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EP-1 Edge Prep Machine

Operation and Service Manual

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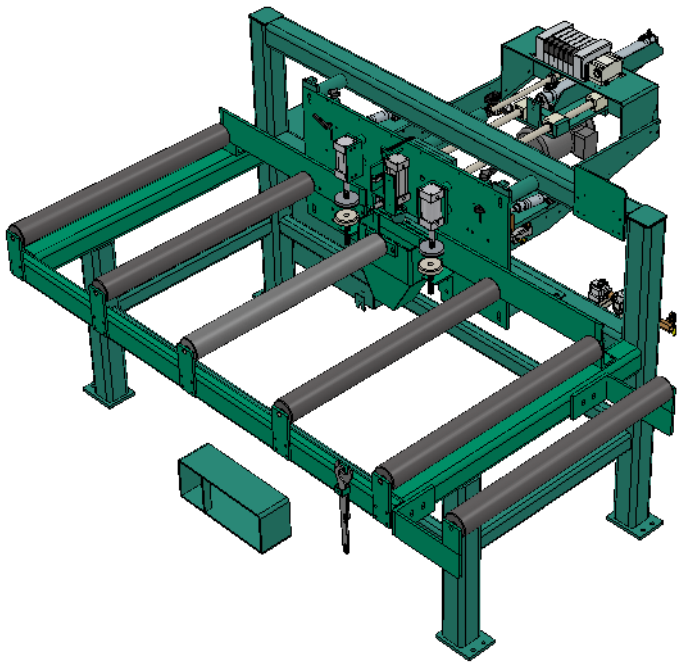

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Manual Part Number: 83_OPSRV_EP1_V1

The EP-1 Edge Prep Machine is a trademark of Kval Incorporated.

Contacting KVAL

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CHAPTER 1 Introduction to the EP-1

This chapter provides an overview of the KVAL EP-1 Edge Prep Machine and important safety information for operating the machine.

Chapter 1 at a Glance

Overview of the EP-1

KVAL's EP-1 Edge Prep Machine routs and bores a faceplate and latch hole. It uses lock holes bored by previous machinery as an index.

About this Manual

This Manual is includes identification of machine assemblies, power-up and power-down steps, operation and using the user interface.

The Manual also includes maintenance and troubleshooting information.

TABLE 1.

Title	Part Number
EP-1 Operation and Service Manual	83_OPSRV_EP1_V1

Safety First!

This machine is a powerful electro-mechanical motion control system. You should test your motion system for safety under all potential conditions. **Failure to do so can result in damage to equipment and/or serious injury to personnel.**

Safety Sheet Sign-Off Sheet

At the end of this chapter, there is a safety sign-off sheet. It lists personnel and machine safety criteria to understand before operating the machine. It is highly recommended that personnel operating, working on a machine meet the criteria listed in this sheet. It is recommended the sheet be signed and kept for records. See “Safety Sign-Off Sheet” on page 1-15.

Safety Terminology of Labels

In addition to the nameplate, KVAL machines may have other warning labels or decals that provide safety information to operators. Safety labels should be clearly visible to the operator and must be replaced if missing, damaged, or illegible.

There are three types of warning labels or decals:

- **DANGER** means if the danger is not avoided, it will cause death or serious injury.
- **WARNING** means if the warning is not heeded, it can cause death or serious injury.
- **CAUTION** means if the precaution is not taken, it may cause minor or moderate injury.

Safety Guidelines

In addition to the caution and warning labels affixed to this machine, follow the guidelines below to help ensure the safety of equipment and personnel.

Training

Ensure that all employees who operate this machine are aware of and adhere to all safety precautions posted on the machine and are trained to operate this machine in a safe manner.

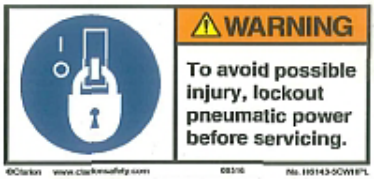
Protective Gear

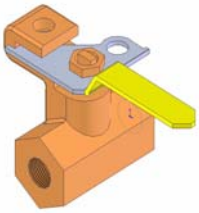
Never operate the machine without proper eye and ear protection.

When the Machine is ON

- **Never** reach hands beyond safety cage. Servo motors can unexpectedly move quickly.
- **Never** clear screws or hinges out of the machine while it is running.
- **Never** reach into the router area to retrieve a hinge. The router may still be running down after shut down.
- **Never** perform any maintenance unless machine is at zero state.
- **Never** clean the machine while it is running.
- **Never** walk away from the machine while it is running.

Compressed Air





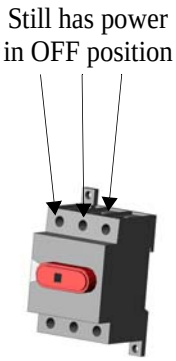
The compressed air system connected to this machine should have a three-way air valve for shut-off and pressure relief.

All cylinders on machine are under high pressure and can be very dangerous when activated. Before performing any maintenance or repairs on this machine turn off the main air disconnect. **Lockout and tagout this connectio**n.

See “Lockout Tagout Procedure” on page 1-7.

Electrical

Electrical circuitry on this machine is protected by an approved lockable disconnect circuit. In addition to this equipment, you must install an approved disconnect for the electrical power supplying this machine.



When opening the cabinet you must first turn off the disconnect switch. When the cabinet door is open there is **still power on the top side of the disconnect switch**. Some machines are powered by more than one supply located at different locations. Before performing any repairs or maintenance, lockout and tagout **must be installed at all locations**

All maintenance and repairs to electrical circuitry should only be performed by a qualified electrician.

Before Conducting Maintenance

Prior to performing any maintenance, repairs, cleaning or when clearing jammed debris, you must disconnect, tag out, or lock out the electrical and air pressure systems. This should be done in accordance with applicable state and/or federal code requirements.

Compliance with Codes and Regulations

KVAL advises that you request an on-site state safety review of your installation of this machine. This is to ensure conformance to any additional specific safety and health regulations which apply in your geographic area.

Other Hazard Control Action

Report a Hazard
Before You Report an Accident

If you believe any part or operation of this machine is in violation of any health or safety regulation, **STOP** production. It is your responsibility to immediately protect your employees against any such hazard.

Additional detailed safety guidelines are included in the operating instructions of this manual. KVAL will be pleased to review with you any questions you may have regarding the safe operation of this machine

Follow Your Company's Safety Procedures

In addition to these safety guidelines. Your company should have on-site and machine specific safety procedures to follow.

Lockout Tagout Procedure

This policy is required by OSHA regulation 1910.147 and Cal OSHA'S SB198 ruling of July 1991.

Use the following lockout procedure to secure this machine while it is powered down. During a lockout, you disconnect all power and shut off the air supply. Be sure to use the tagout guidelines noted below.

To Lockout the This Machine

1. Assess the equipment to fully understand all energy sources (multiple electrical supplies, air supply and pressure, spring tension, weight shifts, etc.).
2. Inform all affected personnel of the eminent shutdown, and the duration of the shutdown.
3. Obtain locks, keys, and tags from your employer's lockout center.
4. Disconnect power:

   a. Turn the disconnect switches on the main electrical panel to the OFF position. Then pull out the red tab and place a padlock through the hole. Place your tag on the padlock, as per the tagout guidelines below. (see illustration below).

When multiple people are working on the machine, each person needs to have a lock on the handle in the extra holes provided.

   b. Turn the disconnect switch on the larger high-frequency panel to the OFF position. Then pull out the red tab and place a padlock through the hole. Place your tag on the padlock, as per the tagout guidelines below.

5. Turn the main air valve to the OFF position and place a padlock through the hole (see illustration below).

NOTE: Place your tag on the padlock, as per the tagout guidelines below.

6. Once the locks and tags are in place and all personnel are clear, attempt to operate the machine to ensure equipment will not operate.

7. Maintenance or repairs may now be completed. The person performing the work must ensure all tools, spare parts, test equipment, etc., are completely removed and that all guards and safety devices are installed.

8. Before removing the locks and tags, the person who attached them shall inspect the equipment to ensure that the machine will not be put in an unsafe condition when re-energized.

9. The lock and tag can now be removed (only by the person(s) who placed them), and the machine can be re-energized.

10. The tags must be destroyed and the locks and keys returned to the lockout center.

Lockout-Tagout Guidelines

- Place a tag on all padlocks. On a tag, each operator must put their own name and date. (These locks are only to be removed by the person who signs the tag)
- If more than one person is working on the machine, then each additional person places a lock and tag on each disconnect.
- Only each operator may remove their own lock and tag.

Important: When many people are all working on the same machine you will need a multiple lockout device, such as the one shown here.

Follow the P-R-O-P-E-R lockout rule of thumb.

P..... Process shutdown

R ..... Recognize energy type (electrical, pneumatic, mechanical, etc.)

O..... OFF! Shut off all power sources and isolating devices

P..... Place lock and tag

E..... ENERGY: Release stored energy to a zero-energy state

R ..... Recheck controls and test to ensure they are in the “OFF” state

Zero-Energy to Start-Up

Zero-Energy State to Start-Up to Operating State

Starting the equipment properly is just as important as the lockout/tagout guidelines in terms of safety.

Start-up Guidelines

The following guidelines below should be followed to start the equipment.

Inspect

The equipment must be inspected for proper adjustment before starting equipment.

Clean Up

All materials and debris must be cleaned up. Any combustible materials or old parts used during repairs must be cleaned up and/or properly disposed of.

Replace Guards

Replace all equipment guards. If part of equipment cannot be properly adjusted after start-up with guard on, contact the KVAL Service team. See “Contacting KVAL” on page 1-2.

Check Controls

Confirm that all switches are in the “OFF” position. Please be advised that some components of the machine may start automatically when energy is restored.

Remove Locks

Each operator must remove his or her own lock and tag. This will ensure that all operators are in a safe place when the equipment is started.

Perform Visual Checks

If the equipment is too large to see all around it, station personnel around the area and sound the personnel alarm before starting the equipment. If your operation is more complex, your company’s comprehensive safety procedure may involve additional steps. You will need to ask your supervisor about these procedures. The company’s lockout procedure should be posted at each machine. On larger or long-term maintenance or installation projects, the company’s procedures must be explained to all new operators and a copy of the company’s procedures should be posted on-site for the duration of the work.

