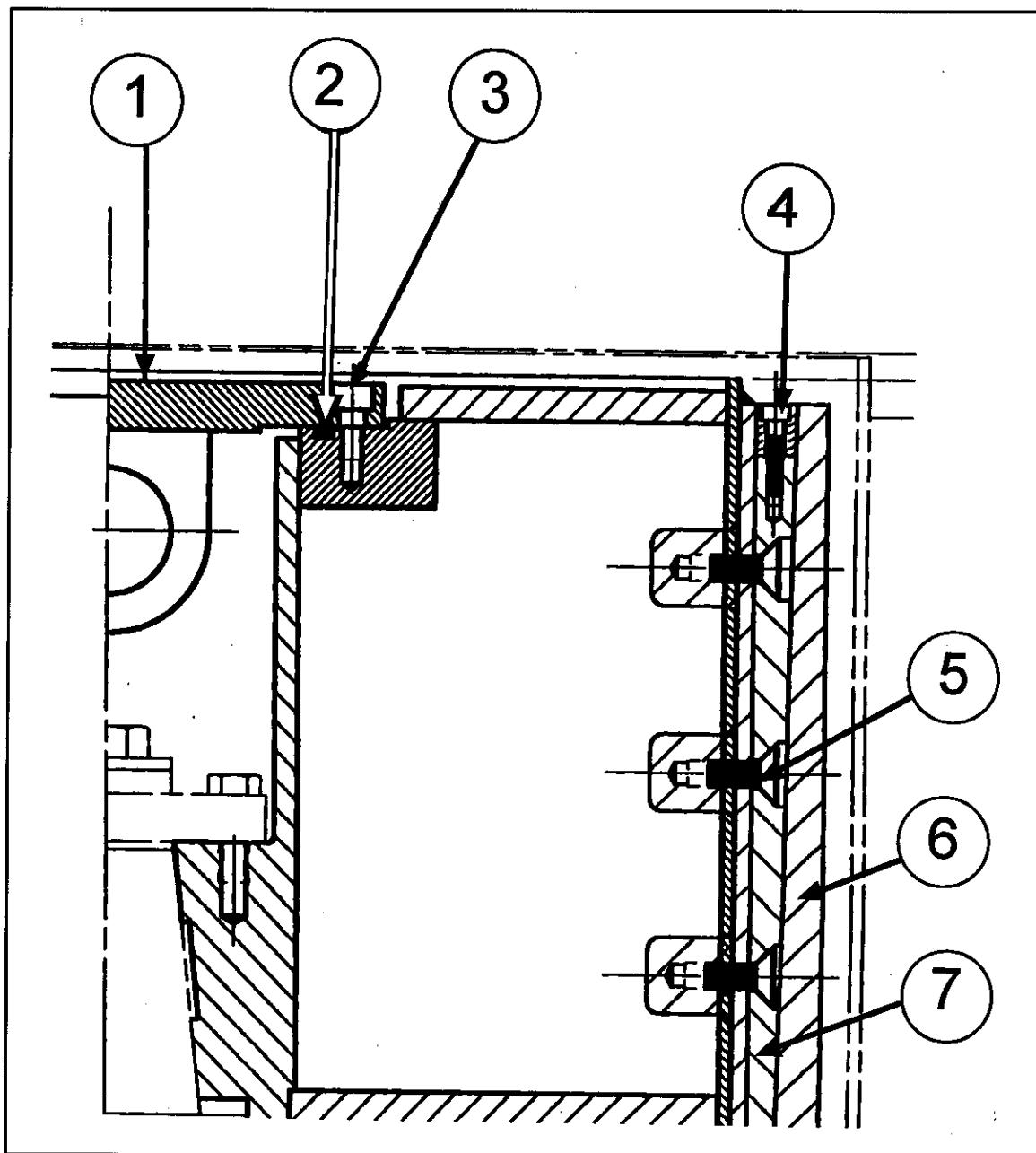
EXTERNAL VIEW OF NS III ROTOR: 1. TOP CAP; 3. CAP SCREW; 4. HOLDING/REMOVAL SCREW; 5. HOLDING SCREW; 6. FOIL; 7. DOVETAIL INSERT (See next page for cross section view with component numbering corresponding to this illustration.)

ULTRA PRESSURE SCREEN

MAINTENANCE

FOIL/CYLINDER CLEARANCE SETTINGS (CONTINUATION)

