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a manual for our

MODEL CPO-315-HFA-NF

COLD SAW

Please read the manual

before operating this saw!!

Scotchman®
Metal Fabricating Solutions

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MODEL
CPO-315-HFA-NF
COLD SAW

S/N B1518 HFA & AFTER

FEBRUARY 2024

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1.0 INTRODUCTION

The CPO-315 HFA-NF Fully Automatic Cold Saw is a high speed saw designed to cut solids, tubes, flats and other profiles in grades of nonferrous material that range from aluminum, brass, copper, synthetics and extrusions.

Cold sawing is a process similar to a milling process. In most cases, this gives a finished cut that does not require any secondary machining or de-burring.

The high spindle speeds of this saw make it ideal for extrusions with varying cross section thicknesses.

To achieve the best results from this machine, choose the proper spindle speed. Proper material clamping and a good quality coolant are also important.

Cold sawing has several advantages over band saws and abrasive saws. Besides the mill quality cut, cold saws have the ability to generate faster cutoff times than band saws. There are no sparks and excessive noises that are associated with abrasive cutoff saws. There is no work hardening of the workpiece.

The vise allows for easy change over to special clamping jaws for profiles and extrusions. Having two spindle speeds enables the user to cut a wide range of materials.

2.0 SAFETY PRECAUTIONS

1. **The operators of this machine must be qualified and well trained in the operation of this machine. The operators must be aware of the capacities and the proper use of this machine.**

2. **This manual is not intended to teach untrained personnel how to operate equipment.**

3. **NEVER OPERATE THIS MACHINE WITH ANY OF THE PROTECTIVE GUARDS OR HOODS OPEN OR REMOVED!**

4. **Wear the appropriate personal protective equipment. Safety glasses are required at all times when operating or observing this machine in operation.**

5. **Never place any part of your body into the path of the saw blade, material vises or shuttle cylinder.**

6. **Do not wear loose fitting clothing, gloves or jewelry when operating this machine.**

7. **All electrical connections shall be made by a qualified electrician. This machine must be grounded in accordance with the National Electric Code.**

8. **Disconnect the machine from the power source before performing maintenance or changing blades.**

9. **Strictly comply with all of the warning labels and decals on the machine. Never remove any of the labels. Replace worn or damaged labels promptly.**

10. **Practice good housekeeping. Keep the area around the machine clean and dry. Do not obstruct the operator's position by placing anything around the machine that would impede the operator's access to any of the machine's functions.**

11. **When sawing, always support long pieces and make sure that the material is properly clamped.**

12. **Keep the guards, as well as all other parts of the saw, in good working condition. Replace worn parts promptly.**

13. **Do not alter or modify this machine in any way without written permission from the manufacturer.**

14. **Set up a program of routine inspections and maintenance for this machine. Make all repairs and adjustments in accordance with the manufacturer's recommendations.**

3.0 WARRANTY

Scotchman Industries, Inc. will, within 2 years of date of purchase, replace F.O.B. the factory or refund the purchase price for any goods which are defective in materials or workmanship, provided that the buyer returns the warranty registration card within thirty (30) days of purchase date, and at the seller's option, returns the defective goods, freight and delivery prepaid, to the seller, which shall be the buyer's sole and exclusive remedy for defective goods.

Hydraulic and electrical components are subject to their respective manufacturer's warranties.

This warranty does not apply to machines or components which have been altered, changed or modified in any way or subjected to abusive or abnormal use, inadequate maintenance or lubrication or subjected to use beyond the seller's recommended capacities and specifications.

In no event shall seller be liable for labor costs expended on such goods or consequential damages.

Seller shall not be liable to purchaser or any other person for loss or damage, directly or indirectly arising from the use of the goods or from any other cause.

No officer, employee or agent of the seller is authorized to make any oral representations or warranty of fitness or to waive any of the foregoing terms of sale and none shall be binding on the seller.

Any electrical changes made to the standard machine to comply with local electrical codes must be paid by the purchaser.

As we constantly strive to improve our products, we reserve the right to make changes without notification.

4.0 INSTALLATION AND SET-UP

⌦ **CAUTION: THIS SECTION DISCUSSES INSTALLATION AND SET-UP PROCEDURES. PLEASE READ ALL SECTIONS OF THIS MANUAL THOROUGHLY BEFORE OPERATING THIS MACHINE.**

4.1 PHYSICAL DIMENSIONS

SEE FIGURE 1 ON THE FOLLOWING PAGE.

		DIMENSIONS	
		INCHES	**CM**
A	**HEIGHT**	**65**	**165**
B	**FLOOR TO VISE**	**38.5**	**98**
C	**BASE HEIGHT**	**35**	**89**
D	**VISE OPENING**	**3-5/8**	**9.2**
E	**VISE DEPTH**	**2-1/4**	**5.7**
F	**BASE WIDTH**	**61**	**155**
G	**BASE DEPTH**	**25**	**64**
H	**WIDTH**	**100**	**254**
I	**DEPTH**	**44**	**112**
	WEIGHT	**1,770 LB.**	**805 KG.**

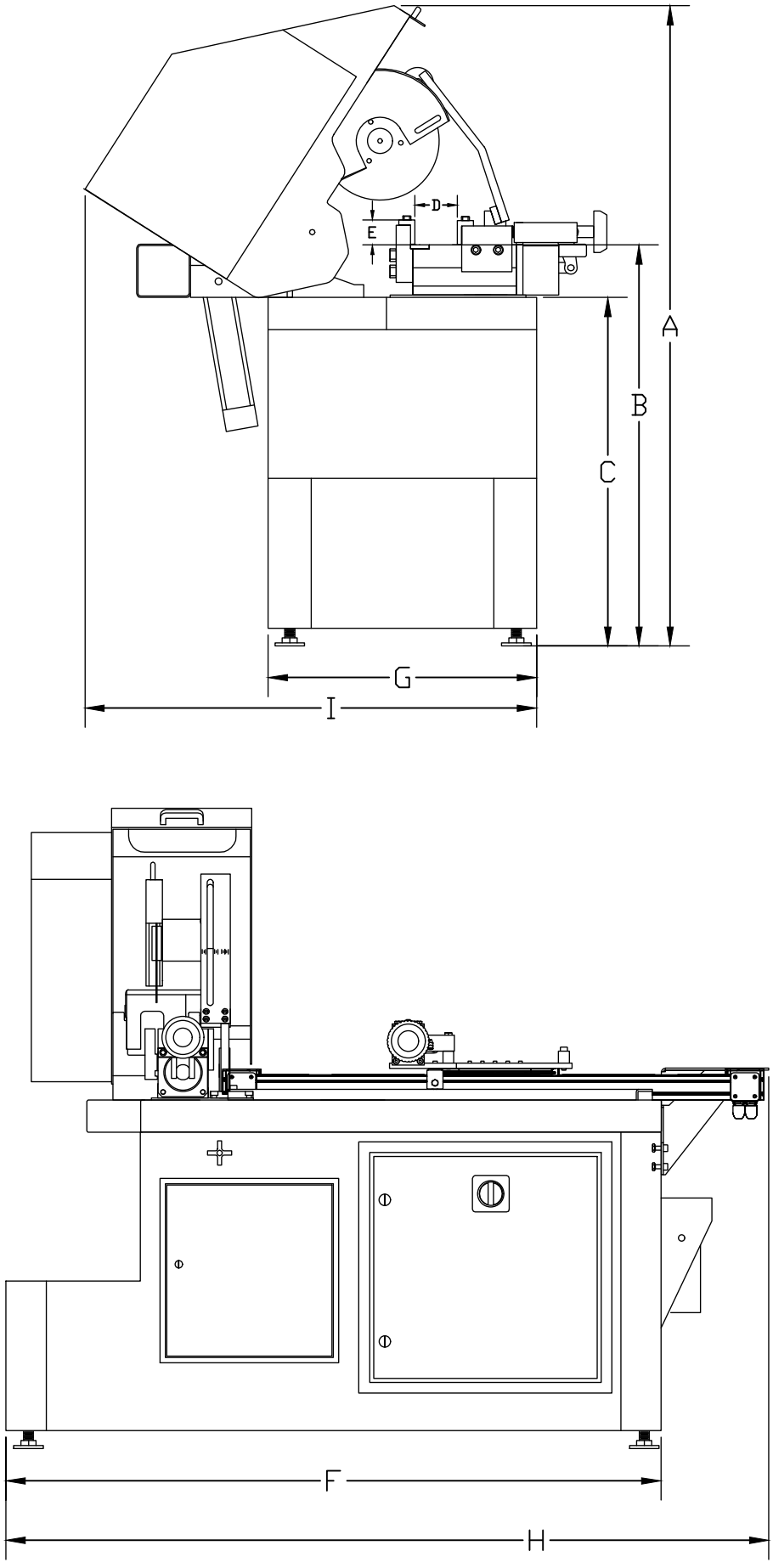


FIGURE 1

4.2 MACHINE INSTALLATION

SEE FIGURE 2 ON THE FOLLOWING PAGE.

This machine is shipped on a pallet and can be moved to the installation location by means of a fork lift.

⌦ CAUTION: THIS MACHINE IS TOP HEAVY AND MUST BE MOVED WITH CARE, ON HARD FLAT SURFACES ONLY.

USE THE FOLLOWING STEPS TO INSTALL THE MACHINE:

1. **Select a location for the machine that allows adequate room for any length of material you may want to cut. Leave adequate space behind the machine and on either end for set-up and maintenance.**

2. **Lift the machine off of the shipping pallet, using a fork lift.**

3. **Place the machine in its final location and level it, using the leveling pads. For this machine to function properly, it is very important that it is level. Any supply tracks used with this machine must also be level and aligned with the vises on the machine.**

4. **Install the shuttle cylinder on the machine.**

5. **We strongly recommend that the machine and any tracks be anchored to the floor. The shipping brackets that hold the machine to the pallet can be used to anchor the machine to the floor.**

6. **Connect the main air and electrical supply lines to the machine. To connect the air, slide the shuttle valve (I) down to the closed position and connect the incoming supply line. (DO NOT TURN THE AIR ON YET.) This machine requires a minimum of 90 PSI and may require up to 130 PSI, depending on your application. The electrical supply lines must be connected by a qualified electrician. The supply lines connect to the top of the main disconnect switch (J) located in the lower base cabinet. Before connecting the electrical supply, make sure that your plant phase and voltage correspond to the phase and voltage of the machine.**

⌦ CAUTION: DO NOT POWER THE MACHINE UNTIL THE MACHINE INSTALLATION IS COMPLETE AND YOU HAVE READ ALL OF THE SECTIONS OF THIS MANUAL!

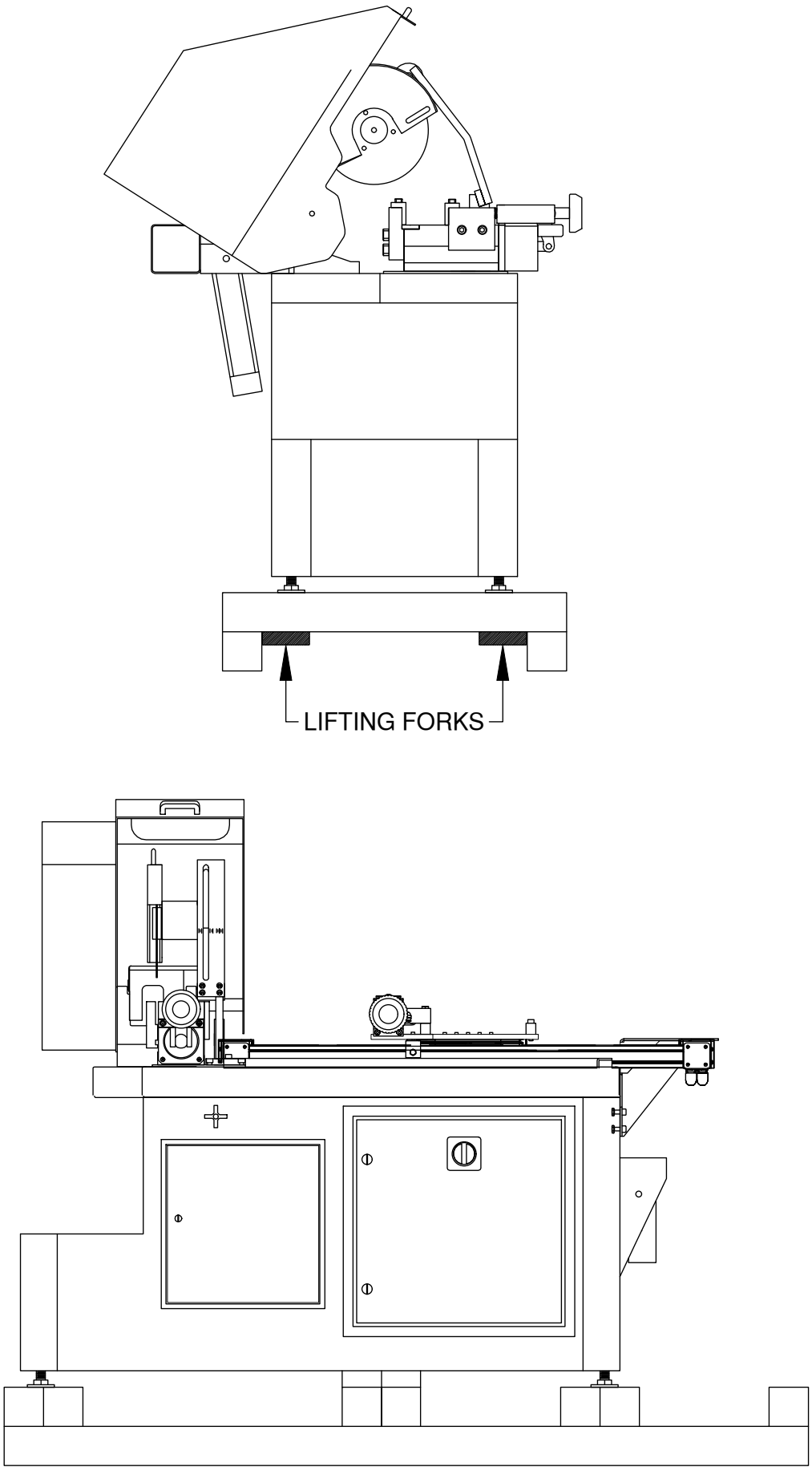


FIGURE 2

4.3 ELECTRICAL REQUIREMENTS

⌧ **CAUTION: TO PREVENT DAMAGE TO THE MACHINE AND DANGER TO THE OPERATOR, ALL ELECTRICAL CONNECTIONS MUST BE MADE BY A QUALIFIED ELECTRICIAN AND MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL ELECTRIC CODES.**

All machines are wired for three phase power. If the machine is not the same voltage as your plant voltage, you can purchase a transformer to either step up or down to the correct voltage for the machine. The other option is to change the voltage of the saw. To do that, it will be necessary to replace the motor-brake, change the primary leads on the transformer and rewire the motor. To ensure satisfactory performance, the supply voltage should be (+ or -) 10% of the motor voltage rating. Check the motor data tag for full load current requirement.

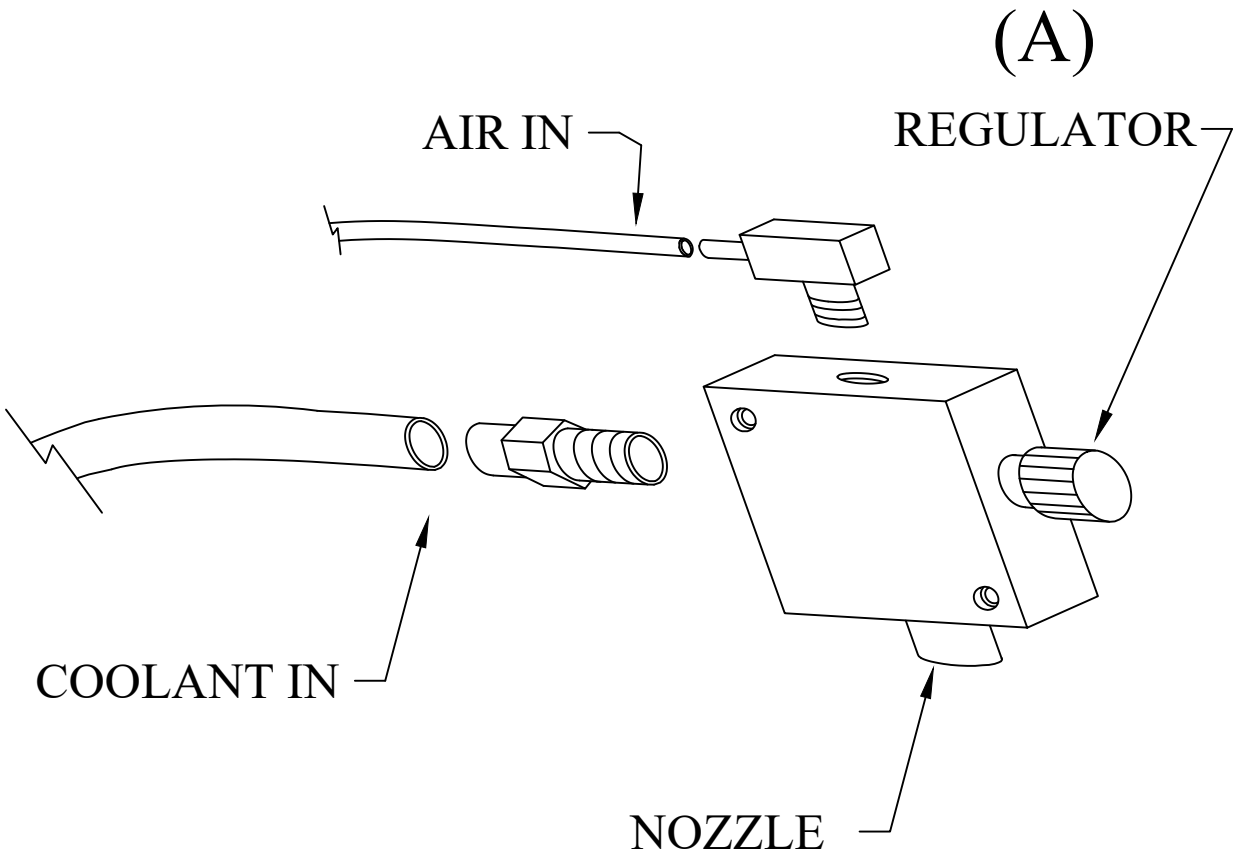
THE ELECTRICAL DIAGRAMS FOR THIS MACHINE ARE IN SECTION 14.

For supply lines ten feet (304 cm) or shorter, we recommend 12 gauge wire. For lines longer than ten feet (304 cm), we recommend 10 gauge wire. We do not recommend supply lines over twenty feet (609 cm) in length.

CPO-315-HFA-NF (3000 RPM)		
MOTOR VOLTAGE	**FULL LOAD CURRENT**	**HORSEPOWER**
208	16.4	5
230	15	5
460	7.5	5

4.4 COOLANT SYSTEM

The coolant system on this machine is a pneumatic mist type. We recommend using only our P/N 075760, SYNCON-2 coolant in this saw. One gallon of coolant is shipped with the saw. For the best results, we recommend that it is used straight and not diluted. The NF coolant reservoir has a capacity of (5) quarts (4.7 liters). The pressure regulator for the mister should be set at 15 PSI (1 BAR). The amount of air is regulated by the adjustment knob (A) on the end of the mister unit. The mist spray should be evenly distributed on both sides of the blade.



MISTER UNIT

FIGURE 3

5.0 MACHINE START-UP

Before starting this machine, take the time to review the operator's manual thoroughly, to familiarize yourself with all of the functions of the machine.

We strongly urge you to follow OSHA directive CFR-1910.147 (effective 09-09-90) regarding lock-out, tag-out procedures. Keep in mind that the directive refers to all hazardous energy sources, not just electrical.

The air supply must also be disconnected and locked or tagged.

Do not install a blade on the saw until after it has been powered and cycled several times.

Once the machine has been powered, check the rotation of the spindle. There is an arrow on the guard showing the proper rotation. If the rotation is not correct, the electrician will have to switch two of the three line wires.

5.1 CONTROL PANEL FUNCTIONS

SEE FIGURE 4 ON THE FOLLOWING PAGE.

The following section gives a brief description of each of the control panel switches and buttons.

Before powering the machine, please familiarize yourself with the location and the function of each of these items. SECTION 7.0 will describe how to set the machine up for an operation.

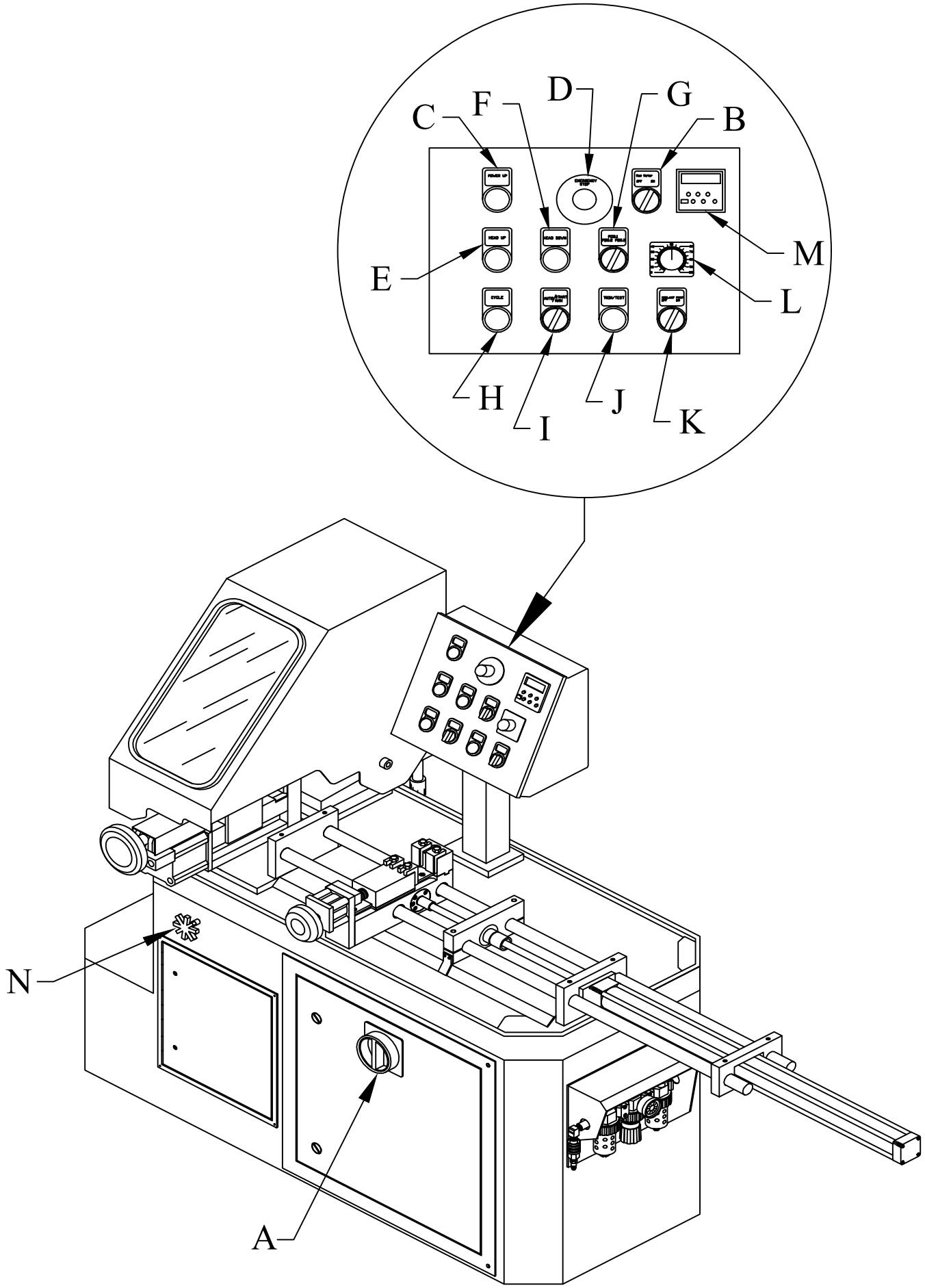


FIGURE 4

5.1A MAIN POWER SWITCH

This is the main power disconnect switch for the machine and it should be locked or tagged in the OFF position any time maintenance or service work is being performed. Maintenance or service work on the electrical controls must be performed by qualified personnel. This switch must be in the ON position to operate any of the other control panel functions.
There is a red power indicator light on the control panel. This light indicates that this switch is in the ON position. This switch must be in the ON position when changing the fuses in the PLC. If the fuses are removed with the power OFF, the PLC memory will be lost.

⌦ **CAUTION: THIS SWITCH DOES NOT DISCONNECT THE AIR SUPPLY TO THE MACHINE. ANY TIME MAINTENANCE OR SERVICE WORK IS PERFORMED ON THE MACHINE, THE AIR SUPPLY MUST ALSO BE DISCONNECTED AND TAGGED OR LOCKED OUT.**

5.1B MOTOR CONTROL SWITCH

This switch is used to turn the motor on.

5. 1C POWER UP SWITCH

This switch energizes the system for the rest of the control panel functions. This switch will also start the saw motor. The motor will not start unless the MAIN POWER switch (A) is on and the AUTOMATIC/ MANUAL SWITCH (I) is in the MANUAL position. The MOTOR SWITCH (B) must be in the on position for the saw motor to start.

5.1D EMERGENCY STOP SWITCH

This switch stops the saw motor and allows the head to return to the up position. The emergency stop switch does not release the material vise or the air pressure. Once this switch has been used, the operator must restart the machine in the MANUAL position and go through the startup procedure again. For complete instructions on changing bars of material, REFER TO SECTION 7.0.

5.1E HEAD UP

This button is used to abort a cut in mid cycle when the AUTOMATIC/MANUAL SWITCH is in the MANUAL position. This button is inoperable when the machine is in the AUTOMATIC position.

5.1F HEAD DOWN

This button is also used to set the overall stroke of the machine and to make manual cuts.

5.1G HITCH SELECTOR

This switch is used to select the number of hitches the shuttle vise makes before the saw makes a cut.

POSITION 1 is for parts from 0 to thirty inches in length. POSITION 2 is for parts from thirty to sixty inches. POSITION 3 is for parts from sixty to ninety inches.

5.1H CYCLE/START BUTTON

This button starts the machine cycle. The CYCLE/START button is used to make trim cuts and set-up cuts prior to starting the automatic operation. It is also used to start the automatic operation once all of the test cuts are done.

5.1I AUTOMATIC/MANUAL SWITCH

This switch must be in the MANUAL position to start the machine, to make trim cuts and to set the product lengths. After the machine has been set up and sample cuts have been made, this switch is moved to the AUTOMATIC position. Any time that the saw is in the AUTOMATIC position, this switch can be turned to the MANUAL position. When it is turned to the MANUAL position, the machine will complete the cycle it's on and stop when the head reaches the up position. The saw motor will continue to run when this switch is used to stop the automatic operation of the machine. When this switch is in the AUTOMATIC position and the machine runs out of product, the operator must reset the machine's operation. For instructions on changing bars of material, REFER TO SECTION 7.0. When this switch is used to stop the automatic operation, you can make manual cuts as needed by depressing the CYCLE button (H). The machine will shuttle and cut one part. This can be done as many times as necessary.

You can then switch the AUTOMATIC/MANUAL SWITCH to the AUTOMATIC position and press the cycle button again. The machine will continue with the automatic operation until the part count is complete or the machine is out of material.

5.1J TRIM/TEST

This button is used to do first part cuts prior to running the machine in the automatic position. With the AUTO/MANUAL switch in the MANUAL position, press the TRIM/TEST button (J) and then, press the CYCLE button (H). The saw will trim, and then cut, one part and return to the up position. Make whatever adjustments you need to and depress the CYCLE button (H) again and the saw will cut one more test piece. After you are satisfied with all of the settings, place the AUTO/MANUAL switch (I) in the AUTOMATIC position and press the CYCLE button again. The saw will start the automatic operation.

5.1L POWER INDICATOR LIGHT

This switch indicates that the main switch (A) is on and that there is power to the control panel.

5.1M COUNTER

This counter can be programmed to count up or down, depending on your preference. The counter is programmed from the factory to count up. If you have an application that requires the counter to be set to count down, please SEE SECTION 6.9. To set the counter for an operation, press the white buttons until the number of pieces you want to cut is displayed on the bottom row of the counter. If you press a number you do not want, continue pressing the button until it returns to zero and then, start over. The machine will run in the automatic position until the top row of the counter reaches the same number as the one you selected on the bottom row. The machine will also quit the automatic operation if the machine runs out of material. The machine will not run in the automatic mode if there is not a quantity set on the counter.

5.1N FEED RATE CONTROL

This valve controls the down feed rate of the saw head and is used in the set-up of the up and down stroke control of the saw head. To adjust the down feed cutting rate of the head, turn the control all the way to the right (clockwise) and then, open it one turn. The down feed rate is set by sound. Start with a slow rate and gradually increase it until the blade chatters, then back it off slightly. Selecting the proper blade and the condition of the blade will effect the down cutting rate dramatically.

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6.0 MACHINE OPERATION

6.1 BLADE INSTALLATION

SEE FIGURE 4A BELOW.

