

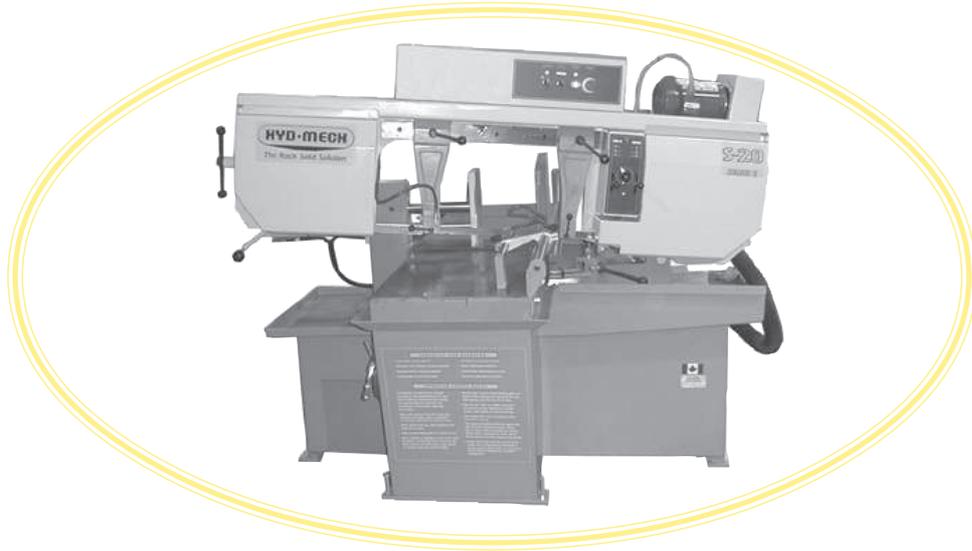
Our Rock Solid Promise

OPERATIONS &
MAINTENANCE
MANUAL

HYD·MECH

The Rock Solid Solution

I N B A N D S A W T E C H N O L O G Y



S-20H

2002, rev b, 393320

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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HYD-MECH

The Rock Solid Solution

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SECTION I

INSTALLATION

SECTION I - INSTALLATION

SPECIFICATIONS and INSTALLATION

Upon delivery of your new S-20 Series II 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. At the beginning and through out this manual there are precautionary indicators, these will inform you of areas which require special attention.

SAFETY PRECAUTIONS

The S-20 Series II 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.

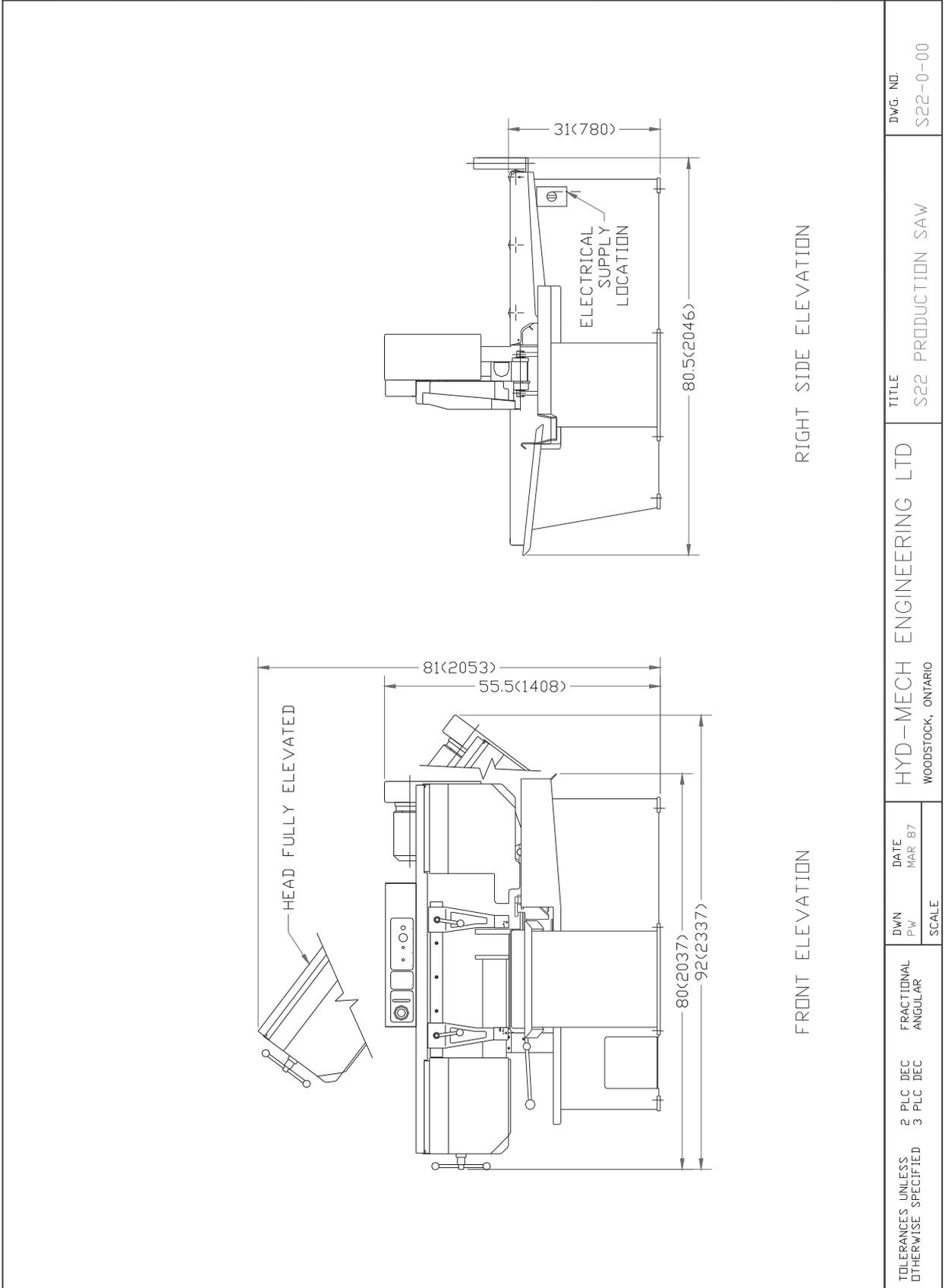
- POWER HOOK-UPS AND REPAIRS SHOULD BE ATTEMPTED ONLY BY QUALIFIED TRADESMEN.
- THE SAW SHOULD BE LOCATED IN AN AREA WITH SUFFICIENT ROOM TO SAFELY LOAD STOCK INTO THE SAW. SECURE THE SAW TO THE FLOOR.
- THE AREA AROUND THE SAW SHOULD BE MAINTAINED IN A CLEAN AND TIDY CONDITION TO AVOID OBSTACLES OPERATORS COULD TRIP OVER.
- THE S-20 SERIES II 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 BEARING SURFACES.
- OPERATOR: HOLD WORK PIECE 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.

SPECIFICATIONS

	IMPERIAL DIMENSIONS	METRIC DIMENSIONS
Cutting Capacity		
rectangular	13" High x 18" Wide	325mm x 450mm
round	12" dia @ 45 deg	300mm dia @ 45 deg
Blade		
length	13' 6"	4115mm
width	1 " (1.075" including teeth)	25mm (27.3mm including teeth)
thickness	.032"	0.8mm
Blade speed (with 50Hz, 1450 RPM motor)		
Standard step pulley	90/140/220/310 SFM	22/34/58/90 m/min
Variable speed option	65 to 330 SFM - Variable	22 to 122 m/min - Variable
Blade guides	Carbide Inserts	
Blade wheel diameter	16"	400 mm
Motors		
Standard	2 HP	1.5 kW
Variable Speed Option	3 HP	2.2 kW
Hydraulic Drive	1/4 HP	0.2 kW
Hydraulic	Optional - Micro Powerpack gear pump	
Coolant pump	2.4 US Gal/min	9 L/min
Coolant reservoir	6 Gallons	23 Litre
Table height	30 " High	762 mm
Machine weight	1800 pounds	810 kg
Overall Dimensions	80" W x 80.5" L x 55.5" H	2037mm W x 2046mm L x 1408mm H

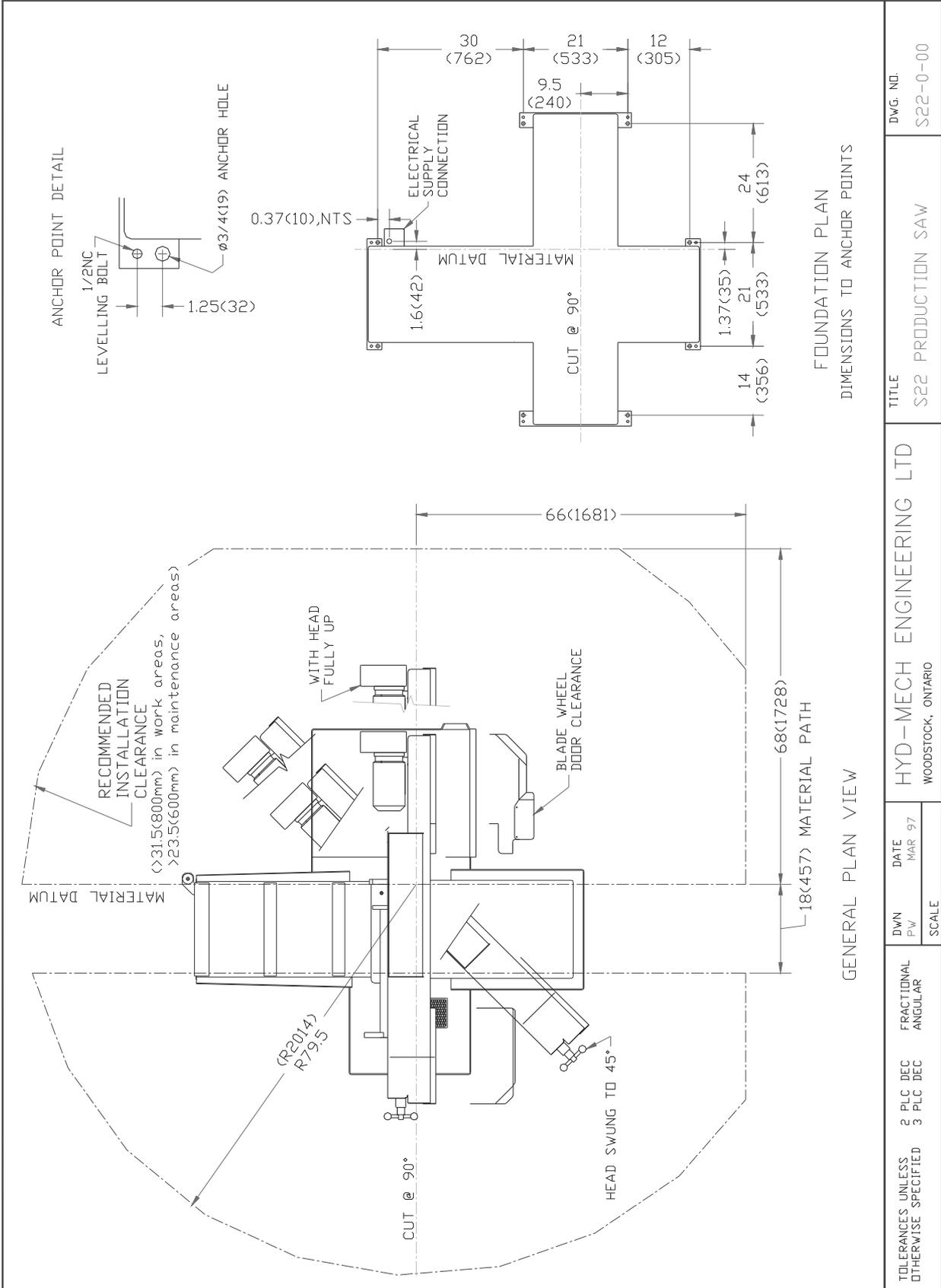
LAYOUT DRAWINGS



RIGHT SIDE ELEVATION

FRONT ELEVATION

TOLERANCES UNLESS OTHERWISE SPECIFIED	2 PLC DEC	FRACTIONAL ANGULAR	DWG. NO.	S22-0-00
	3 PLC DEC		TITLE	
DWN PW	DATE MAR 87	HYD-MECH ENGINEERING LTD WOODSTOCK, ONTARIO		
SCALE				



TOLERANCES UNLESS OTHERWISE SPECIFIED	2 PLC DEC 3 PLC DEC	FRACTIONAL ANGULAR	DWN P.W SCALE	DATE MAR 97	HYD-MECH ENGINEERING LTD WOODSTOCK, ONTARIO	TITLE S22 PRODUCTION SAW	DWG. NO S22-0-00
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LIFTING THE S-20 SERIES II

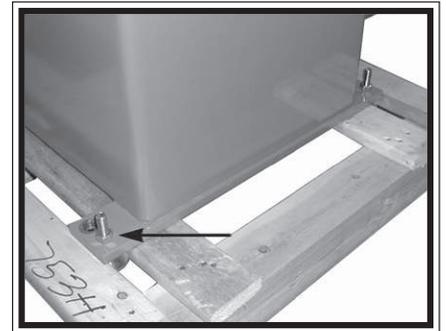
The S-20 is shipped with a shipping pallet attached to the saw. When lifting the pallet with a forklift truck make sure that the load is firmly balanced. The following photo shows a lift truck lifting the saw and pallet from the correct side. The pallet length dimension is 87" (213cm). Minimum fork length of 72" (182cm) is recommended to safely lift the pallet.

WRAPPED FOR SHIPPING

The S-20 Series II 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 corners of the saw. Undo the bolts that hold the saw to the pallet. Retain these bolts to use for levelling. The larger diameter hole is used for retaining during shipping and for use with concrete floor anchors. The smaller diameter, threaded holes at each corner are used for levelling the saw properly.



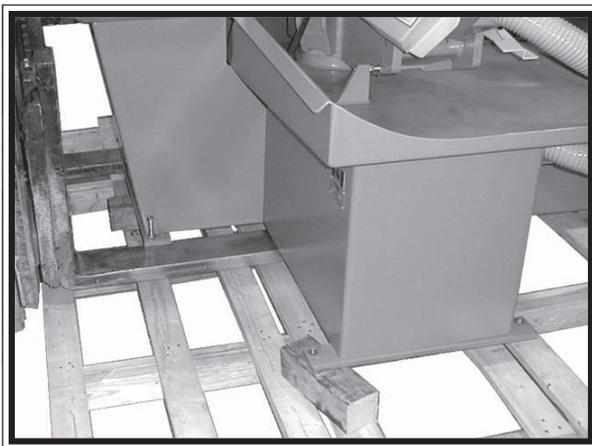
Lifting the packaged S-20 Series II with a lift truck.



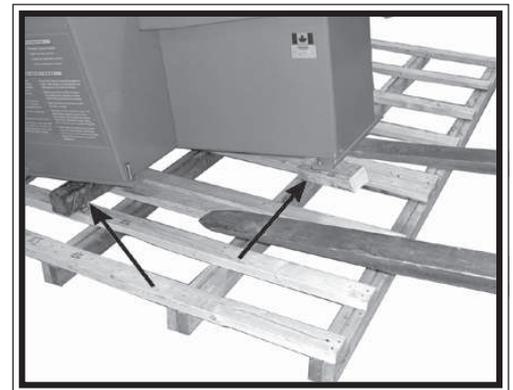
Bolt holding the saw to the skid (4 places).

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 60" (150cm) and rated for 1800lb (810kg) minimum), lift the saw from the skid at the FRONT of the machine as shown and place it where required.



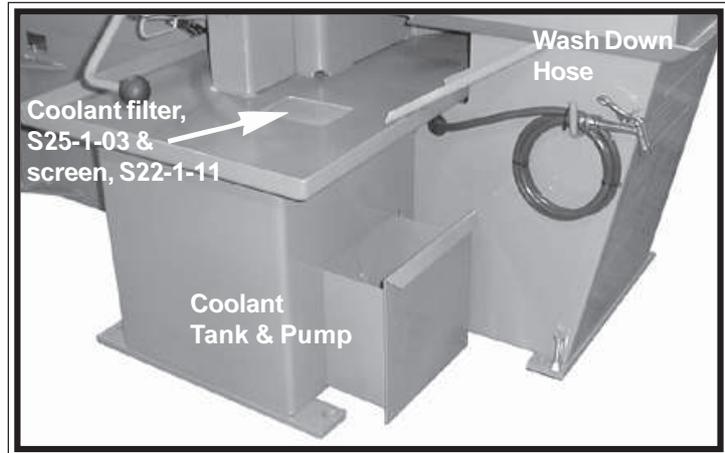
Lifting the machine with a lift truck from the front of machine.



