OPERATIONS & MAINTENANCE MANUAL

BIRG DO



The Rock Solid Solution

IN BANDSAW TECHNOLOGY



S-23P 2001, Rev e, 393395

THANK YOU,

On behalf of everyone at **HYD·MECH**, I would like to thank and congratulate you on your decision to purchase a **HYD·MECH** band saw.

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

To ensure you are maximizing the power and versatility of your new **HYD·MECH** band saw, please take the time to familiarize yourself and your employees with the correct operation and maintenance procedures as outlined in this manual.

We sincerely appreciate the confidence you have demonstrated in purchasing our product and look forward to building a long and mutually beneficial relationship.

Thank-you.

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SECTION I

INSTALLATION

SECTION I - INSTALLATION

SECTION 1, INSTALLATION

Upon delivery of your new S-23P 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 S-23P 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 BE ATTEMPTED ONLY 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 S-23P 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.
- *OPERATOR :* KEEP A SAFE DISTANCE FROM ALL MOVING PARTS ESPECIALLY THE BLADE AND VISES.
- *OPERATOR :* LOOSE CLOTHING AND GLOVES SHOULD NEVER BE WORN WHILE OPERATING THE SAW. COVER LONG HAIR.
- OPERATOR : STOCK SHOULD NOT BE LOADED ONTO THE SAW IF THE BLADE IS RUNNING.
- *OPERATOR :* LONG AND HEAVY STOCK SHOULD ALWAYS BE PROPERLY SUPPORTED IN FRONT OF AND BEHIND THE SAW.
- *OPERATOR :* NEVER ATTEMPT TO DISLODGE OR MOVE STOCK WHILE THE BLADE IS MOVING. TAKE THE TIME TO STOP THE SAW BLADE, REMOVE OBSTRUCTIONS, AND RESTART BLADE.
- OPERATOR: MUST WEAR EYE PROTECTION.
- *OPERATOR:* MAINTAIN PROPER ADJUSTMENT OF BLADE TENSION, BLADE GUIDES, AND BEARINGS
- OPERATOR: HOLD WORKPIECE FIRMLY AGAINST TABLE.
- OPERATOR: 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.

HYD·MECH

OPERATOR SAFETY, VISUAL INSPECTION

The operator should always make a visual inspection of the saw before operating. The following areas should be checked.



- 1. BLADE KEEP AWAY FROM MOVING BLADE!
- 2. VISE NEVER LOAD STOCK WITH BLADE MOVING!
- 3. HEAD WATCH FOR HEAD DESCENDING TO TABLE!
- 4. PIVOT CHECK FOR HEAD MOVEMENT BLOCKAGE!

LIFTING THE S-23P

The S-23P is shipped with a shipping pallet attached to the saw. When lifting the pallet with a lift truck make sure that the load is firmly balanced. The following photo shows a lift truck lifting the saw and pallet from the correct side. The pallet length dimension is 84". Minimum fork length of 72" is recommended to safely lift the pallet.

WRAPPED FOR SHIPPING

The S-23P is shrink-wrapped for shipping from our plant. Remove the wrapping from around the saw. Complete the inspection for signs of damage. The photo shows the floor mounting plates located at the





Lifting the packaged S-20 Series II with a lift truck.



Bolt holding the saw to the skid (4 places).

REMOVING THE SAW FROM SHIPPING SKID

Lift the right (drive) side of the saw as shown with a lift truck and place two blocks under the saw as shown. With a lift truck (fork length 5' min, rated for 2000lbs minimum), lift the saw from the skid at the FRONT of the machine as shown and place it where required.



Lifting the machine with a lift truck from the front of machine.



Blocks placed under the saw.



LEVELLING THE SAW

Use a machinist's level across the vise table to level the saw. Adjust the level with the levelling bolts supplied. Consideration should be given to the flow of the coolant as it returns to the coolant trough at the vise end of the saw. Levelling to give a small incline towards this area helps to ensure the coolant supply returns to the container.



HYDRAULIC OIL and TANK

The S-20P is supplied with a Texaco 46 hydraulic oil in the oil tank. Substitutes should be a 46 grade of hydraulic oil. See Section 3 for instructions on changing brands of oil. The oil tank should be topped up to the top line on the gauge . The oil pressure gauge indicates system pressure.



CUTTING FLUID

The S-23P uses a pump and reservoir to circulate the necessary cutting fluid to the blade for maximum blade life. Your saw blade supplier will be able to provide information to the cutting fluid products that are available for your needs. No cutting fluid (coolant) 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 manufacturer.



SPEED ADJUSTOR INSTALLATION

The speed adjustor is packaged seperately for shipping purposes and must be installed prior to connecting the power supply. Failure to do so will cause a safety hazard. Refer to page 6.44 for installation instructions.

POWER WIRING CONNECTIONS

When the machine has been anchored and levelled the power hook-up is the last installation step. In order to provide safe operation and to prevent potential damage to the machine, only qualified personnel should make the electrical connections. If the hydraulics do not register an immediate pressure rise,



and change the phase order. As supplied your new S-23P is set to run on three phase voltage. The supply voltage of the machine is shown on the serial plate attached to the front of the machine. Connection from the Main supply is made to L1, L2, L3, and ground terminals in the electrical control box as shown below.

Supply conductors should be rated for the current supplied and should be protected by time delay fusing rated for the amperage stated on the machine serial plate.

CHECK FOR: -Signs of damage to the electrical cables from shipping or installation. -Correct phase order - The blade should be running counterclockwise. (If the blade direction is wrong, any two lines should be reversed to correct)



Main power connections found inside the control box.



The power cable should be routed through the two holes found at the left end of the control box beside the motor power cable. A suitable strain relief should be used.



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SECTION 2

OPERATING INSTRUCTIONS

SECTION 2 - OPERATING INSTRUCTIONS

SECTION 2A, CONTROL CONSOLE

OPERATOR CONTROL CONSOLE

The operator control console provides the operator with all the controls necessary to operate the saw after the cutting angle has been set and the stock has been loaded and secured. All of the electrical control functions of the S-20P Series II or S-23P saw are provided to the operator from the control console which incorporates the manual control switches, the Sequencer controller, and the Head Up Limit setting knob. The hydraulic functions of the S-20P Series II / S-23P are controlled from the Hydraulic Feed Control unit. This unit is covered in detail in Section 2B of this manual - Saw Cutting Controls.

The manual control switches allow the operator to raise and lower the Head of the saw, turn the blade on and off, open and close the vises, move the shuttle, and turn the coolant supply on and off. The control switches are described by function on the following three pages



Manual Control Switches for Sequencer

The Sequencer controller provides the operator with the ability to operate the saw in automatic mode. Starting on page 2.12, this controller is described in detail.



Sequencer Controller



CONTROL OPERATIONS

TOP ROW



PLC SWITCH The PLC On/Off switch controls the power supply to the Sequencer controller. When the switch is ON, the controller is active for display in Manual Mode, and to set the saw operation cycles in Automatic Mode.



FIXED VISE SWITCH This switch has three positions, OPEN, HOLD, and CLOSE. It is disabled when the SEQUENCER is in AUTO. The FIXED VISE switch is active while the PLC switch is in MANUAL or NEUTRAL

OPEN: Opens the vise as long as it is held at OPEN.

HOLD: Holds the vise jaw in it's current position.

CLOSE: Closes the vise.



HEAD POSITION SWITCH The HEAD switch is a three position switch and is active only when the PLC switch is in MANUAL. When the switch is set to HOLD the Head will remain stationary. In the UP position the Head will rise until the UPPER LIMIT is met. In the Down position the Head will descend only if the Feed Rate control is set to a value greater than zero.



FEED FORCE PUSH-BUTTON The FEED FORCE switch is used ONLY for the hydraulic setup. Service personnel should contact the Hyd-Mech dealer for information and procedures.



