H28A-120

393074

THANK YOU,

On behalf of everyone at HYD·MECH Group Limited, we would like to thank and congratulate you on your decision to purchase a HYD·MECH bandsaw.

Your new machine is now ready to play a key role in increasing the efficiency of your operation, helping you to reduce cost while boosting quality and productivity.

To ensure you are maximizing the power and versatility of your new HYD·MECH bandsaw, please take the time to familiarize yourself and your employees with the correct operation and maintenance procedures as outlined in this manual. Please keep this instruction manual for future reference in a known location and easily accessible to all users of the device.

HYD·MECH offers a great variety of options, components, and features for its various models. Therefore, some of the equipment described in this manual (various illustrations and drawings) may not be applicable to your particular machine.

The information and specifications provided in this manual were accurate at the time of printing. HYD·MECH reserves the right to discontinue or change specifications or design at any time without notice and without incurring any obligation.

Thank you.

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TABLE OF CONTENTS

SECTION 0 - SAFETY INSTRUCTIONS

SUMMARY 0.1
BASIC RULES....0.3
RESPONSIBILITIES OF THE OWNER....0.3
RESPONSIBILITIES OF THE OPERATOR AND MAINTENANCE PERSONNEL....0.4
SAFETY HAZARD LABELS 0.6

SECTION 1 - INSTALLATION

SAFETY PRECAUTIONS....1.1
FOUNDATION, LEVELLING AND ANCHORING 1.2
BARFEED INSTALLATION 1.3
CABLE TRAY COVERS 1.6
ELECTRICAL CONNECTIONS....1.7
HYDRAULIC CONNECTIONS 1.8
SHUTTLE VISE HOSE CONNECTIONS 1.8
SQUARING VISE (OPTION) HOSE CONNECTIONS 1.10
MACHINE GUARD INSTALLATION....1.11
WIRING CONNECTIONS....1.13
EARTH GROUNDING PROCEDURE 1.14
HYDRAULIC OIL AND CUTTING FLUID 1.14

SECTION 2 - OPERATING INSTRUCTIONS

BLADE BASICS....2.1
VARIABLE SPEED CONTROL....2.1
THE CONTROL PANEL 2.1
START-UP 2.1
PLC 100 CONTROL SYSTEM 2.2
MANUAL MODE....2.5
SINGLE CUT MODE OPERATION 2.6
AUTOMATIC OPERATION....2.7
WORKING WITH A QUEUE....2.8
WORKING WITH A REPEATING QUEUE 2.8
PARAMETERS....2.9
COOLANT SELECTION....2.9
HYDRAULIC FEED CONTROL....2.11
CUTTING PARAMETERS CHART....2.12
ADDITIONAL CONTROLS....2.18
COOLANT FLOW....2.18
HEAD UP AND DOWN LIMIT SETTING....2.19
VARIABLE VISE PRESSURE (OPTION) 2.19
BUNDLING OPERATION (OPTION) 2.20

SECTION 3 – MAINTENANCE AND TROUBLESHOOTING

LOCK OUT PROCEDURE 3.1
BLADE CHANGE MODE PROCEDURE.....3.2
BLADE BRUSH ADJUSTMENT 3.3
BLADE TRACKING ADJUSTMENT 3.3
IDLER WHEEL TRACKING.....3.4
H28A DRIVE WHEEL TRACKING.....3.4
GEARBOX LUBRICATION (H28A WITH A603 GEARBOX) 3.5
OUTPUT SHAFT LUBRICATION 3.6
LUBRICATION.....3.7
HYDRAULIC MAINTENANCE.....3.8
CLEANLINESS.....3.8
PROGRAMMABLE LOGIC CONTROL.....3.11
PLC PARAMETERS 3.12
PLC TROUBLESHOOTING 3.14
MITSUBISHI PLC INPUTS AND OUTPUTS 3.19
M12 PIN ASSIGNMENTS FOR M12 I/P & O/P DEVICES 3.20

SECTION 4 - ELECTRICAL

ELECTRICAL SCHEMATICS: SEE PDF ON ATTACHED CD 4.1

SECTION 5 - HYDRAULIC

HYDRAULIC SCHEMATICS & PLUMBING DIAGRAMS: SEE PDF ON ATTACHED CD 5.1

SECTION 6 - MECHANICAL ASSEMBLIES

MECHANICAL ASSEMBLY DRAWINGS & PARTS LIST: SEE PDF ON ATTACHED CD.....6.1

SECTION 7 - OPTIONS

OPTIONAL ASSEMBLY DRAWINGS: SEE PDF ON ATTACHED CD 7.1
BLADE DEVIATION MONITOR.....7.2
FLOOD MIST SELECTION 7.9

SECTION 8 - SPECIFICATIONS

H28A-120 SPECIFICATIONS.....8.1
H28A-120 BANDSAW LAYOUT 8.2
H28A-120 BANDSAW LAYOUT 8.3

SECTION 9 - WARRANTY

WARRANTY 9.1

SECTION 0 - SAFETY INSTRUCTIONS

SUMMARY

All persons operating this machine must have read and understood all of the following sections of this Manual:

Section 0 SAFETY
Section 2 OPERATING INSTRUCTIONS

However, as a memory aid, the following is a summary of the Safety Section.

Put Safety First

Mandatory Information – What operators and maintenance people must have read and understood.

Signatures – Everyone involved with this machine must sign to confirm they have read and understood mandatory information.

Basic Rules – only use this machine when

- It is in good working order.
- All safety equipment is in place and functional.
- Operations are in compliance with this manual.
- Materials are within designed specifications and are non-hazardous.

Owner is responsible to

- Keep Manual accessible at the machine.
- Ensure only reliable, fully trained personnel work with the machine.
- Clearly define responsibilities of all personnel working with the machine.
- Keep the machine in good working order.

Operator and Maintenance Personnel are responsible to:

- Keep all safety equipment in order, check its function at the beginning of each shift, and report any shortcomings.
- Shut down machine and report any faults or malfunctions that could impair safety.
- Understand and obey safety hazard labels.
- Not to wear unrestrained long hair, loose clothing or jewelry.
- Wear all required personal protective equipment.
- Not to wear gloves within 24 inches of moving blade.
- Maintain a clean working area and machine.
- Always use Lock-out when performing maintenance or repairs.

FOREWORD

Put Safety First!

This Safety Section contains important information to help you work safely with your machine and describes the dangers inherent to bandsaws. Some of these dangers are obvious, while others are less evident.

It really is important to PUT SAFETY FIRST. Make it a habit to consider the hazards associated with any action BEFORE you do it. If you feel any uncertainty, stop and find a safer approach to the action. If you're still uncertain, ask for advice from your supervisor.

The SAFETY FIRST approach is particularly necessary when you do something new, or different, and most people instinctively recognize this, although impatience may still cause them to take unnecessary risks.

Danger also lurks in the routine task that we have done over and over. Here, familiarity, boredom, or tiredness may lull us into unthinking, automatic repetition. Be alert for this, and when you feel it happening, stop and assess your situation. Review the safety hazards associated with what you are doing. That should get your brain working again.

Certainly production is important, but if you think you're too busy to put safety first, think how much production you'll lose if you get hurt.

You owe it to yourself, your family, and your co-workers to PUT SAFETY FIRST.

Mandatory Information

All persons operating this machine must have read and understood all of the following sections of this Manual:

Section 0 SAFETY

Section 2 OPERATING INSTRUCTIONS

Personnel involved in installation and maintenance of the machine must have read and understood all sections of the manual

Persons who have difficulty reading, or for whom English is not their first language, must receive particularly thorough instruction.

Signatures

Everyone involved in operation of this machine must sign below to confirm that:

I have read and understood all parts of Section 0 – Safety, and Section 2 – Operating Instructions.

Name	Date	Signature

Everyone involved in the installation, inspection, maintenance, and repair of this machine must sign below to confirm that:

I have read and understood all parts of this Operation and Maintenance Manual.

Name	Date	Signature

BASIC RULES

Intended Use

Our machines are designed and built in line with the state of the art, and specifically in accordance with American National Standards Institute Standard B11.10 *Safety Requirements for Metal Sawing Machines.* However, all machines may endanger the safety of their users and/or third parties, and be damaged, or damage other property, if they are operated incorrectly, used beyond their specified capacity, or for purposes other than those specified in this Manual.

Exclusion of Misuse

Misuse includes, for example:

Sawing hazardous materials such as magnesium or lead.

Sawing work pieces which exceed the maximum workload appearing in the Specifications.

Operating the machine without all original safety equipment and guards.

Liability

The machine may only be operated:

When it is in good working order, and

When the operator has read and understood the Safety and Operating Instructions Sections of the Manual, and

When all operations and procedures are in compliance with this Manual.

Hyd-Mech Group cannot accept any liability for personal injury or property damage due to operator errors or non-compliance with the Safety and Operating Instructions contained in this Manual.

RESPONSIBILITIES OF THE OWNER

Organization of work

This Operation and Maintenance Manual must always be kept near the machine so that it is accessible to all concerned.

The general, statutory and other legal regulations on accident prevention and environmental protection must also be observed, in addition to the Manual material. The operators and maintenance personnel must be instructed accordingly. This obligation also includes the handling of dangerous substances and the provision and use of personal protective equipment.

Choice and qualification of personnel

Ensure that work on the machine is only carried out by reliable persons who have been appropriately trained for such work.

Training

Everyone working on or with the machine must be properly trained with regard to the correct use of the machine, the correct use of safety equipment, the foreseeable dangers that may arise during operation of the machine, and the safety precautions to be taken.

In addition, the personnel must be instructed to check all safety devices at regular intervals.

Define responsibilities

Clearly define exactly who is responsible for operating, setting-up, servicing and repairing the machine.

Define the responsibilities of the machine operator and authorize him to refuse any instructions by third parties if they run contrary to the machine's safety.

Persons being trained on the machine may only work on or with the machine under the constant supervision of an experienced operator. Observe the minimum age limits required by law.

Condition of Machine and Workplace

Ensure that the machine and its safety equipment are kept in good working order.

Ensure that the work area is well lit, and protected from the elements, such as rain, snow, abrasive dust, and extremes of temperature.

Ensure that the machine is installed with sufficient clearance around it for the safe loading and unloading of work pieces.

RESPONSIBILITIES OF THE OPERATOR AND MAINTENANCE PERSONNEL

Safety equipment

All machines are delivered with safety equipment that must not be removed or bypassed during operation.

The correct functioning of safety equipment on the machine must be checked:

- At the start of every shift.
- After maintenance and repair work
- When starting for the first time, and after prolonged shutdowns

Emergency Stop Button (E-Stops)

Always be aware of the location of the Emergency Stop Button(s). Do not allow material or objects to block your access to an Emergency Stop.

Damage

If any changes capable of impairing safety are observed in the machine or its operation, such as damage, malfunctions, or irregularities, then appropriate steps must be taken immediately, the machine switched off, locked-out, and the fault reported to the responsible person.

Safe operation

The machine may only be operated when in good working order and when all protective equipment is in place and operational.

Keep a safe distance from all moving parts – especially the blade and vises.

Stock should not be loaded onto the saw if the blade is running.

Long and heavy stock should always be properly supported in front of and behind the saw.

Faults

The machine must be switched off and locked-out before starting to remedy any faults.

Safety hazard labels

Safety hazard labels and other instructional labels on the machine must be observed. They must be clearly visible and legible at all times. If they become damaged they must be replaced.

Clothing, jewelry, protective equipment

Personnel operating or working on the machine must not wear unrestrained long hair, loose-fitting clothes and dangling jewelry.

When operating or working on the machine, always wear suitable, officially tested personal protective equipment such as safety glasses and safety boots and any other equipment required by workplace regulations.

Gloves

Experience has shown that careless use of gloves around machinery is a major factor in serious hand injuries.

Gloves should not be worn when operating or adjusting the machine, except:

Wear protective gloves when handling bandsaw blades at blade changes.

Gloves may be worn when handling work pieces, only if the machine is in Manual Mode and the bandsaw blade is not running.

If the machine is running in Auto Mode, and only if the cut parts are greater than 24 inches long, it may be possible to safely wear gloves for handling the cut parts, but the wearer of the gloves must never put his hands near the blade for any reason. If the cut parts are less than 24 inches long, it is required to arrange their automatic flow into a parts bucket or other suitable arrangement to avoid the necessity to pick them off the machine by hand.

Hearing protection

Ear protection must be worn whenever necessary.

The level and duration of noise emission requiring hearing protection depends upon the national regulations in the country in which the machine is being used.

The actual level of noise emission by band sawing machines depends upon work piece size, shape and material, blade type, blade speed and feed rate.

The only practical course of action is to measure the actual noise emission levels for the type of work that is typically done. With reference to national standards, decide upon the necessary hearing protection required.

In the absence of such measurements, it is advisable for anyone exposed to long periods of moderate to loud noise to wear hearing protection. It is important to understand that hearing loss is gradual and easily goes unnoticed until it is serious and irreversible.

Workplace

A clear working area without any obstructions is essential for safe operation of the machine. The floor must be level and clean, without any build-up of chips, off-cuts, coolant, or hydraulic oil.

The workplace must be well lit, and protected from the elements, such as rain, snow, abrasive dust, and extremes of temperature

Nothing may ever be placed on, or leaned against the machine, with the obvious exception of the work piece on the table and conveyor of the machine.

Master Disconnect

Lock-out the machine before undertaking any maintenance or repair work on it. ‘Lock-out’ refers switching off the master electrical disconnect switch, and locking it out so that it cannot be switched on again without authorization.

On Hyd-Mech machines the Master Disconnect Switch will be of one of four types:

- Rotary switch mounted in electrical control cabinet door and inter-locked with door.
- Rotary switch mounted on the side of the operator interface console.
- Lever switch mounted in separate box on the machine.
- Supply disconnect switch supplied by user at installation and usually wall-mounted within sight of the machine, depending upon local regulations.

In almost all jurisdictions, it is required that owners of industrial equipment establish and post lock-out procedures. Know and use the lock-out procedures of your company or organization.

Residual Risks

The machine is still not completely de-energized if an electrical cabinet door type switch is locked-out.

The line side of the disconnect switch itself remains energized.

Variable speed blade drives store dangerous voltage in their capacitors, and this requires time to dissipate. After locking out power, wait 3 minutes before beginning to work on machine electrical circuits.

If compressed air is supplied to the machine to power a mist lubrication system or other devices, it should be disconnected, and any stored air pressure released before working on the machine.

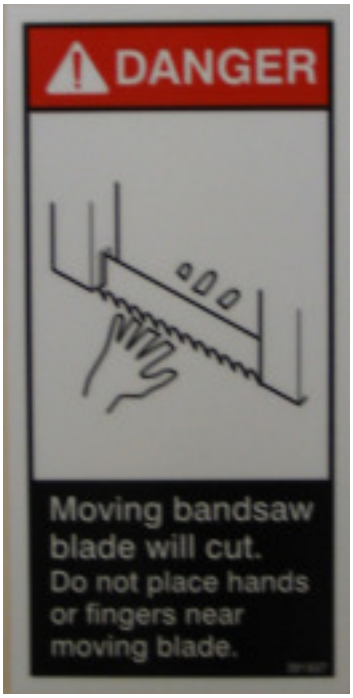
The weight of individual machine components represents stored potential energy that can be released if they fall when disconnected. Secure these components with adequate hoisting gear before disassembly.

SAFETY HAZARD LABELS

The safety hazard labels attached to your machine represent important safety information to help you avoid personal injury or death.
All supervisors, operators, and maintenance personnel must locate and understand the safety information associated with each hazard label prior to operating or servicing the machine.
The safety hazard labels shown below are located at various positions on the machine to indicate possible safety hazards. The location and re-order part number of all the safety labels associated with this particular model of bandsaw are indicated at the end of this section of the manual. It is important to replace any safety hazard label that becomes damaged or illegible.

HAZARDOUS VOLTAGE INSIDE

Contact with high voltage may cause death or serious injury. Never perform maintenance on, or near, electrical components until the machine’s electrical power source has been disconnected. Lock-out power in accordance with your company’s lock-out procedures before any such maintenance. The “Stop” or “Emergency Stop” push button does not disconnect the machine’s power supply. Hazardous voltage is still present in the machines electrical circuits.
The machine’s Electrical Disconnect Switch does disconnect voltage from the machine’s circuits; however hazardous voltage is still present inside the main electrical cabinet, on the infeed (line) side of the main fuses. Therefore keep hands and tools away from the infeed side of the control panel main fuses. If these fuses need to be replaced, use a fuse puller.
Allow three minutes after locking-out power before opening any electrical enclosures. Your machine may be equipped with a variable frequency drive that stores high voltage within its capacitors. Three minutes will allow sufficient time for this voltage to safely discharge.
Never spray coolant directly at electrical components or cabinets.



MOVING BANDSAW BLADE WILL CUT

Do NOT operate with guard removed.
Do NOT place hands or fingers near moving bandsaw blade.
For blade changing, always follow the proper Blade Changing Procedure, as given in Section 3 of this manual.

PINCH POINT

Machine parts may move without warning, either because the machine is operating automatically, or because another person initiates the motion. Keep hands clear of all labelled pinch points, whenever the machine is running. Machine vises can exert great force and cause severe injury. Keep hands clear of vises and work piece when vises are opened or closed. Be aware that vise closing or opening may result in potentially dangerous work piece movement. Be aware also that the opening motion of a vise may create potential pinch points.

MOVING PARTS CAN CRUSH AND CUT

Keep hands clear of chip auger. Lock-out power in accordance with your company's lock-out procedures before attempting to clear a jam in the chip auger.
Be aware that the chip auger may start unexpectedly, either because the machine is operating automatically, or because another person initiates the motion.
If the chip auger is stalled because of a jam, it may start without warning when the jam is cleared, unless the machine power is locked out.

Item # 391938

Item # 391335

Item # 391340

Idler Guide Arm

Drive Guide Arm

Item # 391937

Fixed Vise

Shuttle Vise

Item #. 392801

SECTION 1 - INSTALLATION

Upon delivery of your new H28A 120 saw, it is imperative that a thorough inspection be undertaken to check for any damage that could have been sustained during shipping. Special attention should be paid to the electrical and hydraulic systems to check for damaged cords, hoses and fluid leaks. In the event of damage caused during shipping, contact your carrier to file a damage claim.

SAFETY PRECAUTIONS

The machine has been designed to give years of reliable service. It is essential that operators be alerted to the safe operation of this saw and the practices to avoid that could lead to injury. The following safety rules are at the minimum necessary for the safe installation, operation, and maintenance of the saw. Take every precaution for the protection of operators and maintenance personnel.

- POWER HOOK-UPS AND REPAIRS SHOULD ONLY BE ATTEMPTED BY QUALIFIED TRADESMEN.
- THE SAW SHOULD BE LOCATED IN AN AREA WITH SUFFICIENT ROOM TO SAFELY LOAD STOCK INTO THE SAW. SECURE THE SAW TO THE FLOOR.
- THE AREA AROUND THE SAW SHOULD BE MAINTAINED IN A CLEAN AND TIDY CONDITION TO AVOID OBSTACLES OPERATORS COULD TRIP OVER.
- THE H28A 120 SHOULD ONLY BE OPERATED ACCORDING TO THE SPECIFICATIONS OF THE SAW. AVOID UNSAFE USAGE PRACTICES.
- IF AT ANY TIME THE SAW DOES NOT APPEAR TO BE OPERATING PROPERLY IT SHOULD BE STOPPED IMMEDIATELY AND REPAIRED.

OPERATOR :

- THE SAW SHOULD NEVER BE OPERATED UNLESS ALL GUARDS AND DOORS ARE IN PLACE AND CLOSED.
- KEEP A SAFE DISTANCE FROM ALL MOVING PARTS - ESPECIALLY THE BLADE AND VISES.
- LOOSE CLOTHING AND GLOVES SHOULD NEVER BE WORN WHILE OPERATING THE SAW. COVER LONG HAIR.
- STOCK SHOULD NOT BE LOADED ONTO THE SAW IF THE BLADE IS RUNNING.
- LONG AND HEAVY STOCK SHOULD ALWAYS BE PROPERLY SUPPORTED IN FRONT OF AND BEHIND THE SAW.
- NEVER ATTEMPT TO DISLODGE OR MOVE STOCK WHILE THE BLADE IS MOVING. TAKE THE TIME TO STOP THE SAW BLADE, REMOVE OBSTRUCTIONS, AND START THE BLADE.
- MUST WEAR EYE PROTECTION.
- MAINTAIN PROPER ADJUSTMENT OF BLADE TENSION, BLADE GUIDES, AND BEARINGS
- HOLD WORK PIECE FIRMLY AGAINST TABLE.
- DO NOT REMOVE JAMMED CUTOFF PIECES UNTIL BLADE HAS STOPPED.

NO MODIFICATIONS TO THE MACHINE ARE PERMITTED WITHOUT PRIOR APPROVAL FROM HYD-MECH. ANY APPROVED MODIFICATIONS SHOULD ONLY BE UNDERTAKEN BY TRAINED PERSONNEL.

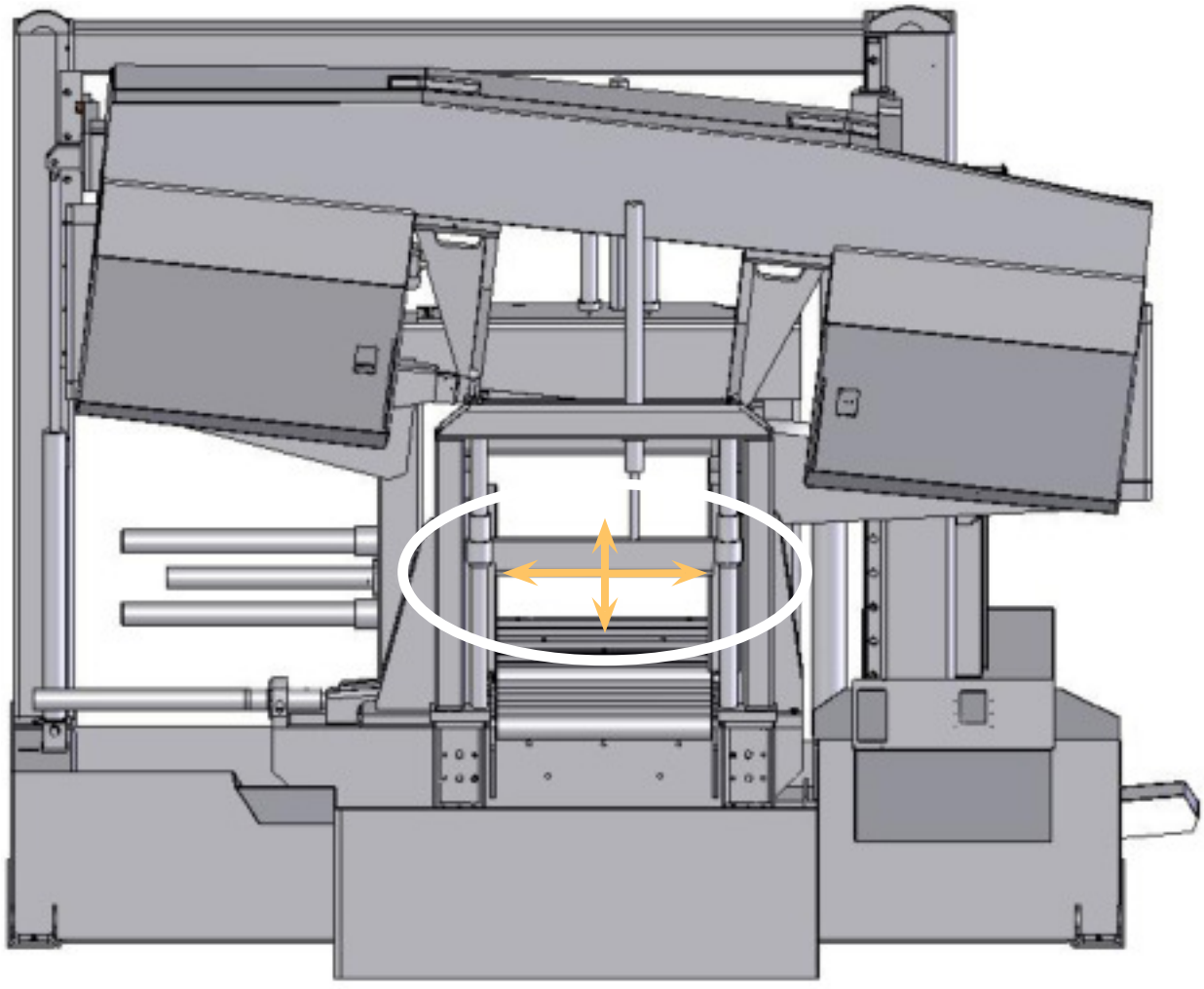
FOUNDATION, LEVELLING AND ANCHORING

The machine location should be carefully selected. A flat concrete floor area should be chosen. It should have enough free space surrounding the machine to enable free access for safe operation and maintenance.

The machine must be leveled in both directions i.e. along and across its in-feed conveyor especially when machine is to be inserted into a larger conveyor system.

Six leveling screws are provided, one in each corner of the machine base plus two in the hydraulic cabinet. Steel plates are to be placed under each screw to prevent their sinking into the concrete floor. In cases where the machine is to be anchored permanently, anchoring holes are provided. They are located next to the leveling screws.

NOTE:
In some cases leveling the saw with a slight slope towards blade is recommended. This will prevent coolant from running down the raw stock. (This is especially true when cutting tubing or bundles).