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.



Coolant components (Shown with tank removed).

HYDRAULIC OIL

The S-20H option is supplied with Texaco Rando HD46 hydraulic oil. Substitutes should be a #46 hydraulic oil. The power pack and tank is mounted on the inside of the door found at the idler side of the infeed table. The tank should be at least 3/4 full at all times.



Hydraulic tank filler cap is found near the pump & motor assembly.

The power pack with the door opened.

CUTTING FLUID

The S20 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.

POWER CABLE ROUTING



The main power cable can be routed up through the bottom of the head frame to the access holes in the end of the control panel. Cable liqueid tight reliefs should be used to secure the cable into the control panel to ensure there is no movement of the cable when the machine is operated.



POWER WIRING CONNECTIONS

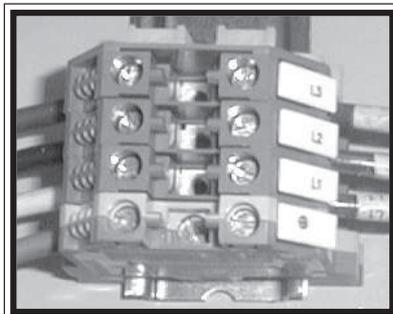
When the machine has been anchored and levelled the power hook-up is the last installation step. In order to provide safe operation and to prevent potential damage to the machine, only qualified personnel should make the electrical connections.

As supplied your new S-20 Series II is set to run on three phase voltage or single phase. The supply voltage of the machine is displayed on the Serial # Plate and the Voltage Label.

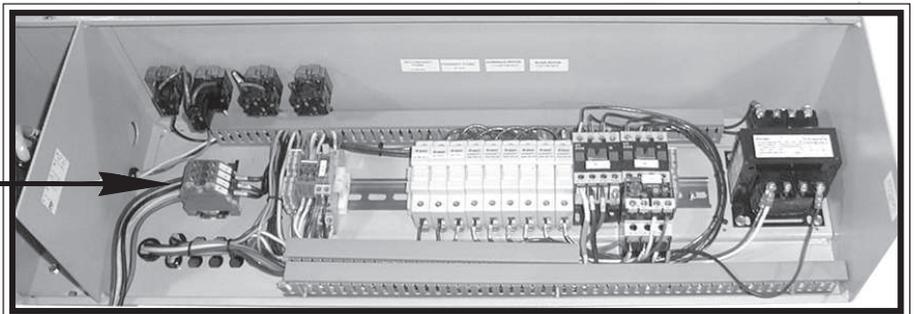
Connection from the Main supply is made to L1, L2, L3, (or L1 & L2 for single phase) and Ground terminals between the contactor & transformer.

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 counter clockwise.
- (If the blade direction is wrong, two lines should be reversed to correct)



L3, L2, L1 and Ground



The S-20, with "H" option control panel, opened.

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SECTION 2

OPERATING INSTRUCTIONS

SECTION 2 - OPERATING INSTRUCTIONS

OPERATING INSTRUCTIONS

OPERATOR CONTROL PANEL

The operator control panel 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 functions are operated from the control panel. The Vise and Feed Rate setting are both controlled with the hydraulic controls shown on the next page.

ELECTRICAL CONTROLS

COOLANT SWITCH
ON : Coolant flow when blade is running.
OFF : No coolant flow.
WASH : Constant flow.

HYDRAULIC BUTTON
This button will start the hydraulic START Button, system. It will illuminate when pressed and held momentarily.



BLADE SWITCH
This selector switch starts and stops the saw blade. The blade will not start with the Head in the down position.

EMERGENCY STOP BUTTON
Pressing the red EMERGENCY STOP Button will turn OFF all machine functions with the exception of the coolant if the selector switch is in the WASH position.

WISE CONTROL

OPEN The vise will open when the lever is pushed up.

HOLD The vise will hold it's position when the lever is in the center position.

CLOSE The vise will close when the lever is pushed down.

NOTE: See page 14 if the bundling option is present.



HEAD CONTROLS

UP The head will rise as long as the lever is pushed up.

HOLD The head will stay at it's current position when the lever is in this position.

DOWN The Head will descend at set Feed Rate.

FEED RATE DIAL The speed at which the head will descend can be set on the scale of 1 to 10. As the number increases so does feed rate.

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 the newer technology blades. Variable pitch (following page), bi-metal blades (like the 3/4 or 4/6 bi-metal blade supplied with the machine) last much longer, cut faster, and more accurately than the 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. 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 and accuracy, and improve expected blade life.

1. A new blade must be properly "broken-in". Proper break-in will alleviate blade vibration, improve surface finish and accuracy, and extend blade life. The most convenient way to do this is to cut the intended work-piece, at the standard recommended blade speed for that material, but with the feed rate reduced to about 25% of normal. Near the end of the first cut, increase the feed rate again, and once again when the blade approaches the end of the second cut. Keep increasing feed rate in this fashion, so that normal feed rate is reached after 300 to 500 sq. cm of cutting.

2. Generous coolant application is essential with almost all materials. A high quality and well mixed coolant will dramatically extend blade life, and will increase cutting rate and surface finish. On those few materials where coolant is undesirable, 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. Stock movement during cutting will strip blade teeth. Noticeable stock vibration reduces cutting performance and blade life - consideration should be given to reorientation of the stock, or additional clamping measures (e.g. wood between vise jaws and work-piece).

4. The proper blade speed for the work-piece material must be selected.

Use the following chart as a starting point.

- Blade speeds higher than recommended will quickly dull the blade. Blue chips are evidence of excessive blade speed.

- Lower than recommended speeds will not prolong blade life, and will require reduced feed rate - but reduced speeds may be helpful in reducing vibration, and will increase blade life in that case.

5. The proper feed rate must be applied. Feed Rate is the speed which the head "free-falls", and is set with the feed rate control knob. The head will descend more slowly when the blade encounters the work-piece but the force of the blade on the work will not be changed unless the setting is changed. Verification of proper feed rate is provided by the appearance of the cut chips which ideally form nicely curled "clock springs". (Note that cast irons, and interrupted cuts result in short, broken chips even at ideal feed rates).

- Excessive feed rate will result in short blade life and/or crooked cuts.

BLADE BASICS - CUTTING SPEEDS FOR VARIOUS MATERIALS			
	Blade Speed (in SFM)	Coolant Required	✓
Free Cutting Steels			
1100 & 1200 Series	310	YES	✓
Low&Medium Carbon			
1008 - 1045	220	YES	✓
High Carbon Steels			
1046 - 1095	140, 220	YES	✓
Alloy Steels	140, 220	YES	✓
Tool Steels	90, 140	YES	✓
Pipe & Structurals	140, 220	YES	✓
Nickel Base Alloys	90, 140	YES	✓
Copper Base Alloys	140, 220	YES	✓
Stainless Steels			
430F,416,420F,303	140, 220	YES	✓
Cast Iron	140, 220	NO	
		Oil Blade	

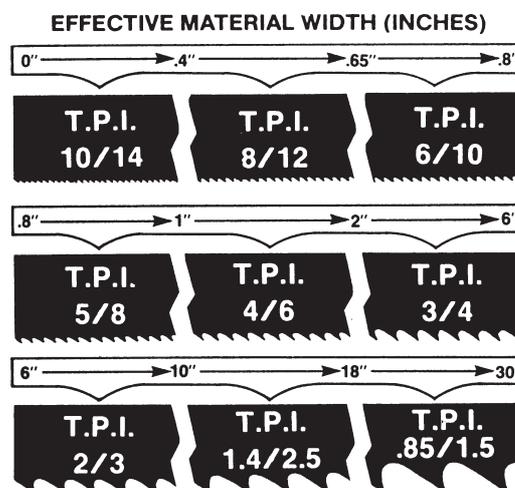
Blade Speed Selection Chart

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. See the sketch below 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.



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

BLADE SPEED SELECTION

The blade speed of the S-20 can be changed between four different speeds. The speed is determined by the ratio of the pulleys that drive the V belt. The four pulley sets give the optional speeds of 90, 140, 220, and 310 Surface Feet Per Minute.

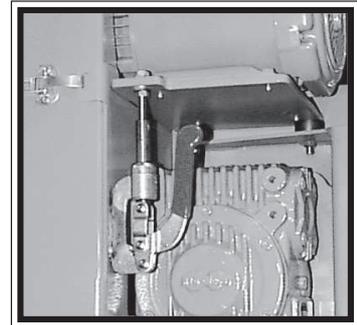
The label shown to the right is found on the rear side of the head near the drive motor.

APPROXIMATE BLADE SPEED

Ratio	1	2	3	4
Ft/Min	90	140	220	310

CHANGING BELT POSITION

To change the blade speed of the S-20 it is necessary to release the V belt tension and move the V belt to another set of pulley grooves. The tension on the V belt is maintained by means of a toggle handle assembly that moves the motor. As the handle is moved to its locking position the motor is driven tight against the V belt. The toggle handle can be adjusted to change the effective tension on the V belt by setting the lock nuts which mount the handle to the motor mount plate. The motor mount plate pivots on rubber bushings that support the motor.



Drive belt tensioning lever.

VARIABLE SPEED CONTROL OPTION

Variable blade speed can be adjusted infinitely between 65 and 330 SMM. 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.

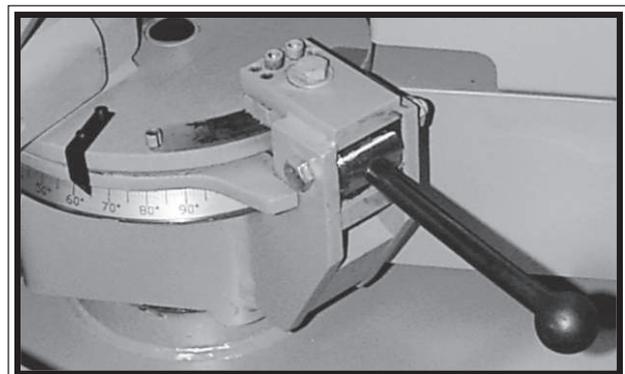
It is recommended to occasionally run the speed adjustor through it's full range. This will help in maintaining the pulley system. It is also recommended that if the same speed is used for long periods, then a minor adjustment should be made, eg; 200 SFM should be run at 190 or 210 SFM for part of the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



Variable blade speed adjustor.

HEAD SWING and BREAK

An integral function of the S-20 is the ability to make mitred cuts at angles between 90° and 45° (or 30° optional). The Head swing of the S-20 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 photo illustrates the angle brake in the locked position at 65°. 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 in the coolant tray at the drive end of the head.



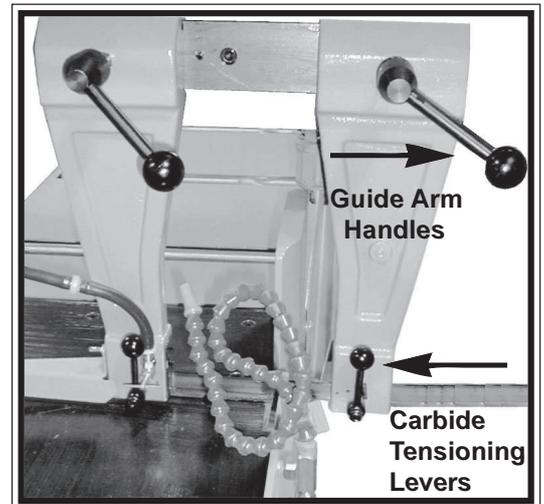
Head swing scale and angle brake (locked).

GUIDE ARM POSITIONING

The S-20 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 spacing to the material size is important to optimize blade life.

To adjust the guide arm spacing the locking handles are loosened by turning them counter clockwise. The carbide locking lever is then moved in the counter clockwise direction so that the carbides release the blade. The guide arms will then slide on the main guide bar which supports them.

To tighten the guide arm, the handle is turned clockwise until the handles are in the Locked position (4 to 6 o'clock) as illustrated in the photo. The carbide locking lever should be moved to the upright tensioned position.



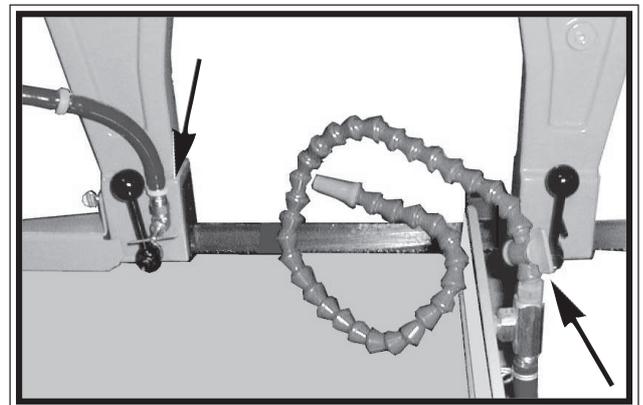
Guide Arms with Handles Locked (4 to 6 O'clock Position) and Carbide Levers in Tensioned Position (Upright)

COOLANT FLOW

The S-20 bandsaw is equipped with two needle valves that independently control the coolant nozzles which are capable of supplying a generous flow of coolant to the blade.

The left (idler) guide arm nozzle 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 valve on the left guide arm should be set to a higher flow as a higher blade speed is used to provide the flood of coolant necessary.

The right (drive) guide arm provides an adjustable coolant flow through the needle valve and the flexible hose nozzle 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.



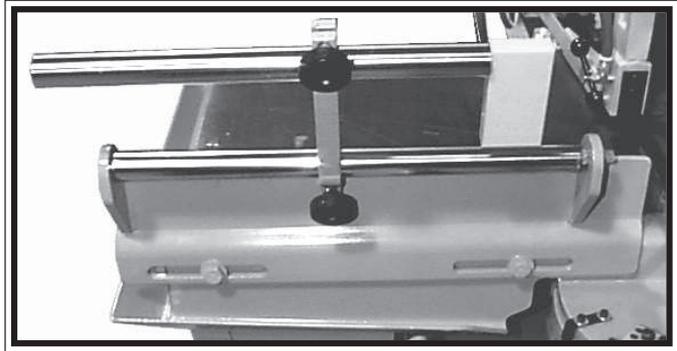
Coolant Valves on the Guide Arm and Fence.

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.

OPTIONAL CONTROLS

WORK STOP

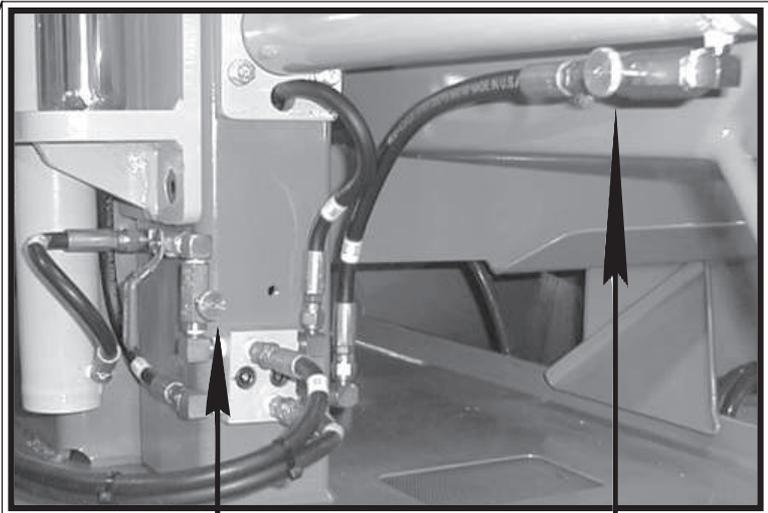
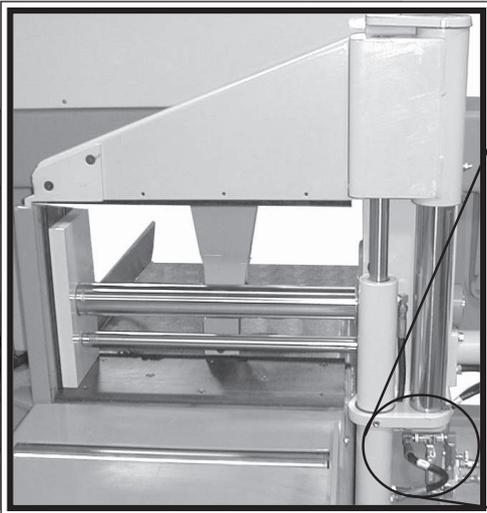
The work stop is used to set a consistent cut length from 0 to 40". The photo shows the stop at a short length which is adjusted with one or both of the locking handles. The bar with the actual stop attached to it can be removed, turned 180° end for end, and inserted for longer lengths. The work stop can also be swung out of the work area when it is not required.



