ACCURSHEAR

INSTRUCTION MANUAL

625010

NOTICE TO EMPLOYERS AND OWNERS

This User Manual provides you with information and instruction on how to operate, install, and service your shear. The manual promotes and advances the extremely important requirements of shear safety in your workplace.

As an employer/owner, you have managerial authority to direct and control the acts of your employees and you have definite legal responsibilities for their safety. You also have the sole control over the point of operation of every metal-forming system in you plant. You have the responsibility to provide and monitor this safeguarding. A shear manufacturer can only convey the knowledge of instructions, requirements, and specifications relating to shear safety and point of operation safeguarding. You have the legal and moral responsibility to abide by and implement these instructions, requirements, and specifications. If you fail to do so, serious injury may occur to your employees.

A shear manufacturer has no control over your day to day operations. That is why legal responsibility for point of operation safeguarding under Federal and State/Provincial Regulations and the various standards clearly rests with you, as the employer. Failure on your part to meet point of operation safeguarding requirements, to properly monitor their use, to implement and supervise a point of operation safety program, and to service and maintain your machines could expose you to a substantial liability for worker injuries.

Your employees should never have any part of their body in the point of operation of any metal-forming equipment at any time while the machine is energized or moving.

Warning signs are provided and attached to all Accurshear machines in conspicuous places at eye level. Additional labels are available from your Accurshear/Accurpress representative. This manual and the supplemental Accurpress/Accurshear Safety manual should be carefully read and understood before operating your shear. A copy of the Safety Manual is available from your Accurshear/Accurpress representative. Once again, you are responsible for point of operation guarding, not the manufacturer of the machine. We hope the information in this manual will be a help to you in safely operating and caring for your shear.

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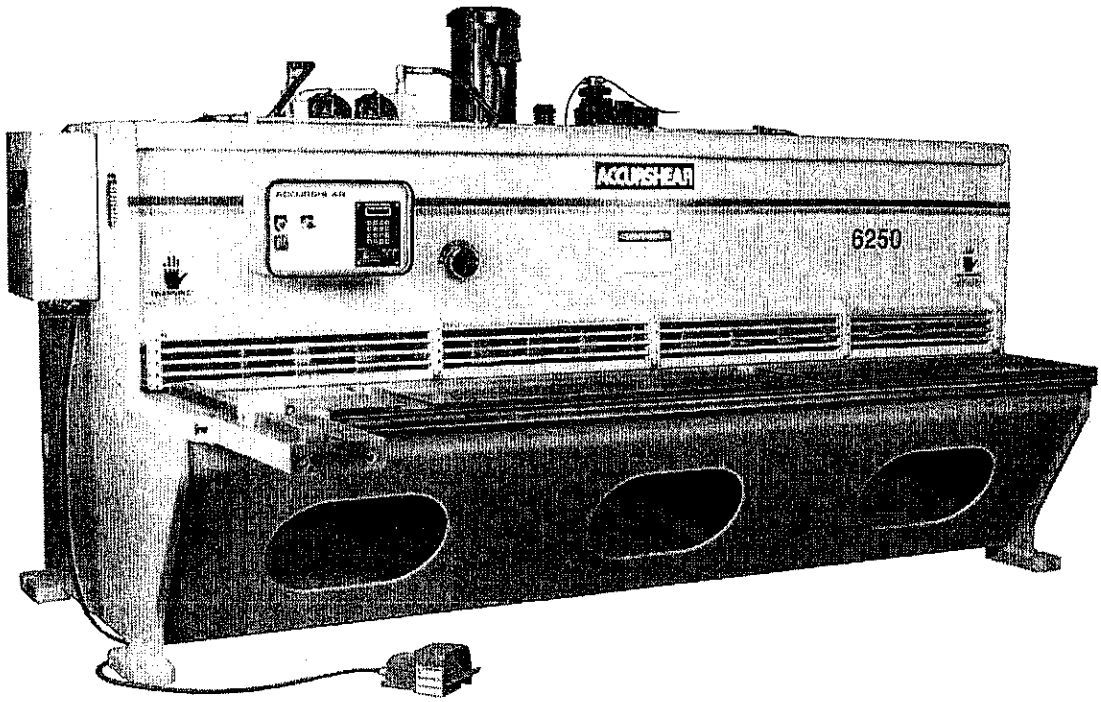
1. ACCURSHEAR GENERAL DESCRIPTION



The ACCURSHEAR is a hydramechanical sheet metal/plate shear. Most models are equipped with standard control features that include the operator console, programmable BG1 backgauge control, and manual blade gap adjustment. Features such as power blade clearance adjustment, and material handling and support systems are optional.

Two hydraulic cylinders supply the required shearing force. They are synchronized by a torque tube interconnecting the rocker arms to give constant force throughout the cut.

The hydraulic system uses a fixed displacement hydraulic pump which supplies the pressurized fluid flow to the hydraulic holddown cylinders and shear ram cylinders in a controlled shearing sequence. During the shearing cycle, plate to be sheared is first clamped by the holddown cylinders. The system senses this holddown pressure and then sequences to the cutting cycle. The holddowns release at the bottom of the cut cycle allowing the operator to immediately remove the sheared part.

A pressure relief valve protects the hydraulic system. This safeguard prevents the hydraulic components and shear frame from overload when shearing is attempted which is beyond the capacity of the ACCURSHEAR.

2. ACCURSHEAR INSTALLATION

2.1. INSPECTION

Upon delivery, inspect the shear thoroughly. Report observed shipping damage to the carrier and the dealer immediately. Should the damage be considered significant, do not attempt to start the shear until the dealer or factory has been notified. Submit a formal claim to the carrier including photographs if possible.

NOTE: All damage in transit must be claimed against the carrier.

2.2. LIFTING

Two different methods may be used to move the shear. The shear can be hoisted by a crane using a spreader bar with slings and clevis connections to lifting cutouts in each side frame. The second method is with a forklift truck of sufficient capacity, lifting from the front of the shear under the bed. The shear is front heavy and should always be secured to the forklift mast when moving.

2.3. PLACEMENT

Place the ACCURSHEAR on a reasonably level concrete floor suitable to support the shear weight. Level the shear and shim under the floor mounting pads as required. Precision leveling is not necessary. Do not attempt to pull the shear down to the floor. Fasten with suitable masonry anchors using the shear base as a template for anchoring hole locations.

NOTE: Refer to the "FOUNDATION DIMENSIONS" in the TECHNICAL SPECIFICATIONS section of the manual.

2.4. PROTECTIVE RUST INHIBITOR REMOVAL

All unpainted machined surfaces are protected with rust inhibitor. Remove this with solvent and wiping cloths prior to shear startup.

2.5. HYDRAULIC SYSTEM OIL

The ACCURSHEAR is normally shipped without hydraulic fluid. Refer to hydraulic fluid specifications as outlined in the TECHNICAL SPECIFICATIONS section before filling the reservoir. The fluid level

should be approximately two inches below the top of the reservoir. If the ACCURSHEAR was specified to be shipped with fluid, remove the hydraulic filler cap seal prior to starting the main hydraulic pump motor.

2.6. ELECTRICAL POWER CONNECTION

Verify that the supply voltage corresponds to ACCURSHEAR nameplate specification. Before starting the main motor, check reservoir fluid level, and turn the JOG/MAN/AUTO selector switch to "JOG". Push the "START" button and establish that the main motor rotation corresponds to the directional arrow on the main motor frame.

2.7. INITIAL START-UP

The ACCURSHEAR is normally shipped with the ram in the down position.

- Make sure the JOG/MAN/AUTO selector switch is in the "JOG" position.
- Start the pump motor and let it run while checking for leaks.
- Set blade gap to maximum setting (thickest material).
- Carefully jog the ram upward by quickly turning the JOG/MAN/AUTO selector switch from "JOG" to "MAN" and then back to "JOG".
- Check blade clearance at each stopping point to be sure the blades are not rubbing.

2.8. BLADE GAP CHECK

Before shearing, check the blade gap and adjust if necessary. See section 7.1.6 BLADE GAP ADJUSTMENT.

2.9. SQUARING ARM INSTALLATION

The squaring arm is removed for shipping and must be reinstalled. Mount the extension channel flush with the top of the table so sliding plate will not catch, and align the rule groove. As it is installed, the squaring bar must be straightened and squared to the lower blade. See section 7.1.5 SQUARING ARM BAR ADJUSTMENT. Bolting the legs, if applicable, to the floor gives much more rigidity to long squaring arms.

3. SAFETY RECOMMENDATIONS

The Owner/Employer, Operator/Helper are responsible to fully read this ACCURSHEAR manual prior to startup to familiarize themselves with the shear functions and operator controls.

Operators/Helpers and maintenance personnel should also read and understand the use, maintenance, and safeguarding requirements of the American National Standard for Machine Tools-Shears-Safety Requirements for Construction, Care, and use ANSI B11.4-1983 or later.

3.1. SAFEGUARDING

All ACCURSHEARS are equipped with point of operation guarding.

Point of operation is the area where the work piece is clamped and actually being sheared.

The Owner/Employer is responsible to ensure that point of operation safeguarding is installed and maintained. Safety/Warning decals installed on the ACCURSHEAR at strategic locations must never be removed.

3.2. OPERATIONAL SAFETY

The Owner/Employer is responsible to train Operators and their Helpers prior to operating an ACCURSHEAR. Safe work practices must be observed at all times.

3.2.1. SAFEGUARDING

Check that all factory installed safeguarding is in place at all times.

3.2.2. OPERATOR/HELPER AWARENESS

Operators and Helpers must maintain a keen awareness of the shearing process to maintain safe work practices. They must never place any part of their body within the point of operation. They must wear appropriate clothing. Loose clothing could possibly be caught in the machine mechanism.

3.2.3. SAFETY HAND TOOLS

Hand tools are recommended for small part removal from the point of operation.

3.2.4.OPERATOR/HELPER POSITIONING

Operators and helpers must avoid hazardous positions when sheet metal sheets or plates are being positioned by power material handling. Personnel must not enter the shear 'drop' area during the shearing process to avoid being struck by the sheared blanks.

3.2.5.TOOL AND ACCESSORY STORAGE

Store accessory tools used at the shear in a convenient designated location to prevent their being drawn into the shear point of operation if left on the shear table. Personal injury and damage to the equipment can result from this occurrence.

3.2.6.SHEAR BLADE AREA

Keep the blade and holddown area (point of operation) clear of loose material and tools.

3.2.7.WORK AREA

Keep the shear Operator's/Helper's floor work area clear of scrap, trim material, and general debris.

3.2.8.UNATTENDED SHEAR

The shear control should be turned OFF and locked out when not in use to prevent unauthorized shearing of unqualified sheet material.

3.2.9.SHEARING HARD MATERIAL

Attempts to shear brittle or heat treated material can cause the material and/or the shear blades to fracture violently causing injury to operators or damage to the equipment.

3.3. SHEAR BLADE SAFETY

3.3.1. MAIN POWER SUPPLY

Before removing or installing shear blades insure that a main power safety lockout procedure is in effect and followed.

3.3.2. SHEAR BLADE HANDLING

Shear blades are heavy and can be awkward to lift by hand. Proper lifting equipment or sufficient personnel must always be used for the weight involved. **Blade edges are very sharp -- wear protective gloves!**

3.3.3. CLEANING SHEAR BLADE SURFACES

Always clean the shear blades and mating surfaces with suitable cleaner solvent prior to installation.

3.3.4. SHEAR BLADE FASTENING

Shear blades are secured to the blade holder location with special plow bolts. Torque blade bolts to 70-80 ft lbs. Over-tightening bolts may crack a blade.

3.3.5. OPERATOR/HELPER PERSONAL SAFETY

Never place any part of the body through the shear blade area.

3.4. ACCURSHEAR MAINTENANCE SAFETY

3.4.1. WARRANTY MAINTENANCE

SHEARPRESS SALES neither assumes nor authorizes any other person to assume for SHEARPRESS SALES any liability or expense in the replacing of parts or servicing of ACCURSHEAR within the warranty period except when such expense is authorized in advance by SHEARPRESS SALES.

3.4.2.MAINTENANCE PERSONNEL

The Owner/Employer is responsible for the correct training of maintenance personnel and their helpers prior to operating an ACCURSHEAR to insure that safe work practices are maintained at all times.

It is the responsibility of the Owner/Employer to ensure that only competent personnel inspect, care for, or operate the ACCURSHEAR when maintenance or service work is performed.

3.4.3.SHEAR RAM BLOCKING

The shear ram should always be at the bottom of its stroke or blocked up before attempting any service or maintenance. This is especially true if service work is to be done to the hydraulic system.

3.4.4.MAIN POWER LOCKOUT

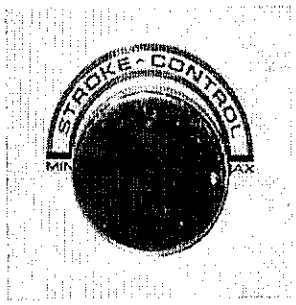
Never service the ACCURSHEAR without first turning the main power "OFF" and locking out the disconnect switch.

4. OPERATING CONTROLS

4.1. DESCRIPTION OF CONTROLS - MECHANICAL

4.1.1. SHEAR RAM STROKE CONTROL

Figure 4.1-1



The shear ram stroke control is adjacent to the front console. The adjustable cam is designed to activate the DOWN limit switch thus controlling the length of the cut stroke. Shortening the stroke will increase shearing speed for small parts.

4.1.2. SHEAR SQUARING ARM

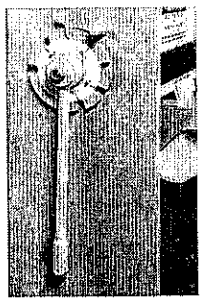
The squaring arm is a fixed reference against which the shear operator can position material to cut blanks with edges that are 90° when sheared. The squaring arm is available in modular 4', 6', 8', 10', and 12' lengths. The squaring arm is equipped with an inch/metric scale and a moveable stop for shearing multiple pieces.

4.1.3. SHEAR BACKGAUGE T-BAR

The backgauge T-bar has adjustment points to enable field straightening. The backgauge T-bar is also adjustable at the swing arm mounting points for parallelism to the lower shear blade.

4.1.4.ADJUSTABLE BLADE CLEARANCE

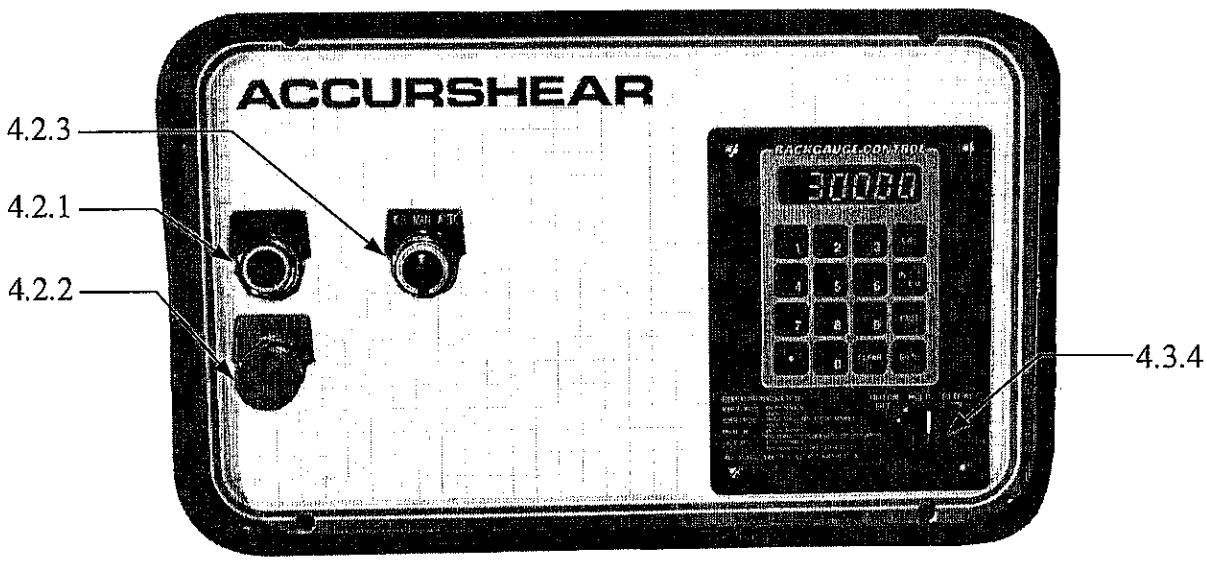
Figure 4.1-2



A lever on the end of the shear is connected by roller chains to eccentric cams that control blade clearance. These settings are a guide for mild steel cutting. It is recommended that the operator experiment with different settings for different material to obtain the optimum cut quality. For example, stainless steel usually requires a smaller gap than mild steel.

4.2. DESCRIPTION OF CONTROLS - ELECTRICAL

Figure 4.2-1



4.2.1.START BUTTON

The "START" button energizes the main motor contactor when pressed. This button is a momentary contact type of push-button.

4.2.2.STOP BUTTON

The "STOP" button de-energizes the main motor contactor when pressed.

4.2.3.JOG/MAN/AUTO SELECTOR SWITCH

4.2.3.1.JOG MODE

The shear ram will cycle downward when the footswitch is depressed but will stop and hold position when the footswitch is released or the ram DOWN limit is reached. The ram will not rise. This mode is used to set blade gap.