⊠ **CAUTION: THIS MACHINE IS DESIGNED TO USE CARBIDE TIPPED BLADES, ONLY. USE ONLY BLADES DESIGNED FOR THIS MACHINE. DO NOT USE BLADES DESIGNED FOR THIS MACHINE ON ANY OTHER EQUIPMENT. THE MAXIMUM RPM'S FOR THESE BLADES IS 4,000.**

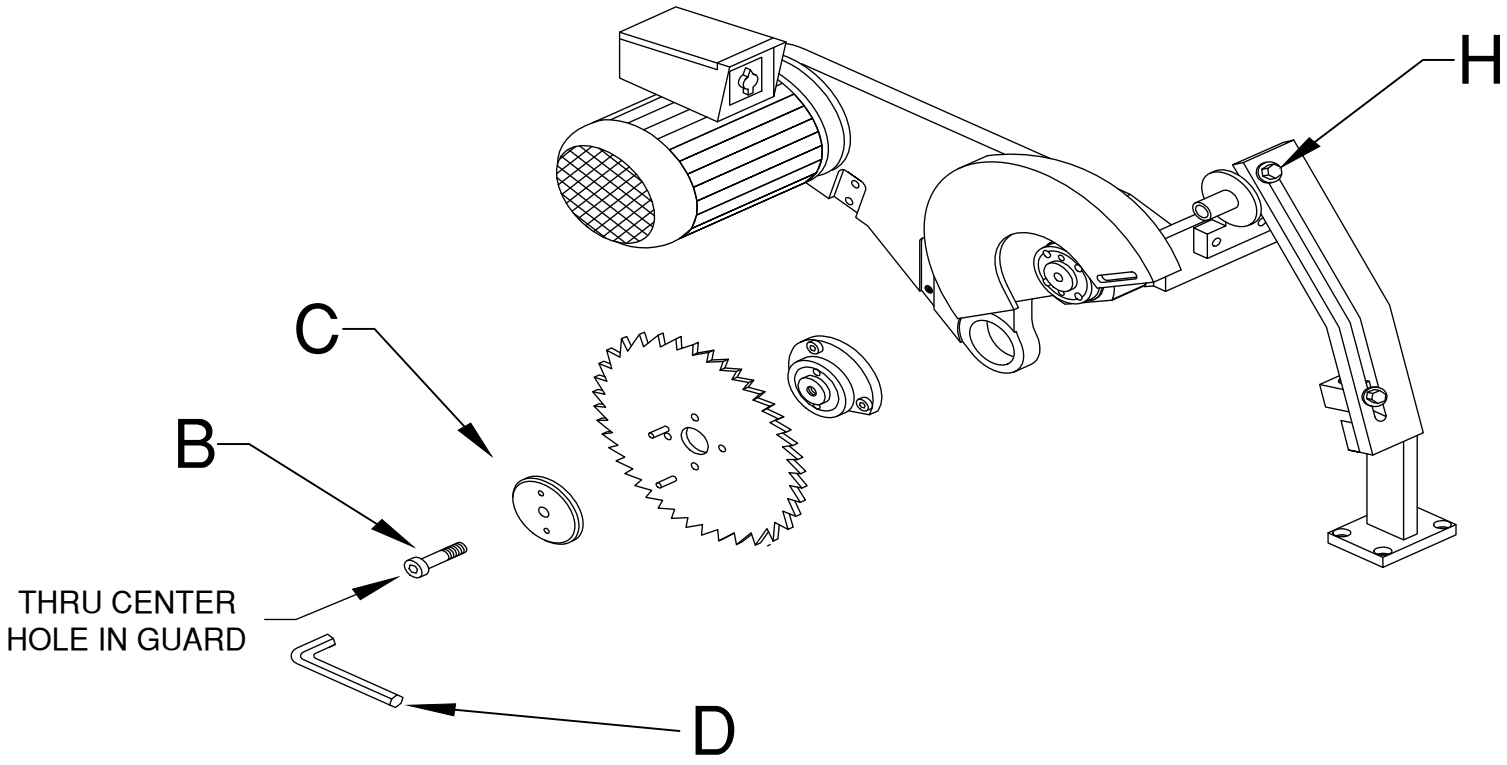


FIGURE 4A

The CPO-315-HFA-NF saw is designed to use a maximum 12 inch (300mm) diameter blade.

The arbor size is 40mm with two 8mm pins spaced at 55mm.

BEFORE INSTALLING THE BLADE, make sure that the power to the machine is off.

USE THE FOLLOWING STEPS TO INSTALL A BLADE:

An 8mm hex key wrench (D), shipped with each machine, is required to change blades.

1. **Raise the movable hood guard to the open position.**

2. **Release the upper stroke control stop (H) and allow the head to travel to its full up position.**

3. **Remove the blade bolt (B) and the blade flange (C).**

☒ **NOTE: The blade bolt is left hand threaded and must be turned clockwise to remove it.**

4. **Check the blade flange, the blade and the saw spindle for any chips or nicks that will affect the way the blade seats.**

5. **Install the blade. Make sure that the pin holes in the blade line up to the holes in the spindle.**

6. **Replace the blade flange (C) and start the bolt (B) into the spindle.**

7. **Before locking the blade in position, the back lash must be taken up. To take up the back lash, rotate the bottom of the blade toward you until it seats against the drive pins.**

⌦ **CAUTION: THE BLADES ARE VERY SHARP AND CARE MUST BE TAKEN WHEN REMOVING THE BACK LASH. DO NOT GRIP THE CUTTING EDGE OF THE BLADE BARE HANDED. THE BACK LASH MUST BE TAKEN UP EVERY TIME A BLADE IS CHANGED.**

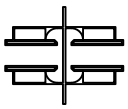
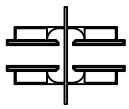
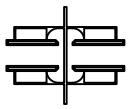
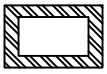
8. **After taking up the back lash, tighten the blade bolt (B).**

9. **Reset the upper stroke control and return the movable hood guard to the down position.**

10. **Break in the saw blade. The teeth on new or re-sharpened blades have a very sharp edge and should be fed through the first three or four cuts, very slowly, before starting normal cutting. Besides taking up the back lash and breaking in the blade, it is very important to keep the blade flange, the spindle and the blade clean and free from nicks. Failure to do these things will result in broken or damaged blades.**

6.2 SAW CAPACITIES

SEE FIGURE 5 BELOW.
Figure 5 below is a chart showing the maximum capacities of this machine in various materials.

CAPACITIES WITH MAXIMUM DIAMETER BLADES 315 MM		HFA 90° ONLY 	RFA/ST 90° ONLY 	RFA/ST BUNDLE FEED 
	INCHES MM	Ø3-1/2 Ø89	Ø3 Ø76	Ø3 Ø76
	INCHES MM	3-1/8 X 3-1/8 79 X 79	2-1/2 X 2-1/2 63 X 63	2-1/2 X 2-1/2 63 X 63
	INCHES MM	3-1/8 X 3-1/8 79 X 79	2-1/2 X 2-1/2 63 X 63	N/A
	INCHES MM	3-1/8 X 3-1/8 79 X 79	2-1/2 X 2-1/2 63 X 63	N/A
	INCHES MM	3-1/2 X 2-3/4 89 X 70	3 X 2-1/2 76 X 63	3 X 2-1/2 76 X 63
 FERROUS	INCHES MM	Ø1-3/4 Ø44	Ø1-3/4 Ø44	Ø1-3/4 Ø44
 FERROUS	INCHES MM	1-1/2 X 1-1/2 38 X 38	1-1/2 X 1-1/2 38 X 38	1-1/2 X 1-1/2 38 X 38
 NF	INCHES MM	Ø3-1/2 Ø89	Ø3 Ø76	Ø3 Ø76
 NF	INCHES MM	3-1/8 X 3-1/8 79 X 79	2-1/2 X 2-1/2 63 X 63	2-1/2 X 2-1/2 63 X 63

03/21 #047200

FIGURE 5

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Metal Fabricating Solutions

CPO 315 HFA - HITCH FEED AUTOMATIC SAW

Ideal for high volume and short length applications that require very accurate and clean cuts; this Hitch Feed Automatic (HFA) cold saw is fully automatic and provides uninterrupted cutting on tubing or solids.

OPTIONAL EQUIPMENT

- **Form jaws for multiple tubes**
- **Digital read-out for quick easy length setting**
- **Ten-foot or twenty-foot material supply track**

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6.3 MATERIAL MAIN VISE

SEE FIGURE 6 BELOW.

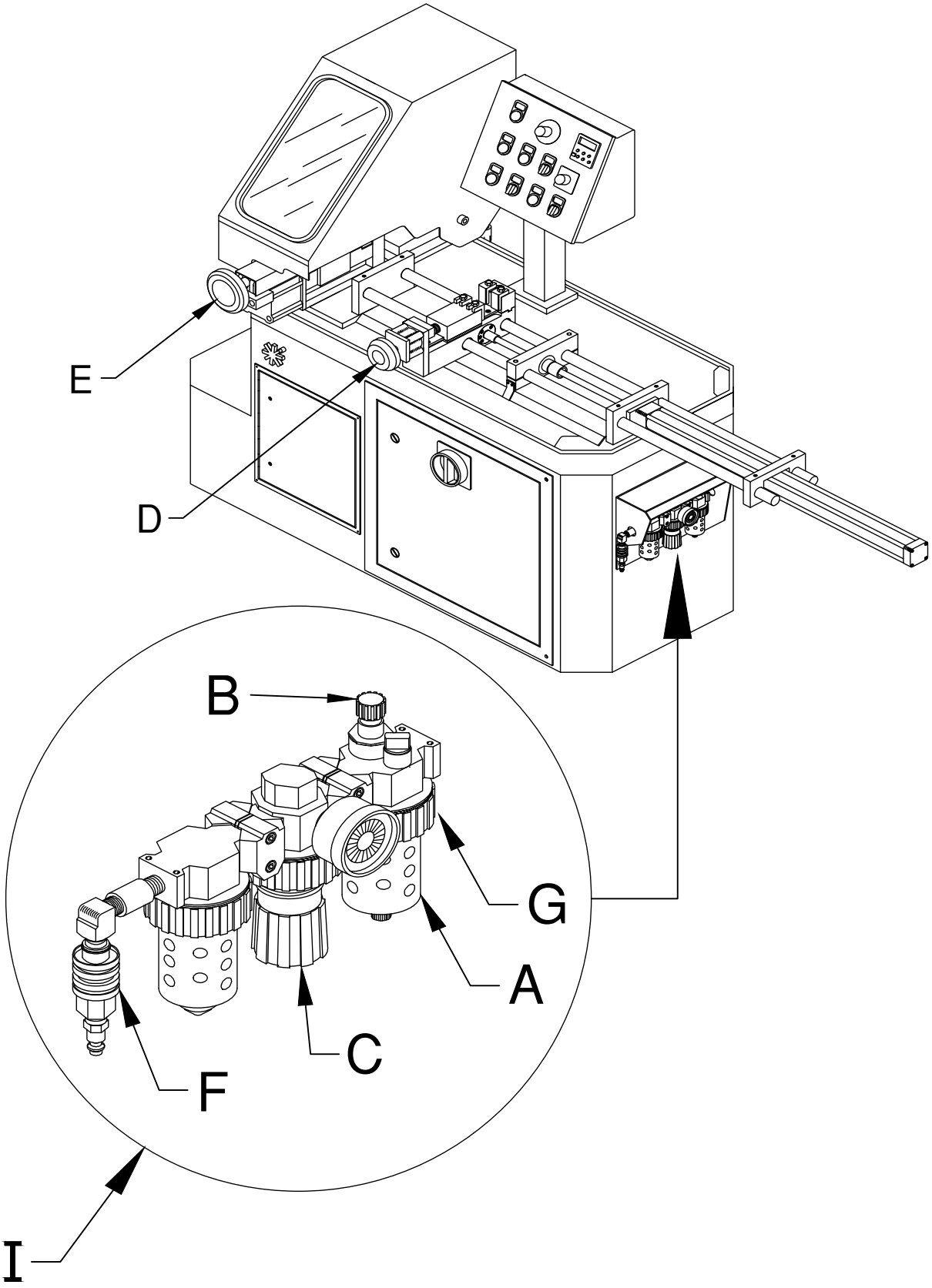


FIGURE 6

The following are set-up and maintenance instructions for the material main vise.

1. **Make sure that the filter/lubricating device (A) is full of oil.**

   NOTE: Use a quality (ISO 22) air line lubricant designed for automatic oilers.

2. **Slide the shuttle valve (F) on the filter/lubricator device down to the closed position.**

3. **Connect the air supply to the shuttle valve. Make sure that the vise is clear and that the head is in the UP position.**

4. **Slide the shuttle valve up to open the valve. Whenever the shuttle valve is closed, it bleeds the air pressure out of the system automatically.**

5. **Adjust the air pressure regulator (C). 90 PSI (6.2 BAR) is the minimum operating pressure. 130 PSI (9 BAR) is the maximum.**

6. **The vise is activated by the top proximity switch on the saw head.**

7. **The lubricating device (A) should release one drop of oil every 5 to 10 cycles. On top of the lubricating device is a clear plastic dome with a small tube inside. The oil should drop out of the tube. The lubricating device is adjusted by turning the knob (B) on the top of the lubricator.**

8. **To add oil to the lubricating device, disconnect the air supply and remove the plastic bowl. The bowl is threaded and is removed by turning the threaded collar (G). Fill the bowl approximately 3/4 full of oil designed for air lubricators and screw it back onto the lubricator.**

TO ADJUST THE VISE TO THE SIZE OF MATERIAL BEING CUT:

1. **Open the vise, using the positioning handle (E), and place the material in the vise.**

2. **Crank the vise closed to within approximately 1/8 of an inch (3mm) from the material. The power vise has approximately 1/4 of an inch (6mm) of stroke. Proper clamping is very important and special jaws may be required for some materials.**

FOR MORE INFORMATION CONTACT YOUR LOCAL DEALER OR THE FACTORY.

MODEL

CPO-315-HFA-NF

- FULLY AUTOMATIC CYCLE
- PUSH BUTTON CONTROLS ACTUATE THE COMPLETE CYCLE
- INTERLOCKING SAFETY HOOD
- EMERGENCY STOP BUTTON
- INTERLOCKING SAFETY HOOD
- QUICK AND EASY FINE ADJUSTMENT OF LENGTH SETTING
- MIST COOLANT LUBRICATION SYSTEM
- ADJUSTABLE STROKE CONTROL ON THE SAW HEAD
- ADJUSTABLE DOWN FEED CONTROL ON THE SAW HEAD FOR FEED RATE

6.4 SHUTTLE VISE AND CYLINDER

REFER TO FIGURE 6 ON PAGE 22.

⌧ **CAUTION: ALWAYS DISCONNECT THE AIR SUPPLY BEFORE REMOVING THE FILLER PLUG FROM THE RESERVOIR. IF THE FILLER PLUG IS REMOVED WHILE THE MACHINE IS CONNECTED TO AIR PRESSURE, THE FLUID IN THE TANK WILL BE PURGED THROUGH THE OPENING UNDER PRESSURE.**

The fluid level in the reservoir should be 1-1/2 inches below the top of the reservoir when the shuttle cylinder is completely extended, all the way to the left, up against the material main vise. Do not add oil if the cylinder is in any other position. Over filling the reservoir will cause hydraulic oil to be forced into the air system of the machine. Use a SAE 10W (ISO 32) non-foaming hydraulic oil, such as Mobil DTE 10 or equivalent.

The following are set-up and maintenance instructions for the shuttle assembly.

1. **STEPS 1 THROUGH 8 are the same for the shuttle vise as they are for the material vise. TO ADJUST THE VISE TO THE SIZE OF MATERIAL BEING CUT:**

2. **Open the vise, using the positioning handle (D) and place the material in the vise.**

3. **Crank the vise closed to within approximately 1/8 of an inch (3mm) from the material. The power vise has approximately 1/4 of an inch (6mm) of stroke. Proper clamping is very important and special jaws may be required for some materials. The speed of the shuttle cylinder is controlled by the flow control valve (H) on the bottom of the reservoir. Since the shuttle system is a positive stop type, feeding heavier materials too fast will adversely affect the tolerance of the length of the part. The feed rate is preset and should not need to be adjusted. If you do decide to adjust it, make the adjustments in small increments.**

6.5 POWER DOWN FEED

REFER TO FIGURE 8 BELOW.

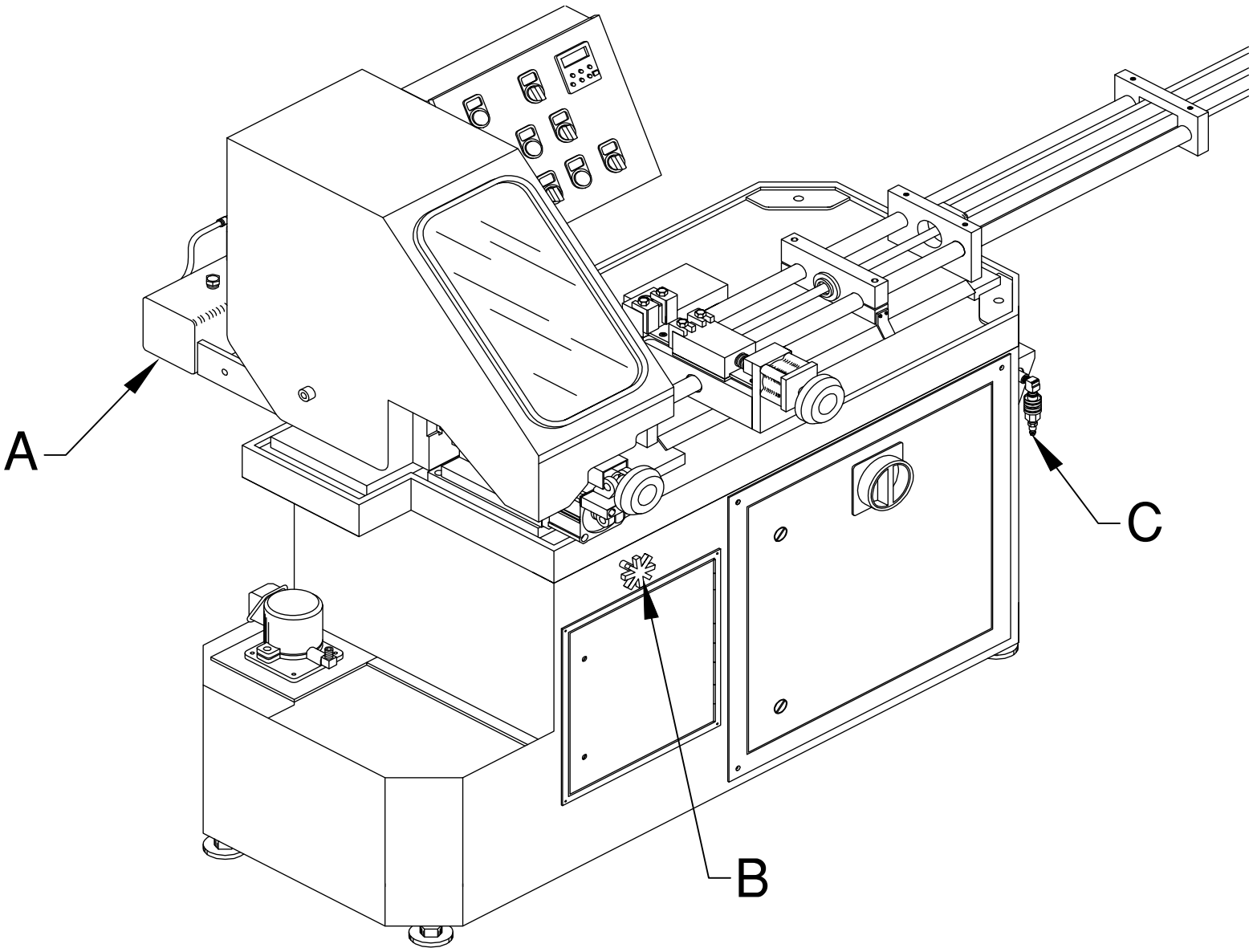


FIGURE 8

⌧ **CAUTION: ALWAYS DISCONNECT THE AIR SUPPLY BEFORE REMOVING THE FILLER PLUG FROM THE RESERVOIR. IF THE FILLER PLUG IS REMOVED WHILE THE MACHINE IS CONNECTED TO AIR PRESSURE, THE FLUID IN THE TANK WILL BE PURGED THROUGH THE OPENING UNDER PRESSURE.**

1. **BEFORE POWERING THE SAW, check the oil level in the reservoir (A). It should be approximately 2-1/2 inches below the top of the reservoir when the saw head is in the UP position. Over filling the reservoir will cause hydraulic oil to be forced into the air system of the machine. Use a SAE 10W (ISO 32) non-foaming hydraulic oil, such as Mobil DTE 10 or equivalent.**

2. **Slide the shuttle valve (C) to its CLOSED position and connect the air supply.**

3. **Slide the shuttle valve (C) to it's CLOSED position and connect the air supply.**

4. **The down feed rate is adjusted using the flow control valve (B). The down feed rate should be set during the set up of an operation while the AUTOMATIC/MANUAL switch is in the MANUAL position. The setting of the down feed rate is done by sound. Slowly adjust the rate as the saw makes a cut. Once the blade starts to chatter or the saw starts to load up, back the rate off by a 1/4 of a turn. Many things, including the type of material being cut, the blade RPM and the condition of the blade, will affect the down feed rate.**

6.6 MATERIAL CLAMPING

All work pieces must be clamped securely in the vise. Any slippage of the material can result in broken or damaged blades. The material should be clamped so that the contact surface between the material and the blade is as small as possible. For this reason, when cutting flat stock material, we recommend standing it up and cutting it through the thinnest section, whenever possible. We also recommend cutting square tubing through the diagonal section and angle iron with the web up. Some thin walled round sections and profiles will require special jaws to hold them.
FOR EXAMPLES, SEE FIGURE 7 ON PAGE 24.

6.7 STROKE CONTROL ADJUSTMENT

SEE FIGURE 9 ON THE FOLLOWING PAGE. TO ADJUST THE UP AND DOWN STROKE OF THE SAW HEAD, USE THE FOLLOWING STEPS:

1. **With the machine's power off, raise the hood of the saw.**
2. **Using a 17mm wrench, loosen the bolt (A) on the lower stroke control (B) and let the stroke control rest at the bottom of the slot.**
3. **Place a piece of the material you are going to cut in the saw vise and manually clamp it in a position so that the saw blade will not contact the material when the head comes down.**
4. **Close the hood. The saw will not run with the hood open.**
5. **Make sure that the motor switch (D) is in the 0 position so that the saw blade does not turn while performing this set up.**
6. **Power the saw and press the HEAD DOWN button (E).**
7. **When the blade has passed the material in the vise by approximately 1/8 of an inch (3mm), stop the head movement by turning off the flow control valve (F) and turn off the air pressure by sliding the shuttle valve (G) down.**
8. **Turn the power off and raise the hood. Bring the lower stroke control (B) up to the head stop and lock it in place.**
9. **Bring the upper stroke control (C) down to the head stop and lock it in place.**
10. **Turn the air back on by moving the shuttle valve (G) up and open the flow control valve (F) one turn.**
11. **Loosen the bolt (A) on the upper stroke control (C) and allow the head to move slowly up until the blade is approximately 1/8 of an inch (3mm) above the material in the vise. Tighten the bolt in the upper stroke control.**

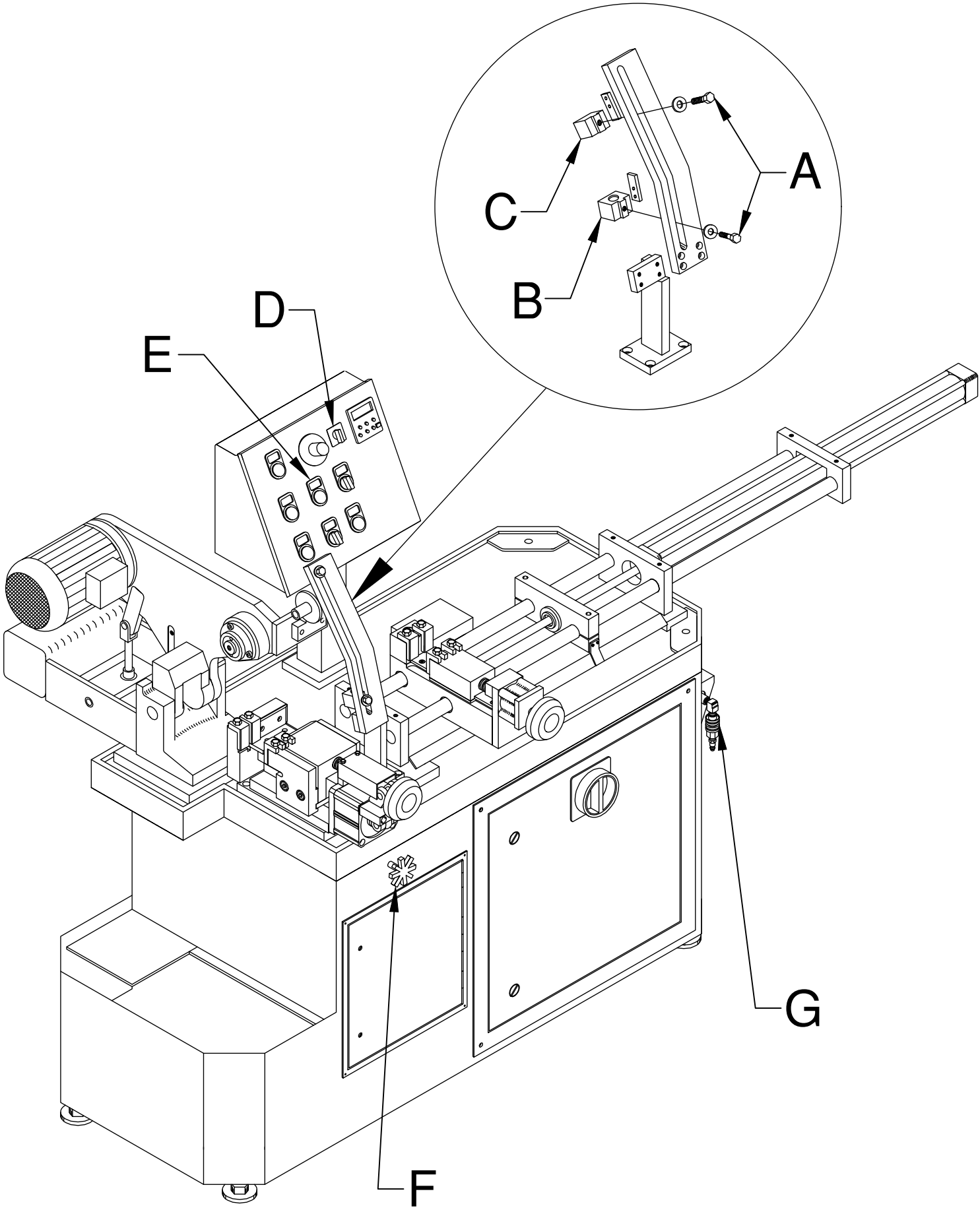


FIGURE 9

6.8 COUNTER SET-UP

REFER TO FIGURE 10 BELOW.

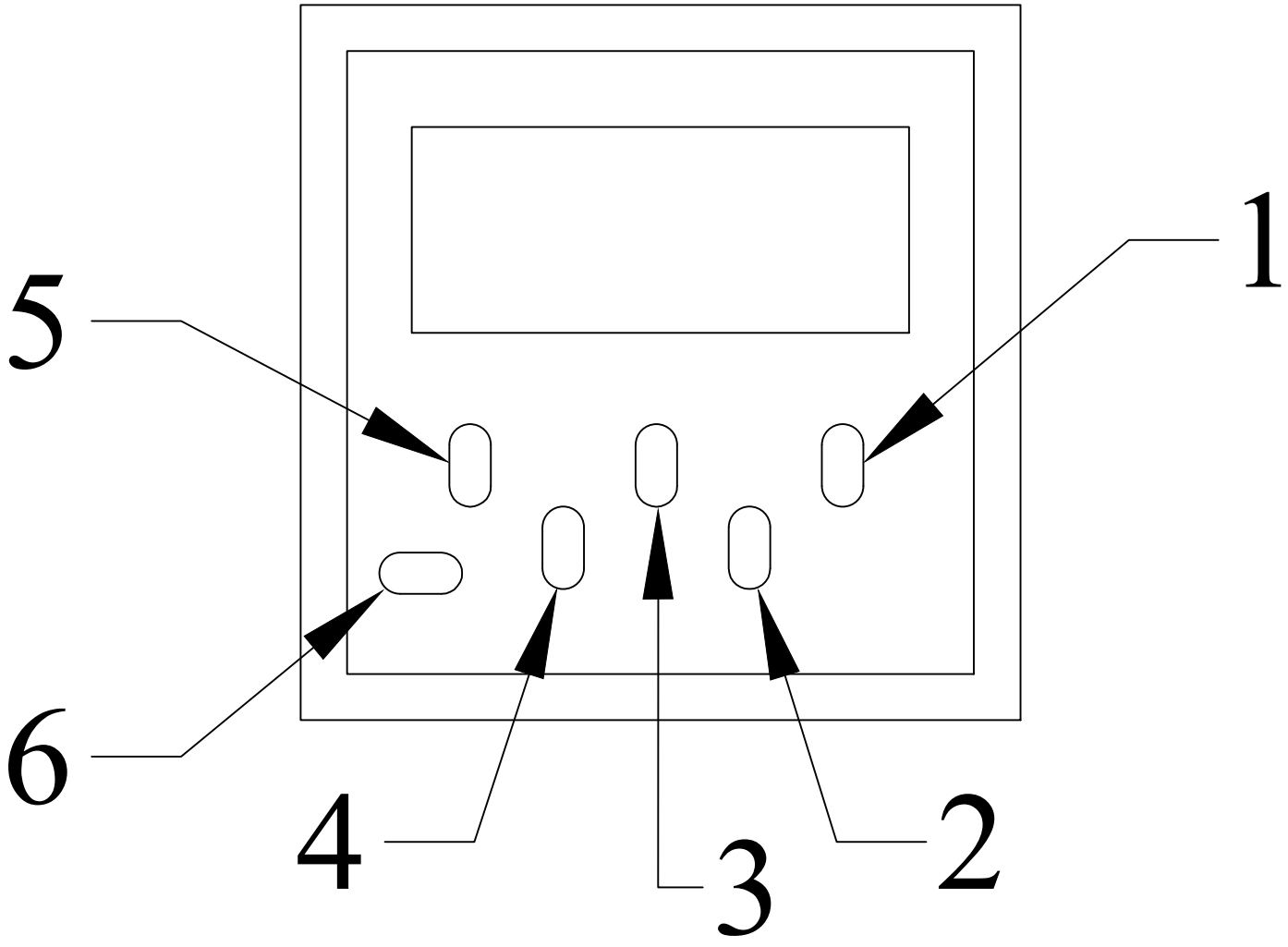


FIGURE 10

THE COUNTER ON THIS MACHINE CAN BE SET TO COUNT EITHER UP OR DOWN.
TO SET THE COUNTER, USE THE FOLLOWING STEPS:

1. **To enter the programming mode, depress the reset button (A), along with buttons 5 and 6. On the lower line of the display, the message INIT appears with a down counter subtracting from five to zero seconds.**
2. **If the buttons are released when the counter is on five seconds, the display will enter an LCD test. If the buttons are released between five and one second, the counter returns to the operating mode.**
3. **If the keys are released after the counter reaches zero, the counter will enter the programming mode.**
4. **Once you are in the programming mode, the display will read COUNT ADD or COUNT SUB. Count Add will count up to the pre-set number. Count Sub will count down from the pre-set number. To change from Count Add to Count Sub, press button number 1. When the choice you want appears on the display, press button number 6 and the program will move to the next step.**
5. **The next option will be Loop-on or Loop-off. For this machine, choose the Loop-off option by pressing button number 1 until Loop-off appears on the display and then, depress button number 6.**
6. **The next option on the display is Relay-nc or Relay-no. For this machine, choose Relay-no by pressing button number 1 until Relay-no appears on the display and then, depress button number 6.**
7. **The next option to appear is Delay 100-500. This is the output delay in milliseconds. This option is normally set in the 100 millisecond mode. Press button number 1 until 100 appears on the display and then, depress button number 6.**
8. **The next option to appear is dp. This allows you to choose the decimal point from 0 to 0.000. On this machine, there is no advantage to moving the decimal point. It is best to leave it set at 0 by pressing button number 6.**
9. **After you press button number 6 at the dp option, the program jumps to the beginning. You have to go through the complete menu, pressing button number 6, without changing any of the options, before the counter will return to the operation mode.**
10. **To set the counter for an operation, depress button 1 until the number you want appears on the display. Repeat this step for each button until the quantity you want appears on the display.**
11. **No matter how the counter is programmed, there must be a quantity set before the machine will operate in the automatic mode.**

7.0 MACHINE AUTOMATIC OPERATION (SET-UP)

REFER TO FIGURE 11 BELOW.