The Company’s procedures should also include provisions for safely handling shift changes and changes in operators or new operators.Comprehensive lockout/tagout

may use a gang box or other system to ensure that locks are secure and not removed without authorization.

Remember, lockout/tagout procedures work because you are the only one with the key to your lock. Proper lockout/tagout can save lives, limbs, and money. Help make your work environment safe for you and your fellow workers. Be sure to follow the P-R-O-P-E-R lockout/tagout procedures, and that those around you do also.

Close the Cage Gate

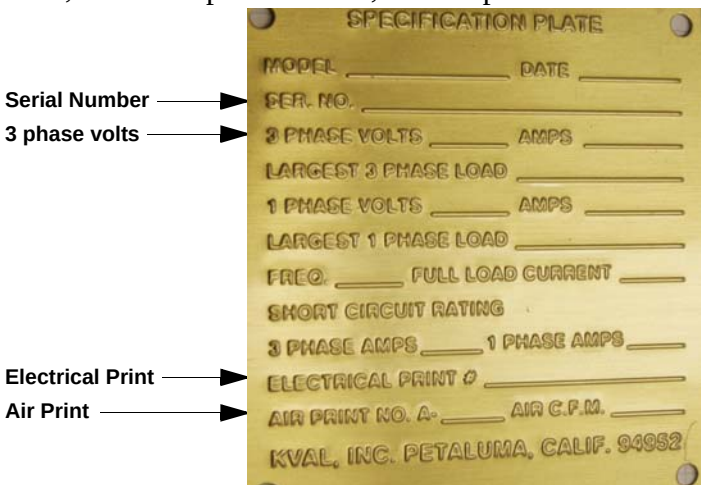
Verify all cage gates are securely closed. Ensure all safety protocols are in effect.

Getting Help from KVAL

Before you seek help, first try the troubleshooting procedures. Follow the procedures below.

If you are unable to resolve the problem:

1. Locate the machine's Specification Plate and record the serial number, 3 phase volts, electrical print number, and air print number.



2. Contact our customer support team:

- In the U.S and Canada, call (800) 553-5825 or fax (707) 762-0485
- Outside the U.S. and Canada, call (707) 762-7367 or fax (707) 762-0485
- Email address is service@kvalinc.com
- Hours:

  6:00 AM to 4:00 PM Pacific Standard Time, Monday through Thursday

  6:30 AM to 1:30 PM Pacific Standard Time, Friday

On-Line Help

On machines with a Beckhoff® PLC and an internet connection, our service team are able to connect, run, and troubleshoot your machine. Ask about this procedure when calling are service team.See Chapter 3 "System IT Administration" on page 3-1, for more information.

Product Return Procedure

If you've contacted Kval for help and it is determined that a return is necessary, use the procedure below to return the machine or part.

Note: Non-Warranty returns are subject to a 15% restocking charge.

1. Obtain the packing slip and/or invoice numbers of the defective unit, and secure a purchase order number to cover repair costs in the event the unit is determined to be out of warranty.

2. Reason for return: Before you return the unit, have someone from your organization with a technical understanding of the machine and its application include answers to the following questions:

- What is the extent of the failure/reason for return? What are the relevant error messages or error codes?
- How long did it operate?
- Did any other items fail at the same time?
- What was happening when the unit failed (e.g., installing the unit, cycling power, starting other equipment, etc.)?
- How was the product configured (in detail)?
- Which, if any, cables were modified and how?
- With what equipment is the unit interfaced?
- What was the application?
- What was the system environment (temperature, spacing, contaminants, etc.)?

3. Call Kval customer support for a Return Material Authorization (RMA). When you call:

- Have the packing slip or invoice numbers available.
- Have the documented reason for return available.

4. Send the merchandise back to Kval.

- Make sure the item(s) you are returning are securely packaged and well protected from shipping damage
- Include the packing slip or invoice numbers.
- Include the documented reason for return.
- Include the RMA number with the parts package.

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Safety Sign-Off Sheet

Machine Model Number:_____

A Note to the Operator:

This machine can help you be highly productive only if you understand how to use it properly and follow the safe operating practices described in this document and the machine's manual. If you do not understand the machine's proper operation or ignore the safe operating practices, this machine can hurt or kill you. It's in your best interest to safely and properly operate this machine.

Personnel Safety Concerns:

- I have been properly trained in the operation of this machine.
- I will always wear ear protection when operating this machine.
- I will always wear eye protection when operating this machine.
- I will never wear loose clothing or gloves when operating this machine.
- I will watch out for other people. Make sure everyone is clear of this machine before operation.
- I will always follow my company's safety procedures. I have read and understand these guidelines.

Machine Safety Concerns:

- I have been given a tour of the machine and understand all the safety labels, E-Stops and the actions to take in case of an emergency.
- I will make sure all guards are in place before operation
- I will turn off the compressed air, before loading hardware (staples, screws, etc)
- I will turn off the electrical power, for setup
- If the machine should operate in an unexpected manner stop production I will immediately and notify a manager, a supervisor, or a qualified service technician.

I have read and understand this document and agree to operate this machine in a safe manner as described above.

Employee

Name (print):_____ Signature: _____ Date:____/____/____

Supervisor/Safety Officer/Trainer

Name (print):_____Signature: _____ Date:____/____/___

Note: It is recommended you make a copy of this sheet for new operators. If a copy is needed, you may download a PDF at the KVAL website (http://www.kvalinc.com). You may also contact our Service Department at (800) 553-5825 or email at service@kvalinc.com.

CHAPTER 2 Operation of the EP-1

This chapter describes components, assemblies, and the user interface of the *KVAL EP-1 Edge Prep Machine.* The content is geared to help operators understand the basic operation of the EP-1.

Chapter 2 at a Glance

Operator's Tour

This section takes you on a tour of the *EP-1* machine. The figure below shows locations of selected areas, parts, and assemblies on the machine.

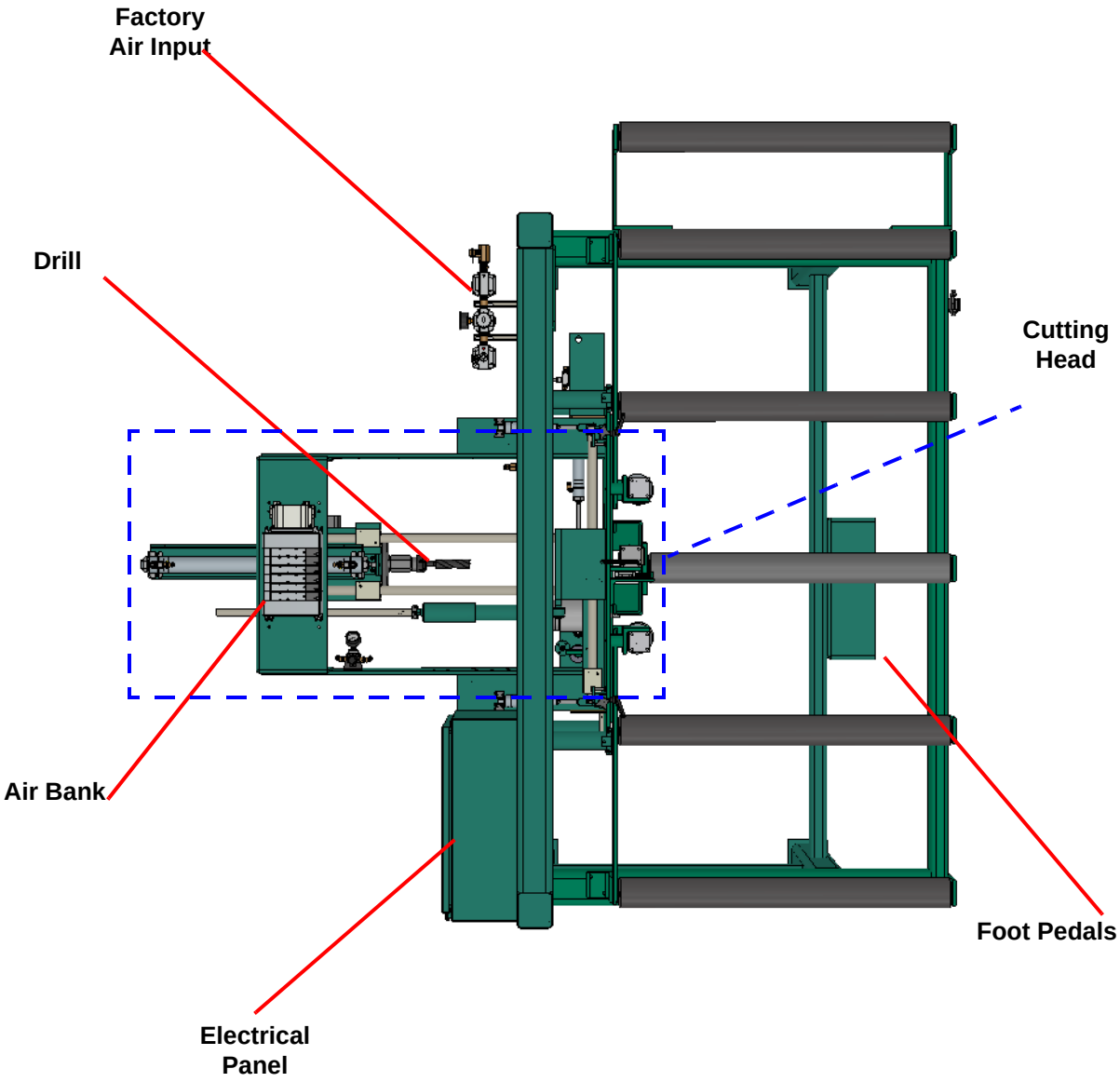


FIGURE 2- 1. **Top View of the EP-1**

Figure 2- 2 below, shows select EP-1 front section assemblies and controls.