4.2.3.2.MANUAL MODE

The shear ram will cycle downward when the footswitch is depressed until the DOWN limit switch is reached which will then stop the ram. The shear ram will return to the up limit switch if the footswitch is released at any point in the shear cycle.

4.2.3.3.AUTO MODE

The shear ram will continuously cycle between the UP and DOWN limits as long as the footswitch is depressed. The shear ram will return to the UP limit switch if the footswitch is released at any point in the shear cycle.

4.2.4.FOOTSWITCH

The footswitch enables the shear operator to control the shearing cycle. The footswitch is equipped with a safety treadle cover as well as a treadle latch to prevent inadvertent operation by falling objects.

Pressing the footswitch initiates the holddown cylinders and the shear ram down sequence.

Release of the footswitch will release the holddown cylinders and initiate ram upward motion to the UP limit switch in the AUTO or MAN selector switch positions.

4.2.5.DISCONNECT SWITCH

A manually operated disconnect switch is provided on the door of the electrical box to isolate the main supply power to the shear. This switch also prevents unauthorized entry to the main electrical enclosure while the switch is in the "ON" position. The operator

handle must be locked in the "OFF" position when the shear is being serviced or during installation of shear blades.

4.2.6.INDEPENDENT HOLDDOWN SELECTOR SWITCH (OPTIONAL)

The holddown cylinders will activate when the independent holddown switch is turned to MAN. This feature permits clamping the material and verifying the position of the cut line prior to cutting. The holddown clamps release when the selector switch is turned to AUTO.

4.2.7.POWER BLADE CLEARANCE SELECTOR SWITCH (OPTIONAL)

The power blade clearance selector switch provides six blade gap settings marked by material thickness to be sheared. Setting the selector switch to a new material thickness setting initiates the blade clearance drive motor to adjust the shear blade gap. The drive motor stops when the blade gap selection has been reached and is indicated by the green indicator light.

4.2.8.BLADE GAP SETTING INDICATOR LIGHT (OPTIONAL)

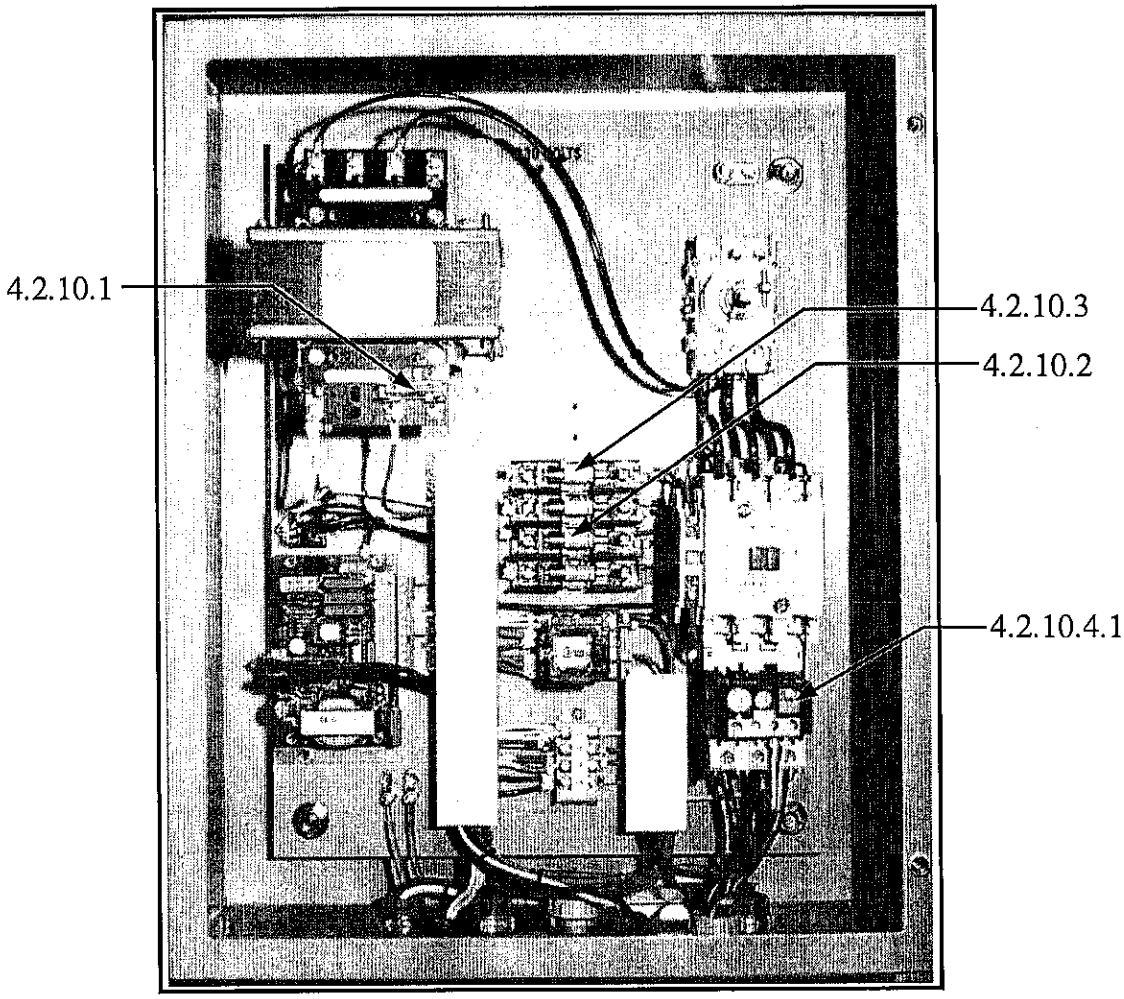
The indicator lamp is lighted green when the blade gap is in the position corresponding to the power blade gap selector switch setting. The lamp is not illuminated when power blade gap drive motor is energized changing the setting or if the drive motor is disabled out of position due to the motor overload relay trip.

4.2.9.SHEET SUPPORT SELECTOR SWITCH (OPTIONAL)

When this switch is turned OFF, the sheet support arms will remain down. In the ON position, the arms will raise automatically as needed by the size of the cut part.

4.2.10.ELECTRICAL SYSTEM OVERLOAD PROTECTION

Figure 4.2-2



4.2.10.1.SHEAR CONTROL CIRCUIT

The control power fuse protects the control circuit and shadow lights in the event of an overload. The fuse is located on the transformer inside the main electrical box. If the fuse has burned, determine the cause before replacing it and restarting the main motor.

4.2.10.2.BG1 BACKGAUGE POWER CIRCUIT

The BG1 backgauge drive circuit is protected by separate 20 amp fuses in the main electrical box.

4.2.10.3.OIL COOLER FANS

Two 1 amp fuses protect the oil cooler fan motors.

4.2.10.4.MOTOR OVERLOADS

4.2.10.4.1. HYDRAULIC PUMP DRIVE MOTOR OVERLOAD

The hydraulic pump drive motor is an AC electric motor that is protected by a motor starter overload relay. This device is located in the main electrical box coupled to the motor contactor. This protective device is reset by a manual button in the event of motor overload.

4.2.10.4.2. POWER BLADE CLEARANCE DRIVE MOTOR OVERLOAD (OPTIONAL)

The power blade clearance motor is an AC electric motor that is protected by a motor starter overload relay. This device is located in the main electrical box coupled to the power blade clearance motor contactor. This protective device is reset by a manual button in the event of motor overload.

4.2.11.LIMIT SWITCHES

4.2.11.1.SHEAR RAM UP LIMIT

The UP limit switch stops the shear ram up travel. Incorrect adjustment to this switch may cause damage to the hydraulic cylinders bottoming-out.

4.2.11.2.SHEAR DOWN LIMIT

The DOWN limit switch stops the shear ram down travel. Incorrect adjustment to this switch may cause damage to the hydraulic cylinders over-extending the cylinder stroke.

4.2.11.3.BG1 BACKGAUGE FRONT LIMIT

The backgauge front limit switch, located on the underside front of the backgauge ways, limits the forward travel of the backgauge T-bar to approximately .3 inches from the lower shear blade.

4.2.11.4.BG1 BACKGAUGE REAR LIMIT

The backgauge rear limit switch, located on the drive end of the backgauge ways, limits the rearward travel of the backgauge at the flipped up position. This position allows long sheet material to pass under the backgauge T-bar.

4.3. AUTOMATED - BG1 BACKGAUGE CONTROL

4.3.1.BG1 DESCRIPTION

The BG1 backgauge control is a "Go-To-Position" backgauge T-bar control. The backgauge T-bar can be programmed for single position moves by entering the desired position or by selecting one of ten backgauge position presets. The BG1 configuration includes a six digit LED display, with a full numeric keypad for user programming, mounted on the shear front console. The three position selector switch provides for a safety OFF, a backgauge position HOLD, and a backgauge T-bar RETRACT function.

The motor drive board is located in the main electrical box. It includes an encoder input from the backgauge leadscrew, an output to a power triac for the permanent magnet DC drive motor as well as a communication link to the front panel keyboard. A fuse provides overload protection to the drive system.

4.3.2.BG1 KEYPAD

4.3.2.1.NUMERIC KEYS

The keypad numbers 0-9 enter all target, preset, and calibration values.

4.3.2.2.IN/MM KEY

The in/mm key toggles from inch mode of measurement to metric mode in millimeters. The display resolution is three decimal places in inch mode and two decimal places in metric mode.

4.3.2.3.CLEAR KEY

The CLEAR key zeros the LED display for entry of new data.

4.3.2.4.DECIMAL KEY

The DECIMAL key sets the standard decimal place.

4.3.2.5.PRST KEY

The PRST key, in conjunction with keys 0-9, enables presetting ten backgauge stop positions to the control system memory.

4.3.2.6.CAL KEY

The CAL key enables setting the dimension of the backgauge T-bar dimension referenced to the lower shear blade.

Momentarily pressing the CAL key returns the display to actual position.

4.3.2.7.GOTO KEY

The GOTO key sends the backgauge to the target position.

4.3.3.BG1 OPERATION

4.3.3.1.POWER UP

The LED digital readout will be ON, displaying the actual backgauge position. On the very initial start up of the system the LED digital readout may display dashes. Momentarily depress any key to reset the readout to display a numeric position.

If the display fails to appear at power-up, turn power off, wait at least 10 seconds, and then try again.

4.3.3.2.CALIBRATION

The distance from the backgauge T-bar face to the lower blade is calibrated with the CAL key as follows

- With a tape, measure the distance to the T-bar. Enter that number. Push and hold CAL until the display stops blinking. This is rough calibration.
- Enter a small number (1 or 2 inches) and press GOTO. The backgauge should move to that position.
- Make a cut and measure the part accurately. Enter the actual part size, then push and hold CAL until the display stops blinking.

EXAMPLE:

- LED display reading 38.250
- Distance from lower knife to backgauge T-bar approximately 8.0 inches
- Enter 8.000
- Press and hold "CAL" until display stops blinking
- LED display will read 8.000
- Set a target of 2.000 on the LED display
- Press "GOTO"

- Backgauge will move to approximately 2 inches from the lower blade
- Perform a test cut and measure the part accurately
- Adjust the LED display to correspond to the test measurement length
- Press and hold "CAL" until display stops blinking.

4.3.3.3.ENTERING PRESET VALUES

Commonly used part sizes or dimensions can be stored in the control memory. Ten presets can be defined as follows

- Enter a desired part size
- Press "PRST"
- Press and hold the desired preset number (0-9) until the display stops blinking.

4.3.3.4.BACKGAUGE MOVE TO TARGET

Enter the required target position (part size) and press the "GOTO" key.

4.3.3.5.BACKGAUGE MOVE TO PRESET TARGET

Press "PRST", then press a selected preset number (0-9), and then press "GOTO."

4.3.4.BG1 SELECTOR SWITCH OFF/HOLD/RETRACT

4.3.4.1.OFF

The selector switch turned to "OFF" deactivates the BG1 drive, and provides protection for personnel accessing the backgauge T-bar area.

4.3.4.2.HOLD

The selector switch turned to "HOLD" maintains the backgauge at the set position. The BG1 control will reposition the backgauge to the set position if mechanically bumped off position. The backgauge can be moved to a new position in this mode.

4.3.4.3.RETRACT

The BG1 control will retract the backgauge T-bar approximately 1/8" each time a cut is made. This allows the cut part to drop freely. The backgauge T-bar repositions to the set position as the ram travels upward.

4.3.4.4.EMERGENCY STOP

The backgauge GOTO position move can be aborted by turning the backgauge selector switch to "OFF" during the move cycle. The move will restart by turning the backgauge selector switch to "HOLD" or "RETRACT" and depressing the GOTO key.

4.3.5.BACKGAUGE BAR FLIP-UP

To shear plates that are longer than the backgauge travel, the backgauge T-bar can be raised so that the long plates can pass underneath. To raise the T-bar, enter a target number that is at least two inches greater than the backgauge travel and press GOTO. For example, if the shear has a 36" backgauge, enter 38" to flip-up. The rear limit switch will stop the backgauge at the flipped-up position before it gets to the target.

4.3.6.BG1 POWER DOWN

The BG1 control will retain the last position indicated on the LED display with the backgauge at rest on a complete power down of the electrical supply to the shear. The last position and calibration will be recalled on power up provided that the backgauge T-bar has not been moved mechanically during the power down.

4.3.7.BG1 TRAINING AND SAFETY

4.3.7.1.OPERATOR TRAINING

The BG1 Backgauge Control will move the backgauge T-bar in under automated control. All operators and maintenance personnel must be trained for safe operation of the BG1 Backgauge Control.

4.3.7.2.SAFETY WARNING SIGNS/DECALS

Safety Warning Decals are factory installed at each end of the shear at the backgauge area warning any personnel that the BG1 can operate under automatic control and that the BG1 must be turned off prior to entry to this area.

5. ACCURSHEAR OPERATION

5.1. PRE-START-UP

It is the responsibility of the Owner/Employer, Operator/Helper to fully read this ACCURSHEAR instruction manual prior to startup to familiarize themselves with the shear and fully understand the function of the shear operator controls. Also, Owner/Employer, Operator/Helper should read

AMERICAN NATIONAL STANDARDS FOR MACHINE TOOLS-SHEARS - SAFETY REQUIREMENTS FOR CONSTRUCTION, CARE AND USE. ANSI B11.4-1983 (or later revision)

5.2. START-UP PROCEDURE

5.2.1. FOREIGN OBJECT CHECK

Check that no foreign objects interfere with any moving part of the shear.

5.2.2. JOG/AUTO/MAN SELECTOR SWITCH SETTING

Set the JOG/AUTO/MANUAL to the "JOG" position. This will ensure that the shear ram will not move at start-up.

5.2.3. MOTOR START

Start the main motor by pressing the "START" button.

5.2.4. SHEAR RAM RAISING

Turn the JOG/AUTO/MANUAL selector switch to "MANUAL." The shear ram should rise and stop at the shear ram UP limit switch.

5.2.5. BLADE GAP

Adjust the blade clearance lever (or selector switch, if so equipped) to the material thickness desired.

The shear should now be ready for operation.

5.3. SHUT DOWN PROCEDURE

Use this procedure at the end of the day or anytime the shear will be shut down for a prolonged period of time.

- Turn the JOG/MAN/AUTO selector switch to the "JOG" position
- With the footswitch, cycle the ram to the DOWN position
- Turn the machine off.

6. SHEARING PRINCIPLES AND METHODS

Plate and sheet metal shearing process involves many variables which affect the quality and accuracy of the sheared parts. Understanding the terminology and the principles of shearing will help the shear operator to optimize the quality of sheared parts and to obtain the desired shear productivity.

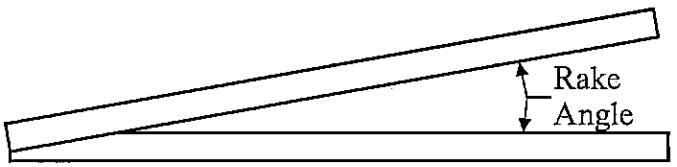
6.1. GLOSSARY OF TERMS

6.1.1. SHEARING

Shearing is the mechanical process of cutting plate or sheet material by two metal blades, inclined at an angle, that are forced through the material by hydraulic or mechanical actuators. In reality only a small part of the material is actually sheared, the rest fractures.

6.1.2. SHEAR RAKE ANGLE

Shear blade rake angle is the inclination of the upper shear blade with respect to the lower fixed blade. The rake angle limits the length being sheared at any time to a small portion of the total length. This means the force to cut a one foot long cut is approximately the same as the force to cut a ten foot long cut. Rake is expressed in inches per foot. The rake angle for an ACCURSHEAR model 6250 is ¼" per foot.



6.1.3. UPPER SHEAR BLADE BACK CUT ANGLE

The upper shear blade is tilted relative to the lower blade. The back-cut angle for an ACCURSHEAR model 6250 is ½ - ¾ degree. This angle ensures that material will not be trapped between the blades and that the shear blades do not rub or score as they pass. It also allows for a 4-edged top blade.

6.1.4.SHEAR BLADE GAP CLEARANCE

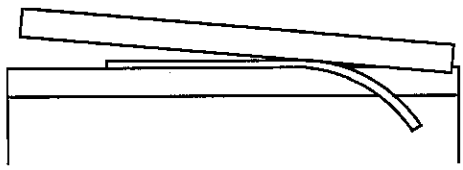
Shear blade gap is the physical separation of the blades at the intersection of the blades as they pass. Blade gap can be adjusted manually or by power for different materials or plate thickness.