The following instructions are to set up a job for automatic operation. Make sure that you are familiar with the functions of all of the switches and buttons before proceeding.

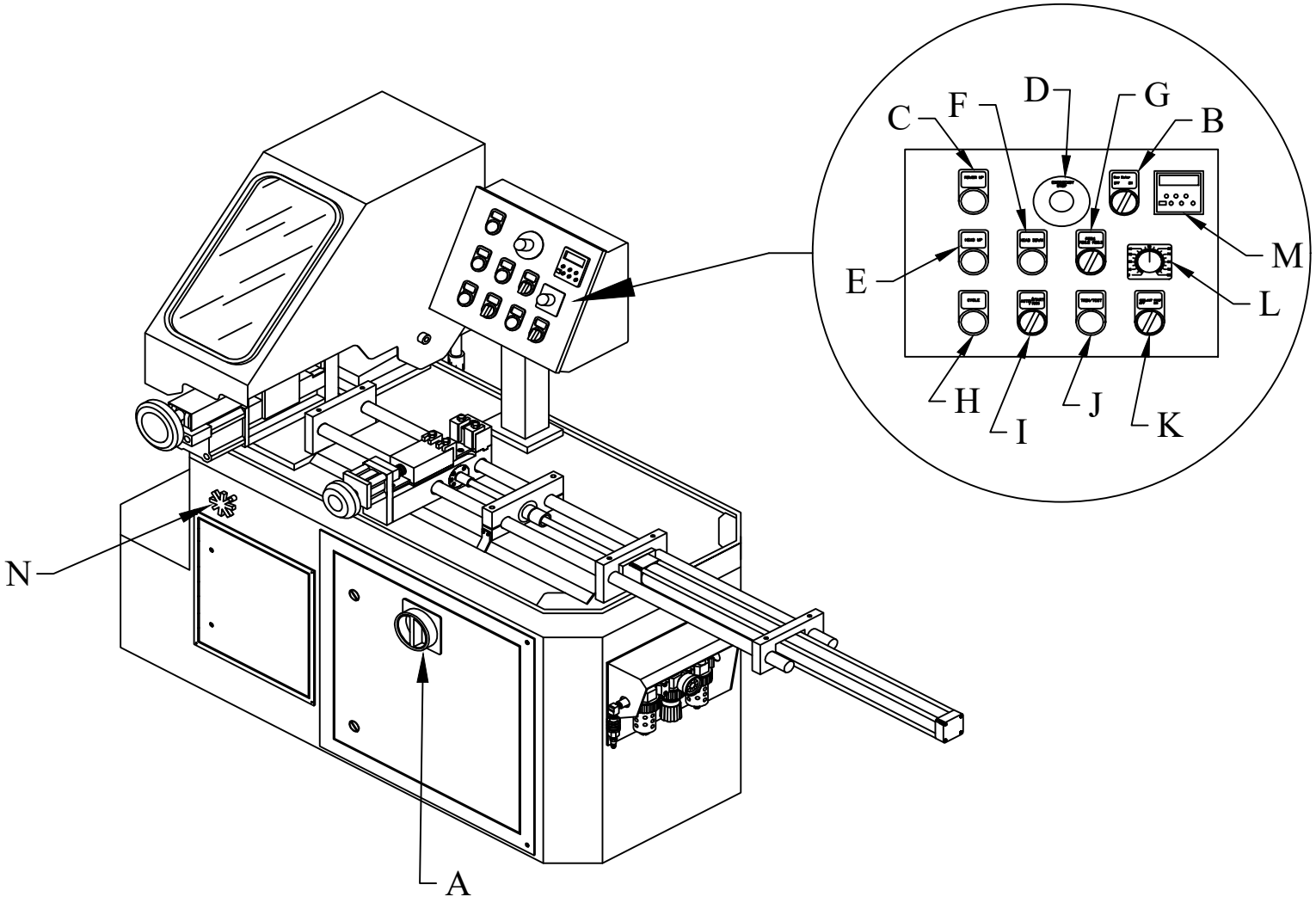


FIGURE 11

The following instructions are to set up a job for automatic operation. Make sure that you are familiar with the functions of all of the switches and buttons before proceeding.

1. **Set the shuttle vise indicator to the desired length by loosening the moving stop (M) and then, move it to the length desired on the scale and re-tighten it.**
2. **Place the HITCH FEED switch (G) in the desired position.**
3. **Adjust the shuttle vise and material vise for the size of material. Adjust the vises up to the material, allowing approximately 1/8 of an inch (3mm) clearance for the throw of the cylinder.**
4. **Set the upper and lower stroke of the saw head. For instructions, REFER TO SECTION 6.8.**
5. **Place the main power switch (A) in the ON position and the motor control switch (B) in the ON position.**
6. **Place the AUTO/MANUAL switch (I) in the MANUAL position and then, pull the EMERGENCY STOP switch (D) out.**
7. **Place the material to be cut in the material vise jaws so that 1/4 to 1/2 inch extends past the blade slot.**
8. **Press the POWER UP button (C).**
9. **Press the TRIM/TEST button (J) and the CYCLE button (H). The machine will make a trim and a test cut. Adjust the down feed rate of the head, using the flow control valve (N), while it is making the first cut.**
10. **Check the accuracy of the first part and make any adjustments required. The fine adjustment knob (O) will change the length of the part by 1.5 thousandths of an inch per increment.**
11. **Press the CYCLE button again and the machine will make another test cut.**
12. **Set the counter (P) to the desired number of pieces. For instructions, REFER TO SECTION 6.9.**
13. **After you have made all of the fine adjustments, place the AUTO/MANUAL switch in the AUTO position and press the CYCLE button again. The machine will start the automatic operation and continue until the counter reaches the set quantity or the machine runs out of material.**

➲ **IMPORTANT: WHEN THE MACHINE HAS FINISHED A BAR OF MATERIAL, YOU HAVE TO RESET THE MACHINE BEFORE CONTINUING WITH THE AUTOMATIC OPERATION.**

TO RESET THE MACHINE:

1. **Load the new bar in the machine with approximately 1/2 inch extending past the blade slot in the material vise.**
2. **Turn the AUTOMATIC/MANUAL switch (I) to the MANUAL position.**
3. **Push the TRIM/TEST button (J) and then, the CYCLE button (H). The saw will make one trim cut and one test cut.**
4. **Place the AUTOMATIC/MANUAL switch (I) in the AUTOMATIC position and press the CYCLE button (H) and the saw will continue with the automatic operation.**

⌦ **CAUTION: FAILURE TO FOLLOW THE ABOVE PROCEDURE EVERY TIME A NEW BAR IS LOADED WILL CAUSE THE MACHINE TO MALFUNCTION.**

8.0 MAINTENANCE

8.1 LUBRICATION

SEE FIGURE 12 BELOW.

Grease the head pivot pin (C) and the spindle shaft with a high pressure, high temperature, bearing grease daily. Apply oil to the shuttle vise guide shafts daily.

Clean the chips out of the vise at least once a day, more often if needed. Apply penetrating oil to the spindle and guide pins. Clear the chips with a brush or similar device. DO NOT use compressed air.

Check the oil level in the air lubricator device daily.

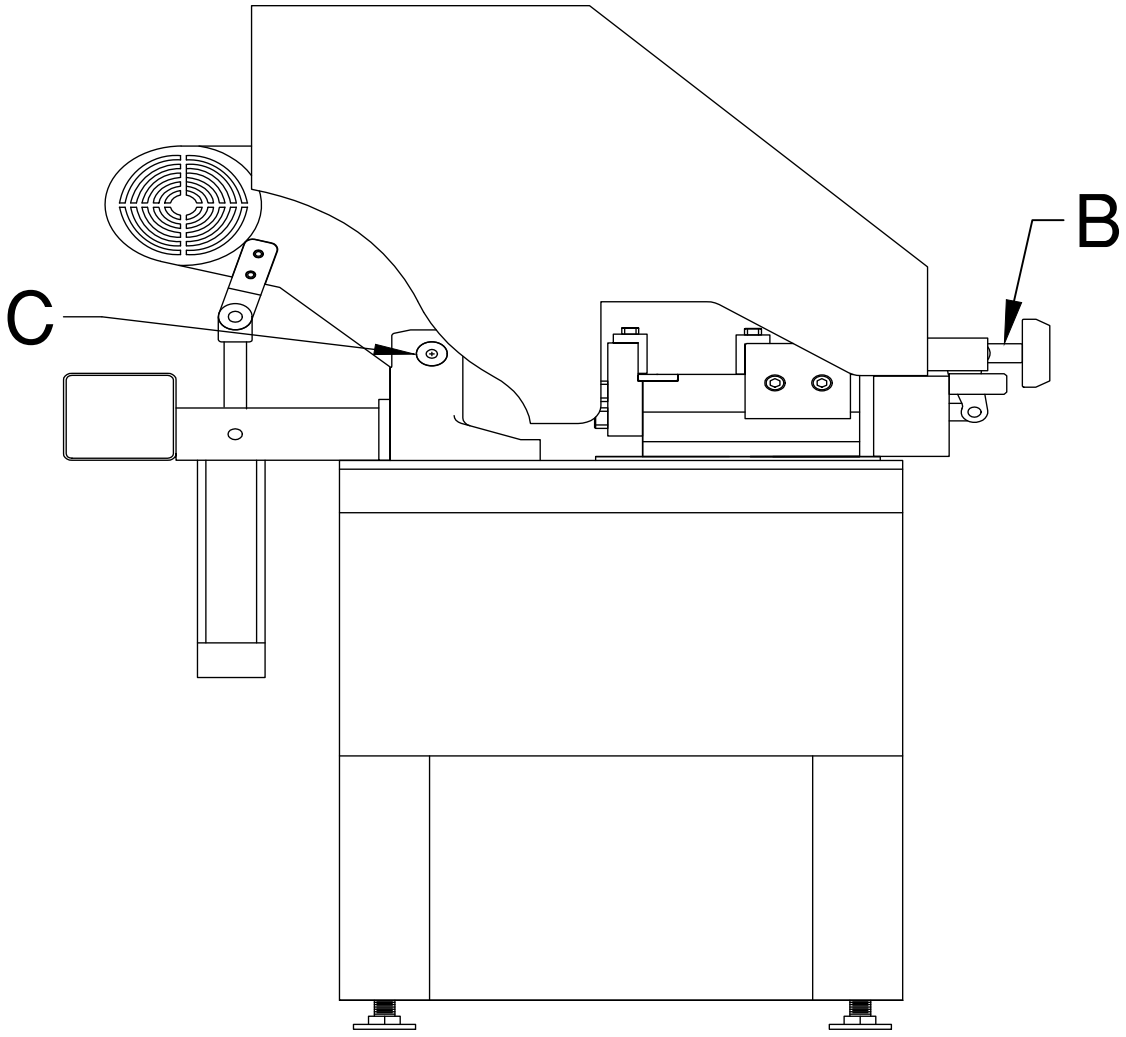


FIGURE 12

8.2 CUTTING OILS AND LUBRICANTS

SECTION 12.2 lists Scotchman's part numbers for cutting oils and lubricants. Using high quality lubricants and oils will greatly increase the life of this equipment.

We recommend using only our P/N 075760 - SYNCON-2 straight - not diluted.

For the power down feed, use a SAE 10W (ISO 32) non-foaming hydraulic oil, such as Mobil DTE 10 or equivalent in the reservoir. For the air lubricators, use a quality (ISO 22) air line lubricant designed for automatic oilers.

8.3 SCHEDULED MAINTENANCE

A program of scheduled maintenance should be set up and documented according to your application and the frequency you use the machine. The following is a list of some important things that should be included in a scheduled maintenance program.

1. **EVERY 250 HOURS OR 3 MONTHS:**
   Drain the coolant reservoir and flush it out. Refill the coolant reservoir with new coolant. Check hydraulic fluid level in the power down feed and the shuttle cylinder reservoirs.

   CAUTION: ALWAYS DISCONNECT THE AIR SUPPLY BEFORE REMOVING THE FILLER PLUG FROM THE RESERVOIR. IF THE FILLER PLUG IS REMOVED WHILE THE MACHINE IS CONNECTED TO AIR PRESSURE, THE FLUID IN THE TANK WILL BE PURGED THROUGH THE OPENING UNDER PRESSURE.

2. **EVERY 750 HOURS OR 6 MONTHS:**

   Check the condition of the pivot pins on the head and on the guard. Check the complete saw for loose connections in the electrical and air systems.

Since every application is different, each user must design and implement a scheduled maintenance program that fits his applications.

8.4 SPINDLE SHAFT REPLACEMENT

REFER TO FIGURE 13 BELOW.

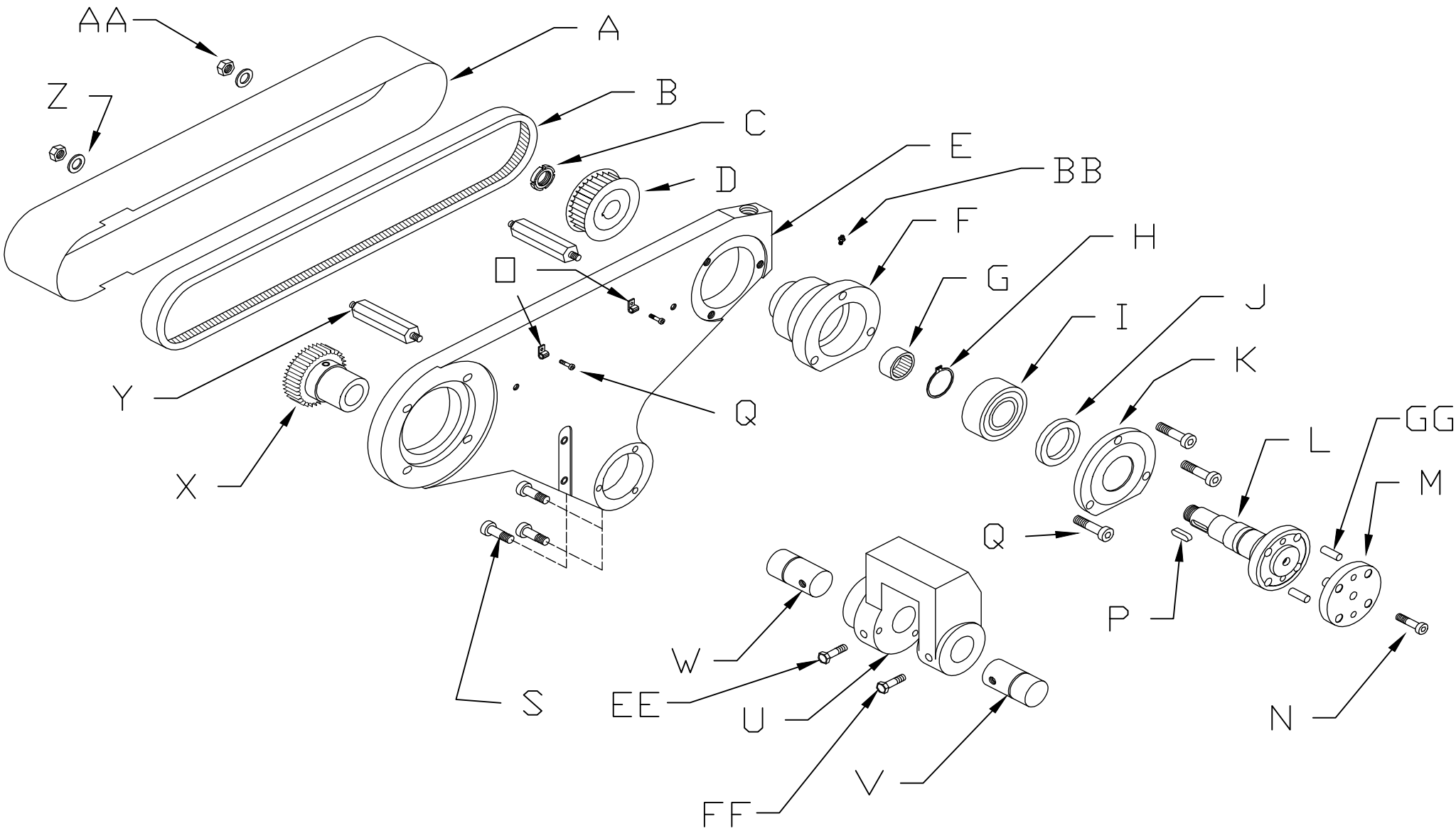


FIGURE 13

Replacing the spindle or spindle bearings on this machine is not an easy task. You may want to consider ordering the spindle shaft assembly, which includes parts E, F, G, H, I, J, K, L and P.

TO REMOVE THE SPINDLE, USE THE FOLLOWING STEPS:

1. **Remove the lock nut (C) and pull the belt sprocket (D) off the end of the shaft.**

2. **Remove the three bolts (Q) and remove the blade guard. Remove the spindle shaft assembly from the saw. The housing (F) fits snugly in the frame (E) and may have to be tapped out with a hammer.**

3. **Gently tap two steel wedges, opposite of each other, between the housing (F) and the bearing retainer (K).**

4. **Place the assembly in a press, resting on the steel wedges, and press the spindle and bearing out of the housing (F).**

5. **Remove the snap ring (H) and press the bearing (I) off of the spindle shaft (L).**

6. **Press the needle bearing (G) out of the spindle housing (F).**

7. **Reassemble the spindle assembly, reversing the above steps.**

8. **Be sure to grease the assembly with a high temperature, bearing grease before operating the machine.**

8.5 SPINDLE REPLACEMENT (MAIN VISE)

SEE FIGURE 14 BELOW.

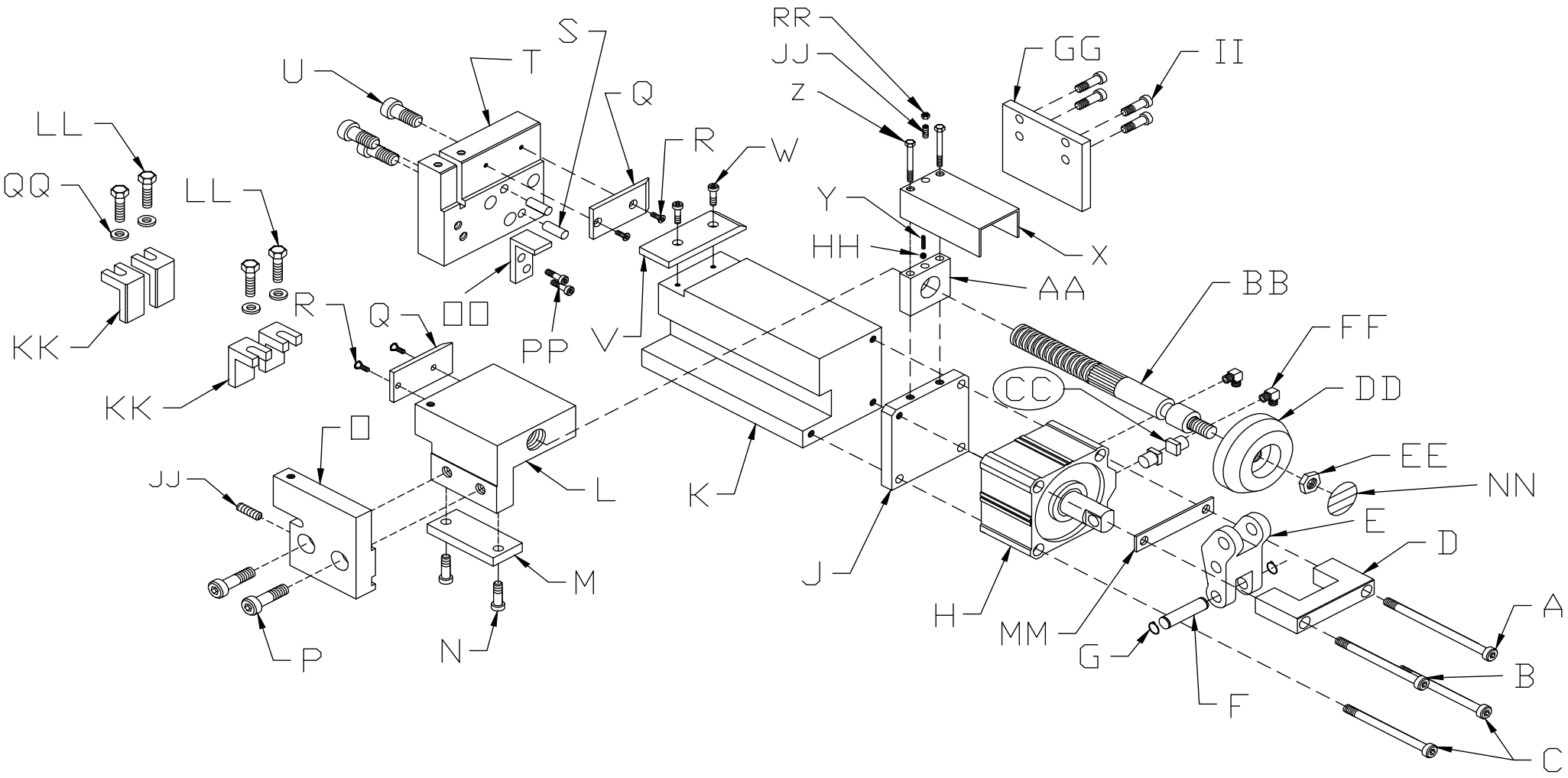


FIGURE 14

1. **Disconnect the machines power and the air supply.**

2. **Remove the vise guard (X) and the spring (Y) and ball (HH).**

3. **Remove the bolts (A & B) and the retainer (D).**

4. **Remove the clevis pin (F) and remove the clevis (E) and the forks (CC).**

5. **The spindle can now be removed from the machine.**

6. **If the spindle is locked up in the machine, remove the bolts (II) and the side plate (GG).**

7. **The vise block (L) and the spindle can now be removed as one piece.**

8. **Install the new spindle and reassemble the vise, reversing the above steps.**

8.6 SEAL REPLACEMENT (MAIN VISE)

SEE FIGURE 14 ON THE PRECEDING PAGE.

1. **Make sure that the power and air supply to the machine are both off.**

2. **Remove the bolts (A & B) and the retainer (D).**

3. **Remove the clevis pin (F) and the cylinder clevis (E) and the forks (CC).**

4. **Remove the two lower bolts (C) and remove the cylinder (H) from the machine.**

5. **Place the cylinder in a vise and remove the snap ring from the front of the cylinder.**

6. **Pull the cylinder apart and remove all of the old seals. Check the end casting, cylinder tube and piston for nicks or scratches.**

7. **Install the new seals and reassemble the vise, reversing the above procedures.**

8.7 SHUTTLE VISE MAINTENANCE

SEE FIGURE 15 BELOW.

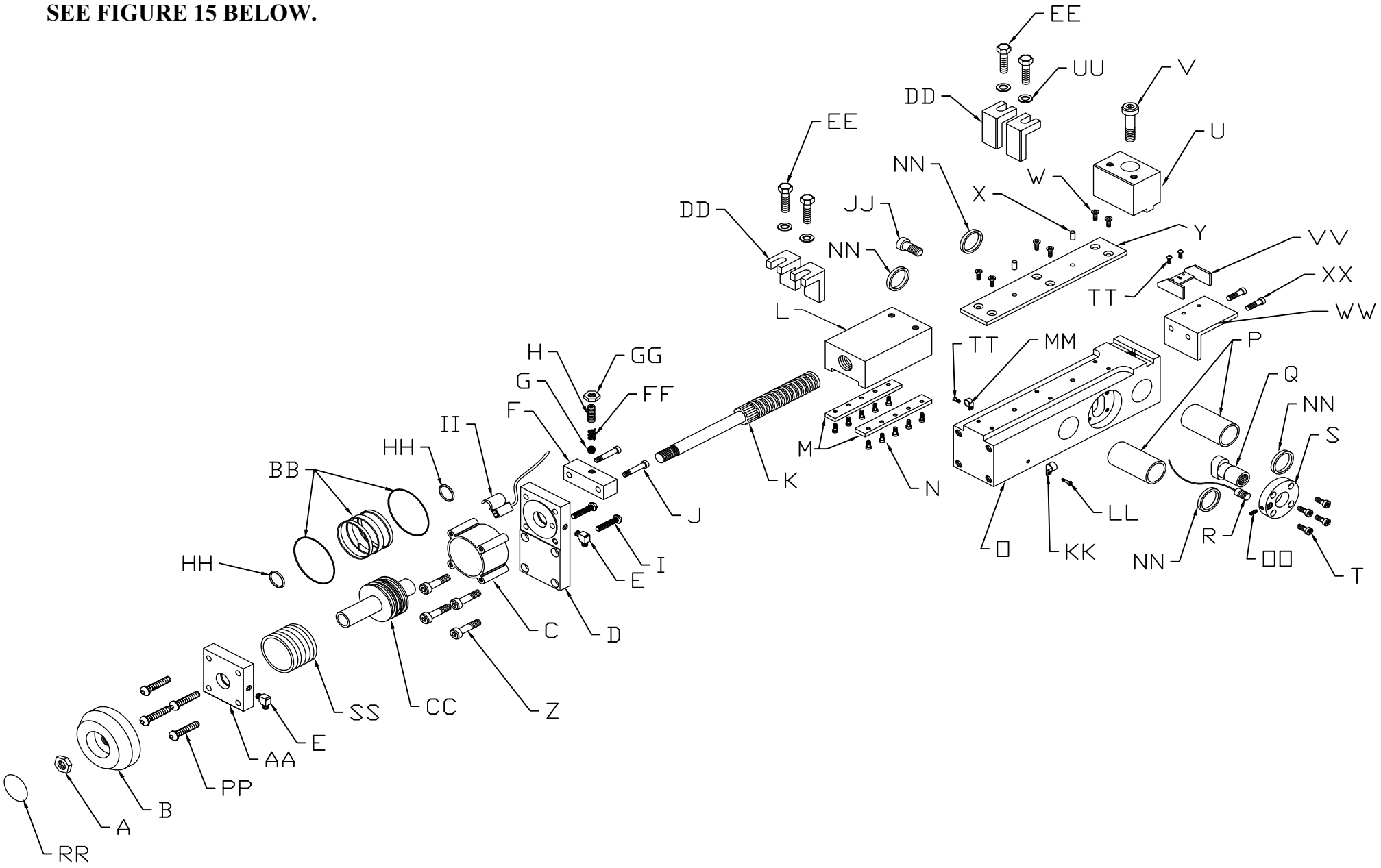


FIGURE 15

TO REPLACE THE VISE SPINDLE:

1. **Remove the jam nut (GG), the set screw (H), the spring (FF) and the ball (G).**

2. **Remove the jam nut (A) and the boss (B) from the end of the spindle.**

3. **Disconnect the air lines and the proximity switch from the cylinder. The air connections on the cylinder are snap connectors. To release the air connections, push the collar around the hose into the fitting and pull the hose out. To reconnect the lines, simply push the air line into the fitting as far as it will go easily.**

4. **Remove the four bolts (Z) from the cylinder end plate and remove the cylinder assembly from the machine.**

5. **Slide the vise spindle (K) and vise block (L) off of the machine and replace either part, as needed.**

6. **Reassemble the vise, reversing the above steps.**

IF YOU NEED TO REPLACE THE SEALS IN THE AIR CYLINDER:

1. **After step number 4 above, clamp the end plate (D) in a vise and remove the four bolts (PP).**

2. **Slide the end plate (AA) off and remove the piston (CC) and the cylinder tube (C).**

3. **Replace the seals and reassemble, reversing the above steps.**

9.0 OPTIONAL EQUIPMENT

9.1 SPECIAL VISE JAWS

Special vise jaws for holding thin wall round tubes, profiles and bundles are available on a made-to-order basis. For prices and delivery on special jaws, contact your local dealer or the factory.

FOR MORE INFORMATION CONTACT YOUR LOCAL DEALER OR THE FACTORY.

9.2 OPTIONAL IN FEED SUPPLY TRACKS

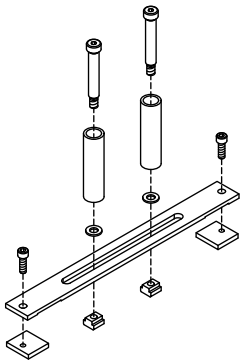
A ten foot roller supply track, that can be installed on the input side of the saw to support longer pieces of material, is an available option for this saw.

The supply tracks can also be bolted end to end, to supply longer tracks, if needed.