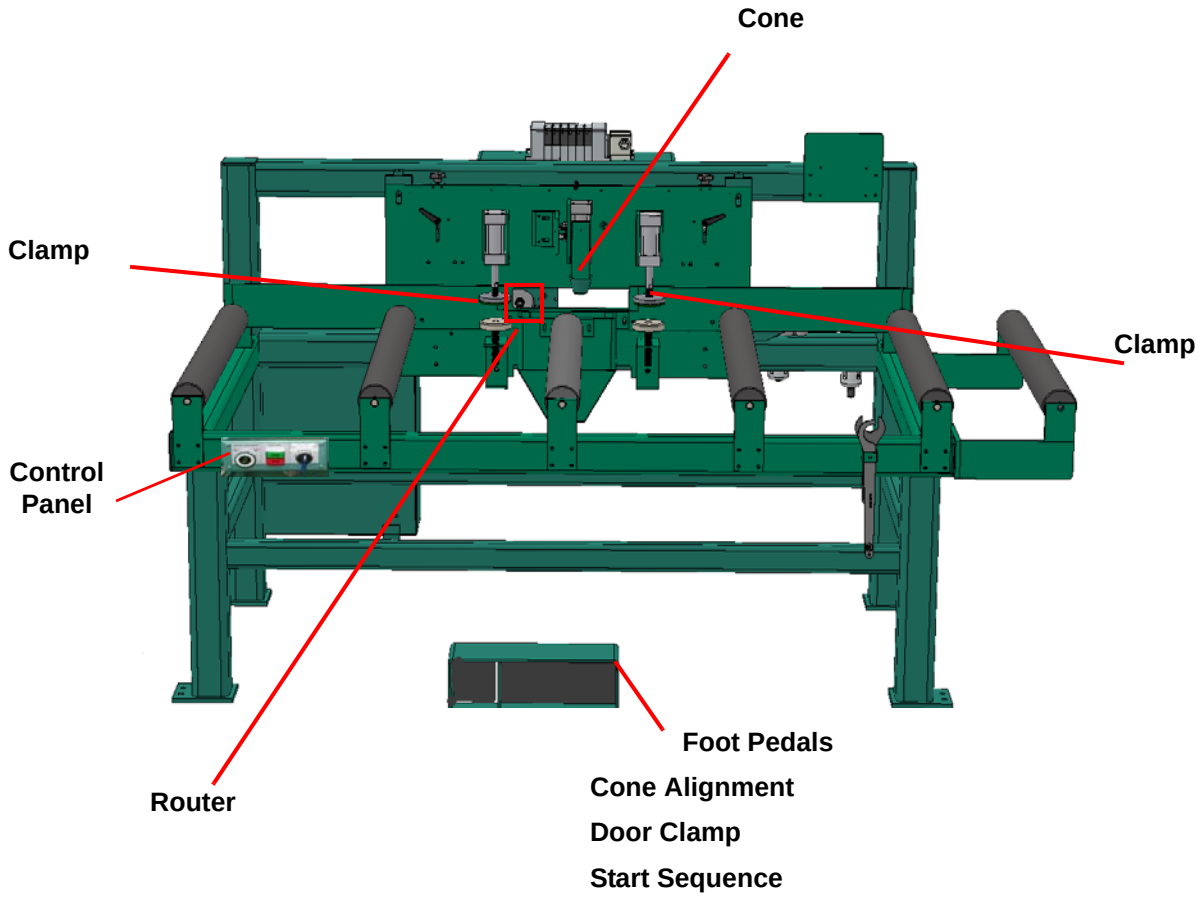


FIGURE 2- 2. **Front Section View**

Figure 2- 3 below, shows a isolated view of the drill and router placement.

Caution: Never reach your hands into this area unless the motors have stopped.

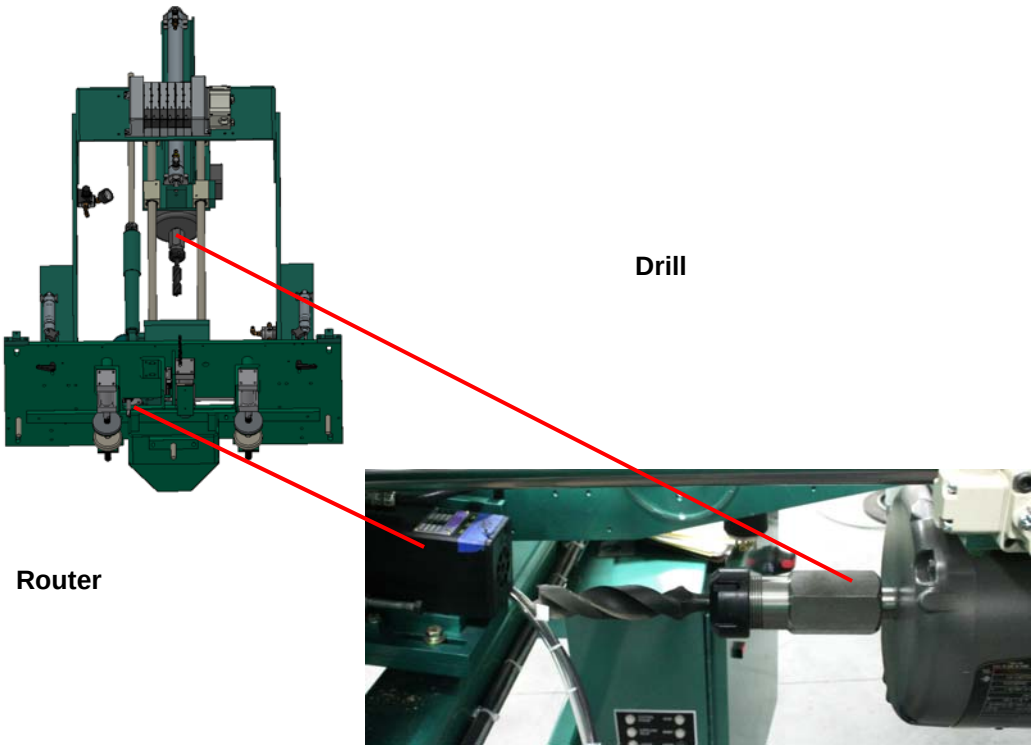


FIGURE 2- 3. **Drill and Router**

About the Electrical Panel

The EP-1 has a Main Electrical Panel located on back section of the machine. Refer the machine's electrical prints for in-depth information.

The Main Electrical Panel:

- Supplies voltages to the machine
- Contains the PLC (Programmable Logic Controller)
- Contains a VFD (Variable Frequency Drive) to interact with the router motor.
- Supplies voltage to drill by way of the contactor and thermal overload circuit

Warning: High Voltage is present in this panel at the top of the Three Phase Input **even with the disconnect off**. If working on the panel, follow safety protocol as described in Chapter 1.

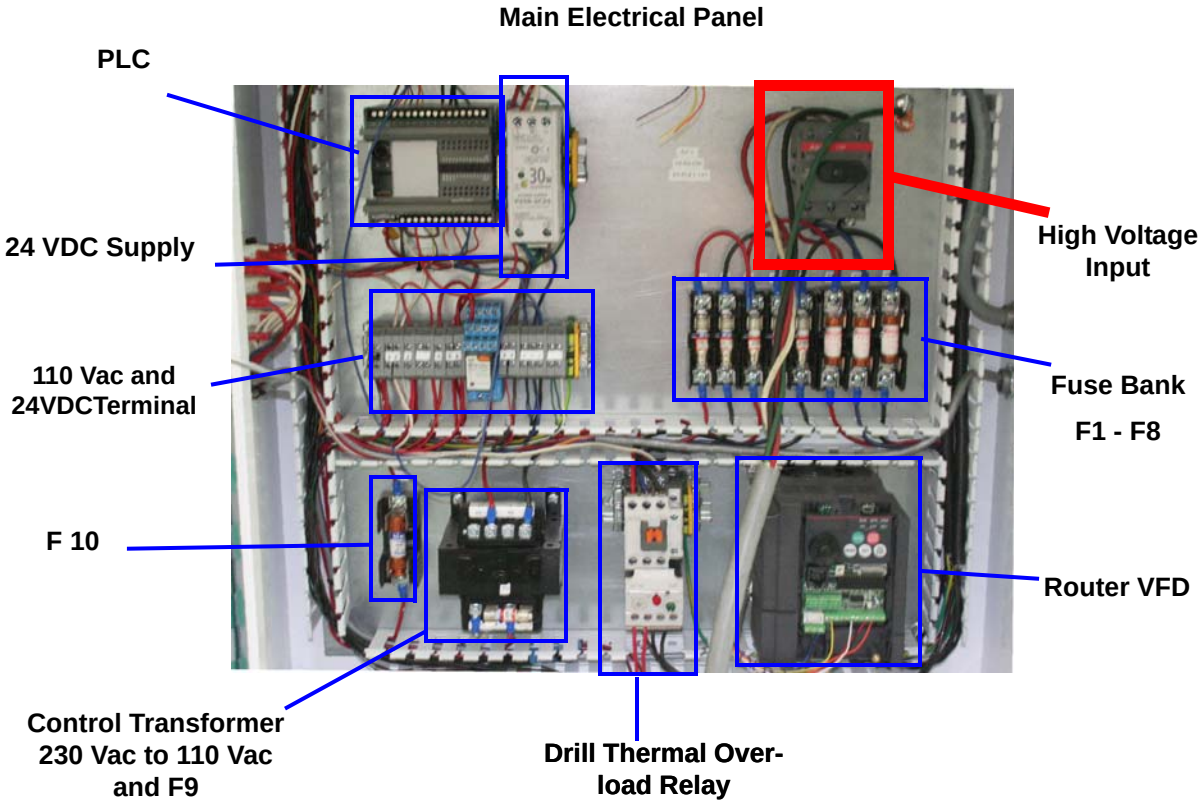


FIGURE 2- 4. **Electrical Box on the EP-1**

Description of the Six Light Panel

The six lights on this panel indicate the status of the EP-1 system.

Note: Refer to the "KVAL EP-1 Service Manual" for information on using this panel for troubleshooting.

The Sequence that the lights activate is as follows:

1. Control Power
2. Overload Relay
3. E-Stop
4. Stop
5. Start
6. 24VDC

Control Power – light illuminates when the Control Transformer is pulled out and the power is working on secondary side-of transformer

Overload Relay – The overload circuit is working when light is on

E-Stop – The back gate is closed and Frame E-stop is not activated when this light is on.

Stop – This light will be on if Machine Stop button is deac-tivated.

Start – This light will be on once the Machine Start button is pressed and the ACR Relay is latched.

24VDC – light comes on once the ACR is latch and the 24VDC power Supply is working

Quick Start

Ensure factory air is present at machine and the DL-NCD main air supply valve is turned on.

1. Setup EP-1. See “Setup of the EP-1” on page 2-8
2. Power up the EP-1. See “How to Power Up the EP-1” on page 2-12
3. Running a Door. See “Machining a Door” on page 2-13
4. Power down the EP-1. See “How to Power Down the EP-1” on page 2-15

Setup of the EP-1

The EP-1 lock preparation machine can be set to automatically drill for the latch bore, and rout for the rectangular latch plate. Before machining the door, set up the machine to adapt to the door type.