6.1.5.DROP

The drop piece is the material sheared from a larger piece that is on the shear table being held securely by the holddown cylinders. The drop piece in most applications is allowed to fall out the rear of the shear for manual removal or is conveyed by automatic or semiautomatic material handling equipment.

6.1.6.BOW

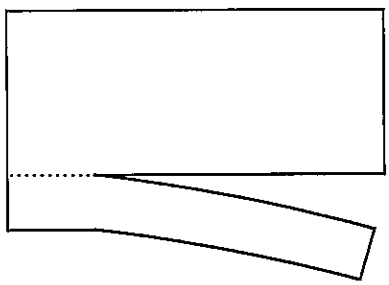
Figure 6.1-1



Bow is the bending that occurs on the drop piece due to the shearing action. Narrow drop pieces exhibit a greater degree of bow. Also, gravity will influence the amount of bow on larger heavier drop pieces as well. The rake angle of the shear blade has a large influence on the degree of bow. Typically a high rake angle shear will produce drop pieces with a greater amount of bow.

6.1.7.CAMBER

Figure 6.1-2



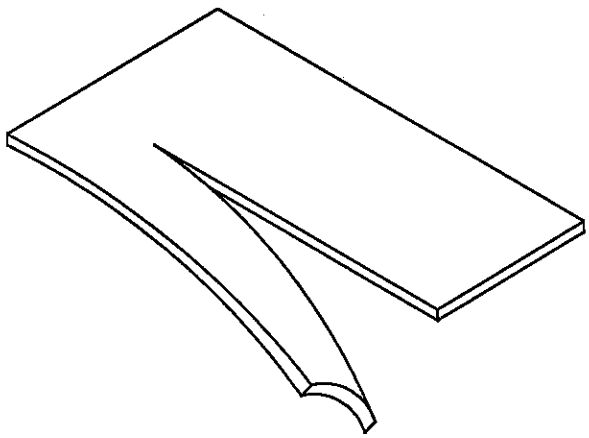
Camber is the curvature in the plane of the sheet that occurs from the shearing process. Material characteristic is the prime factor in camber of parts due to the grain structure and internal stresses rolled into the material. The force of shearing relieves stresses in the blank at the sheared edge causing the drop to deform in the plane of the material. Highly stressed, inferior quality material will exhibit more camber particularly in narrow drop piece parts. Camber decreases with increased width of the drop piece and is controlled most effectively by using good quality material of known specification that is stress relieved.

6.1.8.DROOP

Droop is the sag of a plate between the lower blade and the backgauge T-bar. In effect it leaves the part longer than the backgauge setting. It is most pronounced when shearing wide pieces of light gauge material. A sheet support system may be necessary to ensure good accuracy.

6.1.9.TWIST

Twist in a sheared drop piece is the angular rotation along the sheared edge axis. The degree of twist will reduce as the width of the drop piece increases. Higher rake angles will produce more twist.



6.2. SHEAR BLADE APPLICATION SPECIFICATION

Three most common grades of shear blades are high carbon high chrome D2 (HCHC D2), modified high carbon high chrome (MOD HCHC), and high carbon shock resistant (HCSR). It is not possible to provide a shear blade with both high wear resistance and high shock resistance. The grade of

shear blade is determined by the original material specification and the specific heat treatment.

6.2.1. MOD HCHC SHEAR BLADES

MOD HCHC shear blades have slightly less wear resistance but substantially more shock resistance than HCHC D2. They are the standard blades supplied for ACCURSHEAR models 6135, 6250 and 8375. They will successfully cut a wide variety of material up to the maximum capacity of these shears.

6.2.2. HCHC D2 SHEAR BLADES

The HCHC D2 shear blades have the best wear resistance but a reduced tolerance to shock. These blades are most suited for shearing light gauge materials where long blade life is mandatory. They are recommended for ACCURSHEAR models 6135, and for 6250 when cutting stainless steel 12 gauge and lighter or mild steel 7 gauge and lighter. Misapplication could result in chipped shear blades.

6.2.3. HCSR SHEAR BLADES

HCSR shear blades are most suitable for applications where high shock is experienced in the shearing process. ACCURSHEARS models 8500 through 81000 are equipped with HCSR shear blades. Shears equipped with HCSR blades will require more frequent blade rotation or changes to maintain blade sharpness for optimum performance.

6.3. SHEAR BLADE LIFE

Many factors affect blade life making it difficult to predict how often blades must be rotated. The greatest wear normally occurs on the squaring arm end where most shearing takes place. Inspect blades regularly. Turning blades before they are excessively dull actually increases blade life. When the blades are reground, less material must be removed allowing for the blades to be sharpened more often.

6.3.1. CONDITIONS THAT ACCELERATE BLADE WEAR

- Shearing with dull blades. The increased shearing force required can lead to blade chipping or cracking.

- Shearing hardened or high tensile material.
- Shearing very scaly metal.
- Shearing flame cut or work hardened edges. Previously sheared stainless steel edges are an example of this.
- Shearing multiple layer cutting.
- Small angle cutting. The thin sliver that results from shallow angles increases blade wear.
- Cutting thin material with too much blade clearance.
- Shearing diamond tread plate.
- Shearing expanded metal.
- Shearing wire cloth.
- Improper blade gap.

6.4. SHEARING ACCURACY

Normal shearing accuracy is +/- .001" per foot of shear length regardless of part size. This means that a part of any length sheared on a ten foot shear should be within +/- .010". A good operator, by careful adjustment and maintenance, can reduce this tolerance considerably. A number of things affect shearing accuracy

6.4.1. PLATE QUALITY

The material being sheared must be of good quality. Inferior plate with high internal stress or poor physical characteristics is much harder to cut accurately.

6.4.2. BLADE SHARPNESS

Blades must be sharp. Dull blades increase cutting force, tend to tear the material, and can leave a ragged, burred edge. Turning the blades before they are too dull extends blade life because less blade material must be removed at regrinding.

6.4.3. PLATE DROOP

Plate droop must be controlled or the parts will be longer than the backgauge setting. A sheet support system may be necessary for wide, light gauge material.

6.4.4.SQUARING ARM BAR

The squaring arm bar must be kept at 90° to the lower blade.

6.4.5.CUT BEVEL

The drop piece will usually have some bevel to the edge of the cut due to the bending that occurs prior to shearing. This will be most noticeable on the last six inches of any cut because of the weight of the part. It is more evident on thicker material. Allow for this when measuring a drop part.

6.4.6.BACKGAUGE CALIBRATION

The backgauge calibration should be checked frequently for accuracy. See section 4.3.3.2 CALIBRATION.

6.5. CAPACITY

The rated capacity of an ACCURSHEAR model 6250 is ¼" mild steel up to 80,000 psi tensile strength. Be aware that ASTM steels specify the minimum strength, but not maximum. Occasionally, steel may be purchased, especially on the secondary market, that may be of sufficiently higher specs that exceed the capacity of the shear.

Required force to shear increases as the square of material thickness. Plate that is only slightly thicker than normal can require much more force to shear.

Dull blades can reduce the shear's capacity by as much as 50%. Reducing blade gap increases the force needed to shear. Use the largest blade gap that produces an acceptable cut quality.

The ACCURSHEAR model 6250 should cut the following materials

Material	Thickness
Most grades of stainless steel	.187
Most grades of aluminum	.375
Tempered aluminum	.250
Copper or brass	.250-.375
Steel floor plate	.187-.250
AR plate	.150-.187

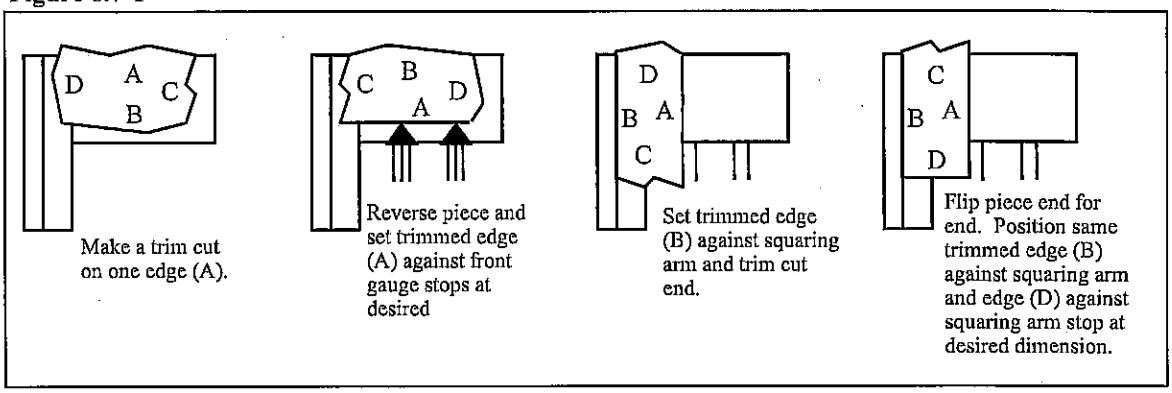
6.6. CUT EDGE QUALITY

Several things affect the quality of the cut edge including blade gap, blade sharpness, the type of material being cut, and whether the cut is across or with the grain of the material. All of these must be optimized to obtain the best cut.

6.7. SHEARING RECTANGULAR BLANKS

Producing rectangular or square blanks is likely the most common shearing task. The following procedure will minimize any inaccuracies.

Figure 6.7-1



6.8. CUTTING NARROW STRIPS

When cutting large sheets into narrow strips, sometimes stress and a resulting camber will build up in the large plate on the table. This means that the last strips cut from the plate may have edges that are not parallel. The narrower the strips being cut (i.e. the more cuts being made,) the worse the problem becomes. To reduce this, cut about one half of the large plate into strips and then turn or flip the plate and cut strips off the opposite edge. When cutting very narrow strips, it may be necessary to turn the plate more than once.

7. MAINTENANCE

The Owner/Operator is responsible for establishing a maintenance schedule that is consistent with in-plant lubrication procedures that complement the production duty cycle of the shear.

Service technicians must post a maintenance service sign in keeping with in-plant written safety procedures to advise that the shear is not available for production work.

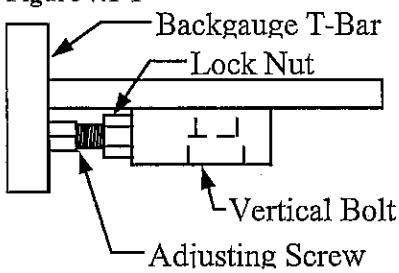
7.1. MECHANICAL SYSTEM

7.1.1.LUBRICATION

Bearings requiring lubrication are fitted with standard zerk type grease fittings for grease gun application. Use an EP (Extreme Pressure) grease at all lubrication points. Refer to the lubrication chart in TECHNICAL SPECIFICATIONS section for lubrication location and frequency. Most bearing pivots are maintenance-free.

7.1.2.BACKGAUGE T-BAR PARALLEL TO LOWER BLADE

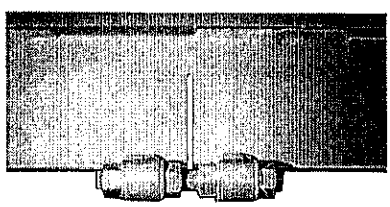
Figure 7.1-1



Check backstop bar parallelism by cutting a small part in line with each backgauge ways (about two feet in from each end of the shear.) If these two parts are not the same size, identify the end with the longer cut. Loosen the vertical bolt ¼ turn, loosen the lock nut and adjust the corresponding push bolt as necessary, pushing the T-bar toward the blade. One turn of the push bolt will move the bar .075".

7.1.3.BACKGAUGE T-BAR STRAIGHTENING PROCEDURE

Figure 7.1-2



Cut a small part at every other holddown. Measure and mark each part to map the T-bar for straightness. To prevent sheets from rocking on the backgauge T-bar, the ideal shape is a very slight (.003"-.005") bow to the rear in the center of the bar.

If adjustment is necessary, bend the bar gently with the adjusting screws. Lengthening the screw will bow the bar toward the rear; shortening the screw will bow it forward. The adjustment is quite sensitive; very little movement is necessary.

7.1.4.BACKGAUGE CALIBRATION

To calibrate the digital readout to actual backgauge position, see section 4.3.3.2. CALIBRATION.

7.1.5.SQUARING ARM BAR ADJUSTMENT

The squaring arm bar can be adjusted so that it is 90° to the blade. Use the following steps

- trim-cut, the long way, a part that is longer than the squaring arm and at least twelve inches wide
- place the cut edge against the squaring arm
- trim-cut end
- use a square on the corner of the two cuts to determine if the bar should be adjusted

If the bar needs adjustment for either straightness or squareness

- loosen the bolts on the top of the squaring arm bar and the adjustment nuts on the underside of the squaring arm
- pull the bar away from the center of the shear
- snug top bolts "A" and "C", leaving them loose enough to make the adjustment
- use adjusting nuts "E" at location "C" to push the bar toward the center of the shear until the section from the blade to bolt "B" is square
- tighten bolts "A" and "B"
- make a trim cut and verify squareness
- continue to adjust nuts "E" until the bar is straight and square from the blade to bolt "C"
- tighten bolt "C" and nuts "E"
- repeat this process at location "D"
- for longer squaring arms, repeat these steps for each adjusting location until the entire bar is straight and square.

Figure 7.1-3

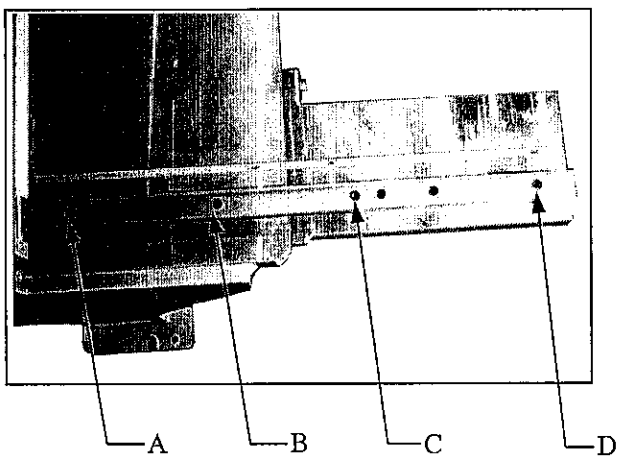
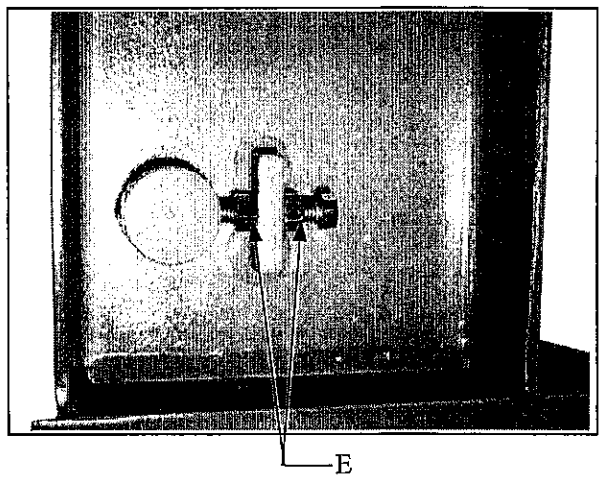


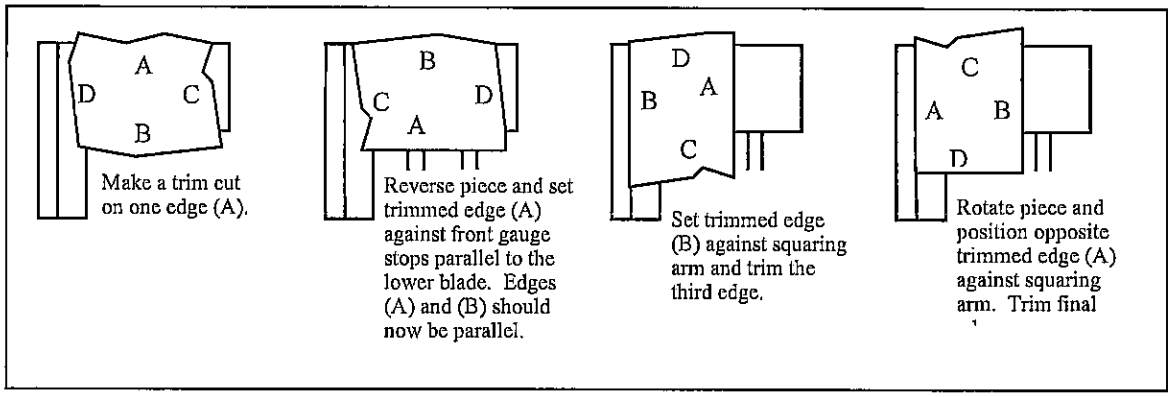
Figure 7.1-4



7.1.5.1.ALTERNATE CHECK FOR SQUARENESS

Cut a part approximately four feet square as shown below.

Figure 7.1-5



Check this part diagonally. If the two diagonal measurements are not the same, adjust the bar as described above.