Machine with Outboard Vise option shown

BARFEED INSTALLATION

The H28A 120 machine is calibrated, adjusted, leveled, and inspected in the factory before shipping. The machine is partially disassembled for shipping purposes. The two main parts of the machine are the front section and the conveyor section. The installation consists of the following sections:

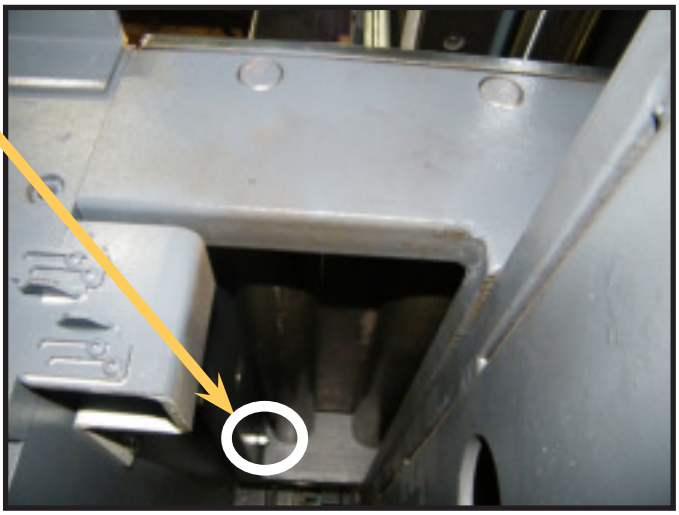
1. Mechanical
2. Hydraulic
3. Electrical
4. Guard

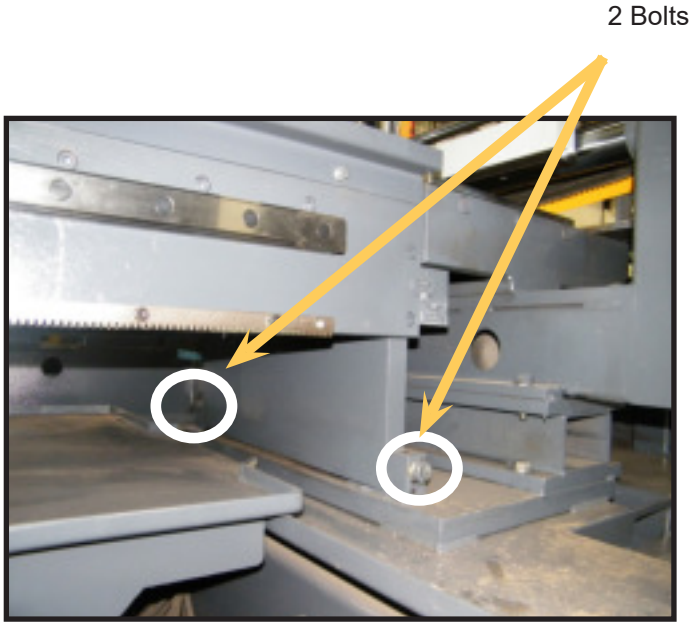
1. Mechanical Installation

Remove the bracket that holds the limit switch targets. This will need to be installed after the conveyor and the main machine have been fastened together.

The conveyor and the main machine need to be connected together.

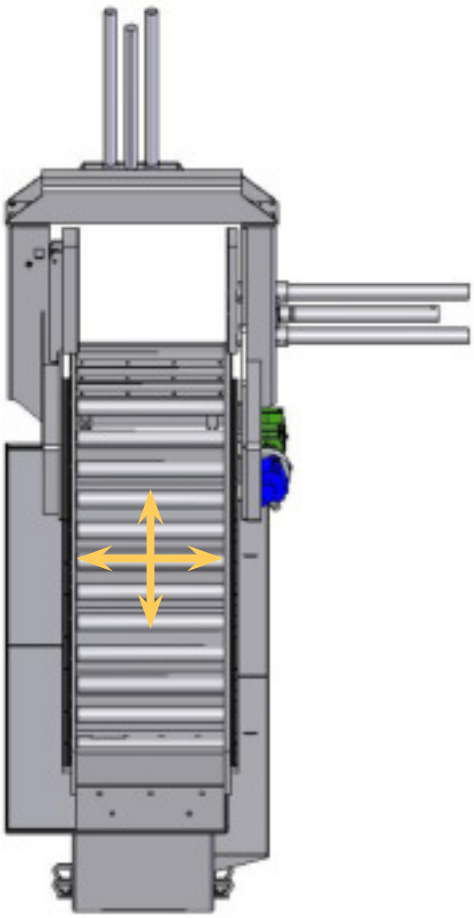
2 Bolts/Nuts





As mentioned earlier, the conveyor should be leveled in both directions (page 1.2); across and along the infeed conveyor. Six leveling screws are provided, three down each length of the conveyor. Steel plates are to be placed under each screw to prevent their sinking into the concrete floor. In cases where the machine is to be anchored permanently, anchoring holes are provided. They are located next to the leveling screws.

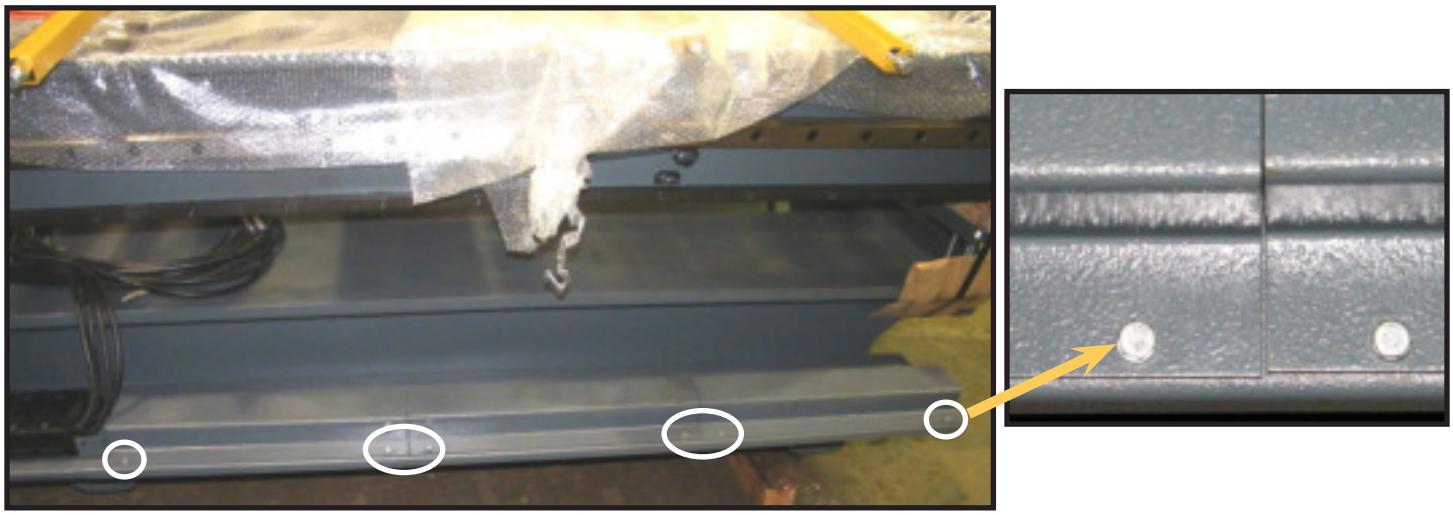
NOTE: Leveling the infeed conveyor with a slight slope towards the blade will prevent coolant from running down the raw stock.



To safely ship the conveyor, weldments and brackets are added to secure the conveyor to its base and to prevent the shuttle from moving. Once the conveyor has been leveled to the bandsaw, remove supports.

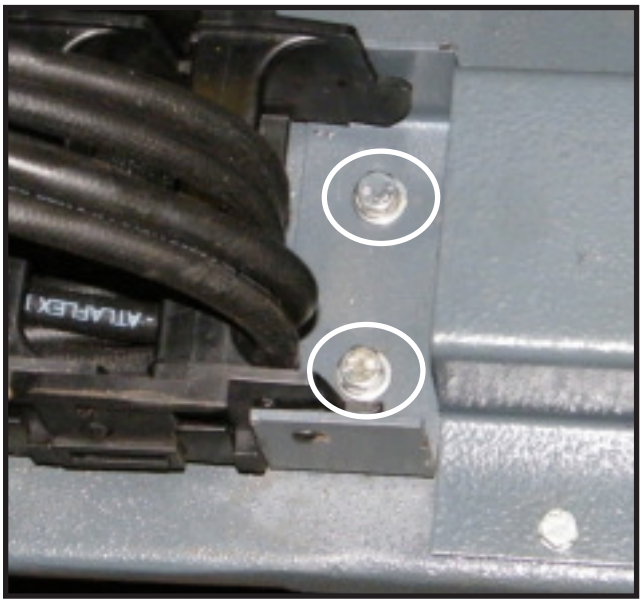
A shuttle support bracket must be removed in-order for the shuttle to move. The bracket is located on the same side as the shuttle gearmotor assembly.

CABLE TRAY COVERS



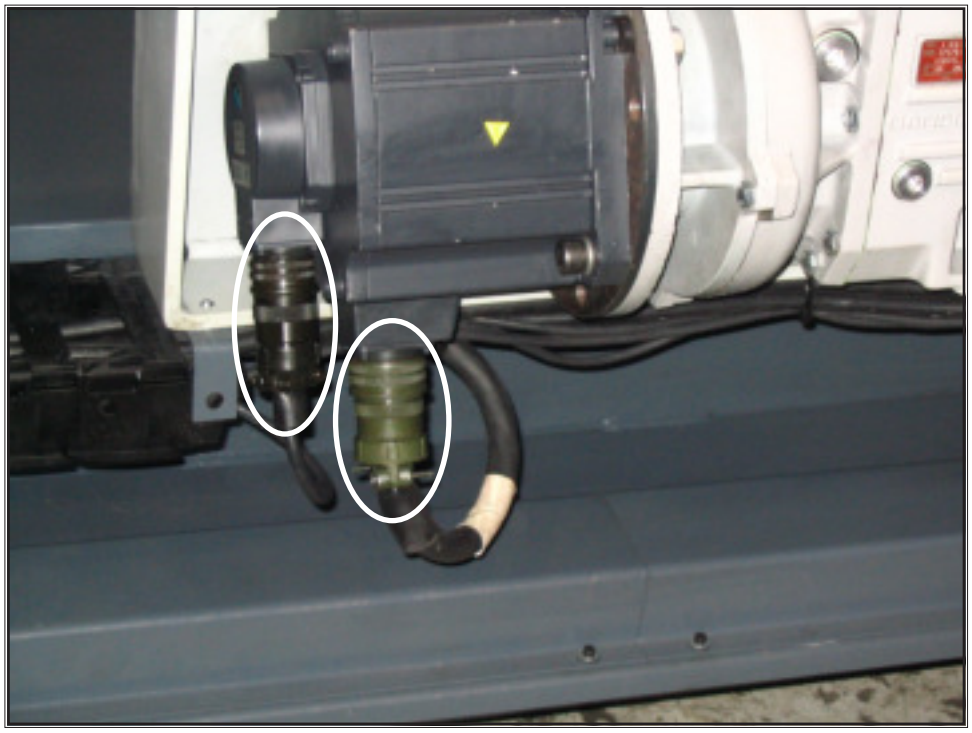
Remove the three cable covers that line the barfeed table. Unpack and unravel the cable track holding the wires and hoses for the barfeed shuttle. Once all cables/hoses have been connected, re-install cable tray covers and bolts.

Fasten the two brackets that will hold the cable track in place.

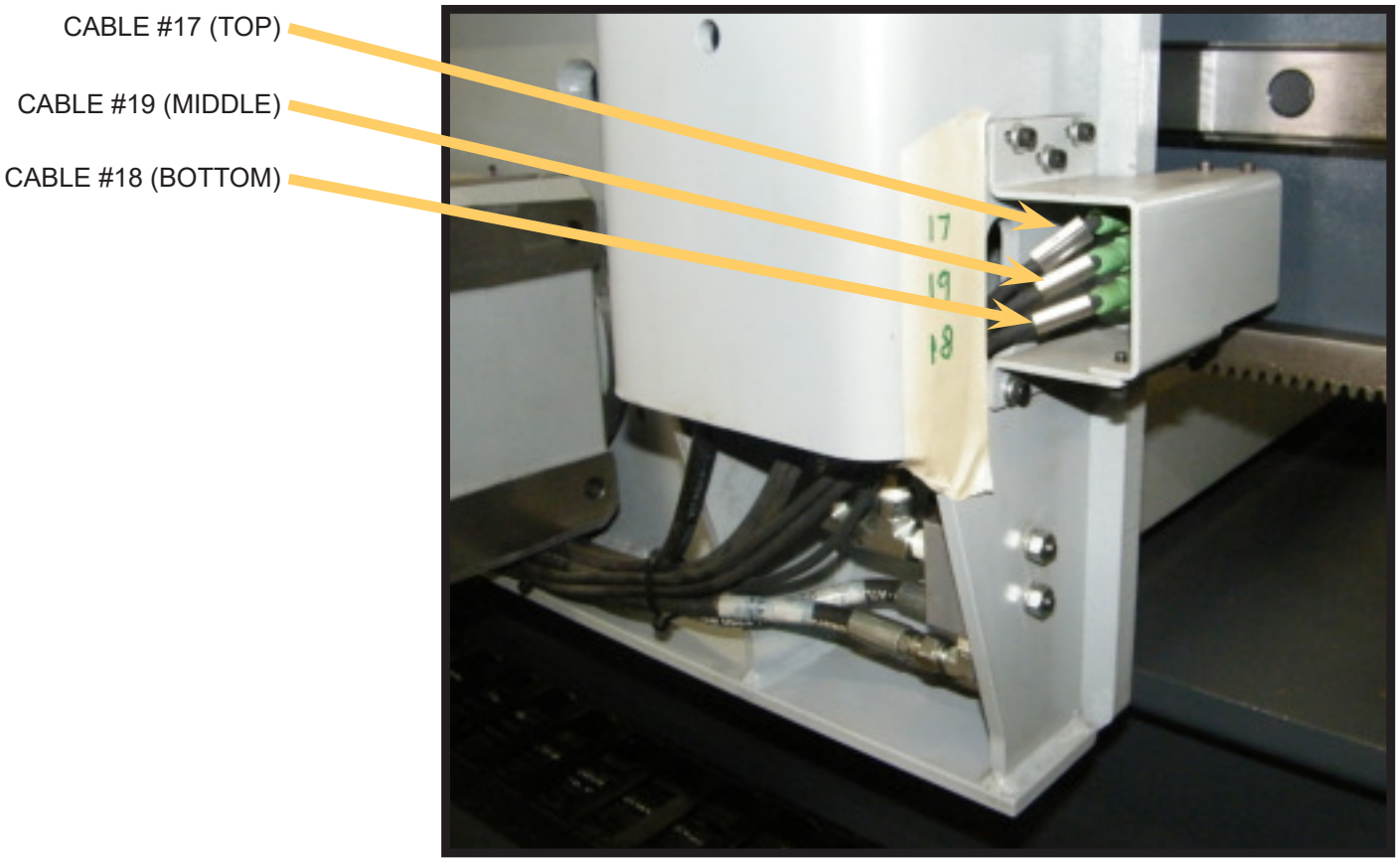


ELECTRICAL CONNECTIONS

Connect both cables to the electric motor as shown.



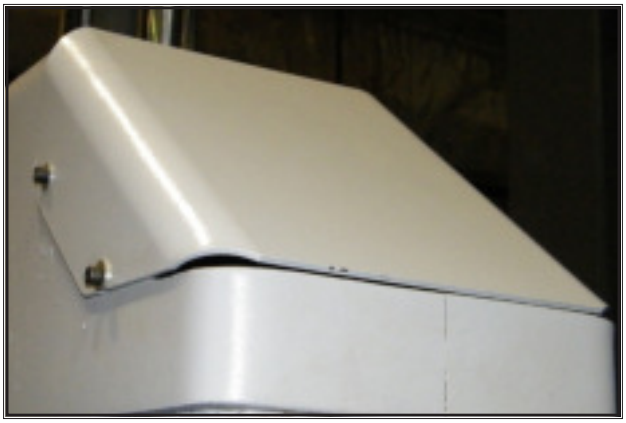
Connect the cables for the limit switches as shown in the picture below.

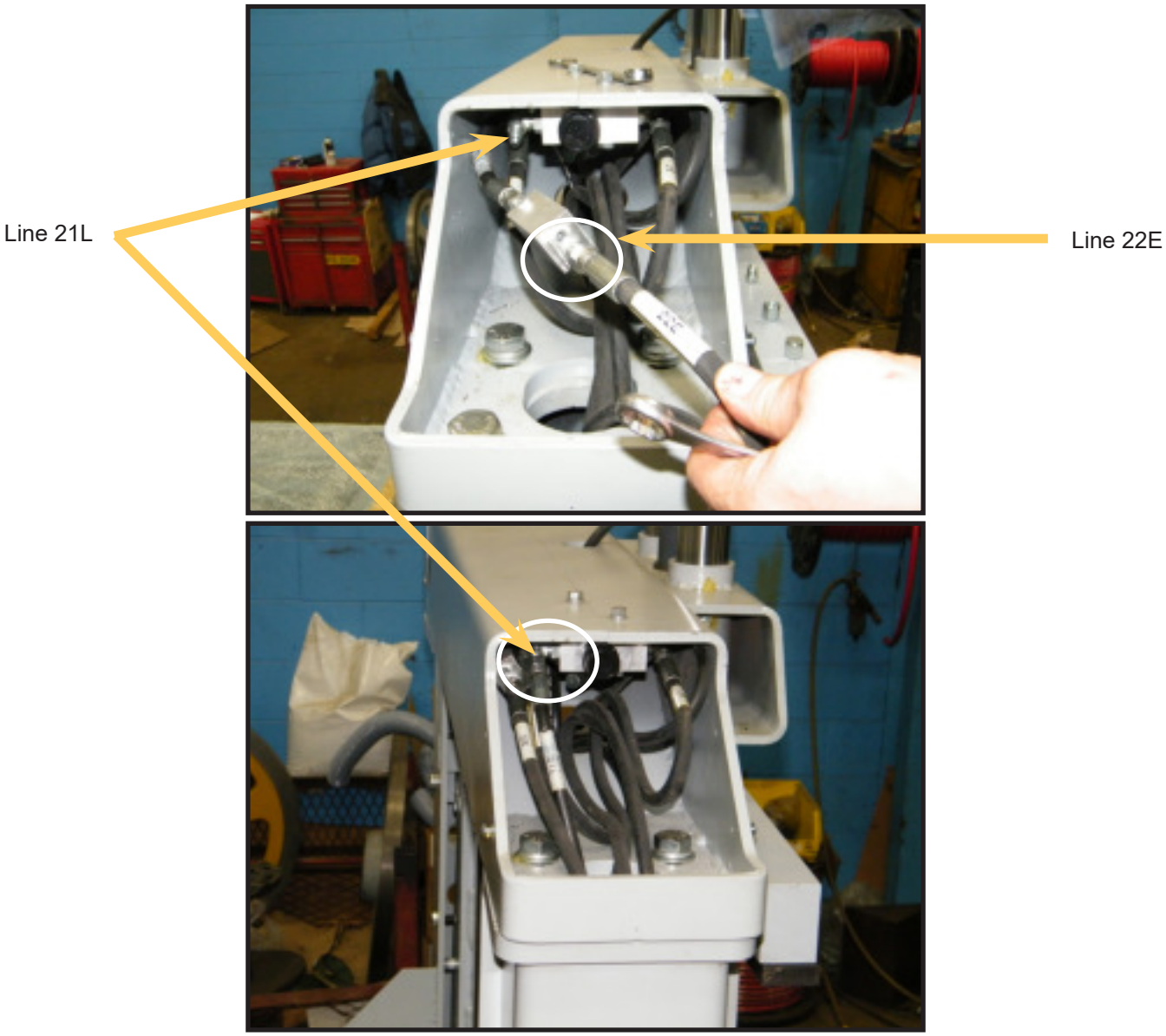


HYDRAULIC CONNECTIONS

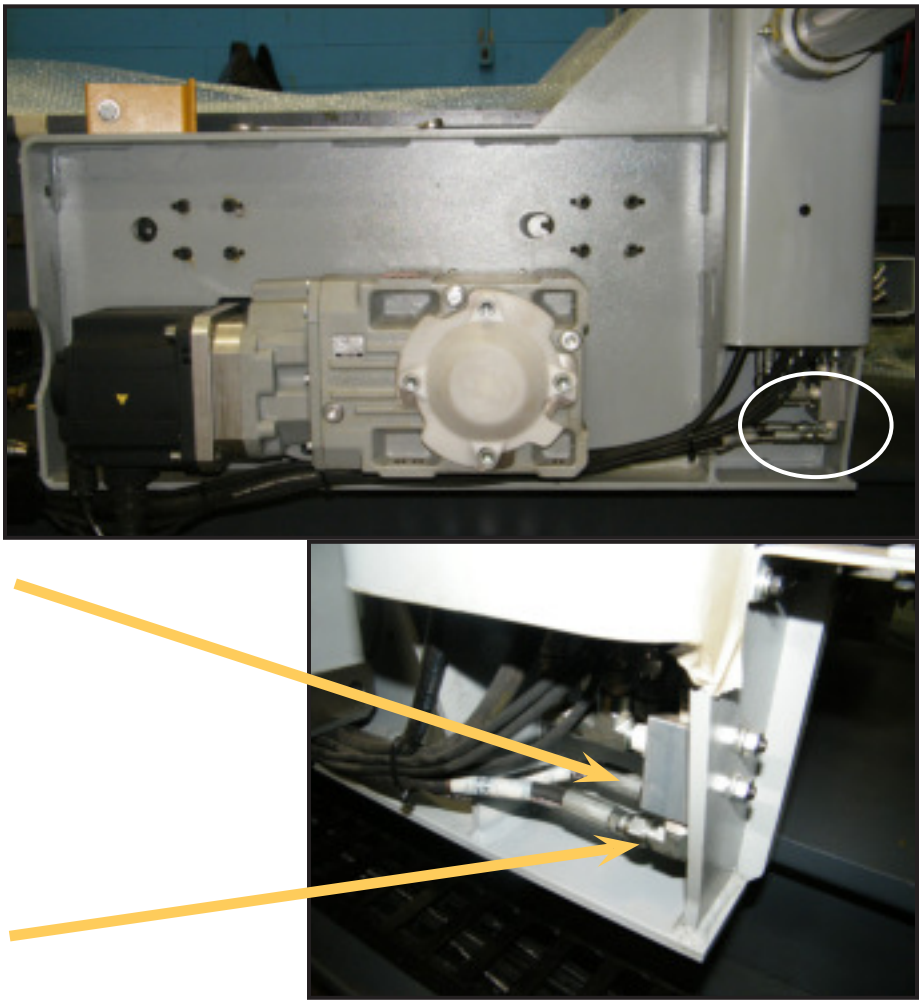
SHUTTLE VISE HOSE CONNECTIONS

Remove cover located towards the top of the shuttle frame.
Feed hoses 21L and 22E up through the column and attach as shown.
Re-Install the cover when finished.

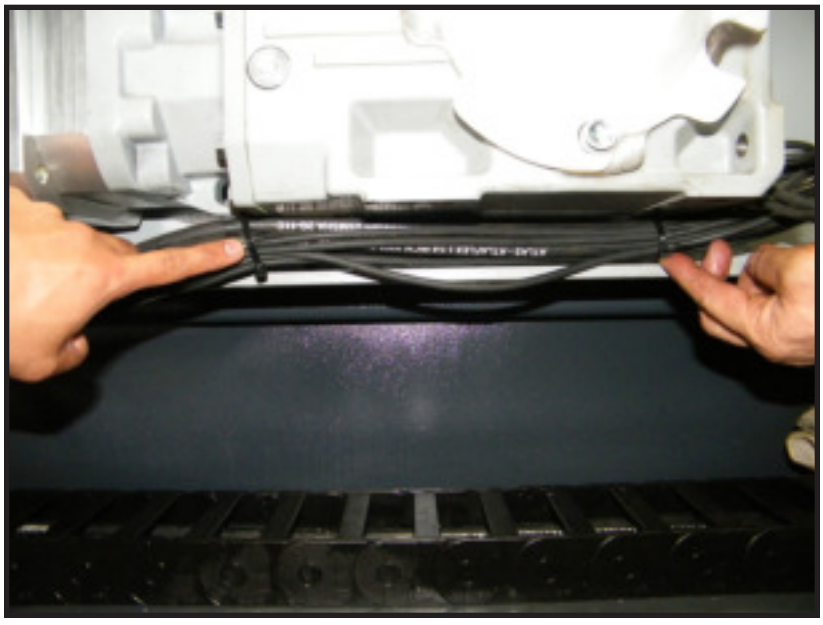




The following hydraulic junction block is located on the drive side shuttle vise frame.
Connect hose 21 and 22 as shown.

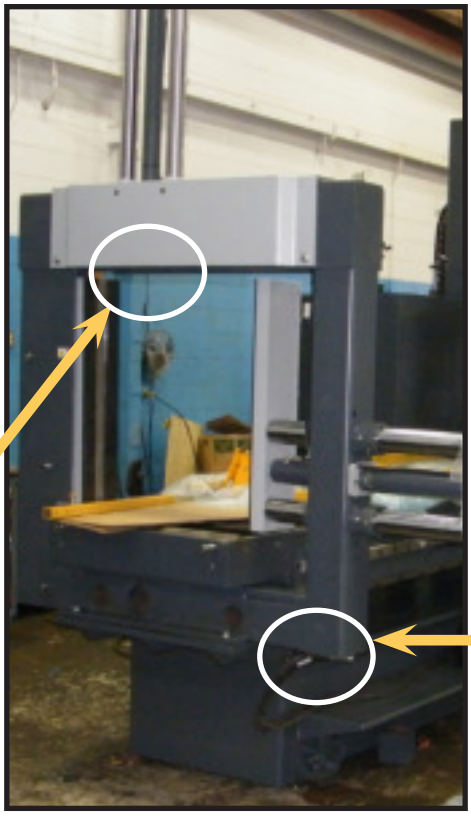


Cable tie the bundle of hoses/cables to the gearbox as shown below.



SQUARING VISE (OPTION) HOSE CONNECTIONS

Feed hose 82E up through the column and attach as shown.
Attach hoses 81 and 82 as shown.