There are four adjustments to pre-set the EP-1.

- Adjust the for a Zero and Three Degree Bevel
- Adjust the for a 2 3/4" or a 2 3/8" Backset
- Adjust the Face Plate Length (Vertical turrets x2)
- Adjust the Router Depth for 0° or 3°

Setting the 0° and 3° Bevels

1. To set the *Zero* and *Three* degree adjustment, locate the two adjustments on the front section of the machine. The top knobs adjust the 0° or 3° position The Kip Handles tighten the settings in place.

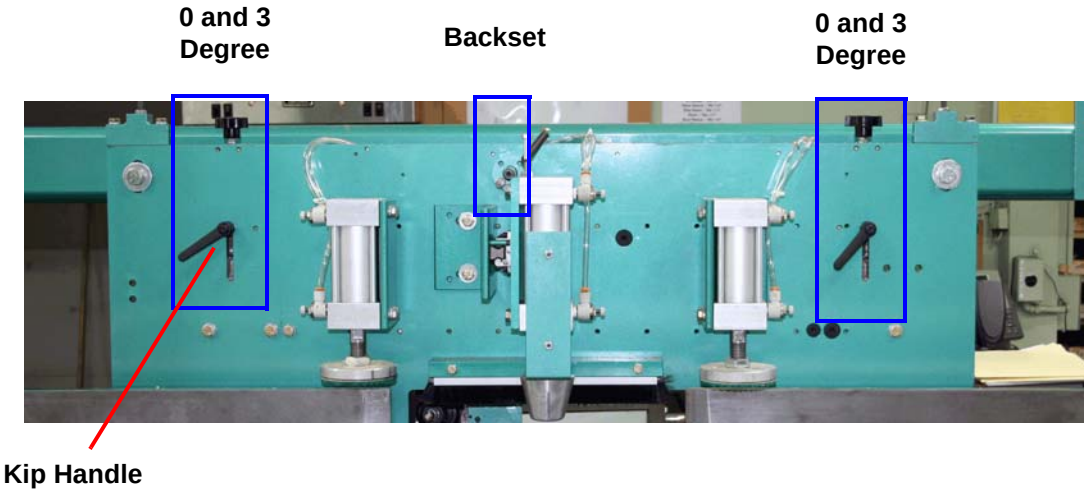


FIGURE 2- 5. **Location of Backset Zero, and Three Degree Adjustment**

2. To set for 3°, loosen the Kip Handle and pull up on the knob. For 0°, the knob should be in the down position. Repeat the same adjustment for other side.

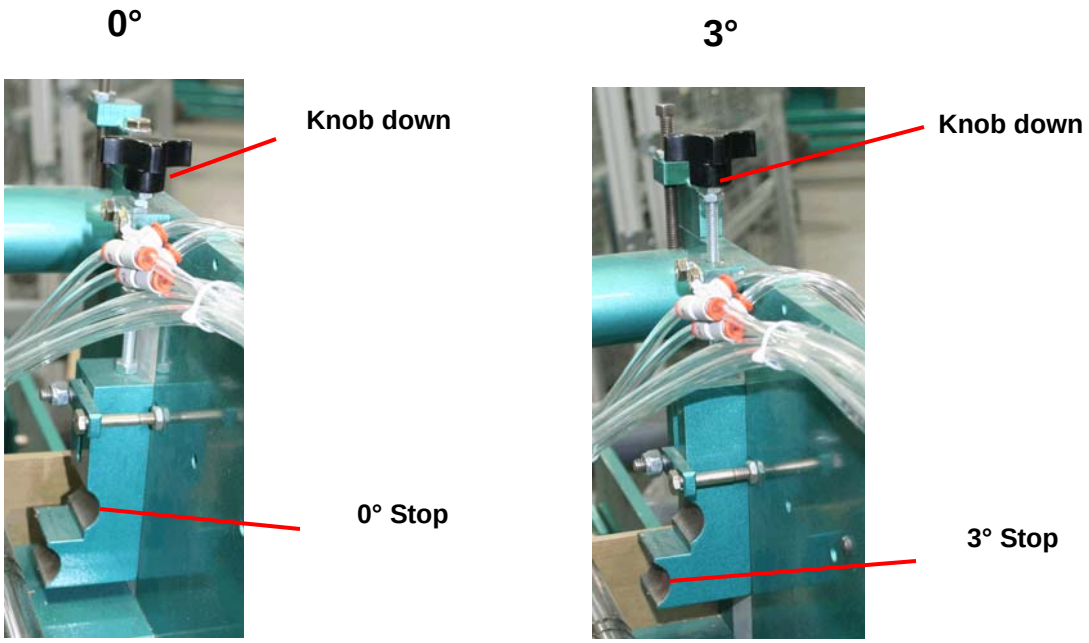


FIGURE 2- 6. **Zero and Three Degree Adjustments**

Setting a 2 3/4" or a 2 3/8" Backset

1. Pull cone cylinder towards you.
2. Rotate turret to desired backset and release cone cylinder. The longer bolt on turret is the 2 3/4" and the shorter bolt is the 2 3/8" backset.

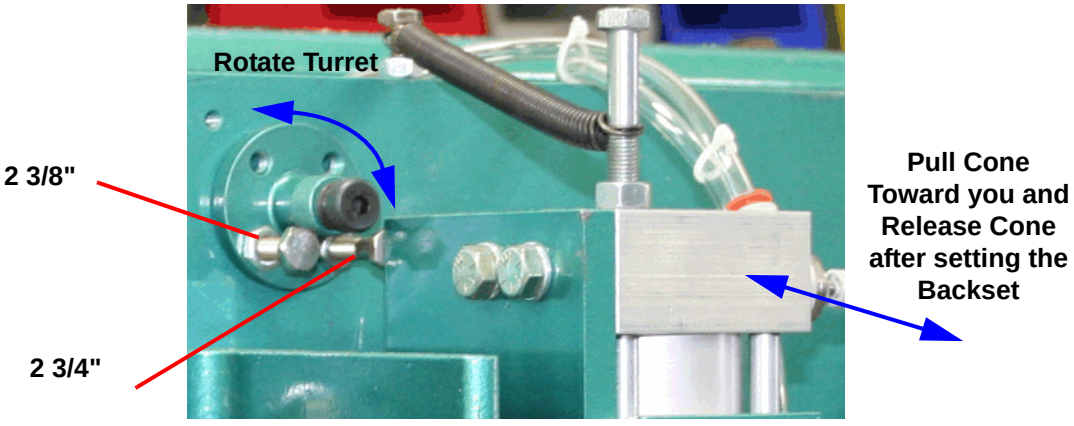


FIGURE 2- 7. **Backset Adjustment**

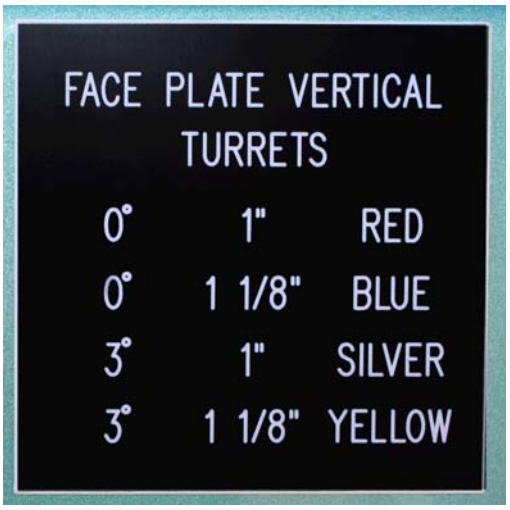
Setting the Face Plate Router for Vertical Travel

Note: See “Adjusting the Bolts on the Face Plate Turrets” on page 4-3, for information on calibrating the vertical travel.

Adjust the face plate turrets.These turrets have four positions: set-ups for 1.0" and 1 1/8" for either square edge (0-degree) or a 3-degree beveled edge. These bolts are color-coded and are located near the router. See Figure below.

1. Turn the air off.
2. Turn the top turret to the correct setting.
3. Lift the router and turn the bottom turret to the correct color.
4. Turn the air back on.

.



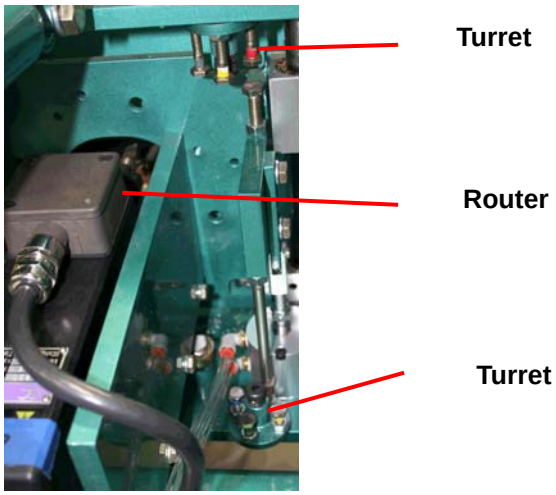


FIGURE 2- 8. **Face Plate Adjustment**

Note: If both the plate and latch hole are off-center, contact KVAL for instructions on shimming the self-centering clamp system.

Setting the Router Depth

Adjust the router depth for a 0° or 3° bevel door. Set the router depth to the appropriate settings. See Figure 2- 9 below for location of adjustment turret and bolts.

1. Turn the air off.
2. Loosen the two router adjust bolts
3. Move the router away from the turret.
4. Switch the turret to the 3° or the 0° settings. The shorter bolt is the 3° setting the longer bolt is the 0° setting.
5. Move Router back to the turret and tighten bolts.