7.1.6.BLADE GAP ADJUSTMENT

7.1.6.1.TOOLS AND ACCESSORY REQUIREMENT

Mechanics open end and box wrenches as well as a torque wrench with sockets are required to set the blade gap. A set of machinist feeler gauges with at least a range of .001"-.005" in .001" increments is necessary. Have several individual feeler gauges of each thickness as occasionally the feeler gauges will be cut at the blade crossing due to sharp shear blades. Clean the blade surfaces of dirt, oil or metal particles to ensure accuracy of measurement of the blade gap. Cardboard or plywood sheets laid temporarily on the floor will make the job more comfortable. Temporary lighting will help to insure that the typical .001"-.002" blade gap clearance is set without the blades touching.

7.1.6.2.GENERAL SHEAR ACCESS REQUIREMENTS

The shear blade gapping procedure involves adjusting the clearance between the upper and lower blades at the shear blade crossing point. A service technician must have access to the drop side of the shear. Remove drop parts and scrap from

this area to provide unrestricted access to perform the blade gap adjustment. Move any sheet support or conveyor systems out of the way.

7.1.6.3. SHEAR CONTROL SETTING

Set the JOG/MAN/AUTO selector switch to "JOG" so that the shear ram will hold position when the footswitch is released at each measurement point. The BG1 backgauge T-bar position should be set at 30" or greater to allow the technician unrestricted access to the shear blade area.

Turn the BG1 Control to "OFF" at the OFF/HOLD/RETRACT selector switch to prevent an inadvertent backgauge move while a service technician is in this work area. The shear ram stroke control must be set for full stroke travel. Accurshear models with manual or power blade gap adjustment must be set to the MINIMUM blade gap setting.

The link bearings must be checked for clearance and the link bolts must be retorqued. Verify that the eccentric cams are properly synchronized. See section 7.1.8 LINKS.

7.1.6.4. SHEAR BLADE GAP ADJUSTMENTS

7.1.6.4.1. SHEAR BLADE MEASUREMENT PROCEDURE

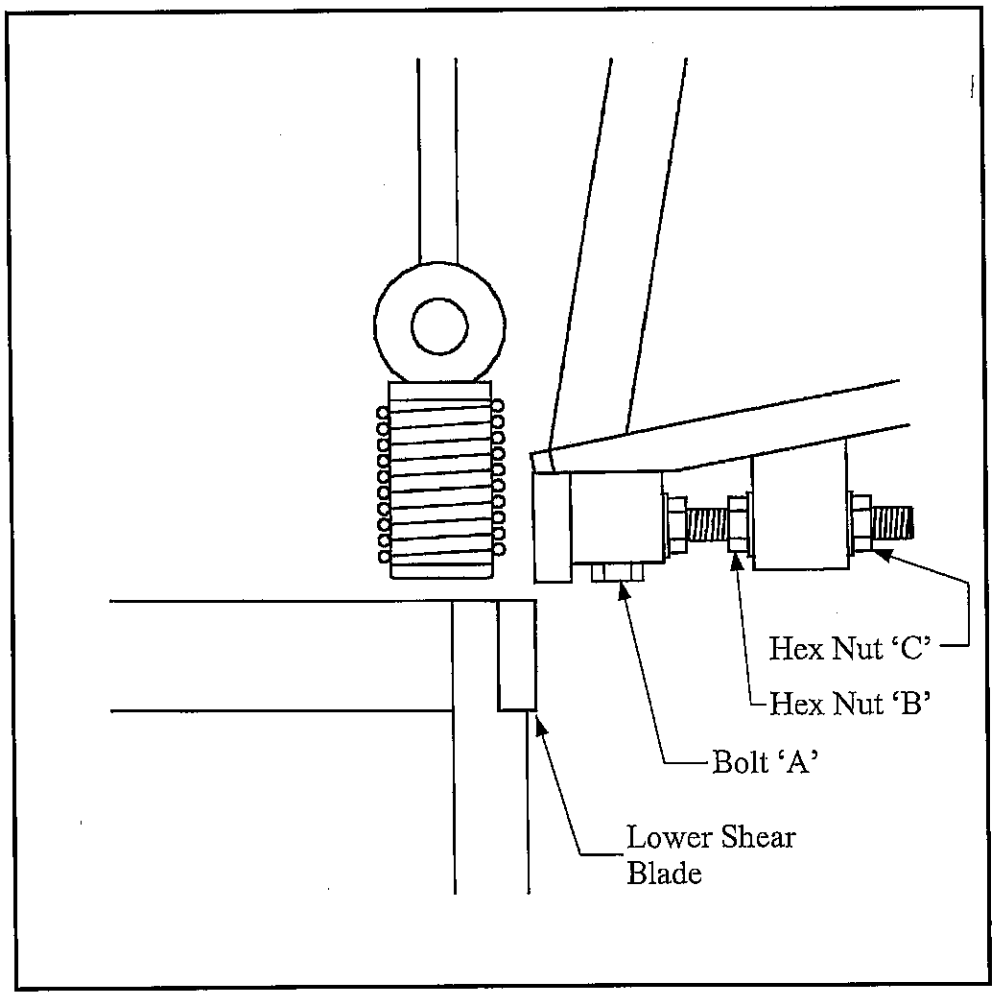
With the footswitch, jog the shear ram down to the initial shear blade crossing point at the squaring arm end. Measure the blade gap with feeler gauges to determine the actual blade gap. A good practice is to mark the actual blade gap on the lower shear blade with a black felt pen. Continue jogging the shear ram down so the shear blade crossing point advances four to eight inches from the previous measurement point and record the actual measured blade gap. Blade gap measurement should be verified at the shear blade crossing point as well as at the previous crossing point to insure that variances in blade thickness is not causing shear blade interference. Should a blade interference occur, the upper blade assembly must be

adjusted to provide a blade gap of at least .001".

7.1.6.4.2. SHEAR BLADE ADJUSTMENT PROCEDURE

Shear blade gap adjustment involves moving the upper shear blade assembly relative to the lower fixed blade. The following detail illustrates the knife assembly with the adjustment fasteners identified.

Figure 7.1-6



- Confirm that the link bolts have been retorqued to give minimum bearing clearance. See section 7.1.8 LINKS.

- Check that the eccentric cams are correctly set. See section 7.1.8.2 REAR BEARING MAINTENANCE.
- Verify that the adjustable blade gap control is at the minimum setting.
- Jog the ram down so the blade crossing point is adjacent to the first adjusting bolt. If the crossing point is jogged past this bolt, jog the ram back up using the JOG/MAN/AUTO selector switch.
- Loosen bolt 'A' approximately ¼ turn.
- Adjust nuts 'B' and 'C' to increase or decrease the blade gap. Set the blade gap to the minimum recommended normally .002". Each wrench flat will change the blade clearance by about .010".
- Retorque bolt 'A' to 200 ft lbs. Note that this will usually decrease the blade gap slightly.
- Torque nuts 'B' and 'C' to approximately 250 ft lbs. By tightening one or the other first, the final blade gap can be slightly changed.
- Recheck that the blade gap is correct.
- Jog the ram down so the blade crossing point is at the next adjusting bolt. Repeat the above procedure.

If a large adjustment is necessary (after a blade regrind, for example) make two or three passes down the length of the blade, gradually setting the blades closer.

Recheck blade gap after two weeks of cutting for a new shear and any time the blades have been removed. The blades tend to seat in slightly. Thereafter, establish a regular schedule of checking blade gap based on the amount of cutting and the type of material being sheared.

7.1.7.SHEAR BLADE REMOVAL/INSTALLATION

Remove the lower shear blade first. Remove the hex nuts and plow bolts and slide the blade through the side frame gaps or lift the blade out the back. The blade is heavy and requires at least two people to handle to prevent injury to the service technicians or damage to the shear blade. Place the shear blades on wooden blocks on a secure work bench or protected floor area.

To remove the top blade, first jog the ram down until the first blade bolt will slip under through the holddown . Remove all the plow bolts except one on each end. Support the blade either by hand with several people, or with a blocking system. Remove the last two bolts and carefully lower the blade. Remove the blade directly out the rear of the shear, or lower it into the bottom blade seat and remove in the same manner as the bottom blade.

Prior to installation of the shear blades, the shear blade seats as well as the shear blades should be cleaned with solvent. With a file, remove all burrs and nicks from the blade seats. Set the blade clearance to maximum (1/4" setting.) Install the top blade first. With a mechanical lifting device or with several people, lift the top blade into place and install the plow bolts. Make sure the tang on the bolt goes into the slot in the blade. Snug up these bolts. Install the bottom blade similarly. Place wood blocks between the blades and jog the ram down to seat the blades. Tighten the blade bolts to 70-80 ft. lbs. **Do not over-tighten.**

If the blades have not been reground (only rotated), be very careful when rechecking the blade gap. Since it takes some shearing to properly seat the blades, the gap will usually be less than before they were removed. With the blade clearance lever at the ¼" setting, check that the blade gap is at least .008". Shear about fifteen full length strips of ¼" plate. If not available, use the next heaviest available. Rotate the blade clearance lever about half way toward the 22 gauge setting. Check the blade gap to make sure the blades will not hit. Continue closing the gap with the lever in steps, checking the gap at each step. If at any step the blades are in danger of hitting, increase the blade gap with the adjusting bolts. With the lever finally set at the 22 gauge position, properly gap the blades as described in section 7.1.6 BLADE GAP ADJUSTMENT. After a couple of weeks of shearing, recheck the blade gap.

If the blades have been reground, shim under the bottom blade so it's flush with the top of the table. The top blade does not need shimming. Re-gap as described above.

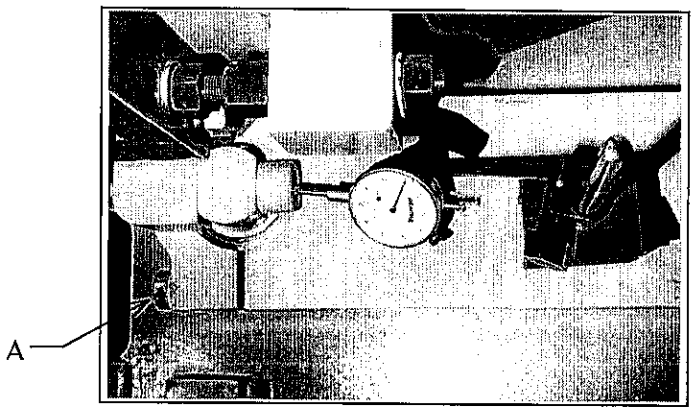
7.1.8.LINKS

The blade gap is maintained by the links. This makes the adjustment and maintenance of the bearings very important.

7.1.8.1.FRONT BEARING MAINTENANCE

The front link bearing is a Teflon lined spherical bushing, and does not require lubrication. The clearance in the bearing must be kept to a minimum. Suspect excessive clearance if burring occurs on light gauge sheet metal even when the blade gap is properly set. Confirm bearing clearance with a dial indicator on a magnetic base as shown in Figure 7.1-7.

Figure 7.1-7



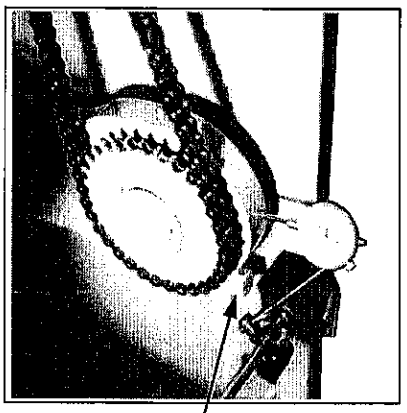
Use a prybar or Porta-Power to apply a rearward load on the ram while checking for movement. Alternatively, cut a piece of thin material while watching for a "jump" in the dial indicator reading. The maximum clearance depends on the thinnest material that must be cut as shown.

Lightest material to be cut	Maximum bearing clearance
24 gauge	.002"
16 gauge	.003"
10 gauge	.004"
3/16"	.005"

Tighten adjusting bolt 'A' on the end of the link sufficiently to reduce bearing clearance. Over-tightening can reduce bearing life. Do not exceed 250 ft lbs. If maximum torque is reached and the bearing still has too much clearance, replace the bearing.

7.1.8.2.REAR BEARING MAINTENANCE

Figure 7.1-8

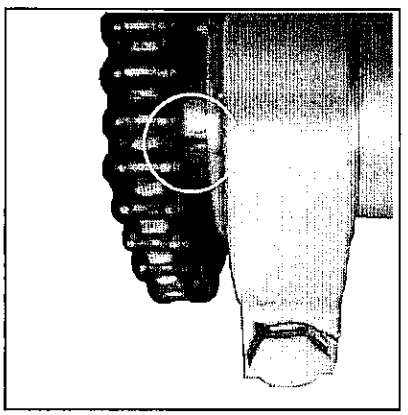


The rear link bearing also involves the eccentric cam for the adjustable blade clearance. The inner bearing of the cam is a maintenance free Teflon lined bushing; the outer link bearing is a needle roller that does require monthly greasing.

As with the front bearing, the clearance in this bearing assembly must be kept to a minimum. Use a dial indicator as described above to check clearance. Maximum torque on the rear link bolt is 125 ft lbs.

The eccentric cams must be correctly timed to the adjustable blade lever. When the lever is set at the 22 gauge position, the slit in the cam must be forward. When the lever is at the ¼" setting, the slit must be toward the rear of the shear.

Figure 7.1-9



To prevent shear blade damage, visually confirm that the cam slit is forward at the 22 gauge lever position before regapping the blades.

Keep the blade adjusting chains snug but not over-tight. To tighten, raise the top shaft with the adjusting nuts. Maintain ¼"-½" slack in the chain.

If these chains are ever removed, the cams must be retimed to the adjustable blade lever.

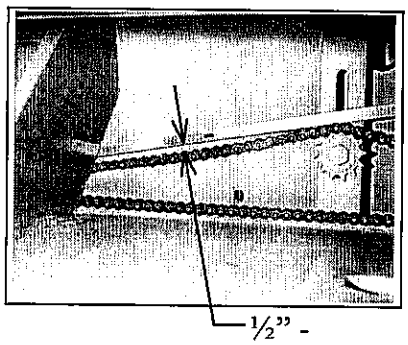
7.1.9.BACKGAUGE WAYS AND SCREWS

7.1.9.1.SCREWS

The backgauge screws operate on tapered roller bearings. Grease these bearings monthly. Use the double nuts at the rear of the screws to tighten the bearings just enough to remove any axial movement from the screws. Over-tightening will shorten the life of the bearing. Use a dial indicator to check for movement.

7.1.9.2.CHAINS

Figure 7.1-10

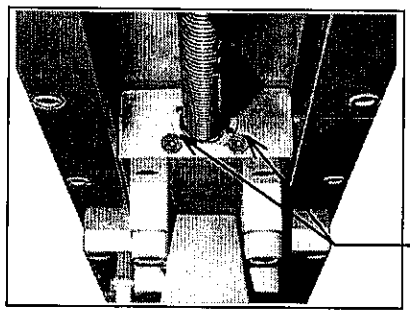


Maintain ½"-1½" slack in the chain that connects the backgauge ways.

Maintain ¼" - ½" slack in the rear drive chain. Loosen the bearing bolts and raise the shaft to tighten. Retighten the drive belt by adjusting the variable sheave on the motor.

7.1.9.3.ADJUSTING THE ANTI-BACKLASH NUT

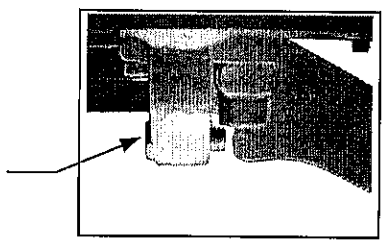
Figure 7.1-11



To remove backlash, loosen the lock screws turn the adjusting nut clockwise until no backlash remains, and then tighten the lock screws. Do not over-tighten the adjusting nut.

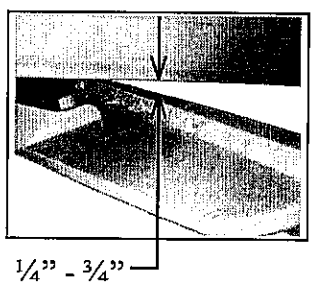
7.1.9.4.FLIP-UP ARMS

Figure 7.1-12



The backgauge bar is designed to flip up out of the way for shearing long plates. The two swing arms must contact their respective lift screws at the same time to prevent binding. The backgauge should travel to at least 36.050" (48.050" if 48" backgauge) before contacting these screws.

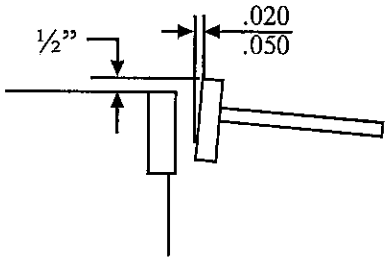
Figure 7.1-13



In the up position the bar must not hit the bottom of the backgauge ways. Adjust the limit switch arm so the travel stops with ¼"-¾" clearance.

7.1.9.5.BACKGAUGE BAR HEIGHT ADJUSTMENT

Figure 7.1-14



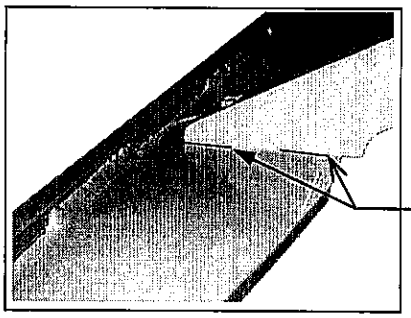
With the ram in its normal up position, the top of the backgauge bar should be about ½" above the top of the table.