CYCLE START PUSH-BUTTON The Cycle start is a single cycle start push-button that allows the operator to set up the next cut with the stock to be cut. With the mode switch in Auto, pressing Cycle Start will close the vise to hold the material. When the Blade is switched on the cycle starts and ends with Head up and vise open.



COOLANT SWITCH Has three positions ON, WASH, and OFF

- **WASH:** Coolant flows any time the machine is under power, permitting wash-down with hose line without running machine.
- OFF: No coolant flow.
- **ON:** The coolant flows only when the Head descends.



BOTTOM ROW



CONTROL FUSE The Control fuse is located in the fuse holder and is accessible by depressing the holder in and turning. The control fuse is used for protection of the control circuitry which operates at 120 volts. The fuse is rated for 5 Amps maximum at 250 volts.



MODE SWITCH The MODE switch is a three position switch.

The NEUTRAL position deactivates all other switches. The MANUAL position allows for manual control of the saw with all switches active. The AUTO position is used when the Sequencer controls cutting. Caution should be used when switching to AUTO mode as the cycle will run *WITHOUT* the BLADE running.



HYDRAULIC START PUSH-BUTTON The HYDRAULIC START button is an illuminated (green) PUSH-BUTTON switch which activates the Hydraulic system. This switch must be pressed and the hydraulic pump must start before the vises and head will respond to operator control.



STOP PUSH-BUTTON The STOP push-button is a safety switch which will stop all saw functions. The electrical control circuitry will be inactive with the exception of the SEQUENCER as it will be ready for the next job but the hydraulic system will shut off when this switch is depressed.



BLADE SWITCH The blade switch is used by the operator to start and stop the saw blade in all modes. In all cases, the HYDRAULIC system must be operating. The SEQUENCER will run a cycle *without* the blade running.



SEQUENCER OPERATION GUIDE



The Hyd-Mech Sequencer controller provides automatic single cycle operation of the S-20P Series II or S-23P. This single cycle operation consists of the closing of the vise when the Cycle Start push-button is pressed, and the start of the blade and Head descent when the Blade switch is turned to Start. When the cut is completed the Head returns to the Head Up limit position, the blade stops, and the vise opens. The number of cuts is recorded on the three digit **REQUIRED QUANTITY** display to a total of 999 cuts total. (Counter begins again at 001) In either the Automatic or Manual Mode the **BLADE SPEED** function displays the current blade speed as the blade is running.

ORDER OF OPERATION:

1. With the Mode Switch in the Manual or Neutral position, turn the Sequencer "On" with the PLC switch.

Do not press any of the keys on the Sequencer Display face as the PLC switch is turned on.

The displays will light, the Sequencer will do a brief self-test and within seconds be ready for operator input. For manual operation the blade speed will be displayed with the blade running.

2. Reset the displayed total of cuts by changing the numbers with the entering keys. The three digits permit up to 999 pieces to be cut before the total is reset. As each key is pressed the display immediately above it will count from 1 to 9.

3. Press the Hydraulics Start push-button and the hydraulic functions of Head movement and vise movement will be activated.





ENTERING KEYS



4. In the Manual mode the Head should be set at the required Head Up limit position. With the vise open the stock can be loaded and set in position for cut length. At this time the operator can close the vise in Manual mode to hold the stock.

5. Switching to Automatic mode and pressing the Cycle Start push-button will cause the vise to close if it is open and illuminate the push button.

6. The Blade switch must then be turned to Start and the cutting cycle begins. The blade will be turning and the Head will descend at the rate set by the Feed Rate knob. At the end of the cycle the blade stops and the head moves back up to the Head Up limit position that has been set. The vise will open when the Head is Up and the Cycle Start push-button light will go off.

7. The operator can then reposition the stock, press the Cycle Start push-button (which will light) and the vise will close. Starting the blade will begin the next cycle.

BLADE SPEED INDICATOR

The running blade speed is displayed on the Sequencer display face in either the Manual or Automatic Mode. The units measurement is factory set in Surface Feet Per Minute or Metric. This setting can be changed by a skilled operator. Contact Hyd-Mech Saws for assistance with this change.



SEQUENCER PARAMETER SETUP

The Sequencer program is factory set with settings that allow the saw to be accurately configured. These settings are available to be changed for different machine operation configurations.

To access the Parameter Settings:

- 1) Turn the Sequencer OFF with the PLC switch.
- 2) Hold down the entering key below the #INDEX.
- 3) Turn the Sequencer ON with the PLC switch.





Hold down key.

Turn switch to ON.

The displays will light, a brief program number message will appear for a brief instant and then the following will be displayed on the Sequencer face.



---- Continued ----



Parameter Options





0: Machine

1: Vise Open Delay Time



2: Blade Wheel Circumference



3: Blade Wheel Pulses/Revolution

Parameter Options Setting

The #INDEX display with the single digit is used to show which option is active and can be set. The Options are:



OPTION 0 : With option 0 there is only one setting. This function is the active option default when the

Parameter Setup is entered by holding down the #INDEX key as the PLC switch is turned ON.

SETTING: 004 This is the default setting for normal machine operation of the vise and cutting head.



OPTION 1 : With option 1 the vise open delay interval can be adjusted. For changes of this setting contact Hyd-Mech Saws as to the possible ramifications.

OPTION 2: With option 2 the Blade wheel circumference measured in feet, times a factor of ten (Example, for S-23P, 5 feet x 10 = 50), is entered into the program. This value is used to calculate and display the blade speed.



OPTION 3 : With option 3 the setting value is the number of pulses sent by the blade speed proximity sensor to the Sequencer for each revolution of the blade wheel. The setting for the S-23P is 320 pulses per revolution.

OPTION 4 : With option 4 the vise open time can be adjusted. For changes of this setting contact Hyd-Mech Saws as to the possible ramifications.



SECTION 2B, SAW CUTTING CONTROLS

This section has been prepared to give the operator the ability to set up the saw for most cutting situations. The saw is equipped with variable blade speed control 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 cut-off 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 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 Blade Changing in Section 3)
- 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 section 2B Saw Cutting Parameters: Step 2)
- 5. The proper blade speed must be selected. (see section 2B Saw Cutting parameters: Step 4)
- 6. The proper feed rate must be applied. (see section 2B Saw Cutting Parameters: Step 5)

VARIABLE SPEED CONTROL

Blade speed can be adjusted infinitely between 75 to 350 SFM (Surface Feet/Minute) (23 to 106 m/min). Adjustment should be made only when the blade is running. Clockwise rotation of the knob increases blade speed while counter clockwise rotation decreases blade speed.

It is recommended to occasionally run the speed adjustor through it's full range. This will help in maintaining the pulley system. It is also recommended that if the same speed is used for long periods, then a minor adjustment should be made,eg; 200 SFM should be run at 190 or 210 SFM for part of the time. This will help in reducing wear grooves and keep the speed adjustment smooth.



Speed adjustor



HYDRAULIC FEED CONTROL

The Hydraulic Feed Control is located adjacent to the drive wheel box. These controls allow independent control of Feed Force and Feed Rate.



Hydraulic Feed Control

CUTTING PARAMETERS CHART

A full size CUTTING PARAMETERS CHART is mounted on the drive door of the saw. The chart contains five steps for the operator to follow in order to achieve optimum performance of the saw.



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.

NOTES:

1) Both effective material width and guide arm width are used in setting the saw.

2) Guide arm width is the distance between the guide arms and is used in STEP 2.

3) 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" (200 mm).

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. FEED FORCE LIMIT should be set with the head in the down mode, according to the label.

CUTTING SOLIDS

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

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.



MAT'L WIDTH as % os CAPACITY

CUTTING STRUCTURALS

A reduced Feed Force Setting is used when cutting structurals:

For structurals, a blade finer than Optimum can be used for more efficient cutting.

If a finer than optimum blade is going to be used, Feed Force Setting should be reduced even further.

For OPTIMUM BLADE SELECTION, see STEP 3

BLADE	FF SETTING
OPTIMUM PITCH FROM STEP 3	20%
② PITCH FINER THAN OPTIMUM	0%

Material Width Chart



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.