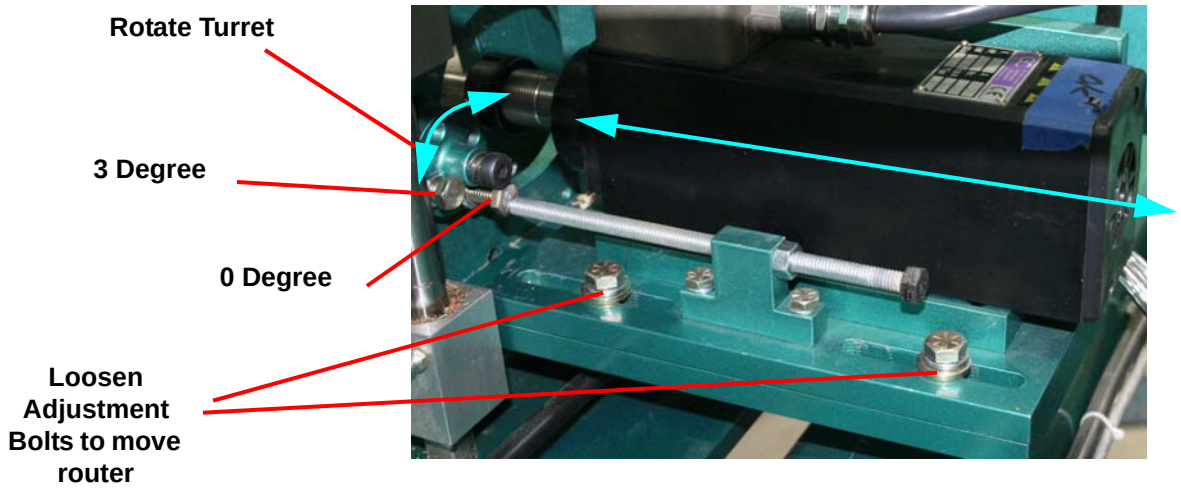


FIGURE 2- 9. **Router Adjust**

Powering the EP-1

This section describes how to power up and to power down the EP-1

Powering up the system includes:

- Applying power to the entire system
- Starting the Control Circuit

Powering down the system includes:

- Shutting down the control power

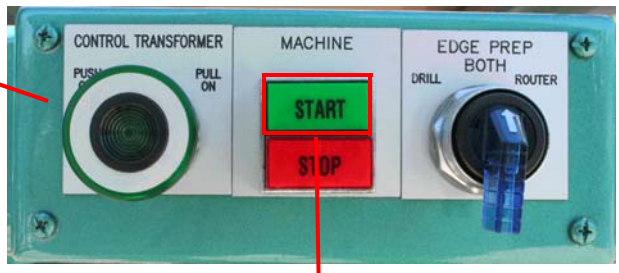
How to Power Up the EP-1

1. Ensure factory air is applied to machine and main air supply is turned on.

2. Make sure the electrical disconnect on the electrical cabinet is turned to the ON position.

3. Pull the **CONTROL TRANSFORMER** out to the On position. It should light up.

4. Push the green **START MACHINE** button.



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5. All lights on the status light panel on the electrical box should be illuminated.

Note: If a status light does not turn on during the power up process, refer to the *EP-1 Service Manual* for assistance in identifying the issue.

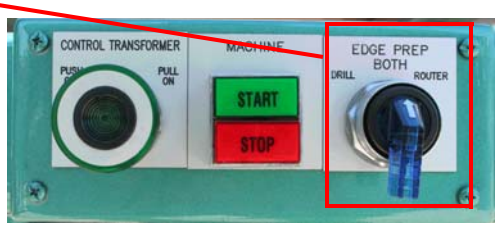
The EP-1 is ready to Run

Machining a Door

After power up of the EP-1, start the process to machine the door.

Move **Edge Prep** switch on the control panel to Drill, Both, or Router.

- Drill only drills the latch bore
- Router routes only the faceplate
- Both routes the faceplate then drills the latch hole.



Move a Door into Position and Start Sequence

1. Put a door on rollers and align lock hole to cone.

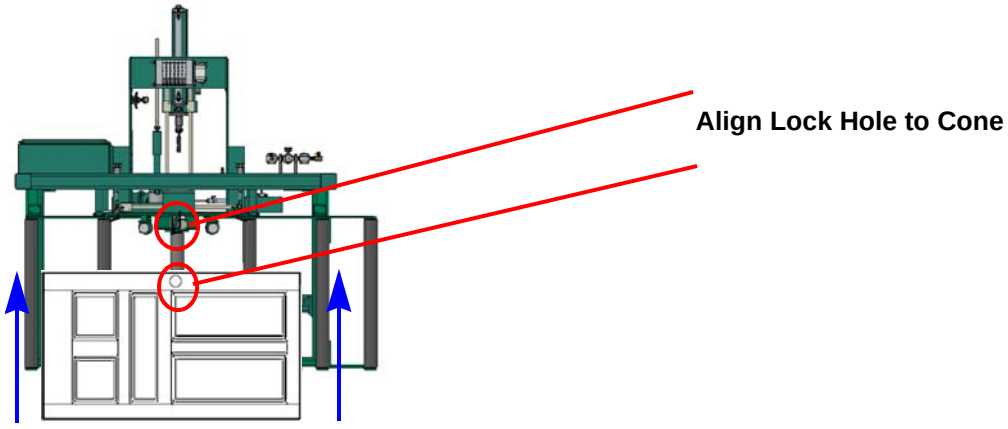


FIGURE 2- 10. **Move a Door into Position**

2. Press the **Cone Alignmen**t foot pedal to bring the cone into the lock hole.
3. Once the door is set, press the **Door Clamp** foot pedal to secure door.
4. Press the **Start Sequence** foot pedal to machine the door.
5. After the process is complete, the cutting tools will retract and the door clamps will release. Move the door to the next process.
6. To machine the next door, repeat step 1.through step 5.

How to Power Down the EP-1

1. Press the **Stop button** from the **panel** to stop the machine.
2. Push the **CONTROL TRANS-FORMER** switch into the OFF position. This kills power to the machine. All status lights should be off.

3. .KVAL also recommends that you turn the disconnect switch on the electrical cabinet to OFF; this helps reduce possible damage resulting from power surges from electrical storms.

CHAPTER 3 Maintenance of EP-1

This chapter describes preventative maintenance steps for *KVAL EP-1*. The content is geared to guide technicians to keep a regular maintenance schedule for your KVAL machine. Keeping your KVAL machine maintained is an important piece for successful operation of your door production process.

Chapter 3 at a Glance

Maintenance Schedule

KVAL recommends the following maintenance schedule to ensure that the machine operates properly. Refer to this section for steps to perform maintenance.

TABLE 3-1. Recommended Lubrication Schedule

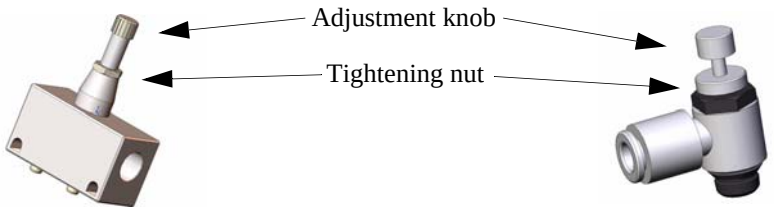
Type of Assembly	Recommended Schedule	Recommended Lubrication Type
Linear Bearing	Every 250 Hours of Machine Operation	Dura-Lith Grease (KVAL P/N Lube EP-2)
Pillow Block Bearing		
Flange Block Bearing		
Air Line Lubricator	One drop of oil per cycle Check the lines every week to two weeks	Either lubricant listed below is approved to use. • KVAL P/N SYSLUBG • Chevron AW Hydraulic Oil 32 • G-C lubricants light AW R&O • Mobile DTE 24 • Shell Tellus32 • Gulf Harmony 32

Daily

- Blow off dust from the entire machine.
- Lubricate linear bearings and chrome shafts with silicone (see lubrication requirements on).
- Wipe down the outside of the machine with a clean dry cloth.
- Check tooling for wear.
- Check the air pressure to make sure it is set between 80- 100 psi.
- Check the air filter water trap. Empty if full. Use the purge button. See “Description of Air Input System” on page 3-5.

Weekly

- Check the machine for smooth motion through a complete door cycle.
- Clean linear bearings and chrome shaft with a clean dry cloth, then lubricate.
- Adjust and lock flow controls.



- Check all air lines & electrical wiring for kinks or rubbing.

- Refill lubricator with an ISO 32 standard hydraulic oil (use KVAL part# SYS-LUBEG).

Six Month Checkups

- Wash filter and lubricator bowls with soapy water.
- Grease all bearings and tighten all bolts. Access to some grease fittings is difficult and will require a special needle point grease tip (supplied with your system).
- Clean and lubricate all slides and cylinder rods with dry silicone spray.
- Tighten all bolts.
- Check mufflers or filters on exhaust ports on air valve banks. They may need to be cleaned so the air can exhaust correctly.

Lubrication Requirements

This section describes the parts of the machine that require periodic lubrication, and specifies the lubricants. In addition, it explains how to maintain the lubrication systems on the machine.

Linear Bearings, Flange Bearing, and Pillow Blocks

If the bearing is equipped with a grease fitting (Zerk Fitting), it should receive 1 Gram (one pump from grease gun) of Dura-Lith Grease (KVAL P/N Lube EP-2) every 250 hours of operation.

Note: Bearings without grease fittings have been pre-lubricated at the factory and do not require further lubrication.