NS III ADJUSTABLE

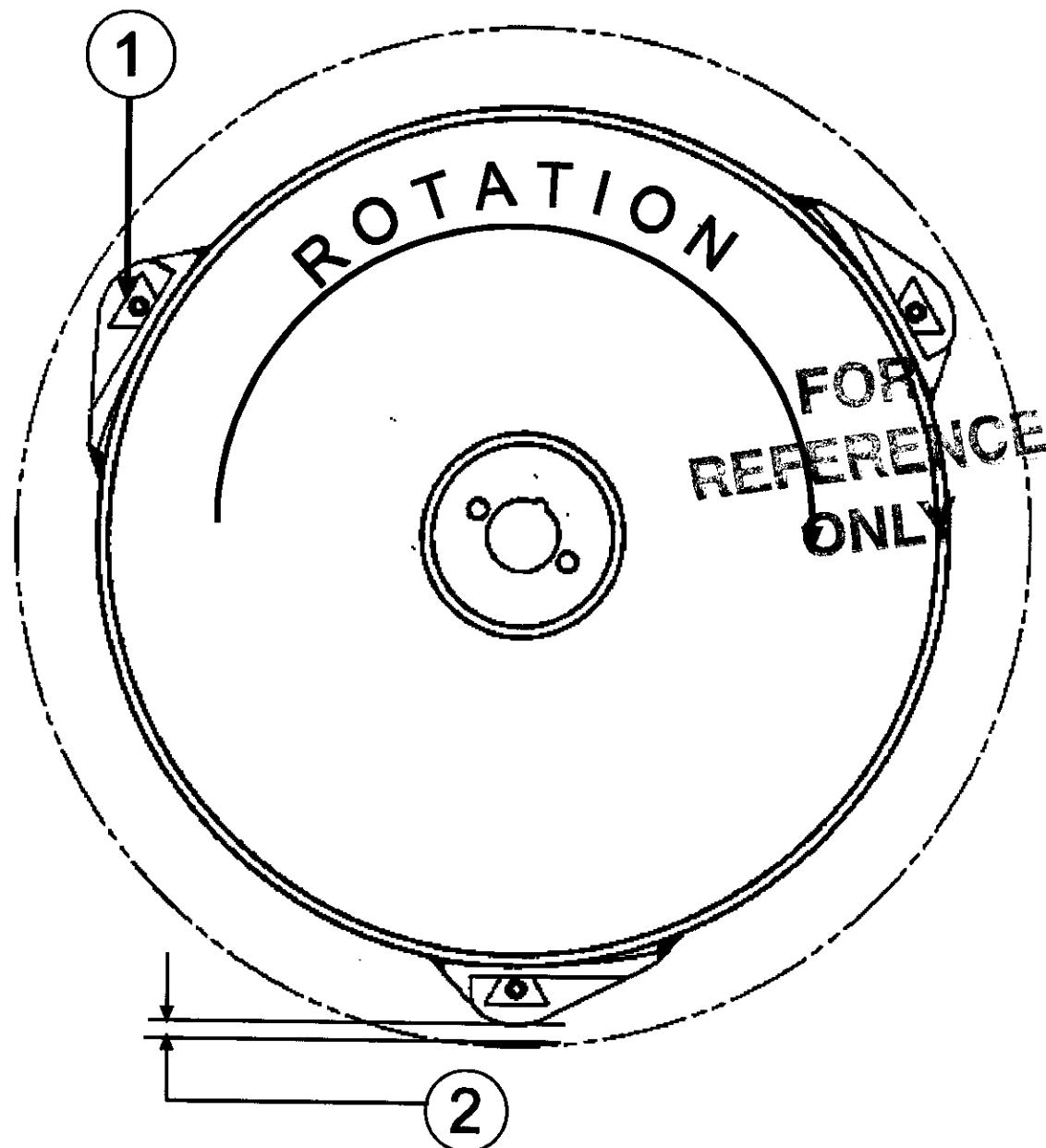


CROSS SECTION OF ROTOR: 1. TOP CAP; 2. SEAL; 3. CAP SCREW; 4. HOLDING/REMOVAL SCREW; 5. HOLDING SCREW; 6. FOIL; 7 DOVETAIL INSERT

MAINTENANCE

FOIL/CYLINDER CLEARANCE SETTINGS (CONTINUATION)

NS III ADJUSTABLE (CONTINUATION)



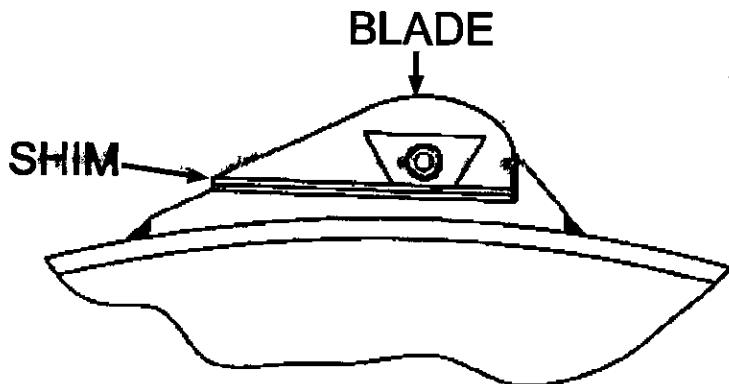
TOP VIEW OF ROTOR: 1. FOIL 2. GAP (BLACK CLAWSON PROVIDES TWO 0.125" SHIMS). CLEARANCE SETTINGS: 0.25", 0.375", AND 0.50"

ULTRA PRESSURE SCREEN

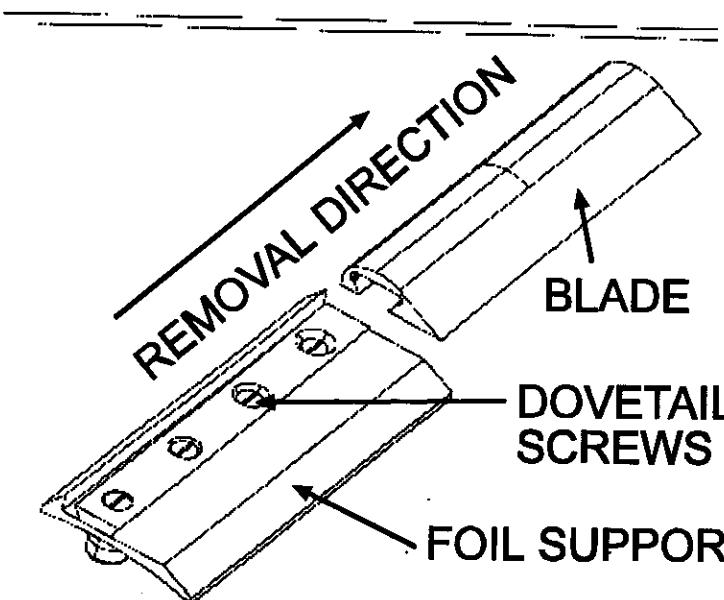
MAINTENANCE

FOIL/CYLINDER CLEARANCE SETTINGS (CONTINUATION)