HYDRAULIC BUNDLING



The bundling is used to hold a number of stock bars, tubes or other shapes which must be held more securely when cut than a square or rectangle shape. The bundling vise is activated and released with the vise control lever. There are also flow control valves with which the timing of the vise and bundling can be varied so they do not close at the same rate. These flow control valves are located on the left (idler) side of the machine as shown in the photos.



Bundling flow control valve.

Vise flow control valve.

VARIABLE VISE PRESSURE



Some materials require that the vise pressure be reduced to prevent the stock from having its shape distorted. This can be accommodated with the knob on the power pack door located on the left (idler) side of the machine. The pressure should be returned to the full pressure of 550 psi (3789kPa) whenever reduction is not necessary. Failure to do may result in damage to the material, machine and personnel.



VVP control

SECTION 3

MAINTENANCE AND TROUBLE SHOOTING

SECTION 3 - MAINTENANCE AND TROUBLE SHOOTING

MAINTENANCE AND TROUBLE SHOOTING



Switch off before beginning work.

- The emergency switch, which is used to turn the hydraulics off, should not be the only means of shutting the power off before cleaning or performing maintenance to the machine. The main power disconnect should be switched off and locked.
- When performing maintenance on the electrical system the main disconnect, which supplies power from the electrical service to the machine, should be switched off.
- Allow three minutes after turning off the power from the main electrical service to the saw before opening any electrical enclosures. Your machine might be equipped with a variable frequency drive unit which stores electricity inside it's capacitors which require a minimum of three minutes to completely discharge.

LOCK -OUT

Purpose:

To prevent injury to workers caused by unexpected start-up of machines being worked on.

OR

Where the starting of a machine or device may endanger the safety of a worker.

a) Control switches or other control mechanisms shall be locked out;

AND

b) Other effective precautions necessary to prevent such starting shall be taken.

LOCK OUT PROCEDURE

Whenever work is to be performed on a machine, the following steps shall be taken:

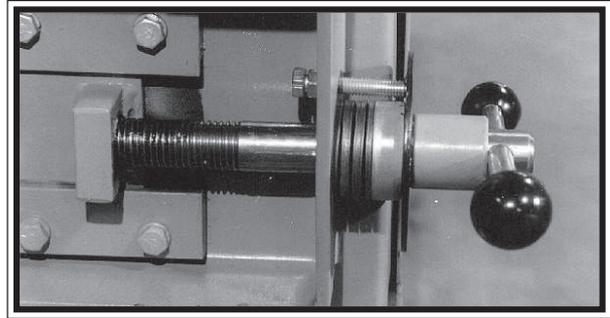
1. Operator shuts down the machine
2. The person in charge should follow Lockout procedures as is required by his organization.

BLADE CHANGING PROCEDURE



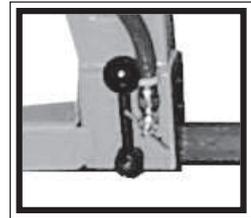
NOTE: Wear gloves for protection from the sharp blade.

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.

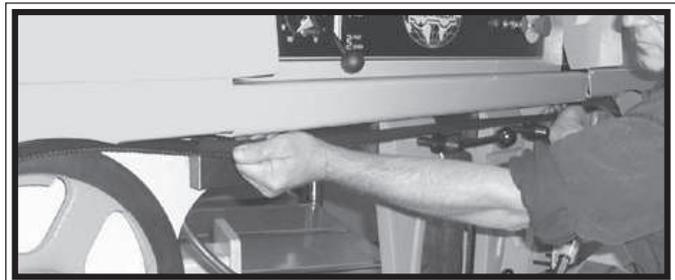


Blade Tensioner

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. 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

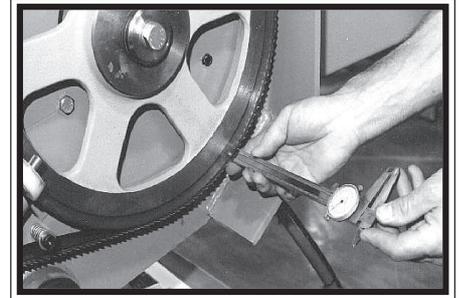
5. Before installing the new blade, check that it measures 1.075" wide including the teeth. Some blade manufacturers supply blades that measure 1" including the teeth. In this case you may not be able to adjust the head down limit switch to complete the cut.
6. Your new blade will be in a coil. While 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 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 .185" to .200" from the face of the blade wheels. If the tracking requires adjustment, follow the instructions below.

BLADE TRACKING ADJUSTMENT

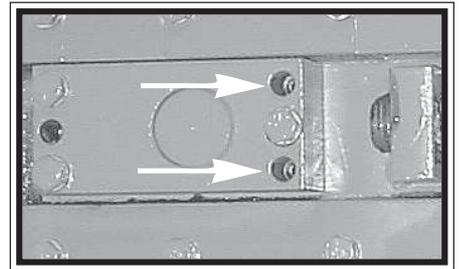
10. First, inspect the blade wheels for wear or damage and repair as required. Blade tracking adjustment should always begin at the wheel where the tracking is farthest out of specification. Using the instructions below, adjust the worst wheel, jog the blade and recheck both wheels. Repeat this process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



Checking the blade tracking with a calliper.

10A. Idler Wheel Adjustment

On the blade tensioner slide assembly, there are three 9/16" hex head bolts. Loosen the two bolts at the left end by 1/4 turn. Loosen the single bolt at the right side of the slide assembly by 1/2 turn. In the two holes above and below this bolt are two 3/16" allen key set screws. Turn both set screws 1/4 turn and tighten the hex bolt at the right, then the two bolts at the left. Turning the set screws clockwise will pull the blade on to the wheel, and turning counter clockwise will push the blade off the wheel. Each 1/4 turn will move the blade approximately .5mm. There is also a single set screw at the left end of the slider. Turning it clockwise will push the blade off the wheel.

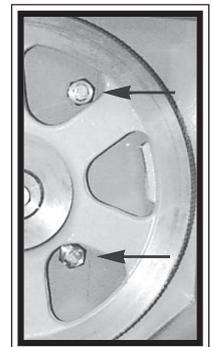


Idler wheel tracking set screws & hex bolts found on the slide assembly.

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 at 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 .5mm".

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

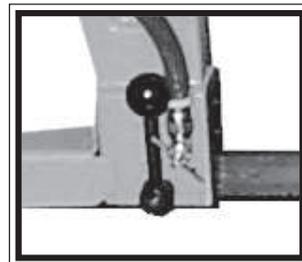


Drive wheel tracking bolt assemblies.

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 clockwise 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 3mm.



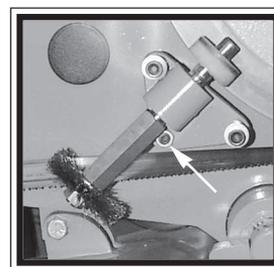
Idler guide arm carbide locking handle in the locked position.

BLADE BRUSH ADJUSTMENT



The machine 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 adjust it closer to the blade or if a new brush is installed, further away from the blade.

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.



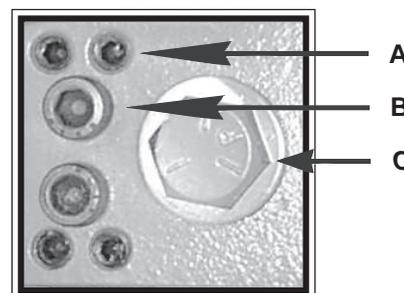
Blade brush adjusting screw & hex nut.

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 its 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.

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 vise wear strips. This setting is critical to ensure that the blade has cut fully through the stock. The Head Down Limit switch is located in the electrical box and is mounted in such a way that as the Head descends the counterbalance spring post contacts the limit switch roller.

Adjustment of the limit switch is made by changing the position of the set bolt which is located in the end of the spring post. 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 spring post will lengthen the time before the Head limit switch is activated.



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

BELT TENSION ADJUSTMENT



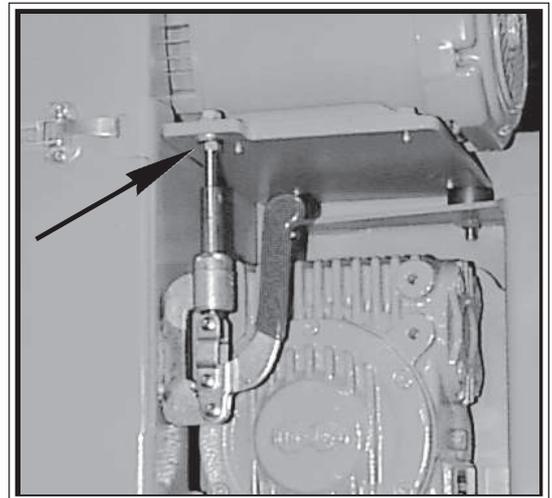
Drive belt tension is maintained by the locking of a toggle clamp assembly. The release of the toggle clamp permits the drive belt to be loosened so that the blade speed can be changed by selecting a different pulley ratio.

STEP 1 Stop the blade motor. Undo the cover latch and swing the pulley cover away.

STEP 2 At midpoint between pulleys, you should be able to push the belt in 1/2". Too much or too little movement will cause slippage or abnormal wear on the belt and other drive system parts.

STEP 3 If adjustment is needed, loosen the lock nut with a 9/16" wrench and turn the adjusting bolt until the belt tension is set.

STEP 4 Tighten the lock nut, test the belt on all 4 speed positions. Close cover.

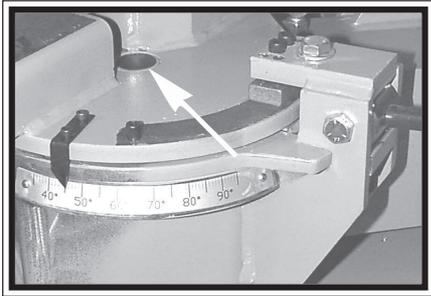


Toggle Tensioner Adjustment Locknuts

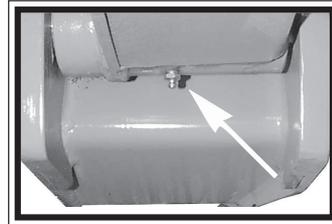
LUBRICATION

The S-20 Series II was designed to minimize the maintenance requirements. Moving assemblies and contact faces need lubrication on a regular schedule whether they are in heavy use or not. The lubrication requirements of the S -20 Series II are primarily the saw pivot points which are equipped with grease fittings, and metal to metal surfaces that require lubrication to prevent wear and seizure.

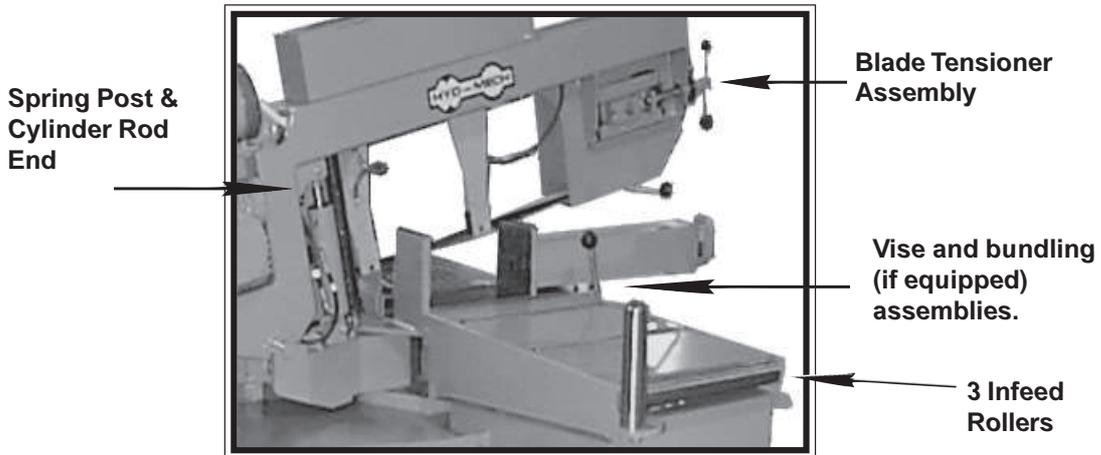
NOTE: Hyd-Mech recommends Monthly lubrication.



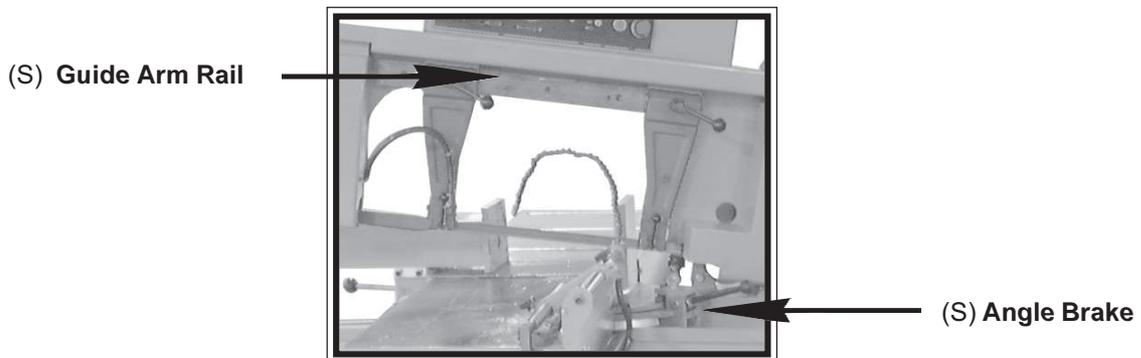
Swivel Pivot pin fitting under dome cap.



Head horizontal pivot fitting.



Rear View - Lubrication Points



S-20 Series II Front View - Surface Lubrication

TROUBLE SHOOTING GUIDE

PROBLEM	PROBLEM CAUSE
1. Cutting out of square vertically.	<ul style="list-style-type: none">- Carbide guide adjustment incorrect (adjust).- Feed rate excessive (reduce).- Blade worn (replace).- Guide arms too far apart.- Blade Pitch Incorrect .
2. Cutting out of square horizontally.	<ul style="list-style-type: none">- Angle not set correctly(adjust).- Stock not square in vise. (reset material)- Angle pointer out of adjustment.- Stock is not secure in the vise. (reset vise)
3. Head cylinder creeps: A) in hold	<ul style="list-style-type: none">- Cylinder seals defective (replace).- Head valve defective (replace).- Hydraulic hose leaking.
B) in feed position	<ul style="list-style-type: none">- Loosen jam nut and adjust pointer with feed rate at zero.
4. Blade tracking incorrect.	<ul style="list-style-type: none">- Improper tension (adjust).- Tracking needs adjustment.- Wheel is worn or in poor condition.
5. Blade stalls in cut.	<ul style="list-style-type: none">- More tension needed.- Excessive feed rate (reduce).- Blade pitch incorrect.- Carbide guides overtightened.
6. Blade vibrating excessively.	<ul style="list-style-type: none">- Blade speed too fast.- More blade tension needed.- Guide arms too far apart.- Feed rate too slow (increase).- Carbide guides worn or loose (adjust or replace). <p>NOTE: New blades tend to vibrate until they are "broken in".</p>
7. Excessive blade breakage	<ul style="list-style-type: none">- Excessive blade tension (reduce).- Excessive feed rate (reduce).- Top guide(s) damaged (replace).
8. No coolant flow.	<ul style="list-style-type: none">- No coolant (add).- Check coolant ports for blockage.- Line blockage (blow out lineswith compressed air).- Coolant pump inoperable (replace).- Coolant pump has lost its prime, loosen screws, sink pump in coolant. When coolant starts flowing, tighten screws.
9. Blade will not start.	<ul style="list-style-type: none">- Lift head off limit switch.- Control fuse blown.- Push reset button.
10. Machine stops before cut is completed or runs on after cut is completed.	<ul style="list-style-type: none">- Adjust head down limit switch bolt.- Feed Rate Valve is fully closed - pointer is set on "0" or close to "0".
11. Head will not descend.	<ul style="list-style-type: none">- Pointer is not adjusted. Loosen jam nut, turn knob fully closed, tighten jam nut with pointer at "0".- Check for physical interference preventing the ference preventing the head from falling.
12. No hydraulic functions.	<ul style="list-style-type: none">- Check that pressure gauge is at a minimum of 400psi. If not, contact service rep.