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.



In our 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.

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.



Optimum Blade Speed Curves

In Example #1

- 8" (200mm) diameter #1045 Medium Carbon Steel solid bar is to be cut.

- On the graph above find the Medium Carbon Steel Curve which represents the optimum blade speeds for 1045 Carbon Steel.

- On the horizontal axis (effective material width axis) find number 8 which represents effective material width of an 8" (200mm) diameter solid.

- Find the point where a vertical line from 8" (200mm) intersects the Medium Carbon Steel Curve.

- From this intersection point run horizontally left to the vertical axis (optimum blade speed axis) and find the point marked "200".

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.

NO.	MATERIALS O	PTIMUM BLAD	E SPEED
		ft/min	m/min
1	5" (125mm) Dia Solid Carbon Steel	225	70
2	12" (300mm) I-Beam	290	90
3	4" x 4" (100 x 100mm) Rec Tube, 1/4" (6mm) Wal	1350 350	110
4	4"(100) 400 Stainless Steel	140	45
5	2" x 2" (50 x 50mm) Rec Tube 1/4" (6mm) Wall		
	Bundle 5 x 5pcs 10" x 10" (500 x 500mm)	325	100
6	3" x 3" (75 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 in the range 0 to 15 in/min (380mm/min). 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 Knob



For 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:

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

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

- 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.

--- Continued ----



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.

NOTE: Use the following chart when cutting solids. For structurals, see "CUTTING STRUCTURALS" in STEP 2.



Optimum versus 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 I	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	TEP 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 = <i>1.3in/min</i>	
	(reduced by finer than optimum blade pitch factor)	(45mm/min x .70= 31.5mm/min)	

EXAMPLE #3

Material	Bundle - Low carbon steel 2	Low carbon steel 2" x 2" Tube with 1/4" wall, 12 piece bundle	
	(50mm x 50mm wit	(50mm x 50mm with 6mm wall)	
	Dimensions - 6" x 8" (150mm x 2	00mm)	
STEP I	Effective Material Width: 5" (.6 X 8") 120mm (.6 x 200)		
STEP 2	Feed Force limit setting for 8" Diamete	r 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)	



SECTION 2C, MECHANICAL CONTROLS

HEAD SWING and BRAKE

An integral function of the S-23P is the ability to make mitred cuts at angles between 90° and 45°. The Head swing of the S-23P is easily changed to set a different cutting angle by first releasing the Angle Brake lever, and then manually moving the Head to the cutting angle desired. An angle scale with a pointer in clear view of the saw operator allows for accurate setting of the cutting angle.

The Angle Brake lever is then locked in position by forcing it into the down position. It should be noted that the angle brake should be locked into position whenever cutting with the saw. The photograph illustrates the Angle Brake in the locked position at 88°. To set the saw to the 90° position, the Head (in the fully down position) is moved until the frame meets the 90° stop bolt which is located on the vise post.



Head Swing Scale and Angle Brake (Locked)

HEAD UP LIMIT SETTING

The Head Up limit setting allows the operator to set the height that the Head will ascend to after a cut is completed. By adjusting this limit the operator can reduce cycle time as the Head does not need to fully ascend between cuts. The Head Up adjustment lever is located on the rear side of the head below the gear box as shown below. Raising the lever will shorten the distance the head will move. Lowering the lever all the way down will allow the head to travel to it's full height.



Head Up Limit Setting Lever

COOLANT FLOW

ON

The main coolant control is found on the control panel.



- WASH Constant flow. OFF
 - No flow
 - Coolant flows if the blade is running.

The S-23P 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 should flood 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.

The right guide arm provides a coolant flow through the flexible hose that can be pointed directly 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.

GUIDE ARM POSITIONING

The S-23P guide arms are adjustable to accommodate varying material widths. The guide arms should be adjusted as close to the material width as possible while still allowing the material to pass between them. This process of matching the guide arm width to the material size is important to optimize blade life.

To adjust the guide arms the locking handles are loosened and then the guide arms will slide on the main guide bar which holds them. To loosen the handle it should be turned counterclockwise and to retighten the handle, it is turned clockwise. The photo illustrates the guide arms with the handles in the locked position.



Guide Arms with Handles Locked (4 to 6 O'clock Position) **Carbide Levers in Tensioned** Position (Upright)

Guide Arm Handles

Carbide Tensioning Levers

SECTION 3

MAINTENANCE AND TROUBLE SHOOTING

SECTION 3 - MAINTENANCE AND TROUBLE SHOOTING

SECTION 3, MAINTENANCE and TROUBLESHOOTING

BLADE CHANGING PROCEDURE



NOTE: Wear gloves for protection from the sharp blade.

1. Open the Idler Wheel and Drive Wheel doors and swing the head to 45° as this will make it easier to grip the blade closer to both wheels.

- 2. Loosen the Blade Tensioner by turning counter clockwise.
- **3.** Loosen the carbide tension handles by turning counter clockwise 1/4 turn.

4. At the top of the head, the saw blade runs in a protective channel as shown below. Grip the blade at each end of this channel and twist the blade teeth down past the channel and slide the blade forward. Let the blade rest on the out feed table, then slide the blade down and out of the carbide guides.

Blade Removal from Top Blade Channel

5. Before installing the new blade, check that it measures 1.345" wide including the teeth. Some blade manufacturers supply blades that measure 1.25" including the teeth. In this case you may not be able to adjust the head down limit switch to complete the cut.

6. Your new blade will be in a coil. While wearing gloves, hold the blade away from yourself, twist the blade to uncoil it. Do not let the blade teeth bounce on the concrete floor as some damage may be caused.

7. Place the new blade in the carbide guides and then slide the blade over the wheels. The teeth should be pointing towards the drive side as they pass through the carbide guides.

8. With the blade in place, turn the tensioner handle clockwise until the large black washer contacts the stop bolt as shown on the previous page. This will set the blade tension correctly.

9. With the blade tension set, turn the two carbide locking handles clockwise to the locked position. Jog the blade a few rotations to check that the blade is not moving in or out on the blade wheels.







Blade Tensioner



BLADE CHANGING PROCEDURE, CONTINUED

9A. As the blade tracking will stay fairly constant, it should be checked occasionally as shown on the drive wheel tracking photo below. The blade teeth should protrude from .195" to .210" (5mm to 5.3mm) from the face of the blade wheels. If the tracking requires adjustment, follow the instructions below.

BLADE TRACKING ADJUSTMENT

10. First, inspect the blade wheels for wear or damage and repair as required. Blade tracking adjustment should always begin at the wheel where the tracking is farthest out of specification. Using the instructions below, adjust the worst wheel, jog the blade and recheck both wheels. Repeat this process until both wheels are within specification.



Checking the tracking.

10A. Idler Wheel Adjustment

The tracking is adjusted by regulating the "push" set screws and the "pull" hex bolts. Before making any adjustments, bolts "A & B" should be loosened but remain snug. This will allow easy movement for the slide assembly. It should be noted that most adjustments can be made with the "B & D" 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" adjustment, tighten bolts "A & B", run the blade and then check the tracking.



Tracking adjusting bolts & set screws.

10B. Drive Wheel Adjustment

On the wall behind the drive wheel are two adjusting bolt assemblies and two hex bolts. Loosen all four of them with a 3/4" socket and turn the larger hex head bolts 1/4 turn with a 1 1/8" socket and extension and then tighten the two bolts in the assemblies, then tighten the two hex bolts et the left. Turning the 1 1/8" bolts clockwise will pull the blade on to the wheel and turning counter clockwise will push the blade off. Each 1/4 turn will move the blade approximately .02".

11. Check the blade brush adjustment (next page) to be sure the blade is being cleaned properly.



Drive wheel tracking bolt assemblies.