NS III ADJUSTABLE (CONTINUATION)



CROSS SECTION OF ROTOR



FOIL/DOVETAIL ASSEMBLY

ULTRA PRESSURE SCREEN

MAINTENANCE

FOIL/CYLINDER CLEARANCE SETTINGS (CONTINUATION)

ADJUSTING CLEARANCE BETWEEN FOILS AND CYLINDER

NS Style Rotors

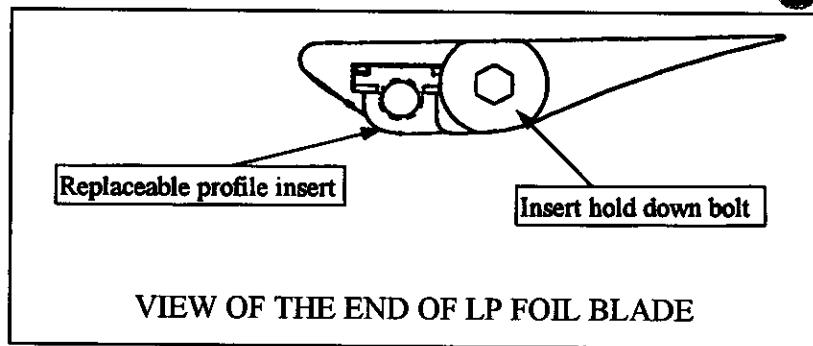
The NS-II drum style rotor does not have adjustable clearance. Clearance is pre-set at the factory to the distances specified previously.

Adjustment procedures for LP style and foil/stud style rotors is presented on the following pages.

LP Style Rotors

LP-I foil blades are designed with replaceable profile inserts that allow maintenance and adjustment of the rotor. Foil clearance is adjusted by adding or removing shims from grooves along each side of the profile insert. The foil is shipped from the factory with two shims in each groove, which sets the clearance between the foil and the cylinder to approximately 0.187". By removing a shim from each groove, the clearance will decrease by .030"; removal of both shims will reduce the clearance by 060". Use the following procedure to remove the insert and adjust the clearance:

1. Remove the insert hold down bolt.



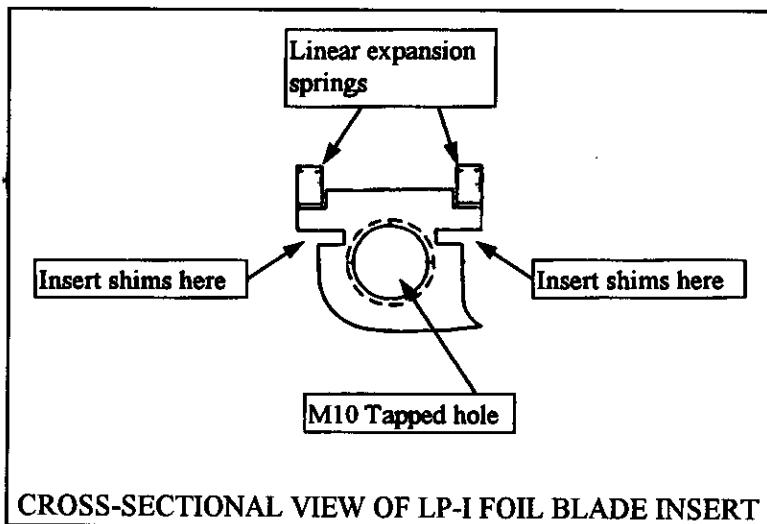
2. Screw a threaded rod, to be used as a puller, into the tapped hole (M10 threads) in the insert.
3. Carefully pull the inserts out of the foil assembly.
4. Add or remove shims on both sides of the profile as necessary to get the correct clearances.

ULTRA PRESSURE SCREEN

MAINTENANCE

FOIL/CYLINDER CLEARANCE SETTINGS (CONTINUATION)

ADJUSTING CLEARANCE BETWEEN FOILS AND CYLINDER (CONTINUATION)



Foil/Stud Style Rotors

Clearance on this style of rotor is set by adjusting the two nuts on the foil stud. Clearance should be checked along the entire length of the foil, and the two studs should be adjusted individually as needed.