SECTION 4

ELECTRICAL SYSTEM

SECTION 4 - ELECTRICAL SYSTEM

ELECTRICAL SYSTEM

CONTROL PANEL & COMPONENTS

The S-20 Series II bandsaw, with the "H" option, has been designed to provide the operator with a simple to use interface that controls all saw functions. The electrical system of the S-20 Series II with the "H" option provides power to the blade drive motor at the required voltage for the motor. The incoming power from source is provided to the blade motor by means of a motor contactor and a motor overload. The contactor switches the power to the motor and the overload provides protection from excessive current draw. The contactor overload is set to automatic at the factory and provides quick reset if the overload "trips". All of the switches that the operator uses to operate the saw are run with 120 Volts A.C. This control system is fed 120 Volts from a transformer that steps down the "line" voltage to 120 Volts. The control wiring is protected by means of a fuse that is rated for 1.5 Amperes. The following components make up the control wiring.

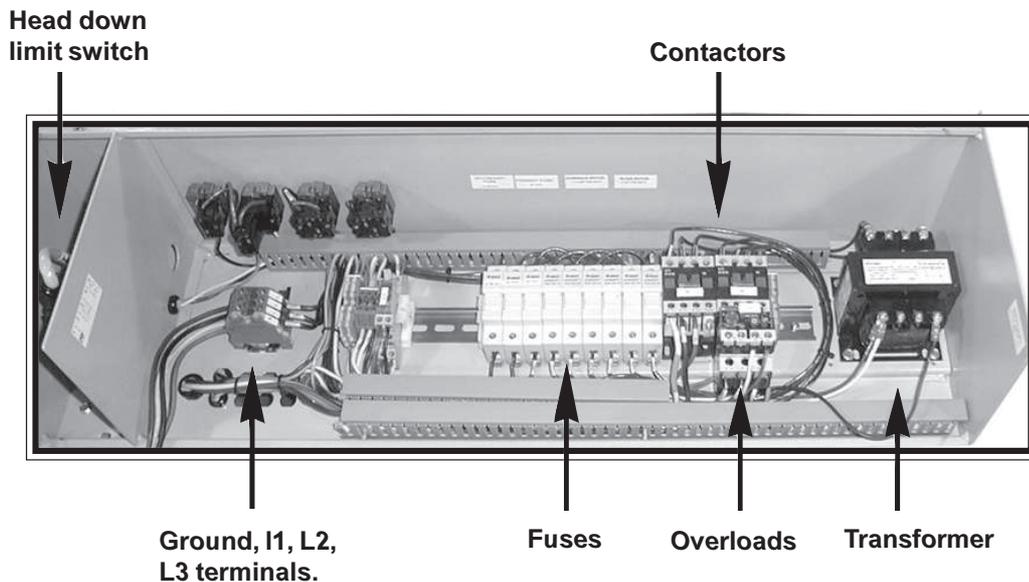
Any work performed on the electrical system should be carried out by qualified personell only.



Control panel layout.



Electrical component layout.



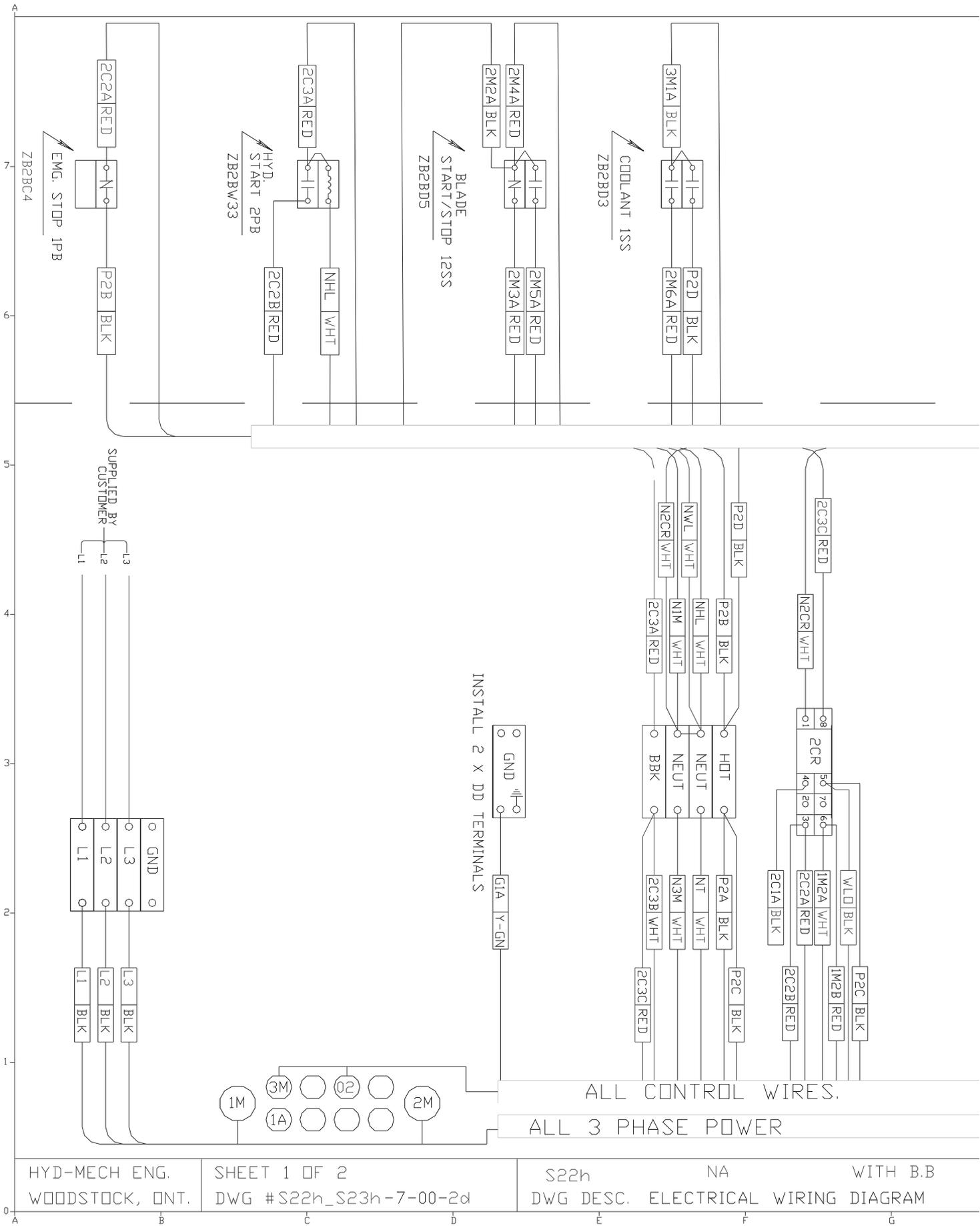
LIST OF S22H_S23H ELECTRICAL COMPONENTS

Item Code as on S22H Schematic	Description	Part Number	Component Manufacturer
1PB-Emergency Stop Push Button	Red mushroom head, spring return push button. Mounting base with 1 N/C contact block.	ZB2 BC4 ZB2 BZ102	Telemecanique Telemecanique
2PB-Hydraulic Start Push Button	Green, illuminated, flush head push button. Light module with 1 N/O contact block plus 130V (BA9s) light bulb.	ZB2 BW33 ZB2 BW061 SP105	Telemecanique Telemecanique Spectro
1SS-Coolant Selector Switch	Black, 3 positions, maintained selector switch. Mounting base with 2 N/O contact blocks.	ZB2 BD3 ZB2 BZ103	Telemecanique Telemecanique
12SS-Blade Start/Stop Selector Switch	Black, 2 positions, spring return to center selector switch. Mounting base with 1 N/O & 1 N/C contact block.	ZB2 BD5 ZB2 BZ105	Telemecanique Telemecanique
2CR	Machine Latch relay plus mounting base.	G2R-2-S P2RF-08-E	Omron
Hyd. Valve Connector	Hirschmann connector	H/927811311	Hirschmann
1FU	Fuse holder 1.5A Time-delay fuse	ATDR ATDR1.5	Gould
2 L/S Head Down	Plastic Limit switch with roller lever	XCK-P121	Telemecanique
3 L/S Blade Break	Plastic Limit switch with roller lever	XCK-P121	Telemecanique
6 L/S Accumulator	Limit switch with roller lever	XCK-P121	Telemecanique
DISC	25A Disconnect switch	VCCF2	Telemecanique
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
	Double ground terminal 20-8 AWG	WK4/D2/2SLU	Wieland
	Suppressor	SSQUENCHO1	Selectric
	R-C Suppressor Quenchark	504M02QA100	Quenchark

This machine has been built to the customers requirements, however, if any voltage changes are required, refer to the information on the following chart and then consult Hyd-Mech service department before implementing any changes.

S22H POWER COMPONENTS for SPECIFIC VOLTAGES							
Description & (Item Code) as on schematic	MACHINE VOLTAGE						Component Manufacturer
	3ph 208V	3ph 240V	3ph 380	3ph 415V	3ph 480V	3ph 575V	
1/4 HP HYDRAULIC PUMP MOTOR (1M) Frame Size 182TC, 1800 R.P.M.							
CONTACTOR (1M)	LC1D1210	LC1D1210	LC1D1210	LC1D1210	LC1D1210	LC1D1210	Telemecanique
MOTOR F.L.A. (1750 RPM)	1.4A	1.4A	0.85A	0.85A	0.7A	0.42A	
(3FU1 - 3FU3) FUSE PART # FUSE HOLDER PART #	2.5A T.D ATDR2.5 30310	2.5A T.D ATDR2.5 30310	2A T.D ATDR2 USM3	2A T.D ATDR2 USM3	1.5A T.D ATDR1.5 30310	1.A T.D ATDR1 30310	Gould
2HP BLADE DRIVE MOTOR (2M) Frame Size 145TC, 1800 R.P.M.							
CONTACTOR (2M)	LC1D1210G6	LC1D1210G6	LC1D1210G6	LC1D1210G6	LC1D1210G6	LC1D1210G6	Telemecanique
OVERLOAD (2 O/L)	LR2D1312	LR2D1312	LR2D1308	LR2D1308	LR2D1308	LR2D1308	Telemecanique
MOTOR F.L.A. (1750 RPM)	6.1A	6A	3.5A	3.2A	3A	2.5A	
(4FU1 - 4FU3) 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
3HP BLADE DRIVE MOTOR (2M) Frame Size 182TC, 1800 R.P.M. (OPTION ON S22H)							
CONTACTOR (2M)	LC1D1210G6	LC1D1210G6	LC1D1210G6	LC1D1210G6	LC1D1210G6	LC1D1210G6	Telemecanique
OVERLOAD (2 O/L)	LR2D1314	LR2D1314	LR2D1310	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 #	20A T.D ATDR20 30310	20A T.D ATDR20 30310	10A T.D ATDR10 USM3	10A T.D ATDR10 USM3	10A T.D ATDR10 30310	8A T.D ATDR8 30310	Gould
CONTROL TRANSFORMER (TR) 200 VA							
TRANSFORMER PART # (TR)	9070 T200D3	9070 T200D1	9070 T200D33	9070 T200D33	9070 T200D1	9070 T200D5	Square-D
PRIMARY FUSE FUSE PART # FUSE HOLDER PART # (2FU1, 2FU2)	5A Fast Actin ATM5 30310	4A Fast Acting ATM4 30310	4A Fast Acting ATM4 USM1	3A Fast Acting ATM3 USM1	3A Fast Acting ATM3 30310	3A Fast Acting ATM3 30310	Gould
SECONDARY FUSE FUSE PART # FUSE HOLDER PART # (1FU)	1.5A T.D ATDR1.5 30310	1.5A T.D ATDR1.5 30310	1.5A T.D ATDR 1.5 USM1	1.5A T.D ATDR 1.5 USM1	1.5A T.D ATDR1.5 30310	1.5A T.D ATDR1.5 30310	Gould
CONTROL TRANSFORMER (TR) 500 VA (Only installed when Work Lamp is added as an option.)							
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)	9A Fast Acting, ATM9 30310	8A Fast Acting, ATM8 30310	6A Fast Acting, ATM6 USM1	6A Fast Acting, ATM6 USM1	5A Fast Acting, ATM5 30310	4A Fast Acting, ATM4 30310	Gould
SECONDARY FUSE FUSE PART # FUSE HOLDER PART # (3FU)	5A T.D ATDR5 30310	5A T.D ATDR5 30310	5A T.D ATDR5 USM1	5A T.D ATDR5 USM1	5A T.D ATDR5 30310	5A T.D ATDR5 30310	Gould

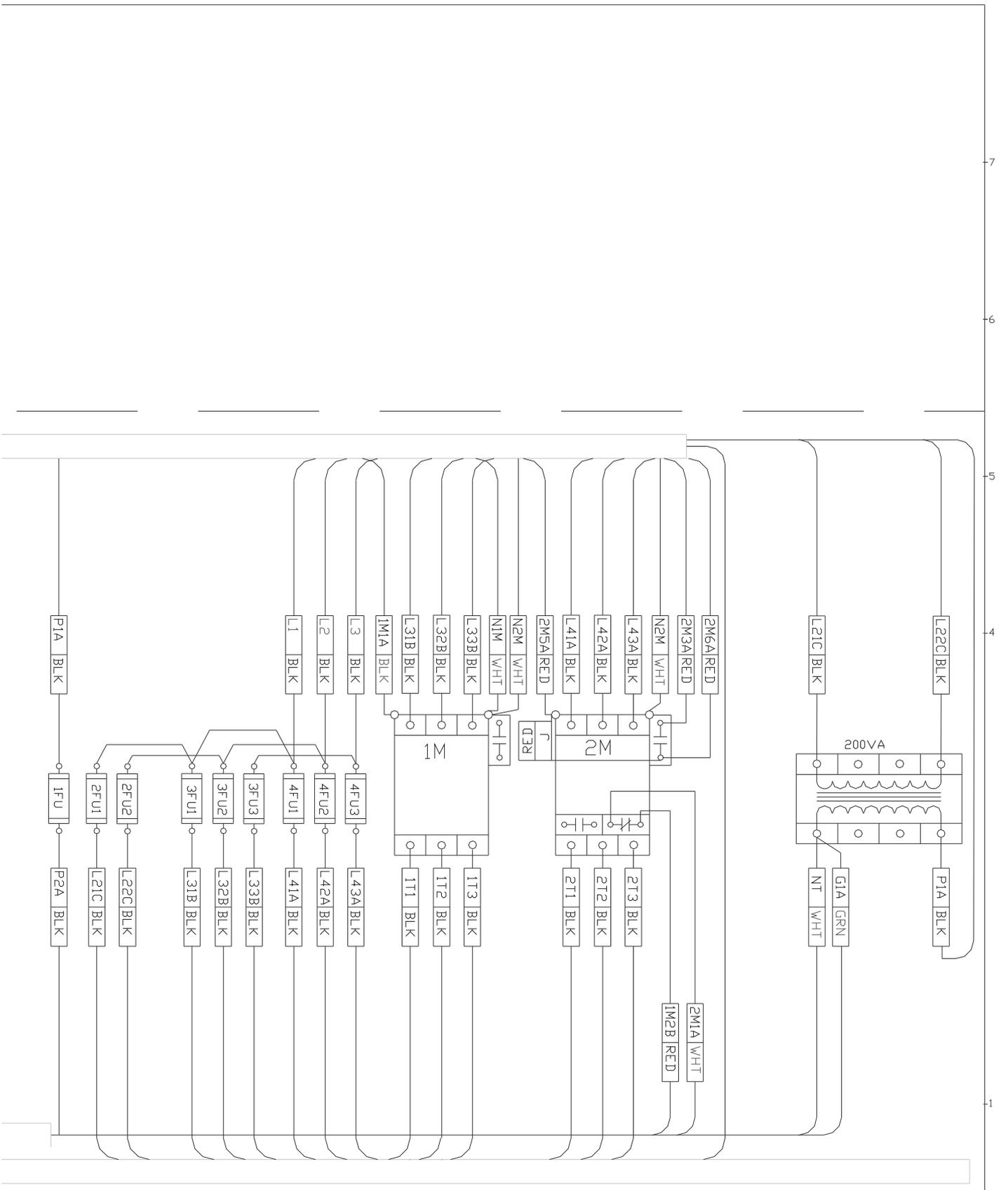
ELECTRICAL SCHEMATIC & WIRING DIAGRAMS



HYD-MECH ENG.
WOODSTOCK, ONT.