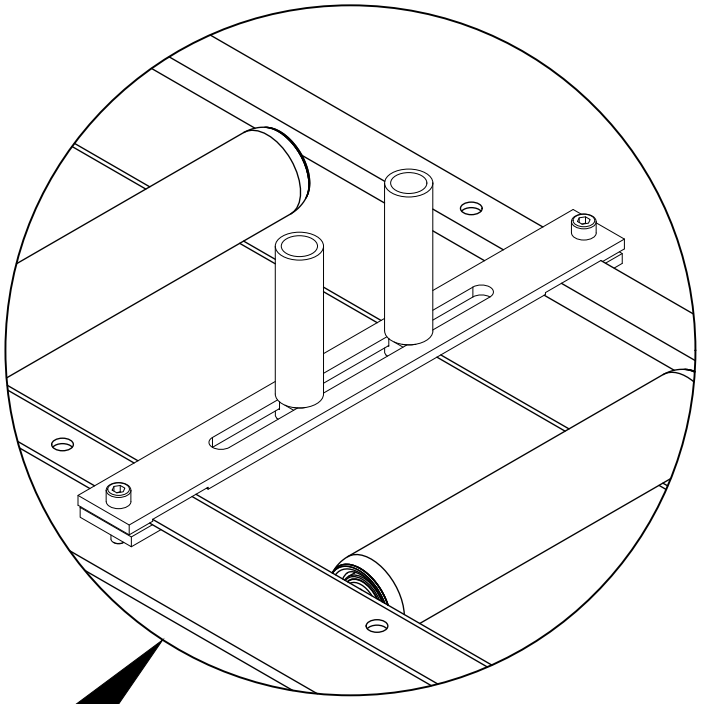
SEE FIGURE 16 ON THE FOLLOWING PAGE.

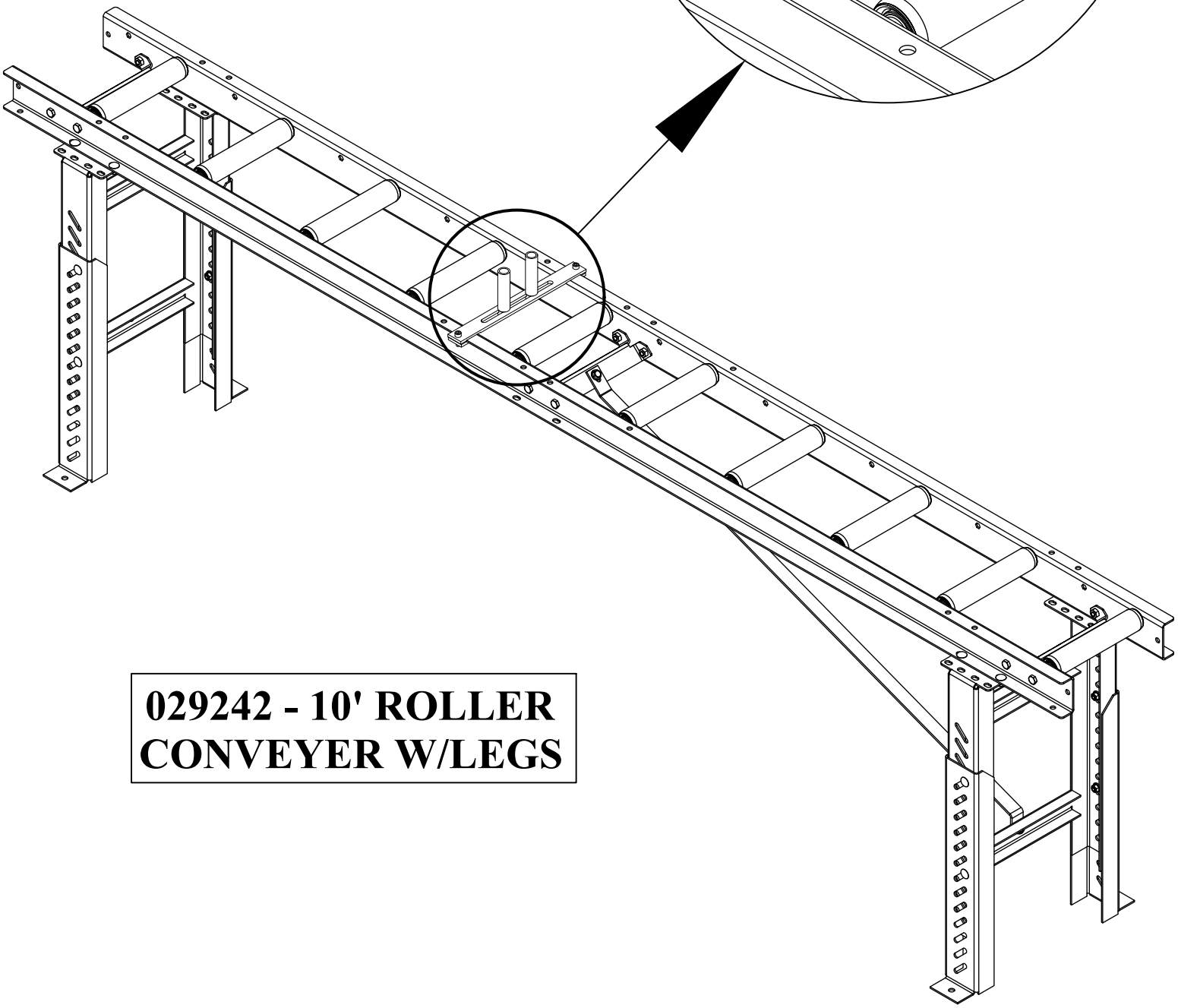
1. **What is shown is our P/N 029242 - 10' ROLLER CONVEYER W/LEGS that is fully assembled with our optional P/N 076938 - 13" GUIDE ASSEMBLY mounted to it.**
2. **The conveyors can be bolted together to make longer lengths if needed.**
3. **Adjust the conveyor so that the rollers are at the same level as the bed of the material vise on the saw. The conveyor height is adjusted via the slots in the legs.**
4. **For additional stability, we strongly recommend anchoring the conveyor to the floor.**
5. **The vertical rollers on the Guide Assembly are adjustable for width and can be adjusted to keep the material toward the front or back of the conveyor.**
6. **Several Guide Assemblies can be mounted to the conveyor if needed.**

EXPLODED VIEW **DETAIL VIEW**



076938
13" GUIDE
ASSEMBLY





029242 - 10' ROLLER
CONVEYER W/LEGS

FIGURE 16

10.0 TROUBLE SHOOTING GUIDE

10.1 ELECTRICAL TROUBLE SHOOTING

1. THE MOTOR WILL NOT RUN.

A. The main disconnect switch in the base cabinet must be on and the emergency stop switch must be pulled out.

B. The MOTOR switch must be in the ON position to start the saw motor.

C. The MANUAL/AUTO switch must be in the MANUAL position to start the machine.

D. The saw hood must be closed.

E. Also, check the supply voltage to the saw to make sure that it is the same as the motor voltage. If the supply voltage is correct and the switch energizes and the motor still will not run, contact your dealer or the factory.

2. THE SAW MOTOR RUNS BUT DOES NOT HAVE ADEQUATE POWER.

A. Make sure that the supply voltage and phase correspond to the saw motor's voltage and phase.

B. Disconnect the machine from the power source and check for any loose or disconnected wires.

C. The supply lines to the machine must be of adequate size to handle the load.

FOR RECOMMENDED SIZES AND LENGTHS, SEE SECTION 4.3.

3. THE MACHINE WILL NOT RUN IN THE AUTOMATIC MODE.

A. The counter must have a pre-set quantity displayed. If the counter reads zero, the machine will not run in the automatic mode.

B. There must be material in the shuttle vise and the vise must be adjusted to the material.

C. If the machine has reached the end of a bar, you need to reset the machine before starting the automatic operation again. REFER TO SECTION 7.0.

10.2 BREAKAGE OR EXCESSIVE DULLING OF BLADES

1. Select the proper blade and spindle speed for the material being cut.
FOR RECOMMENDATIONS, REFER TO SECTION 6.1.

2. Always break in the blade before you start normal cutting.

3. **Do not apply excessive down pressure on the work piece. Excessive down pressure will cause the teeth to remove too large of a chip, resulting in premature dulling or blade breakage.**

4. **Use a good quality synthetic coolant. We recommend using our P/N 075760 - SYNCON-2 coolant straight and not diluted.**

5. **Have your blades re-sharpened by someone who has the right equipment for sharpening these carbide tipped blades. Improper re-sharpening is one of the most common problems encountered in cold sawing.**

6. **Keep the blade flange, the face of the blade spindle, and the blade clean and free from nicks. Any contamination or nicks on the flange, spindle, or blade will cause the blade to run out of alignment.**

7. **Always remove the back-lash when installing a blade. For instructions, REFER TO SECTION 6.2. Also, check the condition of the drive pins when replacing the blade. If the drive pins are broken or worn, replace them.**

8. **Any of the above problems may cause a condition known as pick-up. Pick-up is caused when the material being cut adheres itself to the sides of the saw blade. When pick-up is present, you will notice a jerking or jumping motion in the saw head while cutting. This is caused by the blade being pinched as it goes through the material as pick-up makes the blade thicker in that spot. Pick-up can be removed by using a fine hone stone or very fine file. When removing pick-up, care must be taken not to remove any part of the blade. Do NOT use power tools! It is best to have the blade re-sharpened as once the blade has pick-up, it tends to happen again in the place where it was removed. After the pick-up has been removed, review the above items to determine what caused the problem.**

10.3 PART LENGTH NOT CONSISTENT

1. **Check your air pressure. This machine requires a minimum of 90 PSI to function properly. When cutting solid materials, the pressure may have to be set as high as 130 PSI to prevent the material from slipping in the jaws.**

2. **The bolts in the adjustable stop may not be tight enough, allowing the stop to move.**

3. **The main vise or shuttle vise may be adjusted too tight, causing the material to drag or bind before the vise is seated against the stop.**

4. **Check for chip buildup between the main vise and the shuttle vise.**

10.4 COOLANT SYSTEM

1. IF COOLANT WILL NOT FLOW:

A. Check the nozzle on the end of the mister and make sure that it is turned on.

B. Check the suction line between the reservoir and the mister unit. If there are any cracks or poor connections on the line, it will not siphon the coolant out of the reservoir.

C. Check the level of the coolant in the reservoir.

D. Check the reservoir for contamination or sludge buildup that may be blocking the inlet.

E. Remove the coolant line from the guard and make sure that it is clear. Also, make sure that the valve on the guard is open.

10.5 PLC TROUBLESHOOTING

The PLC on this machine has a readable screen on it that can be used to help diagnose most problems that may be encountered with the machine. The main controller (A) has 8 inputs (B) labeled I1 to I8, and 4 outputs (C) labeled Q1 to Q4. An auxiliary controller (D) is attached to the right of the main controller and acts as an expansion for inputs/outputs. The auxiliary controller has 8 inputs (E) labeled I1 to I8, and 8 outputs (F) labeled Q1 to Q8.

When the controller is first powered, the POW/RUN light (G) will flash green. When the controller is ready, the POW/RUN light will glow a constant green and the display screen (H) header will read SCOTCHMAN HFA. See FIGURE 17 on the next page.

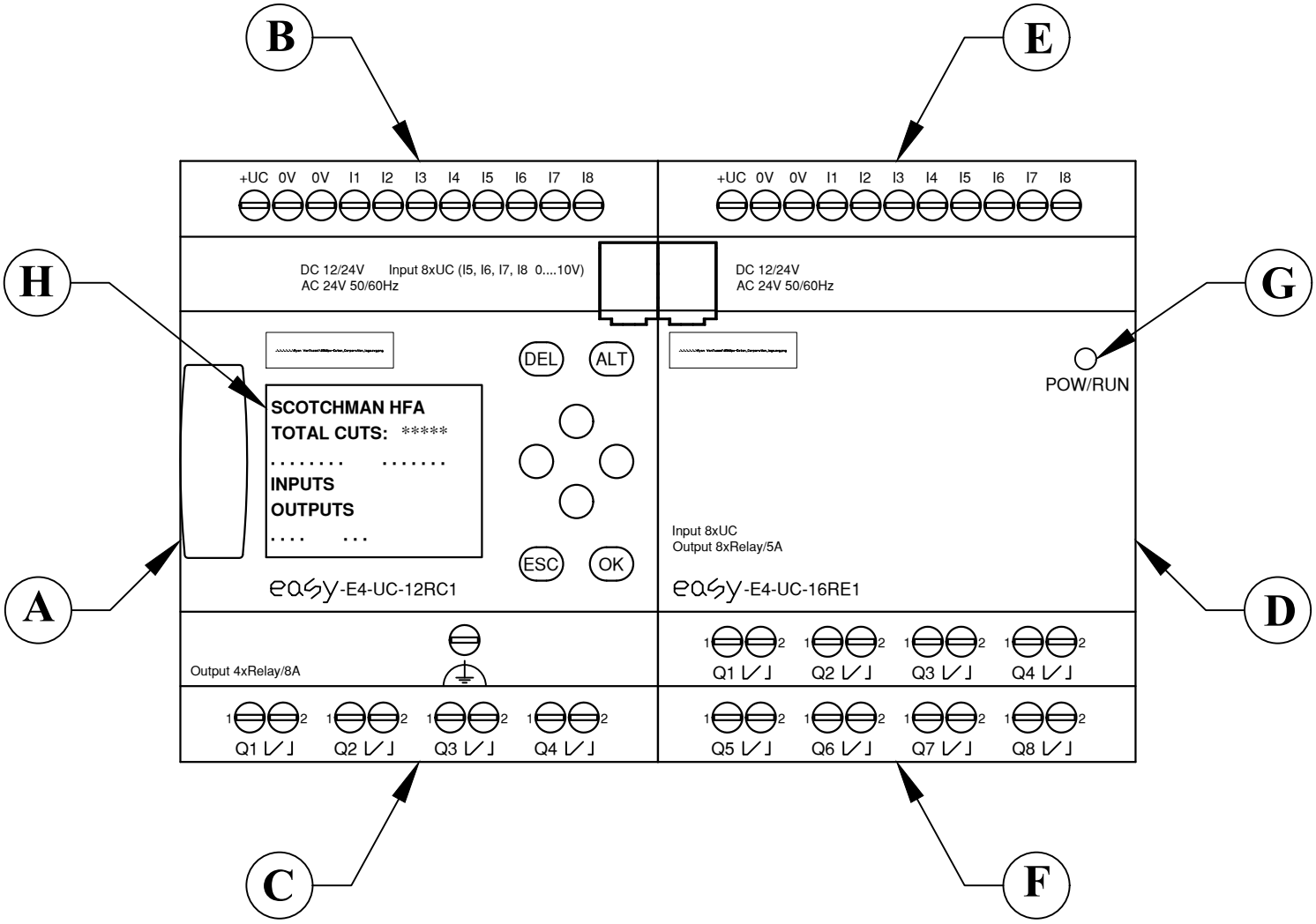


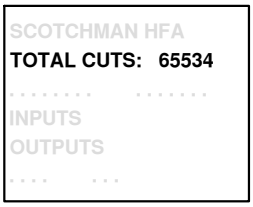
FIGURE 17

The information displayed on the main controller screen and the associated inputs and outputs of each controller are explained in the following pages.

The screen on the controller displays the total lifetime cuts of the machine, active inputs/outputs, and timeout errors. This information can be seen at any time during operation to aid in troubleshooting. A description of each message and function is described below.

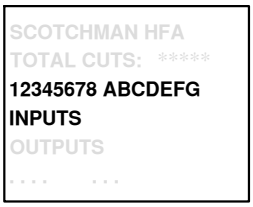
TOTAL CUTS:

The total lifetime AUTO cuts of the machine are displayed on the second line of the display. This value is non-volatile and will continue to count for the lifetime of the PLC. The maximum value this can reach is 65,534. After reaching this value, the count will reset to zero on the next cut.



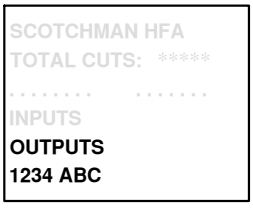
INPUTS:

The inputs of the PLC are displayed on the third line of the display. Inactive inputs are displayed as a dot (.), whereas active inputs are displayed as a number or letter. Inputs on the main controller are displayed as numbers (1, 2, 3...). Inputs on the auxiliary controller are displayed as letters (A, B, C...). These values correspond with the inputs I1-I8 on each controller. Input I8 on the auxiliary controller is not used.



OUTPUTS:

The outputs of the PLC are displayed on the sixth line of the display. Inactive outputs are displayed as a dot (.), whereas active outputs are displayed as a number or letter. Outputs on the main controller are displayed as numbers (1, 2, 3, 4). Outputs on the auxiliary controller are displayed as letters (A, B, C). These values correspond with Q1-Q4 on the main controller and Q1-Q3 on the auxiliary controller. Outputs Q4-Q8 on the auxiliary controller are not used.

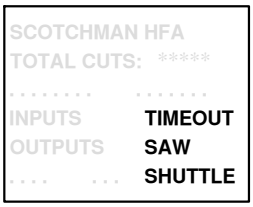


TIMEOUT:

The machine has two timeout error messages that will display on the screen for a when an error occurs. The two error messages are:

TIMEOUT SAW: The saw head took too long to reach the head down sensor. If the PLC does not see the head down input within *5 min* of starting a cut, this message will appear and the cut cycle will stop. Press the E-Stop, Head Down, or Cycle button to clear message.

TIMEOUT SHUTTLE: The shuttle vise took too long to reach the shuttle in sensor. If the PLC does not see the shuttle in input within *30 seconds* of starting a shuttle in command, this message will appear. Press the E-Stop to clear message.



After a timeout error occurs the machine shuts off in the state that it is in. Correct the source of the error and restart the machine as necessary.

The inputs and outputs of the PLC are 24VDC signals. A list of each input/output and their function is listed below. The value displayed on the screen when active is shown in parenthesis (). The wiring schematic (SEE SECTION 14.0) representation is shown in brackets [].

Inputs, Main Controller:

I1 (1) [1CR] : **E-STOP - Activated anytime the saw has been powered up by the START button.**

I2 (2) [1LS] : **SHUTTLE OUT - Activated when the shuttle vise is in the OUT position. This sensor is located in the base of the shuttle vise where the cylinder attaches.**

I3 (3) [2LS] : **SHUTTLE IN - Activated when the shuttle vise is in the IN position. This sensor is located on the bottom of the shuttle cylinder, near the rod end.**

I4 (4) [3LS] : **HEAD UP indicator - Activated when the head is in the UP position.**

I5 (5) [4LS] : **MATERIAL OUT - Activated when there is no material in the shuttle vise or the cylinder has stroked too far. This sensor is located in the shuttle vise cylinder.**

I6 (6) [5LS] : **HEAD DOWN indicator - Activated when the head is in the DOWN position.**

I7 (7) [3PB] : **CYCLE - Activated when the cycle button is depressed.**

I8 (8) [4PB] : **HEAD DOWN - Activated when the head down button is depressed.**

Inputs, Auxiliary Controller:

I1 (A) [5PB] : **HEAD UP - Activated when the head up button is depressed.**

I2 (B) [6PB] : **TRIM/TEST - Activated when the trim/test button is depressed.**

I3 (C) [N] : **PARTS COUNT - Activated when the machine reaches its preset count on the parts counter. Inputs preset count met condition to the PLC. The machine will operate indefinitely in the AUTO mode if the counter value is 0.**

I4 (D) [2SS] : **AUTO/MANUAL - Activated when the AUTO/START/MANUAL switch is in the AUTO position.**

I5 (E) [3SS] : **INDEX 1 - Activated when the index switch is set to 1 indexes.**

I6 (F) [3SS] : **INDEX 2 - Activated when the index switch is set to 2 indexes.**

I7 (G) [3SS] : **INDEX 3 - Activated when the index switch is set to 3 indexes.**

Outputs, Main Controller:

Q1 (1) [1SOL] : **SHUTTLE - Activates the shuttle solenoid valve. Shuttle cylinder retracts (out) when output is ON, extends (in) when OFF.**

Q2 (2) [2SOL] : **SHUTTLE VISE - Activates the shuttle vise solenoid valve. Shuttle vise cylinder extends (closes) when output is ON, retracts (opens) when OFF.**

Q3 (3) [3SOL] : **HEAD - Activates the head down solenoid valve. Head power down is activated when output is ON, head retracts to UP position when OFF.**

Q4 (4) [4SOL] : **MATERIAL VISE - Activates the material vise solenoid valve. Material vise cylinder retracts (opens) when ON, extends (closes) when OFF.**
SEE SECTION 10.6 for more details.

Outputs, Auxiliary Controller:

Q1 (A) [2CR] : **INCREASE - Activates the relay connected to the increment terminal of the parts counter. This signals the parts counter to increase the part count after a cut has been made in AUTO mode.**

Q2 (B) [3CR] : **RESET - Activates the relay connected to the reset terminal of the parts counter. This signal resets the active count on the parts counter to 0 after the preset value has been reached.**

Q3 (C) [4CR] : **MOTOR - Activates the saw motor relay. If the SAW MOTOR ON/OFF switch is in the ON position, the this signal will start the saw motor at the beginning of a cycle.**

10.6 PNEUMATIC SYSTEM

REFER TO FIGURE 18 ON THE FOLLOWING PAGE.

THE MOST COMMON PNEUMATIC/HYDRAULIC PROBLEMS ARE:

A. Low levels of fluid in the reservoirs: The fluid level in the power down feed reservoir should be approximately 1-1/2 inches below the top of the reservoir with the head in the down position and 2-1/2 inches below the top of the reservoir when the head is in the up position. The fluid level in the shuttle cylinder reservoir should be 1-1/2 inches below the top of the reservoir when the cylinder is completely extended (all the way to the left, against the material vise).

⌦ CAUTION: THE AIR SUPPLY TO THE MACHINE MUST BE DISCONNECTED BEFORE YOU REMOVE THE FILLER PLUG FROM THE RESERVOIRS. FAILURE TO DISCONNECT THE AIR WILL CAUSE THE FLUID TO BE PURGED OUT THROUGH THE OPENING UNDER PRESSURE!

B. Worn seals in the vise or shuttle cylinders: For seal kit installation instructions, REFER TO SECTIONS 8.6 & 8.7.

C. Loose connections in the air lines: All of the air lines on this machine are the snap in connector type. To remove the hose, push in on the slide connector while pulling out on the hose. To reconnect the hose, simply push the hose into the connector as far as it will go. If there are any questions about where the hoses connect, REFER TO FIGURE 18 ON THE FOLLOWING PAGE.

1A - 5/16" BLACK TO SAW VISE BACK
1B - 5/16" BLACK TO SAW VISE FRONT
2A - 1/4" RED TO TOP OF POWER DOWN HYD. TANK
2B - 1/4" GREEN TO BOTTOM OF POWER DOWN CYLINDER
3A - 1/4" BLUE TO RIGHT END OF SHUTTLE CYLINDER
3B - 5/16" BLACK TO TOP OF SHUTTLE HYD. TANK
4A - 1/4" BLACK TO BACK OF SHUTTLE VISE
4B - 1/4" YELLOW TO FRONT OF SHUTTLE VISE

FLOW CONTOL VALVE - POWER DOWN - SAW VISE
RIGHT SIDE - 3/8" BLACK TO TEE UNDER POWER DOWN HYD. TANK
LEFT SIDE - 3/8" BLACK TO STRAIGHT FITTING UNDER POWER DOWN HYD. TANK
3/8" BLACK FROM TEE UNDER POWER DOWN HYD. TANK TO CYL. TOP
FLOW CONTROL VALVE - SHUTTLE
1/2" BLACK FROM VALVE TO LEFT END SHUTTLE CYLINDER
AS VIEWED FROM FRONT OF MACHINE

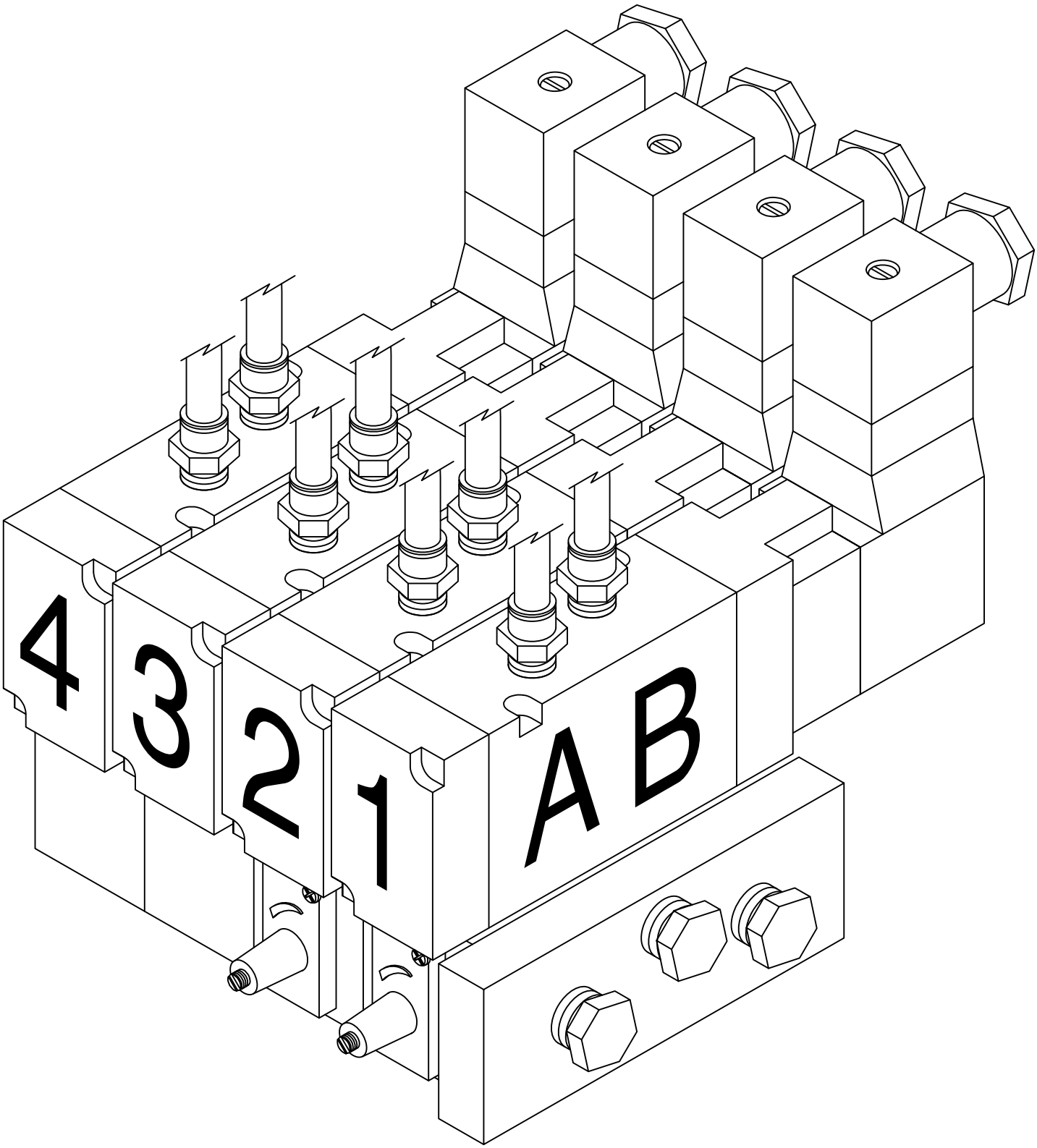


FIGURE 18

11.0 PARTS LISTS

THE FOLLOWING SECTIONS CONTAIN THE SAW AND OPTIONAL EQUIPMENT PARTS LISTS AND DRAWINGS.

FOR YOUR CONVENIENCE, ALWAYS GIVE YOUR COMPLETE SERIAL NUMBER WHEN ORDERING PARTS!