ULTRA PRESSURE SCREEN

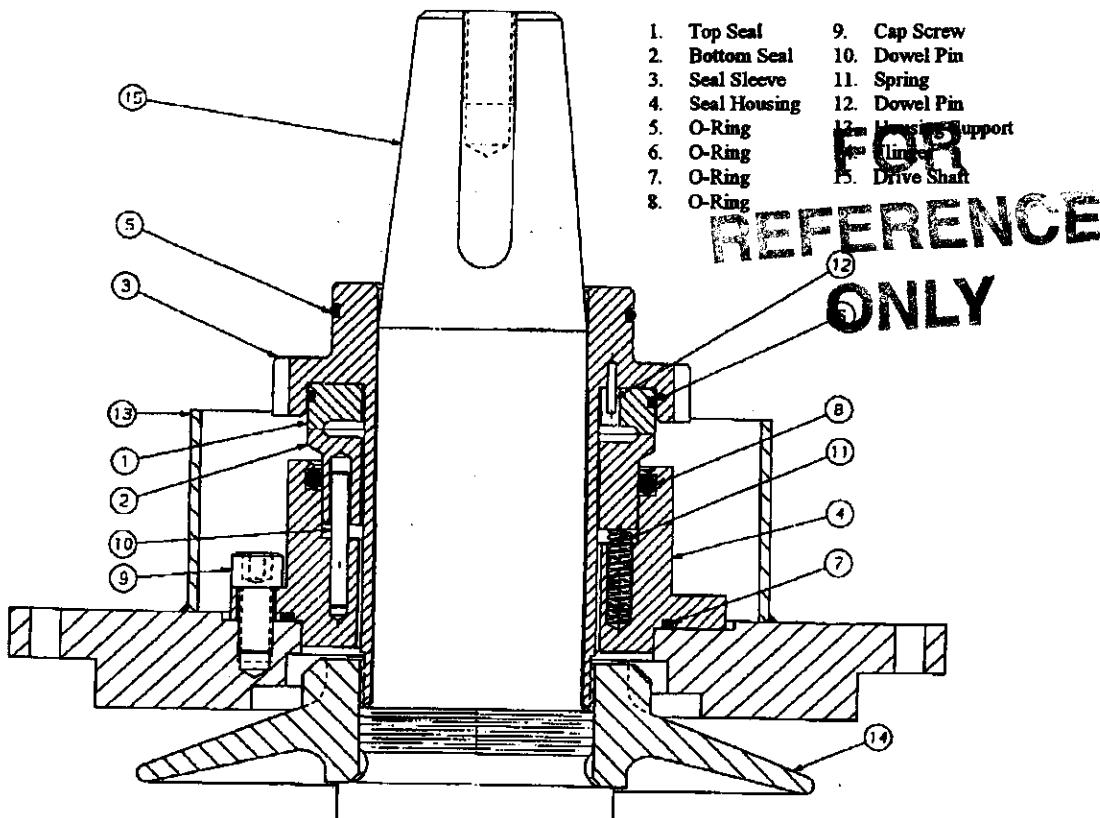
MAINTENANCE

OVERVIEW OF MECHANICAL SEAL

A mechanical seal prevents stock from leaking out of the screen body through the opening around the drive shaft. The mechanical seal operates by means of a rotating seal element against a stationary seal element.

The rotating element is mounted in a flanged sleeve which is driven by the drive shaft. The sleeve is threaded (left hand thread) into a flinger, which in turn is threaded onto the shaft.

The stationary element, and springs to maintain consistent pressure between the two elements, are assembled in a seal housing which mounts on a housing support. The stationary element is prevented from turning by a pin in the housing. The seal housing, sleeve, and both seal elements are sealed with O-rings.



MECHANICAL SEAL (END FACE SEAL) ASSEMBLY

ULTRA PRESSURE SCREEN

MAINTENANCE

REMOVAL OF MECHANICAL SEAL

1. Shut down screen per procedure in Section 7-2 of this manual.
2. Shut off, lock out, and tag out all sources of energy, stock, and water.
3. Remove top cover, rotating element, and cylinder.
4. Remove the flanged shaft sleeve by turning in a clockwise direction (left hand thread).
Note: A spanner wrench is required for sleeve removal.
5. After sleeve is removed, all other parts can be taken out for inspection.
6. Clean and inspect all parts.
7. Replace the springs, and any other worn or damaged parts.
8. Rebuild mechanical seal with the procedure above.

ULTRA PRESSURE SCREEN

MAINTENANCE

ASSEMBLY/REBUILD OF MECHANICAL SEAL

1. Shut down screen per procedure in Section 7-2 of this manual.
 2. Shut off, lock out, and tag out all sources of energy, stock, and water.
 3. Clean and inspect all parts.
 4. Replace the springs, and any worn or damaged parts.
 5. Clean groove on the bottom surface of the seal housing (part #4), then install O-ring (part #7).
 6. Slide the seal housing over the end of shaft and bolt it into place.
 7. Put pin (part #10) into the hole in the seal housing.
 8. Place the springs (part #11) around the perimeter of the housing.
 9. Put the O-ring (part #8) into the groove near the top of the seal housing.
 10. Spread silicone grease on the surface of the O-ring and the outside diameter surface of the bottom seal element (part #2). **Note:** Be very careful not to touch the mating surface of the seal element with **anything!**
 11. Slide bottom seal element over shaft and into place in the seal housing, aligning the pin in the housing with the hole in the seal element.
 12. Install the O-ring (part #6) into the groove in the O.D. of the top seal element (part #1).
 13. Put silicone grease on the outside diameter surface of the top element and the surface on the seal sleeve (part #3) that will come in contact with this surface. **Note:** Be very careful not to touch the mating surface of the seal element with **anything!**
 14. Grease the inside diameter of the seal sleeve and the threads on the seal sleeve.
 15. Place the O-ring (part #5) into the groove on the outer surface of the seal sleeve.
 16. Install the top seal element in the seal sleeve. Take care to align the pin with the keyway in the element.
 17. Slide the top element sub-assembly over the drive shaft, and tighten it by turning counter-clockwise (**left hand thread**). The sleeve must bottom out on the shaft shoulder.
 18. Hand spin the sheave in the operating direction of the screen to be sure that the mechanical seal is seated.
 19. Make sure that coolant water line is connected (if desired) and functioning properly.
- FOR
REFERENCE
ONLY**

ULTRA PRESSURE SCREEN

MAINTENANCE

REMOVING DRIVE ASSEMBLY

1. Shut down screen per procedure in Section 7-2 of this manual.
2. Shut off, lock out, and tag out all sources of energy, stock, and water.
3. Follow procedures for removal of top cover, rotor, and cylinder.
4. Remove all guards.
5. Insert an eyebolt into the tapped hole in the top center of the drive shaft.
6. Hook a sling or chain, connected to an overhead lifting device, through the eyebolt.
7. Remove slack from the overhead lifting device so that the drive will be supported completely when it is released from the screen body.
8. Block or brace under the driven sheave, and have sufficient assistance available to handle the weight of the sheave. (See chart in Section 3-3.)
9. Release the tension on the V-belts.
10. Remove driven sheave from drive shaft by removing the screws that attach it to the sheave bushing. This sheave should be removed straight down from the shaft.