BLADE GUIDE ADJUSTMENT

At the bottom of the guide arms are the carbide blade guide assemblies, the photo below shows the carbide locking handle. These assemblies will need to be adjusted occasionally as the carbide pads become worn. To adjust properly, follow this simple procedure. Loosen the hex nut on the locking handle with a 9/16 wrench and turn the handle clockwise until it rests against the coolant tap on the idler guide arm or the roll pin on the drive guide arm. Turn the set screw clock wise with a 3/16 allen key until tight and then loosen 1/8 of a turn and tighten the hex nut. This should put just enough pressure on the blade to permit you to push the blade down approximately 1/8".



Idler guide arm carbide locking handle in the locked position.

BLADE BRUSH ADJUSTMENT

The S-23P leaves the factory with the blade brush adjusted for maximum life of the brush. This setting places the ends of the blade brush wires so as to contact the blade at the bottom of the blade gullets. The plastic drive wheel that is driven by the drive wheel face should be held against the blade face with the minimum force that is necessary. As the blade brush wears it is necessary to periodically readjust it.

As shown, there are two springs on socket head screws holding the brush assembly against the blade. There is also an adjusting socket set screw with a hex nut on it. Loosen the hex nut with a 9/16" wrench and turn the set screw counter clockwise with a 3/16" allen key. This will move the brush closer to the blade. Adjust the set screw so that the brush cleans to the bottom of the blade gullets and tighten the hex nut.



Blade brush adjusting screw & hex nut.

ANGLE BRAKE ADJUSTMENT

The clamping force on the swivel brake can be adjusted to ensure that the Head is held securely and does not move during cutting. The brake handle should be adjusted so that it does not "bottom out" or hit it's movement limit, yet holds the head securely.

ANGLE BRAKE ADJUSTMENT PROCEDURE

STEP 1 Loosen locking cap screws "B" with a 1/4 allen key.

STEP 2 Tighten all 4 set screws "A" until snug with a 5/32" allen key.

STEP 3 Back out the "A" screws 1/4 of a turn.

STEP 4 Tighten the locking cap screws "B".

STEP 5 Swing the head to 45° and back to ensure that the head moves freely and does not bind on the pivot surfaces. Continue to step 6 if necessary.

STEP 6 Adjust the clamping force bolt "C" with a 3/4" wrench. If not tightened enough, the locking handle will "bottom out" and not hold the head firmly.



Angle Brake Adjustment Screws.



DRIVE BELT REPLACEMENT

The drive belt on the S-23P is a long life grooved belt. It should last for many of hours of operation and should rarely require replacement. See the BLADE DRIVE ASSEMBLY drawing on Pg 6.2.

HEAD DOWN LIMIT SWITCH

The Head down limit switch operates to cut power to the blade motor and the coolant pump motor when the Head has descended to the bottom of its travel. The Head is adjusted so that the blade will descend slightly past the level of the table. This setting is critical to ensure that the blade has cut fully through the stock. The Head Down Limit Switch is located inside the control panel on top of the head.

Adjustment of the limit switch is made by changing the position of the set bolt which is located inside the control panel. Lengthening the set bolt will cause the limit switch to activate sooner as the spring post meets the limit switch roller. Shortening the setting bolt by turning it into the shaft will lengthen the time before the Head limit switch is activated.



Head Down Limit Switch & Adjusting Bolt (inside control box)

LUBRICATION

The S-23P was designed to minimize the maintenance requirements. Moving assemblies and contact faces need lubrication on a regular schedule which would depend on the frequency of use. The lubrication requirements of the S-23P are primarily the saw pivot points which are equipped with grease fittings and metal to metal surfaces (S) that require lubrication to prevent wear and seizure, as shown on this page and page.



S-23P Front View - Surface Lubrication



Swivel Pivot pin fitting under dome cap.



Head horizontal pivot fitting.



Infeed Rollers



Spring Post & Cylinder Eye



Vise shaft grease nipples. S-23P has only one on the fixed vise.



Idler Way, 2 Grease fittings plus shaft and bearing assembly.


HYDRAULIC MAINTENANCE

There are only FOUR 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:

RSE-30-10
K-22001
921999
AE-10

2. OIL LEVEL & REPLACEMENT- 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. In general, if the oil level is maintained and the filter is changed as recommended, there is no need to change the oil unless there are visible signs of degradation such as;

> Rapid darkening of oil. Milky or hazy oil colour. Varnish or sludge formation. Burnt smell from the oil.

However, if the machine is exposed to extreme temperature variation and high humidity, then the oil should be changed every 2000 operating hours or at least once a year. To change the oil, it is necessary to drain the tank (a drain plug is found on the bottom of the tank) and fill it to 1/3 full level with the new oil, operate through several fully automatic cycles with the index set to full stroke and the head to full rise. Drain the tank again, and finally fill the tank with the new oil. Hydraulic tank capacity is approximately 8 US gallons.

Recommended replacement oils:	Chevron Esso Mobil Texaco Shell	AW Hydraulic Oil 46 NUTO H46 Mobil DTE 25 Rando HD 46 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 to 500 PSI (3263 kPa) and should not require further attention except precautionary observation at start-up and every few days thereafter.

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.



TROUBLE SHOOTING GUIDE

Most problems which may occur have relatively simple solutions which appear in this section. If the solution is not found here, contact the Hyd-Mech Distributor from whom you purchased your bandsaw. They have trained field service personnel who will be able to rectify the problem.

	PROBLEM		PROBABLE CAUSE		SOLUTION
1.	Saw is cutting out of	1a.	Blade worn.	1a.	Change blade.
	square vertically.	1b.	Low blade tension.	1b.	Reset blade tension.
		1c.	Blade guides.	1c.	Chek if guides worn.
		1d.	Excessive feed rate.	1d.	Check for the proper cutting parameters.
2.	Saw is cutting out of	2a.	Stock not square in vises.	2a.	Adjust accordingly.
	square norizontally.	2b.	Head not at 90 degrees.	2b.	Reset.
3.	Blade comes off	За.	Not enough blade tension.	За.	Tension blade.
	wheels.	3b.	Improper tracking.	3b.	Adjust.
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	5a.	Blade speed too fast.	5a.	Reduce.
	excessively.	5b.	Guide arms too far apart.	5b.	Adjust accordingly.
		5c.	Not enough blade tension.	5c.	Tension blade.
6.	Excessive blade	6a.	Excessive blade tension.	6a.	Reduce blade tension.
	breakage.	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 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 necessary





PROBLEM		PROBABLE CAUSE	SOLUTION		
9. Saw will not start.	9a.	Motor overload has tripped.	9a. buttor Depre trying which	Depress each of the overload ns located in the electrical box. essing one button at a time and to start the saw will indicate motor was overloaded.	
	9b.	Control circuit fuse has blown.	9b. 250 V blowc repea wiring	Replace the fuse with a 5 Amp /olt AG1 type fuse. Random outs may occur but a quickly ited blow-out points to an internal g fault.	
10.Saw starts but will not run after Start button has been released.	10. the ou switch	On machines so equipped, ut-of-stock or blade breakage limit n has been tripped.	10. blade	Reload with stock or remount	
11.Saw starts but no hydraulic functions.	11a. wrono to sav	If blade wheels run clockwise, g phase order in power connection v.	11a. two o	Stop immediately; reverse any f the 3 phase connections.	
	11b. l hydra	f pump is noisy cause may be low ulic oil level.	11b. oil. (S nance	Stop immediately, add hydraulic ee pg.3.28 hydraulic mainte- e.)	
	11c. separ	Pump-motor coupling has ated.	11c.	Adjust accordingly.	
12.Saw starts but only front vise functions.	12. "Neut	Mode Selector switch is in the ral" position.	12.	Select "Manual" mode.	
In Manual Mode					
13.Head will not rise.	13.	Head up limit is set fully down.	13. brack	Adjust head up limit switch et.	
14.No individual function will respond to its manual control switch.	14a. valve. functi electr	Observe pilot light(s) on relevant If pilot light related to inoperative on fails to light, problem is ical.	14a. respo switch opera on bo replac unit it togeth wiring manu functi Open vaves withd with a proble attent	In case of head function non- inse check the related limit hes. Limit switch levers should the freely and emit an audible click th depress and release. If not ce the switch. To check the switch self remove the switch lid and wire her the two terminals closest to the g port. If function now responds to al switch replace limit switch. If on still does not respond then. panel door to gain access to a. Remove coil retaining nut and raw problem related coil, replace it any other coil from the group. If the em remains it requires the tion of a qualified service person.	