11.1 DRIVE ASSEMBLY

ITEM	PART #	DESCRIPTION
A	677912	Belt Guard
B	077915	Belt
C	077189	Lock Nut
D	077898	Belt Sprocket
E	047913	Pivot Frame
F	077900	Bearing Housing
G	077909	Needle Bearing
H	077897	Snap Ring (33mm)
I	075077	Bearing
J	075075	Seal
K	077896	Seal Flange
L	077894	Spindle Shaft
M	077626	Saw Flange
N	077908	M-10 Bolt (Left Hand)
O	046094	Wire Clip
P	077902	Key 8 x 25
Q	677901	M-10 SHCS
R	077864	M-5 x 12 SHCS
S	221120	M-8 HHCS
T		Not used
U	077912	Pivot Shaft Housing
V	077329	Pivot Pin (Short)
W	077341	Pivot Pin (Long)
X	077906	Motor Sprocket
Y	677904	Guard Mount Studs
Z	077160	M-8 Plastic Washer
AA	677936	M-8 Dome Nut
BB	243102	Grease Nipple
EE	073328	M-8 x 40 HHCS
FF	073326	M-8 x 25 HHCS

GG	**073920**	**M-10 Dowel Pin (Included in M)**
HH	**077929**	**Spindle Assembly**
		(Includes C, D, F, G, H, I, J, K, L, N, P & BB)

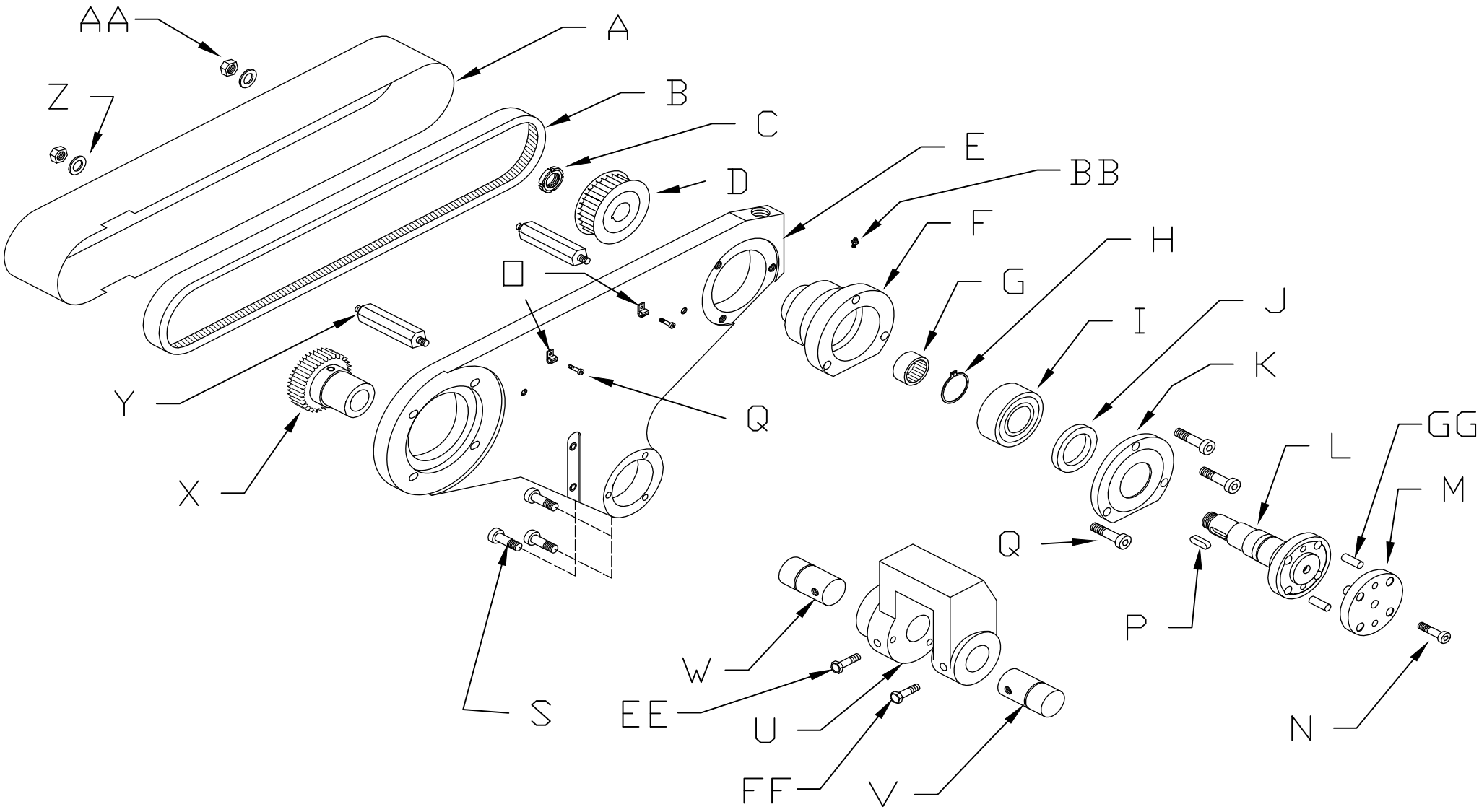


FIGURE 19

11.2 MAIN VISE ASSEMBLY

ITEM	PART #	DESCRIPTION
A	221245	10 x 160mm SHCS
B	221240	10 x 140mm SHCS
C	221235	10 x 100mm SHCS
D	045311	Clevis Guide
E	045312	Clevis
F	045317	Clevis Pin
G	046655	Snap Ring
H	045630	Cylinder
I	045631	Cylinder Seal Kit
J	045313	Cylinder Mount
K	045301	Vise Body
L	045302	Push Block
M	045306	Hold down Plate
N	221210	M-10 x 25 SHCS
O	045304	Vise Side Plate
P	221412	M-16 x 35 SHCS
Q	045307	Upper Wear Plate
R	230005	M-6 x 12 FSHCS
S	077100	M-10 Dowel Pin
T	045303	End Plate
U	201620	M-16 x 55 HHCS
V	045308	Lower Wear Plate
W	073458	M-6 x 10 SHCS
X	045325	Lead Screw Cover
Y	045602	Spring
Z	201160	M-8 x 60 HHCS
AA	045314	Detent Block
BB	045309	Lead Screw
CC	045198	Drive Forks
DD	045310	Boss
EE	077121	M-20 Jam Nut
FF	045030	1169 x 5 x 65 90 Degree Elbow
GG	045305	Guide Plate
HH	046652	Detent Ball
II	221210	M-10 x 25 SHCS

JJ	**219047**	**M-10 x 12 Set Screw**
KK	**077798**	**Vise Jaws**
LL	**203212**	**M-10 x 30 HHCS**
MM	**045224**	**Clevis Wear Plate**
NN	**210012**	**M-10 Jam Nut**
OO	**060270**	**End Cap**
PP	**114020**	**M-10 Washer**
QQ	**045300**	**Complete Vise Assembly**

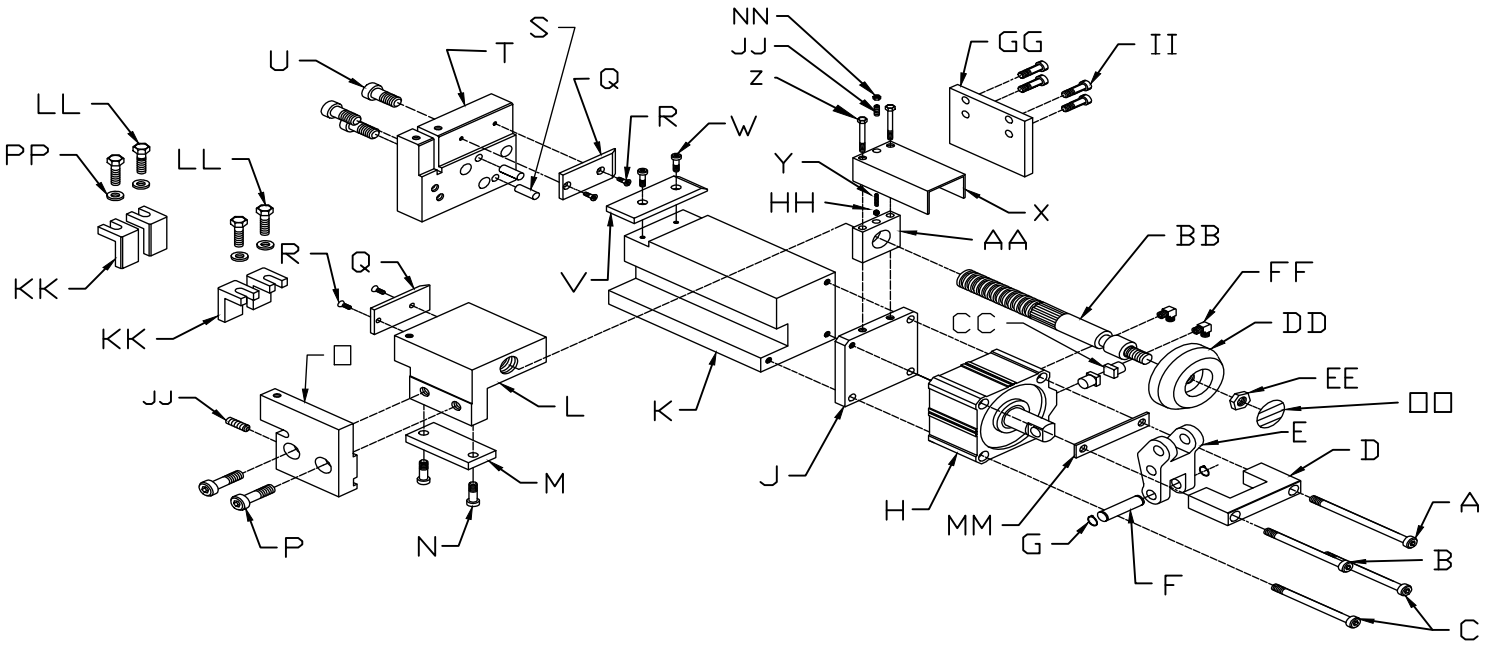


FIGURE 20

11.3 SHUTTLE VISE ASSEMBLY

ITEM	PART #	DESCRIPTION
A	111015	5/8 x 11 Jam Nut
B	045219	Boss
C	045652	Cylinder Body
CA	045662	Cylinder Rebuild Kit - Shuttle Vise
D	045220	Cylinder Mounting Plate
E	077743	Fitting
F	045221	Detent Block
G	046652	Detent Ball
H	218048	M-10 Set Screw
I	220027	M-8 x 35 RHMS
J	201160	M-8 x 60 HHCS
K	045212	Lead Screw
L	045210	Push Block
M	045211	Keeper Plates
N	077864	M-5 x 12 SHCS
O	045215	Vise Body
P	045208	Teflon Bushing
Q	045217	Alignment Probe
R	077795	Proximity Switch
S	045216	Alignment Cap
T	073458	M-6 x 10 SHCS
U	045213	End Block
V	221417	M-16 x 45 SHCS
W	230005	M-6 x 12 FSHCS
X	073925	1/4 x 1/2 Dowel Pin
Y	045214	Slide Plate
Z	220027	M-8 x 35 BHCS
AA	045222	End Plate
BB	045654	Seal Kit
CC	045199	Piston
DD	077798	Shuttle Jaws
EE	203212	M-10 x 30 SHCS
FF	045602	Spring
GG	210012	M-10 Jam Nut
HH	046667	O-Ring

II	**045661**	**Reed Switch P8S-GRFAX Serial# of Saw Required!!**
JJ	**073626**	**M-10 x 20 SHCS**
KK	**046669**	**Large Wire Clip**
LL	**073458**	**M-6 x 10 SHCS**
MM	**046668**	**Small Wire Clip**
NN	**010070**	**Wiper Seal**
OO	**218007**	**M-4 x 4 Set Screw**
PP	**220027**	**M-8 x 35 BHCS**
QQ	**045209**	**Complete Vise Assembly**
RR	**060270**	**End Cap**
SS	**045660**	**Magnet**
TT	**220010**	**M-4 x 12 BHCS**
UU	**114020**	**Washer**
VV	**045621**	**Cable Track Bracket**
WW	**045376**	**Angle Mount**
XX	**221010**	**M-6 x 16 SHCS**
YY	**045620**	**Cable Track (not shown)**

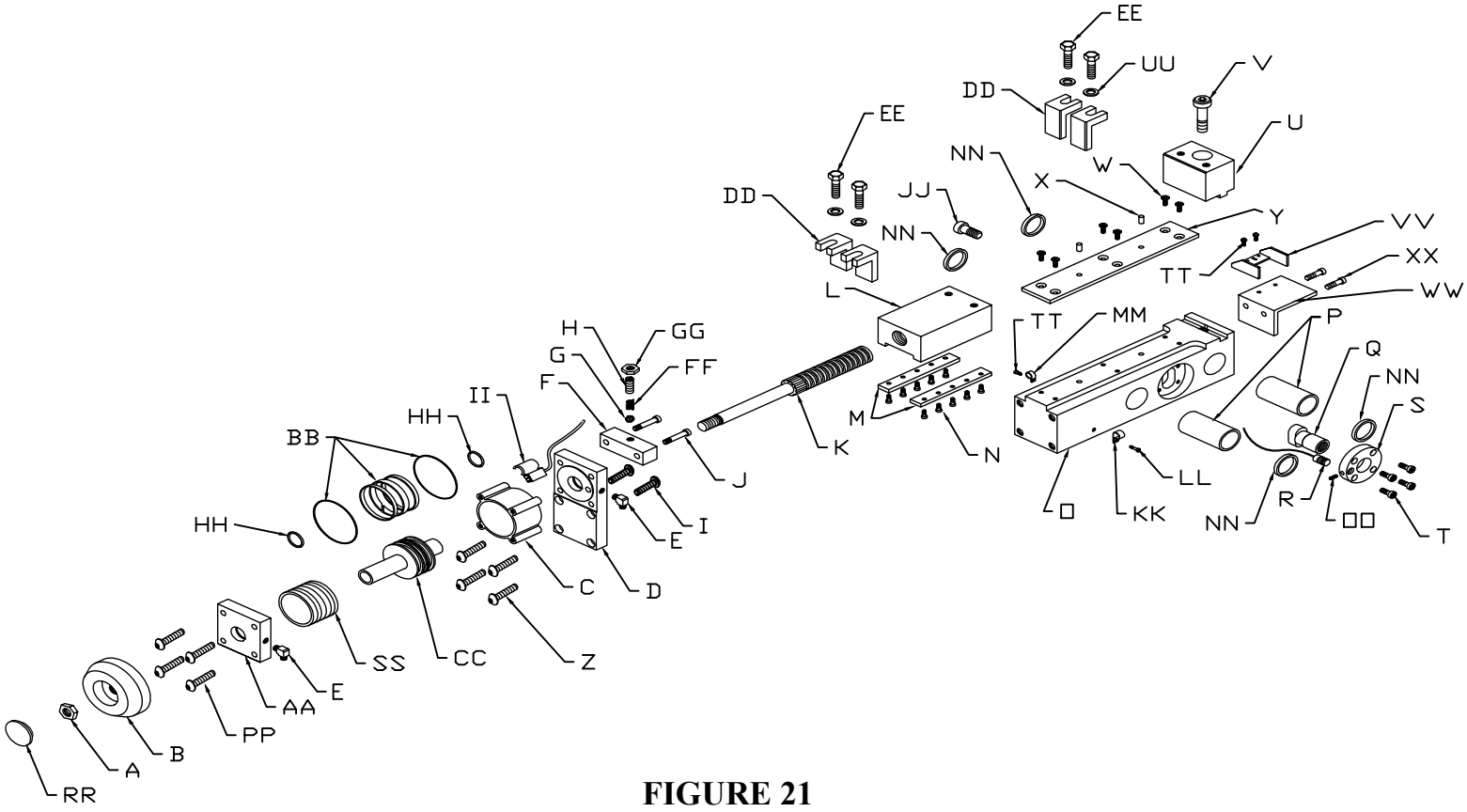


FIGURE 21

11.4 SHUTTLE ASSEMBLY

ITEM	PART #	DESCRIPTION
A	077742	1/4" NPT x 169 Plastic
B	077701	Filter
C	077777	3/8 NPT Filler Plug
D	077774	3/8" NPT Nipple
E	077712	Flow Control Valve
F	045042	1168 x 1/2 Male Connector
G	045048	Line (Cylinder 1/2)
H	060501	Line (Valve 5/16)
I	077738	1/4" NPT x 169 Plastic
J	221210	M-10 x 25 SHCS
K	045661	Reed Switch P8S-GRFAX
L	045054	11699 x 3/8 90 Degree Elbow
M	221120	M-8 x 25 SHCS
N	045643-045661	Shuttle Cylinder (Ser.# 1323HFANF1107 & Prior)
N1	045643	Shuttle Cylinder (Ser.# 1324HFANF1108 & Up)
O	219040	M-10 x 10 Set Screw
P	045265	Mounting Bracket (Cylinder End)
	045195	Set
Q	230005	M-6 x 12 FSHCS
R	045423	Shroud
S	045225	Scale
T	201220	M-10 x 50 SHCS
U	114020	M-10 Hardened Washer
V	045370	Pointer
W	220010	M-4 x 12 BHCS
X	201232	M-10 x 80 HHCS
Y	045266	Front Guide
Z	045204	Sliding Stop
AA	045202	Mounting Bracket (Vise End)
	045195	Set of Guide Blocks
BB	045207	Linear Shafts
CC	045209	Shuttle Vise Assembly
DD	045201	Rear Plate
EE	045284	Reservoir
FF	045197	Adjustable Wear Plate

GG	**230207**	**M-20 FSHCS**
HH	**218000**	**M-8 x 8 Set Screw**
II	**045254**	**Roller**
JJ	**221212**	**M-10 x 30 SHCS**
KK	**045259**	**Roller Block**

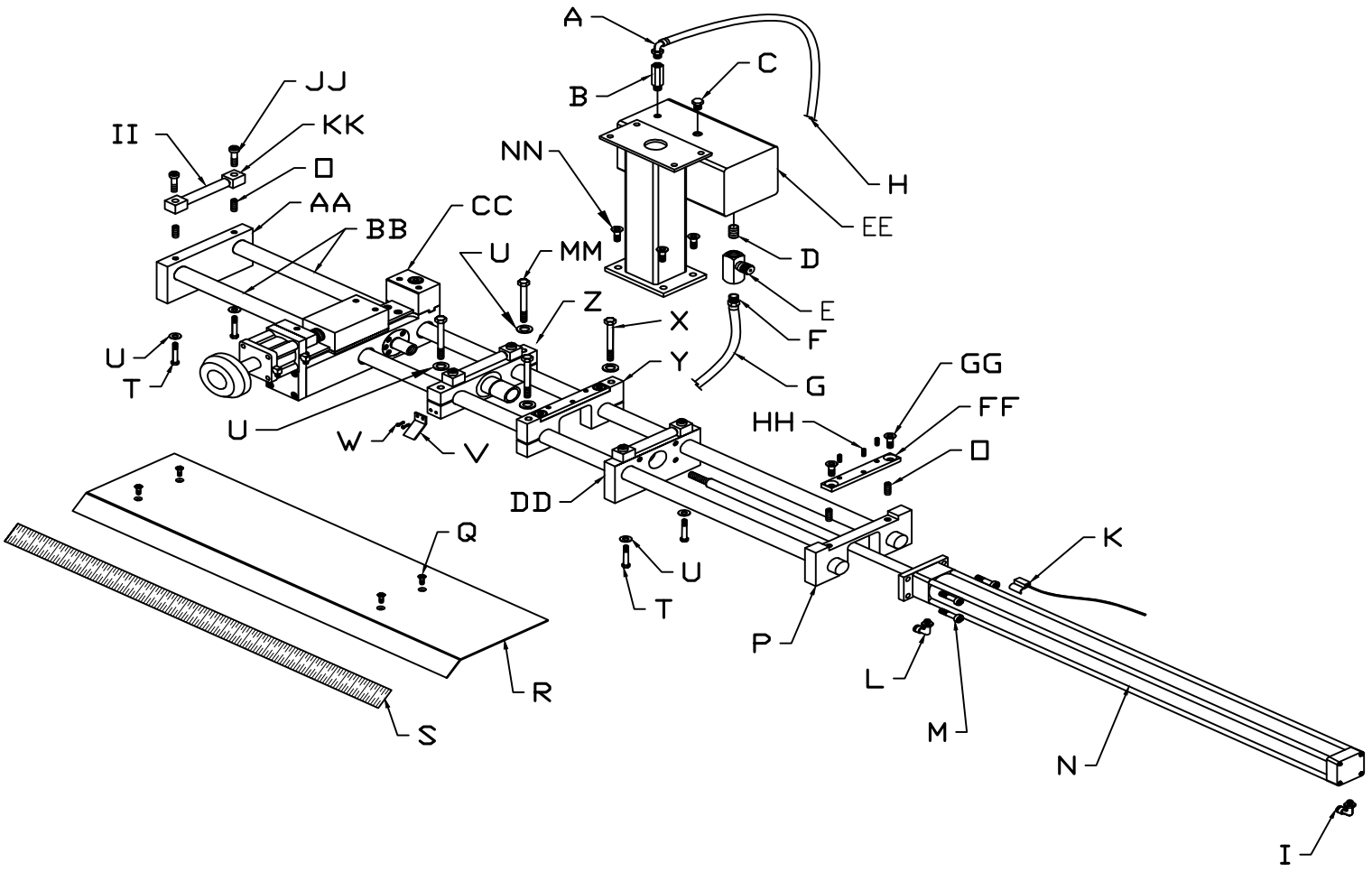


FIGURE 22

11.5 FINE ADJUSTMENT STOP ASSEMBLY

ITEM	PART #	DESCRIPTION
A	045205	Fine Adjustment
B	045206	Adjustment Collar
C	016063	1-1/2 Snap Ring
D	046652	Detent Ball
E	045602	Detent Spring
F	045204	Sliding Stop
G	204225	M-10 x 80 HHCS
H	221212	M-10 SHCS
I	045259	Roller Block
J	045254	Roller
K	114020	Hardened Washer
L	045233	Roller Bearing
M	047255	Roller Set (Includes J & L)
N	045256	Dowel Pin

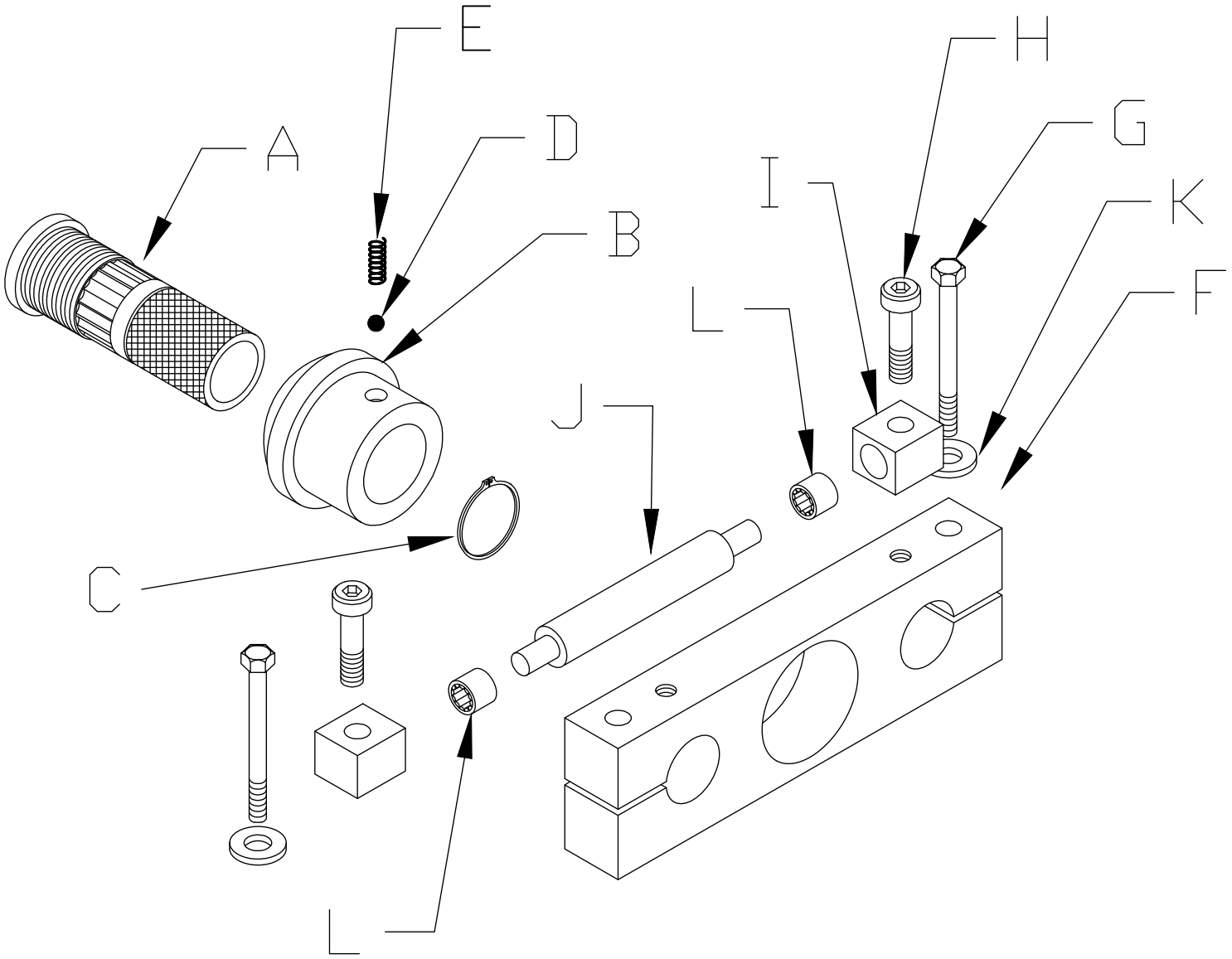


FIGURE 23

11.6 POWER DOWN FEED ASSEMBLY

ITEM	PART #	DESCRIPTION
A	077671	Sales Cylinder Festo NF Metric Includes A, E, J, K, K1, L, N, O, P & Q
B	045425	Reservoir
C	077715	Pivot Bolt - Package of (2)
D	045232	Cylinder Bracket
E	077512	TPC Cyl. Nut-Machined
F	041015	Right Angle Flow Control
G	221212	M10 x 30 SHCS
H	047100	Upper Bracket Assembly
I	221210	M10 x 25 SHCS
J	077663	1/2" Elbow 90°
K	077664	3/8 MBSPP TO 1/8 FNPT Adapter
K1	077665	3/8 BSPP Bonded Seal
L	077578	M16 x 1.5 Cylinder Clevis (Includes R)
M	078455	Sight Glass
N	077700	Bellow
O	077505	Bellow Clamp
P	660505	Black Zip Tie
Q	210017	M16 X 1.5 Jam Nut
R		Included with L

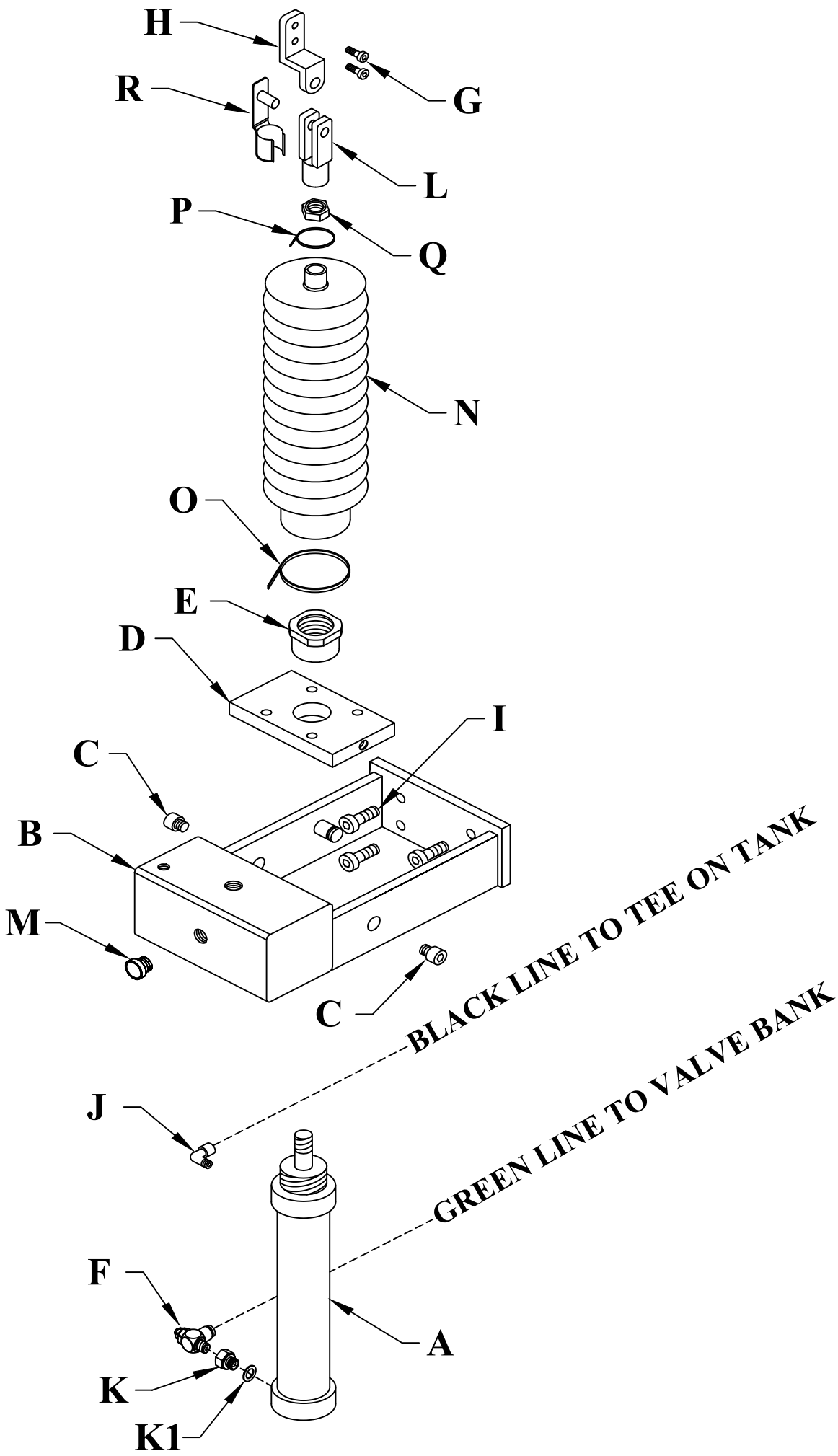

H
G
R
L
P
Q
N
O
E
D
I
C
B
M
C
BLACK LINE TO TEE ON TANK
GREEN LINE TO VALVE BANK
J
F
A
K
K1

FIGURE 24

11.6A POWER DOWN FEED VALVES

ITEM	PART #	DESCRIPTION
A	077746	1/4" NPT x 169 PL
B	077701	Baffle
C	077777	3/8" NPT Plug
D	045054	1/2" x 90 Degree Swivel x 169 PL
E	077536	Check Valve (Auto Saws Only)
F	045042	Return Line Fitting
G-H-I		MVK6 Mounting Kit
J	047535	Flow Control Valve
K	045054	1/4 NPT x 5/16 PL 90 Degree Elbow
L	045041	1/4 NPT Tee
M	077779	1/4 NPT Nipple
N	077771	Reducer
O	078455	Sight Glass