WARNING

Be sure that the driven sheave is supported securely on blocks or braces, and that sufficient assistance is available to handle the weight of the sheave. Failure to follow these safety precautions could result in severe personal injury or death.

11. Remove the sheave bushing by removing the retaining plate and cap screw.
12. Remove the drain pan by removing all bolts holding it to the underside of the screen body.
13. Unhook all grease and coolant lines from the connections on the frame.
14. Remove all bolts connecting the drive to the screen body.
15. Use overhead lifting device to pull the drive straight out of the top of the screen.

ULTRA PRESSURE SCREEN

MAINTENANCE

INSTALLING DRIVE ASSEMBLY

1. Verify that all sources of energy, stock, and water to the screen are shut off, locked out, and tagged out.
2. Install the mechanical seal onto the drive assembly.
3. Screw an eyebolt into the tapped hole in the top of the drive shaft.
4. Using an overhead lifting device with sufficient capacity to lift the weight of the drive assembly, use a sling or chain through the eyebolt to lower the shaft into the screen body.
5. Install the cap screws that connect the drive to the screen body.
6. Replace the drip pan and secure it with the cap screws provided.
7. Connect the lubrication and coolant lines.
8. Install the sheave bushing onto the lower end of the drive shaft.
9. Place the retaining plate in position against the bottom end of the shaft and secure it with the cap screw.
10. Use an appropriate device to lift the driven sheave into position below the drive. **Securely block under the sheave.**



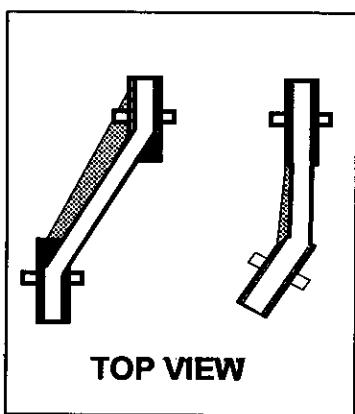
WARNING

Be sure that the driven sheave is supported securely on blocks or braces, and that sufficient assistance is available to handle the weight of the sheave. Failure to follow these safety precautions could result in severe personal injury or death.

11. Secure the sheave in place with bolts provided for attaching the sheave to the bushing. Tighten the sheave according to manufacturer's instructions.
12. Install the V-belts, and align and tighten them as necessary.
13. Install the screen cylinder. Follow procedure in Section 8-4.
14. Install the rotating element. Follow procedure in Section 8-5.
15. Check rotor clearance
16. Install the top cover. **Note: Be sure that O-ring is properly seated in the groove.**
17. Lubricate bearings.
18. Replace all guards.
19. Follow procedure for proper start up.

ULTRA PRESSURE SCREEN

MAINTENANCE

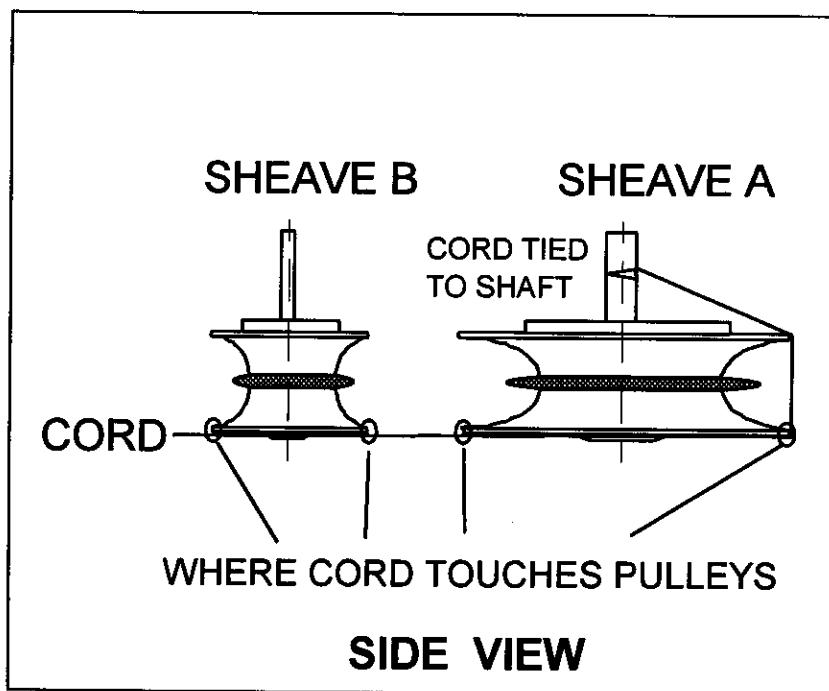


EXAMPLES OF MISALIGNMENT

When a suitable straight edge is not available, misalignment of sheaves can be detected readily with the aid of a cord as shown in the drawing to the right. Assuming that the shafts are parallel, as they should be, a light, strong cord secured around one shaft and held straight and tight along the sides of both sheaves should just touch at all points as shown. Each sheave can be checked by rotating it, and noting whether or not the rim contact with the cord is disturbed. If either of the rim contacts pull away, it indicates misalignment which must be corrected to obtain expected belt and equipment life.