SHEET 1 OF 2
DWG #S22h_S23h-7-00-2d

S22h NA WITH B.B
DWG DESC. ELECTRICAL WIRING DIAGRAM

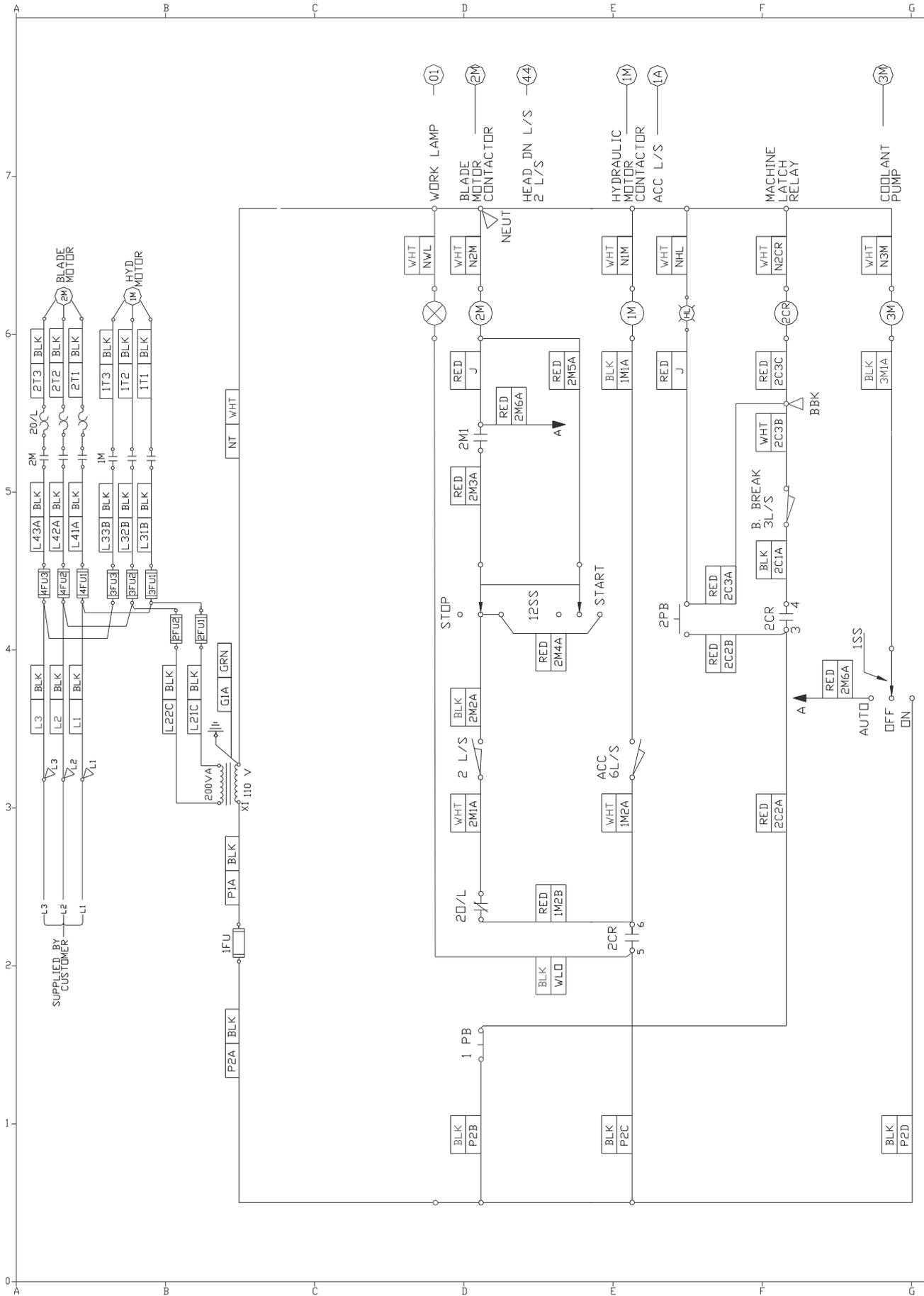


DWN BY: JSH
 DATE: AUG 28/00

CHKD BY: -
 DATE: -

FIRST MACHINE SERIAL # AFFECTED
 -
 AUG 11/00. REVISION '1d' & '2d' IS DUE TO THE CONTROL ENCLOSURE CHANGED & THEREFORE COMPONENT LAYOUT & WIRING CHANGED.

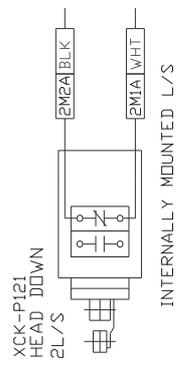
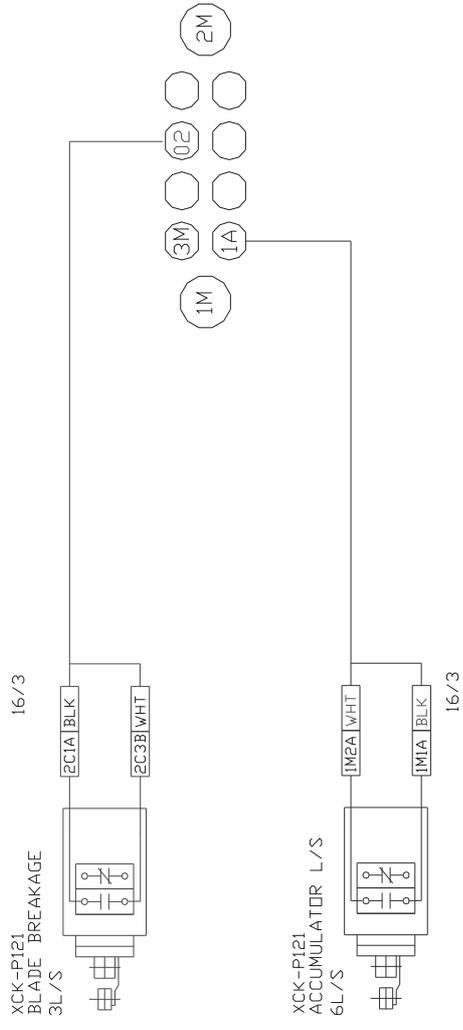
ELECTRICAL SCHEMATIC & WIRING DIAGRAMS



HYD-MECH. ENG. SHEET 1 OF 1
 WOODSTOCK, ONT. DWG # S22h_S23h-7-00-1d

S22h NA WITH B.B SERIAL # -
 DWG DESC. ELECTRICAL SCHEMATIC

DWN BY JSH
 DATE: AUG 28/00



HYD-MECH. ENG. WOODSTOCK, ONT.	SHEET 2 OF 2 DWG # S22h_S23h-7-00-2d	S22h NA WITH B.B DWG DESC. INPUT / OUTPUT DEVICES	SERIAL # -	DWN BY JSH DATE: AUG 28/00
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SECTION 5

HYDRAULIC SYSTEM

SECTION 5 - HYDRAULIC SYSTEM

HYDRAULIC SYSTEM

HYDRAULIC COMPONENTS

The S-20/S-23 optional 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. See the following page for the cylinder information.

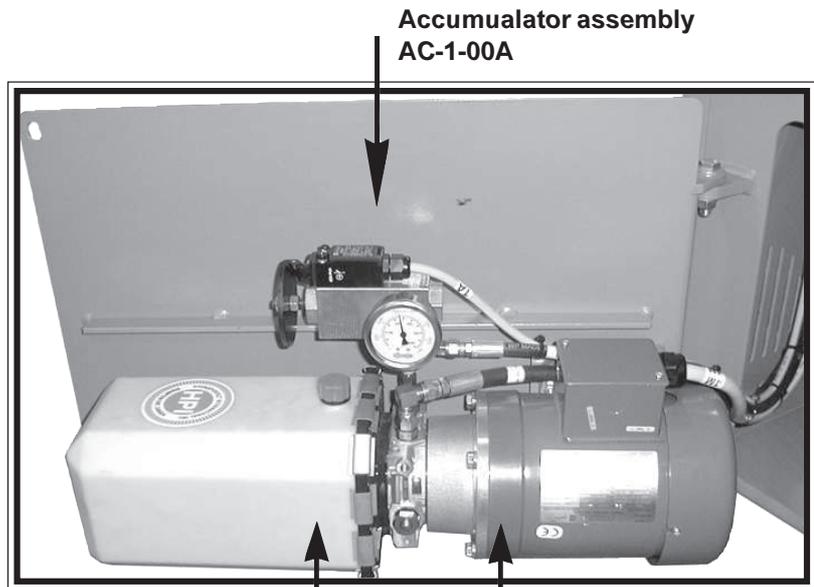


Switch off before beginning work.

- The emergency switch, which is used to turn the hydraulics off, should not be the only means of shutting the power off before cleaning or performing maintenance to the machine. The main power disconnect should be switched off and locked.



Panel mounted hydraulic control valve assembly, S22H-621-00B
810606



Accumulator assembly AC-1-00A

MPI Micro Powerpack 0-00-00-0-150-N-U-20-800(71)-N-1

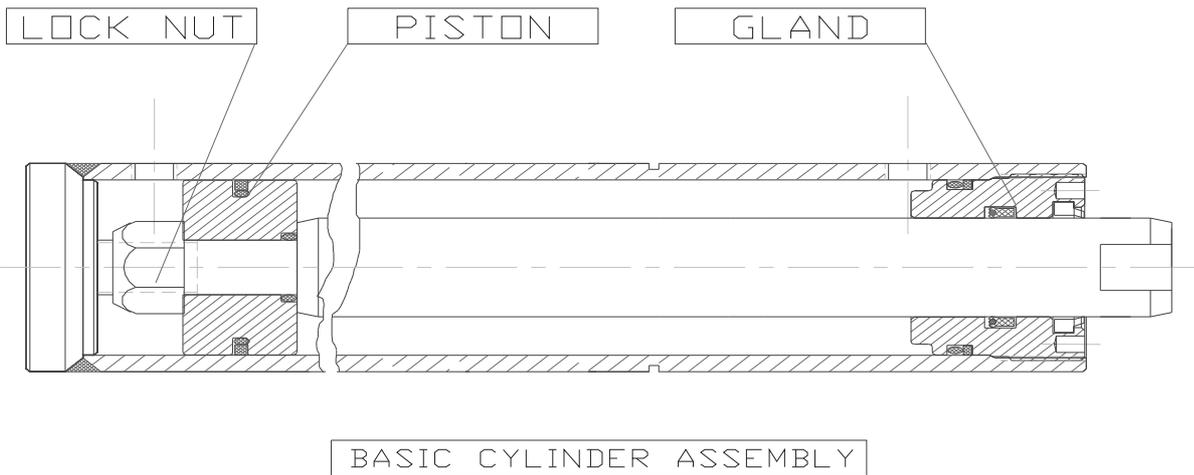
362736

1/4 Horse power motor 145TC Frame

Door Mounted Hydraulic Assembly

Motor is voltage specific.
371880 - 240/480V
371895 - 575V

CYLINDER ASSEMBLIES



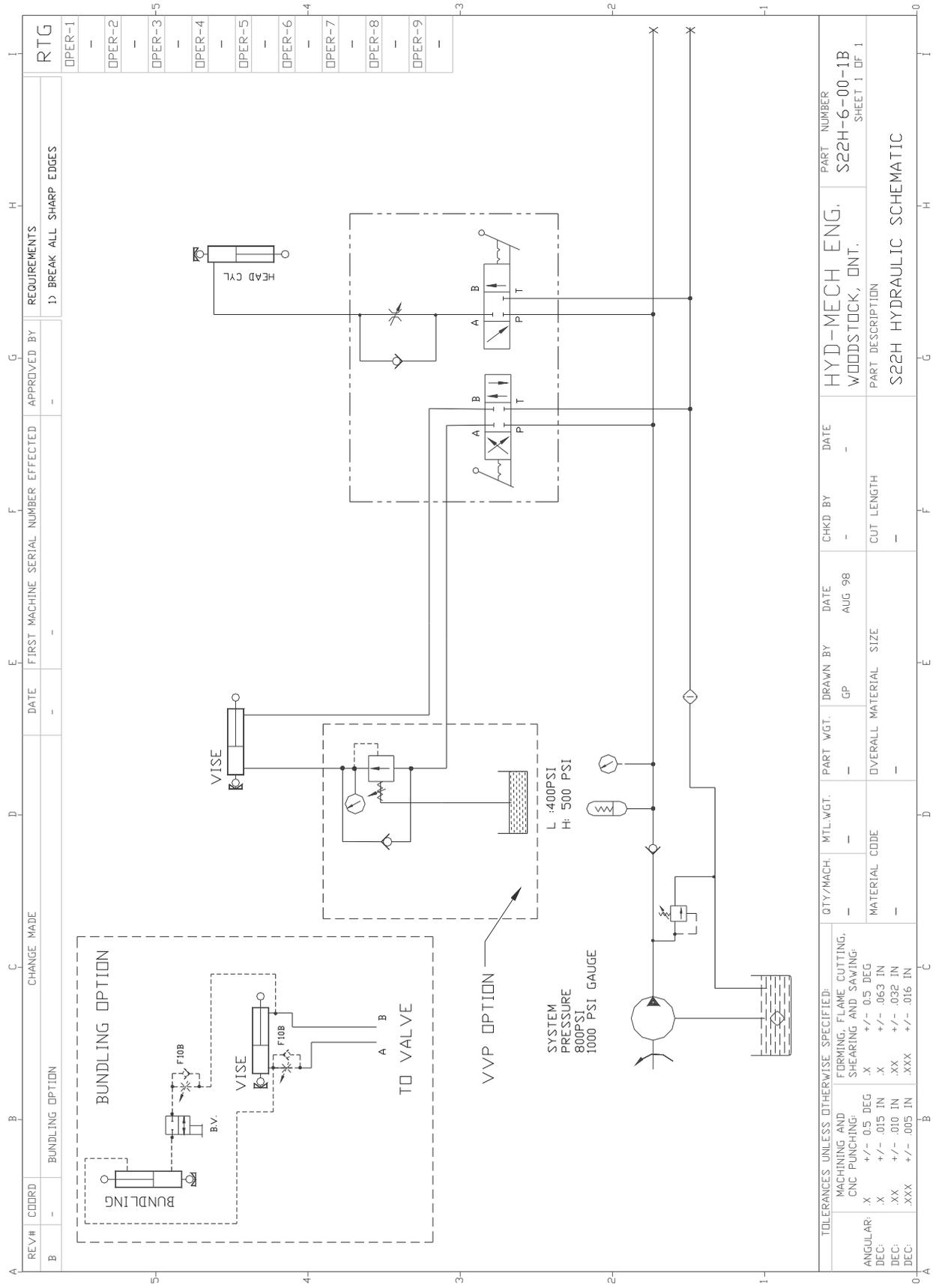
HYDRAULIC SERVICE KITS

The S20 with the hydraulic option uses two cylinders, a vise cylinder (S22A-C3-00H) and a head cylinder (S22A-C4-00). Both may be serviced with the kit listed.