The top of the bar should tilt back .020"-.050". Use a square on the table top to check as shown.

If the height is not correct, raise the bar with the adjusting screws. Make sure both screws equally support the bar to minimize vibration. Do not raise the bar too high or it will hit the bottom of the top shear blade on its low end.

If the angle needs adjusting, loosen the mounting bolt and shim under the swing arm as necessary.

Figure 7.1-15



7.2. HYDRAULIC SYSTEM

7.2.1. HYDRAULIC FLUID

7.2.1.1.FLUID LEVEL

The hydraulic fluid level should be approximately two inches below the top of the reservoir. Refer to the TECHNICAL SPECIFICATIONS section for the proper oil.

7.2.1.2.FLUID REPLACEMENT

The frequency of replacing a shear's hydraulic fluid depends on the duty cycles and operating environment. Have the fluid analyzed for a true determination of the hydraulic fluids' condition. The oil can be run for several years unless there has been a component failure or dirt ingestion that has contaminated the oil.

7.2.1.3.DRAINING THE RESERVOIR

The reservoir has a 3/4" NPTF drain port at the bottom of one end. A portable filter and transfer unit can be used to withdraw the fluid out through the filler cap assembly. The filler cap assembly is removable from the reservoir top.

7.2.1.4.REFILLING THE RESERVOIR

Refer to the HYDRAULIC FLUID SPECIFICATIONS of the TECHNICAL SPECIFICATIONS section for the correct hydraulic fluid. A portable filter and transfer unit is recommended for filling the hydraulic reservoir to ensure a clean oil change.

7.2.2.HYDRAULIC FLUID FILTRATION

7.2.2.1.RETURN FILTER

Replace the return line filter whenever the condition indicator gauge approaches 20 psi and whenever the hydraulic fluid is replaced. Loosen the four filter housing cover plate bolts, turn the cover plate a partial turn counter clockwise to release and remove the cover plate. Remove the filter retaining spring, and withdraw the filter element. Place the used filter element into a suitable container for inspection.

Inspect the inner filter housing bowl and the filter element for contamination. The type of particles retained can be an indicator of the condition of the hydraulic system and of the need for possible maintenance. Remove the bypass valve assembly from the old filter element and install in the replacement filter element prior to installing into the filter housing. Clean the 'O' ring and the 'O' ring mating surfaces of the filter housing before reassembly. Retorque the cover fasteners. Hydraulic fluid analysis is a good preventative maintenance practice to minimize the discarding of used hydraulic fluid prematurely and to determine component wear before a catastrophic failure.

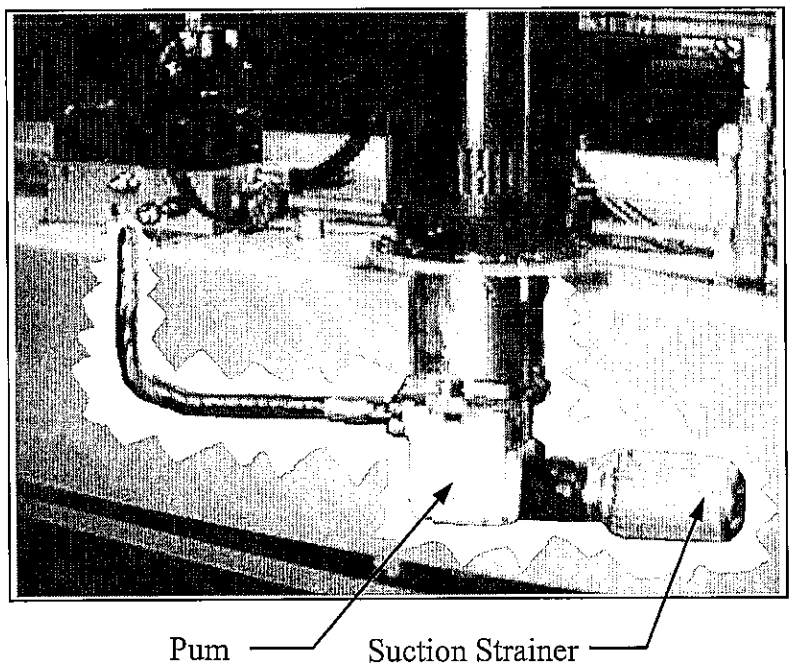
7.2.2.2.SUCTION STRAINER

The pump suction strainer is mounted on the pump inside the tank and is generally not replaced. Should the strainer

require changing or cleaning, the pump/motor assembly and strainer must be lifted out of the tank. Disconnect the pressure hose as the pump assembly is raised. Tilt the motor to one side to remove the strainer from the tank. The replacement strainer must be installed with adequate torque to prevent loosening by vibration. Apply a bead of RTV or similar sealant to the top of the tank before lowering the pump assembly back into place.

7.2.3.HYDRAULIC PUMP

Figure 7.2-1



The hydraulic pump is a fixed displacement vane type pump that requires little maintenance. The suction (inlet) port is fitted with a screen described in section 7.2.2.2 SUCTION STRAINER.

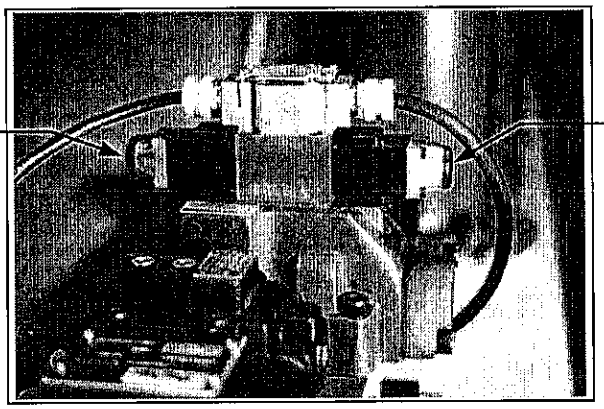
Pump performance can be tested by checking the relief valve. (See section 7.2.4.4 RELIEF VALVE) If normal relief pressure can be obtained, the pump is usually in good condition.

If the pump seems abnormally noisy, first check the oil level. It should be within two inches of the top of the tank. Next check the coupling between the electric motor and the pump. A worn or misaligned coupling can transmit extra noise. Lastly, the suction screen may be partially plugged, restricting the flow of oil to the pump. To service the pump, coupling, or screen, remove the pump/motor assembly from the tank as described in section 7.2.2.2 SUCTION STRAINER.

7.2.4.VALVES

7.2.4.1.MAIN DIRECTIONAL VALVE

Figure 7.2-2

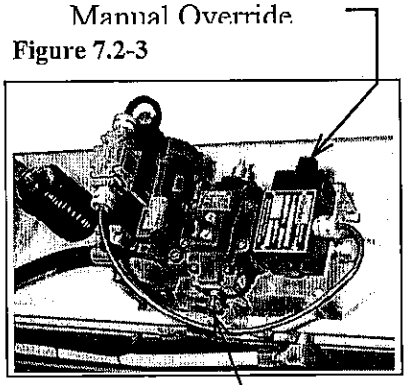


The main valve controls the up and down motion of the ram. This valve is normally in the spring centered position which holds the ram from moving. When a shear cycle is initiated, this valve shifts simultaneously with the holddown valve directing oil to the holddowns first, and then to the main cutting cylinders via the sequence valve. At the bottom of the stroke, the main valve shifts the opposite way to raise the ram.

This valve is pilot operated, meaning that a small valve called the pilot valve controls the larger, main spool. The pilot valve is electric solenoid operated and also has manual override buttons. If the ram fails to move up or down the valve operation can be checked by firmly pressing the appropriate override button. If the ram can be made to move by pushing the correct button, you know the valve and hydraulics are functioning properly. Then proceed to check the electrical system.

7.2.4.2.SEQUENCE VALVE

Figure 7.2-3



The sequence valve sets the initial holddown pressure. When it senses the presence of the proper holddown pressure, it opens and allows oil to flow to the main cylinders, allowing the ram to lower. To adjust the initial holddown pressure, loosen the lock nut and turn the screw "in" (clockwise) to increase pressure, or "out" (counter-clockwise) to reduce pressure. The sequence pressure is the momentary peak pressure on the gauge at the beginning of each cycle. This pressure is normally approximately 1000 psi.

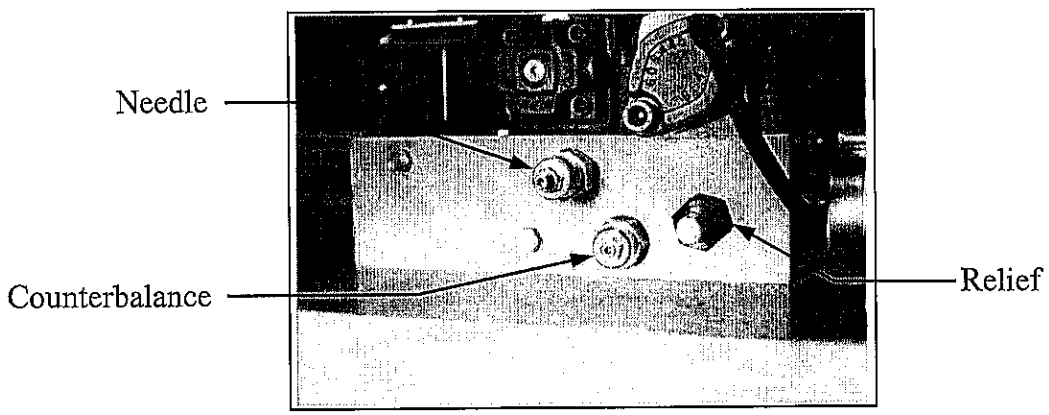
7.2.4.3.HOLDDOWN VALVE

The holddown valve is a single solenoid, spring return valve. It is normally held by the spring in an offset position. The solenoid is energized whenever the foot switch is in the "down" position and the ram is not at the bottom of its stroke. Oil then flows to the holddown cylinders clamping the plate for shearing. A check valve locks the oil into these cylinders until the ram has stopped its downward movement. At the bottom of the ram stroke, this holddown valve is de-energized allowing the holddown cylinders to be immediately released.

This valve has a manual override pin in the end of the solenoid for testing and troubleshooting. Use a small tool to manually operate this valve.

7.2.4.4.RELIEF VALVE

Figure 7.2-4



The relief valve controls the maximum pressure the system will develop. It protects against damage, should an overload occur. The valve is normally factory set, however, should adjustment be necessary, remove the cap nut to expose the adjusting screw. Loosen the lock nut and turn the screw in to increase pressure, or out to decrease the pressure.

To check relief pressure, place selector switch in the "JOG" position and lower the ram to the bottom position. Simultaneously, manually override both the holddown valve and the rear solenoid of the main valve. Observe the relief valve pressure setting on the pressure gauge. The correct setting (normally 3500 psi) is on the nameplate on the side of the shear or in the TECHNICAL SPECIFICATIONS section.

7.2.4.5.RAM HOLDING COUNTERBALANCE VALVE

The hydraulic counterbalance valve prevents the shear ram from lowering due to the weight of the ram. During the down stroke, it keeps the ram from falling freely and running ahead of the pump. During the normal shearing cycle, correct adjustment will permit the holddowns to fully clamp the plate before the ram begins the cut.

Turn the adjusting screw "in" (clockwise) to reduce counterbalance pressure (holding pressure.) Turn the adjusting screw "out" (counter-clockwise) to increase counterbalance pressure. Set the pressure to the minimum holding pressure that allows the shear to function properly. Excessive counterbalance pressure can cause the hydraulic system to heat up during continuous cycling.

WARNING: **DO NOT** turn the adjusting screw to full "out." This will cause excessive counterbalance pressure that may result in hydraulic cylinder failure.

Turn the adjusting screw "out" just enough so that the holddowns are fully clamped before the ram starts downward. With no material being cut, the pressure gauge should read 250-300 psi during the down stroke (after the initial 1000 psi pressure peak.) If a chatter occurs during the down stoke, change the setting slightly. This adjustment is quite sensitive - usually 1/8 - 1/4 turn will eliminate the chatter.

If the counterbalance valve fails to respond to adjustment, remove it, check the 'O' ring seals (3 sets), and clean.

CAUTION: Before removing this valve, be sure the ram is down on the stops or firmly blocked up.

7.2.4.6.NEEDLE VALVE

The needle valve may be needed to smoothen the motion of the ram in the down stroke. If the ram hesitates or stops once or twice during a down stroke, turn the needle valve "in" until the hesitation goes away. This should raise the momentary peak pressure at the beginning of the cycle by 200-300 psi (up to approximately 1200 psi.)

7.2.4.7.HYDRAULIC SYSTEM ADJUSTMENT SUMMARY

A. First check the relief valve setting. Adjust if necessary.
B. Follow the steps below when setting the valves:
    1. Turn the counterbalance adjusting screw "in" until resistance is felt.
    2. Turn the needle valve adjusting screw "out" several turns.
    3. Adjust the sequence valve to about 800-1000 psi. This will be the momentary pressure seen on the gauge at the beginning of each cycle.
    4. Turn the needle valve "in" until the initial pressure is 1200 psi. This setting is quite sensitive near the correct setting.
    5. Turn the counterbalance valve "out" just enough to prevent the ram from free-falling. There should be 200-300 psi on the pressure gauge while the ram is moving down.

7.2.5.HOLDDOWN REPLACEMENT

Inspect the holddown cylinder for a possible leak source before removing it. If the entire cylinder is wet with oil, just the top 'O' ring (size #220) needs replacing. If only the lower half is wet, the internal seal must be replaced.

Position a shallow pan (a cake pan or the bottom of a pail works well) under the holddown to be removed. This will catch the oil that drains out. Remove the finger guards. Use the spanner wrench supplied with the shear to unscrew the holddown. A spare holddown is supplied with the shear.

To disassemble a holddown, unscrew the external spring and pull the cylinder apart. Use care and proper tools when working with the spring. Most users return the holddowns to the factory for rebuilding.

7.2.6.MAIN CYLINDER REPLACEMENT

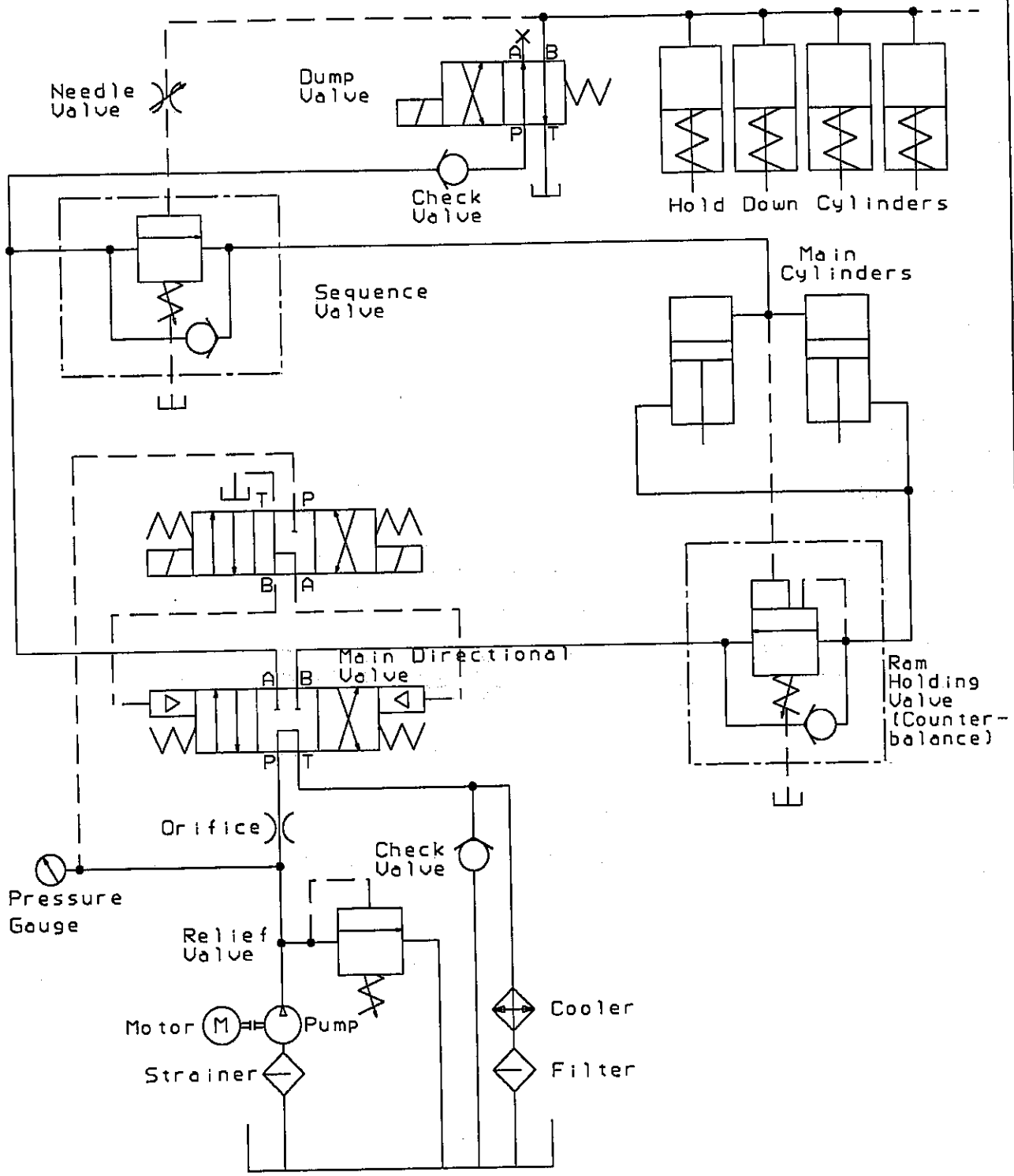
Before removing a main cylinder, the ram must be down on the stops. Turn the selector switch to "JOG" and cycle the shear to the down position. Manually override the main valve down solenoid and the holddown valve simultaneously until the ram is on the stops. Remove the top cover from the shear. Remove the top and bottom cylinder bolts. Use the shear hydraulics to retract the cylinder partially by jogging the selector switch from "JOG" to "MAN" and back. Do not raise the ram. Support the cylinder with a rope to prevent it from falling over. Do not put your hands into the cylinder area while jogging the cylinder. Turn off and lock out the hydraulic pump. Mark and disconnect the hoses. Insert a board from the back of the shear. Lower the cylinder onto the board and slide it out the back.

To disassemble a cylinder, use a spanner wrench or chain wrench to unscrew the rod end cover plate. Replace parts and seals as needed. Look carefully for scoring of the rod or tube. Reassemble using grease or anti-seize compound on the threads.

To reinstall, slide the cylinder along the board and lift into the lower cylinder pin lug using a rope to prevent hand injury. Connect the hoses to the correct ports. While supporting the cylinder vertically with a rope, start the shear and jog the shear "down" using the override pins described above. This jogging will extend the cylinder so the top bolts can be installed. Tighten all the bolts. Cycle the shear and check for correct operation before reinstalling the top cover.

HYDRAULIC SCHEMATIC - 1/4, 3/8, 1/2 SHEAR

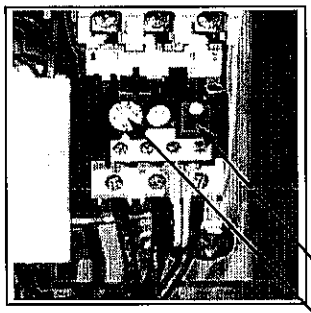
HS102



7.3. ELECTRICAL SYSTEM

7.3.1.MOTOR OVERLOAD ADJUSTMENT

Figure 7.3-1



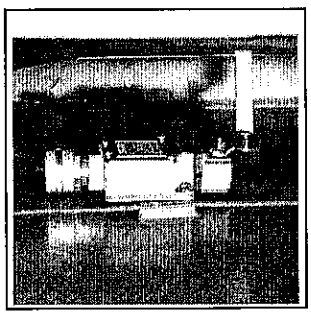
The main motor overload should be set to the full load amps on the motor nameplate. If nuisance tripping occurs, increase the setting by up to 15%.

The main motor running current when idling should be about 40% of nameplate full load amps. Motor current at relief pressure will be about 175% of full load amps. Amperage when cutting will vary with the thickness of material being cut.

7.3.2.LIMIT SWITCHES

7.3.2.1.UP LIMIT

Figure 7.3-2



The UP limit switch stops the upward motion of the ram. Loosen the nut and rotate the arm on the limit switch to adjust. Set the switch so the ram stops with approximately ½" clearance between the upper and lower blades at the low end of the ram. The ram must stop at least 1/8" from the end of the cylinder travel. Push the up override button on the main valve to raise the ram to the end of the cylinders. Observe the amount of travel. If less than 1/8", reset the switch arm.

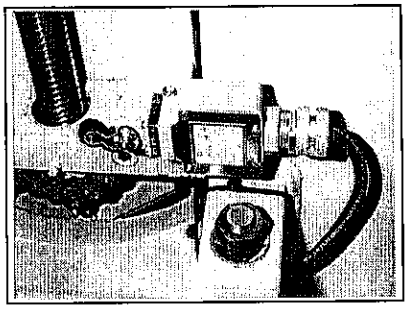
7.3.2.2.DOWN LIMIT

The DOWN limit switch stops the downward motion of the ram and thus controls the length of the stroke. With the stroke control cam set for maximum stroke, adjust the arm on the limit switch so the ram stops after the high end of the upper blade has crossed the lower blade by 1/8" - 1/4".

The amount of friction on the stroke control can be adjusted with the nut on the back side of the cam. Keep enough tension so the cam does not vibrate out of the selected position.

7.3.2.3.BACKGAUGE FRONT LIMIT

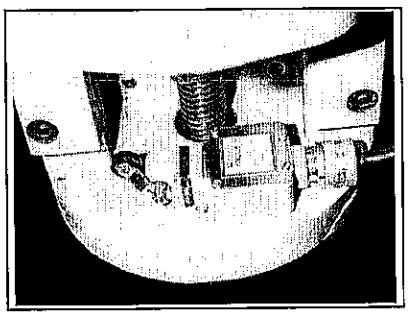
Figure 7.3-3



The BG1 control has a built in minimum target dimension of .256". Should the control be uncalibrated, the front limit will stop the backgauge before the bar hits the lower blade. Adjust the arm on the limit switch to stop the backgauge at .25"-.30" from the lower blade.

7.3.2.4.BACKGAUGE REAR LIMIT

Figure 7.3-4



The rear limit switch stops the travel of the backgauge in the flipped-up position. Adjust the arm as described in section 7.1.9.4 FLIP-UP ARMS.

7.3.3.BG1 BACKGAUGE CONTROL

The BG1 backgauge control consists of a digital display and keypad for operator input, a motor control board and triac, a DC motor, and a rotary encoder. The triac converts AC power to DC for the motor. The encoder provides feedback so the control knows the position of the backgauge. The two circuit boards are connected by a three wire communication cable.

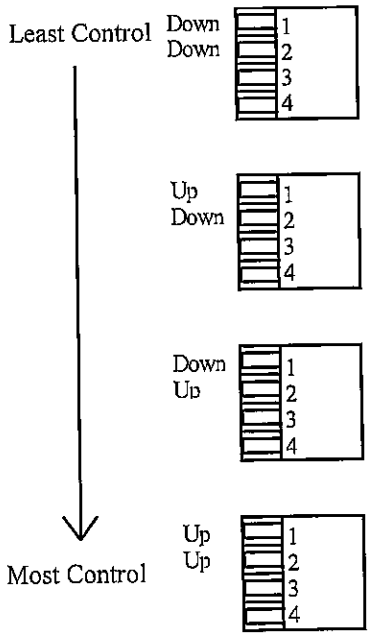
7.3.3.1.MOTOR BOARD INSTRUCTIONS

7.3.3.1.1.REPLACING THE CHIP

1. Turn off all power.
2. Insert small instrument (i.e. Small screwdriver) under end of chip and lift chip out of socket.

3. Insert the new chip with the notch down. Be careful not to bend over any of the pins.

7.3.3.1.2.ADJUSTING THE DIP SWITCHES

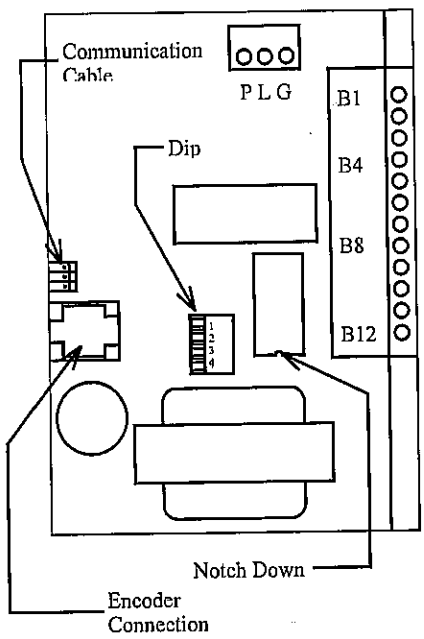


- Low speed converge adjustment
  1. Enter a target .200" less than the present position. Press "GOTO" and move the backgauge to the smaller number.
  2. If the gauge overruns the target by more than .001", turn off the power and move switch 3 to the UP position. Switch 3 controls the short distance converge speed.

- High speed converge adjustment
  3. Move to a target at least 5" smaller.
  4. If the backgauge overruns the target, turn off the power and adjust switches 1 and 2 per the diagram on the left to the next lower position to reduce the overrun. These two switches control the high speed deceleration. Use the least control that will give proper operation. Too much control increases converge time.

7.3.3.1.3.VOLTAGE CHECKS

Figure 7.3-5



The main pump motor is normally used as a transformer to supply power to the BG1 system. The two small wires at the motor junction box **must** be connected to motor leads 1 and 4 regardless of the voltage for which the main motor is connected. On 575 volt systems an external transformer supplies the power for the BG1 control.

If there is a suspected problem with the control system, the following checks can help diagnose a problem. Open the main electrical and turn the main disconnect switch back on with a tool. Use great caution when working in the open box around the live high voltage wires.

Power comes into the BG1 system at motor board terminals B3 and B4. With probes on B3 and B4, a VOM should measure 115-145 volts AC.

Measure power to the DC motor with probes on B1 and B3. When the motor is running at normal speed, a VOM should read approximately 90 volts DC. This voltage will drop as the motor slows near the target.

Measure voltage for the interconnect cable at the 3-pin plug connector with the cable unplugged. Power for the digital display should be 12 volts DC on the bottom pin with respect to the center pin. The top pin should have 3-6 volts DC with respect to the center pin.

7.3.3.2.KEYBOARD PROGRAMMING

The keyboard must be programmed for the backgauge length on the shear. To enter the program configuration number:

1. Press "CLEAR".
2. Enter 36.099 for 36" backgauge.
Enter 48.131 for 48" backgauge.
3. Press and hold "PRST". Do not release.
4. Press "6" and "in/mm" together. Do not release.
5. Release "PRST". Display will start to blink.
6. When blinking stops, release the other buttons.

To check that the configuration number is correctly programmed:

1. Press "CLEAR".
2. Press and hold "PRST". Do not release.
3. Press "6" and "in/mm" together. Do not release.
4. Release "PRST". Immediately release the other buttons.

7.3.3.3.DC BACKGAUGE MOTOR

Periodically remove the two small covers on the sides of the backgauge motor and check the condition of the brushes. Replace the brushes when they are less than 1" long.

Normal motor running current should be about 10 amps. Check at the motor with a DC ammeter in the line in with the motor or with a "clip-on" DC ammeter around one of the wires going to the motor. This current will be momentarily higher at starting and at backgauge T-bar flip-up. A steady high running currents indicates a tight backgauge that needs lubrication or adjustment, or a defective (demagged) motor.

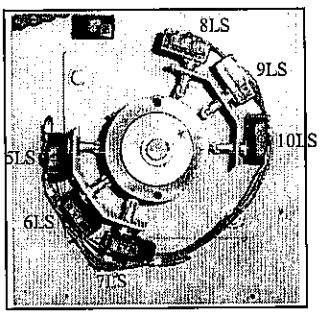
7.3.3.4.ROTARY ENCODER

The encoder is driven by a flexible coupling from the front end of the backgauge screw. Keep the coupling set screws tight to prevent erratic calibration. The encoder cord plugs into the motor board with a telephone type plug. Be sure the encoder cord has sufficient slack to allow full travel of the ram.

7.3.4.POWER BLADE CLEARANCE (OPTIONAL)

7.3.4.1.LIMIT SWITCHES

Figure 7.3-6

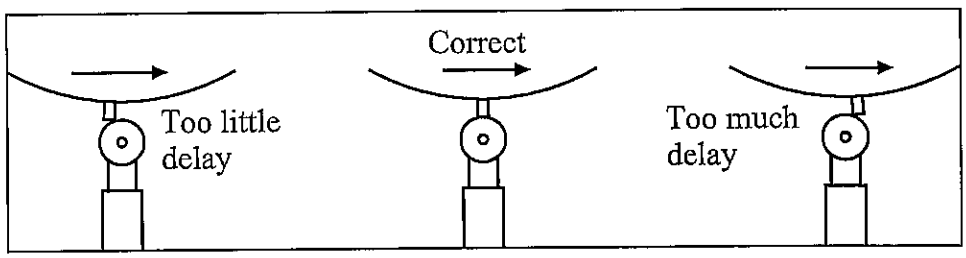


The limit switches/cam must be synchronized with the lower eccentric cams. Rotate the lower eccentric cams to the ¼" position (slit to the rear - see Figure 7.1-9). Rotate the switch cam so the row of three pins is centered on limit switch 10. Install the chains.

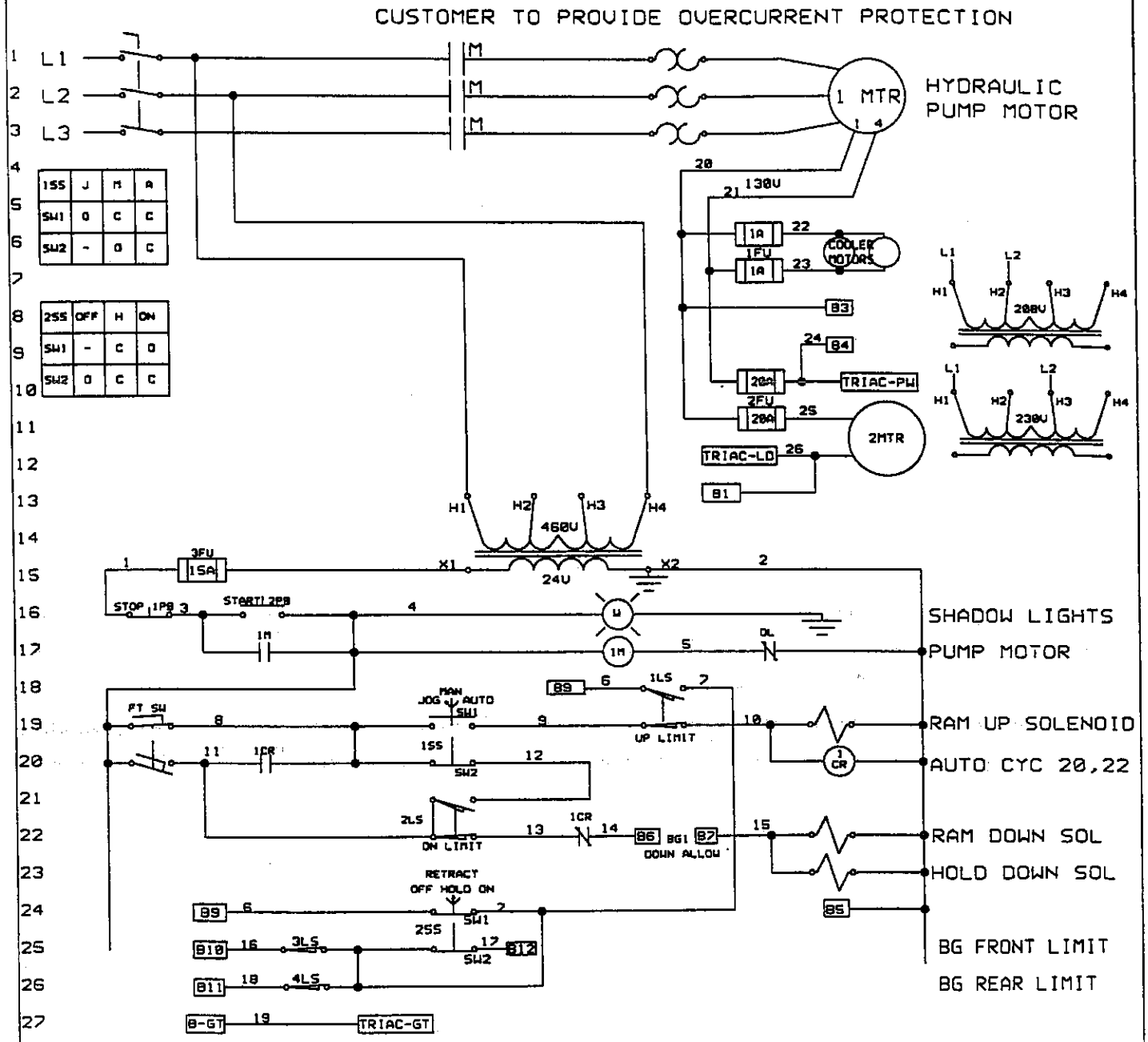
7.3.4.2.TIME DELAY RELAY

The timer relay delays the stopping of the power blade clearance motor until the cam pin is centered on the limit switch roller. Too little delay and the green light will blink. Too much delay and the motor will not stop.

Figure 7.3-7



ELECTRICAL SCHEMATIC - BG 1 CONTROL, 1/4, 3/8 | ES149



For stroke counter, connect module input to wires 2 & 15

8. MAINTENANCE DIAGNOSTICS

NOTE: Refer to section 3 SAFETY RECOMMENDATIONS prior to any servicing.

Dealer or customer personnel performing service work to any part of the shear must exercise good safe work practices. Ensure that other personnel are made aware that the shear is not in service by adequate machine lockout procedures and/or warning signs to prevent inadvertent shear operation when service is being carried out. Service personnel should have diagnostic tools such as an electrical multimeter for diagnosing electrical control problems and a pressure sensing device to diagnose hydraulic problems.

Service personnel attempting to operate the shear using manual override actuators on the hydraulic directional must observe extreme caution to prevent personal injury or damage to the shear blades, limit switches, and hydraulic cylinders due to overtravel by manual actuation.

The following schedule identifies typical mechanical, electrical, and hydraulic control malfunctions and suggested means to correct the fault.

8.1. TROUBLESHOOTING GUIDE - HYDRAULICS

Problem:	**Solution:**
Hydraulic pump drive motor runs, but shear ram will not cycle - no pressure on the gauge.	Manually override the main valve down (rear) solenoid. Make sure this pilot valve spool is shifting. If pressure or ram movement occurs, go to Electrical tests. Hydraulic tests if there is no pressure: • Verify correct main motor rotation. • Inspect the pump/motor coupling. Be sure the pump is turning. • Check for a defective pressure hose under the manifold. • Check the main valve lower spool. It must have free movement. Electrical tests: • Check mechanical action of footswitch. Listen for two distinct 'clicks' when the footswitch is actuated. Make sure the

	footswitch DOWN switch is closing. Check cord for damage. Check continuity with a multimeter. • Check the stroke control setting and adjust for shear stroke required. • Make sure the lower limit switch is closed. • Make sure the backgauge is at the target position. The BG1 down-allow relay must be closed to cycle the shear. • Check the wiring to the solenoid valve.
Hydraulics at relief pressure when footswitch is activated, but no ram or holddown movement.	• Check that the holddown valve spool moves freely. If seized, remove and clean. • Manually override the holddown valve and depress the footswitch. If the shear cycles, check the wiring to the holddown valve.
Hydraulic system displays maximum system pressure and holddowns clamp when footswitch is activated, but shear ram will not cycle.	• Open the needle valve. • Check sequence valve pressure setting. Spool cannot shift to advance the shear ram if adjustment is set to maximum. • Disassemble sequence valve and check for foreign particles or seized spool.
Hydraulic pump drive motor will not start.	• Turn disconnect switch to "ON". • Check incoming power supply. • Check for tripped overloads of blown fuses, determine cause, and reset/replace overloads/fuses. • Check for electrical control wiring continuity using a multimeter and the control schematic.
Hydraulic pump drive motor running, but shear ram will not return to the UP position.	• Manually override the main valve up (front) solenoid. If no ram movement occurs, go to Hydraulic tests if there is no pressure • Verify that the selector switch is set to MAN or AUTO. • Check footswitch continuity. • Check mechanical function and electrical continuity of UP limit switch.
Shear hydraulic system is overheating. (Measure oil temp with a thermometer - up to 160° F. (70° C.) is acceptable.)	• If the system shows relief pressure when idling, adjust the UP limit switch to prevent the ram cylinders from bottoming out. • Ensure that material thickness is within the capacity of the shear.

	• Check operation of oil cooler. • Check oil level.
Hydraulic pump is noisy.	• Check fluid level when ram is in the "UP" position and add fluid if required. • Check fluid condition. Replace hydraulic strainer, filter, and fluid as required. • Inspect coupler between motor and pump and replace as required.
Holddowns will not clamp when footswitch is activated or holddowns will not release when footswitch is released.	• Remove holddown valve, disassemble, clean with solvent and compressed air to remove contaminant. Re-assemble and re-install. • Replace holddown valve.
Shear ram will not remain in the up position, but regularly resets back up to the UP limit while the shear is idling.	• Increase the counterbalance pressure setting. **CAUTION:** Excessive counterbalance pressure can cause hydraulic failure. • Support shear ram prior to removing counterbalance valve. Clean with solvent and compressed air. Also check all 'O' ring seals for damage prior to replacing the valve.
Ram starts down before holddowns are clamped.	• Increase the counterbalance valve setting by turning the adjusting screw out slightly. • Remove the counterbalance valve and check the 'O' rings. Clean and replace.
Shear will not cut rated capacity.	• Check material hardness and thickness. Try cutting a different plate. • Check relief valve setting and readjust to nameplate value if necessary. If pressure is questionable, replace the pressure gauge. • Check blade clearance setting. A close setting takes more cutting tonnage. • Check blade edge condition. Dull blades require more cutting pressure. • Observe pressure on the gauge while attempting to make a cut. If it's significantly less than relief pressure, look for an internal leak in one of the main cylinders. Run the shear at this pressure until the oil becomes noticeably hotter. Feel the main cylinders - the hot one will be leaking.

8.2. BG1

Problem:	Solution:
The 20 amp fuses burn out regularly.	• Verify that the backgauge is clear of debris or obstruction. • Do not use the backgauge to move plate. The backgauge is not designed to move plate. • Check for motor demag. See section 7.3.3.3 DC BACKGAUGE MOTOR.
No digital display.	• Check supply voltage. See section 7.3.3.1.3 VOLTAGE CHECKS. • Check output voltage at the 3-pin plug. See section 7.3.3.1.3 VOLTAGE CHECKS. If not correct, replace the motor board. • Check continuity of communication cable between motor board and keyboard, replace if defective. • Replace keyboard.
Backgauge will not move to target when GOTO is pressed - display reverts to present position.	• Set selector switch to HOLD or RETRACT ON. • Check for backgauge obstruction. • Remove fuses and check. • Check calibration of backgauge T-bar. It may have tripped a limit switch. • Check coupling between encoder and leadscrew. • Inspect motor board for visible damage. • Check DC voltage output. See section 7.3.3.1.3 VOLTAGE CHECKS. If not correct, replace the triac and/or motor board. • Check backgauge motor brushes. • Check wiring and connections to backgauge motor.
Keypad is inoperative.	• Check plug connection to the circuit board. Check the 3-wire communication cable to the motor board. See Problem: No digital display.

Backgauge position does not match the LED display.	• Refer to calibration procedure. • Check the shaft coupling to the encoder.
Backgauge motor buzzes, but does not move.	• Replace the triac.
Backgauge oscillates or hunts back and forth at the target.	• Reset the motor board dip switches. See section 7.3.3.1.2 ADJUSTING THE DIP SWITCHES.

8.3. MECHANICAL

Problem:	**Solution:**
Thin gauge parts are excessively burred.	• Rotate the blade clearance lever to a thinner gauge setting. • Check for dull blades. Rotate blades before they are excessively worn. • Check link bearings clearances. See section 7.1.8 LINKS. • With the blade clearance lever set at the 22 gauge position, regap the blades to .002". See section 7.1.6 BLADE GAP ADJUSTMENT.

9. TECHNICAL SPECIFICATIONS

9.1. ACCURSHEAR DESCRIPTION

Model	625010
Rated Capacity	¼" Mild steel plate x 10 feet.
Total Weight	16,500 pounds

9.2. SPECIFICATIONS AND CAPACITIES

Drive Motor	20 hp, 256TC frame, 1800 rpm, 3ph
Backgauge Drive Motor	1 hp, 56C frame, 1800 rpm, DC
Main Hydraulic Cylinders	4" dia. x 5" stroke
Hydraulic Reservoir Capacity	64 gallons (U.S.)
Hydraulic Relief Pressure	3,500 psi
Control Voltage	24 volt AC
Backgauge Travel (std)	36 inch
Strokes/min. (full length)	23
Hydraulic Pump Flow	15 gpm

9.3. HYDRAULIC FLUID

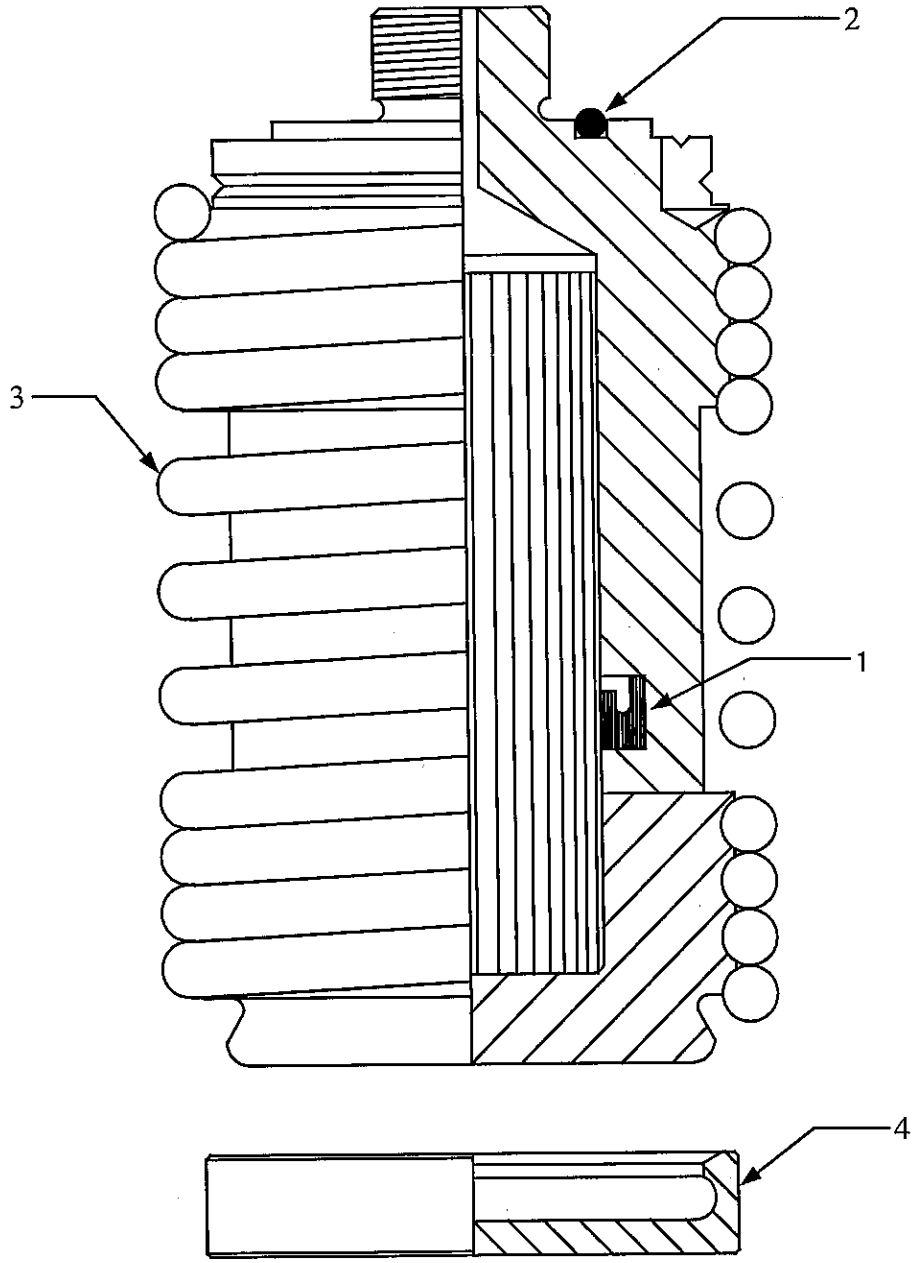
Anti-wear Hydraulic Oil

Viscosity - Normal Operation	ISO 46
- High ambient temps and/or continuous heavy duty use	ISO 68
- Cold temps and/or intermittent use	ISO 32

9.4. SHEAR BLADES

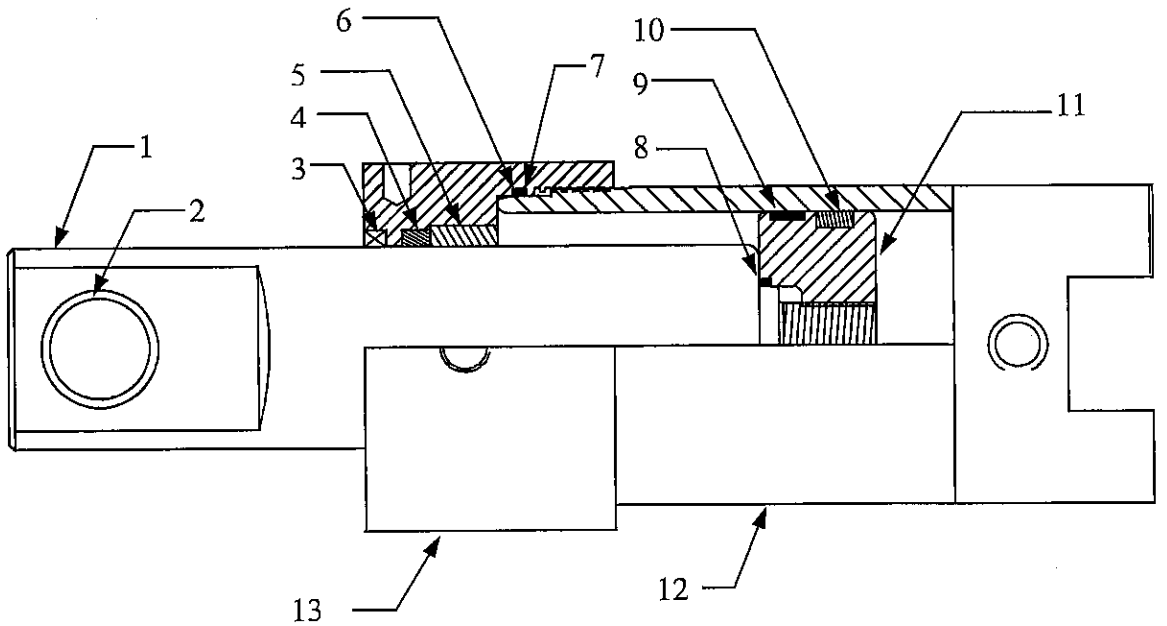
Size	124" x 3" x 1"
Type	Modified HCHC
Minimum Gap Setting	.001"
Normal Gap Setting	.002" - .003"
Rake Angle	¼" per foot
Back Cut Angle	½ - ¾ degree

9.5. HOLD DOWN CYLINDER ASSEMBLY - 1.5"



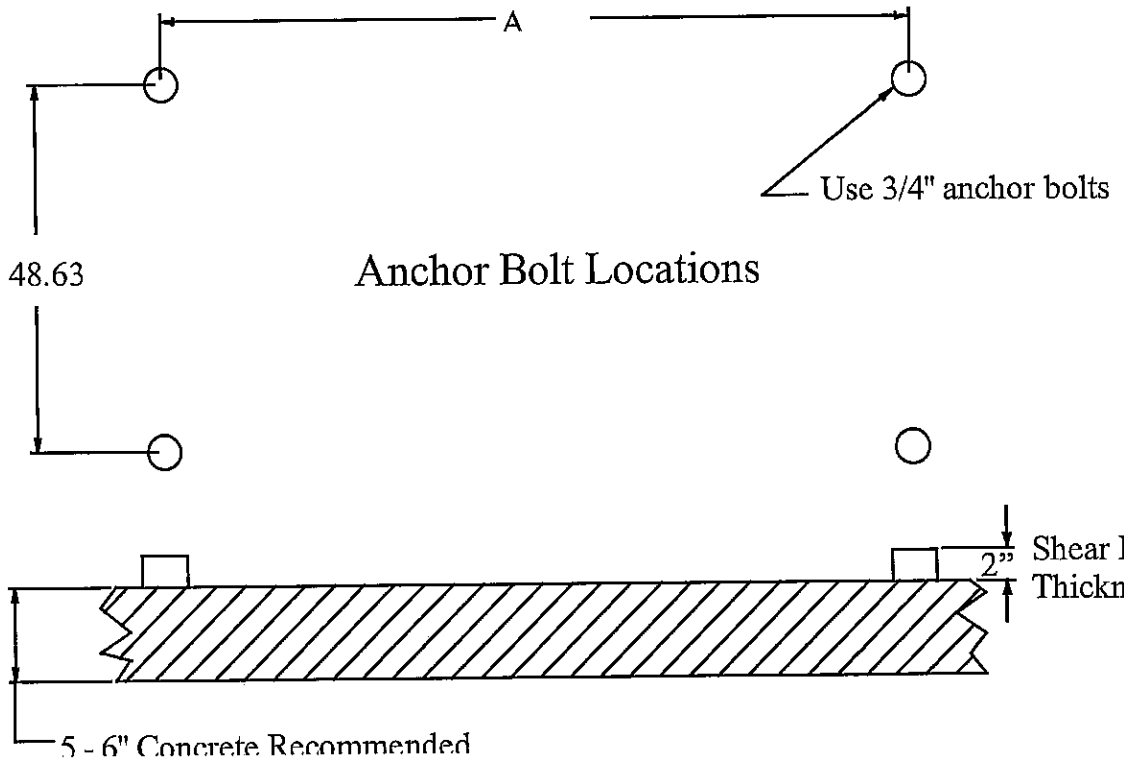
Item	Description	Part Number
	Complete Hold Down Assembly	V100
1	Rod Seal - Disogrin #001-115	HS00
2	'O'-Ring #220	HO00
3	Spring	SP13
4	Hold Down Pad (Optional)	UH0B

9.6. MAIN CYLINDER ASSEMBLY - 4"



Item	Description	Part Number
	Complete Cylinder Assembly	V105
1.	Cylinder Rod	W294
2.	Garlock Bushing - 1 ¾" long	BC23
3.	* Rod Wiper - Disogrin #110-047	HS08
4.	* Rod Seal - Disogrin #001-191	HS03
5.	Wear Ring - Bronze	WA039
6.	* 'O' Ring #246	HO0Q
7.	* Backup Ring #246	HO19
8.	* 'O' Ring #224	HO02
9.	* Wear Ring	HS11
10.	* Piston Seal - #2500-3500-P375B	HS20
11.	Piston	W292
12.	Cylinder Tube	WA256
13.	Rod End Cover	WA002
	Seal Kit (includes * items)	V113

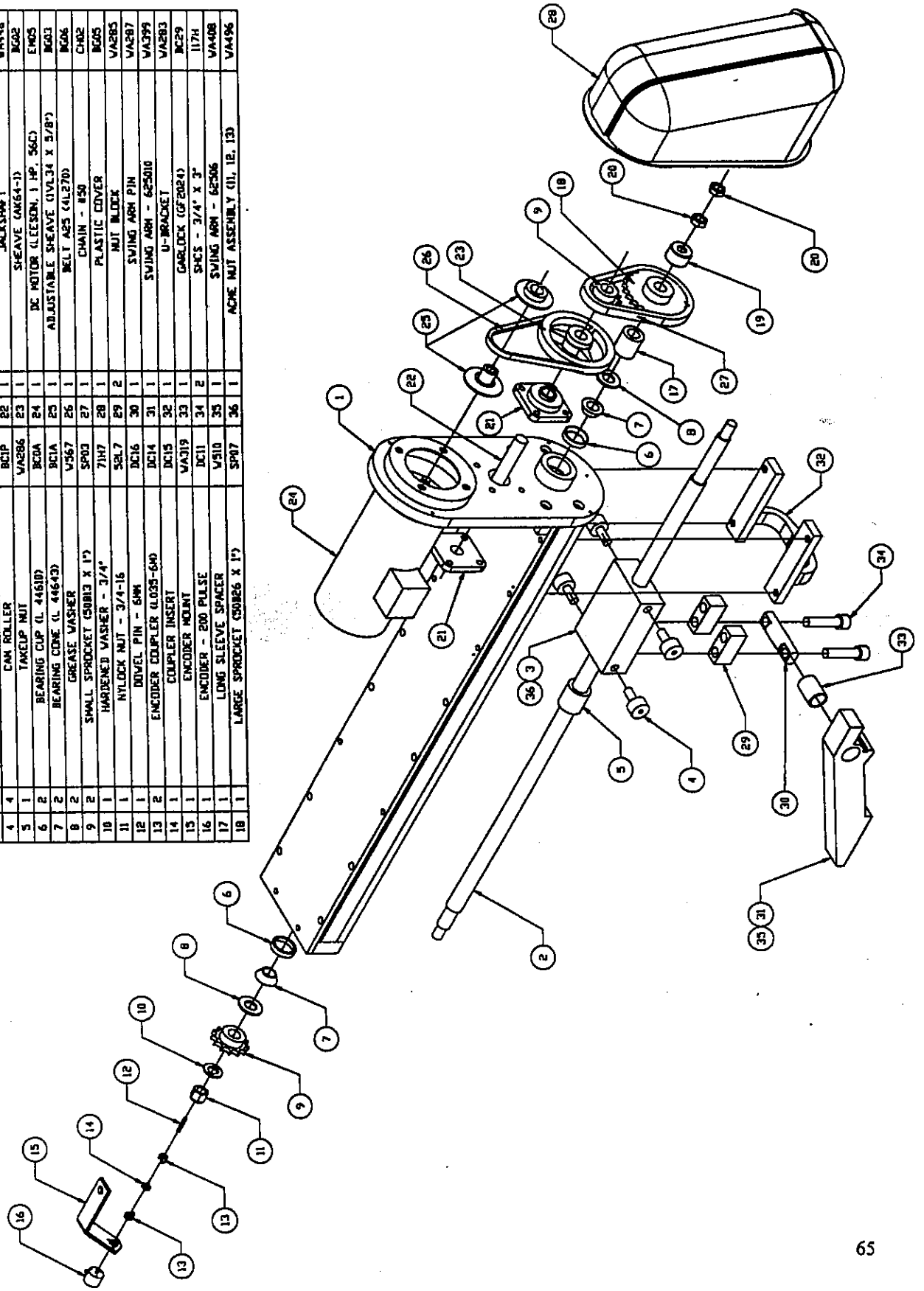
9.7. FOUNDATION DIMENSIONS



Model:	"A"
62506	89.5"
62508	113.5"
625010	137.5"
625012	162"

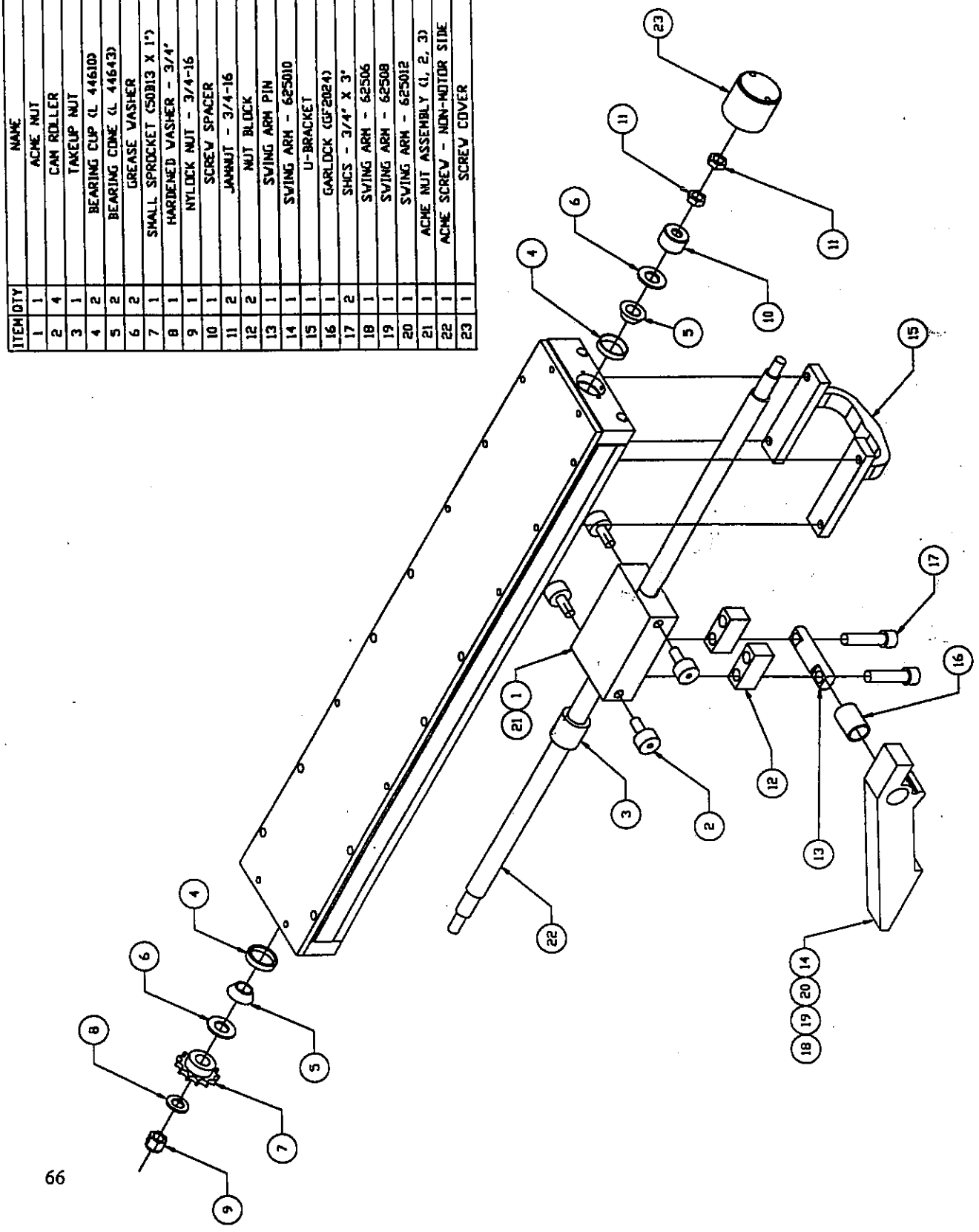
9.8. PARTS LIST FOR BACKGAUGE - MOTOR SIDE

ITEM	QTY	NAME	PART #
1	1	MOTOR MOUNTING PLATE	VA277
2	1	ACME SCREW - MOTOR SIDE	V359
3	1	ACME NUT	VA382
4	4	CAM ROLLER	BC1P
5	1	TAKEUP NUT	VA286
6	2	BEARING CUP (L 44610)	BC0A
7	2	BEARING CONE (L 44643)	BC1A
8	2	GREASE WASHER	V567
9	2	SMALL SPROCKET (50B13 X 1")	SP03
10	1	HARDENED WASHER - 3/4"	71H7
11	1	NYLOCK NUT - 3/4-16	SZL7
12	1	DOVEL PIN - 6MM	DC16
13	2	ENCODER COUPLER (L035-6M)	DC14
14	1	COUPLER INSERT	DC15
15	1	ENCODER MOUNT	VA319
16	1	ENCODER - 200 PULSE	DC11
17	1	LONG SLEEVE SPACER	V510
18	1	LARGE SPROCKET (50B26 X 1")	SP07
19	1	SCREW SPACER	V357
20	2	JAMNUT - 3/4-16	52J7
21	2	FLANGE BEARING	BC0D
22	1	JACKSHAFT	VA446
23	1	SHEAVE (AK64-1)	BG02
24	1	DC MOTOR (LEESON, 1 HP, 56C)	EM05
25	1	ADJUSTABLE SHEAVE (1VL34 X 5/8")	BG03
26	1	BELT A25 (4L270)	BG06
27	1	CHAIN - #50	CH02
28	1	PLASTIC COVER	BG05
29	2	NUT BLOCK	VA285
30	1	SWING ARM PIN	VA287
31	1	SWING ARM - 625016	VA399
32	1	U-BRACKET	VA283
33	1	GARLOCK (GF2024)	BC29
34	2	SHCS - 3/4" X 3"	117H
35	1	SWING ARM - 62506	VA408
36	1	ACME NUT ASSEMBLY (11, 12, 13)	VA496

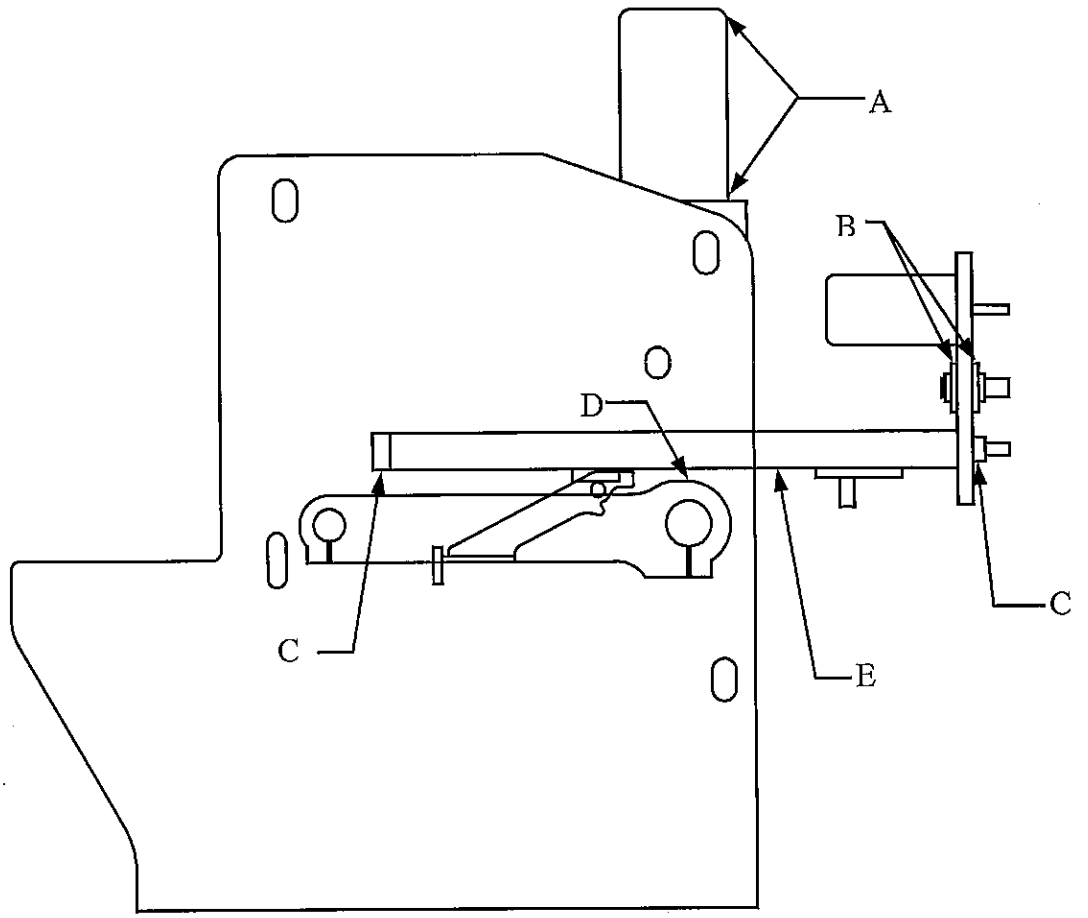


9.9. PARTS LIST FOR BACKGAUGE - NON-MOTOR SIDE

ITEM	QTY	NAME	PART #
1	1	ACME NUT	VA382
2	4	CAM ROLLER	BC1P
3	1	TAKEUP NUT	VA286
4	2	BEARING CUP (L 44610)	BC0A
5	2	BEARING CONE (L 44643)	BC1A
6	2	GREASE WASHER	V567
7	1	SMALL SPROCKET (50B13 X 1")	SP03
8	1	HARDENED WASHER - 3/4"	71H7
9	1	NYLOCK NUT - 3/4-16	52L7
10	1	SCREW SPACER	V357
11	2	JAMNUT - 3/4-16	52J7
12	2	NUT BLOCK	VA285
13	1	SWING ARM PIN	VA287
14	1	SWING ARM - 625010	VA400
15	1	U-BRACKET	VA283
16	1	CARLOCK (GF2024)	BC29
17	2	SHCS - 3/4" X 3"	117H
18	1	SWING ARM - 62506	VA412
19	1	SWING ARM - 62508	VA405
20	1	SWING ARM - 625012	VA401
21	1	ACME NUT ASSEMBLY (1, 2, 3)	VA496
22	1	ACME SCREW - NON-MOTOR SIDE	V620
23	1	SCREW COVER	V343



9.10. LUBRICATION CHART



Item	Description	Amount
A	Main Motor Bearing	Annually - One shot with motor running
B	Flange Bearings	Annually - One shot with motor running
C	Leadscrew Bearings	Monthly
D	Link Bearings	Monthly
E	Leadscrews	Weekly - Apply a bead of grease to the length of the screw

Use Multi-Purpose Grease In All Locations
Based On 8 Hour Operating Day

9.11. HYDRAULIC COMPONENTS

Component	Manufacturer	Part Number
Pump	Denison - T6C-010-2R00-B1	HP04
Pump - High Speed	Vickers - 25VQH17A-1C-20	HP05
Relief Valve Cartridge	Danfoss - 1A30-01-V-O-E-D	HV08
Main Valve	Rexroth - 4WEH22G-7X-6AW24-60NDA/H18/5	HV0Z
Holddown Valve	Continental VS12M-5F-G-65L-H	HV0R
Check Valve Cartridge	Sun - CXFA-XEN	HV0U
Check Valve	Hycon - RV16.1.0/5-25	HV09
Needle Valve Cartridge	Sun - NFDC-LBN	HV0V
Counterbalance Valve	Sun - CBEY-LBN	HV0D
Sequence Valve	Vickers - RCG-06-F3-30	HV2A
Filter Element	MP - MFS 180903	HFF8
Cooler	Thermal Transfer - M-10	HC03
Main Cylinders	Accurpress - 4"	V105
Holddown Cylinders	Accurpress - 1.5"	V100

9.12. ELECTRICAL COMPONENTS

Component	Manufacturer	Part Number
Transformer	GE 9T58B3552 GE 9T58B3413 (575v)	ET40 ET44
Fuse	AGC 15	EF30
Disconnect Switch	ABB OETL-NF 60P ABB OETL-NF30P (575v)	ED12 ED11
Main Contactor	CH CE15JNS3TB CH CE15FNS3TB (575v)	EC12 EC11
Main Contactor (High Speed)	TE LC1-D8011B6	EC13
Overload Relay	S &S CEP7-M85-85-10 CH C316FNA3S (575v)	EO21 EO0B
Overload Relay (High Speed)	S &S CEP7-M85-85-10	EO21
Start Button	Square D 9001-KR1U	EB20
Stop Button	Square D 9001-KR4R	EB21
Selector Switch	Square D 9001-KS42B	EB22
Contact Blocks for above	Square D 9001-KA2 (NO) Square D 9001-KA3 (NC)	EB23 EB24
Relays	Daytons 5X826	ER0H
Limit Switches	TE XCK-L115	ES04
Shadow Lights	Osram 64155	EB14
Main Electrical Motor	20 HP, 256TC, "Y" Wound 20 HP, 256TC, 575v	EM0B EM0C

Main Electrical Motor (High Speed)	30 HP, 286TC	EM0F
Backgauge Motor	1HP, 56C, DC	EM05
Encoder	MES-20-200	DC11
Fuse	Little Fuse - CCMR1 Little Fuse - CCMR20	EF38 EF39