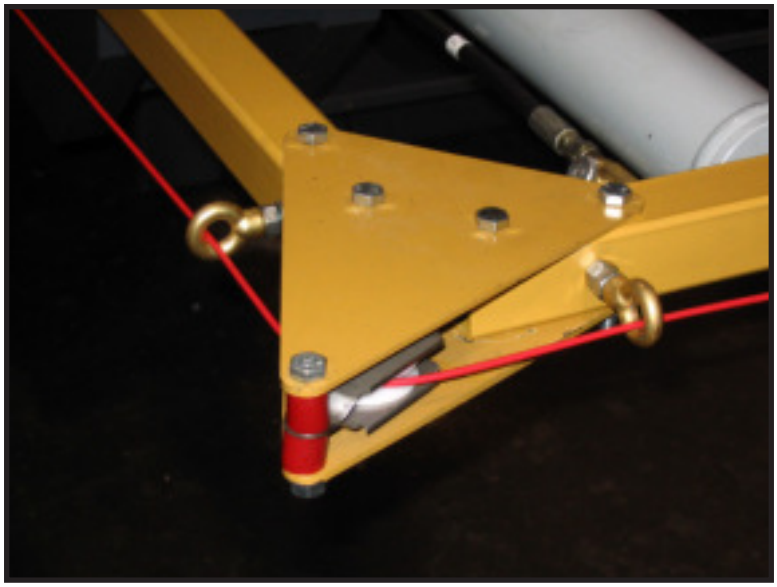


MACHINE GUARD INSTALLATION

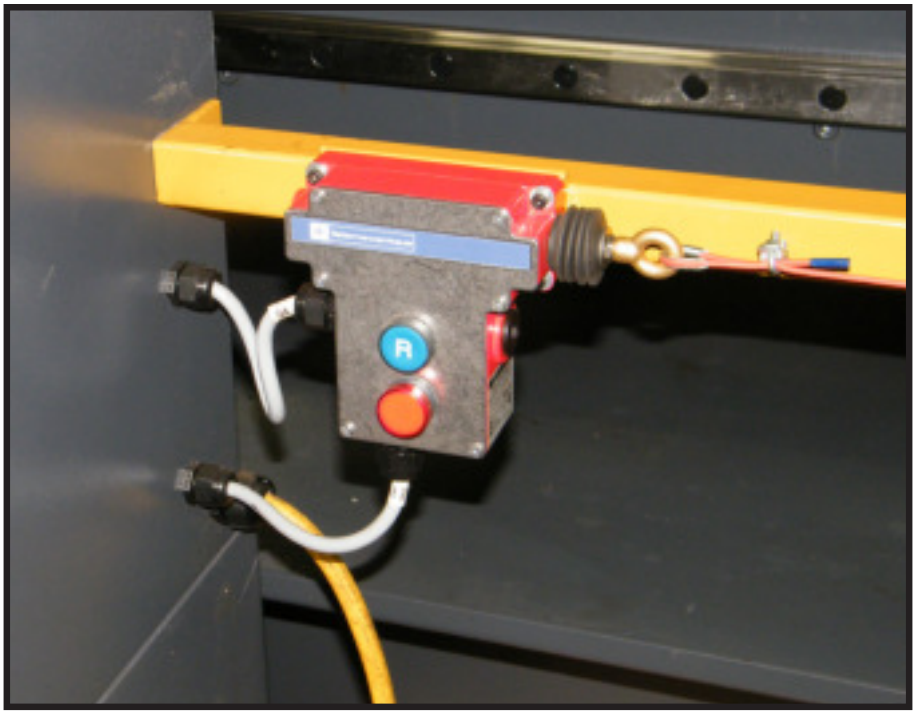
Position the three pieces of the safety guard around the conveyor. The idler side guard is connected to the machine column and the drive side is connected to the control box. The rear guard is connected to the conveyor and to the two sides with a bracket.

H22A 120 Machine

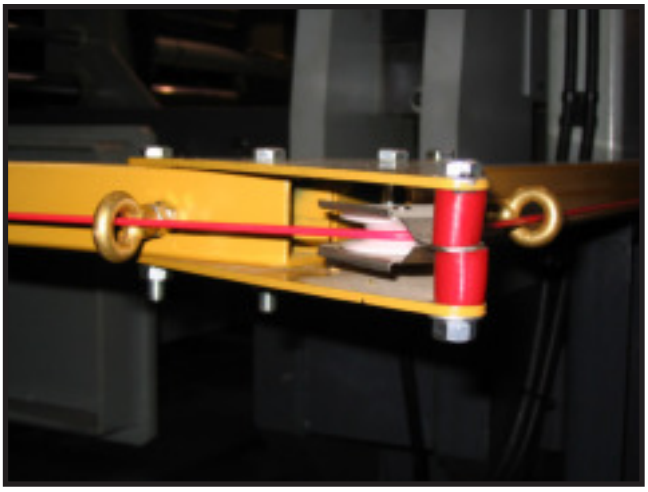
A pulley is mounted on a bracket and attached to each rear corner of the safety guard.



Fasten the trip wire control box to the safety guard and complete the wire connections (see schematics). The box is attached to the mounting plate with four socket head cap screws. The plate is mounted to the safety guard with two hex bolts.



Attach the eyebolt to the idler side column. Fasten the wire rope to the spring and then proceed to feed it through the eyebolts and pulleys along the guide rail. Loop the other end of the wire rope around the eyebolt of the trip wire control box. Tighten or loosen the idler side column eyebolt to adjust the tension on the wire rope. The switch can not be activated if there is not enough tension on the wire rope.



WIRING CONNECTIONS

After the machine is leveled and anchored the necessary power hook-up needs to be performed. In order to provide safe operation as well as to prevent potential damage to the machine, only qualified personnel should make the connections.

BEFORE START-UP THE FOLLOWING TWO POINTS SHOULD BE CHECKED:

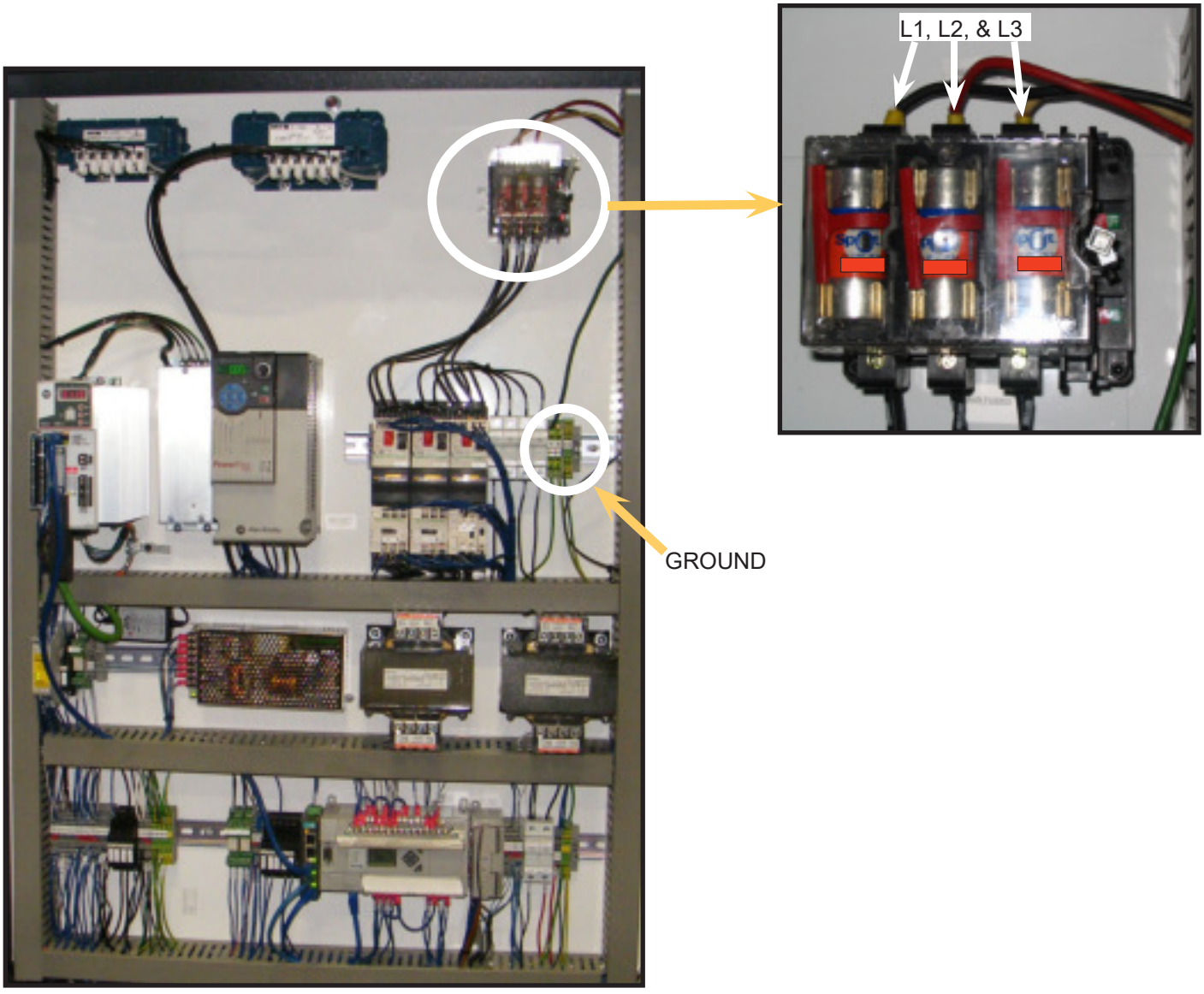
1. Signs of damage that may have occurred during shipping to the electrical cables and the hydraulic hoses.
2. The hydraulic oil level is between the upper and lower lines on the level gauge.

As supplied, the machine is set to run on three phase voltage as indicated on the serial plate and voltage label.

Power connection to the machine is made to L1, L2, L3 and Ground terminals in the main electrical box found beside the conveyor on the drive side. For machines equipped with a variable frequency drive unit, an earth ground is also recommended.

During the initial hook-up it is very important to check that the phase order is correct. This is indicated by the hydraulic pressure gauge registering a pressure rise and the blade running in a counter clockwise direction. If the hydraulics do not register an immediate pressure rise, shut the hydraulics off and change the phase order.

ATTENTION: Running the hydraulics “backwards” can damage the hydraulic pump.



EARTH GROUNDING PROCEDURE

1. The customer is to provide and install a ground rod approximately .60 (15mm) diameter, copper clad steel, to be driven no less than 8’ (2.5m) into the ground, no more than 10’ (3m) away from control enclosure.
2. The ground rod is to be connected to customer’s in plant ground system. This connection shall be made directly at the ground rod. (If applicable).
3. It is desirable that the overall resistance to ground measured at the ground rod does not exceed 3 ohms. Customer is advised to consult local power company for further information on grounding.
4. The ground rod is to be connected to the ground terminal in the control enclosure using insulated, stranded copper wire. The wire gauge size is to be determined according to the electrical code of the customers local electrical authority.
5. An additional point to check is to ensure continuity of all ground within the control enclosure. Start with the main power entrance ground terminal where the internal ground conductors should originate and then connect to, the DIN terminal strip, control transformer, and the lid of control enclosure. Also, the PLC and Interface units should have their own ground conductors connected to one of the main ground terminals.
6. A properly functioning ground system will:
   - provide safety for personnel.
   - ensure correct operation of electrical/electronic apparatus.
   - prevent damage to electrical/electronic apparatus.
   - help dissipate lightning strikes.
   - divert stray radio frequency (RF) energy from electronic/control equipment.

HYDRAULIC OIL AND CUTTING FLUID

The H28A 120 bandsaw is supplied with Texaco Rando HD46 hydraulic oil. If it is necessary to change the oil to a different brand, see the HYDRAULIC SECTION for an equivalent grade of oil.

No cutting fluid is supplied with the machine. There are two types of coolant available:

- Oil-based; dilute 1:10 ratio (one part concentrated coolant to 10 parts water)
- Synthetic; dilute as recommended by the manufacturer

SECTION 2 - OPERATING INSTRUCTIONS

This section has been prepared to give the operator the ability to set up the saw for most cutting situations. Before cutting any material, the operator should be familiar with all operations and controls as well as the basic cutting theory described below. The saw is equipped with variable blade speed and hydraulic feed control, as well as an extensive door chart to guide the operator to the correct setting of these controls.

BLADE BASICS

Technology is rapidly changing all aspects of production machining. Metal cutoff is no exception. The advances made in the bandsaw blade industry have definitely brought down the cost per cut, despite the three fold higher price of high technology blades. Variable pitch, bi-metal blades (like the 4/6 or 3/4 bi-metal blade supplied with the machine) last much longer, cut faster, and more accurately than conventional carbon steel blades. In order to take advantage of the superiority of bi-metal blades, it is critical to properly “break-in” a new blade. This is accomplished by taking two or three cuts through solid four or five inch diameter mild steel at an extremely slow feed rate. (It is also advisable to utilize a slow blade speed.)

These two or three slow cuts sufficiently lap (polish) the teeth on the new blade so that it does not snag the material being cut. Proper break-in will alleviate blade vibration; improve surface finish, accuracy, and blade life.

After “break-in”, the following six points must be closely monitored to ensure long blade life:

1. Proper blade tension should be maintained. (See Section 3, Maintenance and Troubleshooting)

2. Generous coolant application is essential with most materials. A high quality and well mixed coolant will extend blade life, and also increase cutting rate and quality. On those materials where coolant is undesirable for cutting, a slight coolant flow or periodic oiling of the blade is necessary to prevent the blade from being scored by the carbide guides.

3. The stock being cut must be securely clamped in the vises.

4. The proper feed force should be chosen. (see Saw Cutting Parameters: Step 2)

5. The proper blade speed must be selected. (see Saw Cutting parameters: Step 4)

6. The proper feed rate must be applied. (see Saw Cutting Parameters: Step 5)

VARIABLE SPEED CONTROL

Blade speed can be adjusted infinitely between 40 to 300 SFM (Surface Feet/Minute) (12 to 91.5 m/min). Adjustment should be made only when the blade is running.

THE CONTROL PANEL

START-UP

The control console has been designed to simplify the operation of the saw, to give the operator the ability to stop any function at any time, and to be able to control all the functions remotely. We cannot overstress the importance of familiarizing yourself with the controls prior to starting the machine.

NOTE:

1. WHEN STARTING THE MACHINE FOR THE FIRST TIME MAKE SURE THAT BLADE IS MOVING IN A COUNTERCLOCKWISE DIRECTION, AND THAT THE HYDRAULIC PRESSURE IS 1200 PSI (8274 kP). IF THERE IS NO IMMEDIATE PRESSURE, SHUT THE SAW DOWN AND CHANGE THE PHASE ORDER.

PLC 100 CONTROL SYSTEM
OPERATION OVERVIEW

The PLC is a programmable logic controller that allows the operator to run the machine in both manual and automatic modes.
All of the machine functions are also controlled from the PLC operator interface. There are four function buttons on either side and eight function buttons below the display. The functions of the buttons below the screen are labeled on the buttons themselves. The functions of the buttons to the left and right and the middle six buttons below the display are indicated on the display in a coloured box immediately beside the button. The far left and right buttons below the display are permanently labeled.

NOTE:

1. THE FUNCTION OF THE BUTTONS LABELED ON THE DISPLAY MAY CHANGE DEPENDING ON THE SCREEN MODE BEING DISPLAYED.
2. ALL FUNCTIONS ARE NOT DISPLAYED ALL THE TIME. ADDITIONAL FUNCTIONS MAY BE ACCESSED BY PRESSING THE FUNCTION BUTTON LABELED NEXT (IF DISPLAYED).

There is also a numeric keypad and a set of navigation keys to the right of the display. All of these as well as the EMERGENCY STOP button detailed descriptions follow.
To power up the control panel, the EMERGENCY STOP button must be pulled out. The display screen will scroll through several screens and finally display in MANUAL MODE. Once the control panel has power, the MACHINE START key must be pressed to start the hydraulic system. Now all of the controls have been activated.
In MANUAL MODE, the operator has the ability to execute a single cut utilizing a pre-programmed SINGLE CUT MODE.
In AUTOMATIC MODE, the PLC has the capacity to program and store 999 jobs. Designated job numbers can be programmed for the quantity required (maximum 99 pieces). Piece lengths range from 0” to 214” (5436 mm). Jobs can be run individually or in a QUEUE, which allows a maximum of 5 jobs to run consecutively.

NOTE: **If an emergency situation arises during any operation, use the large red mushroom EMERGENCY STOP button located on the control panel to shut down the machine.**

The PLC operator interface is used in all four operating modes:

1. Manual Mode – permits the operator to control all machine functions using the pushbuttons, as well as the operator interface function keys.

2. Single Cut Mode – permits the operator to enter part length, and then advance and cut a single part automatically.

3. Automatic Job Mode – is used to automatically cut a 'job' (a preset quantity of identical parts).

4. Automatic Que Modes – there are two alternative Que Modes, selectable by changing a PLC parameter.

    - Automatic Queue Mode – is the standard queue mode. It is used to automatically cut up to five different jobs, consecutively, from a single workpiece or bundle. When all jobs in the queue are completed the saw shuts down.

    - Multi Queue Mode – is used to repeat the same queue a preset number of times. This mode is primarily used to cut parts in sets. To illustrate, consider cutting four pieces each, of three different parts, A, B, and C. In the Auto Queue approach, each job is programmed with required quantity of 4. In multi Queue approach, each job only has a quantity of 1, but the queue required is set to 4.

Auto Queue: A, A, A, A, B, B, B, B, C, C, C, C
Multi Queue: A, B, C, A, B, C, A, B, C, A, B, C

The same number of parts are cut, but Multi Queue procedures the parts in sets, and the first complete set is available much sooner if large quantities are being cut.

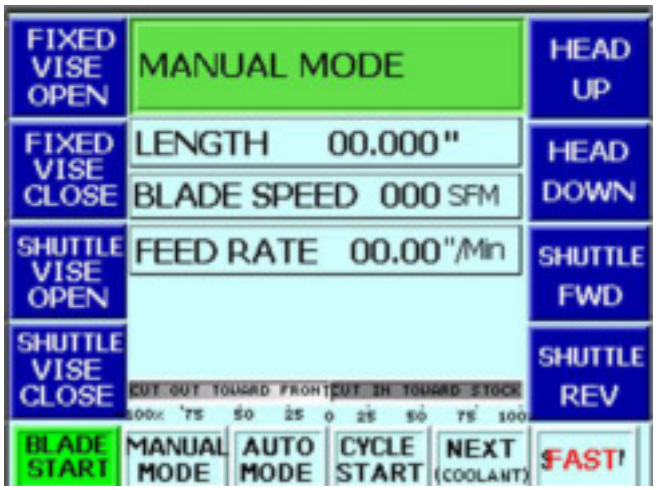
FUNCTION DESCRIPTIONS	
HEAD CONTROLS	
HEAD UP	Pressing this key will raise the head but it will stop and hold its position if the key is released.
HEAD DOWN	Pressing this key will lower the head to its bottom limit and will stop and hold its position when pressed again, or if the HEAD UP key is pressed.
FIXED VISE CONTROLS	
FIXED VISE OPEN	Pressing this key will open the fixed (front) vise and will stop and hold its position if the key is released.
FIXED VISE CLOSE	Pressing this key will close the fixed (front) vise. To stop and hold its position, press again or press the FIXED VISE OPEN key. The fixed vise must be closed to start the blade.
SHUTTLE VISE CONTROLS	
SHUTTLE VISE OPEN	Pressing this key will open the shuttle (rear) vise and will stop and hold its position if the key is released.
SHUTTLE VISE CLOSED	Pressing this key will close the shuttle (rear) vise. To stop and hold its position, press again or press the SHUTTLE VISE OPEN key.

SHUTTLE CONTROLS	
SHUTTLE FORWARD	Pressing this key will move the shuttle towards the front of the saw and will stop and hold its position if the key is released.
SHUTTLE REVERSE	Pressing this key will move the shuttle towards the back of the saw and will stop and hold its position if the key is released.
SHUTTLE SLOW / FAST	Pressing this key will toggle between FAST and SLOW shuttle speed. The button display will indicate FAST or SLOW.
BLADE CONTROLS	
BLADE START/STOP	Pressing this key will start or stop the blade. The blade will not start if the head is fully down or if the fixed vise is not closed.
RIGHT ARROW KEY (NAVIGATION KEYS)	Pressing this key will cause the blade speed to increase until the key is released or the speed is at the maximum (350 SFM). The blade must be running to use this key and the blade speed is shown on the display screen.
LEFT ARROW KEY (NAVIGATION KEYS)	Pressing this key will cause the blade speed to decrease until the key is released or the speed is at the minimum (70 SFM). The blade must be running to use this key and the blade speed is shown on the display screen.
COOLANT CONTROLS	
COOLANT ON	Pressing this key will start the coolant flow.
COOLANT OFF	Pressing this key will stop the coolant flow.
COOLANT AUTO	Pressing this key will cause the coolant to flow only when the blade is running OR when the blade is running and the head is descending.
MODE CONTROLS	
SERVICE MODE	The SERVICE MODE allows the user to adjust the various PLC parameters. The user will be prompted for a password. Contact Hyd-Mech Group Limited to access this mode.
MANUAL MODE	Pressing this key will put the saw in MANUAL MODE.
AUTO MODE	Pressing this key will put the saw in AUTO MODE. To enter AUTO MODE, the FIXED VISE must also be activated.
MACHINE & CYCLE CONTROLS	
MACHINE START	Pressing this key will activate the control panel, display, and start the hydraulic system. The EMERGENCY STOP button must be pulled out. This key must be activated to use the machine functions.
MACHINE STOP	Pressing this key will shut down all machine functions including the control display and hydraulic system. The display will not have a back light on. All jobs will remain in memory as will the QUEUE.
CYCLE START	The user will be prompted by the display to press this key as it is used to initiate an AUTO or SINGLE CUT MODE cycle. Pressing this button will also initiate the QUEUE if pressed when in the QUEUE screen.
CYCLE PAUSE	Pressing this key will pause the cycle in progress. To resume the cycle, press the CYCLE START key.

PLC Operator Interface and Labeled Buttons

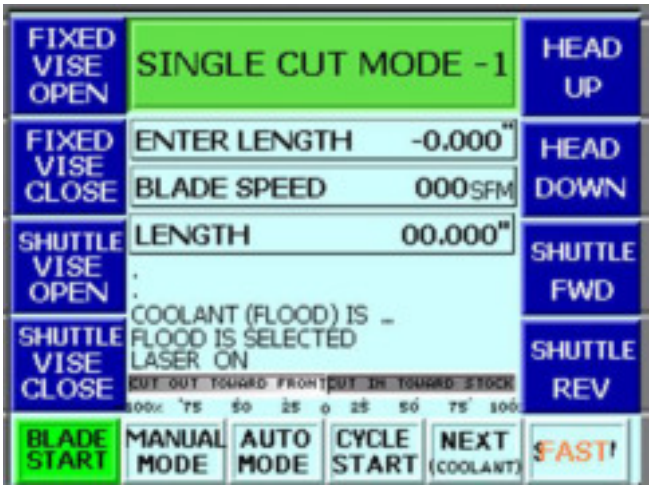
MANUAL MODE

MANUAL MODE is the default mode. All functions are enabled when in MANUAL MODE. The screen will look as follows:

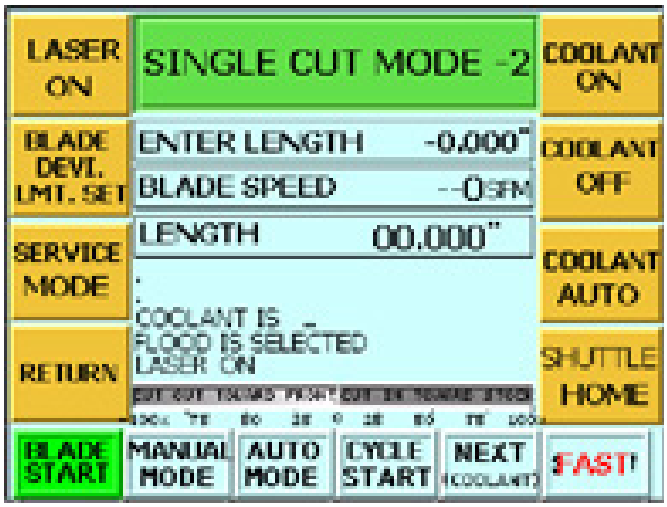


SINGLE CUT MODE OPERATION

In MANUAL mode, the PLC allows the operator to initiate a SINGLE CUT MODE to cut one piece at a desired length. Closing the front vise automatically initiates Single Cut Mode. Follow the procedure below.

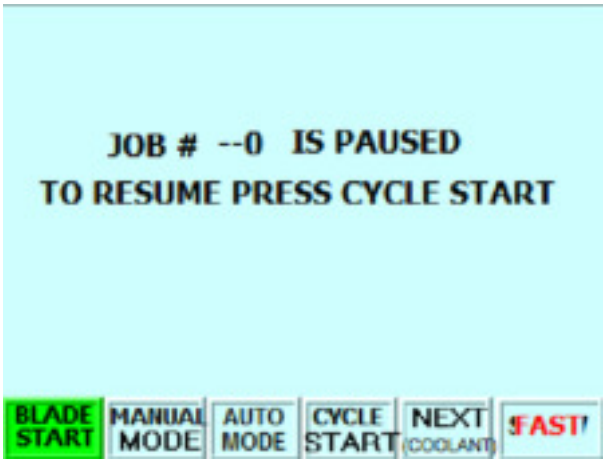


1. A trim cut should be made before initiating the SINGLE CUT MODE operation
2. Make sure the front vise is in the closed position.
3. Make sure the head is set so that the blade is above the material.
4. ENTER LENGTH will be flashing. Key in the desired length up to 214" (5436 mm) using the numeric keypad and press enter.
5. Cycle start will be flashing in the display window.
6. Press the cycle start pushbutton. The pushbutton lights and the Material Height Prompt Screen appears.
7. Set the material height using the Head Up & Head Down push buttons and then press enter. Position the blade about 3/8" above material.
8. If the blade is not running, you will be prompted by the words BLADE START. Start the blade and adjust the blade speed as required.
9. When the cut is completed, the head will rise to the set material height, the blade will stop and the display window will reset for the next cut.
10. To cut another piece, repeat steps 2 through 6.



NOTES:

1. To pause the SINGLE CUT CYCLE, press the CYCLE PAUSE button. The CYCLE START button will be displayed and the screen will indicate a paused condition. The cycle will stop, and blade will continue to run. To continue the cycle, press CYCLE START.
2. To cut multiple pieces, switch to AUTO MODE and follow the automatic procedures.
3. Whenever a new job or new material is being loaded for production, the head up limit should be properly set to clear the material positioned for a trim cut and the front vise should be closed (in MANUAL MODE).



AUTOMATIC OPERATION

To enter AUTO MODE, the FIXED VISE must be closed, putting the saw in SINGLE CUT MODE. When the AUTO MODE key is pressed, the red indicator will come on. The screen will change to the JOB display window as shown below and will be ready for editing or starting a new job. All manual functions will be disabled.

PROCEDURE FOR EDITING OR STARTING A NEW JOB IN AUTO MODE

1. In AUTO mode, key in a job number from 0 to 99, the number of pieces to be cut, the number of pieces already cut, and the length, pressing enter after each value. If the number of pieces cut equals or exceeds the number required, the cycle will not start. If the job number has previously been programmed, the number of pieces, length, and number cut will be displayed. To navigate through the values, use the cursor keys. The values displayed may be edited by using the numeric keypad and pressing enter. The job will then be stored in memory with the new values.

The job is now ready to start to run or other jobs can be programmed at this time. To run a certain job, press the QUEUE key and then CLEAR to clear the QUEUE. Move the cursor to the 1st job and key in the desired JOB #.

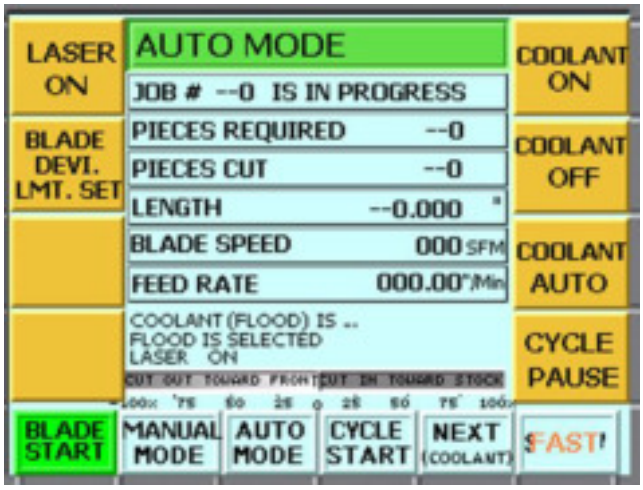
2. After the values are entered, press the CYCLE START button. The Material Height Prompt Screen appears.

3. Set the material height using the Head Up & Head Down push buttons and then press enter. Position the blade about 3/8" above material.

4. The display window will prompt you to start the blade for a trim cut (if the "Trim Cut" parameter has been selected).

When the AUTO CYCLE commences, the screen will change to the "Auto Mode Status" screen and the following events will take place:

1. A trim cut will be performed.
2. After the trim cut, the shuttle will advance the material to the LENGTH value.
3. The saw will now cut the material to the LENGTH value compensating for the thickness of the blade.
4. Steps 2 and 3 will be repeated for the given number of pieces to be cut.
5. At the completion of the job, the machine will shut off.

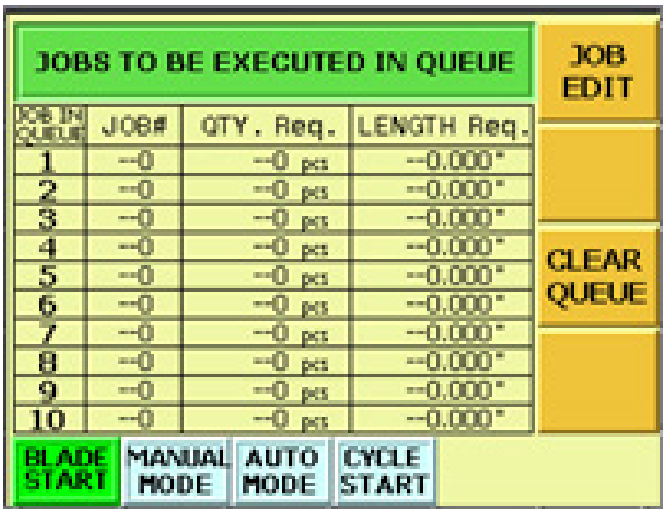


NOTES:

1. The CYCLE PAUSE key is used to pause a job in progress. To resume the job, press the CYCLE START key and the AUTO CYCLE will resume.
2. If PIECES CUT equals or exceeds NUMBER OF PIECES, AUTO CYCLE will not start.

WORKING WITH A QUEUE

The purpose of a QUEUE is to allow the operator to run several jobs (maximum of 5) in series if they are of the same material and shape.
To run a QUEUE, it is necessary to program in all job values as is done with programming a single job. After the jobs are programmed in, press QUEUE, press CLEAR to clear the QUEUE, and enter the desired JOB #'s in the desired sequence.



To run the QUEUE press CYCLE START. The pushbutton lights and the Material Height Prompt Screen appears.

Set the material height using the Head Up & Head Down push buttons and then press enter. Position the blade about 3/8" above material.
If the blade is not running you will be prompted by the words BLADE START. Press the BLADE START key. The JOB PROGRESS screen will appear and display each individual JOB as it is being run.
At the completion of the last job in the QUEUE, the machine will shut off if "0" has been entered in the POWER DWN TIMER parameter or continue running the specified time up to a maximum of 180 minutes. The machine will automatically advance the stock between jobs for trim cuts as needed.

WORKING WITH A REPEATING QUEUE

The QUEUE mode can also be set to repeat the sequence of jobs up to 99 times. To do this the QUEUE parameter in SERVICE mode must be set at REPEAT.
To run a repeating queue, two additional rows are added to the QUEUE display screen after JOB E: QUEUE CUT (the number of times that the QUEUE has been completed) and QUEUE REQUIRED (the number of times that the QUEUE is required to be repeated.
When entering job data for jobs to be used in a repeating QUEUE be aware that:

# of parts cut = # of JOBS x QUEUE REQUIRED

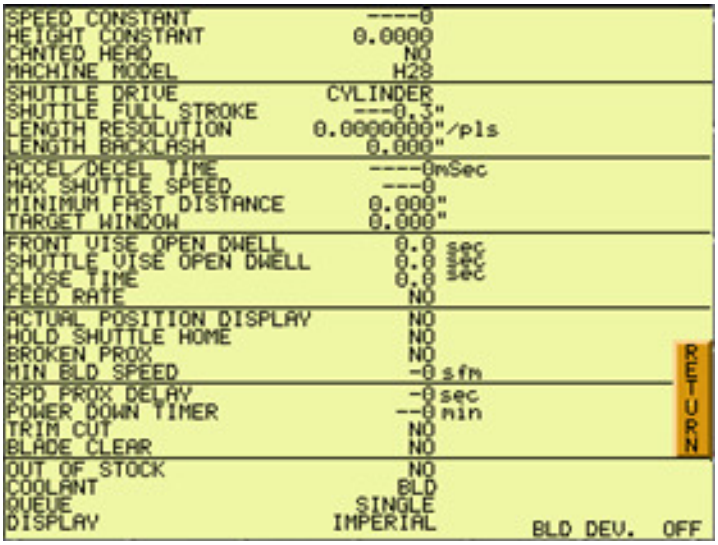
For example:
JOB A is set to cut 1 piece
JOB B is set to cut 2 pieces
QUEUE REQUIRED is set to 5

When the cycle is initiated, 1 JOB A piece will be cut followed by 2 JOB B pieces with this pattern repeating 5 times. This will give you a total of 5 JOB A pieces and 10 JOB B pieces.

The QUEUE may be exited to the previous screen at any time by pressing the JOB key.

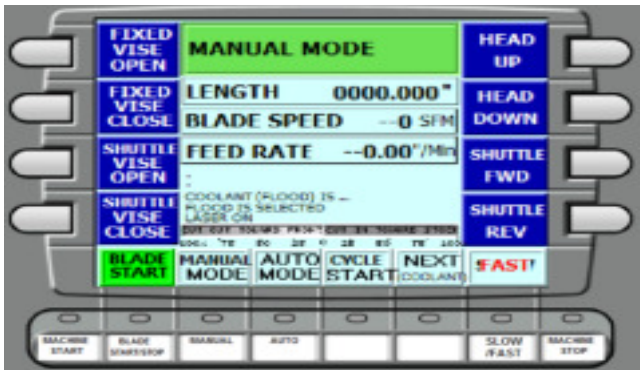
PARAMETERS

The parameters can be accessed by pressing the service mode button on the panel. These parameters can be changed without a password.

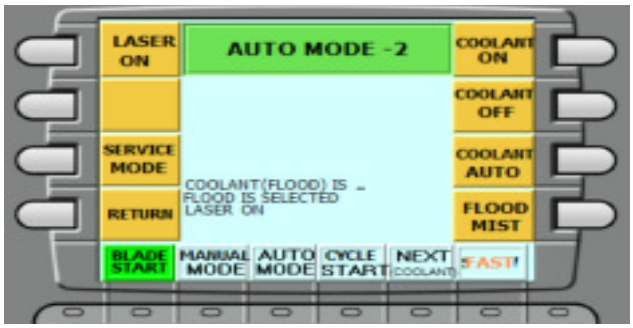


COOLANT SELECTION

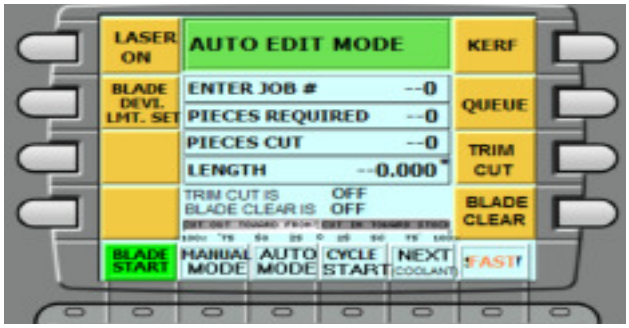
In Auto Mode press the NEXT (coolant) button to move to AUTO MODE - 2.



Use the FLODD/MIST button to select the different type of coolant.



Use the RETURN button to return to the previous screen



PARAMETER	DEFINITION
SPEED CONSTANT	Blade Speed Display adjustment number. If actual blade speed is different than displayed blade speed, a new Speed Constant will need to be calculated. Speed Constant = old Speed Constant x actual speed / displayed speed.
HEIGHT CONSTANT	Feed rate display constant value. If the actual feed rate differs from displayed value, enter new Height Constant = old Height Constant x actual feed rate / displayed feed rate.
CANTED HEAD	Select Yes if the saw is equipped with a canted head.
MACHINE MODEL	Select saw model: H18, H22, H28
SHUTTLE DRIVE	Select the type of shuttle drive: Servo of Cylinder.
SHUTTLE FULL STROKE	Maximum usable shuttle travel.
LENGTH RESOLUTION	Specifies linear distance of shuttle movement in inches per one pulse generated by motion controller.
LENGTH BACKLASH	Backlash value of the shuttle drive system.
ACCEL/DECEL TIME	Shuttle acceleration/deceleration time. Time, in milliseconds that the shuttle will accelerate from 0"/s to full speed or decelerate from full speed to 0"/s.
MAX SHUTTLE SPEED	Maximum shuttle speed constant.
MINIMUM FAST DISTANCE	Not used.
TARGET WINDOW	Not used.
FRONT VISE OPEN DWELL	Delay time for the opening of the Fixed Vise in seconds.
SHUTTLE VISE OPEN DWELL	Delay time for the closing of the Shuttle Vise in seconds.
CLOSE TIME	Delay time for the closing of the Fixed of Shuttle Vise in seconds.
FEED RATE	Activates feed rate display.
ACTUAL POSITION DISPLAY	If this value is set to YES, displays Shuttle Vise actual position.
HOLD SHUTTLE HOME	Hold Shuttle Vise home and closed during cut.
BROKEN PROX	Allows user to override signal from proximity switch in case it is broken. When set to NO machine will not run with broken proximity sensor. Set to YES allows machine to run, but with out blade speed display, blade breakage, or stall protection.
MIN BLD SPEED	Minimum blade speed on which blade breakage will be activated.
SPD PROX DELAY	Delay in monitoring of the blade speed proximity switch during acceleration of the blade from start to desired speed set by the manufacturer.
POWER DOWN TIMER	If "0" selected, then the machine will shut down after the job is completed. This will allow the machine to continue running for a specified time after the job (in Manual Mode) for the cycle (in Auto Mode) has been completed. Range from "0" to "180" minutes.
TRIM CUT	If YES is selected, the machine will perform a facing cut of the material at the beginning of an automatic cycle.
BLADE CLEAR	If set to YES, when the AUTO CYCLE reaches the function of head up, the shuttle will retract the material from the blade by 1/8” before the head will move up. When the head reaches the up position, the next length of material is shuttled into position.
OUT OF STOCK	Selecting YES activates the out of stock option, which prevents the shuttle vise from closing if an insufficient length of material is available for the next length advance. Also stops the automatic cycle after completing the last cut.
COOLANT	When BLD is selected, coolant flows when the blade is running. Then BLD + DWN is selected, coolant flows when the blade is running and head is moving down.
QUEUE	The Queue allows the operator to run several jobs (max 10) in series. If REPEAT is selected the above series will be executed the selected number of times.

HYDRAULIC FEED CONTROL

The Hydraulic Feed Control is located to the left of the control panel. These controls allow independent control of Feed Force (FF) and Feed Rate (FR)

FAST APPROACH LEVER.
Depress for fast head descent

FEED FORCE KNOB
Used to set feed force limit (counterclockwise rotation to increase and clockwise rotation to decrease).

FF IS NOT APPLICABLE TO H40 MODEL

EXTRA FINE METERING VALVE
Used to set feed rate (counterclockwise rotation to increase and clockwise rotation to decrease).

FEED RATE KNOB (Fine Metering)
Used to set feed rate (counterclockwise rotation to increase and clockwise rotation to decrease).

The FINE METERING DDF VALVE is equipped with two Feed Control Knobs. Extra fine Micrometer style Knob and Fine Metering Knob. The main difference between both Feed Controls is that the Extra Fine Metering valve does not work with the Feed Force Limit Valve. It is recommended to use only one feed control at a time with the second control valve shut. The choice of control is arbitrary and a matter of trial.
In some cases Extra fine Metering provides better results in others Fine Metering Control.
As a rule of thumb:
Extra Fine metering valve should be used

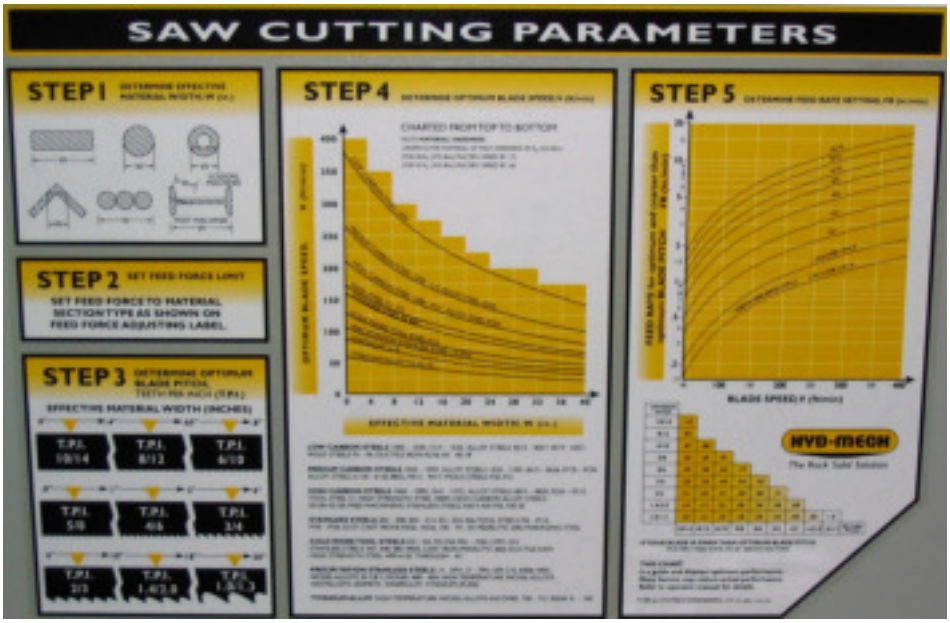
- if required feed is in a range of .12-.25”/min
- and/ or when cutting hard material
- or when work hardening may occur.

Fine metering valve should be used

- When cutting structural steel
- and/ or bundles
- High feed rates required

CUTTING PARAMETERS CHART

A full size CUTTING PARAMETERS CHART is mounted on the front of the saw. The chart contains five steps for the operator to follow in order to achieve optimum performance of the saw. These steps are detailed on the following pages.



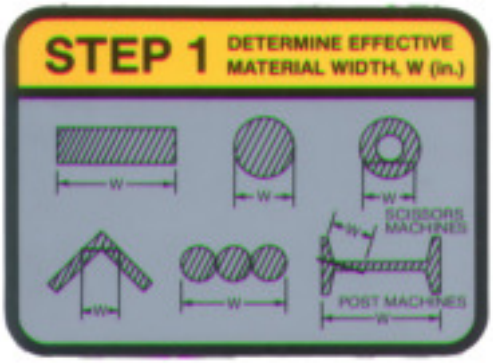
Saw Cutting Parameters Chart

CHART EXAMPLE #1

We will use the parameters chart to set up the saw for cutting 8” (200mm) Diameter #1045 Carbon Steel.

STEP 1: DETERMINE EFFECTIVE MATERIAL WIDTH - W (inches) or (mm)

Effective material width, W (in.) for most common shapes of materials, is the widest solid part of the material to be in contact with blade during cutting. For simple shapes, as illustrated on the chart, this can be directly measured. For bundles of tubes and structurals, measuring the effective width is difficult. Effective width is 60% to 75% of the actual material width.



Material Width Chart

NOTES:

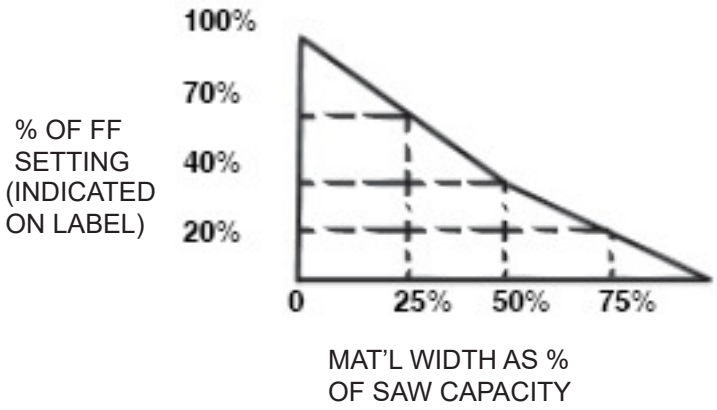
1. Effective material width, as determined here in STEP 1, can be thought of as the average width of material “seen” by each tooth, and it is used in STEPS 3 and 4.
   In Example #1, for an 8” (200 mm) diameter solid, Effective Material Width is 8” (200mm).

STEP 2: SET FEED FORCE LIMIT

The Feed Force Limit is the maximum amount of force with which the head is allowed to push the blade into the work-piece.

CUTTING SOLIDS

For cutting solids, the wider the section, the less FF should be set, to avoid blade overloading. See the graph below.



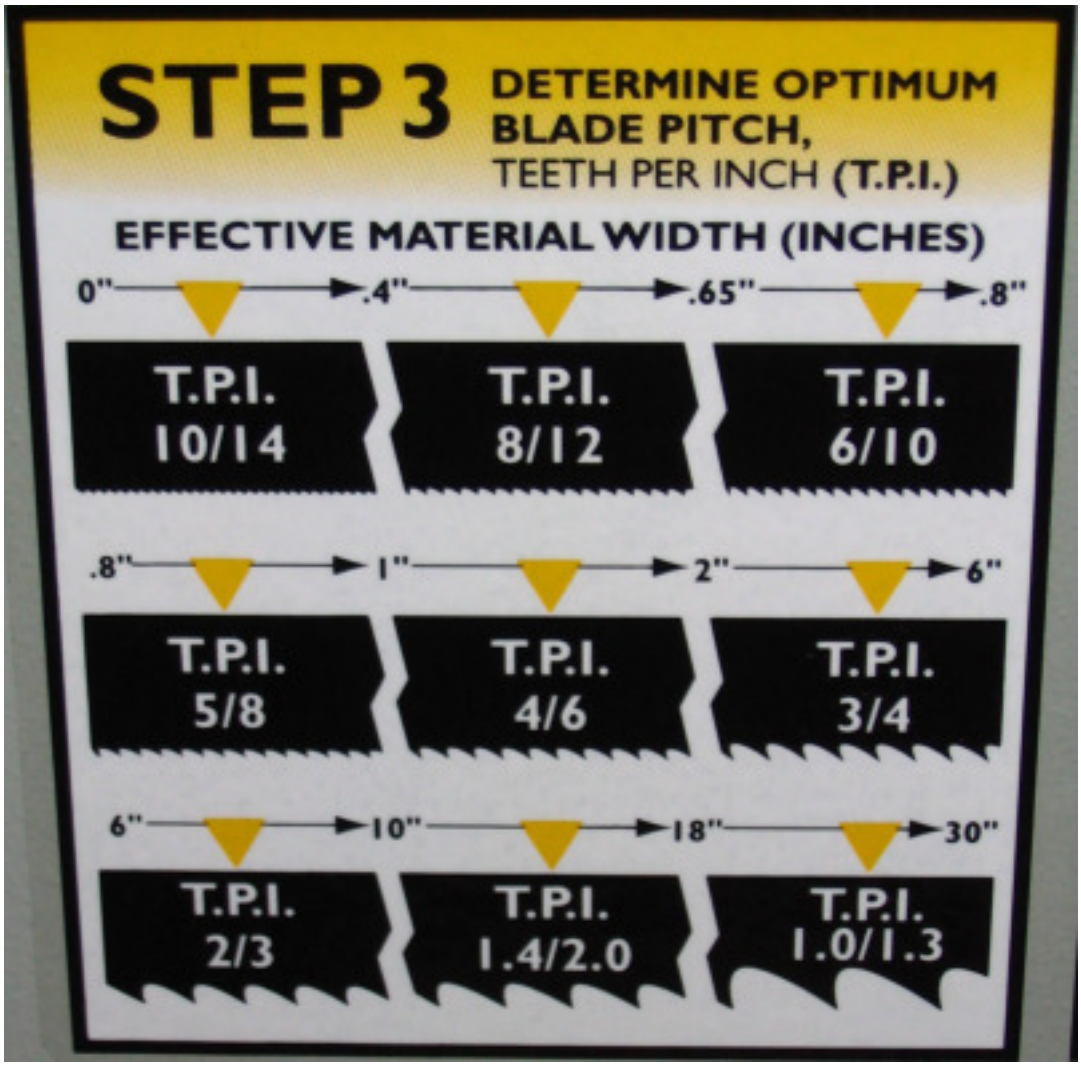
EXAMPLE: When cutting a solid which is 1/2 of machine capacity using the graph, locate 50% on the horizontal line and travel upwards to the plotted line and then travel directly across to the vertical FF Setting line. The point that you have arrived at shows a setting of 40% for a piece 50% of capacity.

CUTTING STRUCTURALS: A reduced Feed Force Setting is used when cutting structurals.

STEP 3: DETERMINE OPTIMUM BLADE PITCH - TEETH PER INCH (T.P.I.)

Selecting a blade with proper tooth pitch is important in order to achieve optimal cutting rates and good blade life.

For cutting narrow or thin wall structural materials a fine blade with many teeth per inch (T.P.I.) is recommended. For wide materials a blade with a coarse pitch should be used. The sketch can be referenced for the blade pitch changes for differing effective material widths.



Optimum Blade Pitch (T.P.I) for Material Width (Inches)

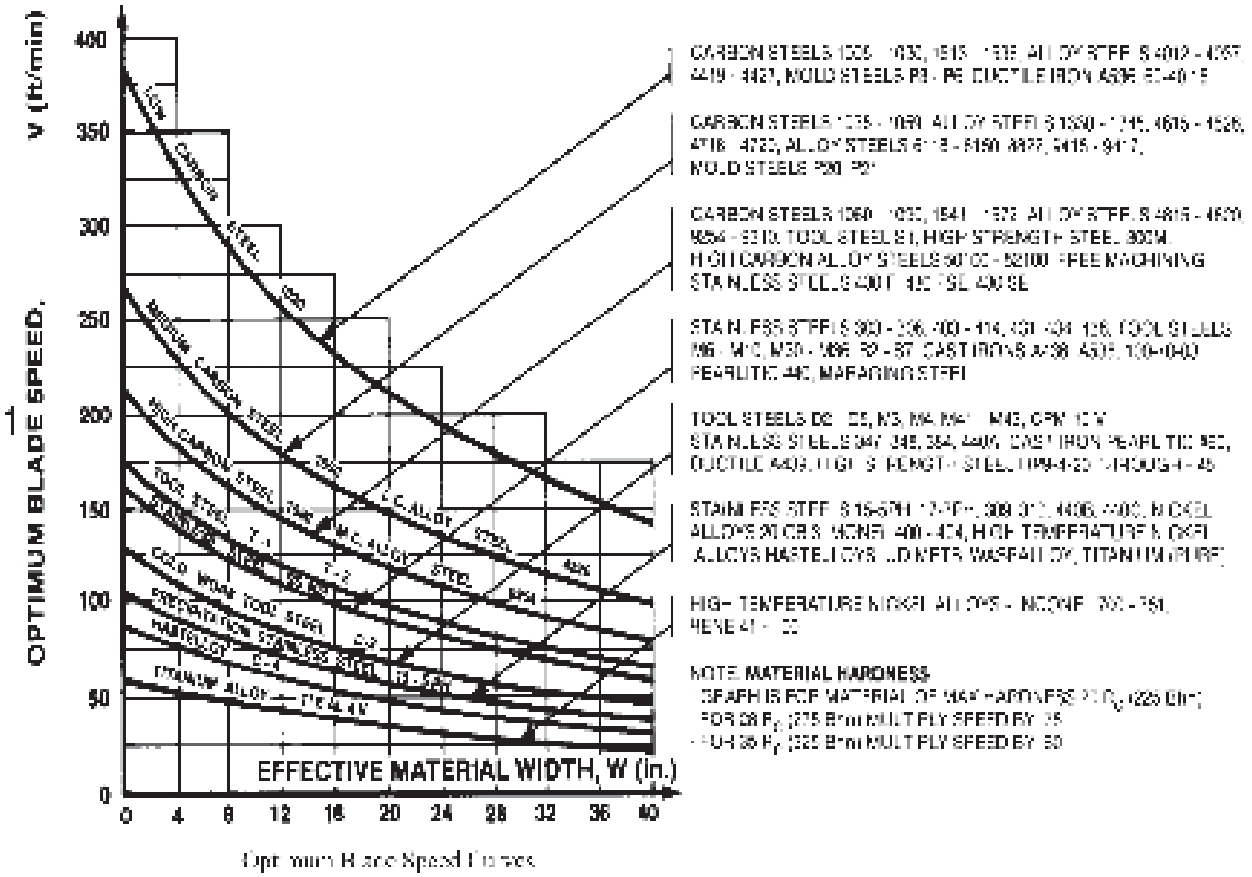
It is impractical to change the blade to the proper pitch every time a different width of material is cut and it is not necessary, but remember that the optimum blade will cut most efficiently. Too fine a blade must be fed slower on wide material because the small gullets between the teeth will get packed with chips before they get across and out of the cut. Too coarse a blade must be fed slower because it has fewer teeth cutting and there is a limit to the depth of a cut taken by each tooth. Allowance for the use of a non-optimum blade is made in STEP 5.

Example #1: Effective material width of 8” (200 mm):

Optimum blade has 2/3 teeth per inch.

STEP 4: DETERMINE OPTIMUM BLADE SPEED, V (ft/min) (m/min)

The relationship between optimum blade speed and effective material width for various materials is represented on the graph shown.



Optimum Blade Speed Curves

The graph shows that as effective material width gets wider or as material gets harder, lower blade speeds are recommended. If material is narrow or soft, higher blades speeds should be selected.

Example #1

1. 8” (200mm) diameter #1045 Medium Carbon Steel solid bar is to be cut.
2. On the graph above find the Medium Carbon Steel Curve which represents the optimum blade speeds for 1045 Carbon Steel.
3. On the horizontal axis (effective material width axis) find number 8 which represents effective material width of an 8” (200mm) diameter solid.
4. Find the point where a vertical line from 8” (200mm) intersects the Medium Carbon Steel Curve.
5. From this intersection point run horizontally left to the vertical axis (optimum blade speed axis) and find the point marked “200”.
6. For 8” (200mm) diameter, 1045 Carbon Steel solid bar 200 ft/min (60m/min) is the optimum blade speed.

NOTE:

1. Higher than optimum blade speed will cause rapid blade dulling. Lower than optimum blade speeds reduce cutting rates proportionately and do not result in significantly longer blade life except where there is a vibration problem. If the blade vibrates appreciably at optimum speed as most often occurs with structurals and bundles, a lower blade speed may reduce vibration and prevent premature blade failure.

2. Material Hardness - The graph above illustrates blade speed curves for materials of hardness 20 RC (225 Bhn) or lower. If the material is hardened then the multipliers need to be used. These multipliers are given in the NOTE at the bottom right of the graph. As the hardness increases the optimum blade speed decreases.

The following table gives examples of the optimum blade speeds for different materials.

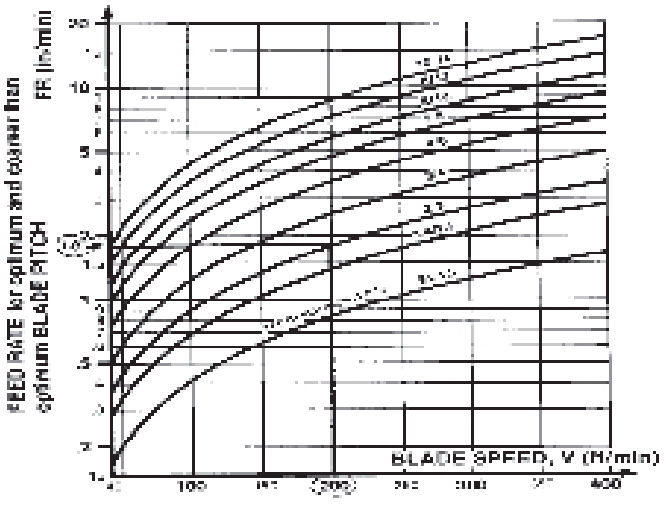
#	MATERIALS	OPTIMUM	BLADE SPEED
		(ft/min)	(m/min)
1	5” (125mm) Diameter Solid Carbon Steel	225	70
2	12” (300mm) I-Beam	290	90
3	4” x 4” (100mm x 100mm) Rect. Tube 1/4” (6mm) Wall	350	110
4	4” (100mm) 400 Stainless Steel	140	45
5	2” x 2” (50mm x 50mm) Rect. Tube 1/4” (6mm) Wall		
	Bundle 5” x 5” pcs. 10” x 10” (500mm x 500mm)	325	100
6	3” x 3” (75mm x 75mm) Inconel	60	20

Materials and Blade Speed

STEP 5: DETERMINE FEED RATE SETTING, FR (in/min) (mm/min).

FEED RATE is the vertical speed at which the blade descends through the work-piece.

The FEED RATE Knob controls FEED RATE of the blade descent. The FEED RATE should be adjusted only in one direction (from “O” to required value). If you go too far, go back to “O” and come back up. To set FEED RATE for particular cutting situations use the graph below, which represents the relationship between FEED RATE, blade speed and blade pitch.



Feed Rate Calculation

Example #1: It is known from Step 3 that optimum blade pitch is 2/3, and from Step 4 that blade speed is 200 ft/min (60mm/min). From the Graph on the left, the FEED RATE is determined in the following way:

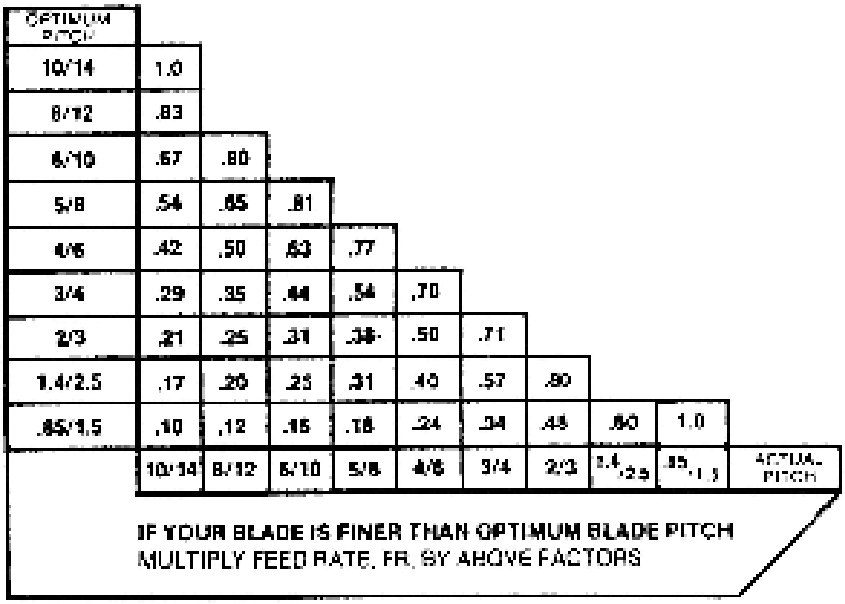
1. On the horizontal axis (blade speed axis), find 200 ft/min (60mm/min).

2. Find the point where a vertical line from 200 ft/min (60mm/min) would intersect the 2/3 blade pitch curve

3. From this intersection point run horizontally left to the vertical (FEED RATE) axis, to arrive at 1.8 in/min (45mm/min) FEED RATE. Thus 1.8 in/min (45mm/min) is the FEED RATE for cutting 8” (200mm) diameter 1045 Carbon Steel when the optimum 2/3 pitch blade is used.

FEED RATE, continued

If the saw is fitted with a blade coarser than optimum (e.g.: 1.4/2.5 TPI) we can still use the graph, but we go to the 1.4/2.5 curve. As a result we find that the FEED RATE is decreased to 1.3 in/min (133mm/min) for this blade. If however, the machine is fitted with a finer than optimum blade (e.g. 3/4 TPI) we use the graph for the optimum blade as before, and then use a multiplier given by the table below.



Optimum Vs Actual Blade Pitch

ADDITIONAL CUTTING SETUP EXAMPLES

EXAMPLE # 2

Material:

Round Steel Tube SAE 4320 - Hardened to 35 RC (325 Bhn)
Dimensions - 6” O.D. x 4” I.D. (150mm O.D. x 100mm I.D.)

Step 1 Effective Material Width: 4 1/2” (.75 X 6) 114mm (19 x 6)

Step 2 Feed Force limit setting for 6” Diameter material (Refer to Feed Force Limit, Setting in Step 2)

Step 3 Optimum blade pitch (TPI): 3/4 T. P. I.
Actual blade pitch on the saw: 4/6 T. P. I.

Step 4 Optimum blade speed for 4 1/2” effective 225 ft/min (70m/min) material width
Blade speed reduced by hardness factor: 225 ft/min X .60 = 135ft/min (70m/min x .60 = 42m/min)

Step 5 Feed Rate for 3/4 TPI blade: 1.8 in/min (45mm/min)
Feed Rate for 4/6 TPI blade: 1.8 in/min X .70 = 1.3in/min
(reduced by finer than optimum blade pitch factor) (45mm/min x .70= 31.5mm/min)

ADDITIONAL CUTTING SETUP EXAMPLES, continued

EXAMPLE # 3

Material:

Bundle low carbon steel 2” x 2” Tube with 1/4” wall, 12 piece bundle (50mm x 50mm with 6mm wall)

Dimensions: 6” x 8” (150mm x 200mm)

Step 1 Effective Material Width: 5” (.6 X 8”) 120mm (.6 x 200)

Step 2 Feed Force limit setting for 8” Diameter material. (Refer to Feed Force Limit, Setting in Step 2)

Step 3 Optimum blade pitch (TPI): 3/4 T. P. I.

Step 4 Optimum blade speed for 5“ effective material width: 320 ft/min (100m/min)

Step 5 Feed Rate for 3/4 TPI blade: 4.0 in/min (100mm/min)

ADDITIONAL CONTROLS

COOLANT FLOW

The main coolant control is found on the control panel.

WASH: Coolant flows any time the machine is under power, permitting wash down with spray nozzle without running machine.
OFF: No coolant flow.
ON: The coolant flows only when the blade is running or when the blade is running and the head is descending. This is selectable via the PLC parameters.

A generous flow of coolant should be applied in order to increase production and blade life.

The bandsaw is equipped with two independently controlled coolant spouts that are capable of supplying a generous flow of coolant to the blade.

The left guide arm supplies a flow of coolant that floods the blade as it moves through the carbide pads into the material to be cut. The adjustable spout on the left guide arm should be set with the blade speed to provide the flood of coolant necessary.

There is also a flexible hose that can be pointed where necessary. This flexible hose should be used when cutting solid bars, bundles or wide structurals. Set the flow of coolant directly into the opening in the material where the blade is cutting.

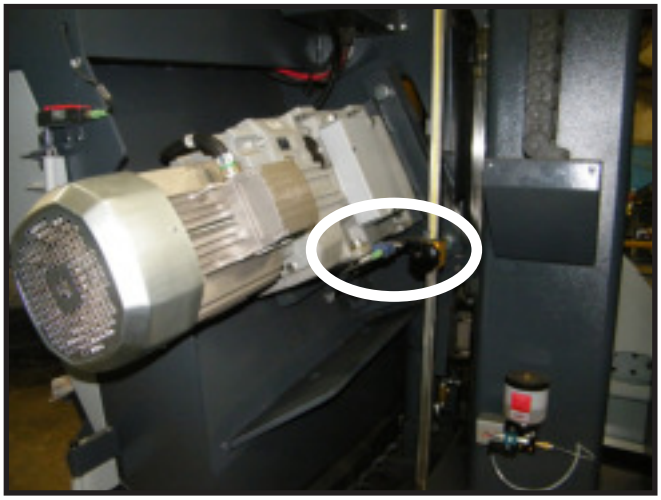
NOTE:
When cutting materials that do not need constant coolant, such as Cast Iron, some coolant flow is required for blade lubrication to prevent blade scoring by the carbide pads as the blade moves through them.

HEAD UP AND DOWN LIMIT SETTING

The head up limit is used to restrict the distance the head travels for each stroke. It can be adjusted at any time by moving the switch trip plate to any position on the vertical bar. The trip plate & switches are found behind the head on the drive end near the gear box.

Head Up Limit: In order to maximize production in the automatic cycle the Head Up Limit should be set to just clear the height of the material.

Head Down Limit: This limit is factory set and under ordinary cutting requirements should not be changed. If changed, it may cause the machine to malfunction in the automatic cycle.

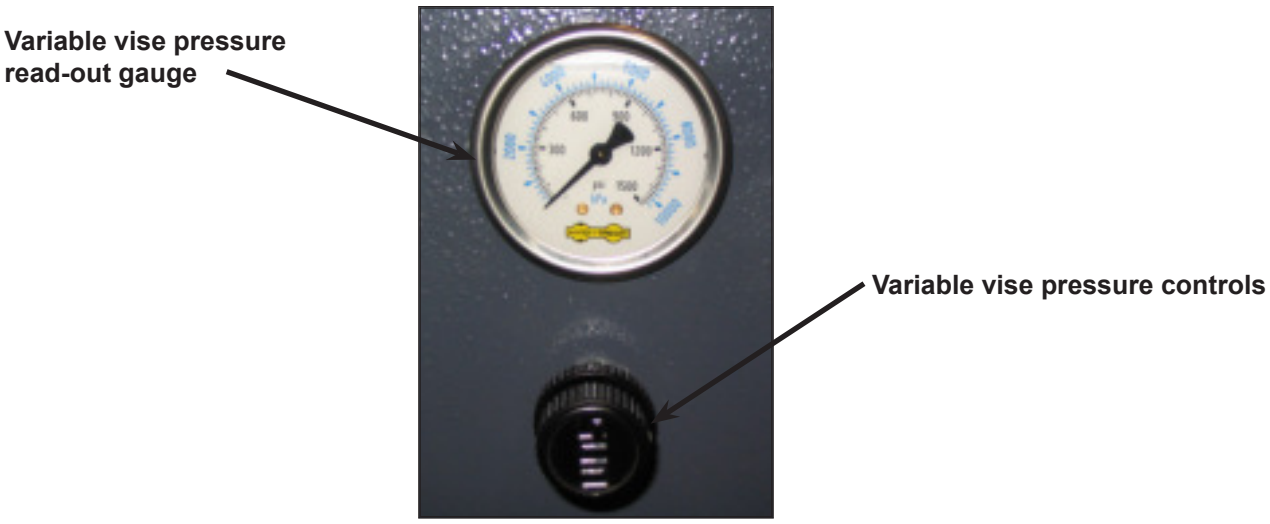


HEAD UP LIMIT SWITCH

HEAD DOWN LIMIT SWITCH

VARIABLE VISE PRESSURE (OPTION)

This option allows the operator to adjust the vise pressure. This can be valuable when cutting light structurals and tubes. By reducing the vise pressure from the system (1200 PSI or 8274kPa) pressure, distortion of materials is prevented. The controls are located at the drive end of the machine next to the hydraulic compartment.



BUNDLING OPERATION (OPTION)

The bundling vises can be operated in direct conjunction with the front and shuttle vises or at a slower clamping speed. Either bundling can be turned on or off at any time. The on / off valves are shown in the photos.
The speed at which the bundling jaws open and close can be adjusted as required by turning the flow control valve for each bundling cylinder.

SECTION 3 – MAINTENANCE AND TROUBLESHOOTING

LOCK-OUT

"Lock-out", or "Lock-out Tag-out" are terms that refer to procedures taken to prevent the unexpected start-up, or other release of energy, by a machine, whenever anyone is required to remove or bypass safety guards or devices, or whenever anyone is required to place part of his body in a hazard area.
In almost all jurisdictions, it is required that owners of industrial equipment establish and post lock-out procedures. Know and use the lock-out procedures of your company or organization. In the absence, of such posted procedures, use the following procedure.

LOCK OUT PROCEDURE

Whenever work is to be performed on a machine, which requires removal or bypassing of safety guards or devices, or the placement of part of anyone's body in a hazard area, the following steps shall be taken:

1. Operator shuts down the machine.
2. The supervisor in charge of the machine must be informed of the intention to Lock-out the machine.
3. The FEEDER power which supplies power to the machine and which is connected to the machine via the Power Junction Box (see picture below) must be turned OFF and locked in the OFF (0) position by means of a padlock. The key for this padlock must be kept by the person performing the work on the machine. If more than one person is performing work on the machine, then a multiple lock hasp shall be used, and each person shall apply his or her own lock to the hasp.
4. The Machine Power Disconnect Switch must be turned OFF, and locked in the OFF (0) position by means of a padlock. The key for this padlock must be kept by the person performing the work on the machine. If more than one person is performing work on the machine, then a multiple lock hasp shall be used, and each person shall apply his or her own lock to the hasp.
5. Prior to starting any work on the locked-out machine, the supervisor shall attempt to start the machine to ensure that the lock-out device provides adequate protection. Operating controls must be reset to the "OFF" position after this test.
6. Work on the locked-out machine may now proceed.

STYLE OF MACHINE DISCONNECT SWITCH MAY VARY

Machine Power Disconnect located on the door of the electrical control box.

1. Ensure switch is in the OFF position.
2. Install padlock and lock it.

BLADE CHANGE MODE PROCEDURE

Wear safety glasses, gloves, and a long sleeve shirt for protection when handling band saw blades during blade change. NOTE THAT GLOVES SHOULD NEVER BE WORN NEAR A RUNNING BANDSAW BLADE. When handling new blades, or ones that will be re-used, it is important to keep the teeth out of contact with concrete floors.

This machine is equipped with hydraulic blade tension and a 'Blade Change Mode' key switch, located on the operator control panel.

This key has two positions:

OFF – All normal operations of the band saw are operative.

ON – Hydraulic motor can be started.
Blade tension and head control is operative.

BLADE REMOVAL

1. With the blade change mode key switch in 'OFF', the blade stopped and the hydraulics ON, raise the saw head until the drive door will clear the electrical control panel.
2. Open the front vise about 12". This will provide room between the two guide arms to easily grasp the blade with two hands, BUT DO NOT TOUCH THE BLADE UNTIL THE BLADE CHANGE MODE SWITCH IS TURNED TO THE 'ON' POSITION.
3. Turn the blade change key switch to the 'ON' position. The hydraulics will continue to run, but only the blade tension switch is functional. The blade wheel doors can be opened without the hydraulics shutting down.
4. Remove the blade guard.
5. Open both blade wheel doors.
6. Release the blade tension by turning the switch briefly to ' – '. By jogging the switch between 'HOLD' and ' – ', it is possible to regulate the degree of tension on the blade.
7. Pull the top strand of the blade down out of its slot above the cutting area and forward out of the slots on the inside walls of the blade wheel housings.
8. Pull the lower strand of the blade down out of the blade guides.
9. Store and dispose of the used blade.

BLADE INSTALLATION

NOTES ABOUT NEW BLADES

- A new blade will come folded into a compact coil. Follow the blade manufacturer's instructions for safely unfolding the blade.
- The blade must be installed with the teeth facing towards the front of the saw where it passes around the wheels, and with the teeth in the cutting area pointing towards the drive wheel. This may require that the blade be turned inside out before installation.

1. With the blade change mode key switch remaining in the 'ON' position, turn the blade tension switch to the ' – ' position for several seconds until the idler wheel has fully retracted.
2. Insert the lower strand of the new blade into the blade guides.
3. Lift the upper strand of the blade up into its slot above the cutting area, and place it around the blade wheels.
4. Turn the blade tension switch briefly to ' +/RUN' and then leave it in 'HOLD' to retain the blade lightly on the wheels.
5. Adjust the blade position on the wheels so that the blade is not crooked on them and the teeth overhang the front edge of the wheels.
6. Turn the blade tension switch to ' +/RUN'.
7. Close both blade wheel doors.
8. Turn the blade change mode key switch to the 'OFF' position. The hydraulics will shut down.
9. Switch the hydraulics on, then start the blade and run for 20 seconds.
10. Stop the blade.
11. Turn the blade change key switch to the 'ON' position.
12. Open the blade wheel doors and inspect the blade tracking, plus the position of the blade brush. Refer to the manual for tracking adjustments.
13. Close the blade wheel doors and turn the blade change mode key to the 'OFF' position.
14. Blade change procedure is now complete.

BLADE BRUSH ADJUSTMENT

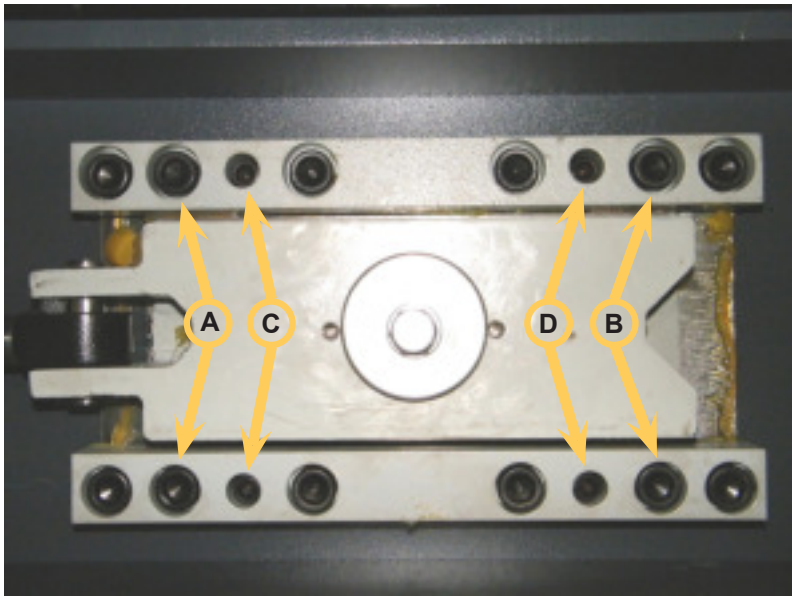
The blade brush is properly set when the machine leaves the factory but it will wear during operation and needs to be adjusted periodically. The blade brush assembly is found behind the drive side door and is shown below. To adjust the assembly, loosen the hex nut, turn the set screw counter clockwise until the wires on the brush touch the bottom of the blade gullets and tighten the hex nut. The brush should be replaced as it becomes worn to approximately 70% of its original 3" diameter. Replacements can be purchased through your Hyd-Mech Group Limited dealer.

BLADE TRACKING ADJUSTMENT

Blade tracking is set so the teeth of the blade protrude .340" (8.6mm). +/- .01" (.25mm) from the face of the idler and drive wheels. Adjustments should always begin with the wheel that measures farthest out of specification.

IDLER WHEEL TRACKING

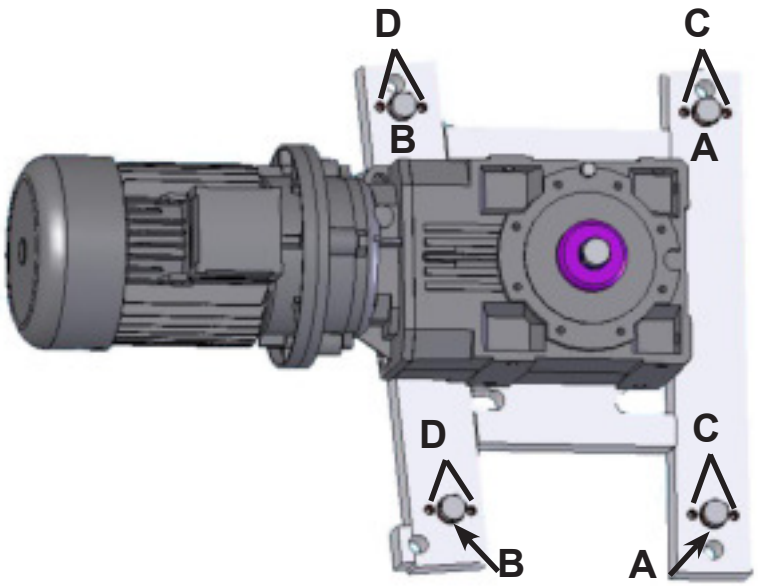
Release blade tension before adjusting. Adjust tracking by regulating “push” set screws and “pull” bolts. Loosening bolts “A” and turning in set screws “C” by equal amounts will move the blade OFF the wheel. Loosening bolts “B” and turning in set screws “D” by equal amounts will move the blade ON to the wheel. After each “C” or “D” set screw adjustment, tighten bolts “A” or “B”, turn tension switch to “+RUN”, run the blade for a moment and recheck the tracking.



Idler wheel tracking bolts & set screws

H28A DRIVE WHEEL TRACKING

Release blade tension before adjusting. Loosening bolts “A” and turning in set screws “C” by equal amounts will move the blade OFF the wheel. Loosening bolts “B” and turning in set screws “D” by equal amounts will move the blade ON to the wheel. After each “C” or “D” set screw adjustment, tighten bolts “A” or “B”, turn tension switch to “+ RUN”, run the blade for a moment and recheck the tracking.



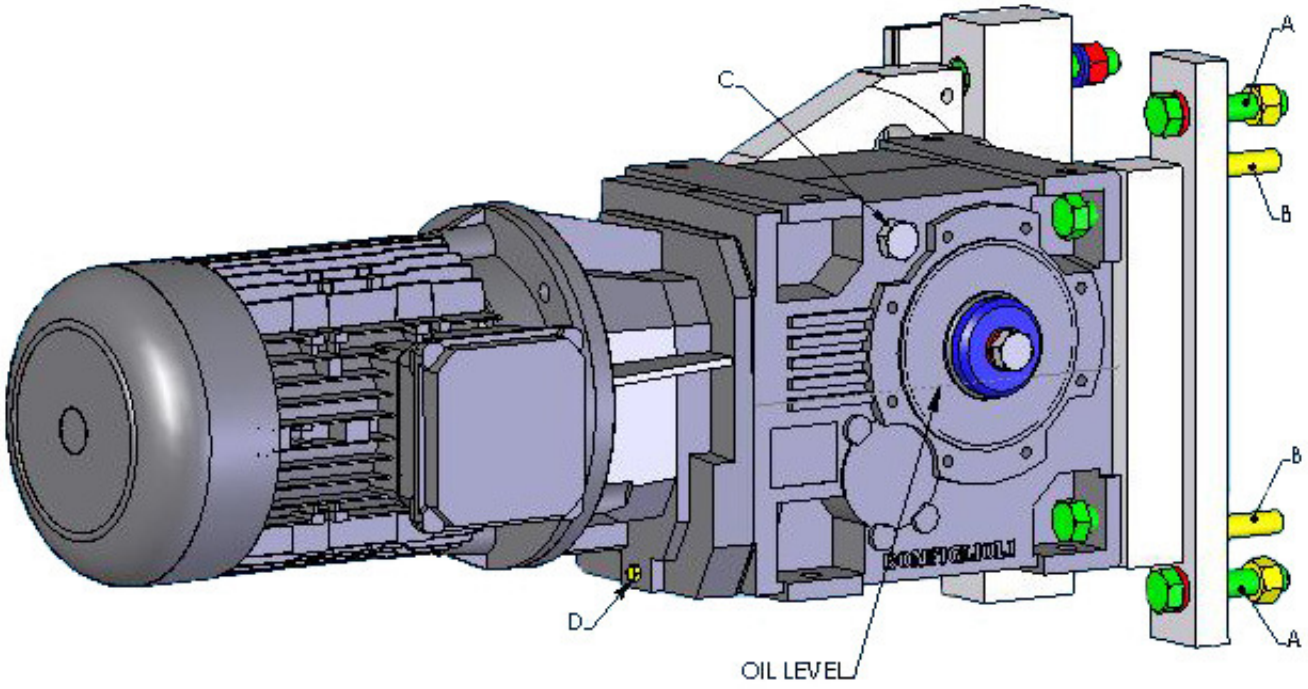
GEARBOX LUBRICATION (H28A WITH A603 GEARBOX)

The H28A-120 with the A603 gearbox requires 15 litres (3.96 US gallons) of Mobil SHC 634 synthetic oil.. This oil has an ISO Viscosity Grade of 220 that is optimum for ambient temperatures from 20-40 Deg C [70-104 Deg F]. If the machine will be operated for prolonged periods at ambient temperatures below 20 Deg C [70 Deg F] an oil of ISO Viscosity Grade 150 should be substituted.

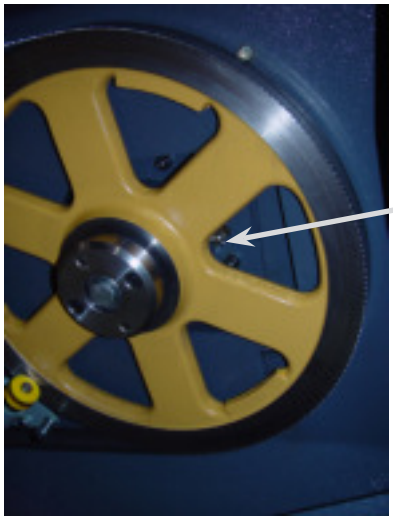
The suggested oil change interval is given below:

Oil Temperature	Mineral Oil Interval	Synthetic Oil Interval
Deg C [deg F]	[hours]	[hours]
< 65 [< 150 F]	8000	25000
65-80 [150 F-175 F]	4000	15000
80-95 [175 F-200 F]	2000	12500

The oil can be changed by draining through the plug, D, and filling at plug C. If the type of oil is being changed, it is advisable to flush the old oil by filling the box with the normal quantity of the new oil, and running it briefly at a moderate speed. Drain the box again before re-filling with a fresh quantity of the new oil.



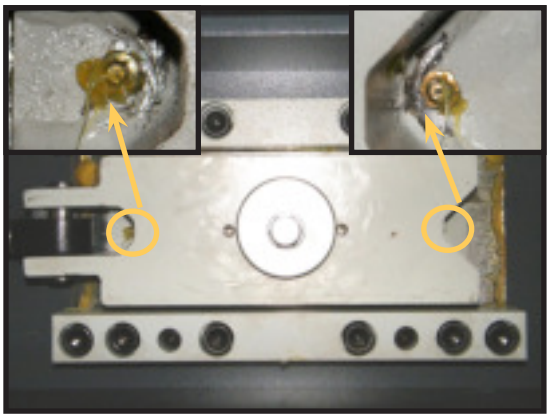
OUTPUT SHAFT LUBRICATION



Always follow Lock-out Procedures before performing this lubrication.
Band tension load is carried by a grease lubricated spherical bearing. A grease fitting is accessible through the spokes of the blade wheel, as shown at point G in the accompanying illustration. Lubricate once per year with 30 ml [1 fluid once] of NLGI Class 2 Lithium base mineral oil grease. This quantity represents about 20 to 30 strokes of a typical hand grease gun.
Vise jaw guides, infeed rollers and bundling assemblies also require periodic greasing.

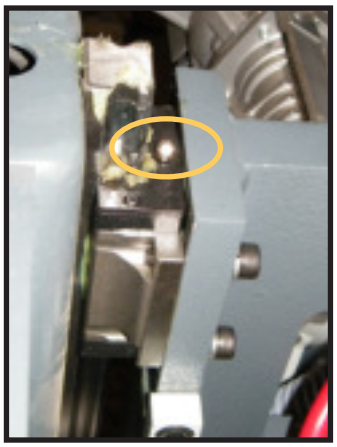
LUBRICATION

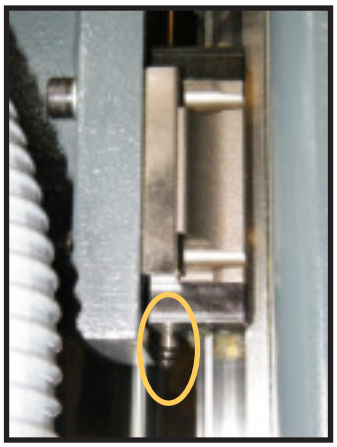
The design of the saw is intended to minimize maintenance, although periodically certain moving parts do require lubrication. We recommend that this periodic lubrication be done once a month using any general-purpose grease. In addition to the grease points shown, vise jaw guides, infeed rollers and bundling assemblies require greasing.



Idler Wheel Slider Assembly
Grease Nipple

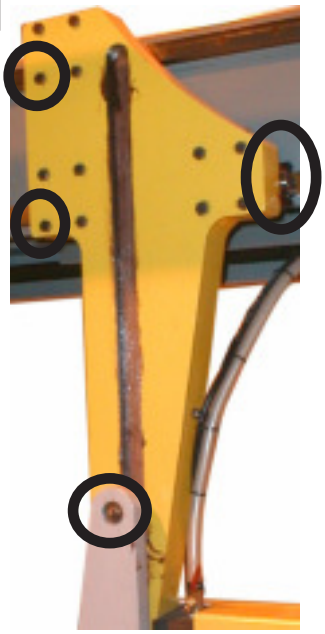
Shuttle Shaft Bearing Housings
x2





Head Linear Guide Blocks
x3

Shuttle Vise Grease Nipples
x2



Guide Arm Grease Points
x4

HYDRAULIC MAINTENANCE

There are only FIVE items of routine maintenance associated with the hydraulic system:

1. OIL FILTER – Ten-micron filtration of the hydraulic oil is provided by a spin-on type filter mounted on the tank return line. The element should be changed after the first 50 Hours of operation and then every 500 working hours. Suitable replacement elements are:

CANFLO	RSE-30-10
GRESEN	K-22001
PARKER	921999
ZINGA	AE-10

2. OIL LEVEL - The oil level should be maintained in the upper half of the level gauge. Normally the rate of oil consumption will be very low and it should be unnecessary to add oil more often than at filter changes. Add oil only to the top line on the gauge. Hydraulic tank capacity is approximately 9.5 US gallons (36 Litres).

NOTE: The H-32 is shipped from the factory with TEXACO RANDO HD46 hydraulic oil. Generally any brand of recognized mineral hydraulic oil with the same properties should be compatible with TEXACO RANDO HD46 oil, but to avoid any risk we suggest staying with TEXACO RANDO HD46. If it is desirable to change brands, it is necessary to drain the tank and to fill to 1/3 with the new oil. Operate through several full strokes of each cylinder, drain the tank again, and finally fill the tank with the new brand.

It is recommended to change the oil every 3000 hours of operation on once a year.

Recommended replacement oils:	Chevron	AW Hydraulic Oil 46
	ESSO	NUTO H46
	Mobil	Mobil DTE 25
	Texaco	Rando HD 46
	Shell	Tellus 46

3. OIL TEMPERATURE – Oil temperature is indicated by a thermometer contained in the level gauge. Oil temperature during steady operation should stabilize at about 50-55°F (10-12° C) above room temperature. Thus in a 70° F (20° C) shop one might expect an oil temperature of about 120° F (50°C) Oil temperature should never exceed 160°F (70°C).

4. OIL PRESSURE – Oil pressure is factory set and should not require further attention except precautionary observation at start-up and every few days thereafter.

5. BLADE TENSION – Is preset at the factory and should under normal conditions not require attention. For adjustments, see the hydraulic schematic.

CLEANLINESS

The heavy-duty design should endure heavy operating conditions and provide the customer with flawless machine performance. To extend good performance some care is required especially as cleanliness is concerned.

The following areas should be kept clean:

- Control console free of dirt and grease
- Door charts free of dirt and grease
- Wheel boxes free of chips
- Blade guides free of chips
- Outfeed table free of chips
- A large chip build-up should be avoided in the base of the saw

NOTE: All parts must be cleaned before any repair service can be performed on them.

PROBLEM		PROBABLE CAUSE		SOLUTION	
1	Saw is cutting out of square vertically.	1a.	Blade worn.	1a.	Replace blade.
		1b.	Low blade tension.	1b.	Tension blade.
		1c.	Blade guides.	1c.	Check for worn guides.
		1d.	Excessive feed rate.	1d.	Reduce.
2	Saw is cutting out of square horizontally.	2	Stock not square in vises.	2	Adjust accordingly.
3	Blade comes off wheels.	3a.	Not enough blade tension.	3a.	Reset blade tension.
		3b.	Improper tracking.	3b.	Set tracking.
4	Blade stalls in cut.	4a.	Not enough blade tension.	4a.	Tension blade.
		4b.	Excessive feed force.	4b.	Reduce.
		4c.	Excessive feed rate.	4c.	Reduce.
5	Blade vibrates excessively.	5a.	Blade speed too fast.	5a.	Reduce.
		5b.	Guide arms too far apart.	5b.	Adjust accordingly.
		5c.	Not enough blade tension.	5c.	Tension blade.
6	Excessive blade breakage.	6a.	Excessive blade tension.	6a.	Reduce blade tension.
		6b.	Excessive feed rate.	6b.	Reduce.
7	Tooth strippage.	7a.	Blade pitch too fine.	7a.	Select coarser pitch.
		7b.	Blade brush not cleaning.	7b.	Adjust or replace blade brush.
		7c.	Excessive feed rate.	7c.	Reduce.
		7d.	Excessive feed force.	7d.	Reduce.
8	No coolant flow.	8a.	No coolant.	8a.	Add coolant.
		8b.	Coolant line blocked.	8b.	Blow out coolant line.
		8c.	Coolant pump inoperable.	8c.	Check, replace if faulty.
9	Saw will not start.	9a.	Safety relay is not energized	9a.	1.Ensure all Emergency Stop push buttons are released. 2.Ensure Door interlock switches are not activated.(Close Drive & Idler doors)
		9b.	Motor overload has tripped.	9b.	Depress each of the over-load buttons located in the electrical box. Depressing one button at a time and trying to start the saw will indicate which motor was overloaded.
		9c.	Control circuit fuse has blown.	9c.	Replace the fuse in the control panel. Random blowouts may occur but a quickly repeated blowout points to an internal wiring fault.
		9d.	Vise or head selector switch not in the center (neutral) position.	9d.	Turn all switches to the center (neutral) position.

PROBLEM		PROBABLE CAUSE		SOLUTION	
10	Saw starts but will not run after Start button has been released.	10	On machines so equipped, the out-of-stock or blade breakage limit switch has been tripped.	10	Reload with stock or reset the blade. Hold the hydraulic start button and release the blade tension or open vises far enough to deactivate the limit switch.
11	Saw starts but no hydraulic functions.	11a.	If blade wheels run clockwise, wrong phase order in power connection to saw.	11a.	Stop immediately; reverse any two of the three phase connections.
		11b.	If pump is noisy cause may be low hydraulic oil level.	11b.	Stop immediately, add hydraulic oil. (See "Hydraulic Maintenance")
		11c.	Pump-motor coupling has separated.	11c.	Adjust accordingly.
IN MANUAL MODE					
12	No individual function will respond to its manual control switch.	12a.	Observe pilot light(s) on relevant valve. If pilot light fails to go on, problem is electrical.	12a.	This requires the attention of a qualified service person.
		12b.	If pilot light related to inoperative function does light, problem may still be the coil . If problem remains it may result from dirt in the valve spool.	12b.	Disassembly of hydraulic valves should be under taken only by qualified service personnel or those knowledgeable with hydraulic components.
13	Head will not descend.	13a.	Feed Rate Valve is fully closed - pointer is set on "0" or close to "0" in/min.	13a.	Turn Feed Rate Knob in a counter clockwise to open valve.
		13b.	Feed Force Limit is set too low.	13b.	Increase Feed Force Limit.
		13c.	Check for physical interference preventing the head from falling.	13c.	Remove obstructions.
IN AUTOMATIC MODE					
14	Auto cycle will not start.	14a.	No job queue programmed to run.	14a.	Enter job numbers(s) and job data as described in Section 2.
		14b.	Pieces required equals pieces cut.	14b.	Clear pieces cut.

PROGRAMMABLE LOGIC CONTROL

Note:

The PLC is equipped with a lithium battery to keep the program stored while the power is shut down. The battery will need to be replaced every 3 to 5 years, depending on the usage. A visual warning will be displayed on the interface when the battery drains to a certain level. Batteries can be purchased through your Hyd·Mech distributor.

The programmable logic control uses signals from limit switches, control panel switches, encoders (rotary shaft or linear) and information that is programmed into it to supply accurate automatic length control and sawing functions.

The inputs used include:

- Head up limit switch
- Head down limit switch
- Machine function switches and push buttons
- A signal from the auto/manual push button (tells the PLC whether auto or manual operation has been selected).

An encoder is attached the shuttle assembly and travels with the shuttle to provide length information to the PLC. A proximity sensor is mounted through the rear of the idler wheel box. A target for this sensor is mounted on the back of the idler wheel, or, all six spokes of the wheel may be targets to provide blade speed input to the PLC.

The programmed information includes logic put into the PLC by the manufacturer, as well as information programmed into it, through the keypad during assembly. Information from the plant is referred to as the parameters. The parameters are important for the PLC to provide accurate sawing lengths and blade speed display. The following is a description of each parameter and the procedure to access them.

To view the PLC parameters:

In manual mode, with the front vise switch in the “close” position press FWD and REV key simultaneously (not more the 0.5 sec apart). The PLC will prompt you for a password that can be obtained from the Hyd·Mech Group Limited Service Dept. If the password is correct, a screen of parameters will appear. The display will show four lines of parameters at a time. If the length control calibration is necessary, follow the calibration procedure in this section. To move through the parameters use the cursor keys to scroll up or down. To change a parameter, cursor to that parameter line and using the number keys type in the new value and press enter. To leave the parameters press the Auto/Man key.

PLC PARAMETERS

SPEED CONST
Blade speed adjustment number. If the actual blade speed is different than the displayed blade speed, a new speed factor will need to be calculated (providing the WHEEL TRGETS parameter is set correctly). Actual speed ÷ display + adjustment factor X existing speed factor = New Speed Factor

WHEEL TRGETS
Number of targets per revolution of the idler wheel. Can be toggled either 1 or 6.

HGT CLB (Press Enter)
This is to be used only if calibration is required. Call Hyd·Mech Service department for instruction.

ACTUAL HGT
Actual Height Value. Value entered after performing height calibration procedure (described later in this section). This value represents the head full stroke height.

HGT CONST
Height constant. Specifies linear distance of head movement in inches per one pulse of head encoder.

LTH CLB (Press Enter)
Length calibration. This is to be used only if calibration is required. Call Hyd·Mech Service department for instruction.

ACTUAL LTH
Actual Length Value. Value entered after performing length calibration procedure (described later in this section). The PLC uses this value to calculate its length encoder resolution and stroke parameter. Note: If Calibration Procedure is activated and not completed, or activated and a value not entered for ACT LTH, this value will reset to 00.000 and the PLC will not be able to count/display lengths.

LTH CONST
Length constant. Specifies linear distance of shuttle movement in inches per one pulse of shuttle encoder.

ACCEL DIST
Shuttle acceleration distance. Distance, in inches, the shuttle will travel slowly before reaching fast speed while starting to move in either direction. (i.e. 1.000).

DECEL DIST
Shuttle deceleration distance. Distance, in inches, the shuttle will travel slowly reaching before home or target position. (i.e. 1.000)

MIN FST DIST
Minimum fast speed distance. If the programmed length is smaller than this parameter, the shuttle will only move in slow speed.

TARGET WINDOW
Allowable +/- tolerance from programmed length.

FVO DWELL
Delay time for the opening of the fixed VISE in seconds.

SVO DWELL
Delay time for the opening of the shuttle VISE in seconds.

CLOSE TIME
Delay time for the closing of the shuttle or fixed VISE in seconds.

FEED RATE
Activates feed rate display. (Not active on S20A, S23A and H10 machines)

ACTUAL POSITION
If this value is set to “YES,” displays shuttle vise actual position.

HOLD SHT HOME
Hold shuttle VISE home and closed during cut.

BRKN PROX
Allows user to override signal from proximity sensor in case it is broken. (When set to “NO” machine will not run with broken proximity sensor. Set to “YES” allows machine to run).

MIN BLD SPEED
Minimum blade speed on which the PLC will detect the that blade is running

SPD PROX DELAY
Delay in monitoring of the blade speed proximity sensor during acceleration of the blade from start to desired speed set by the potentiometer.

POWER DWN TIMER
If “0” selected, then the machine will shut down after the job is completed. This will allow the machine to continue running for a specified time after the job (in Manual Mode) or the cycle (in Auto Mode) has been completed. Range is from “0” to “180” minutes.

BLADE CLEAR
If set to “YES,” when the AUTO cycle reaches the function of head up, the shuttle will retract the material from the blade by 1/8” before the head will move up. When the head reaches the up position the next length of material is shuttled into position.

TRIM CUT
If “YES” selected the machine will perform a facing cut of the material at the beginning of an automatic cycle.

OUT OF STOCK
Selecting “yes” activates the out of stock option, which prevents the shuttle vise from closing if insufficient length of material is available for the next length advance. Also stops the automatic cycle if there is insufficient length of material.

COOLANT
When “BLD” selected, coolant flows when the blade is running. When “BLD+ DWN” selected, coolant flows when the blade is running and head is moving down.

QUEUE
The queue allows the operator to run several jobs (max 5) in series. If “REPEAT” is selected the above series will be executed the selected number of times.

PLC TROUBLESHOOTING

Problem 1 (for automatic models with a shuttle)

PLC is not measuring lengths

Possible causes:

1. Encoder
   a. Pinion gear is loose on the encoder shaft
   b. A bad encoder

2. Encoder Cable
   a. Bad connections at the encoder or the PLC
   b. Open or shorted wire.

3. PLC Unit
   a. Damaged hardware

4. Display unit
   a. No power from the PLC unit
   b. Damaged hardware

5.Actual Length (Actual LTH)
   a. The parameter value is set to 00.000. Perform a self-calibration procedure and enter the value.

Diagnosis:

1. With the machine in MANUAL mode, bring the shuttle forward to the home position and clear the length display so it reads “0.000”. Run the shuttle, in slow speed, to the rear of the machine and back to the home position. Make sure you move in full complete strokes.
   a. The length should accumulate on the display as a positive number when the shuttle is moving away from the blade and should count back to 0 when coming back. If this is not the case then reverse the green channel wire on the encoder with the white channel wire.
   b. If the display alters between 0.000 and ± 0.001, then the encoder channel is not being recorded correctly.

2. To determine the cause, first, check the encoder cable connections at both ends to be sure all four wires are connected properly.

3. Measure the voltage:
   a. At the encoder connector. Between 0 Volt pin and 24 Volt pin. This voltage should be a minimum of 22 to 26 VDC.
      If the voltage is incorrect, check the encoder cable continuity. If it is ok, there is possible PLC problem.
      If the voltage is correct then proceed to the next step.
   b. At the encoder connector. Between 0 Volt pin and channel A pin, and, between 0 Volt pin and channel B pin. This voltage should be slightly less then the supply voltage at each channel
      If the voltage is incorrect at this point, check for proper continuity of these wires and repair as necessary.

Note:
When checking the encoder cable for continuity, each wire should also be checked for shorting to ground and or to each other. If the voltage to the encoder is correct, proceed to the next step.

4. At the encoder connection of the PLC, between the 0 volt and A&B channels, with the shuttle moving slow, the voltage should be approx. 10 to 13 VDC. Input LED’s X0 and X1 should flicker or go dim with the shuttle moving. If these LED’s show no change with the shuttle moving, the encoder is likely at fault. Check that the pinion gear is securely fastened to the encoder shaft and that it can rotate along the rack as the shuttle moves.

If all mechanical components are functioning correctly then the encoder is defective.
If all test check positive, the problem is in the PLC unit.

Problem 2 (for automatic models with a shuttle)

Inaccurate Lengths in Auto Mode

Possible Causes:

1. Encoder
   a. Pinion not engaging the rack all the way from front to back.
   b. Mechanical interference.
   c. Pinion loose on the encoder shaft.

2. Encoder Cable
   a. Bad connection at encoder or at the PLC.
   b. Intermittent open in one or more signal wires.

3. Improper programmed information
   a. Existing parameter(s) incorrect.
   b. Incorrect blade kerf.

4. PLC
   a. Faulty PLC unit (not repairable in the field)

GENERAL RULES

Normally, three types of length inaccuracies may occur.

1. Inconsistent
   a. Lengths cut are not consistent, error changes. It doesn't matter how long the part required is the error is never the same.
   b. Cause: Most likely a defective electrical, hydraulic or mechanical component.

2. Consistent
   a. Lengths cut are consistent and the error is also consistent. The error always stays the same regardless of part length.
   b. Cause: Kerf Value

3. Linear
   a. Lengths cut are consistent but the error increases as the part length increases. The longer the part the greater the error.
   b. Cause: When the self-calibration is executed, an incorrect "ACT LTH" value was entered.

Diagnosis:
- Check and record the existing parameters. Also check for proper blade kerf. By making a cut part way into a piece of material and measuring the width of the cut, the operator can check the blade kerf.

INCONSISTENT INACCURACY

- With the machine in Manual mode, move the shuttle all the way forward and clear (zero) the length display. Move the shuttle in reverse, in slow speed, all the way to the end of its travel. Return the shuttle forward to the home position, also in slow speed. The display should read 0.000" ± 0.005". Do this test several times to be sure the read-out is repeatable.

Diagnosis:
Following the same procedure, run the shuttle alternating between fast and slow speed going back and forth. Again the display should be able to read 0.000" ± .005" when returning to the home position.

If the display does not read as specified:

- Check the encoder pinion gear to be sure it can run smoothly down the rack and that the gear and rack teeth engage over the entire travel of the shuttle.
- Check that the pinion gear is tight on the encoder shaft.
- Check the encoders cable connections, a loose connection could easily cause this concern.
- Remove the encoder from the machine and check that the shaft can rotate freely. There should be no binding or rough spots felt when spinning the shaft. Plug the encoder cable into the encoder, clear the length display and rotate the shaft as closely as possible to one revolution. The display should ready 3.142" (positive or negative depending on the direction you rotated). Repeat this test 3 or 4 times, spinning the shaft several times between tests.

CONSISTENT INACCURACY (make sure the blade kerf value is correct)

Change the "ACTUAL POS" parameter to YES. This will make the PLC show actual shuttle travel in AUTO

With no material in the machine:

1. Program JOB 1 for 2 pieces of 5" in length. JOB 2 for 2 pieces of 10" in length and JOB 3 for 2 pieces of one complete shuttle stroke length.
2. Enter JOBS 1 to 3 into the QUEUE.
3. Record measurements on the display each time the shuttle vise reaches the target length and closes. It should equal the required length plus the programmed kerf. Check that this measurement is ± .002" for each length.
   If the overshoot / undershoot is very inconsistent, it could be related to an incorrect shuttle cushion period. This may be caused by "DECEL DIST" parameter being set to low, defective fast or reverse output relays on the PLC, or the hydraulic cushion valve (located at the hydraulic manifold) may be faulty.

LINEAR INACCURACY (not valid for machines with linear encoder)

- Load machine with a piece of stock for test cutting.
- Open the parameters screen.
- Initiate the length calibration procedure.
- Re-enter the new "ACT LTH" (actual length) value.
- Re-cut test lengths and check if accuracy is satisfactory.

Note:
Linear inaccuracy may be corrected in two ways, by using the length calibration as described or by adjusting the LTH CONST as follows:

Load the machine with a piece of stock for test cutting
Program he PLC to cut two pieces of 1", 12" and a length equal to a shuttle and a half of the machine being checked.
Make the cuts and measure as accurately as possible.
Using the formula provided, calculate the new parameter "LTH CONST"

Formula for determining new parameter "LTH CONST"
Measured length ÷ programmed length x existing constant = new "LTH CONST"

i.e. Programmed length	=1.00"	Measured Length	=.99"	-.001"
	=12.00"		=11.988"	-.012"
	=60.00"		=59.940"	-.060"

Existing parameter for LTH CONST = 0.001256
11.988 ÷ 12.00 x .0012566 = 0.001255
The new parameter LTH CONST value would then be 0.001255. This value should be entered and the test repeated. Adjust the parameter as necessary.

GENERAL RULE:
Lowering the parameter value = longer shuttle travel = longer parts
Increasing the value = shorter shuttle travel = shorter parts

Problem 3 (for P Models, disregard all references to a shuttle)

Auto Cycle Not Being Completed

In auto mode, the PLC controls the saw functions through output relays. For a certain function to be actuated, the PLC must first see specific input(s). Like the output relays, the input relays are located on the PLC unit. Directly beside the input and output terminals are red LED's (Light Emitting Diode), which will light up when the corresponding input is being received or output being actuated. Observation of these input/output LED's can help diagnose auto cycle problems. Refer to the PLC inputs and outputs in this section. When a problem occurs in the auto mode, the lights should be checked to see if they are coming on at the proper time or if they are coming on at all.

Input LED's
If a specific input light does not come on when expected
- Check for a faulty/mis-adjusted limit switch, push button, encoder or faulty wiring or connections.
- Wiring for each limit switch should be connected from the VDC terminal connection to the particular limit switch, and from the limit switch to the input connector of the PLC.

Note:
All inputs are denoted by an "X"
All outputs are denoted by a "Y"

The following is information on output diagnosis and the sequence of inputs and outputs during the auto cycle.

Auto Cycle Sequence:

After the mode push button is in the auto position, the job has been programmed into the PLC, and the cycle start push button pressed:
1. Hydraulics running, the head should move to its up limit if it is not already there. The shuttle vise should open and come forward to the home position. HUP input light must come on for the cycle to continue.
   a. HUP input on – cycle should continue, if not check outputs per step 2.
   b. HUP input not on – Check that the head up limit switch is being activated. Check the limit switch/limit switch wiring.
2. Front vise should be closed; the shuttle vise should stay open and move back to the programmed length.
   a. FVC output should be on and SVO output will light momentarily, REV output and FST output should be on when the shuttle moves back fast.
3. As the shuttle approaches the target length the FST output should shut off and the shuttle should travel slowly for the DEC DIST parameter (cushion distance). When the shuttle reaches the target length the SVC output should light and the shuttle vise should close on the material.
4. FVO output light should momentarily turn on and the front vise should open.
5. FWD output should light as will the FST for the shuttle to move forward in fast speed. FST will turn off when the shuttle home cushion period is reached and the shuttle should slow down into the home position.
6. FVC output should light and the front vise should close. FWD light should go out, HDN output should come on and the head should start to descend for the cut. If the blade is not running at this time, the cycle will hold until minimum SFM is reached. Depending on "HLD SHTL HM" parameter in the PLC, the shuttle may stay home and closed during the cut or may move back to pick up the next length. HUP input should go out as the head descends and HUP L/S deactivates.
7. After the cut is completed HDN input should light, HDN output should go out, the HUP output should light and the head should move up. When the head reaches it's up limit, HUP input should come on, HUP output should turn off and the cycle repeats with the next length being clamped by the shuttle, the front vise opening and the material being brought forward to the home position.

As mentioned, beside each input and output terminal there is a bank of red LED's. Each light corresponds to an input or output. An input LED will light when it's specific input signal is being received at the PLC and output LED's will light when the PLC commands specific outputs. If an output LED is present but the output does not happen, then either the output relay is faulty/stuck or the output (3 amp) fuse is blown. If a fuse is blown, a shorted directional valve coil, shorted noise suppressor at the coil or shorted wiring could be the cause (a good coil will measure between 30 to 40 ohms). If the fuse is good and no output voltage condition still exists, with the output light on, then the relay is defective. If this is the case the PLC will have to be returned to the manufacturer for repair.

FUSES

The PLC outputs are protected with four glass fuses which are mounted on TB1(Beside PLC).
Fuse "FU8" is a 2 amp instant blow fuse which feeds power to the input side of the PLC thorough input terminal "L"
Fuses "FU3" and "FU5" to "FU7" are 3 amp time delay fuses which each supply power to a specific bank of output relays through that bank of relays "COM" terminal:

FU3 is wired to terminal "COM1" supplying outputs -Y0, Y1, Y2, Y3
FU5 is wired to terminal "COM3" supplying outputs -Y10, Y11, Y12, Y13
FU6 is wired to terminal "COM4: supplying outputs -Y14, Y15, Y16, Y17
FU7 is wired to terminal "COM5" supplying outputs -Y20, Y21, Y22, Y23

Problem 4

No Display

Possible Causes:
1. No power to the PLC
2. PLC unit failure
3. Faulty connection of cable between PLC and Interface

Diagnosis:
a. Check the power led. This light should be on when the PLC is switched on.
b. If the light is on, the PLC may have failed. Check for proper connection of the cable at the PLC and at the interface. Also check the PLC fuse.
c. If the fuse is OK, ensure that power is being supplied to the fuse.

Problem 5

No blade speed display

Possible Causes:
1. Fault at the proximity sensor
   a. Bad sensor, mis-adjusted sensor (the gap should be approx .030" - .040")
   b. Contamination on the end of the sensor.

2. Fault at the PLC
   a. Bad connection of sensor wiring
   b. Faulty PLC unit.

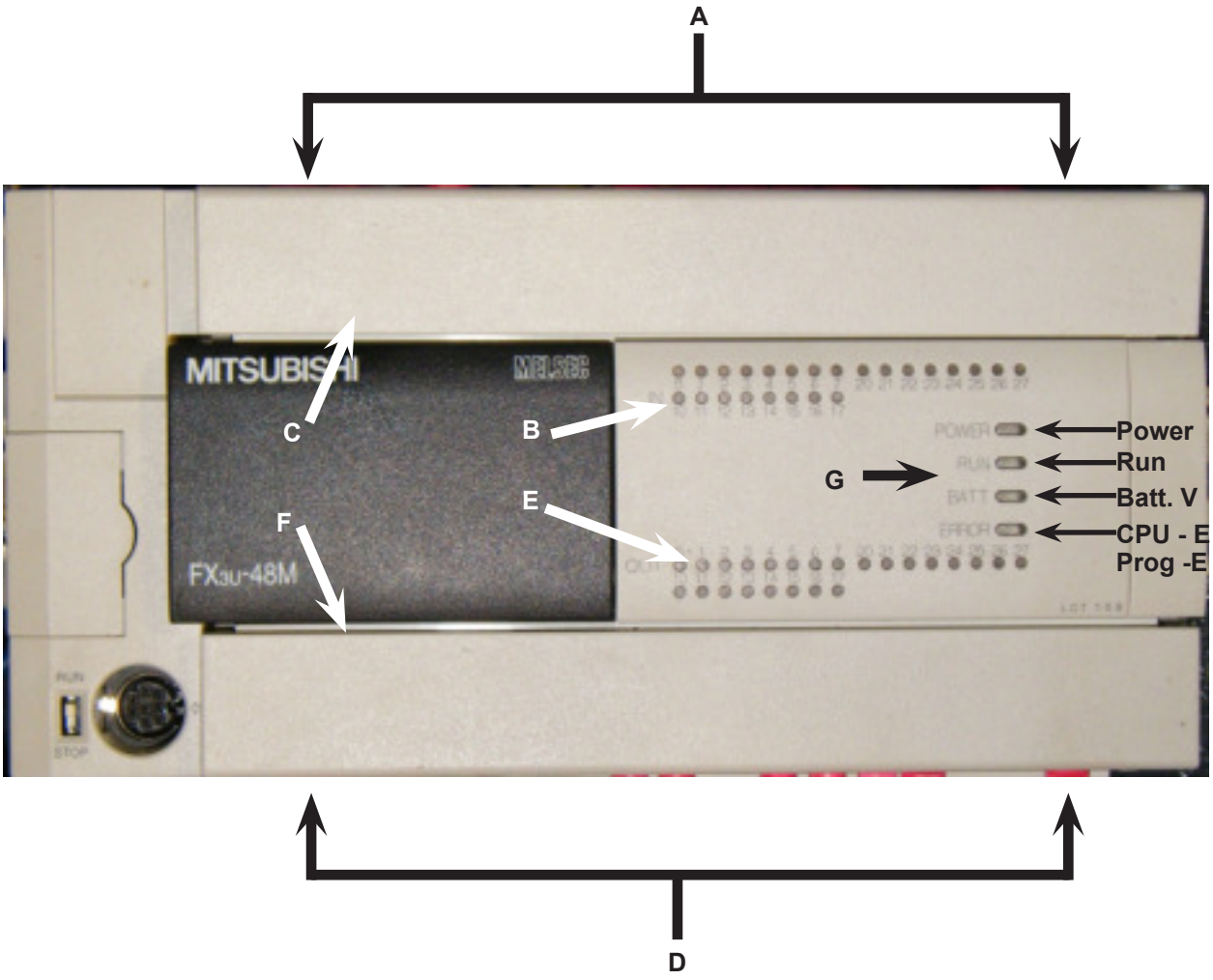
Diagnosis:
- Check for the LED light on the sensor. The light indicates that the sensor has power and is activated. The problem could be with the sensor, signal wire to the PLC or with the PLC itself. With the blade running, the light on the back of the sensor should "pulse". Likewise, the PLC input LED X2, should also be "Pulsing". If both LED's are pulsing with the blade running, the PLC is the problem. If the sensor is pulsing but the input LED on the PLC is not, there is a problem between the sensor and the PLC unit.
- If the LED on the sensor is not on, the problem is with the sensor wiring or the sensor is at fault.

MITSUBISHI PLC INPUTS AND OUTPUTS

Input and output terminal identification:
The top row of identification labels corresponds to the top row of terminals and the bottom row of labels to the bottom row of terminals. Input and output LED numbers correspond to the input or output of the same number. I.E. input LED #0 corresponds to input X0.

PLC status indicators:

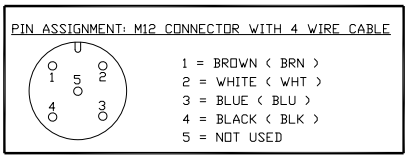
Power	On when power exists to the PLC
Run	On when the PLC is in run mode. If not, check the run/stop switch. It should be in the run position
Batt V	Battery low voltage. If this LED is on, then replace the PLC battery.
Prog E	Flashing LED indicates a program error.
Cpu -E	LED on (Solid). Indicates a CPU error.

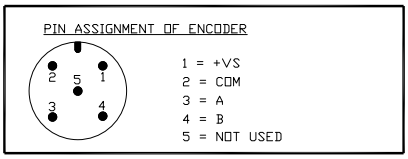


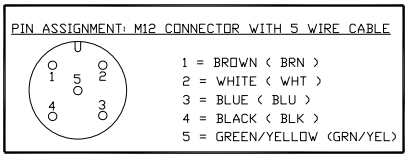
A - Input Terminals
B - Input Indicating LED's
C - Input Terminal Identification
D - Output Terminals
E - Output Indicating LED's
F - Output Terminal Identification
G - PLC Status Indicator Lights

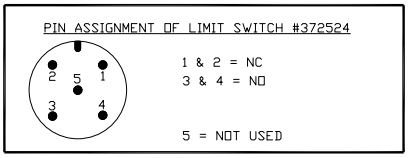
FX3U-48MR-ES			
INPUTS		**OUTPUTS**	
X0	Shuttle Encoder, Channel A	COM1	Fused 120Vac Supply
X1	Shuttle Encoder, Channel B	Y0	Hydraulic Pump Start
X2	Blade Speed or Proximity Switch	Y1	NOT USED
X3	Feed rate encoder A / Angle Encoder A	Y2	NOT USED
X4	Feed rate encoder B / Angle Encoder B	Y3	Blade Pilot Light & Blade Brush
X5	Head Down L/S	COM2	Contact Input Common
X6	Coolant ON	Y4	Forward Rotation Start
X7	Coolant AUTO	Y5	Output Stop
X10	Shuttle Vise Close	Y6	NOT USED
X11	Shuttle Vise Open	Y7	NOT USED
X12	Front Vise Close	COM3	Fused 120Vac Supply
X13	Front Vise Open	Y10	Front Vise Close
X14	Head Up	Y11	Front Vise Open
X15	Head Down	Y12	Shuttle Fast
X16	Blade Start	Y13	2M Contactor
X17	Cycle Start	COM4	Fused 120Vac Supply
X20	Blade Stop	Y14	Shuttle Reverse
X21	(Option) Out Of Stock	Y15	Shuttle Forward
X22	Head Up L/S	Y16	Head Up
X23	NOT USED	Y17	Head Down
X24	(Option) Outboard Vise Close	COM5	Fused 120Vac Supply
X25	(Option) Outboard Vise Open	Y20	Shuttle Vise Close
X26	Blade Deviation	Y21	Shuttle Vise Open
X27	NOT USED	Y22	Coolant
		Y23	Cycle Pilot Light
		Y24	(Option) Outboard Vise Close
		Y25	(Option) Outboard Vise Open
		Y26	Blade Deviation Pilot Light
		Y27	NOT USED

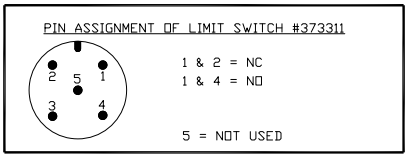
M12 PIN ASSIGNMENTS FOR M12 I/P & O/P DEVICES

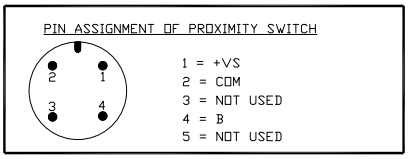










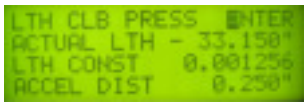


LENGTH CALIBRATION PROCEDURE

Prior to initiating the calibration procedures the following steps are to be taken:

1. The saw must not be in METRIC units.
2. Clear all jobs in the Queue.
3. All “optional” PLC parameters below must be inactive (See page 3.11)
    a. ACTUAL POSITION
    b. HOLD SHT HOME
    c. BRKN PROX
    d. BLADE CLEAR

Length calibration may be achieved in two ways: By inputting the ACTUAL LTH or the LTH CONST parameter.
To determine the ACTUAL LTH value, the LTH CLB (length calibration) procedure must be executed.
In manual mode, position a piece of material, which is longer than the shuttle full stroke length and close the front vise. Simultaneously press the “FWD” and “REV” buttons on the PLC to access the parameters. A password is required at this point, which can be obtained from the Hyd·Mech Service Dept. The screen will then display as follows:



With the cursor at the shown position press the enter button. The cycle start button will start to flash and the “Enter” will change to “On” indicating self calibration mode. Start the blade and the trim cut will be made. After the trim cut is made the head will rise, the shuttle will retract fully in slow speed, clamp the material and come fully forward in slow speed to the home position and make a cut. After the cut is complete “On” will change back to “Press Enter”. Measure the length of the cut part.

Move the cursor down to the “ACTUAL LTH” and enter the length of the cut part plus the actual kerf value. Then exit the parameters by pressing the AUTO/MAN key (the cycle start button will stop flashing). To determine if the encoder channels are connected correctly, observe the actual length parameter for the sign only during shuttle retraction in calibration mode. If the actual length value shows as a negative number, then the channels must be reversed and the calibration procedure repeated.

To determine “LTH CONST” value, use this formula;
LTH CONST = ENCODER PINION CIRCUMFERENCE ÷ ENCODER RESOLUTION
Example:
For a 1” pinion diameter and 2500 PPR encoder:

LTH CONST = π(1”) ÷ 2500PPR = 0.001257

NOTE:
When first entering the parameters screen if not running the self-calibration do not use the enter key but use the cursor keys to scroll through the parameters.

To check length control consistency:

1. Perform test cuts of three different lengths (i.e. 1”, 12”, 20”) and measure as accurately as possible with a Vernier or dial caliper.

2. If the measurements indicate a linear problem (measured length error increases as the programmed length increases) the “ACTUAL LGTH” or “LTH CONST” value will have to be adjusted.

To adjust “ACTUAL LGTH” value The Length Calibration Procedure MUST be performed. This may be done with material in the machine (cut and measure material length) or with no material in the machine (let machine complete the calibration cycle, then enter new value).

If part length error gets longer as the programmed length increases; ACTUAL LTH value should be increased.

If part length error gets shorter as the programmed length increases; ACTUAL LTH value should be decreased.

Make small adjustments at a time (i.e. .020” - .030”) and check with test cuts.

To adjust “LTH CONST”, follow this procedure:

Cut length ÷ Programmed length x Existing “LTH CONST” = New “LTH CONST”

Example:
Cut length of 11.998”, Programmed length of 12”, Existing “LTH CONST” parameter of 0.001256.
11.988 ÷ 12.000 x 0.001256 = 0.001255

The new “LTH CONST” value of 0.001255 should be entered as the “LTH CONST” parameter and test cuts repeated. Adjust the parameter again if necessary.

General rule:
Lowering the “LTH CONST” value = Longer shuttle travel = Longer parts.
Increasing the “LTH CONST” value = Shorter shuttle travel = Shorter parts.

HEAD HEIGHT CALIBRATION PROCEDURE

NOTE:
Remove the head up limit switch target to prevent damage of the head up limit switch during calibration.

Head calibration may be achieved in two ways:
- a: By inputting “ACTUAL HGT” (actual height) parameter or
- b: By inputting “HGT CONST” (height constant) parameter.

To determine “Actual HGT” value, the “HGT CLB” (height calibration) procedure must be executed.

1. Enter the PLC parameter screen as per Length Calibration Procedure above.
2. Using the arrow cursor keys scroll down until the screen displays:

HGT CLB PRESS	ENTER
ACTUAL HGT -	xxxxxx
HGT CONST	xxxxxx

3. With the cursor on the word “ENTER”, press the enter key. The cycle start button will begin to flash, the “ENTER” will change to “ON” (indicating self calibration mode) and the head will move to it’s down limit and then will move up to it’s full upper limit.

4. Measure the distance from the vise horizontal wear strip to the blade teeth tips, and enter this value in the ACTUAL HGT parameter. Measurement must be made along the front vise datum jaw. Input this measurement value & press the enter key. Press the AUTO/MAN key to finish the procedure & exit the parameters screen.

NOTE:
To determine if the encoder channels are connected, observe the actual height value parameter for the sign during head up movement while in calibration mode. If the actual height value shows as a negative number, the channels must be reversed and the calibration procedure repeated.

To determine “HGH CONST” value, use this formula;
ACTUAL FEED RATE ÷ Displayed FEED RATE x HGT CONST = new HGT CONST.

5. Input new HGT CONST & press ENTER.
6. Press the AUTO/MAN key to exit the parameters screen.

SECTION 4 - ELECTRICAL

ELECTRICAL SCHEMATICS: SEE PDF ON ATTACHED CD

SECTION 5 - HYDRAULIC

HYDRAULIC SCHEMATICS & PLUMBING DIAGRAMS: SEE PDF ON ATTACHED CD

SECTION 6 - MECHANICAL ASSEMBLIES

MECHANICAL ASSEMBLY DRAWINGS & PARTS LIST: SEE PDF ON ATTACHED CD

SECTION 7 - OPTIONS

OPTIONAL ASSEMBLY DRAWINGS: SEE PDF ON ATTACHED CD

BLADE DEVIATION MONITOR

This system monitors lateral blade deviation during cutting. If the blade deflection increases beyond the pre-set warning limit, then the monitoring device sends a warning signal by means of a flashing beacon mounted on top of the machine head. If no steps are taken to correct this condition, the machine will continue to cut until the pre-set shut-down limit is reached. At this point the machine will behave in one of two ways selectable by a parameter setting:

1. Stop cutting, raise the head, and shut down

or

2. Finish the cut with the present degree of deviation and then shut down.

Operation of the system

The proximity transducer is enclosed in a housing mounted on the idler side guide arm. The sensor converts the blade lateral deflection to an analog signal, which is sent to the PLC. After a series of calculations the lateral deflection is displayed on the operator interface in the form of a bar graph.

The bar graph appears in both the Manual Mode and Automatic Mode Screens. It is only active when the blade is running and head is descending. The length of the bar graph is proportional to the blade deflection. The bar graph extends from the screen centre towards the right if the blade is deviating towards the front of the saw (cutting into the part), and extends from the screen centre towards the left if the blade is deviating towards the rear of the saw (cutting into the stock).

If a warning limit is reached and maintained longer than the preset response time, then the beacon light mounted on top of the head will start flashing.

If a shutdown limit is reached and maintained longer than the preset response time, then the machine will behave in one of two ways: stop cutting, raise the head, and shut down; or finish the cut with present degree of deviation and then shut down.

Setup procedure

To enable the blade monitor system, follow the steps outlined below:

1. Enter the MONITOR LIMIT SETTING screen by pressing function key F2 labeled LmtSet. The MONITOR LIMIT SETTING screen will be displayed (Fig. 2).
2. Enter the Parameter screen by pressing function key F6 labeled PARMTRS. The PARAMETER SETTING screen will be displayed (Fig. 4).
3. Change the BLADE DEVIATION MONITOR parameter to ON by moving the cursor using the navigation keys to ON/OFF and pressing ENTER. The value of Blade Monitor parameter will change to ON.
4. Exit the Parameter screen by twice pressing the function key F8 labeled RETURN.

Repeating the above steps will disable the blade monitor option.

Warning and shutdown limits adjustments

To adjust the warning and shutdown limits, enter the MONITOR LIMIT SETTING screen by pressing function key F2 labeled Blade Devi. LmtSet .

Figure 1 Operator interface panel.

The MONITOR LIMIT SETTING screen will be displayed (Figure 2).

There are two scales, the upper one showing the preset right and left warning limits, and the lower scale showing the preset right and left shutdown limits. All four limits (right and left warning, and right and left shutdown) are set independently. To adjust the limits, move the cursor to the desired limit and then use the function keys F1 through F4 to change its value.

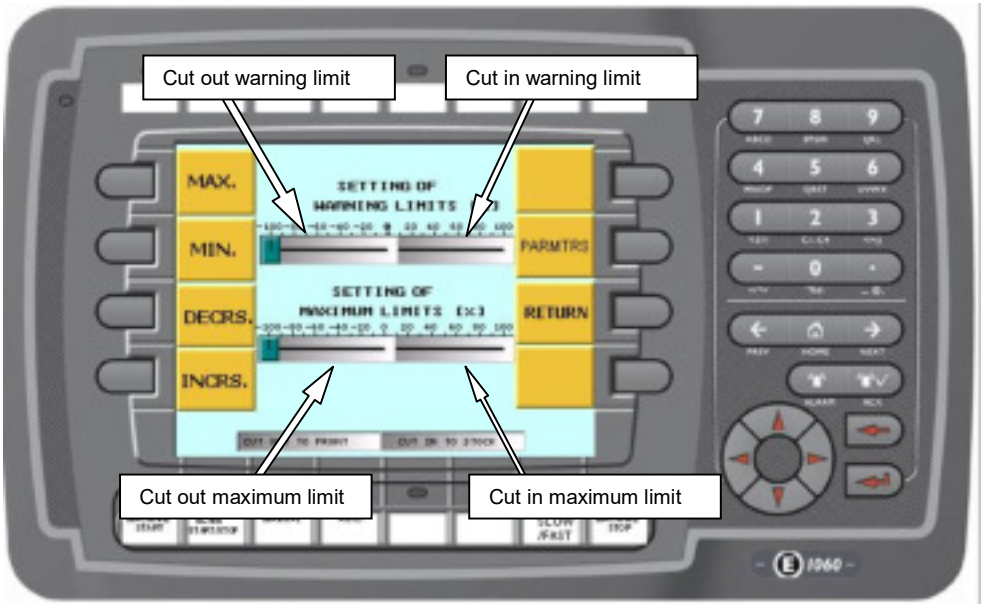


Figure 2 Monitor Limit setting screen.

Cut out warning limit – (out - cutting towards outfeed, range 0 ~100) This parameter will adjust the warning limit if the blade is cutting towards the part. Increasing this value decreases sensitivity, which will result in a warning further away from nominal straight.

Cut in warning limit – (in - cutting towards infeed, range -100 ~ 0) This parameter will adjust the warning limit if the blade is cutting towards the stock. Decreasing this value decreases sensitivity, which will result in a warning further from away nominal straight.

Cut out maximum limit – (out - cutting towards outfeed, range 0 ~100). This parameter will adjust the shutdown limit if blade is cutting towards the part. Increasing this value decreases sensitivity, which will result in a larger deviation from nominal straight, before the shutdown sequence is initialized.

Cut in maximum limit – (in - cutting towards infeed, range -100 ~ 0) This parameter will adjust the shutdown limit if the blade is cutting towards the stock. Decreasing this value decreases sensitivity, which will result in a larger deviation from nominal straight, before the shutdown sequence is initialized.

MIN	This function key will move the selected slider to the far left.
DEC	When this function key is depressed once, the value of selected slider will decrement by 2.5%.
INC	When this function key is depressed once, the value of selected slider will increment by 2.5%.
MAX	This function key will move the selected slider to the far right.
PARMTS	This function key will access parameters screen.
RETURN	This function key will return to previous screen.

Figure 3. Monitor limit setting function key description chart

To return from the MONITOR LIMIT SETTING screen to the AUTO or MANUAL screens, press RETURN (F7 function key, Figure 1).

To access the PARAMETERS screen (Figure 4), press PARMTR (F6 function key).

Figure 4. Parameter settings screen.

To set any of the numerical parameters, use the NAVIGATION keys (Figure 1) to place the cursor over the number. Key in the desired value, and then press ENTER.

To change the ON/OFF parameters, place the cursor over the parameter, and press ENTER to toggle between ON and OFF.

WARNING RESPONSE TIME	Warning response time (range 2 – 99 seconds)
	If the blade deviation exceeds the preset warning limit for longer than the warning response time, then the beacon light mounted on top of the head will start flashing.
MAX LIMIT RESPONSE TIME	Maximum limit response time – (range 2 – 99 seconds)
	If the blade deviation exceeds the preset shutdown limit for longer than the shutdown response time, then the machine will execute the shutdown sequence.
MACHINE RESPONSE IF MAX LIMIT REACHED	If the shutdown sequence has been executed then, the machine will behave in one of two ways:
BLD ST0P, HEAD UP AND MACHINE OFF	NO/YES
	Stop cutting, raise the head, and shut down
FINISH CUT, MACHINE OFF	NO/YES
	Finish the cut with present degree of deviation and then shut down
SENSOR SETTING	(range –2000 – +2000)
	The number displayed here represents the position of the blade within the measuring range of the proximity transducer. At 0, the blade is exactly centred within the sensing range. The display assists adjustment with the prompts ‘SETTING, or ‘SET’. The prompt ‘SET’ appears when the adjustment is within the acceptable range of – 100 +100. [See sensor adjustment procedure section]
DISPLAY REFRESH TIME	(range 0.1 sec – 10 sec)
	The refresh time is time between bar graph updates.
BLADE DEVIATION MONITOR	ON/OFF
	This parameter will activate or deactivate response of the blade deviation monitoring system.

Figure 5. Parameter description chart

To return from the PARAMETER screen to the AUTO or MANUAL screens, press the RETURN (F8 function key, then F7 Figure 1).

To access the HISTOGRAM screen (Figure 6), press HSTGRM (F2 function key).

To return from the HISTOGRAM screen to the AUTO or MANUAL screens, press Ret (F2 function key) and then press the RETURN (F8 then F7 function keys).

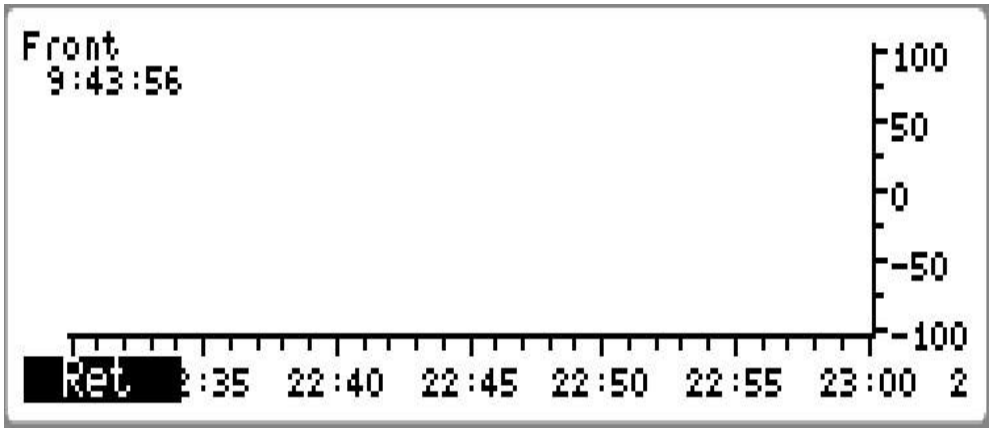


Figure 6. Histogram screen

The histogram records the last 30 minutes of the machine run time. This gives a graphical representation of blade deviation over time. To reset the data buffer power down the machine.

To set the clock:

1. Press Service Mode key
2. Type password (79479)
3. Press Enter key
4. Enter new time
5. Press Enter key
6. To Exit press Ret (F2) function key

Relationship between Blade Deflection Display and Actual Cut Deviation

The digital display indicates the blade lateral deflection at the point where it passes the blade deflection sensor, which is 1” past the idler side guide arm. The maximum deviation of the cut surface will actually occur at or near the center of the cut, and will be several times larger than that measured at the sensor. The display range of 0 +/-100 is proportional to the amount of blade deviation. This depends on the type of material, shape of the work-piece and amount of blade tension.

The actual amount is difficult to predict, experience with different work-pieces will provide the best guide.

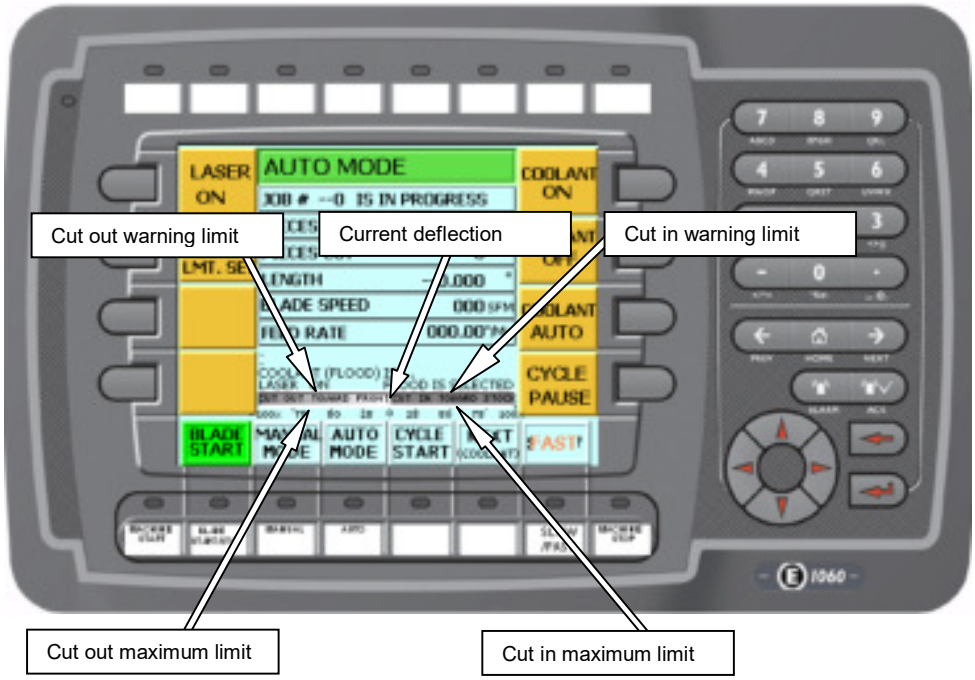


Figure 8 Auto Mode screen.

SENSOR ADJUSTMENT PROCEDURE

It is desirable for the un-deflected position of the blade to lie in the center of the sensing range of the proximity transducer. This relation may be changed when new carbide guides are installed, or guide arm alignment is adjusted. To reset the relation, proceed as follows:

1. To prevent accidental blade start during adjustment:
    a. Use the disconnect switch to isolate the machine.
    b. Open the electrical cabinet and turn OFF the manual motor starter labeled 2 O/L and lock it in the off position by means of a padlock (Fig 9).

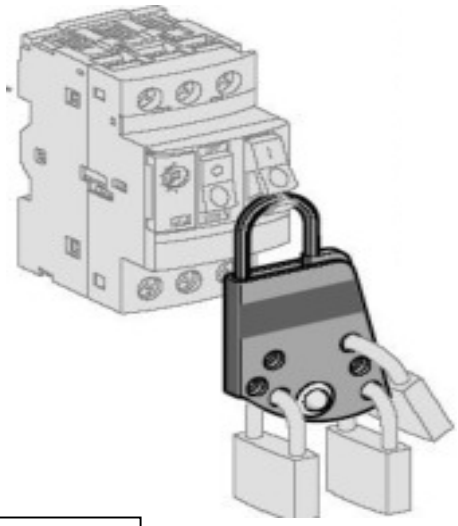


Figure 9.

    c. Close the electrical cabinet and turn the disconnect switch to ON.

d. Confirm that correct manual motor starter has been turned off by starting hydraulics

e. Wait 1 minute and then attempt to start the blade motor. If the blade motor does not start proceed to step 2.

2. Position the guide arm at mid point of the range between fully open and fully closed.
3. Raise the head to place monitor body at comfortable working height.
4. Press the F6 function key to enter the blade monitor limit setting screen.
5. To enter blade monitor parameters screen, press function key F5 labeled PARMTR.
6. Loosen the two hex socket cap screws.
7. By moving the block in perpendicular direction to the blade (Fig 10) observe the bottom line of the BLADE MONITOR PARAMETERS screen labeled SENSOR SETTING. Adjust the block until the prompt reads 'SENSOR SET'. The adjustment is quite sensitive and requires careful movement of the block in small increments. The display range limit is from –2000 to +2000. The target setting is 0, but anywhere from –100 to +100 is acceptable and will result in the display prompt 'SENSOR SET'.
8. When adjustment is complete, lock the two hex socket cap screws.
9. Restore blade motor circuit:
    a. Turn off the hydraulics.
    b. Use the disconnect switch to isolate the machine
    c. Open the electrical cabinet and remove padlock.
    d. Turn ON the manual motor starter 2O/L.
10. Close electrical cabinet and turn on the disconnect switch.

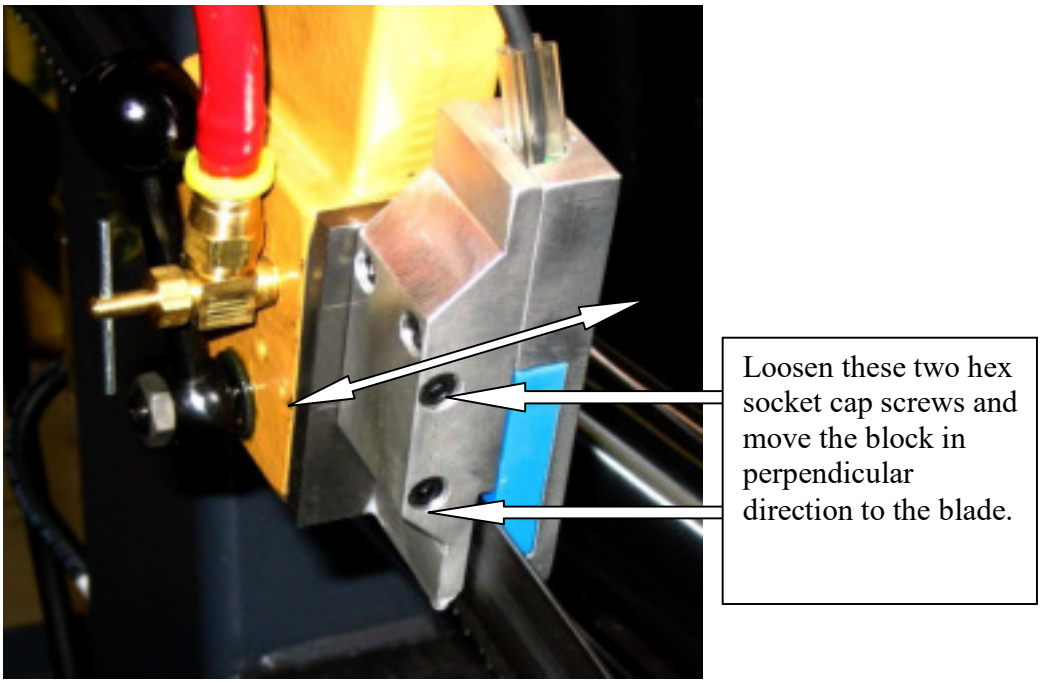
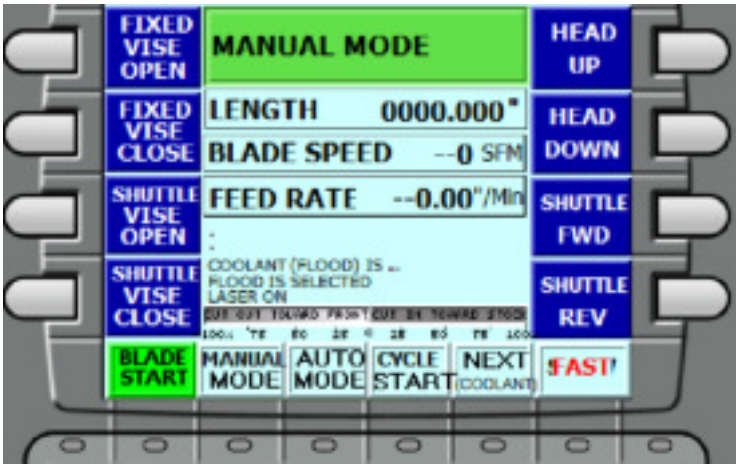


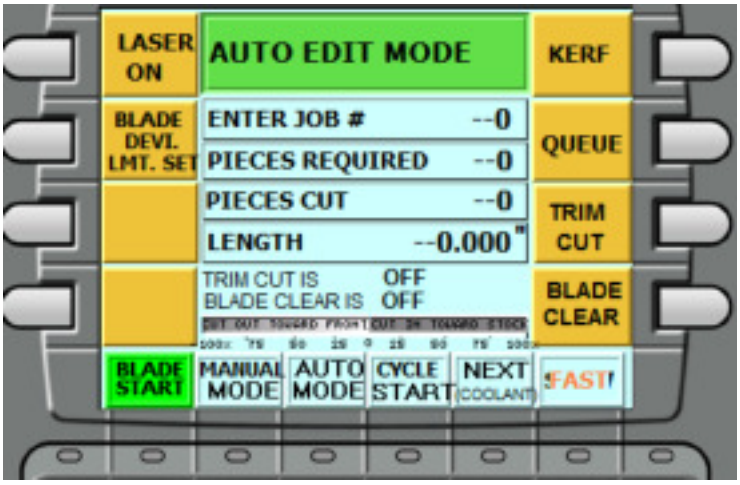
Figure 10

FLOOD MIST SELECTION

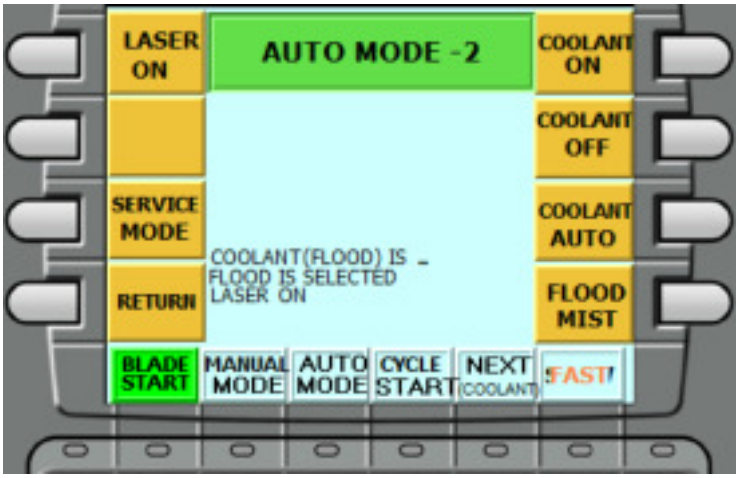
1. Selecting FLOOD or MIST coolant



2. In Auto Mode press NEXT (coolant) button to move to AUTO MODE - 2



3. Use FLOOD/MIST button to select different type of coolant.



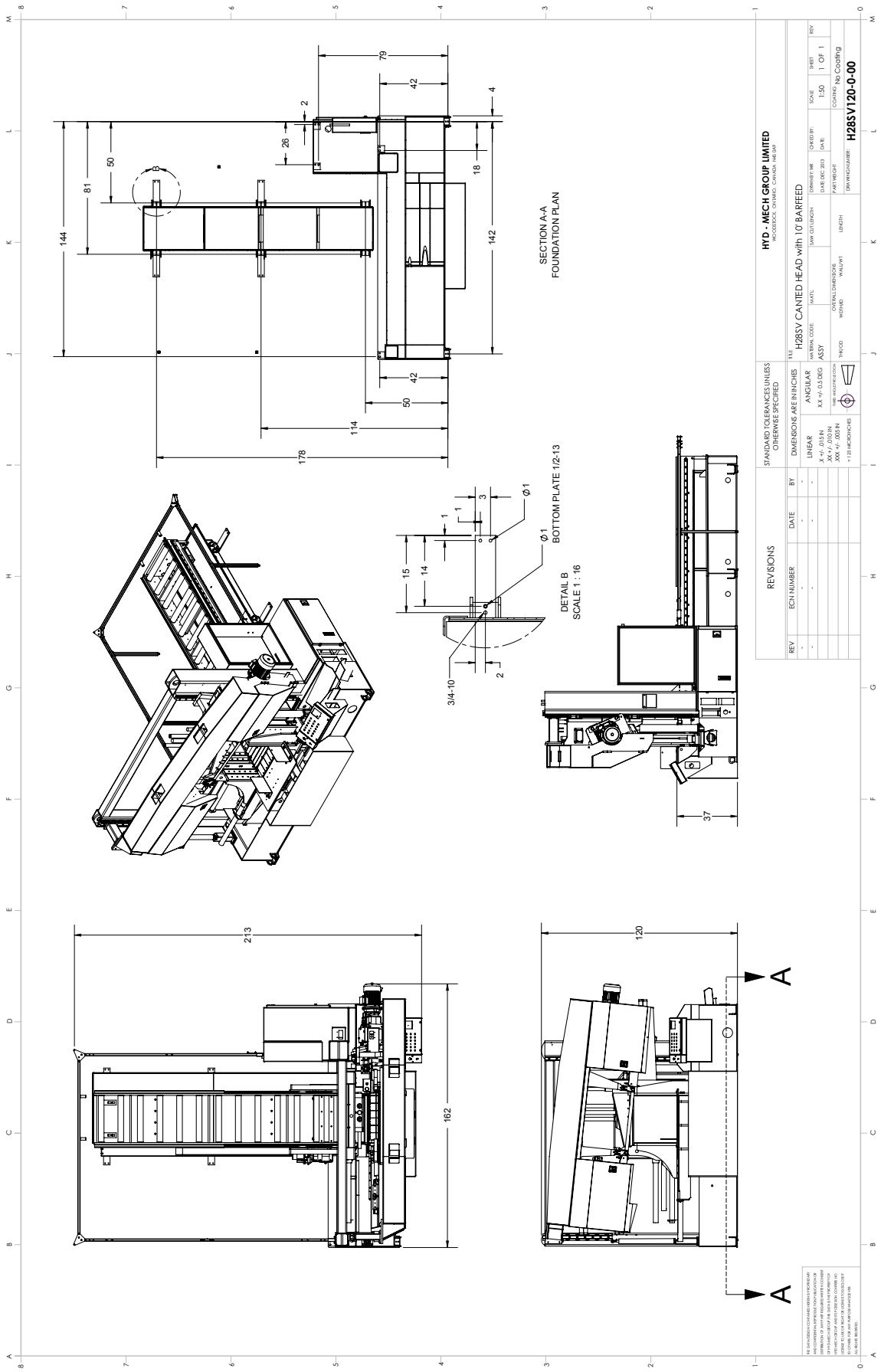
4. Use RETURN button to return to previous screen

SECTION 8 - SPECIFICATIONS

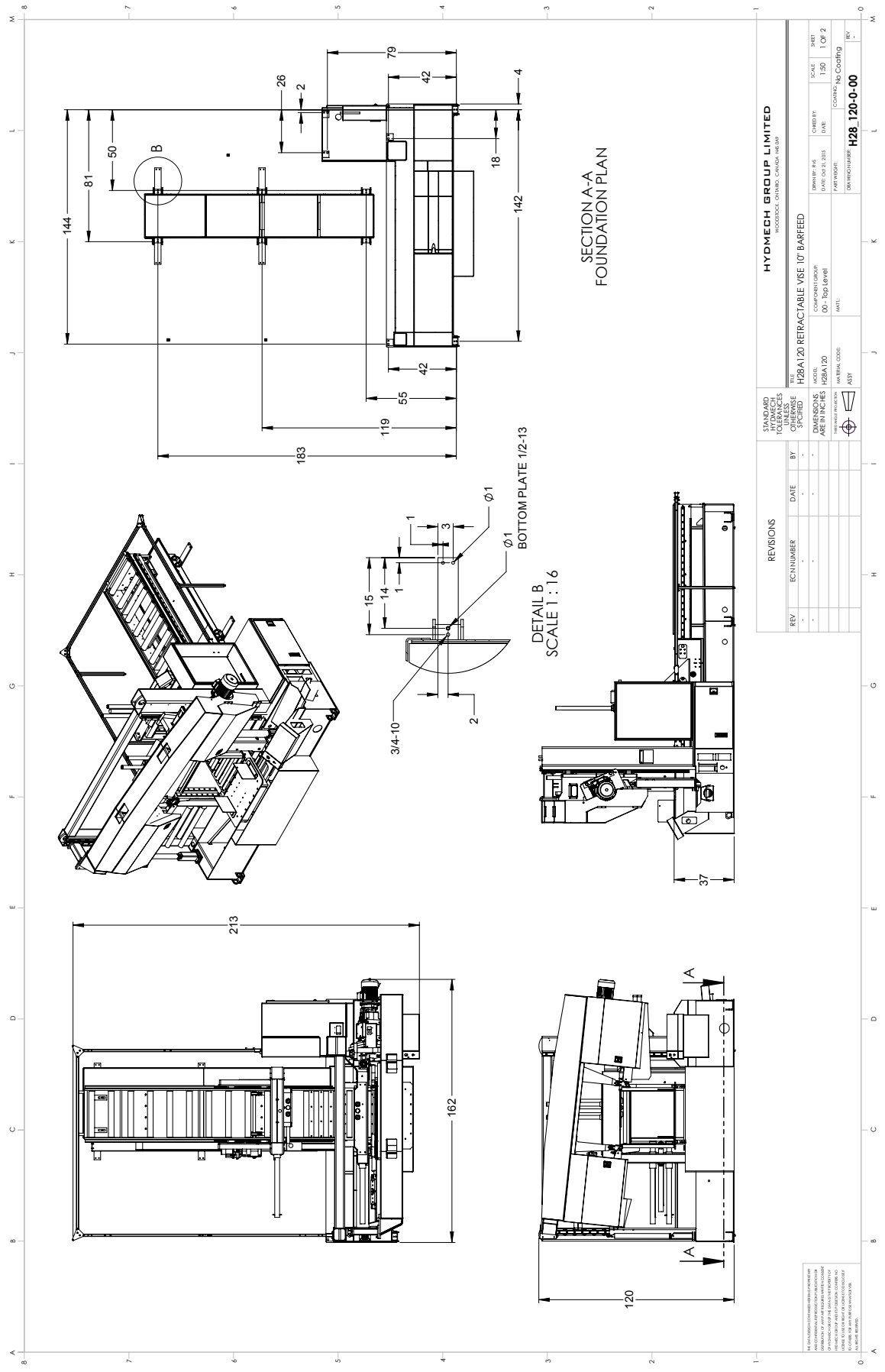
H28A-120 SPECIFICATIONS

Capacity	Round	28" (711mm)
	Rectangular	28" (711mm) wide x 28" (711mm) high
	6 Cant	24" x 28" (H x W)
Blade	Length	25'-0" (7620mm)
	Width	2" (51mm)
	Thickness	.063" (1.6mm)
Blade Tension	Hydraulic	
Blade Speed	VFD	40 - 300 sf/min (12 - 91.5 m/min)
Blade Guides	Carbide inserts (water soluble coolant lubricated)	
Blade Wheel Dia.	32" (813mm)	
Motors	Blade drive	10 HP (7.5 KW)
	Hydraulic pump drive	5 HP (3.7 KW)
Pumps	Hydraulic	6 1/2 U.S. Gal. / min (25 Liters/min) pressure compensated
	Coolant	3 1/2 U.S. Gal. / min (13.5 Liters/min)
Hydraulic Tank	9.5 U.S. Gallons (36 Liters)	
Coolant Tank	40 U.S. Gallons (151 Liters)	
System Pressure	1200 PSI (8266 kPa)	
Vise Control	Hydraulic	
Shuttle Stroke	0-32" (0-813mm) single stroke, multi-indexing capability	
Table Height	31" (787mm) or 37" (940mm) with 6º cant head	
Control Panel	Waist Height	
Machine Weight	24,000 lbs (10886 Kg)	
Maximum Workload	30000 lbs (13608 Kg)	
Overall Dimensions	161" (4090mm) Wide, 92" (2337mm) Long, 120" (3048mm) High	

H28A-120 BANDSAW LAYOUT



H28A-120 BANDSAW LAYOUT



SECTION 9 - WARRANTY

WARRANTY

Hyd·Mech Group Limited warrants parts/components on each new H28A-120 bandsaw to be free from failure resulting from defective material and workmanship under proper use and service for a period of two years following the date of shipment to the user. Hyd·Mech's sole obligation under this warranty is limited to the repair or replacement without charge, at Hyd·Mech's factory, warehouse, or approved repair shop any part or parts which Hyd·Mech's inspection shall disclose to be defective. Return freight must be prepaid by the user.

This warranty, in its entirety, does not cover maintenance items, including but not limited to lubricating grease and oils, filters, V-belts, saw blades, etc., nor any items therein which show signs of neglect, overloading, abuse, accident, inadequate maintenance, or unauthorized altering.

MOTOR, GEARBOX, PUMP, ELECTRIC COMPONENTS, VALVES, HOSES, FITTINGS, and any other items used in the manufacture of the H28A-120, but not originally manufactured by Hyd·Mech are subject to the original manufacturer's warranty. Hyd·Mech will provide such assistance and information as is necessary and available to facilitate the user's claim to such other manufacturer.

Liability or obligation on the part of Hyd·Mech for damages, whether general, special or for negligence and expressly including any incidental and consequential damages is hereby disclaimed. Hyd·Mech's obligation to repair or replace shall be the limit of its liability under this warranty and the sole and exclusive right and remedy of the user.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, WRITTEN OR ORAL, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

This warranty may not be changed, altered, or modified in any way except in writing by Hyd-Mech Group Limited

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