HYD·MECH

	PROBLEM		PROBABLE CAUSE	SOLUTION			
		14b. functi the co from o	If pilot light related to inoperative on does light, problem may still be bil. If problem remains it may result dirt in the valve spool.	4b. shoul servic ble wi	Disassembly of hydraulic valves d be under taken only by qualified ce personel or those knowledgea- ith hydraulic components.		
15.	Head will not descend.	15a. pointe min.	Feed Rate Valve is fully closed - er is set on "0" or close to "0" in/	15a. clockv	Turn Feed Rate Knob counter wise to open valve.		
		15b.	Feed Force Limit is set too low.	15b.	Increase Feed Force Limit		
		15c.	Pointer is not adjusted .	15c. clocky pointe	Loosen pointer, turn knob wise until it bottoms; tighten er at "0".		
In Au	tomatic Mode	15d. (preve	Check for physical interference nting the the head from falling.	15d.	Remove obstructions.		
16.	Auto cycle will not start.	16. prese	Proper input or outputs not nt.	16. "on" s shoul	Check I/O led's, auto mode & hyd should light. Hyd enable output d light.		
17. before	Auto cycle stops e completion.	17. prese down	Proper input or outputs not nt. Possible problem at head up/ switche(s).	17. I/O's v	Run saw in auto and check for when cycle stops.		
18. work	Functions will not in Automatic cycle.	18. worki	Missing output for function not ng.	18. functi conne functi	Check output led for missing on. If led is on, check for lighted ector at directional valve for that on.		

TROUBLESHOOTING THE SEQUENCER

Removing the electrical control box cover exposes the electrical wiring of the S-20A Series II. The Sequencer Control Board as viewed from the rear is shown.

The INPUT LED's light when the condition is met. All of the inputs are optically isolated.

The OUTPUT LED's light when the program calls for an output relay to be energized except for head up which will have the "ON" DOWN led go off.

If the Blade Speed Proximity connections are disconnected, they must be replaced in the correct order.

Power from the transformer is protected by a .25 amp fuse.

HEAD HEAD SHTL SHTL AUTO HYD UP DOWN HOME BACK MODE "ON" LIMIT LIMIT LIMIT	FWD HDUP HYD FV-O FV-C SV-O REV DOWN ENAB FV-O FV-C SV-O "ON" "ON" HYD FXVISE SHVISE REV DOWN ENAB CLOSED CLOSED
BLADE SPEED PROXIMITY	
OV DC Signal NPN Open Collector + V DC	

SERVICE RECORD & NOTES

DATE	SERVICED BY	COMMENTS

HYD·MECH

SECTION 4

ELECTRICAL SYSTEM

SECTION 4 - ELECTRICAL SYSTEM

SECTION 4, ELECTRICAL SYSTEM

CONTROL PANEL & COMPONENTS

This machine has been built to the customers requirements, however, if any voltage changes are required, refer to the information on the following pages and then consult Hyd-Mech service department before implementing any changes. The following photos show the S-23P control panel layout.



The S-22P control panel.



The S-23P control panel layout.



ELECTRICAL COMPONENTS LISTS

LIST OF S22P_S23P SEQUENCER ELECTRICAL COMPONENTS							
Item Code as on S22P/S23P Schematic	Description	Part Number	Component Manufacturer				
1PB-Emergency Stop	Red mushroom head, spring return push button.	ZB2 BC4	Telemecanique				
Push Button	Mounting base with 1 N/C contact block.	ZB2 BZ102	Telemecanique				
2PB-Hydraulic Start	Green, illuminated, flush head push button.	ZB2 BW33	Telemecanique				
Push Button	Light module with 1 N/O contact block plus	ZB2 BW061	Telemecanique				
	130V (BA9s) light bulb.	SP105	Spectro				
3PB-Cycle Start	Amber, illuminated, flush head push button.	ZB2 BW35	Telemecanique				
Push Button	Light module with 1 N/O contact block &	ZB2 BW061	Telemecanique				
	130V (BA9s) light bulb.	SP105	Spectro				
1SS-Coolant Selector	Black, 3 positions, maintained selector switch.	ZB2 BD3	Telemecanique				
Switch	Mounting base with 2 N/O contact blocks.	ZB2 BZ103	Telemecanique				
3SS-Front Vise	Black, 1 position spring return from left to center &	7B2 B I7	Tolomoconiquo				
Selector Switch	1 position maintained to right s/s.	702 037	Telemecanique				
	Mounting base with 2 N/O contact blocks.	ZDZ DZ 103	relemecanique				
4SS-Head	Black, 3 positions, maintained selector switch.	ZB2 BJ3	Telemecanique				
Selector Switch	Mounting base with 2 N/O contact blocks plus	ZB2 BZ103	Telemecanique				
12SS-Blade	Black, 2 positions, spring return to center selector	ZB2 BD5	Telemecanique				
Start/Stop	switch. Mounting base with 1 N/O contact block &	ZB2 BZ105	Telemecanique				
Selector Switch	1N/C contact block						
13SS-Mode	Black, 3 positions, maintained selector switch.	ZB2 BJ3	Telemecanique				
Selector Switch	Mounting base with 2 N/O contact blocks plus 1	ZB2 BZ103	Telemecanique				
	N/C contact block.	ZB2 BE102	Telemecanique				
14SS-PLC On/Off	Black, 2 positions maintained selector switch.	ZB2 BJ2	Telemecanique				
Selector Switch	Mounting base with 1 N/O contact block.	ZB2 BZ102	Telemecanique				

LIST OF S22P_S23P SEQUENCER ELECTRICAL COMPONENTS						
Item Code as on S22P/S23P Schematic	Description	Part Number	Component Manufacturer			
Sequencer	Sequence controller with 'G' chip	SEQUENCER	O.E.S.			
3CR	Head down relay	CA2 DN22G6	Telemecanique			
10CR	AUTO relay with additional Auxiliary contactor	CA2 DN31G6 LA1 DN20	Telemecanique Telemecanique			
Hyd. Valve Connector	Hirschmann connector	H/927811311	Hirschmann			
1FU	Fuse holder 5A Time-delay fuse	BKHT B261 6CC5S	Buss			
1 L/S Head Up	Limit switch with roller lever	XCK P121	Telemecanique			
2 L/S Head Down	Limit switch with roller lever	XCK L115H7	Telemecanique			
P1 - Blade Speed	Proximity switch c/w washer & nut (NPN - N0)	DCA12/4608KS	Burgess-Saia			
Coolant Pump	Coolant pump 1 Phase /120 VAC	2E-NT	Little Giant			
	Coolant Pump Junction Box	SCEJB442	Selectric			
	Wire terminal 20-10 AWG	WK4/U	Wieland			
	Wire terminal 20-8 AWG	WK6/U	Wieland			
	Suppressor	SSQUENCHO1	Selectric			
	R-C Suppressor Quenchark	504M02QA100	Quenchark			
	Options					
Work Lamp	Work lamp 120 VAC	0618-3-AS	Moffatt			
3 L/S Blade Break	Limit switch with roller lever	XCK L115H7	Telemecanique			
26SS-Oil Heater Selector Switch.	Black, 2 positions maintained selector switch. Mounting base with 1 N/O contact block.	ZB2 BD2 ZB2 BZ102	Telemecanique Telemecanique			