The hydraulic valve assembly is not usually serviced in the field with the exception of replacing knobs and levers, etc. Contact your service representative if the valve assembly requires internal servicing.

S 22H HYDRAULIC CYLINDER SEAL KITS <i>(kits do not include pistons or glands)</i>	
Inside diameter	Kit number
2"	2CSK

S22H HYDRAULIC SCHEMATIC



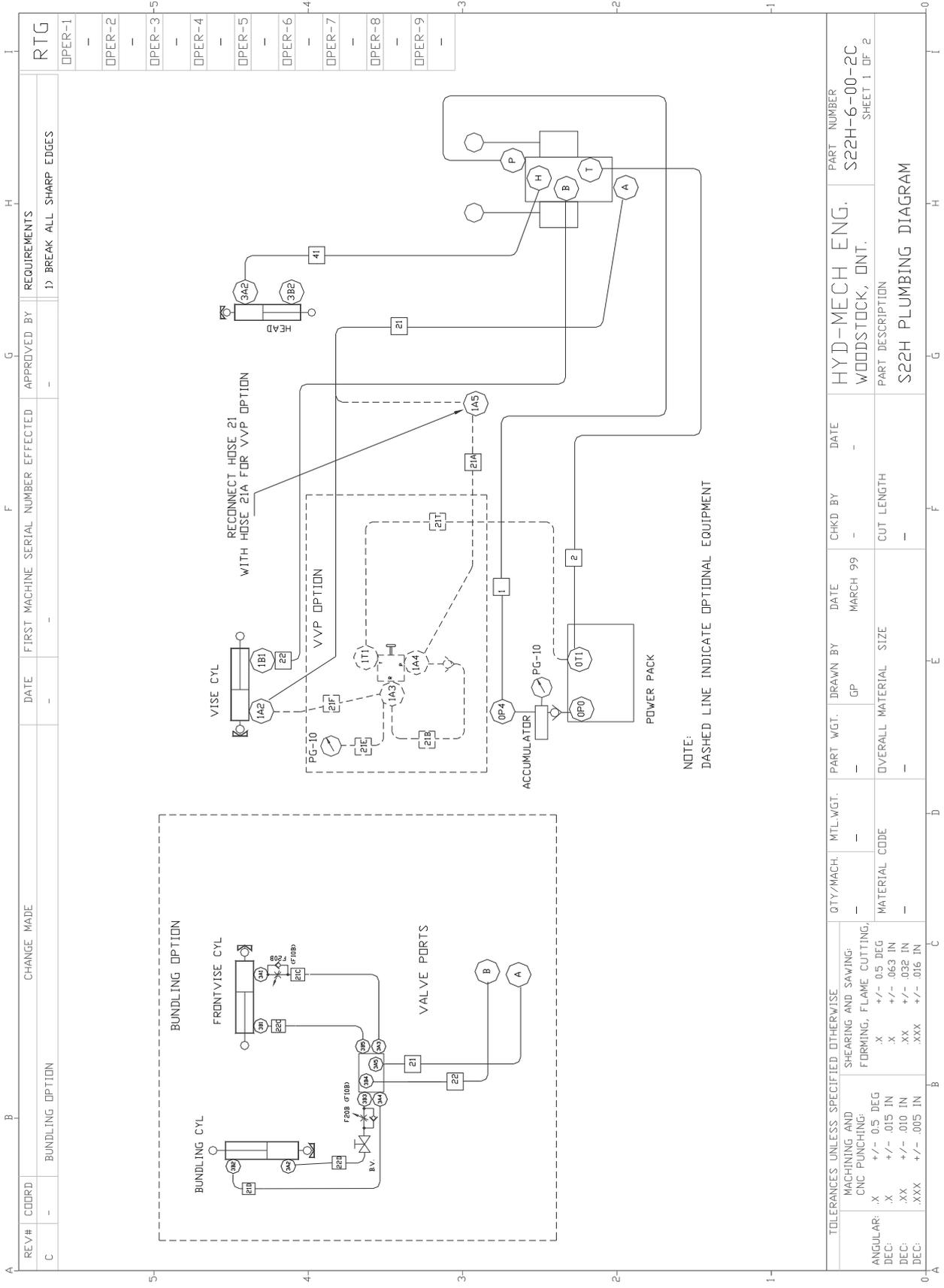
REV#	COORD	CHANGE MADE	DATE	FIRST MACHINE SERIAL NUMBER EFFECTED	APPROVED BY	REQUIREMENTS
B	-	BUNDLING OPTION	-	-	-	1) BREAK ALL SHARP EDGES

RTG	OPER-1	OPER-2	OPER-3	OPER-4	OPER-5	OPER-6	OPER-7	OPER-8	OPER-9
	-	-	-	-	-	-	-	-	-

TOLERANCES UNLESS OTHERWISE SPECIFIED:		QTY/MACH.	MTL.WGT.	PART WGT.	DRAWN BY	DATE	CHKD BY	DATE	PART NUMBER
MACHING AND CNC PUNCHING:	FORMING, FLAME CUTTING, SHEARING AND SAWING:	-	-	-	GP	AUG 98	-	-	HYD-MECH ENG. WOODSTOCK, ONT.
ANGULAR: X	+/- 0.5 DEG								S22H-6-00-1B
DEC: .X	+/- .015 IN								SHEET 1 OF 1
DEC: .XX	+/- .010 IN								PART DESCRIPTION
DEC: .XXX	+/- .005 IN								S22H HYDRAULIC SCHEMATIC



S22H PLUMBING DIAGRAM



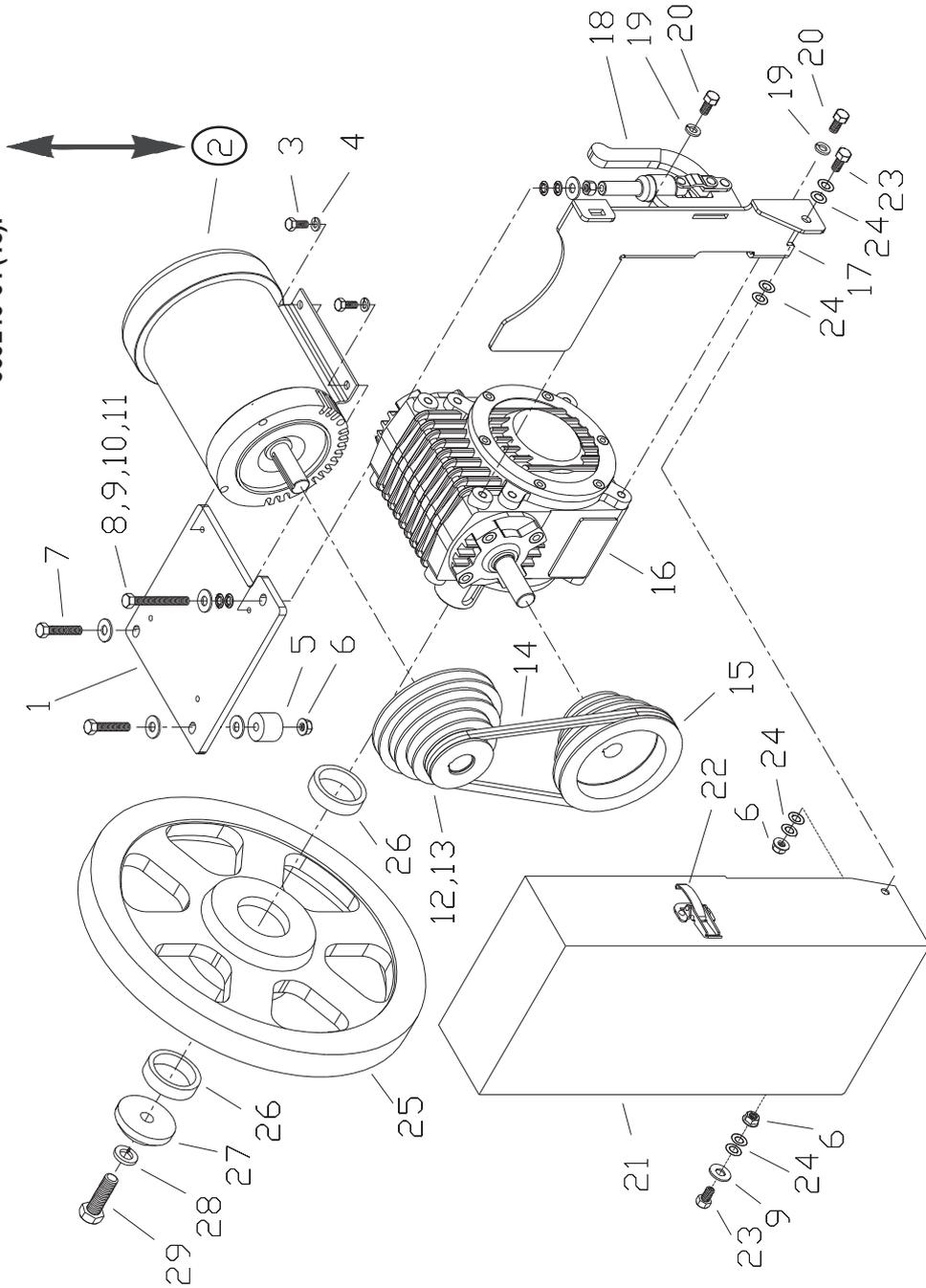
SECTION 6

MECHANICAL ASSEMBLIES

SECTION 6 - MECHANICAL ASSEMBLIES

BLADE DRIVE ASSEMBLY

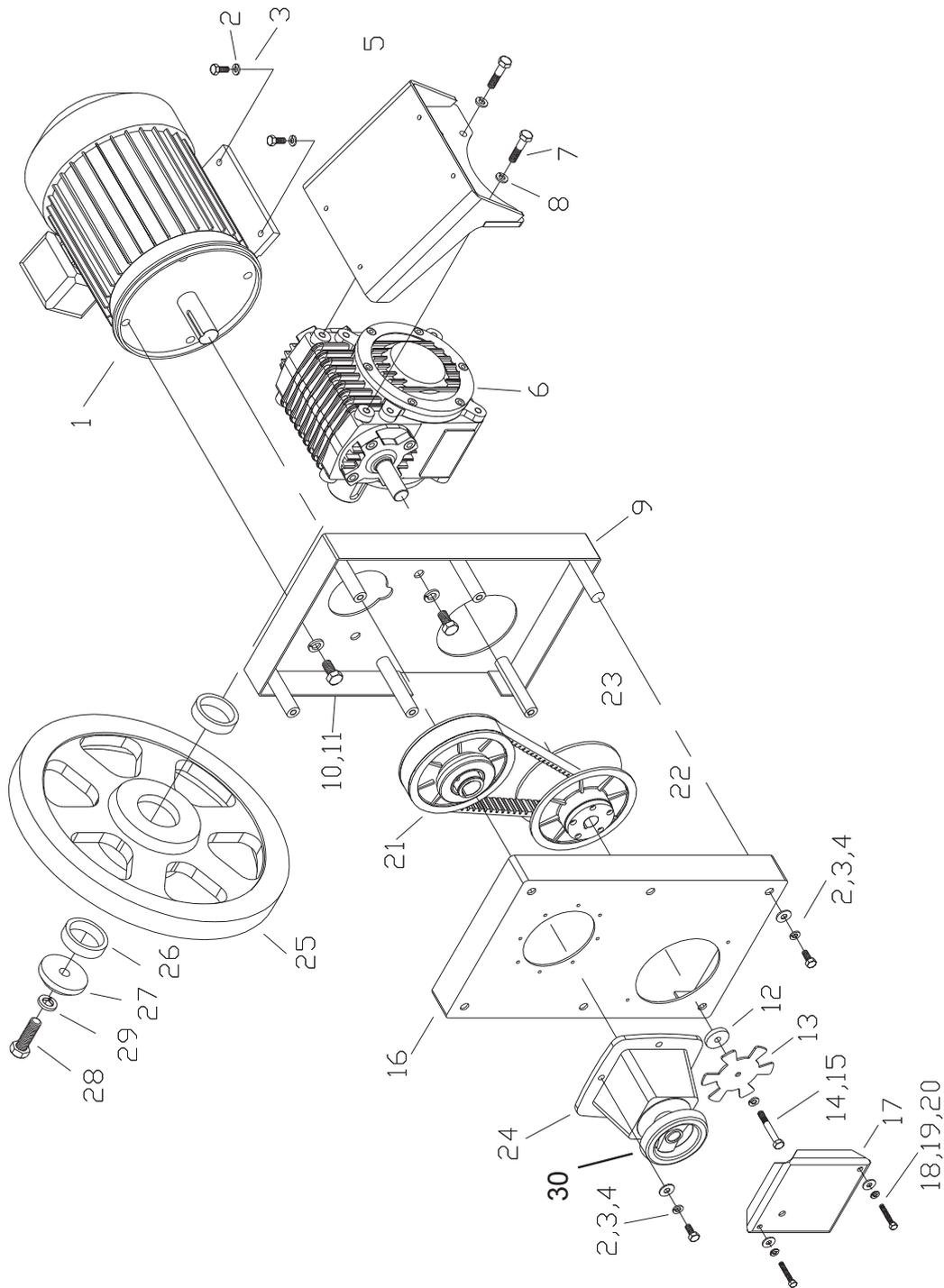
NOTE: There is no "C" flange on single phase motor (item 2), 145T_frame size, not 145TC. Also for single phase motors the pullys (items 12 & 15) are a three step pullys, part number 000214-01 (12) and 000240-01 (15).