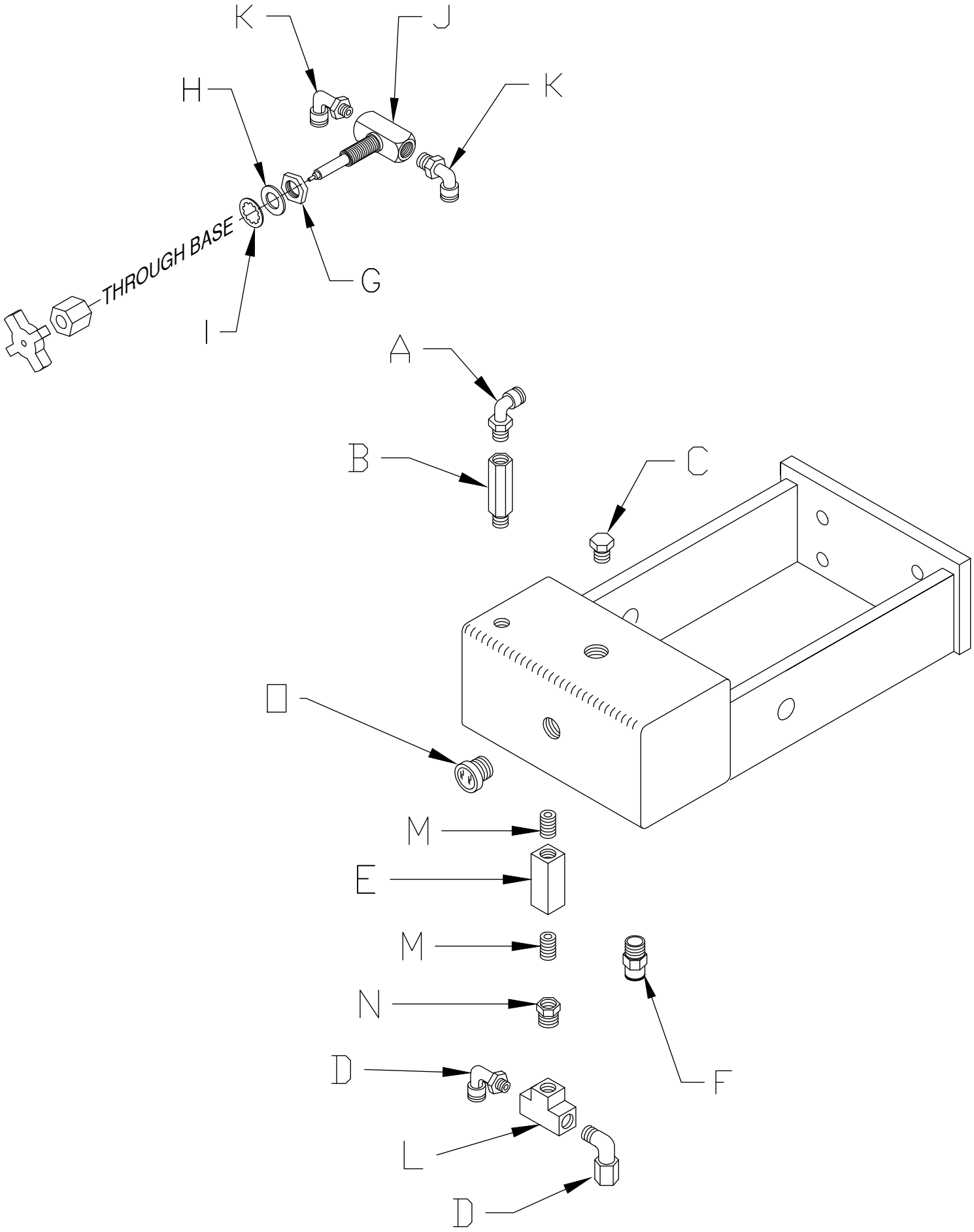


FIGURE 25

11.6B AIR CONTROLS

ITEM	PART #	DESCRIPTION
A	N/A	Provided by Customer
B	077719	Shuttle Valve
C	077737	1/4 NPT Brass Street Elbow
D	077780	Brass NPT Coupler
E	077779	1/4" NPT Nipple
F	045604	Complete Filter/Regulator/Lubricator
G	045605	Mounting Brackets
H	077738	90 Degree Fitting
I	045609	Replacement Bowls
J	045610	Filter Seal Kit
K	045612	Regulator Seal Kit
L	045613	Lubricator Seal Kit
M	045176	Valve Mount
N	045606	Gauge

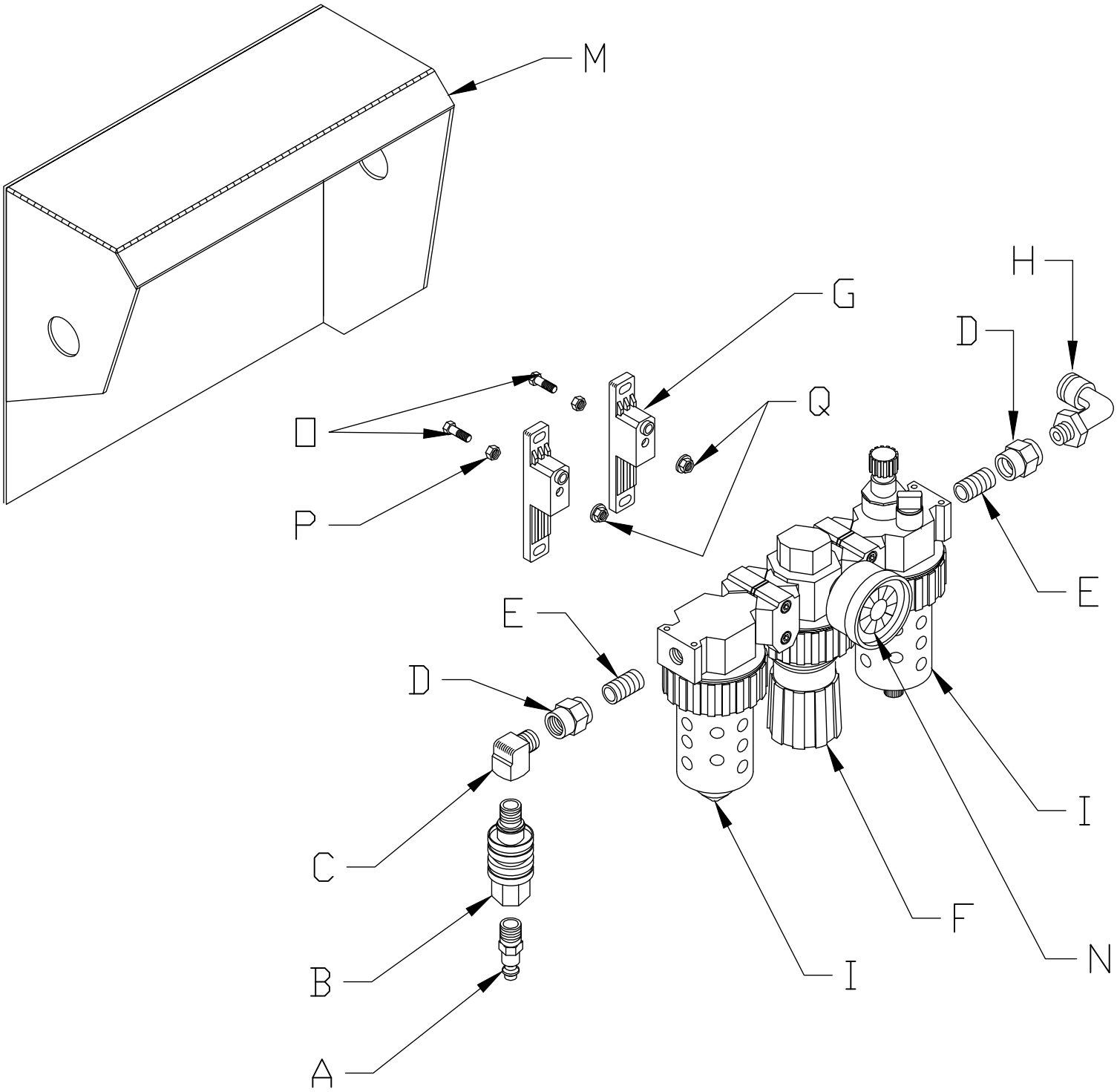


FIGURE 26

11.7 AIR VALVE ASSEMBLY

ITEM	PART #	DESCRIPTION
A	046047	DIN Connector for 060040
B	077744	Fitting (5/16 PL to 1/4 NPT)
C	077777	Plug (3/8 NPT)
E	077740	3/8" 90 DEG Male Swivel
F	045650	Solenoid 24VDC
G	045655	Valve (Includes F)
H	677728	Fitting (1/4 NPT to 1/4 Hose)
I	077779	1/4" X Close Brass Nipple
J	077741	1/8" Male SW x 169 PL
K	077750	1/8" NPT X 2-1/2" Nipple
L	077721	1/8" X 1/4" Brass Bushing
M	677745	1/4" Brass Tee
N	045653	4 Station Valve Assembly All Except: H, I, J, K, L, M, & O
O	077930	Mister Regulator

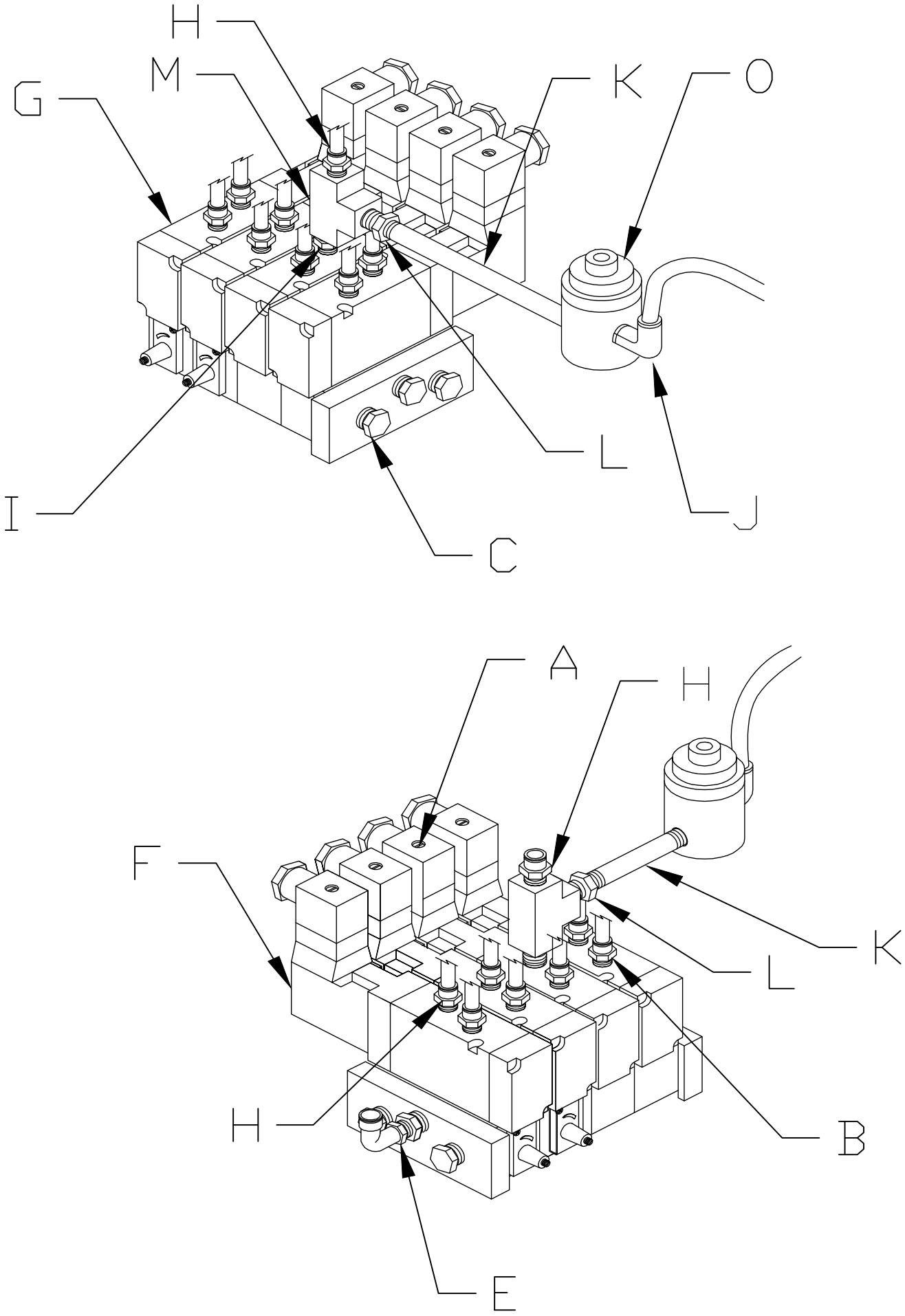


FIGURE 27

11.8 BLADE GUARD ASSEMBLY

ITEM	PART #	DESCRIPTION
A	045267	Guard Shell
B	677901	M-10 x 55 SHCS
I	076839	Mister Unit
J	676842	Hose Barb Elbow
K	077926	Coolant Line
L	060501	Air Line
M	676844	Fitting
N	073095	M-4 Washer
O	073415	M-4 SHCS

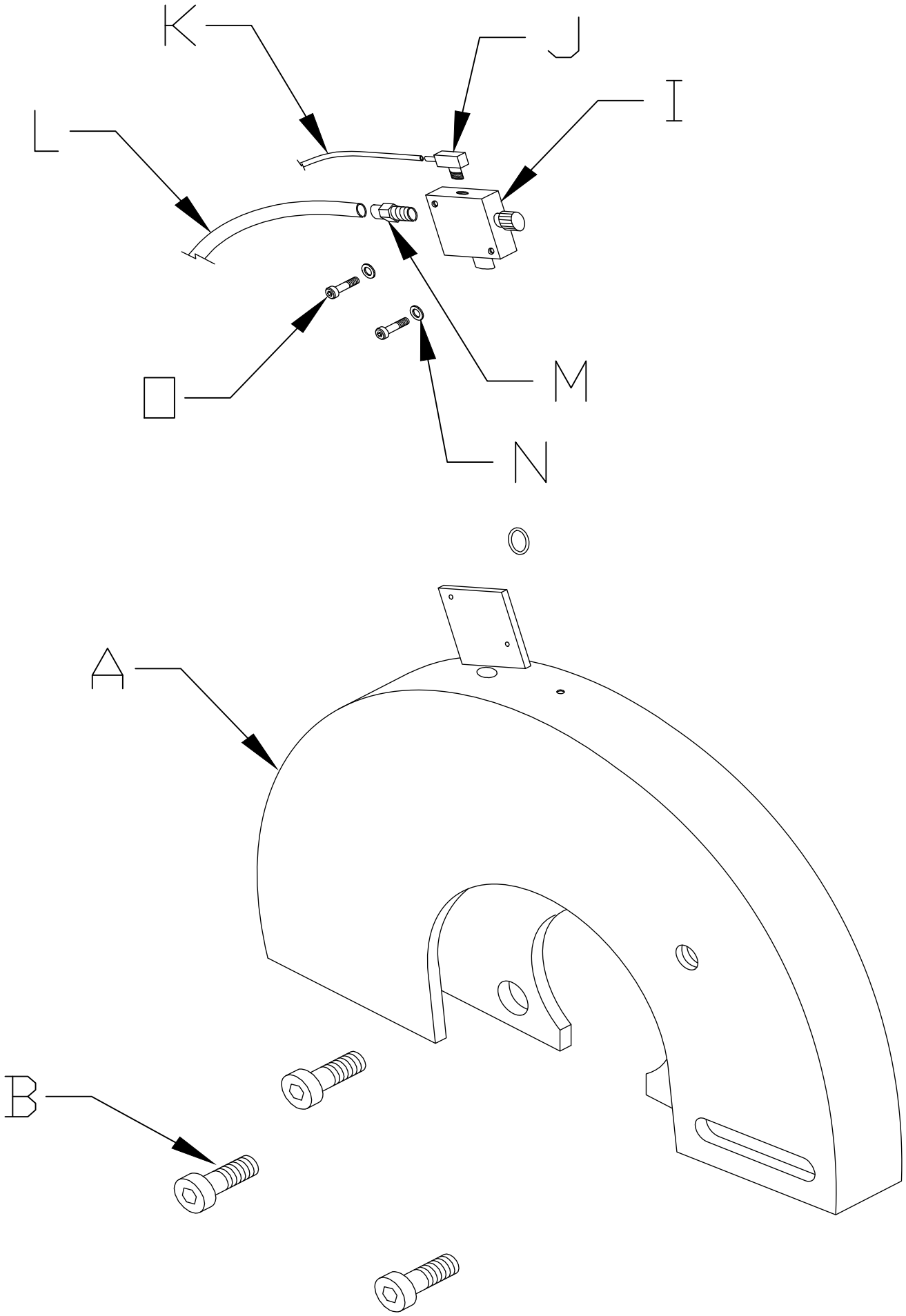


FIGURE 28

11.9 MOTOR ASSEMBLY

ITEM	PART #	DESCRIPTION
A	076883	Fan Cover
B	073407	M-5 x 8 SHCS
C	076881	Fan (25mm Bore)
CA	076884	Fan (30mm Bore)
D	077380	End Casting (25mm Bore)
DA	077381	End Casting (30mm Bore)
E	075049	Motor Bearing (6205Z) (25mm)
EA	077325	Motor Bearing (6206) (30mm)
F	077191	Snap Ring
G	076369	Key
H	073326	M-8 x 30 SHCS
I	077370	Key 6 x 4 x 32mm
J	077376	Seal
K	075050	Spacer Washer
L	076556	Snap Ring (30mm Only)
M	077378	End Casting (Front)

COMPLETE MOTORS

A	076987	230 Volt
B	076989	460 Volt
C	076990	575 Volt

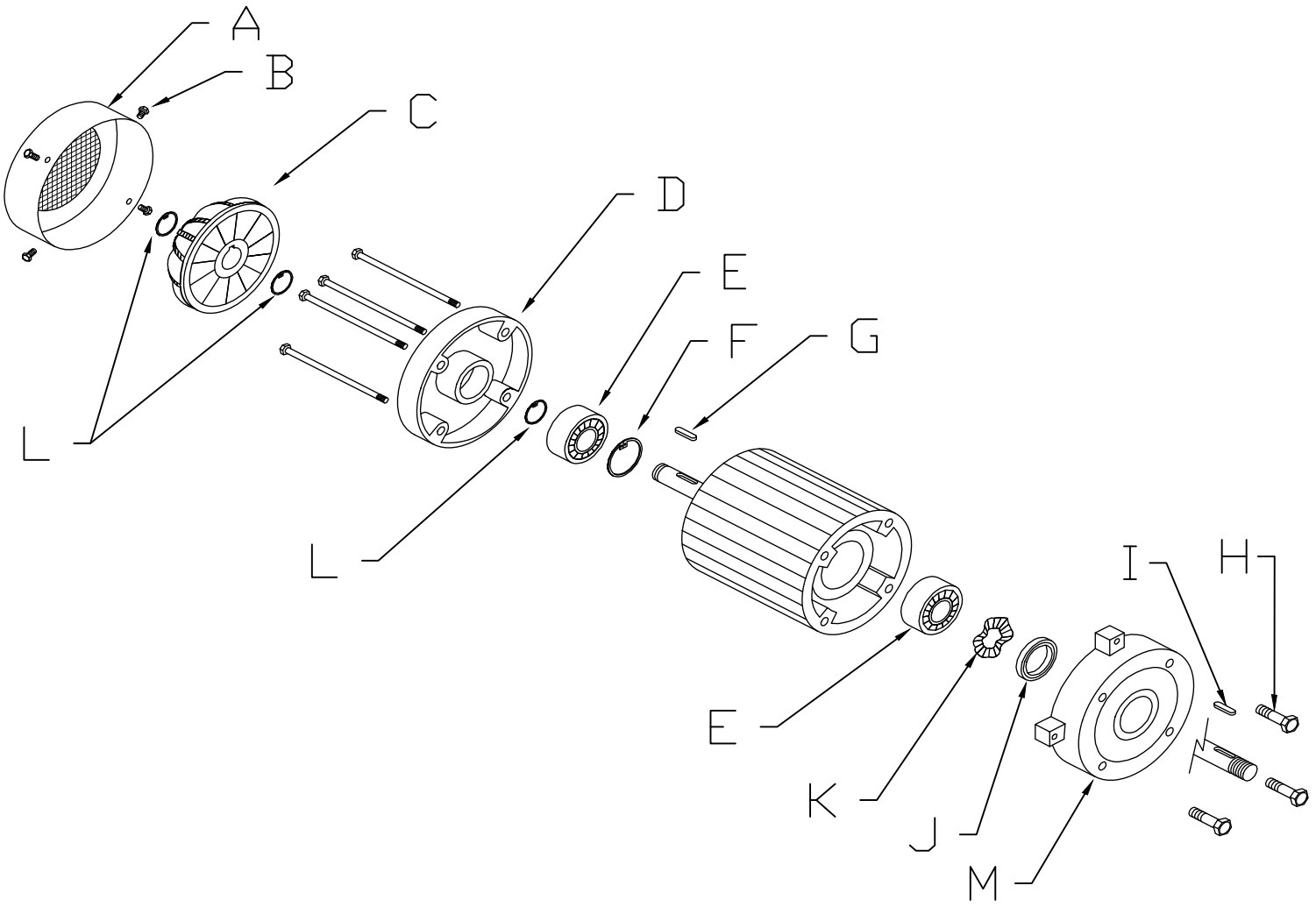


FIGURE 29

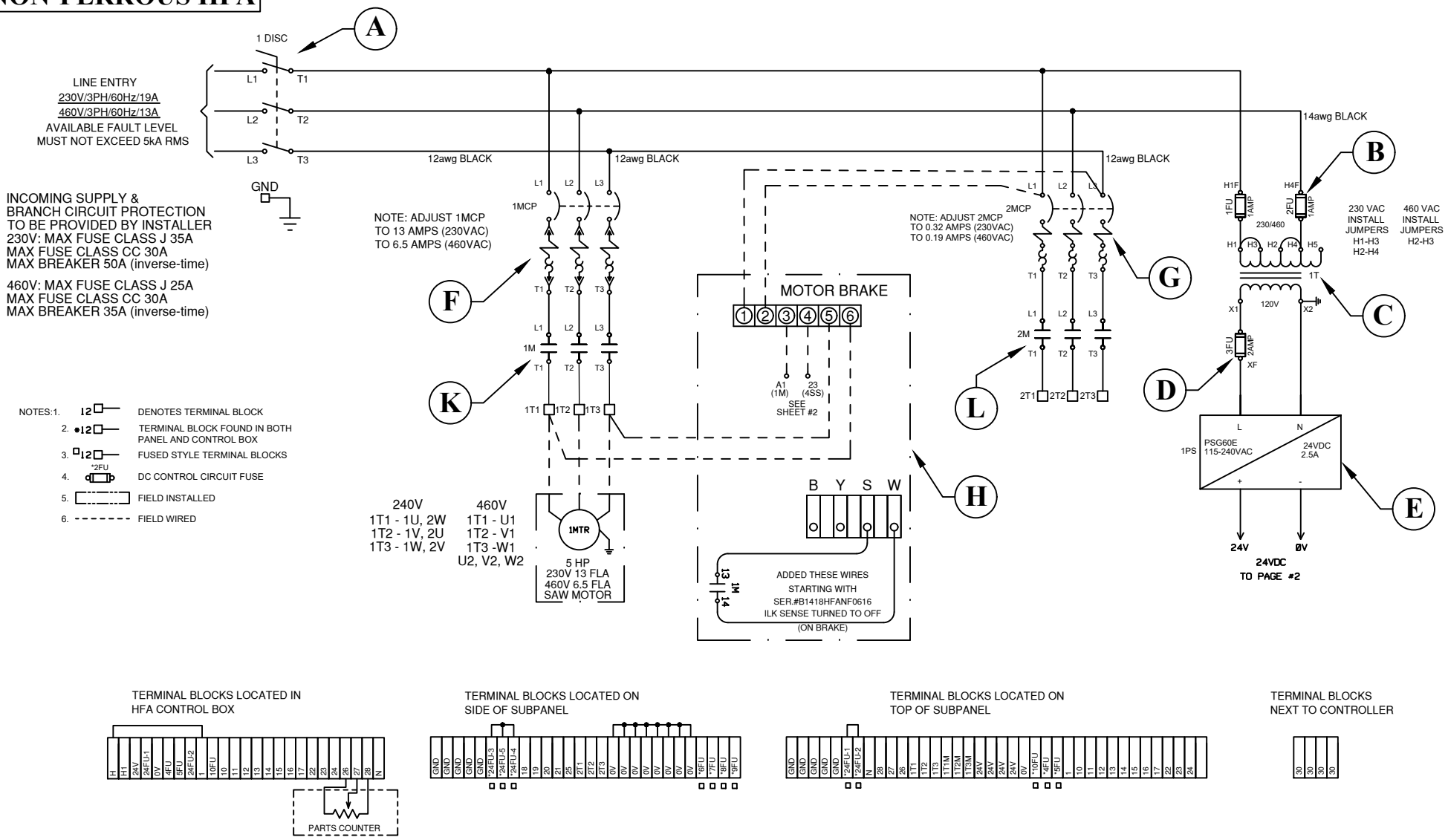
11.10 ELECTRICAL UNIT - LINE CIRCUIT

ITEM	PART #	DESCRIPTION
A	011854	Disconnect Switch
B	011933	Fuse 1-1/2 AMP Primary
C*	011930*	Transformer 150VA - Replacement
D	011835	Secondary Fuse 2 AMP
E	045714	Power Supply HFA 01-14
F F1	000940 000943	460V Motor Protect Switch (6-10 Amp) 230V Motor Protect Switch (10-16 Amp)
G	048039	Motor Protect Switch (0.4 Amp) (Optional Flood Coolant Pump)

ITEM	PART #	DESCRIPTION
H	072858 072867	230V Motor Brake High Torque 460V Motor Brake High Torque
I	045636	EASY-E4-UC PLC (not shown)
J	045637	EASY-E4-UC Expansion Module (not shown)
K	011984	Motor Contactor
L	045681	Pump Contactor
M	045683	Control Relay (1CR, 2CR, & 3CR) (not shown)
N	028483	Control Relay (5CR) (not shown)

C* - REPLACEMENT PART - Not exactly the same - but will fit.

NON-FERROUS HFA

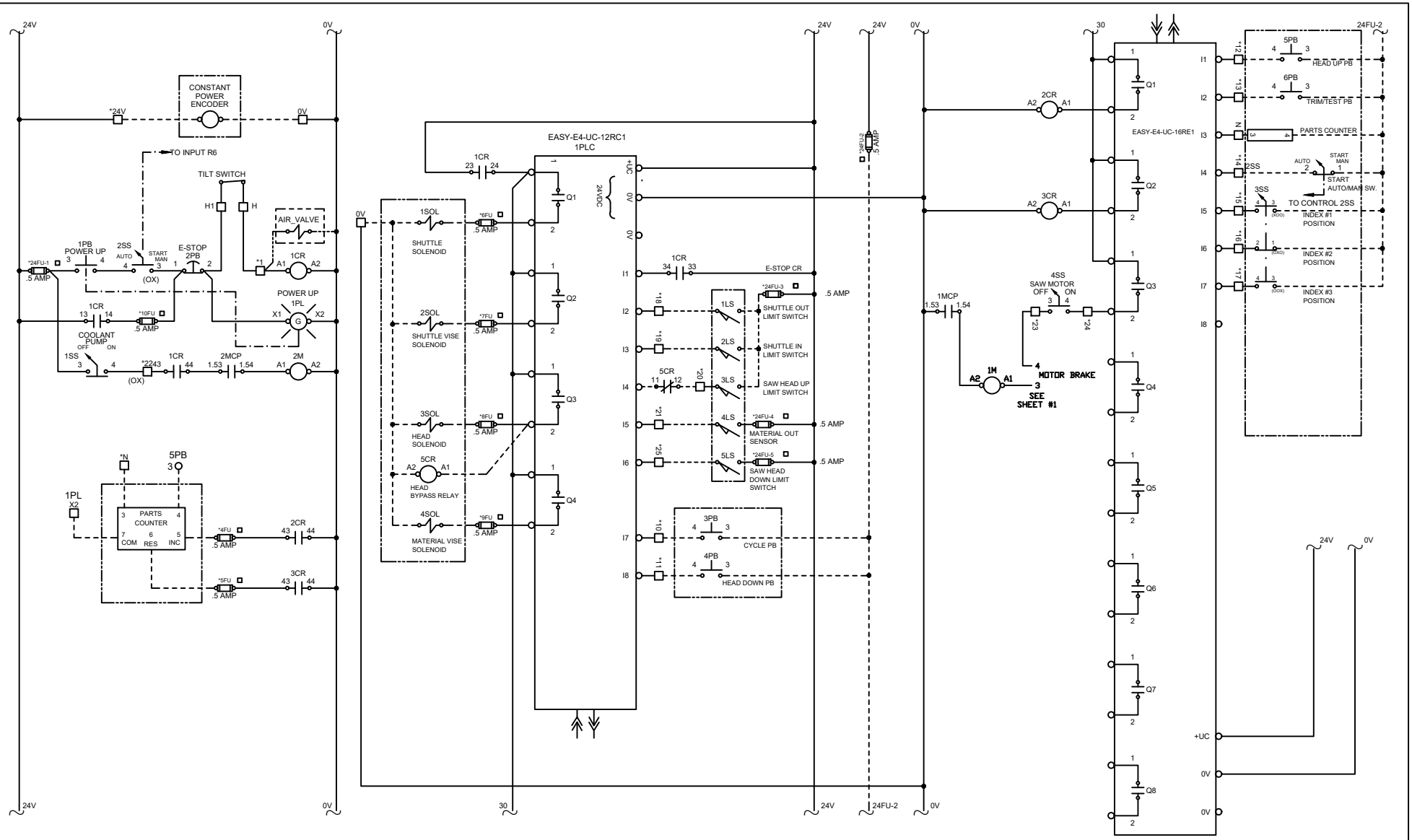


REV	DESCRIPTION	DATE	BY	APPR.
F	UPDATED BRANCH CIRCUIT PROTECTION INFO; ADDED 460V VOLTAGE; UPDATED 1MCP CIRCUIT PROTECTOOR	7/22/22	GRQ	CAH
E	UPDATED EATON EASY RELAY	04/27/22	GRQ	ABS
D	ADDED 5CR RELAY	01/18/21	GRQ	DMC
C	CHANGED FUSE *2FU TO *10FU	08/24/17	GRQ	DMC

Model: 45355	Drawn By: GRQ	Date: 05-19-2016	Rev: F
SCOTCHMAN INDUSTRIES 180 E US-14 Philip, SD 57567	Description: HITCH FEED CONTROL PANEL		
	Drawing Number: 045355-E1	Sheet 1	Of 2

S/N B1491 HFA 0622 & UP

FIGURE 30



Model:	Drawn By:	Date:	Rev:
45355	GRQ	05-19-2016	F
SCOTCHMAN INDUSTRIES 180 E US-14 Philip, SD 57567	Description: HITCH FEED CONTROL PANEL		
	Drawing Number: 045355-E2	Sheet 2	Of 2

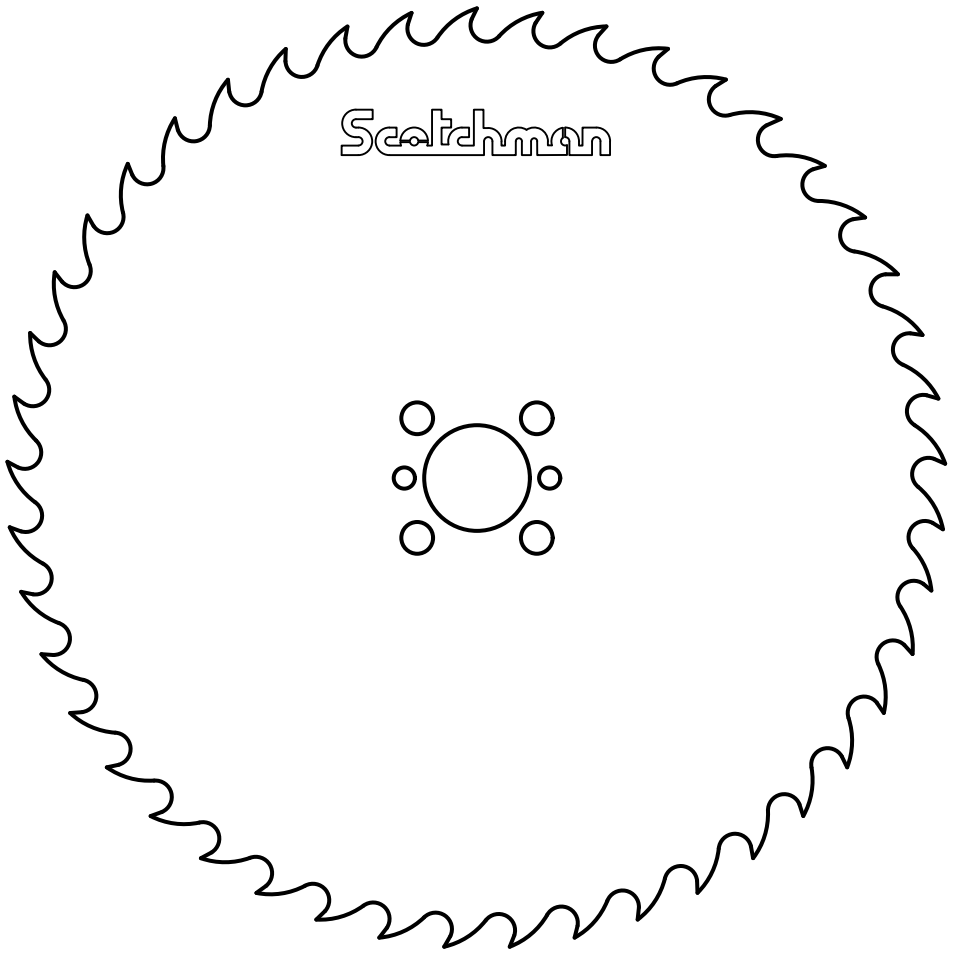
NON-FERROUS HFA

S/N B1491 HFA 0622 & UP

FIGURE 30A

Scotchman

Metal Fabricating Solutions



MADE IN USA

SCOTCHMAN IND. - 180 E US HWY 14 - PO BOX 850 - PHILIP, SD 57567 Call: 1-605-859-2542

11.11 ELECTRICAL UNIT - SECONDARY CIRCUIT

ITEM	PART #	DESCRIPTION
A	011879	Start Button
A1	048047	24 Volt Lamp
A2	048050	KM/AFR Red "Power On"
B	011879	Start Button
C	011837	Emergency Stop Switch
D	011872-011867-048108 & (2) 011874	Hitch Selector Switch
E	011879	Start Button
F	011879	Start Button
G	011877	Selector Switch
H	011879	Start Button
I	011877	Selector Switch
J	045543	Counter (For HFA)
K	011877	Selector Switch

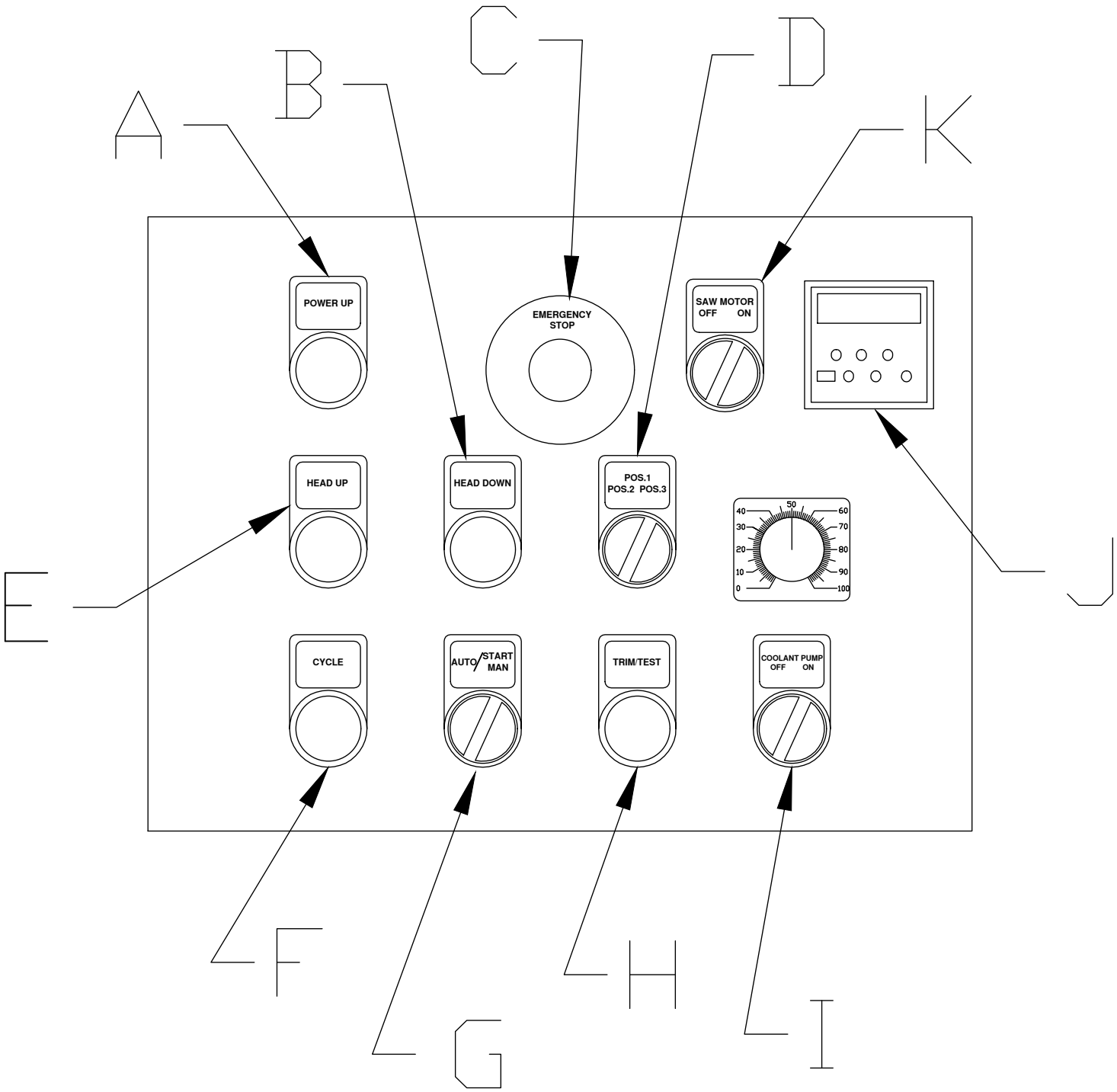

A
B
C
D
K
POWER UP
EMERGENCY STOP
SAW MOTOR OFF ON
HEAD UP
HEAD DOWN
POS.1 POS.2 POS.3
50
40
30
20
10
0
60
70
80
90
100
E
J
CYCLE
AUTO/START MAN
TRIM/TEST
COOLANT PUMP OFF ON
F
G
H
I

FIGURE 30B

11.12 BASE ASSEMBLY

ITEM	PART #	DESCRIPTION
A	045171	Base Cabinet
B	045413	Base Casting
C	045735	Lower Enclosure
D	N/A	Door Assembly
E	045260	Reservoir Screen (For Mister)
G	049217	Leveling Pads
G1	208024	M-24 Hex Nut
H	073350	M-10 x 100 HHCS
J	N/A	
K	N/A	M-4 x 12 SHCS
L	045470	Chip And Parts Chute
M	221120	M-8 x 25 SHCS
N	045052	Chip Bucket
O	046018	Handle
P	049330	Brackets
Q	203235	M-10 x 90 HHCS
R	114020	Washer
S	216015	M-10 Flange Nut
T	073617	M-6 x 12 BHCS
U	046640	Access Cover
V	220010	M-4 x 12 BHCS

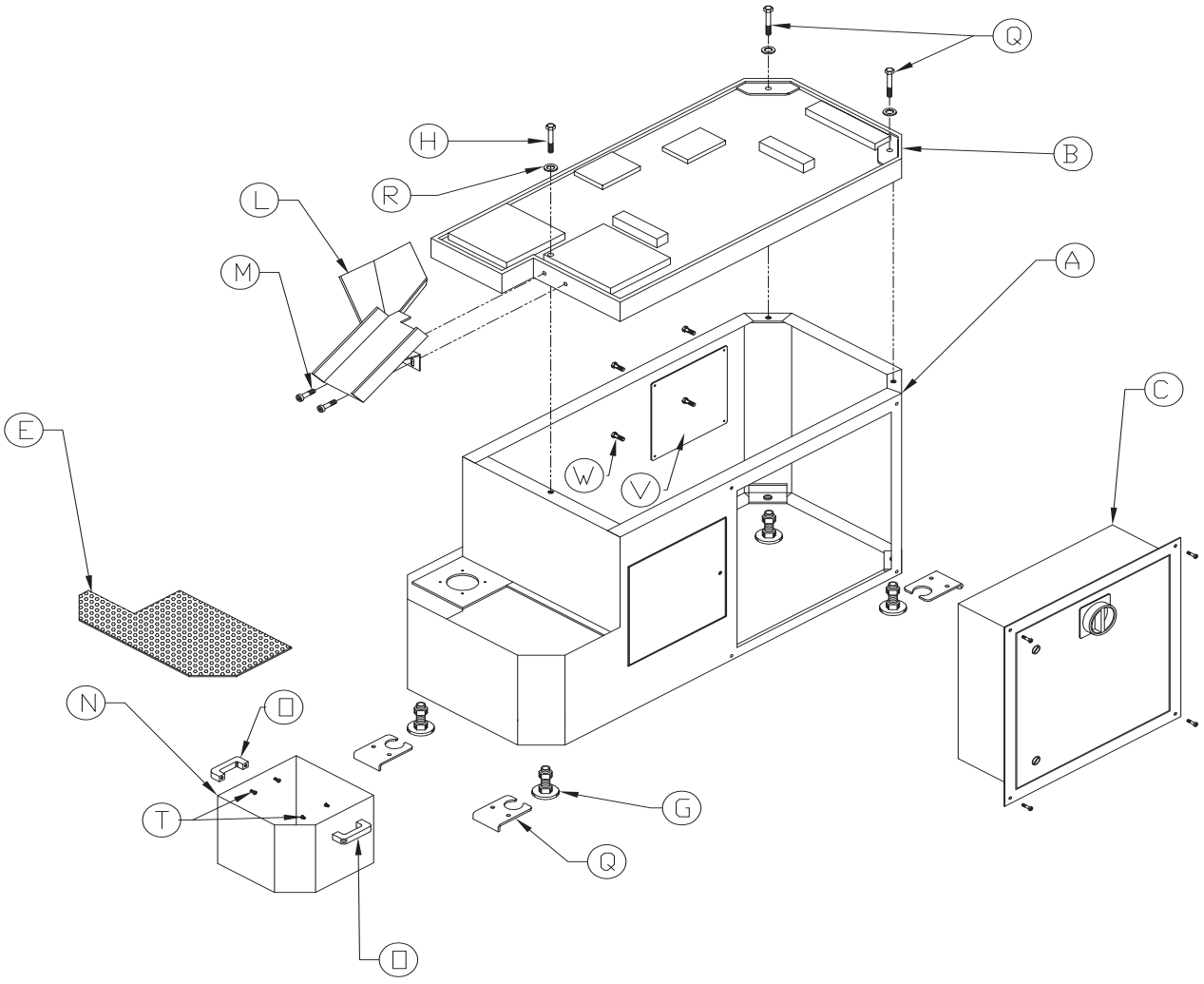


FIGURE 31

11.13 MIST COOLANT SYSTEM

ITEM	PART #	DESCRIPTION
A	677728	1/4 NPT x 1/4 Hose
B	677745	1/4 Brass Tee
C	077721	1/4 To 1/8 NPT Reducer
D	077750	1/8 x 2-1/2 Pipe Nipple
E	077930	Mister Regulator
F	677933	Mister Reservoir
G	077779	1/4 Brass Nipple
H	077741	5/16 Swivel Fitting
I	045740	Check Valve
J	077926	Line

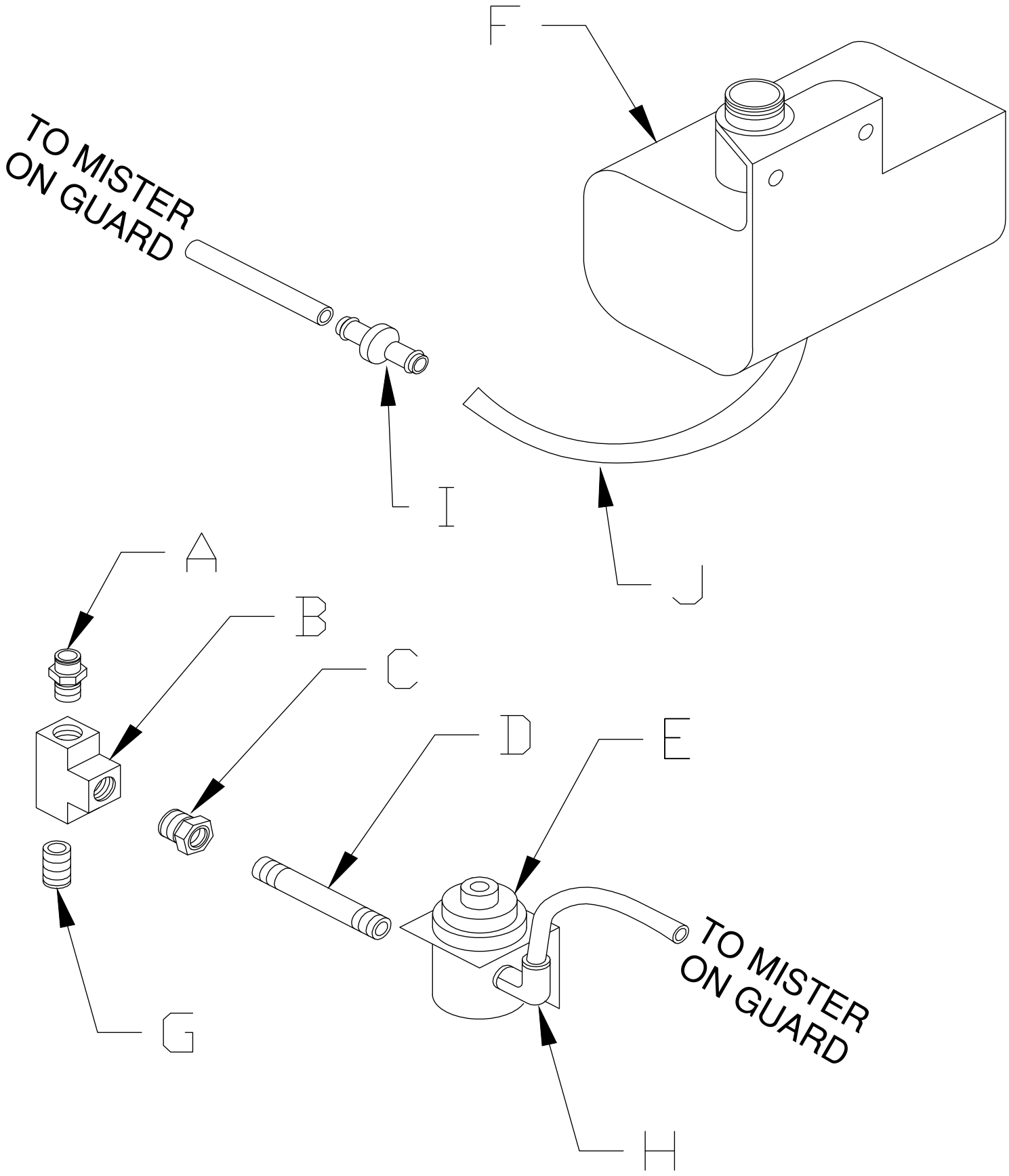


FIGURE 32

11.14 STROKE CONTROL ASSEMBLY

ITEM	PART #	DESCRIPTION
A	045253	Stroke Adjustment Plate
B	045249	Stroke Control Stand
C	045299	Stop Block
D	045320	Stroke Sensor Mount
E	045330	Stop Guide
F	220010	M4 X 10MM BHCS
G	203212	M-10 x 30 HHCS
H	114020	3/8" Hard Washer
I 1	077796	Proximity Sensor (OLD M18 - One Used)
I 2	077795	Inductive Prox. Sensor (NEW M12 - Two Used) NOTE: Verify Size Before Ordering!!
J	221212	M-10 x 30 SHCS
K	221210	M-10 x 25 SHCS
L	221120	M-8 x 25 SHCS
M	158202	Bumper
N	073095	M-4 Washer

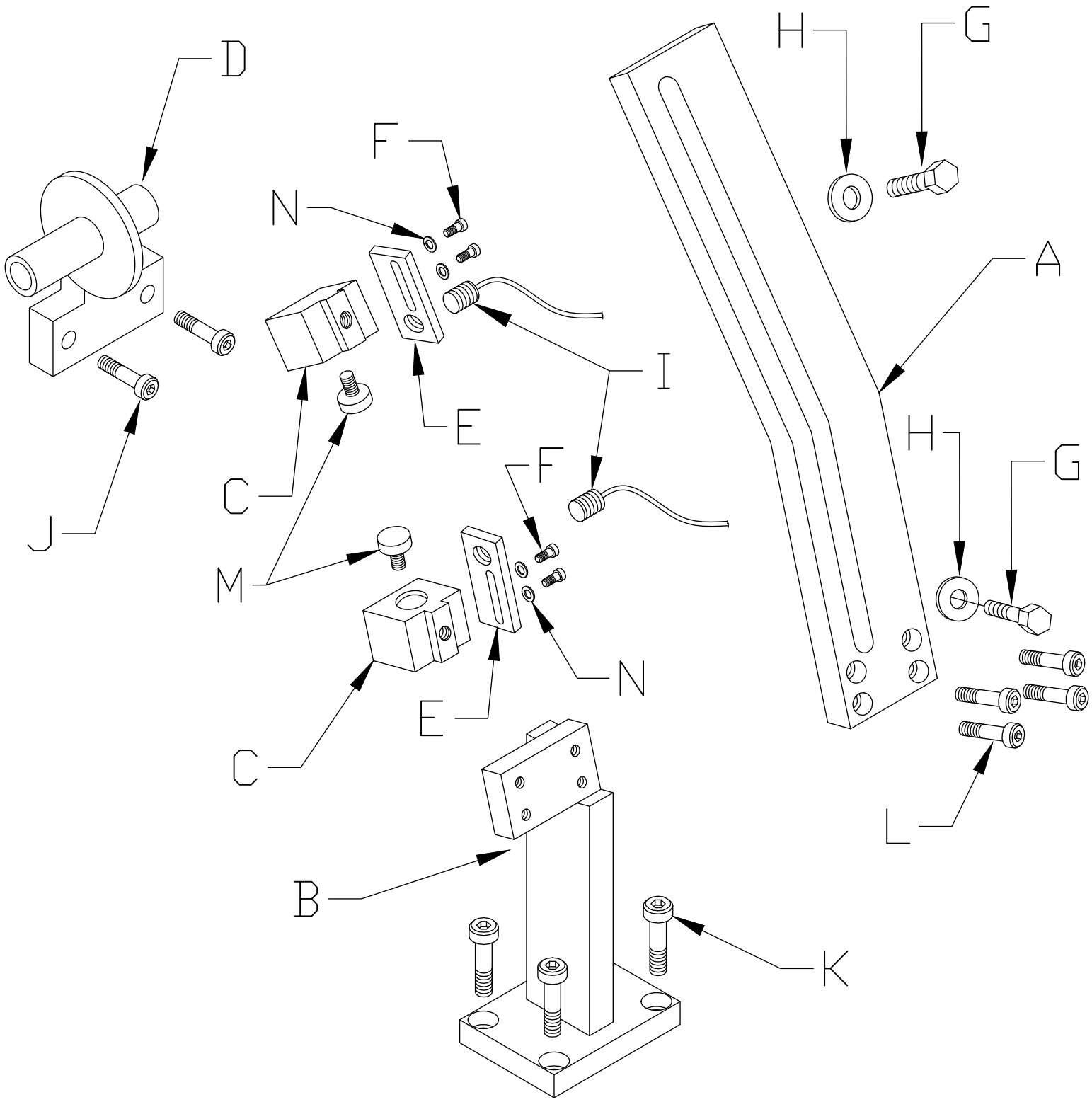


FIGURE 33

11.15 HOOD ASSEMBLY

ITEM	PART #	DESCRIPTION
A	203217	M-10 x 45 HHCS
B	045196	Pedestal
C	045285	Pivot Pin
D	046018	Hood Handle
E	045464	Extension
F	045322	Sight Glass
G	046645	Sight Glass Seal
H	201120	M-6 x 20 HHCS
I	077157	M-6 Nylon Loc Nut
J	229415	M-10 x 12 x 16 Shoulder Bolt
K	047151	NF Hood Painted
L	077142	Grease Nipple
M	077100	M-10 Dowel Pin
N	073617	M-6 x 12 BHCS
O	040012	Bumpers
P	047110	Interlock Switch
P1	047115	Switch Mount
P2	220010	M-4 x 12 BHCS
P3	21500	M-4 Nylon Loc Nut
Q	047160	Hood Assembly (Includes D, E, F, G, H, I, K, N, O, P, R)
R	215013	M-8 Nylon Loc Nut
S	077907	Shroud Edge

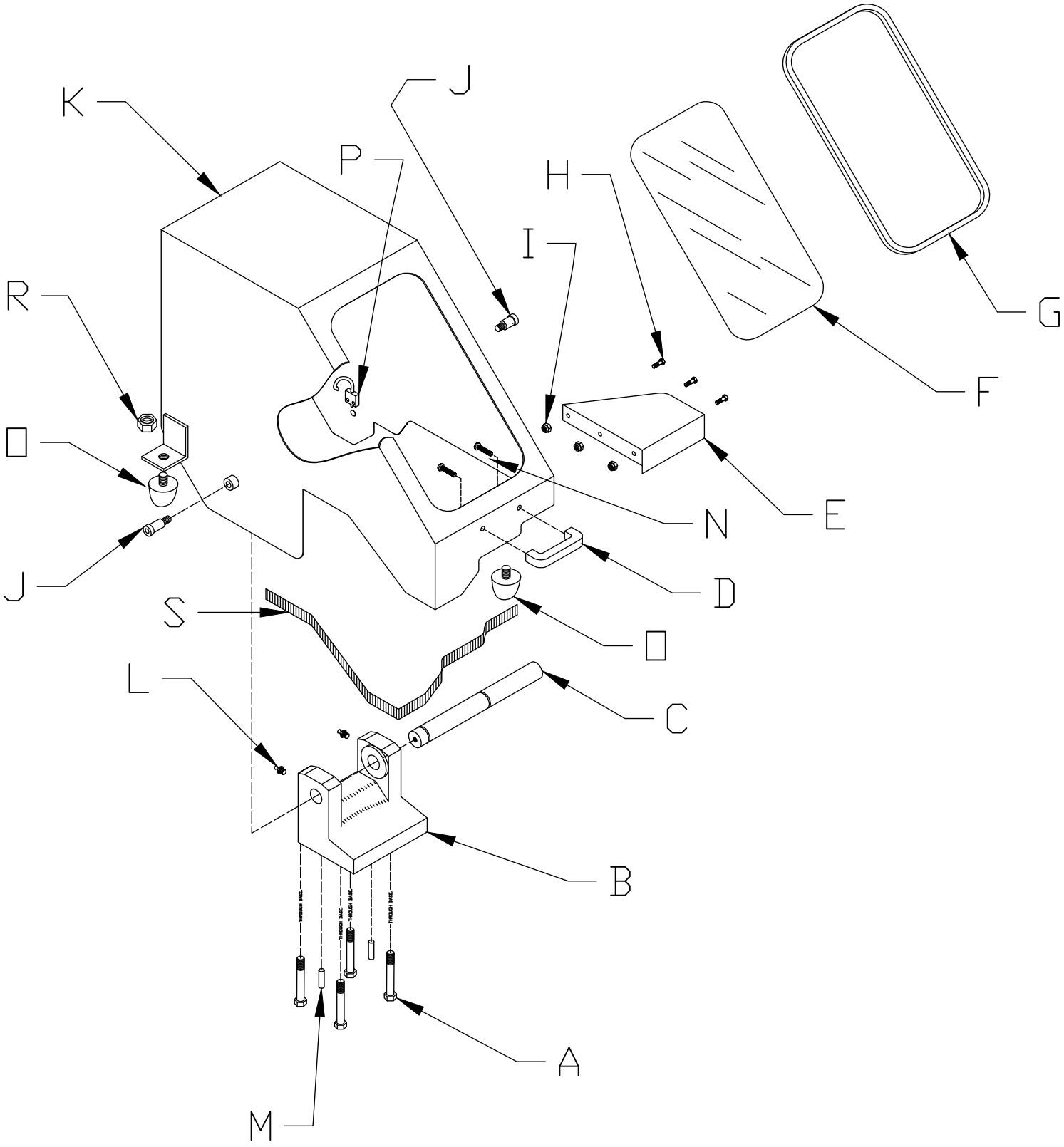


FIGURE 34

12.0 OPTIONAL EQUIPMENT PARTS LISTS

12.1 TEN FOOT SUPPLY TRACK

ITEM	QTY	PART #	DESCRIPTION
1	1	029242	10' Roller Conveyer W/Legs (Complete Assy.)
2	2	029243.1	10' Roller Conveyor Side
3	2	029244	Leg Roller Conveyor
4	10	029245	Replacement Rollers For #29243
5	1	029300	Conveyor Brace
6	3	029621	Conveyor Support Bracket
7	12	201205	M10 X 16MM DIN933 HHCS
8	12	208012	M10 DIN 934 Hex Nut
9	2	216015	M10 BN190 Flange Nut
10	2	224205	M10 X 16MM DIN-BN73 WLCS

*076938 - 13" GUIDE ASSEMBLY (Optional)

ITEM	QTY	PART #	DESCRIPTION
1	2	026619	SMALL TEE NUT (M10)
2	2	043003	NYLON ROLLER 3.25
3	2	076941	BASE CLIP
4	1	076943	BASE MATERIAL GUIDE 13" PAINT
5	2	214012	M10 DIN125 REGULAR WASHER
6	2	221120	M8 X 25 DIN9121580 12.9 SHCS
7	2	229225	M10 X 12 X 70 SB912

*** Optional Guide Assembly for the older conveyors is P/N - 076935**

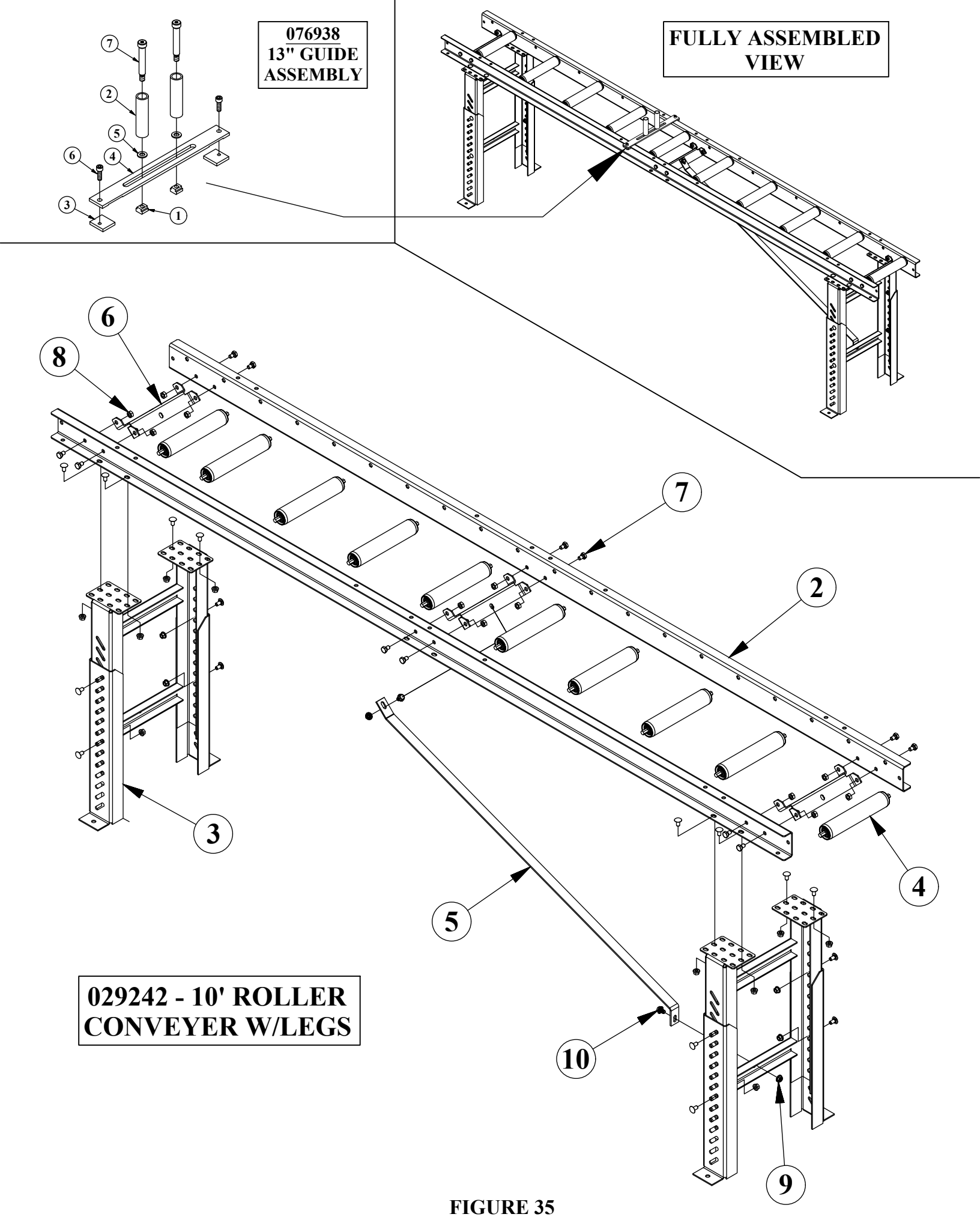

076938
13" GUIDE
ASSEMBLY
FULLY ASSEMBLED
VIEW
029242 - 10' ROLLER
CONVEYER W/LEGS
1
2
3
4
5
6
7
8
9
10

FIGURE 35

12.2 COOLANTS AND LUBRICANTS

UNIT	PART	DESCRIPTION
1 Gal.	075760	1 GAL. SYNCON-2 (do not dilute)
55 Gal.	075761	55 GAL. SYNCON-2 (do not dilute)
1 Qt.	075753	Air Line Lubricant
1 Gal.	075759	Air Line Lubricant

12.3 VISE REGULATOR

ITEM	PART #	DESCRIPTION
A	078190	REGULATOR W/GAUGE
B	677934	NF-FRL WALL MOUNT BRACKET
C	077864	M5 X 12 DIN912 SHCS
D	077742	1/4" MALE SW X169PL
E	077744	1/4-5/16 NPT STR FITTING
F	060501	5/16" BLACK AIR TUBE
	047250	AIR REG RFA VISE (MAN PK)

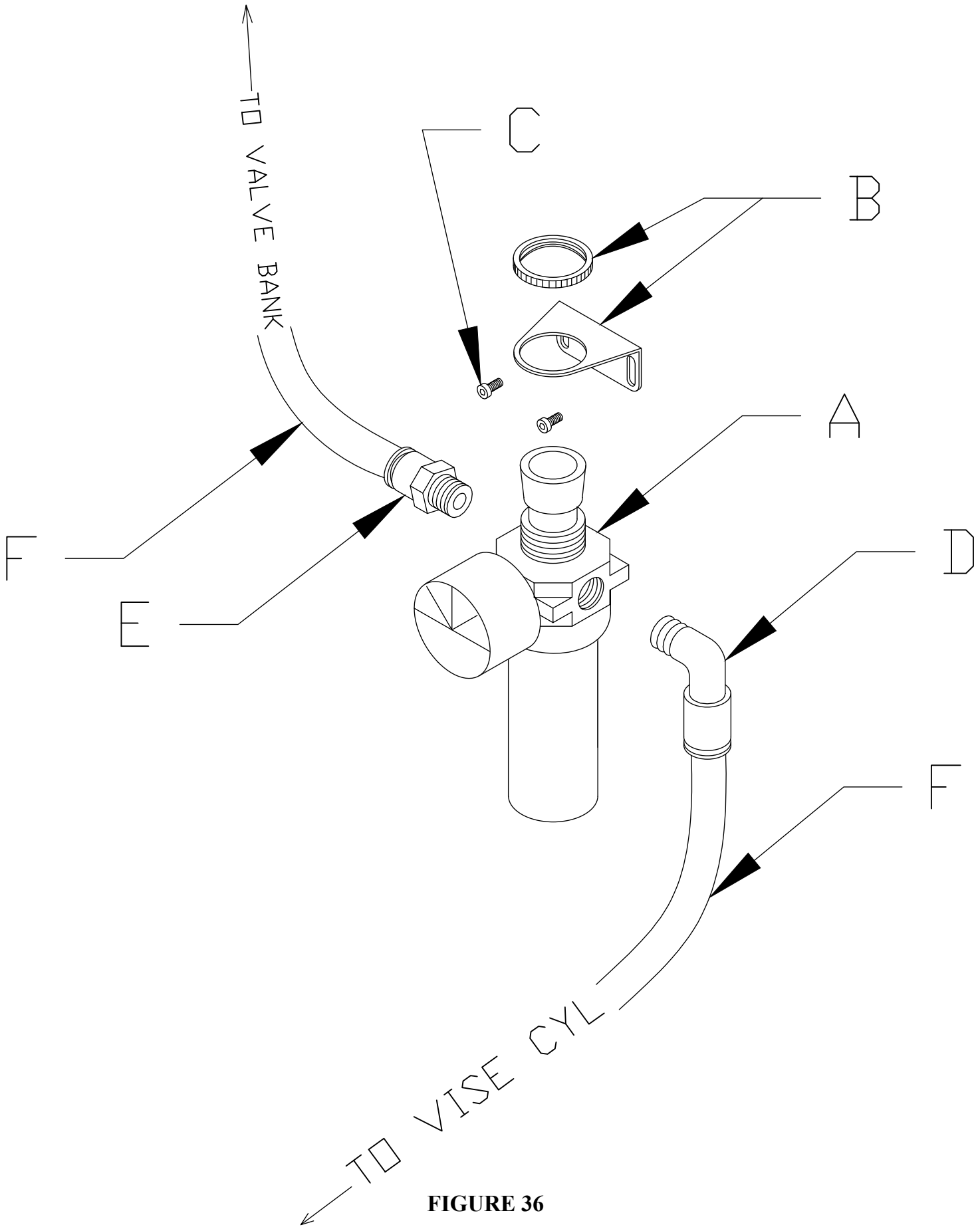


FIGURE 36

12.4 SHUTTLE VISE REGULATOR

ITEM	PART #	DESCRIPTION
A	078190	Regulator
B	677934	Regulator Mount
C	077864	M-5 x 12 SHCS
D	077746	1/4 x 90 Swivel Fittings
E	077721	Bushing
F	077750	1/4" Nipple

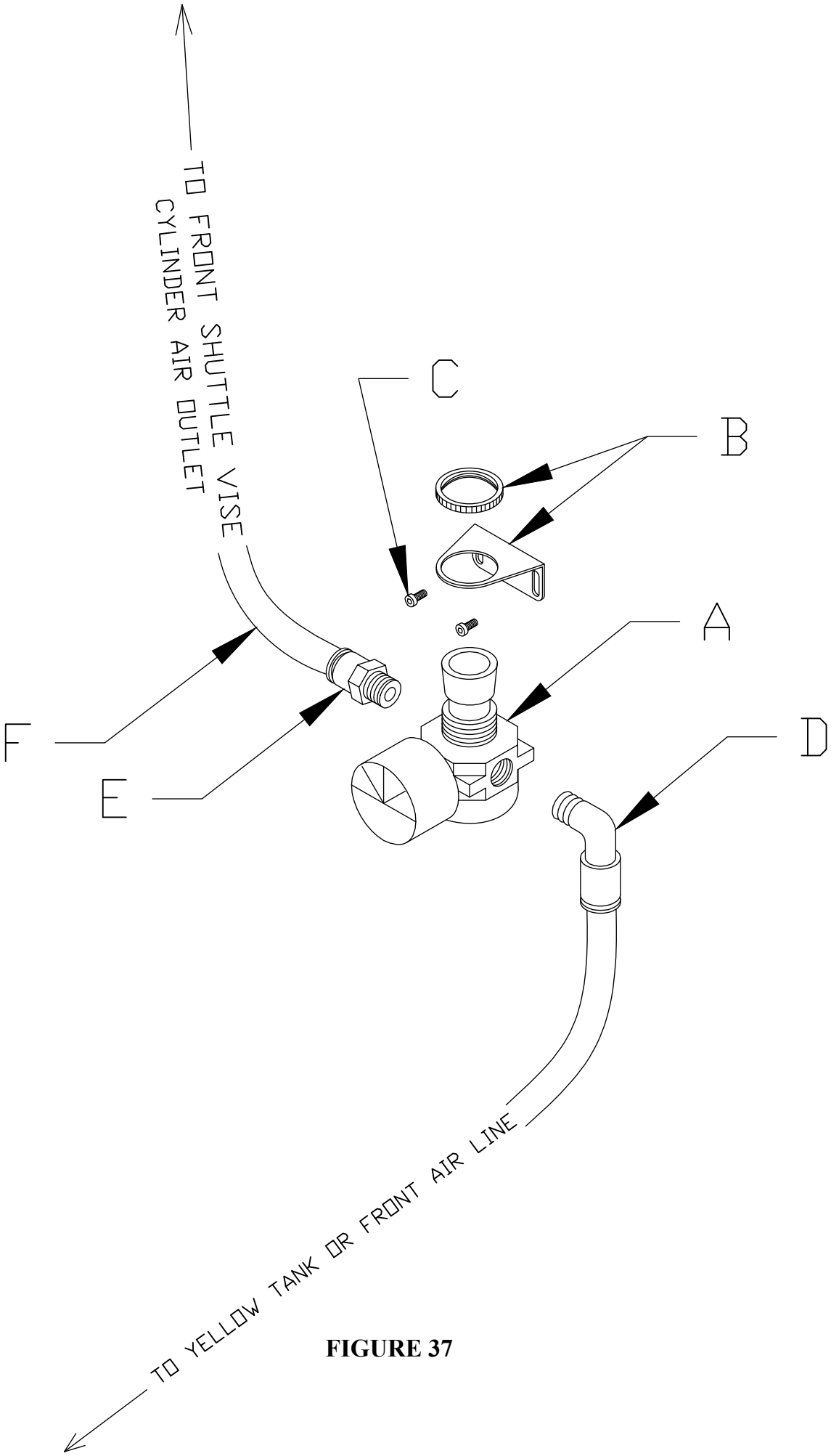
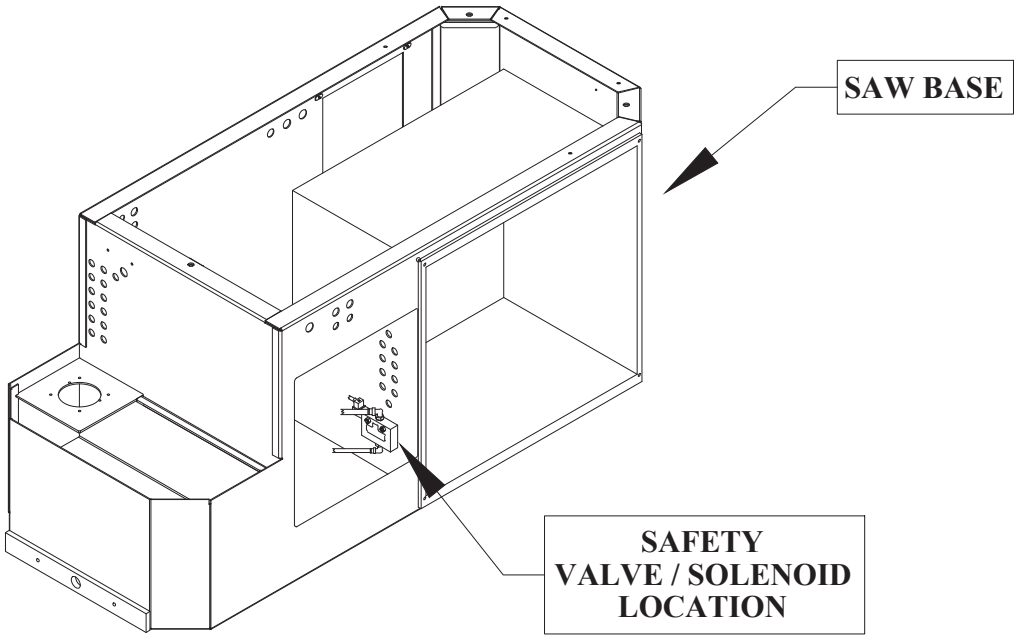
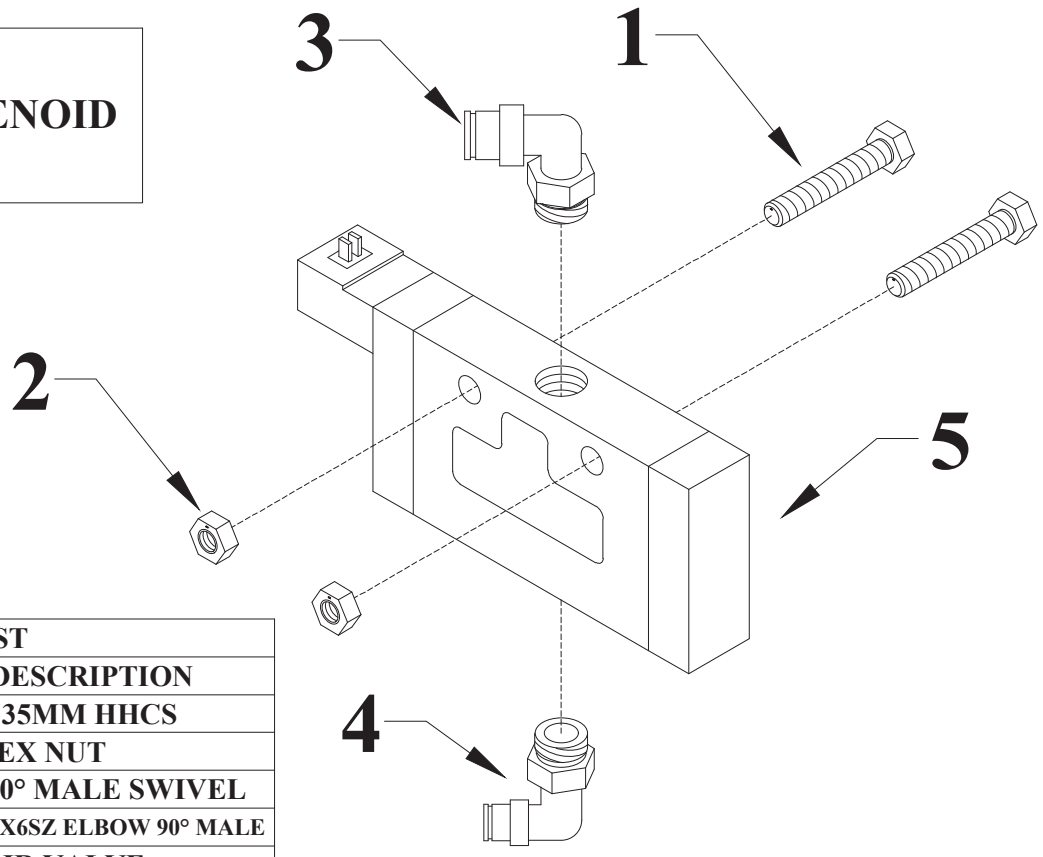

TO FRONT SHUTTLE VISE
CYLINDER AIR OUTLET
C
B
A
F
E
D
TO YELLOW TANK OR FRONT AIR LINE

FIGURE 37

13.0 SAFETY VALVE / SOLENOID

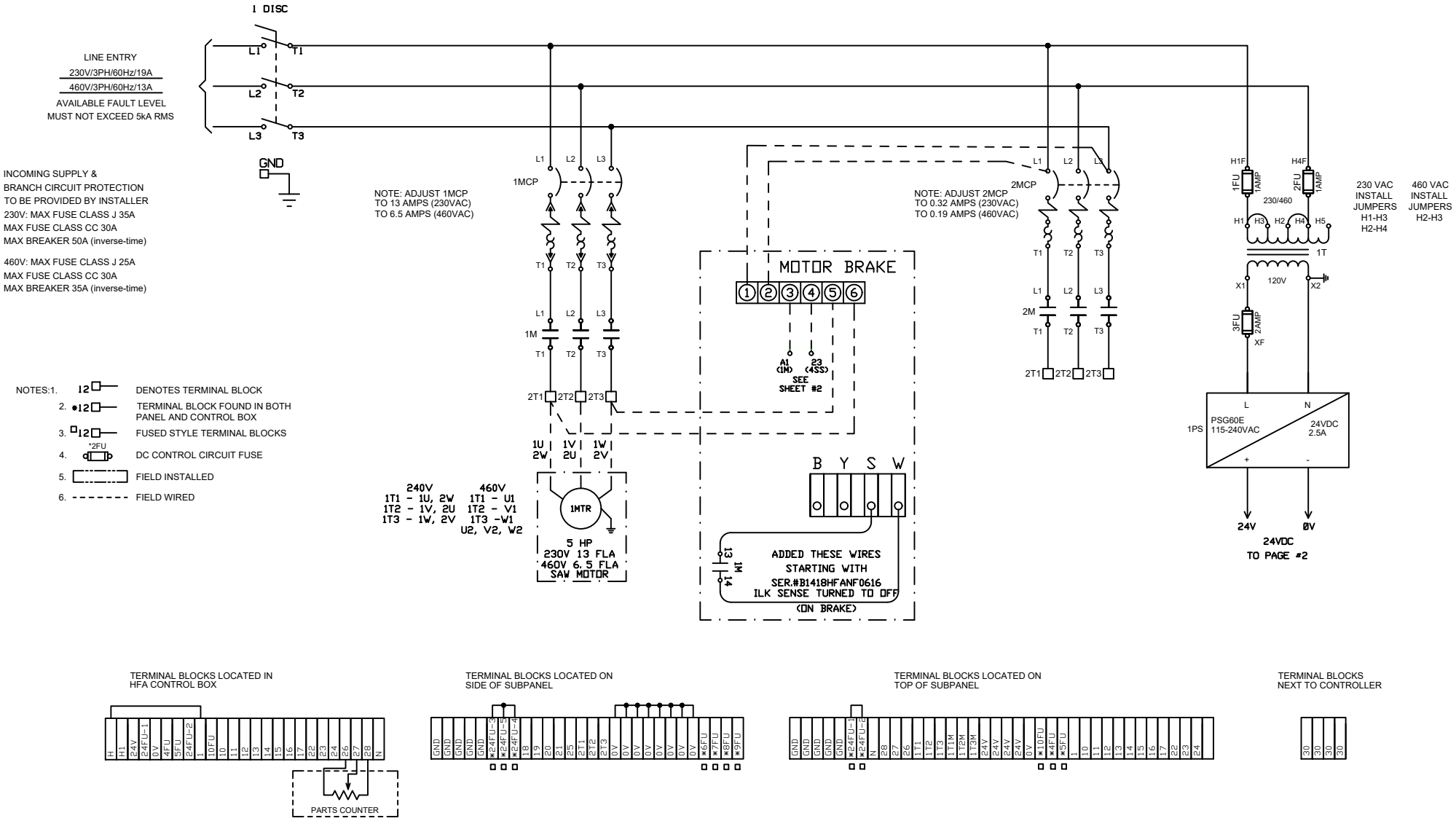


SAFETY VALVE / SOLENOID DETAIL



PARTS LIST			
ITEM	QTY	PART #	DESCRIPTION
1	2	201135	M6 X 35MM HHCS
2	2	073206	M6 HEX NUT
3	1	077740	3/8" 90° MALE SWIVEL
4	1	045030	1169X5X6SZ ELBOW 90° MALE
5	1	044110	24V AIR VALVE

14.0 WIRING DIAGRAMS



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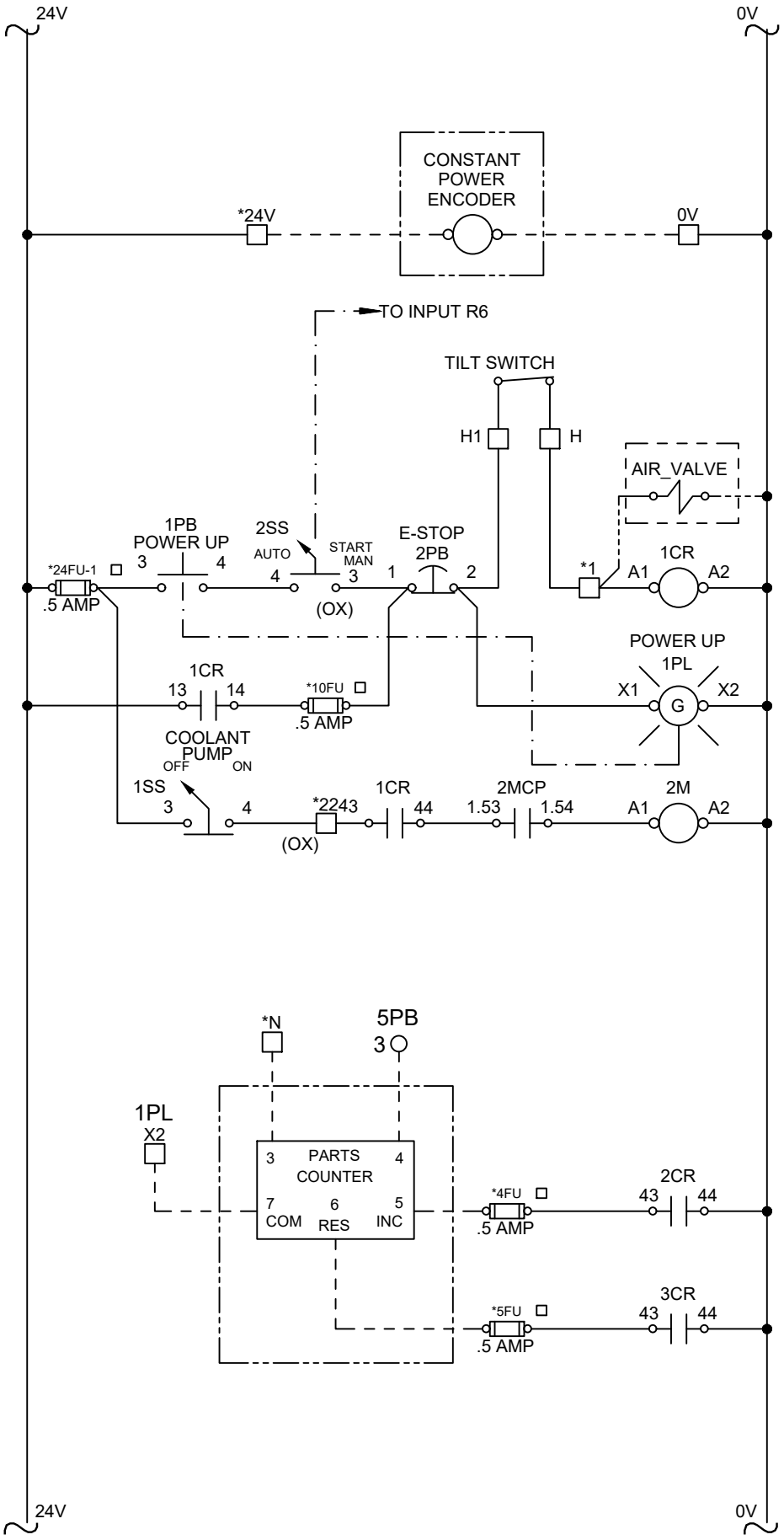

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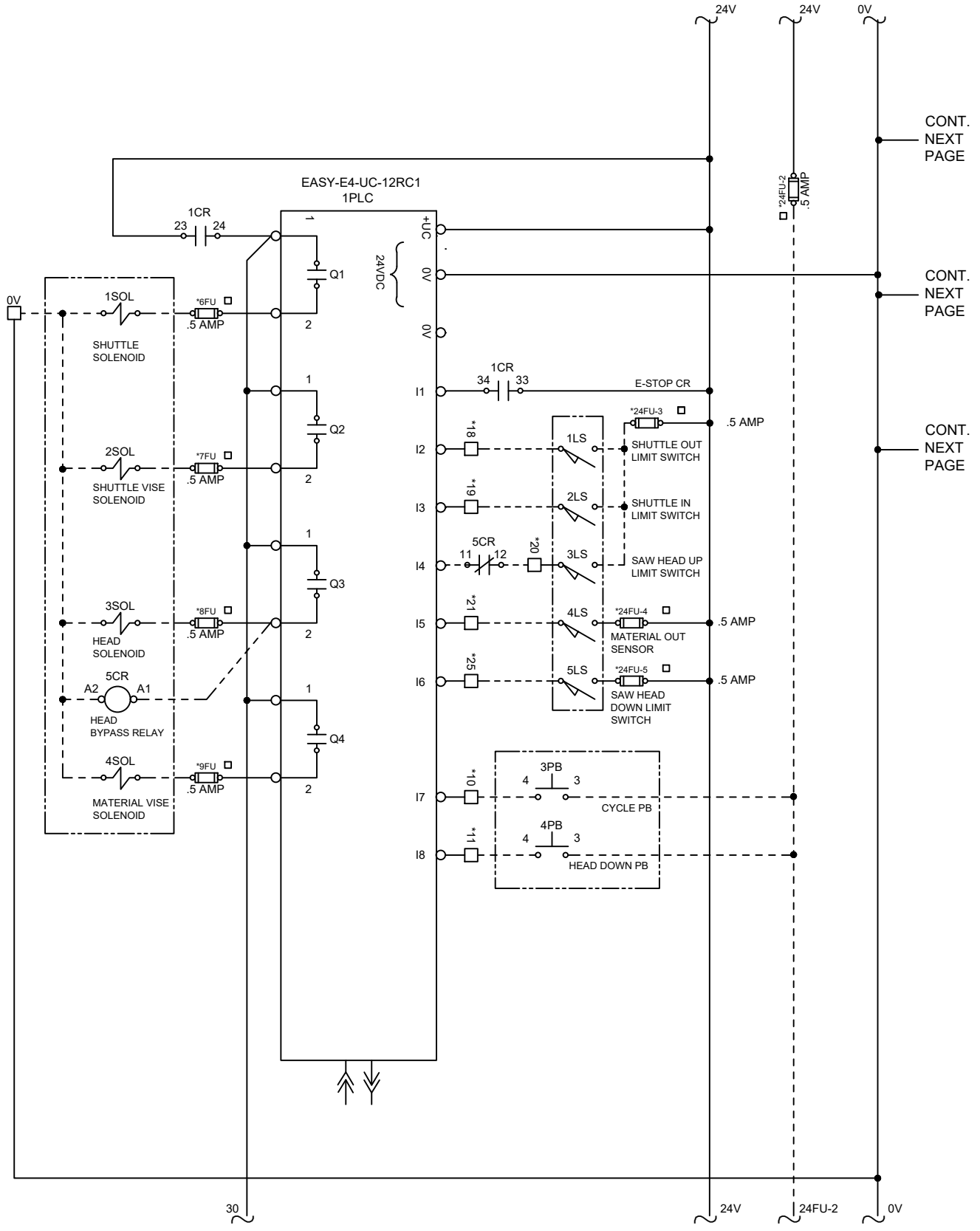

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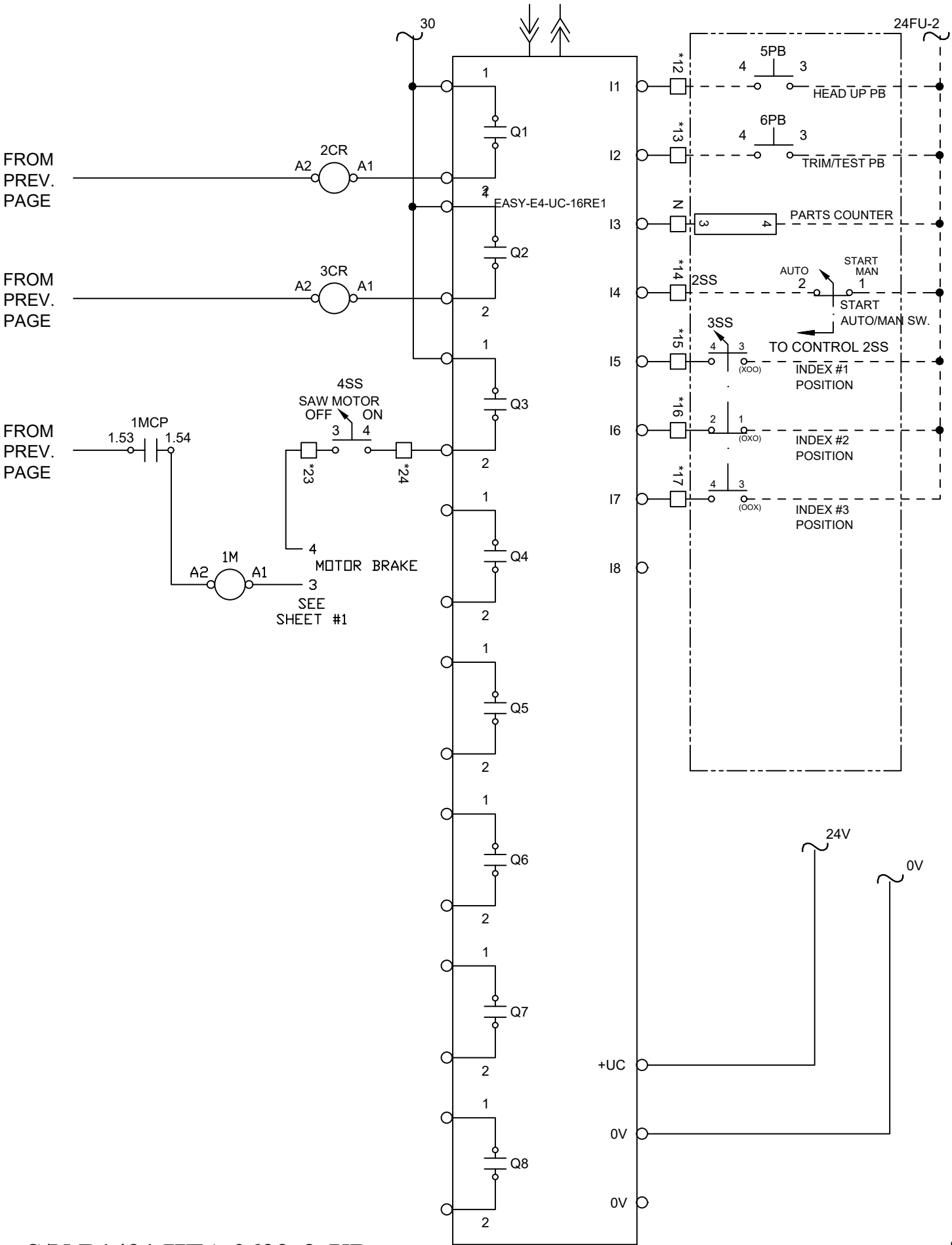

S/N B1491 HFA 0622 & UP