S23P SEQUENCER POWER COMPONENTS for SPECIFIC VOLTAGES							
Description & (Item Code) as on schematic	MACHINE VOLTAGE						
	3ph 208V	3ph 240V	3ph 380	3ph 415V	3ph 480V	3ph 575V	
2HP HYDRAULIC M	IOTOR (1M) Fra	me Size 145TC,	1800 R.P.M.				
CONTACTOR (1M)	LC1D1210	LC1D1210	LC1D1210	LC1D1210	LC1D1210	LC1D1210	Telemecanique
OVERLOAD (1 O/L)	LR2D1312	LR2D1312	LR2D1308	LR2D1308	LR2D1308	LR2D1308	Telemecanique
MOTOR F.L.A. (1750 RPM)	6.1A	6A	3.5A	3.2A	ЗА	2.5A	
(3FU1 - 3FU3) FUSE PART # FUSE HOLDER PART #	15A T.D ATDR15 30310	15A T.D ATDR15 30310	8A T.D ATDR8 USM3	8A T.D ATDR8 USM3	8A T.D ATDR8 30310	6A T.D ATDR6 30310	Gould
5HP BLADE DRIVE	MOTOR (2M) F	rame Size 184T	C, 1800 R.P.M.				
CONTACTOR (2M)	LC1D1810	LC1D1810	LC1D1210	LC1D1210	LC1D1210	LC1D1210	Telemecanique
OVERLOAD (2 O/L)	LR2D1321	LR2D1321	LR2D1312	LR2D1310	LR2D1310	LR2D1308	Telemecanique
MOTOR F.L.A. (1750 RPM)	8.6A	8A	4.8A	4.6A	4A	3.5A	
(4FU1 - 4FU3) FUSE PART # FUSE HOLDER PART #	30A T.D ATDR30 30310	30A T.D ATDR30 30310	15A T.D ATDR15 USM3	15A T.D ATDR15 USM3	15A T.D ATDR15 30310	15A T.D ATDR15 USM1	Gould
CONTROL TRANSI	- FORMER (TR) 5	500 VA		•		•	
TRANSFORMER PART # (TR)	9070 T500D3	9070 T500D1	9070 T500D33	9070 T500D33	9070 T500D1	9070 T500D5	Square-D
PRIMARY FUSE FUSE PART # FUSE HOLDER PART # (2FU1, 2FU2)	10A Fast Acting, ATM10 USM1	8A Fast Acting, ATM8 USM1	6A Fast Acting, ATM6 USM1	6A Fast Acting, ATM6 USM1	5A Fast Acting, ATM5 USM1	4A Fast Acting, ATM4 USM1	Gould
SECONDARY FUSE FUSE PART # FUSE HOLDER PART # (1FU)	5A T.D ATDR5 USM1	5A T.D ATDR5 USM1	5A T.D ATDR5 USM1	5A T.D ATDR5 USM1	5A T.D ATDR5 USM1	5A T.D ATDR5 USM1	Gould



















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SECTION 5

HYDRAULIC SYSTEM

SECTION 5 - HYDRAULIC SYSTEM

SECTION 5 , HYDRAULIC SYSTEM

HYDRAULIC COMPONENTS LIST

The S-20P Series II hydraulic system does not require any special work on a new machine before its start-up. The hydraulic tank is filled with Texaco Rando HD46 hydraulic oil and all machine functions have been tested at the factory to ensure proper operation upon initial start-up.



Door Mounted Hydraulic Assembly

ITEM	QTY	S-22P PART NUMBER	DESCRIPTION
1	1 (not shown)	MAIN HEAD CYLINDER	S22A-C4-00A
2	1 (not shown)	VISE CYLINDER	S22A-C3-00H
3	1 (not shown)	POSITIVE DOWN FEED VALVE	DDF1-0-00
4	1	DIRECTIONAL VALVE	DCV3P-AB-T
5	1	DIRECTIONAL VALVE	DCV3P-AB-C
6	1	MANIFOLD BLOCK	MB2P
7	2	DOUBLE PILOT CHECK VALVE	DPCH-1
8	1	IN LINE CHECK VALVE	460-4M-4M
9	1	PRESSURE GAUGE (1000 psi)	PG-10
10	1	HYDRAULIC PUMP	HYP-1
11	1	SUCTION STRAINER	SS-100-00
12	1	RETURN FILTER	AE-10
13	1	HOSE KIT ASSEMBLY	AE-10
14	1 (not shown)	VISE PRESSURE REDUCING VALVE	S22A VVP OPTION KIT

CYLINDER ASSEMBLIES

Gland assemblies



CYLINDER DIAMETER	E D-RING RING	F BACKUP D-RING	G Gland	H LOADED U CAP	VIPER
2.0″	2-224	8-224	CS20-GL-01	1250-1125-250B	U-1125
2.5″	2-228	8-228	CS25-GL-01	1870-1125-312B	U-1250
3.0″	2-232	8-232	CS30-GL-01	1870-1125-312B	U-1250
3.5″	2-236	8-236	CS35-GL-01	2500-1500-375B	U-1500
4.0″	2-342	8-342	CS40-GL-01	2500-2250-375B	U-2250
5.0″	2-350	8-350	CS50-GL-01	2500-2250-375B	U-2250

Piston assemblies

SEAL CRUSS SECTIONS SEAL CRUSS SECTION D RING PISTON LOADER D RING				
CYLINDER DIAMETER	A TEFLON RING	B Loader D-ring	C PISTON	D D-RING
2.0″	TFE-52000	2-129	CS20-PS-01	2-114
2.5″	TFE-\$2500	2-137	CS25-PS-01	2-116
3.0″	TFE-\$3000	2-145	CS30-PS-01	2-116
3.5″	TFE-\$3500	2-151	CS35-PS-01	2-118
4.0″	TFE-\$4000	2-153	CS40-PS-01	2-124
5.0″	TFE-\$4500	2-157	CS50-PS-01	2-124





HYDRAULIC SCHEMATIC and PLUMBING DRAWINGS

HYD·MECH



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Pg 5.42 S22P



Pg 5.43 S22P

HAD·WECH

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SECTION 6

MECHANICAL ASSEMBLIES

SECTION 6 - MECHANICAL ASSEMBLIES



ITEM	QTY	S-23 PART NUMBER	DESCRIPTION
1	1	S22-45-01A	GUIDE ARM BAR
2	5	A1375 X.75	SOCKET HEAD CAP SCREW
3	1	.25X1	ROLL PIN
4	1	S23-45-02	IDLER ARM
5	2	S22-45-06	GUIDE ARM LOCKING HANDLE
6	2	S22-45-05A	CLAMPING PAD
7	1	S22-45-04	COOLANT NOZZLE COVER
8	2	SB119X.5	SOCKET BUTTON HEAD SCREW
9	2	S22-45-08	CARBIDE LOCKING HANDLE
10	6	30 C0750-040	DISC SPRING
11	2	S2375X1.75D	SOCKET SET SCREW, DOG POINT
12	2	3/8-24 JNUT	JAM HEX NUT
13	2	CRB-125-21-00	CARBIDE PLATE, FRONT
14	2	CRB-125-22-00	CARBIDE PLATE, REAR
15	2	CRB-TL-770	CARBIDE, TOP
16	2	F1312X.5	FLAT SOCKET HEAD SCREW
17	1	S23-45-03	DRIVE ARM





HYD·MECH

Pg 6.46 S23P 2001a

ITEM	QTY	S-23 PART NUMBER	DESCRIPTION	
1	1	184TC	5 HP, 1800RPM, SPECIFY VOLYAGE	
2	14	B1312X1	HEX HEAD CAP SCREW	
3	14	.312 LOC	LOCK WASHER	
4	10	.312 FLT	FLAT WASHER	s
5	1	S23-46-00A	MOTOR SEAT WELDMENT	n
6	1	HM4A	RENOLD GEAR BOX, 53:1	s
7	4	B3-12x30	METRIC HEX HEAD CAP SCREW	
8	4	M12 LOC	LOCK WASHER	a
9	1	S22A-411-00A	VSD INNER COVER WELDMENT	
10	4	B15X1	HEX HEAD CAP SCREW	F
11	4	.5LOC	LOC WASHER	tl
12	1	S22A-41-04	TARGET SPACER	tl
13	1	S22-41-01	PULSAR TARGET	v
14	1	B3-8x60	METRIC HEX HEAD CAP SCREW	
15	1	M8 LOC	LOCK WASHER	t
16	1	S22A-41-02A	OUTTER BOX SHELL	d
17	1	S22A-41-03	OUTTER BOX TACH COVER	(
18	2	B125x1.5	HEX HEAD CAP SCREW	
19	2	.25LOC	LOCK WASHER	
20	2	.25FLT	FLAT WASHER	
21	1	R150B	MECHANICAL PULLEY	
22	1	RF150	SPRING PULLEY	
23	1	28x800	DRIVE BELT	
24	1	RF150 ADJ	SPEED ADJUSTOR	
25	1	V18-44-01A	DRIVE WHEEL	
26	1	S23-44-02	DRIVE WHEEL SPACER	
27	1	WP-1-01	DRIVE WHEEL RETAINER	
28	1	B3-16x50	METRIC HEX HEAD CAP SCREW	
29	1	M16 LOC	LOCK WASHER	
30	1	WP-3-02	DRIVE WHEEL SPACER	

5 HORSE POWER DRIVE, speed adjustor installation, instructions and parts list.

The speed adjustor is packaged seperately for shipping purposes. Installation of the speed adjustor must be completed prior to connecting the power supply.

Remove the assembly from the coolant reservoir and remove the wrapping. Rotate the handwheel of the speed adjustor completely counter clockwise. Hold the assembly so that the speed clock decal faces you. Rotate the assembly until 75 suface feet per minute on the decal is positioned at the 12 O'clock position. Hold the cup of the speed adjustor assembly with one hand while rotating the body of the speed adjustor assembly until the needle alignes with 75 surface feet per minute at the 12 O'clock position. The assembly is now ready to be bolted to the outer cover of the variable speed drive housing using the four 5/16" x 3/4" hex head bolts (Item #2, B1-.312x.75).

HM4A GEAR BOX ASSEMBLY



HAD·WECH

IDLER WHEEL ASSEMBLY



ITEM	QTY	S-23 PART NUMBER	DESCRIPTION
1	1	H12-342-00	TENSION NUT WELDMENT
2	6	30 K2000-097	DISC SPRING
3	1	4462-00	THRUST BEARING
4	1	S22-42-04	STOP PLATE
5	1	S22-42-03A	BLADE TENSION COLLAR
6	1	S23-42-01	BLADE TENSION SHAFT
7	1	S22-42-02A	TENSIONER HANDLE
8	2	1993	1 3/8 BALL KNOB, 1/2 nc
9	1	V18-43-02C	IDLER WHEEL SLIDER TRACK
10	4	B15x2.5	HEX HEAD CAP SCREW
11	5	.5LOC	LOCK WASHER
12	8	S15x.75C	SOCKET SET SCREW CUP POINT
13	3	1610-B	STEEL GREASE FITTING
14	1	V18-43-01E	IDLER WHEEL CARRIER
15	1	S1375x.375C	SOCKET SET SCREW CUP POINT
16	1	B1625x2.5	HEX HEAD CAP SCREW
17	1	.625LOC	LOCK WASHER
18	1	S25-42-02A	IDLER SHAFT
19	1	W19-45-01	IDLER WHEEL
20	2	6309 2RS	BALL BEARING
21	1	M16-4-13	BEARING SPACER
22	1	HO-0393-PA	INTERNAL RETAING RING
23	1	WP-1-01	IDLER WHEEL RETAINER
24	1	B15x1.5	HEX HEAD CAP SCREW
25	1	B1375x1.75C	HEX HEAD CAP SCREW (head ground round & flat, slot cut in thread end)
26	1	3/8HXNUT	HEX NUT

BLADE BRUSH ASSEMBLY



ITEM	QTY	S-22 PART NUMBER	DESCRIPTION
1	1	S22-43-01B	SHAFT EXTENSION
2	1	W6440-4	BEARING
3	1	S20-925-03	POLYURETHANE WHEEL
4	1	5043	3" BLADE BRUSH
5	2	.5FLT	FLAT WASHER
6	1	.5-13HXNUT	HEX NUT
7	1	S125X.25-C	SOCKET SET SCREW, CUP POINT
8	2	TC 13	COMPRESSION SPRING
9	4	.375FLT	FLAT WASHER
10	2	A1375X3.5	SOCKET HEAD CAP SCREW
11	1	S1375X2.5	SOCKET SET SCREW, FLAT POINT
12	1	.375-16HXNUT	HEX NUT
13	1	S22-431-00A	BEARING PLATE WELDMENT





ITEM	QTY	S-23 PART NUMBER	DESCRIPTION
1	1	S23-2-01A	SPRING GUIDE
2	1	S23-2-02	COMPRESSION HEAD SPRING
3	1	CM8	ROD END
4	1	.5NF HXNUT	HEX NUT
5	1	S22-2-07	SPRING SUPPORT
6	1	.25X1.75	ROLL PIN
7	1	B15X1.5	HEX HEAD CAP SCREW
8	1	.5LOC	LOCK WASHER
9	1	.5FLT	FLAT WASHER



HYDRAULIC TANK ASSEMBLY (Less hoses)



ITEM	QTY	S-22A PART NUMBER	DESCRIPTION
1	1	S22A-611-00B	POWER PACK WELDMENT
2	1	S22A-61-01	OIL TANK LID
3	4	B1312x.75	HEX HEAD CAP SCREW
4	1	SNA2B/TO	OIL LEVEL/TEMPERATURE GAUGE
5	1	TFS-100-0-P	SUCTION STRAINER
6	1	SES-3-40-S-80	50 micron FILLER BREATHER
7	6	T119x.5	TRUSS HEAD MACHINE SCREW
8	1	CFIP-070B	1000psi PRESSURE GAUGE
9	1	0188-12-12	HOSE BARB FITTING (MNPT)
10	1	MP 100-E	90 deg ELBOW (FNPT-FNPT)
11	1	01HP-4	PIPE PLUG
12	1	SAF07-25-0	FILTER HEAD
13	1	MP 116-E	90 deg FITTING (MNPT-FNPT)
14	1	30182B-12-8	HOSE BARB FITTING (MNPT)
15	1	SF6520	10 micron RETURN FILTER



HYDRAULIC PUMP ASSEMBLY (Less hoses)



ITEM	QTY	S-22A PART NUMBER	DESCRIPTION
1	1	145TC	2HP, 1800 RPM, SPECIFY VOLTAGE
2	4	RB-220	RUBBER GROMMET
3	4	.312FLT	5/16" FLAT WASHER
4	4	.312HXNUT	5/16-18 HEX NUT
5	1	10692	7/8 LOVEJOY HUB
6	1	N075	LOVEJOY INSERT
7	1	10690	7/8 LOVEJOY HUB
8	1	6028	BELL HOUSING
9	6	B1375x1	HEX HEAD CAP SCREW
10	6	.375LOC	3/8" LOCK WASHER
11	1	PVQ-13-A2R-SE-1S-10-CM7	HYDRAULIC PUMP
12	1	0502-12-12	ADAPTER, 1 1/16 MNF-3/4 FNPT
13	1	MP-113-E2	3/4"x2 BMI PIPE NIPPLE
14	1	MP-100E	3/4" 90DEG. BMI ELBOW
15	1	0188-12-12	HOSE BARB-MNPT
16	1	0503-12-8	ADAPTER, 1 1/16"MNF-MJIC
17	1	3903-8-8	90 DEG. ELBOW, FNPT-FNPT
PIVOT LINK ASSEMBLY