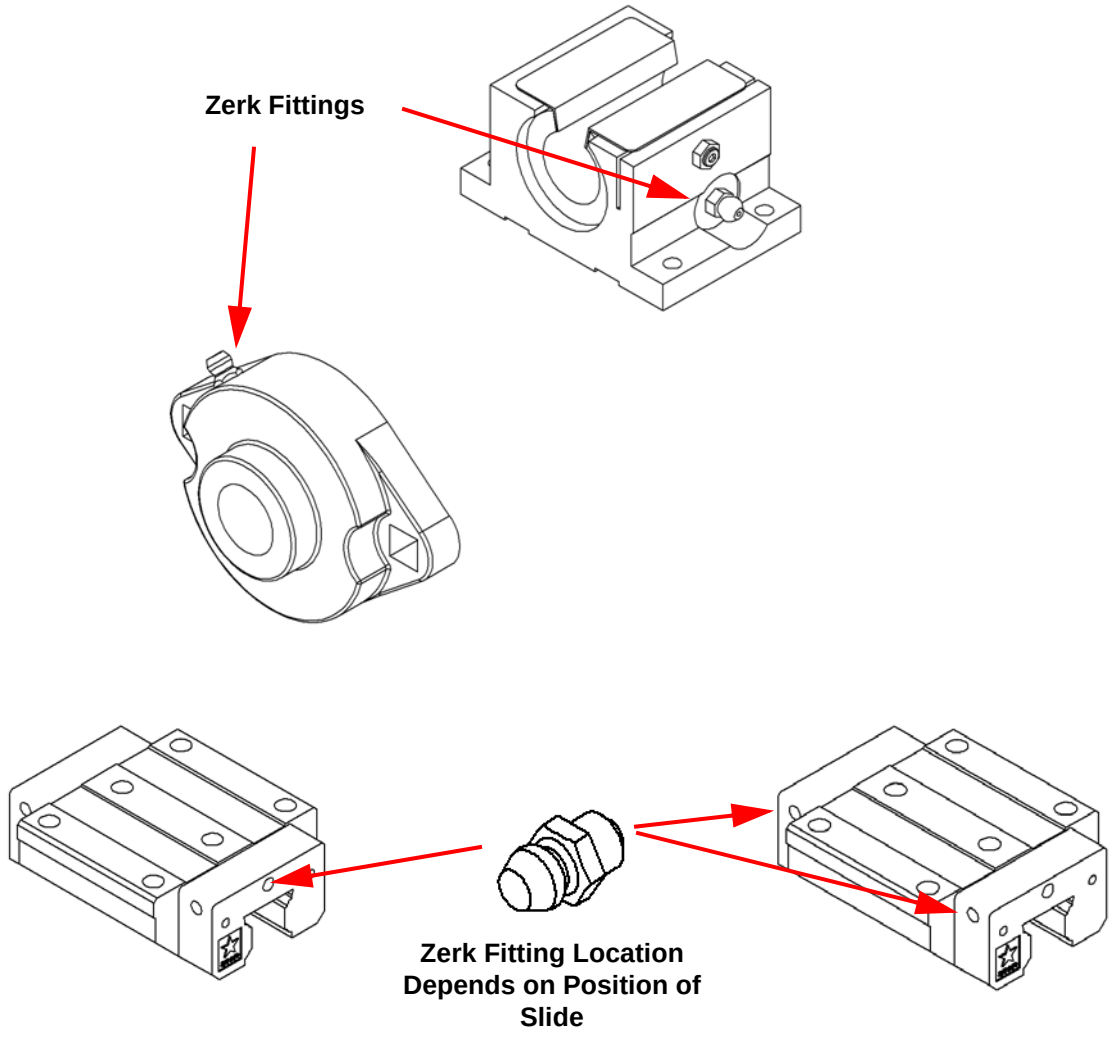


FIGURE 3-1. Zerk Fittings

Gear Motor Lubrication Requirements

Oil change is recommended after 2000 operation hours of operation. Use AGMA #8 gear lube or MOBILUBE HD 80 W-90 or equivalent.

Description of Air Input System

The air input system takes in shop air and supplies clean dry air (CDA) and lubricated air to the machine. The clean dry air is diverted to blow off nozzles. The lubricator, located after the CDA filters, delivers the lubricated air to valve banks and air cylinders.

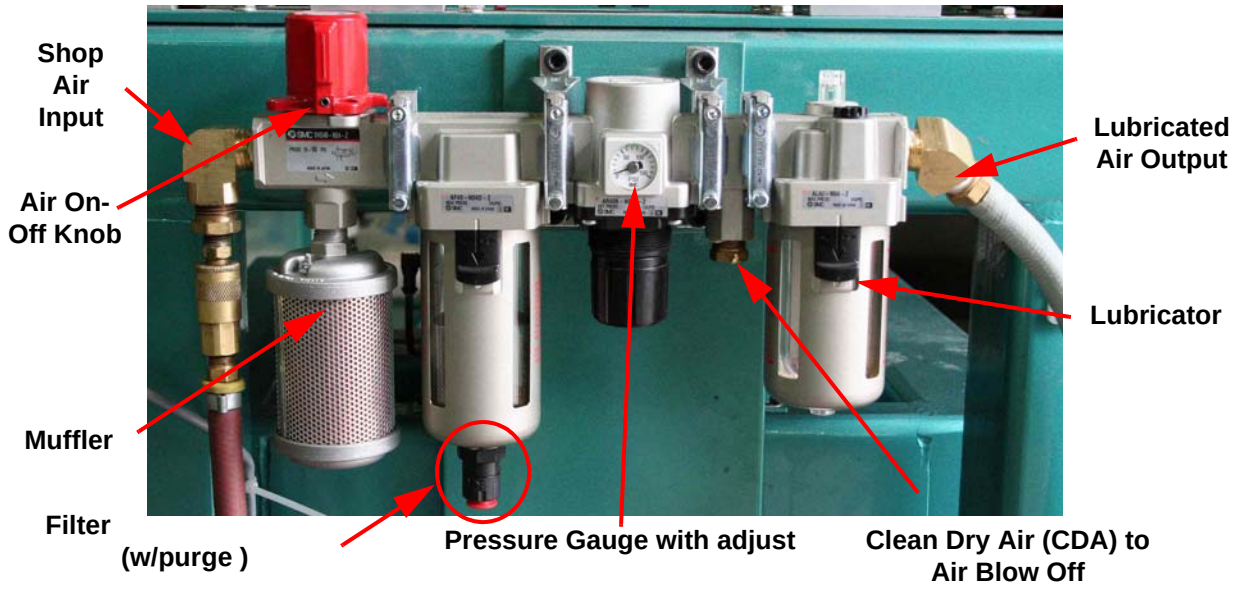
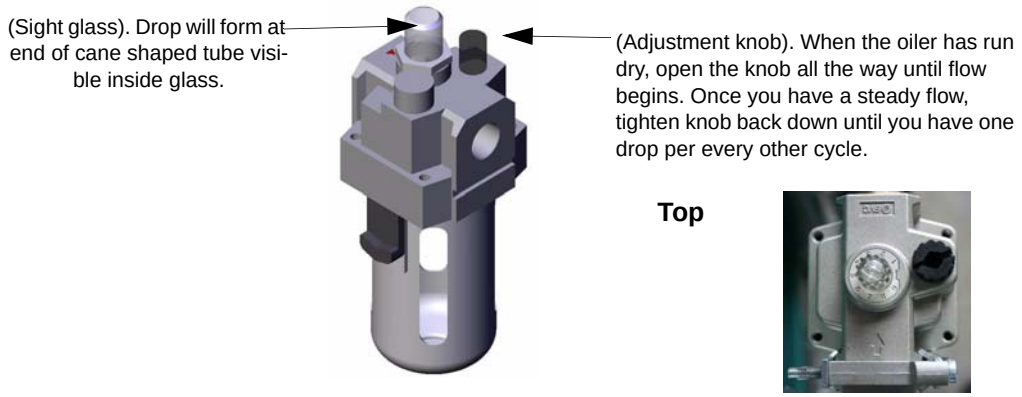


FIGURE 3-2. **Typical Air Line Filter and Lubrication System**

Adjusting the Air Line Lubricator

Using the knob on the top of the lubricator, adjust until one drop per every other cycle is used (as observed through sight glass.)



Priming the Air Line Lubricator

New and used machinery run out of oil from time to time. It is a good practice to check your machine lubricator to insure that it is putting the proper dose of oil in the air lines. Usually 1 drop of oil every other cycle is a good rule of thumb. The approved list of oil for lubricators is as follows:

- KVAL P/N SYSLUBG
- Chevron AW Hydraulic Oil 32
- G-C lubricants light AW R&O
- Mobile DTE 24
- Shell Tellus32
- Gulf Harmony 32

To prime the lubricator, find an air line on the carriage section of the machine that is energized, and disconnect it, allowing the air stream to bleed air pressure away from any persons. Direct the air stream at the machine so you can see when there is an oily film blowing out of the air hose. Repeat this same procedure for the back section and other trouble areas.

It is recommended to check the lines every week to two weeks.

CHAPTER 4 Trouble Shooting the EP-1

This chapter describes troubleshooting steps to help technicians solve issues that may occur with your KVAL machine. If help is needed, call or contact our KVAL Service team at (800) 553-5825 or http://www.kvalinc.com.

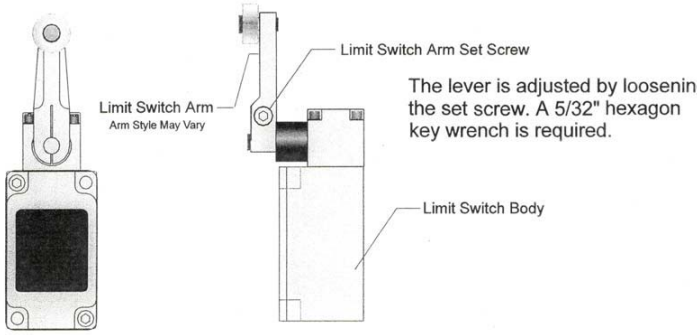
Chapter 4 at a Glance

Note: Refer to the Air and Electrical drawings provided with delivery of the machine. The drawings are normally located in the Electrical Panel. If copies are unavailable, contact the KVAL Service Department. Have drawings numbers, model number, and serial number of machine readily available.

Adjusting Limit Switches

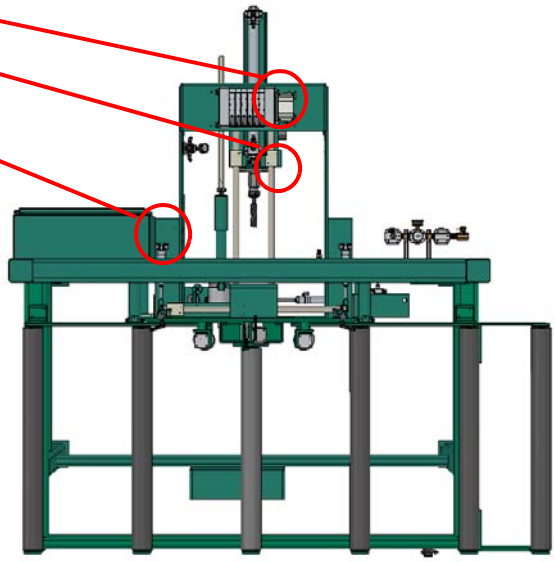
If a machine suddenly stops in mid cycle, check the limit switches. A worn limit switch arm or a mis-adjusted limit switch is more than likely the cause. Depending on the model of limit switch on your machine, the *pre-travel* (amount of movement from the limit switch arm's resting position to the position at which the switch actuates – with a "click") is either 5 or 20-degrees. The EP-1 has three 20-degree switches.