Misapplied or incorrectly assembled belts can over-load and cause overheating of the windings or the bearings. Follow instructions of the V-belt manufacturer carefully. A noisy drive should be corrected at once. Visual inspections are also helpful in finding trouble before a breakdown occurs. Rubber and some other belts are affected by oil and other liquids. For oily locations, use oil resistant belts. If the location is oily or dirty, use belts which are resistant to all petroleum derivatives. In case of overheating or bearing failures in the motor or drive shaft bearings, check the belts as a possible cause.

When more than one belt is used on the same sheave they must all be matched (as to length). If one belt fails, the complete set of belts must be replaced with a set of matched belts. This is necessary to distribute the load among all the belts. Bearing overloading results from the use of belts of varying lengths on the same sheaves. It is possible to pull belts so tight that quick failure of the bearings or shafts will result. Sheave must be in line to keep from overloading the motor, as well as to get satisfactory service life from the equipment.



CORD METHOD FOR FINDING SHEAVE MISALIGNMENT

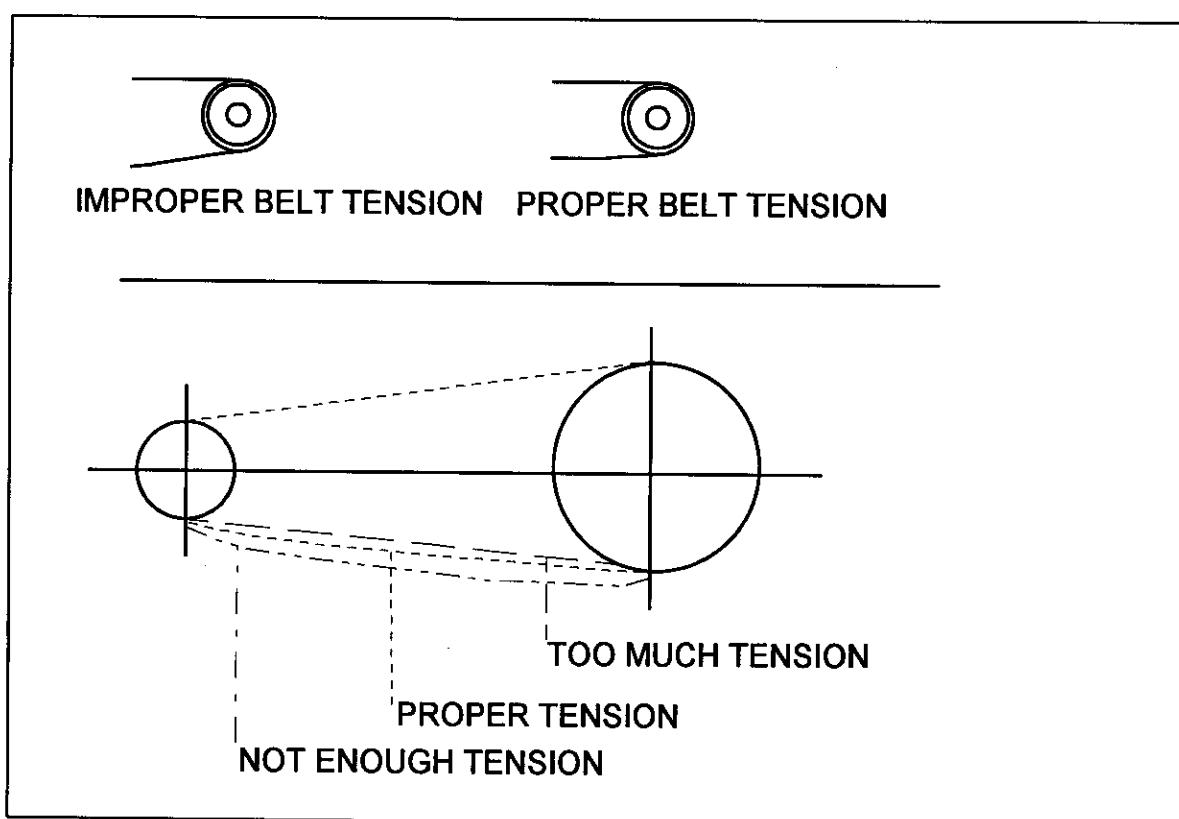
ULTRA PRESSURE SCREEN

MAINTENANCE

Proper belt tension is important to provide full grip around the sheaves. While a V-belt does not depend on tension to provide grip, it is dependent on tension for the extent of its grip. As you can see from the diagrams, inadequate tension allows a V-belt to hang away from the bottom of a sheave, reducing the arc of contact. A properly adjusted V-belt is wrapped around the sheave in a full arc. Proper contact is important because horsepower ratings for the different sizes of V-belts are based on a 180 degree arc contact. Actually, this arc varies from one drive to another and allowance is made for the variation when the drive is engineered.

When a properly engineered drive is delivered to you, you must maintain that proper tension and proper contact arc. Otherwise, the belts will slip. Because many mills have no means to measure equipment in terms of pounds-pull, common practice is to measure by rule of thumb. Some of these rules are more superstition than science. Some are good. Perhaps the best one is this:

"A slack V-belt feels dead when you thump it with your hand; a properly taut V-belt has alive springiness."



BELT TENSION

ULTRA PRESSURE SCREEN

MAINTENANCE

V-Belt Condition Check List

Condition	Possible Cause	To Correct
Belt slip (Sidewalls glazed)	<ul style="list-style-type: none"> • Oil on belts • Not enough tension 	<ul style="list-style-type: none"> – Replace belts – Correct tension
Belt turned over	<ul style="list-style-type: none"> • Broken cord caused by prying • Impulse loads • Misalignment • Worn Sheave grooves • Excessive vibration 	<ul style="list-style-type: none"> – Replace belts correctly – Apply proper tension – Realign drive – Replace sheaves – Check drive and equipment mounting – Consider banded belts
Mismatched belts	<ul style="list-style-type: none"> • New belts installed with old 	<ul style="list-style-type: none"> – Replace belts in matched sets
Sheave grooves worn unevenly or improper groove angle	<ul style="list-style-type: none"> • Shafts not parallel 	<ul style="list-style-type: none"> – Replace sheaves – Align drive
Belt breaks	<ul style="list-style-type: none"> • Shock loads • Heavy starting loads • Belt pried over sheaves • Foreign objects in drive 	<ul style="list-style-type: none"> – Apply proper tension – Apply proper tension – Use compensator starting – Replace belts correctly – Provide drive shroud
Belt wear	<ul style="list-style-type: none"> • Sheave grooves worn • Mismatched belts • Belt slippage • Sheaves misaligned • Oil or heat condition 	<ul style="list-style-type: none"> – Replace sheaves – Replace with matched belts – Increase tension – Align sheaves – Eliminate oil – Ventilate drive

**FOR
REFERENCE**

ONLY

ULTRA PRESSURE SCREEN

SERVICE PARTS

We recommend that you keep the following parts on hand for repairs and routine maintenance. This list does not include specific part numbers for your unit. You should refer to your Certified drawings for individual part numbers or, if you would like a list of part numbers for your unit, contact:

Customer Service Department
Black Clawson Company
Shartle Division
605 Clark Street
Middletown, OH 45042
Phone: (513) 424-7400
Fax: (513) 424-1168

IMPORTANT: When ordering spare parts or requesting a parts list, refer to the Certified Prints and give the item number, drawing number, and part description, along with the product identification numbers. Product identification numbers include the serial number, shop order number and model number.

RECOMMENDED SPARE PARTS

DESCRIPTION	RECOMMENDED QUANTITY FOR STOCK
Cylinder	One (1) of each configuration in use
End face seal kit, less housing	One (1) per unit
Top cover o-ring	One (1) per unit
Spare drive assembly	One (1) per unit
Options for rotating element (recommend appropriate mix based on configurations in system)	<ul style="list-style-type: none">• Foil blades for foil/stud type• Foil cage assembly w/4 blades• LP style rotor• Stainless steel insert kit for LP rotor• NS style rotor <ul style="list-style-type: none">• One set per unit size (four blades = one set)• One per unit size• One per unit size• One set per unit size• One per unit size

ULTRA PRESSURE SCREEN

CUSTOMER INPUT

As a Black Clawson customer, you can help us toward our goal of providing high quality manuals that meet or exceed our customers' expectations. We would like to hear from you if you have suggestions or comments that would help us toward this effort. From procedures to safety issues and other areas, your input and concerns are important to us. Perhaps we haven't described something as much as you think we should have. Maybe you have a technique that you'd like to share with us. If you have input that would help us improve our manuals, write or fax your comments to us:

Black Clawson Company
Technical Writing/Shartle Division
605 Clark Street
Middletown, OH 45042
Fax: (513) 424-1168

ULTRA PRESSURE SCREEN

EQUIPMENT DETAIL

	I	II	III
Material of construction	316L S. S. for all wetted parts. Motor base and flanges are mild steel.	316L S. S. for all wetted parts. Motor base and flanges are mild steel.	316L S. S. for all wetted parts. Motor base and flanges are mild steel.
Outside dimensions L. x W. x H.	71" x 32" x 62"	81" x 41" 69"	88" x 49" x 92"
Headroom clearance, not including lifting device	67"	74"	97"
Surface finish	Glass bead blasted, unpainted (Base and flanges are painted)	Glass bead blasted, unpainted (Base and flanges are painted)	Glass bead blasted, unpainted (Base and flanges are painted)
Seal design	Mechanical seal	Mechanical seal	Mechanical seal
Seal lubrication	Cooling water lines installed, piped to bulkhead, $\frac{1}{4}$ " NPT. Requires 1-3 gpm at 10 psi above inlet pressure.	Cooling water lines installed, piped to bulkhead, $\frac{1}{4}$ " NPT. Requires 1-3 gpm at 10 psi above inlet pressure.	Cooling water lines installed, piped to bulkhead, $\frac{1}{4}$ " NPT. Requires 1-3 gpm at 10 psi above inlet pressure.
Inlet Nozzle	6" dia., 150 lb. ASA flanged	10" dia., 150 lb. ASA flanged	14" dia., 150 lb. ASA flanged
Accept Nozzle	8" dia., 150 lb. ASA flanged	12" dia., 150 lb. ASA flanged	18" dia., 150 lb. ASA flanged
Reject Nozzle - Ultra-V Screen	4" dia., 150 lb. ASA flanged	4" dia., 150 lb. ASA flanged	6" dia., 150 lb. ASA flanged
Maximum pressure rating	75 PSI	75 PSI	75 PSI
Maximum temperature	200 degrees Fahrenheit	200 degrees Fahrenheit	200 degrees Fahrenheit

ULTRA PRESSURE SCREEN

EQUIPMENT DETAIL

COMPONENT WEIGHTS (IN POUNDS)

	I	II	III
Cover	140	235	300
Drive Assembly	460	577	597
Standard Foil Cage (4 foils)	210	373	440
Additional Standard Foils (each)	9	17	28
LP Rotor	35	70	120
NS Rotor	150	225	350
Cylinder	200	300	420
Shipping Weight	2700	3600	5100

ULTRA PRESSURE SCREEN

EQUIPMENT DETAIL

DESIGN FEATURES

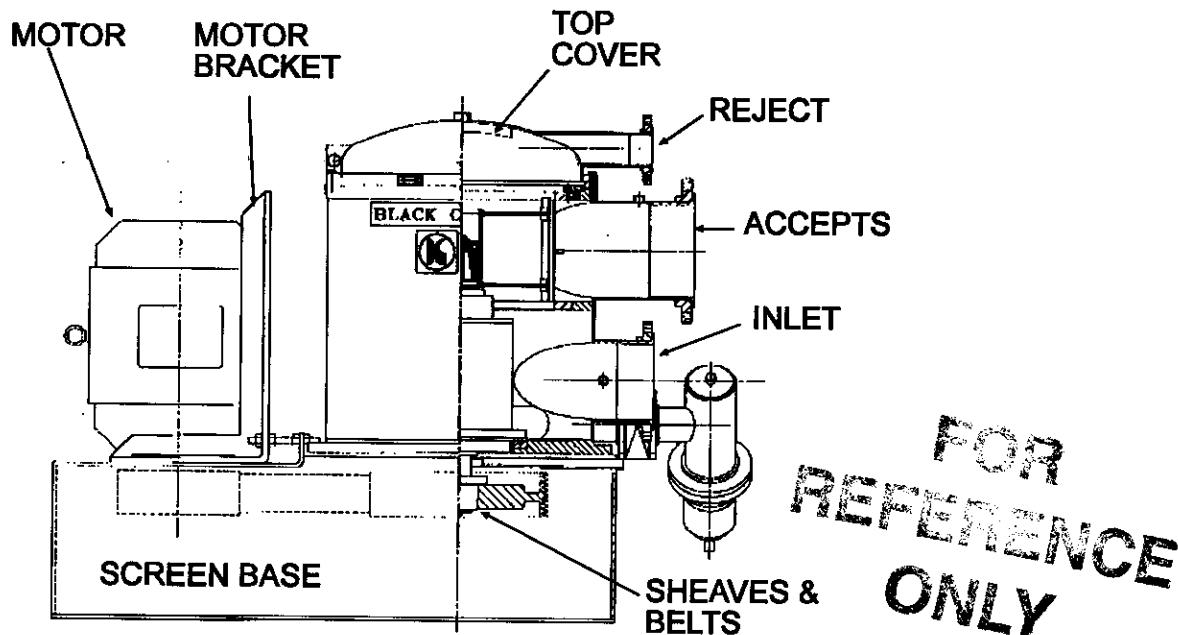
- The inlet pipe is at the bottom while the discharge pipe is at a higher level, thereby eliminating pipe crossing.
- Heavy, rugged base with open design provides easy access to belts, sheaves, and retainer bolts.
- Heavy duty drive and seal assembly can be removed as a unit, reducing downtime for required maintenance.
- Easy access to cylinder and rotor for cleaning, adjustment, inspection, and removal.
- Designed for minimum headroom requirement for cylinder removal.
- All stainless steel construction, except base.
- Heavy debris is rejected to a junk box in the bottom of the unit, preventing wear and damage to the rotor/cylinder and minimizing downtime.
- Lightweight debris and air is removed immediately through a top reject.
- High efficiency. Debris moves quickly through the screening zone, substantially reducing the possibility of recirculation.
- Low inlet pressure requirements.
- Design of inlet chamber eliminates fiber hang-up or stringing.
- Screen cylinder can be inverted to extend the life of the contoured surfaces

ULTRA PRESSURE SCREEN

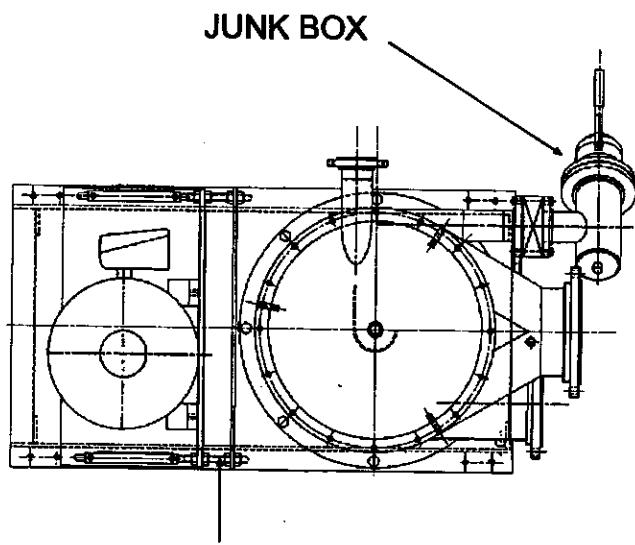
EQUIPMENT DETAIL

The Ultra Pressure screen designs are configured to permit added flexibility to your mill floor plan. When rearrangement or relocation of a screen is required, the unit can be reconfigured by either the mill or Black Clawson.

The following diagrams illustrate the various configurations available.



SIDE VIEW



TOP VIEW