ITEM	QTY	S-23 PART NUMBER	DESCRIPTION
1	1	S23-21-00A	PIVOT LINK WELDMENT
2	1	S22-2-01	PIVOT PIN
3	1	1627-B	PIVOT PIN GREASE FITTING, 1/4 NPT
4	1	S22-2-08	THRUST PLATE
5	1	S22-2-02B	SCALE SUPPORT
6	1	S22-2-05A	ANGLE SCALE
7	2	N125X.250	PRESS IN RIVET
8	2	A1375X1	SOCKET HEAD CAP SCREW
9	4	S1312X.75-C	SOCKET SET SCREW, CUP POINT
10	2	A1312X1	SOCKET HEAD CAP SCREW
11	1	S20-42-03	BRAKE SHOE
12	1	B15X3.5	HEX HEAD CAP SCREW
13	1	S22-22-00	BRAKE TONGUE WELDMENT
14	1	.5FLT	FLAT WASHER
15	2	.5LOC	LOCK WASHER
16	1	.5-13LOCHXNUT	LOCKING HEX NUT
17	1	S20-42B-02	BRAKE CAM
18	1	S20-423-B-01	BRAKE HANDLE
19	1	8470939	1/2" id BLACK TUBE
20	1	1993	1 3/8" BALL, 1/2" NC
21	1	B15X3.75	HEX HEAD CAP SCREW
22	1	S22-3-01A	HORIZONTAL PIN
23	2	SH-0150-PA	EXTERNAL RETAINING RING
24	2	TRB 2435	THRUST WASHER
25	2	A25X1.25	SOCKET HEAD CAP SCREW
26	1	.5-13HXNUT	HEX NUT





ITEM	QTY	S-23A PART NUMBER	DESCRIPTION
1	2	7.260X1X.125	WEAR RING
2	2	H2250	2 1/4" SHAFT WIPER
3	1	S22A-1-03	JAW GUIDE SHAFT
4	1	SH-0237-PA	2 3/8" EXTERNAL RETAINING RING
5	1	S22A-1-02B	CYLINDER MOUNTING PLATE
6	4	B1375x1	HEX HEAD CAP SCREW
7	4	.375LOC	LOCK WASHER
8	1	S22A-C3-00G	VISE CYLINDER
9	1	S22-1-01A	WEAR PLATE
10	19	F1312x.5	FLAT SOCKET HEAD CAP SCREW
11	1	S22A-1-01C	FRONT MOVABLE JAW
12	2	F175x2	FLAT SOCKET HEAD CAP SCREW
13	1	S23A-1-02	FRONT WEAR STRIP
14	1	S23A-1-03	REAR WEAR STRIP



COOLANT GROUP



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DOORS and COVERS



NOTE: When ordering doors or covers, specify label language.



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SECTION 7

OPTIONAL ASSEMBLIES

SECTION 7 - OPTIONAL ASSEMBLIES

SECTION 7, OPTIONS

WORK STOP



ITEM	QTY	S-22 PART NUMBER	DESCRIPTION
1	1	S22-G15-01	ARM
2	2	KHU-30	KNOB, 5/16-18X1 STUD
3	1	S22-G15-02	GUIDE BAR
4	1	S1375X2.25-C	SOCKET SET SCREW, CUP POINT
5	2	30 C0750-040	DISC SPRING
6	1	A1375X2.5	SOCKET HEAD CAP SCREW
7	1	.375-16HXNUT	HEX NUT
8	1	S22-G15-03	BAR
9	1	S22-G15-04	STOPPER
10	1	S22-G151-00	MATERIAL STOP WELDMENT



OVER HEAD BUNDLING

NOTES:

1) The relative speed of the bundling jaws and vise jaws can be adjusted with the needle valves at each cylinder. 2) The following steps will ensure the efficient operation of the Overhead Bundling. a) The material should be loaded into the machines vises and advanced to a position where a trim cut can be performed. b) Close the Fixed Vise until the Overhead 10~ Bundling Arm is slightly (1/32" to 1/64") above the material to be cut. ß Ð А c) Close the ball valve located on the Fixed Overhead Bundling 6 cylinder to lock the position of A the Overhead Bundling -1 Arm and then operate 11,12 as normal. 13 15 14 3-17 Ø -16

ITEM	QTY	S-22A PART NUMBER	DESCRIPTION
1	1	S22A-53-01	BUNDLING GUIDE SHAFT
2	2	F175x2	FLAT SOCKET HEAD CAP SCREW
3	1	S22A-C23-00	BUNDLING CYLINDER
4	2	SH-0237-PA	2 3/8" EXTERNAL RETAINING RING
5	4	F15x1.5	FLAT SOCKET HEAD CAP SCREW
6	1	F175x1.5	FLAT SOCKET HEAD CAP SCREW
7	1	S22A-53-02	WEAR STRIP
8	2	7.260x1x.125	2 1/4" WEAR RING (702 STRIP)
9	2	H2250	2 1/4" SHAFT WIPER
10	1	S22A-533-00A	BUNDLING FRAME
11	1	S22A-532-00A	BUNDLING ARM, FRONT
12	1	S22A-531-00A	BUNDLING ARM, SHUTTLE (SHOWN)
13	3	S125x.375C	SOCKET SET SCREW, CUP POINT
14	1	S22A-53-03	GUIDE PLATE
15	2	F1312x1	FLAT SOCKET HEAD CAP SCREW
16	1	S22A-53-04	BUNDLING KEEPER
17	3	F1375x1	FLAT SOCKET HEAD CAP SCREW



BLADE BREAKAGE

(STANDARD ON CE MACHINES)



WORK LAMP ASSEMBLY



30° MITRE CUTTING



Angle scale on the head swing pivot.

VARIABLE VISE PRESSURE



VVP control



VVP valve assembly



SECTION 8

SPECIFICATIONS

SECTION 8 - SPECIFICATIONS

SECTION 8, SPECIFICATIONS

SPECIFICATION LIST

Cutting	Capacity			
-	rectangular round	16" High x 18" Wide 15" diameter @ 45 ⁰		
Blade	length width thickness	15' 6" 1 1/4" (Actual measurment 1.350" including teeth.) .042"		
Blade speed		5 HP, 75 to 400 Surface Feet/Minute - Variable		
Blade guides		Carbide		
Blade wheel diameter		19"		
Motors		2 Horsepower - Hydraulic 5 Horsepower - Variable Speed Blade Drive		
Coolant pump		3.5 Gallons Per Minute		
Coolant reservoir		6 Gallons		
Table h	eight	31 "High		
Maximum Workload		5000 pounds		
Machine weight		2300 pounds		
Overall	Dimensions	81" Wide x 71" Long x 66" High		

LAYOUT DRAWINGS



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SECTION 9

WARRANTY

SECTION 9 - WARRANTY

SECTION 9, WARRANTY

Hyd-Mech Group Ltd. warrants each new S-23P bandsaw to be free from failure resulting from defective material and workmanship under proper use and service for a period of one year 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, of 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 S-23P, 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 MERCHANTABILI-TY 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 Ltd.

HYD-MECH GROUP 1079 Parkinson Road P.O. BOX 1030 Woodstock, Ontario N4S 8A4

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SEQUENCER PARAMETERS

NOTE: With the V.V.P. option parameter #1 is increased to allow vises to close.





OPERATIONS & MAINTENANCE MANUA & MAINT **ENANCE** PERATIONS MANUA & MA DNS ENAN ΙΔ Δ 8 S 1 **& MA** DNS **NA** Δ Ŀ. R $\vdash \Gamma$ Ŀ. Δ 8 S 8 out Rock Sollion X Black 8 8 1011 ŀ R,



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Through its twinned distribution channel of authorized dealers and factory representatives, HYD•MECH services a worldwide network of customers from its two state-of-the-art manufacturing facilities in Houston, Texas, USA and Woodstock, Ontario, Canada. Check out the full range of Rock Solid Sawing Solutions at www.hydmech.com

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