If the arm is moved to the full extent of its travel and you do not hear the limit switch "click", the switch needs to be adjusted. Use the set screw on the limit switch arm and adjust the arm to activate at the desired degree of rotation (see illustrations below).

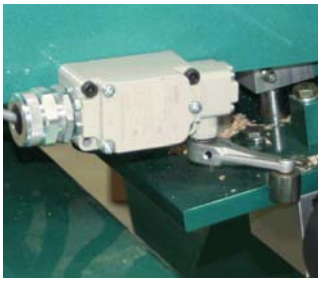


The EP-1 has three limit switches that have 20-degrees of pre-travel

- Drill Retract
- Drill Extended
- Router Stop (Signals that the Router is out of position so Drill can move forward.)



Switch Example



Adjusting the Bolts on the Face Plate Turrets

The bolts on the turrets are factory set. However, they may have to be adjusted.

One way to isolate the issue is to machine a door on all four settings.(red, blue, silver, and yellow). If all four parameters are out of calibration. Check and adjust the bolts that raise and lower the assembly.

If one parameter is out of specification, adjust that bolt linked to that parameter. See Figure below.

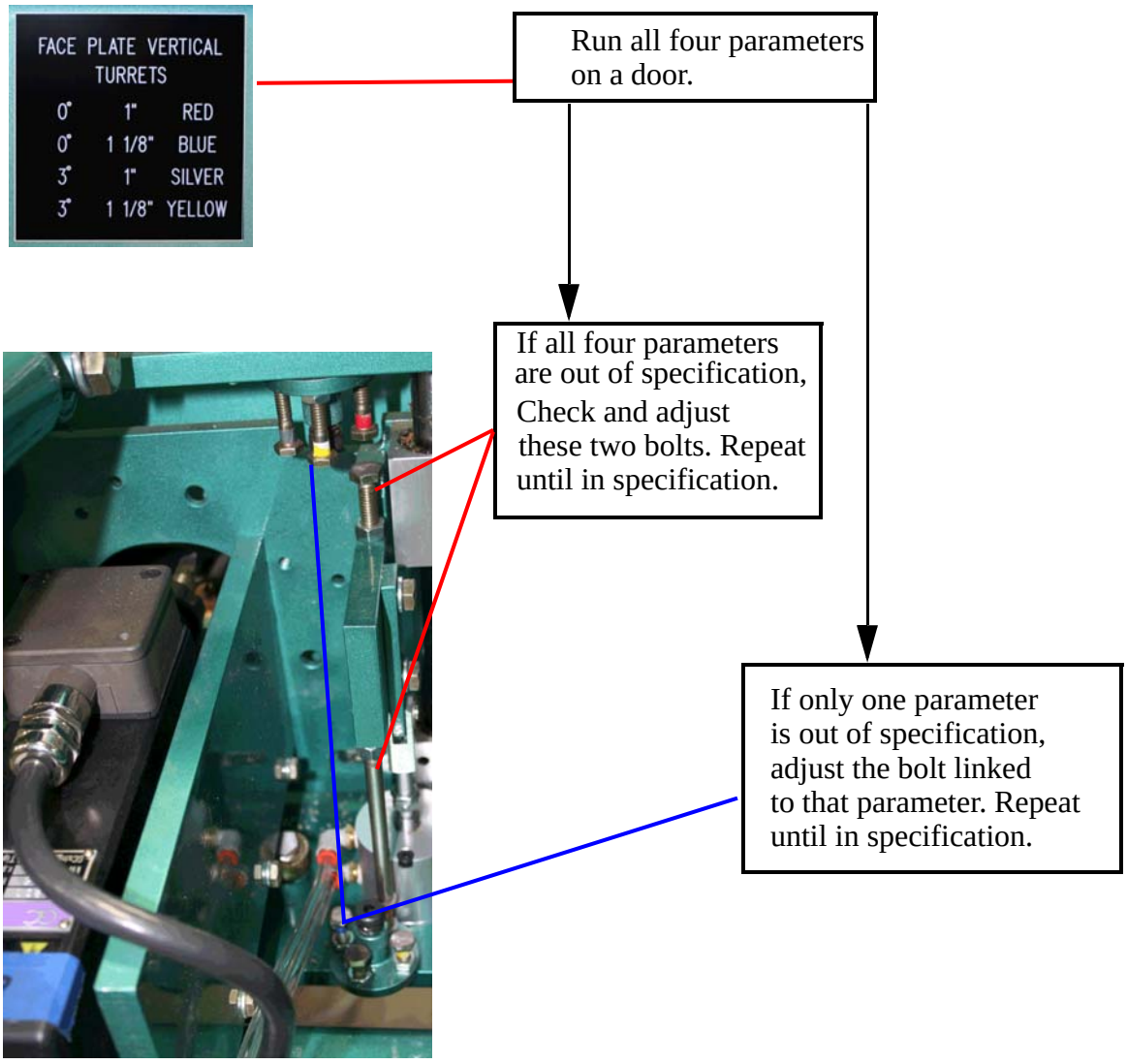


FIGURE 4-2. Adjusting the Vertical Position.

Troubleshooting Electrical Problems

NOTE: Refer to Air and Electrical Schematics provided with delivery of the machine. Schematics are located in the Electrical Panel. If copies are unavailable, contact the KVAL Service Department. Have model number and serial number of machine readily available.

Warning The following checks require the electrical panel to be energized. These troubleshooting checks *must* be performed by a **Qualified Electrical Technician.**

The electrical component systems are designed to expedite the troubleshooting process and minimize "down time". In general, component systems have the input or feed functions at the top. Output or load functions are positioned at the bottom. Most two-voltage electrical panels are designed with the LOW VOLTAGES on the LEFT, and the HIGH VOLTAGES on the RIGHT. The majority of the system components are labeled with numbers that correspond with the electrical prints included in the electrical box door.

Computer controlled machines have signals on the computer that light up when the input or output functions are energized, respectively. Computer controlled as well as non-computer controlled machines have white 120V control power terminal strips. This will indicate power supply from the respective circuits.

PLC controllers also have lights on them for the input and output functions. You can easily find out which circuits are failing by watching the lights turn on or off. Compare the lights on the IDEC or Beckhoff controllers to the electrical print to determine what systems are being affected.

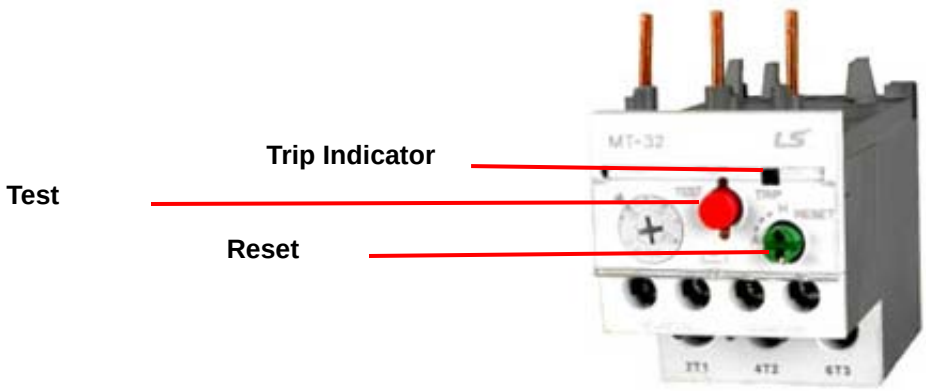
If the Power Stops During Normal Operation

1. Check that the input power disconnect switch is not turned off.
2. Check that all of the emergency stop buttons are in the normal position.
3. Check the Six Lights on the Electrical Panel. See "Troubleshooting with the Status Light Panel" on page 4-5.

Lockout and Tagout the main power source.

1. Turn the panel disconnect switch in the off position, open the electrical panel door.
2. Observe the disconnect switches. Look for loose or broken wires at the disconnect then at all of the components.
3. Check for continuity of all fuses with an OHM meter. (Fuses need to be removed from the bottom side of the fuse holder before measuring the fuses)

4. With the power off, check for motor overloads by pressing each reset button (usually at the bottom of the panel) in SEQUENCE. If one is tripped there will be a slight resistance to touch and a “click” sound as it is reset.



Thermal Overload Relay

Check for Tripped Circuits

1. Remove lock and tag outs on the main power sources.
2. Manually close disconnect sensors and energize the control circuit or transformer with its respective sensor. Check the Status Light Panel,. If all lights are observed, there are no overloads or emergency stops tripped. See” *Troubleshooting with the Status Light Panel* “below, for more information.

Note: Most electrical problems are related to mechanical malfunction (e.g., stuck motors, jammed chain, blocked photo sensors etc.)

Note: If a solenoid valve is suspected, and not cleared in the air checks section (see), it can be electrically jumped to check operation.

Troubleshooting with the Status Light Panel

The Status Light Panel is located on the Electrical Panel. All six lights are illuminated when the system is in proper working order. The lights turn on in a sequence and will stop at the point where a fault is first detected.

The sequence that the lights turn on are as follows:

1. Control Power (Amber)
2. Overload Relay (Amber)
3. E-Stop (Amber)
4. Stop (Amber)
5. Start (Amber)
6. 24VDC (Green)

If one or more lights are OFF, follow the process below to isolate the cause.

NOTE: Be sure to proceed down the table, starting with the CONTROL POWER light.

STEP 1:Control Power (Amber). If light is OFF go to item **A** on page 4-7.

STEP 2:Overload Relay (Amber) If light is OFF go to item **B** on page 4-7.

STEP 3:E-Stop (Amber) If light is OFF go to item **C** on page 4-8.

STEP 4: Stop (Amber) If light is OFF go to item **D** on page 4-8.

STEP 5: Start (Amber) If light is OFF go to item **E** on page 4-8.

STEP 6: 24VDC (Green light is OFF go to item **F** on page 4-9.