BLADE DRIVE ASSEMBLY, PARTS LIST

ITEM	QTY	S-22 PART NUMBER	DESCRIPTION
1	1	S22-41-01C	MOTOR MOUNTING PLATE
2	1	145TC FRAME	2 HP, 1800RPM, SPECIFY VOLTAGE
3	4	B1-.312X.75	HEX HEAD CAP SCREW
4	4	.312 LOC	LOCK WASHER
5	2	S22-41-04	DAMPING SPACER
6	4	.375-16LNUT	HEX LOCK NUT
7	2	B1-.375x2	HEX HEAD CAP SCREW
8	1	B1-.375X3	HEX HEAD CAP SCREW
9	4	.375FLT	FLAT WASHER
10	4	30 C0750-040	DISC SPRING
11	1	.375-16HXNUT	HEX NUT
12	1	S22-41-05A	STEP PULLEY (motor) (see note on drawing)
13	1	S1-.25X.375-C	SOCKET SET SCREW, CUP POINT
14	1	4L-320	V BELT
15	1	S22-41-06B	STEP PULLEY (gear box) (see note on drawing)
16	1	HM 3 SP (HM3A)	CANIMEX (RENOLD) GEAR BOX, 39:1
17	1	S22-411-01A	BELT COVER BRACKET, c/w spacer S22-411-02A
18	1	GH-36012-Z	TOGGLE CLAMP (welded to item 17)
19	2	M10LOC	LOCK WASHER
20	2	B3-10X20	METRIC HEX HEAD CAP SCREW
21	1	S22-41-02B	BELT PULLEY COVER
22	1	772-0086	DOOR LATCH (welded to item 21)
23	1	B1-.375X1	HEX HEAD CAP SCREW
24	8	30 C0750-040	DISC SPRING
25	1	W16-44A-01	DRIVE WHEEL
26	2	S22-44-01A	DRIVE WHEEL SPACER
27	1	S22-44-02	RETAINING CAP
28	1	M16LOC	LOCK WASHER
29	1	B3-16X50	METRIC HEX HEAD CAP SCREW

3 (7kW) HORSE POWER DRIVE OPTION
with variable speed

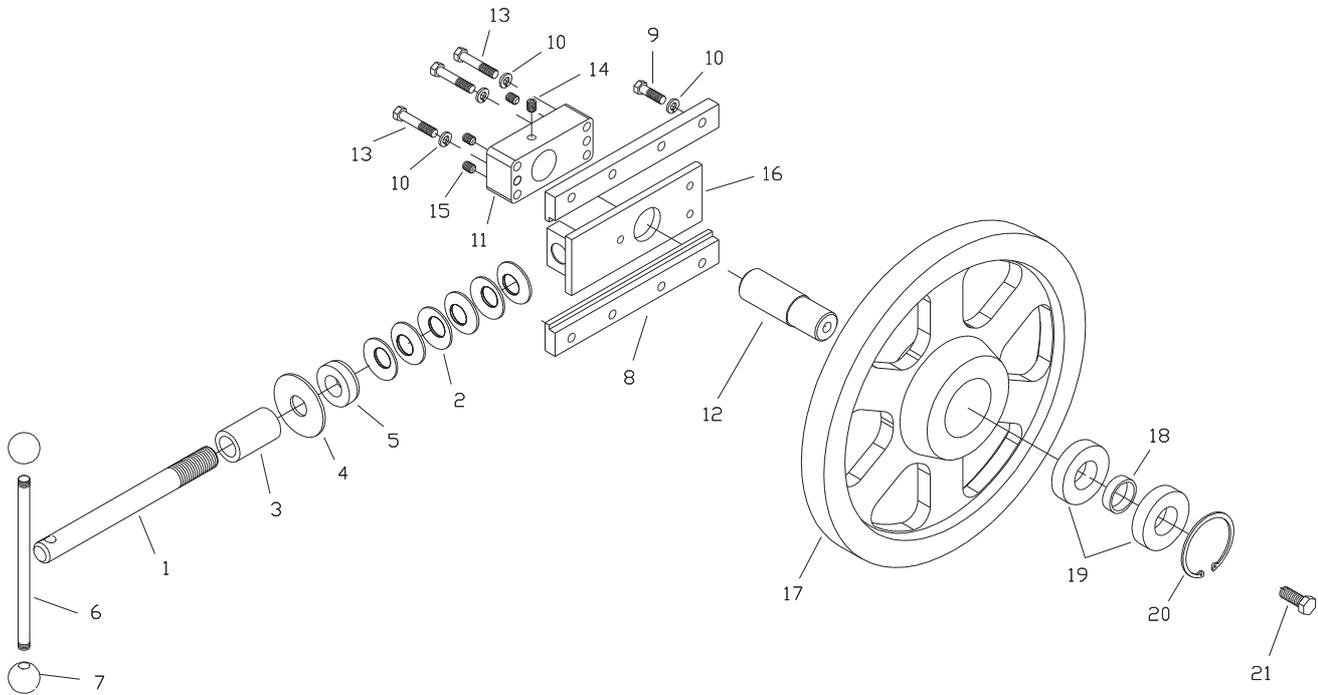


3 (7kW) HORSE POWER DRIVE

parts list, with variable speed

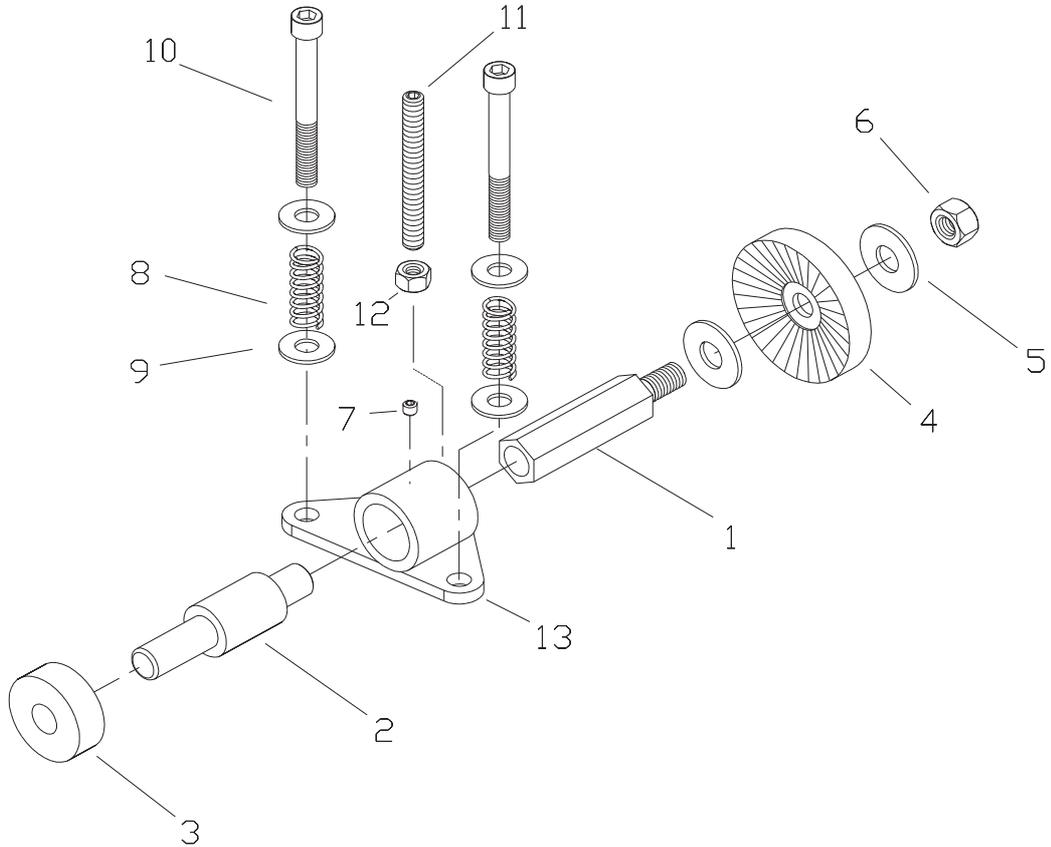
ITEM	QTY	S-22A PART NUMBER	DESCRIPTION
1	1	182TC FRAME	3 HP, 1800RPM, SPECIFY VOLTAGE
2	12	B1-.312X.75	HEX HEAD CAP SCREW
3	12	.312LOC	LOCK WASHER
4	10	.312FLT	FLAT WASHER
5	1	S23-46-00B	MOTOR SEAT WELDMENT
6	1	HM4D	GEAR BOX, 39:1, TOP
7	4	B3-12x30	METRIC HEX HEAD CAP SCREW
8	4	M12 LOC	LOCK WASHER
9	1	S22A-411-00D	VSD INNER COVER WELDMENT
10	4	B1-.5X1	HEX HEAD CAP SCREW
11	4	.5LOC	LOCK WASHER
12	1	S22A-41-04	TARGET SPACER
13	1	S22A-41-01	PULSAR TARGET
14	1	B3-8X60	METRIC HEX HEAD CAP SCREW
15	1	M8LOC	LOCK WASHER
16	1	S22A-41-02A	OUTER BOX SHELL
17	1	S22A-41-03	OUTER BOX TACH COVER
18	2	B1-.25X1.5	HEX HEAD CAP SCREW
19	2	.25LOC	LOCK WASHER
20	2	.25FLT	FLAT WASHER
21	1	R150B	MECHANICAL PULLEY
22	1	F150B	SPRING PULLEY
23	1	28X800	DRIVE BELT
24	1	RF150 ADJ	SPEED SDJUSTOR
25	1	W16-44A-01	DRIVE WHEEL
26	2	S22-44-01A	DRIVE WHEEL SPACER
27	1	S22-44-02	RETAINING CAP
28	1	B3-16X50	METRIC HEX HEAD CAP SCREW
29	1	M16LOC	LOCK WASHER
30	1	VS10-01-1A	ADJUSTING WHEEL c/w WHP-85 HANDLE, AA-M12X15X20 BUSHING

IDLER WHEEL ASSEMBLY



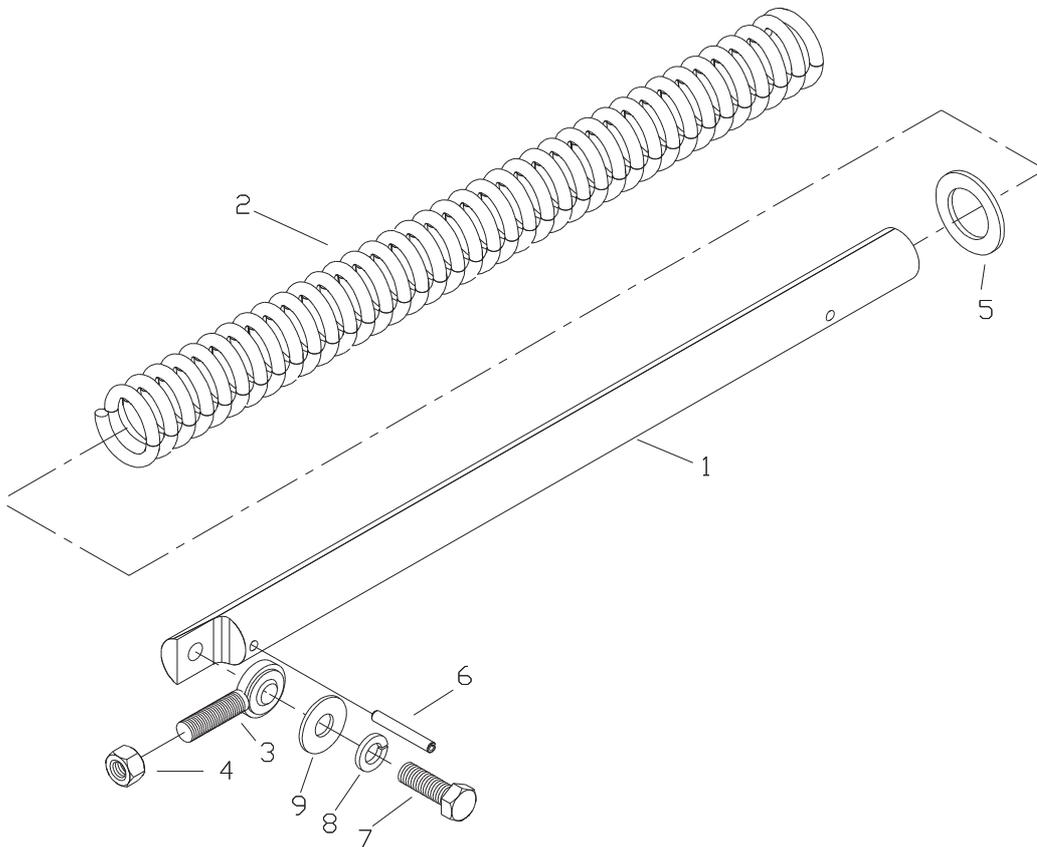
ITEM	QTY	S-22 PART NUMBER	DESCRIPTION
1	1	S22-42-01A	BLADE TENSION SHAFT
2	6	30 K2000-097	DISC SPRING
3	1	S22-42-03A	BLADE TENSION COLLAR
4	1	A20-76-01	STOP PLATE
5	1	4462-00	THRUST BEARING
6	1	S22-42-02A	TENSIONER HANDLE
7	2	1993	1 3/8 BALL KNOB, 1/2 nc
8	2	S22-421-01	SLIDE WAYS
9	8	B1-.375X1	HEX HEAD CAP SCREW
10	11	.375LOC	LOCK WASHER
11	1	S20-33B-01	IDLER PIN ADJUSTING BLOCK
12	1	S20-3-08B	IDLER SHAFT
13	3	B2-.375X2	HEX HEAD CAP SCREW (NF)
14	1	S2-.375X.375-F	SOCKET SET SCREW, FLAT POINT (NF)
15	3	S2-.375X2-C	SOCKET SET SCREW, CUP POINT (NF)
16	1	S20-331-00	BASE WELDMENT
17	1	W16-45A-01	IDLER WHEEL
18	1	W16-45A-02	IDLER WHEEL SPACER
19	2	6307 2RS	BALL BEARING
20	1	HO-315-PA	INTERNAL RETAINING RING
21	1	B1-.5X1.5	HEX HEAD CAP SCREW
22	1	.5LOC	LOCK WASHER
23	1	S22-44-02	RETAINING CAP

BLADE BRUSH ASSEMBLY



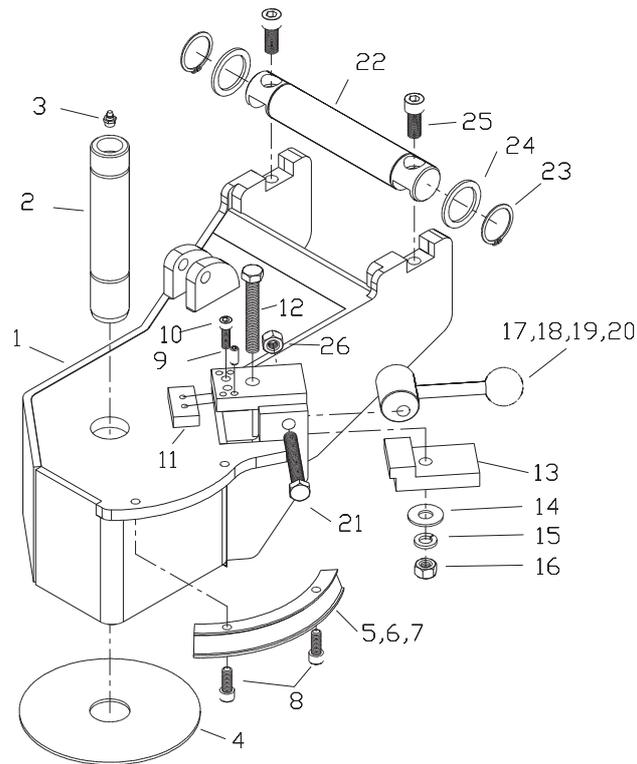
ITEM	QTY	S-22 PART NUMBER	DESCRIPTION
1	1	S22-43-01B	SHAFT EXTENSION
2	1	W6440-4	BEARING
3	1	S20-925-03	POLYURETHANE WHEEL
4	1	5043	3" BLADE BRUSH
5	2	.5FLT	FLAT WASHER
6	1	.5-13HXNUT	HEX NUT
7	1	S1-.25X.25-C	SOCKET SET SCREW, CUP POINT
8	2	TC 13	COMPRESSION SPRING
9	4	.375FLT	FLAT WASHER
10	2	A1-.375X3.5	SOCKET HEAD CAP SCREW
11	1	S1-.375X2.5	SOCKET SET SCREW, FLAT POINT
12	1	.375-16HXNUT	HEX NUT
13	1	S22-431-00A	BEARING PLATE WELDMENT

COUNTER BALANCE SPRING ASSEMBLY



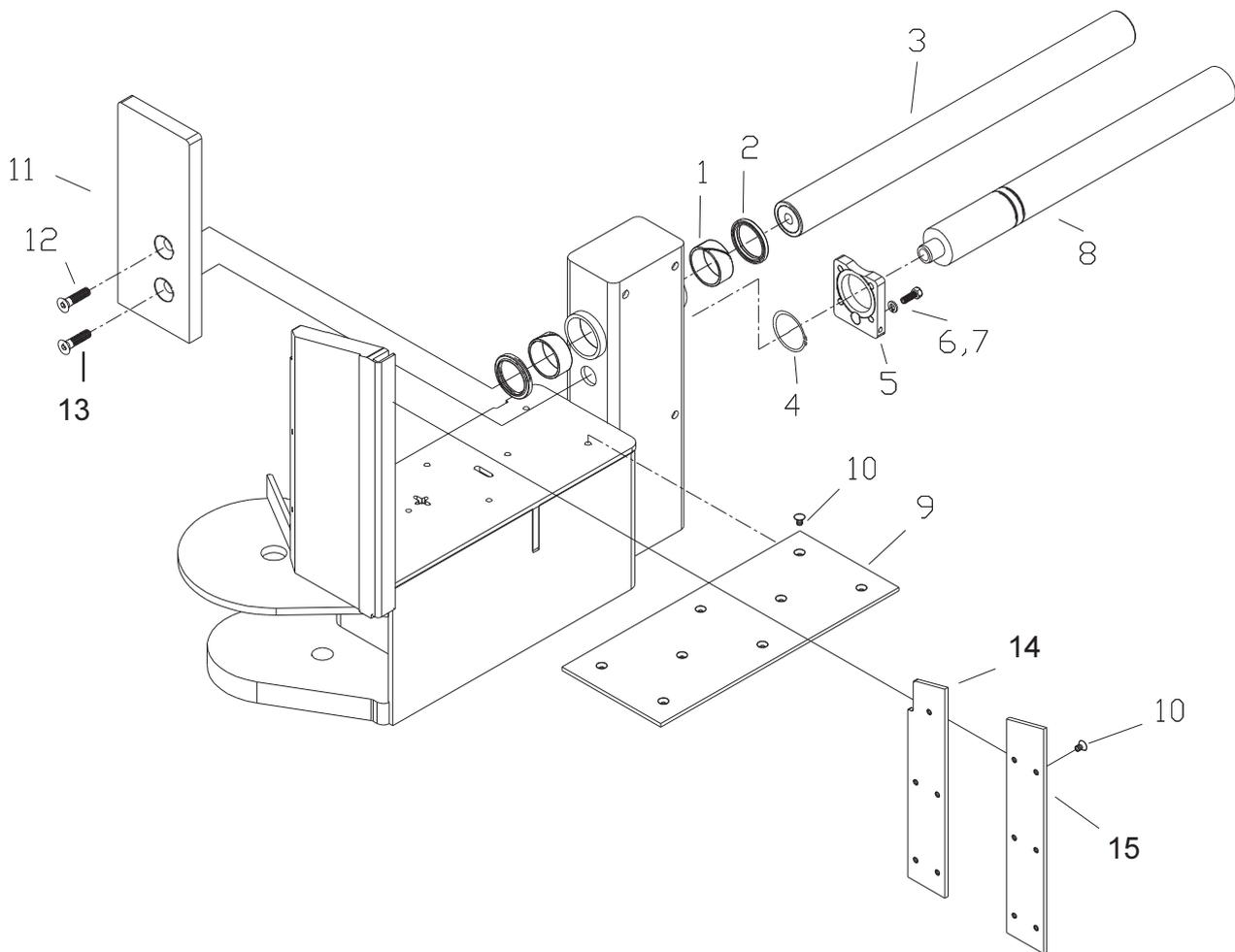
ITEM	QTY	S-22 PART NUMBER	DESCRIPTION
1	1	S22-2-03A	SPRING GUIDE
2	1	S22-2-06	COMPRESSION HEAD SPRING
3	1	CM8	ROD END
4	1	.5NF HXNUT	HEX NUT
5	1	S22-2-07	SPRING SUPPORT
6	1	.25X1.75	ROLL PIN
7	1	B1-.5X1.5	HEX HEAD CAP SCREW
8	1	.5LOC	LOCK WASHER
9	1	.5FLT	FLAT WASHER

PIVOT LINK ASSEMBLY



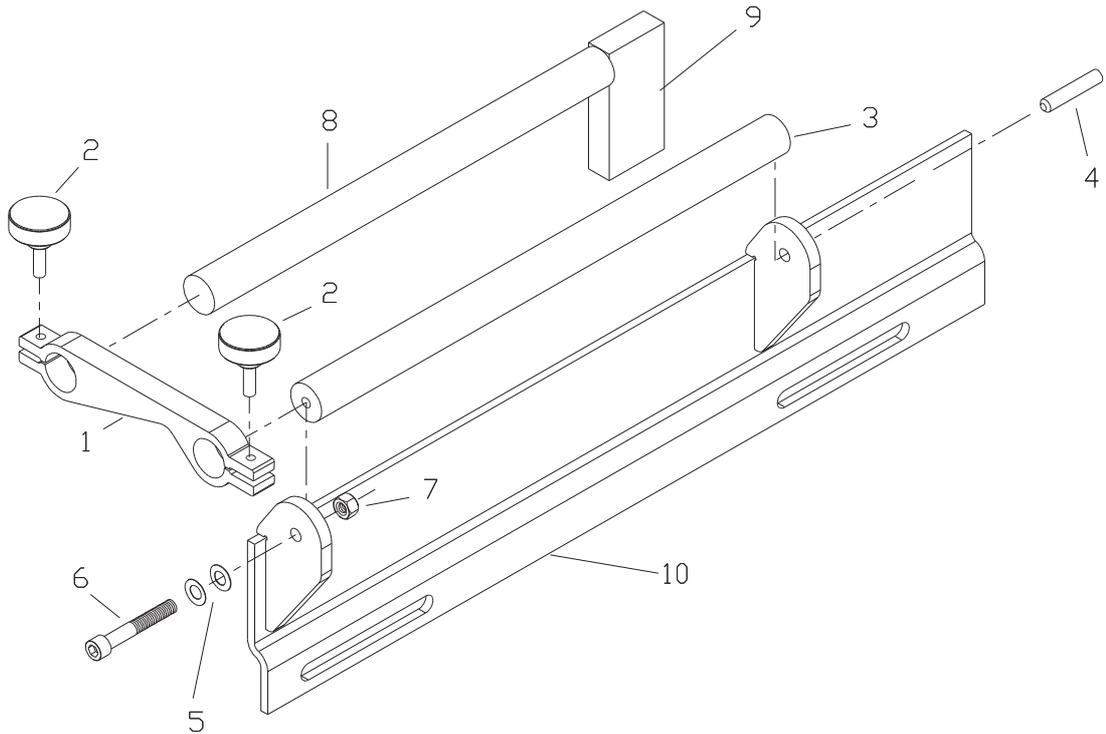
ITEM	QTY	S-22 PART NUMBER	DESCRIPTION
1	1	S22-21-00D	PIVOT LINK WELDMENT
2	1	S22-2-01	PIVOT PIN
3	1	1627-B	PIVOT PIN GREASE FITTING, 1/4 NPT
4	1	S22-2-08	THRUST PLATE
5	1	S22-2-02C	SCALE SUPPORT
6	1	S22-2-05A	ANGLE SCALE
7	2	N-.125X.250	PRESS IN RIVET
8	2	A1-.375X1	SOCKET HEAD CAP SCREW
9	4	S1-.312X.75-C	SOCKET SET SCREW, CUP POINT
10	2	A1-.312X1	SOCKET HEAD CAP SCREW
11	1	S20-42-03	BRAKE SHOE
12	1	B1-.5X3.5	HEX HEAD CAP SCREW
13	1	S22-22-00A	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	S20-423B-01	BRAKE HANDLE
19	1	8470939	1/2" id BLACK TUBE
20	1	1993	1 3/8" BALL, 1/2" NC
21	1	B1-.5X3.75	HEX HEAD CAP SCREW
22	1	S22-3-01D	HORIZONTAL PIN
23	2	SH-0150-PA	EXTERNAL RETAINING RING
24	2	TRB 2435	THRUST WASHER
25	2	A2-.5X1.25	SOCKET HEAD CAP SCREW
26	1	.5-13HXNUT	HEX NUT

FRONT VISE ASSEMBLY



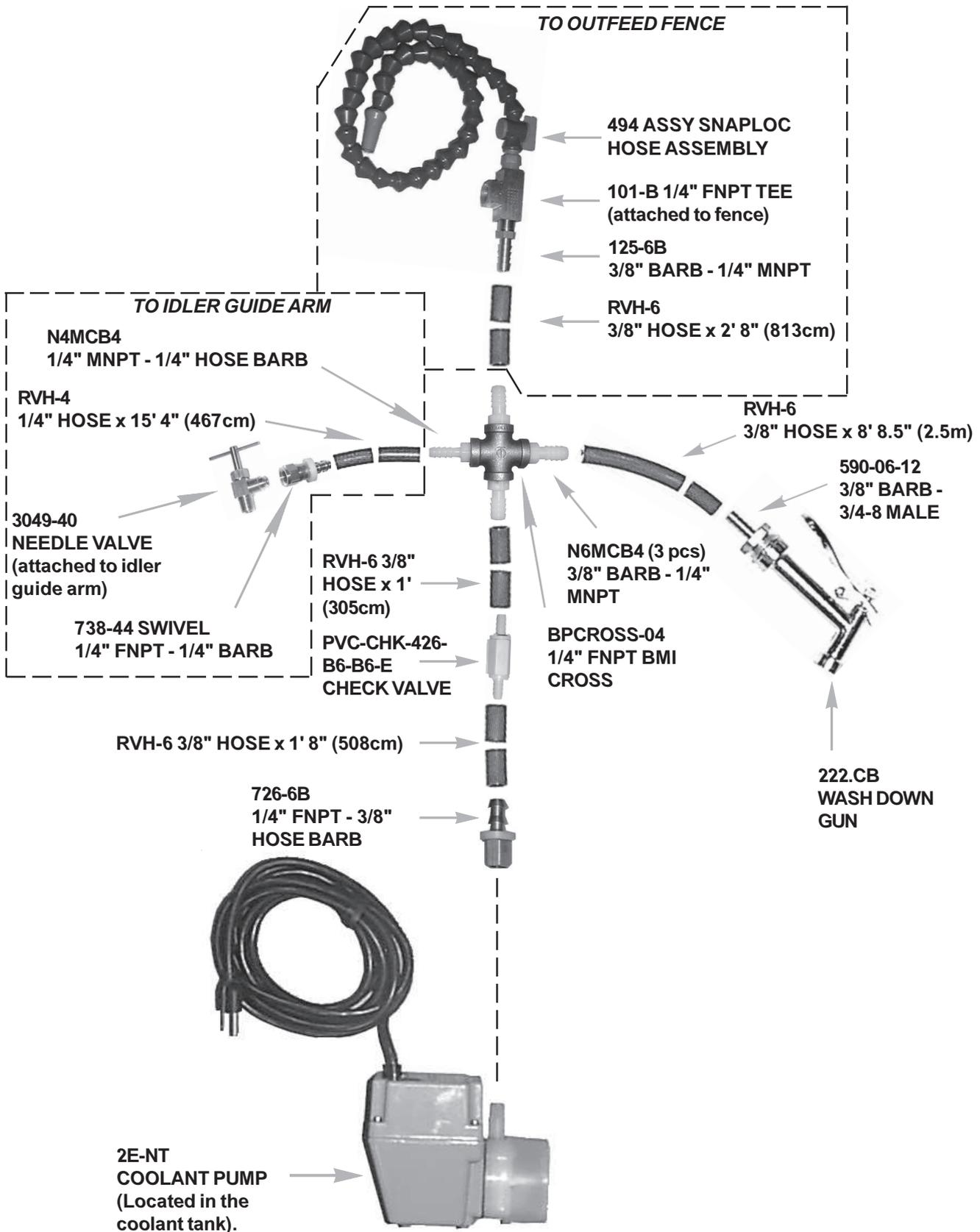
ITEM	QTY	S-22A PART NUMBER	DESCRIPTION
1	2	7.260X1X.125	WEAR RING
2	2	H2250	2 1/4" SHAFT WIPER
3	1	S22A-1-03B	JAW GUIDE SHAFT
4	1	SH-0237-PA	2 3/8" EXTERNAL RETAINING RING
5	1	S22A-1-02C	CYLINDER MOUNTING PLATE
6	4	B1-.375x1	HEX HEAD CAP SCREW
7	4	.375LOC	LOCK WASHER
8	1	S22A-C3-00H	VISE CYLINDER
9	1	S22-1-01A	WEAR PLATE
10	14	F1-.312x.5	FLAT SOCKET HEAD CAP SCREW
11	1	S22A-1-01C	FRONT MOVABLE JAW
12	1	F1-.75x2	FLAT SOCKET HEAD CAP SCREW
13	1	F1-.75x1.5	FLAT SOCKET HEAD CAP SCREW
14	1	S22A-G1-01	FRONT WEAR STRIP (short)
15	1	S22A-G1-02	REAR WEAR STRIP (long)

WORK STOP ASSEMBLY

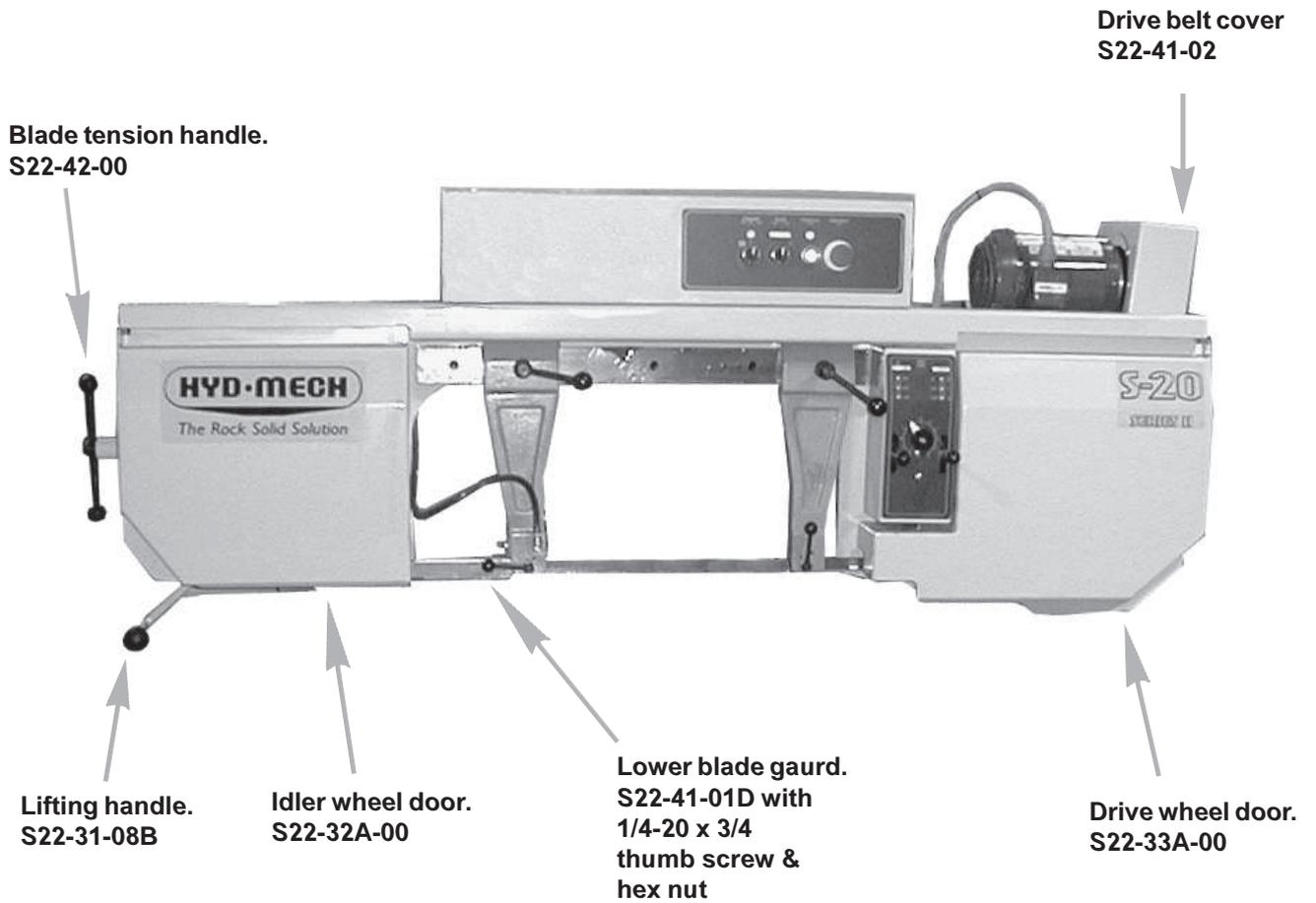


ITEM	QTY	S-22 PART NUMBER	DESCRIPTION
1	1	S22-G15-01	ARM
2	2	KHU-30	KNOB, 5/16-18X1 STUD
3	1	S22-G15-02	GUIDE BAR
4	1	S1-.375X2.25-C	SOCKET SET SCREW, CUP POINT
5	2	30 C0750-040	DISC SPRING
6	1	A1-.375X2.5	SOCKET HEAD CAP SCREW
7	1	.375-16HXNUT	HEX NUT
8	1	S22-G15-03	BAR
9	1	S22-G15-04	STOPPER (press fit to 8)
10	1	S22-G151-00	MATERIAL STOP WELDMENT

COOLANT GROUP



DOORS and COVERS



BLADE BREAKAGE