Warning

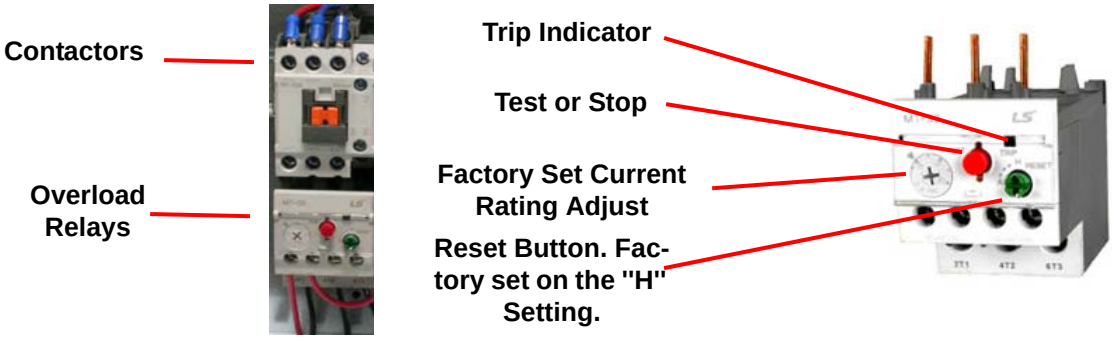
The following checks require the electrical panel to be energized. These troubleshooting checks *must* be performed by a **Qualified Electrical Technician.**

A Control Power Light OFF

1. Check if the Control Transformer button is pulled out.
2. Is the Disconnect Switch on the main electrical cabinet set to ON?
3. Is there 208, 220, 440, or 575 VAC to the top side of the Control Transformer (E3)? If not, check the fuses at the Fuse Block (E5), and the contacts on the Control Transformer button on the switch panel.
4. Is there 110 VAC between #1 & #2 on the110 VAC Terminal Strip? If not, check the fuse on the output side of the Control Transformer. If fuse is good, check power coming out of Control Transformer.
5. If no power on the output side, and there is power going into the top of the Control Transformer, replace the Control Transformer. If there is power at the Control Transformer, check the wiring of the black and white wire going from the Control Transformer to the 110 VAC Terminal Strip.

B Overload Relay Light OFF

1. Check Motor Overload Circuits
2. With power on, check the trip indicator LED on the overload. If indicator is orange, press the Reset Button to reset the overload circuit. Retest the Machine.



C E-Stop Light OFF

Check to see the if any E-Stop buttons are pulled out.

NOTE: Location and quantity of E-Stop buttons varies depending on customer need. Typical locations for E-Stop buttons are near the Rear Access Gate and near the Tool Changer Access Gate

D Stop Light OFF

Check for 110 VAC between #2 and #4 If there is voltage, press the Start button. If no voltage, check the Stop button to make sure it is all the way out and not stuck in, then check the contact to make sure it is closed. If still no voltage, check the wiring.

E Start Light OFF

Push the Start button. If the Start light remains unlit, push in the Start button and hold it in while a second person checks for voltage between #2 and #5. If there is 110 VAC, replace the ACR relay. If there is no voltage while the button is held in, check the wiring.

F

24VDC Light OFF

Check between DC+ and DC- for 24VDC.

If there is **no** DC voltage, disconnect the + Brown/Red and - Blue/Black wires from the 24VDC power supply-and check for DC voltage where those wires were disconnected.

If no voltage:

Check the input side for 110 VAC. If no 110 VAC, check the fuse. If there is 110 VAC and no 24VDC, replace the 24VDC Power Supply.

If there is 24VDC:

Reconnect the + Brown/Red and - Blue/Black wires to the 24VDC power supply.

Trace the + Brown/Red wire to the DC terminal block.

Disconnect all brown wires from the + DC from the DC terminal block except the + Brown/Red wire form the + 24VDC power supply.

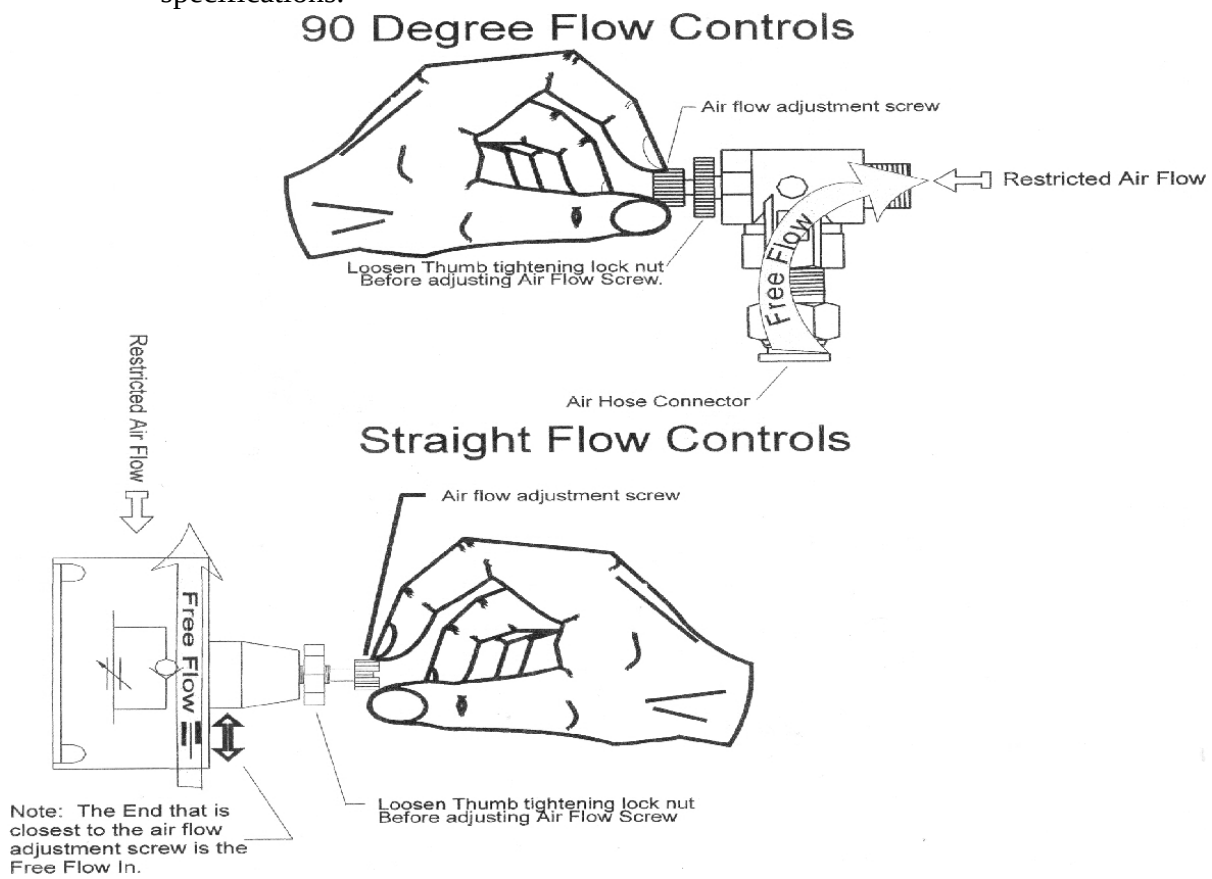
Check for +24VDC at between any –DC and +DC terminal on the DC Terminal block.

Reinstall the + brown wires one by one checking for +24VDC after installing each + brown wire. If at any point no voltage is found trace the last reinstalled wire and check for shorts.

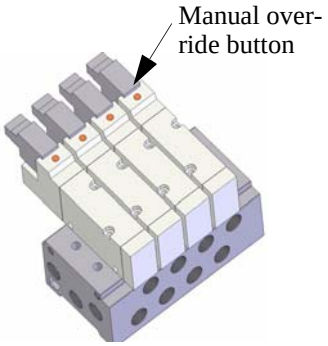
Troubleshooting the Air Cylinders

Most cylinders have an extend and retract port. To adjust the extend motion of a cylinder you must adjust the flow control on the retract port; this regulates the air flow exhausting from the cylinder and the opposite is true for the retract motion.

1. Check the air pressure to the machine.
2. Check the flow controls to see that they are adjusted correctly and to the proper specifications.



3. Check for any obstructions to the cylinders such as screws or a misplaced tool etc. FOLLOW ALL SAFETY GUIDELINES AND SIGNS DURING THIS PROCESS.



4. Check the solenoid air valves:

Caution Once activated, The valve will allow **full pressure to the cylinder.** Make sure you are clear of all moving parts.

a. The solenoid valves can be manually operated by pushing the red manual override button on the end of the valve.

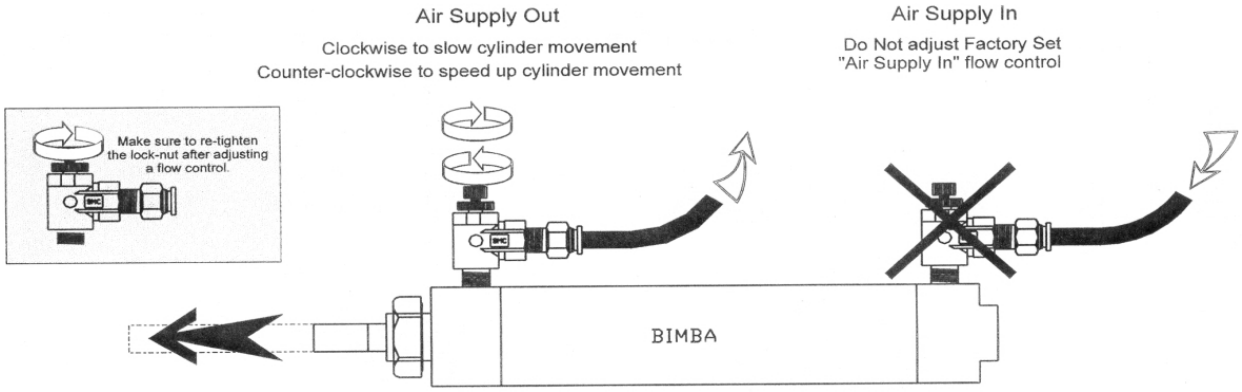
b. If the valve seems to be leaking, the seals may be dry or contaminated with water or it maybe that the cylinder "O" rings are damaged and air is passing from one side to the other side of the cylinder which means the air is exhausting through the solenoid valve. It maybe is necessary to purchase a rebuild kit or a new cylinder.

c. If the valve is not receiving an electrical signal, for instructions. It might be necessary to call in a specialist or check with KVAL Customer Service at 1-800-553-5825.

5. If an Air Leak is coming from an exhaust port on the solenoid air bank:

a. Check the solenoid for the manual override. If the solenoid has a manual override you can push each of the buttons one at a time. When the air leak stops or weakens it usually means that one or more of the cylinders that the solenoid is operating are faulty.

Adjusting Cylinder Extension Speed:



Adjusting Cylinder Retraction Speed: