RazorGage has developed a plurality of I/O interfaces that interact with various machines. This plurality of I/O options coupled with the number of software platforms and screens make it necessary to provide an overview of our I/O options as they relate to various operating systems and software screens.

Android Operating System

Android is the only operating system offered on the RazorGage xT Eco and is optional on the RazorGage ST.

- The RazorGage xT Eco has no I/O so no machine interface options are available on this model.
- The RazorGage ST with Android is available with either no I/O or with Tool Safe only. In the Android software, the only function of the Tool Safe Sensor is to lock out motion when the switch contacts are open.

Windows Operating System

The Windows Operating System is only available on the RazorGage ST. Here we have several I/O options available. Here is how the various screens behave with the more common I/O options:

Tool Safe Sensor Only or Tool Safe with Machine Enable (BMI)

- Locks out motion when contacts are open. This applies throughout all software functions.
- When the RazorGage positioner is being used as a STOP, the Tool Safe Sensor's only function is to lock out motion when the contacts are open except in the case of Autolist. When Autolist is in STOP MODE and the user has entered a clear span length causing the software to present a list of parts selected to optimize said clear length, the software will automatically jump to the next length upon detection of the Tool Safe Sensor transitioning from closed to open and then back to closed.
- Autolist and Work Order Screens can be used alternately in PUSHER or STOP modes. With the Tool Safe option, when these screens are in PUSHER mode, a checkbox is displayed by which the operator may enable automatic advance after detection of Tool Safe transition.
- Auto Pusher Screen and Batch Screen are PUSHER only screens. With Tool Safe option these screens display a check box by which the operator may enable automatic advance after Tool Safe transition.

Auto Cycle Option (BMI+)

All screens behave the same as Tool Safe Sensor Only except that there are no check boxes in the pusher screens. The software assumes that automatic operation is expected so it does not require the operator to indicate such.

RazorGage
POSITIONERS • SOFTWARE • SYSTEMS

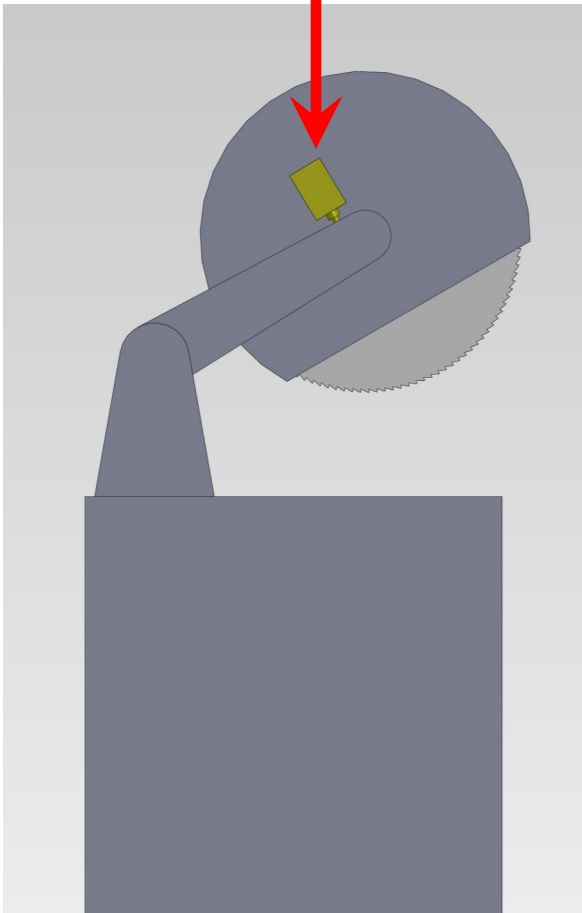# Basic Machine Interface Options

Limit Switch Version

The Tool Safe Sensor is a limit switch to be installed on the user's saw, drill press, punch press, or whatever the processing tool may be, that, when depressed, indicates to the RazorGage software that the processing tooling is in a position that favors movement of the pusher. The software then allows motion of the positioning carriage. The Tool Safe Sensor is also used to detect that the tool has completed a cycle. In certain software screens that allow semi-automatic to fully automatic operation, the RazorGage will automatically move to the next position after sensing that the Tool Safe Sensor has opened and closed within a certain timeframe. Since the RazorGage control is simply looking for a set of contacts to close, you may use a relay on your machine instead of the limit switch. Contact the factory for more details.
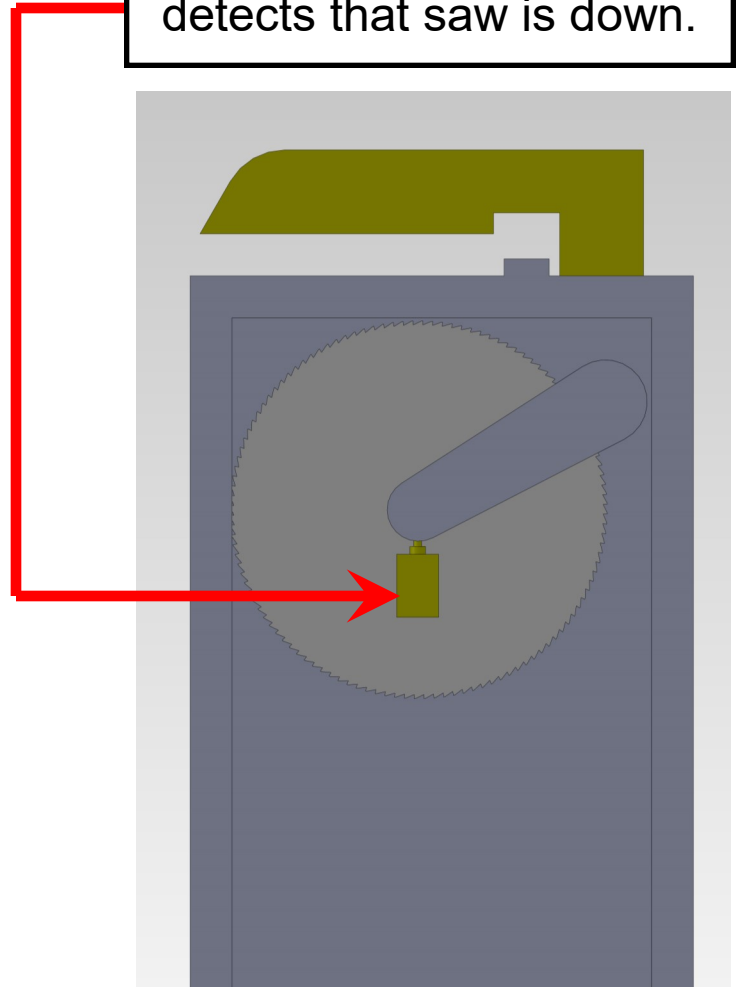
Roller Style (Standard) - Optionally request styles.

Down Cut Saw - Switch detects that saw is up.

Up Cut Saw - Switch detects that saw is down.

35.0
[1.38]

2X M3X0.5

16.0
[0.63]

24.9
[0.98]

2X Ø4.3 [Ø0.17]
CBORE Ø8.0 [Ø0.31]
DN 3.5 [0.14]

39.8
[1.57]

49.0
[1.93]

3M
[9.8 FT]

35.0
[1.38]

16.0
[0.63]

2X M3x0.5

38.9
[1.53]

34.4
[1.35]

24.9
[0.98]

Ø18.0
[Ø0.71]

27.9
[1.10]

55.5
[2.19]

M3.5x16
TORQUE:
0.5-0.8 Nm

74.5
[2.93]

39.8
[1.57]

BMI Tool Safe Sensor

P2E Version

Some saws have pneumatic logic controlling the saw cycle. Often this logic includes an air signal that is present (or absent) when the saw is in the safe position. In these cases, a P to E (Pneumatic to Electric) sensor can use that air signal to close or open a set of electrical contacts. The photos below show an example of a BMI P2E installation.
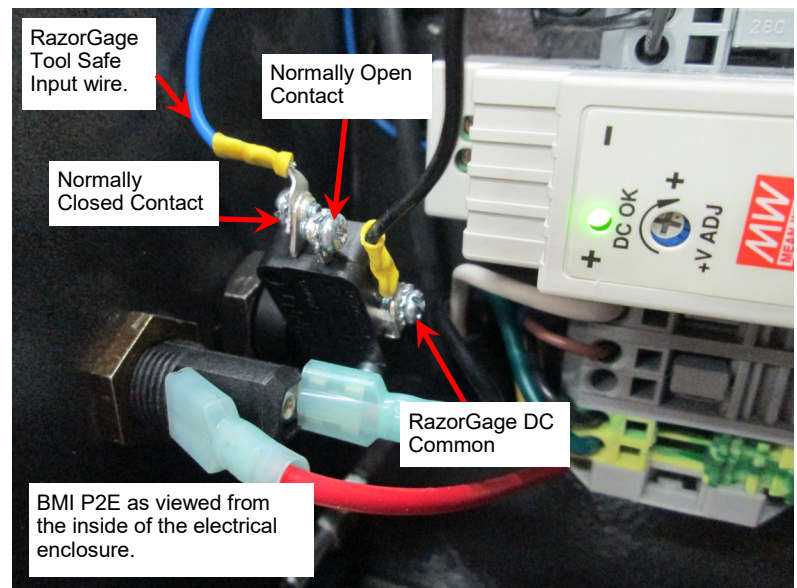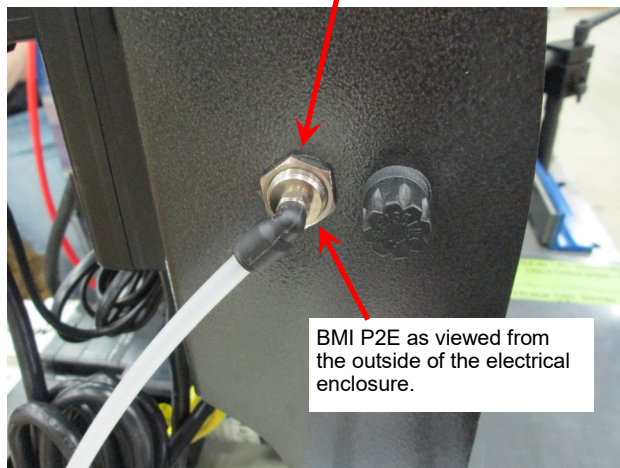
This air switch is part of the saw's existing pneumatic logic. In this case the switch blows compressed air whenever the saw is NOT in the safe position.

When shipped from the saw's manufacturer, this air line was plugged directly into the air switch.
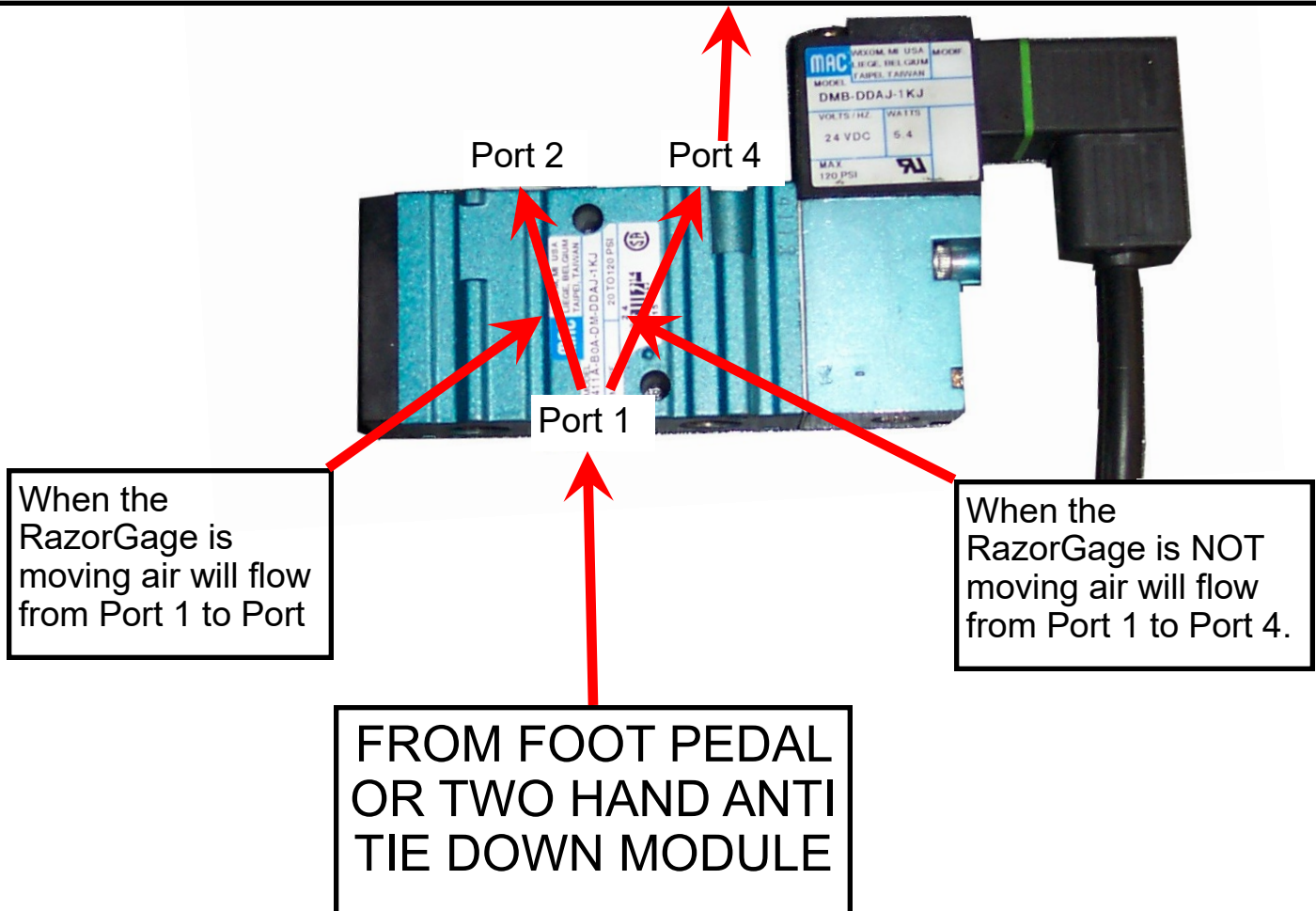
Blue air line was added.

To incorporate the BMI P2E, we installed this Y connector to allow us to send the air signal to both its originally intended destination and to the BMI P2E

This air line goes to the BMI P2E

BMI P2E as viewed from the outside of the electrical enclosure.

RazorGage Tool Safe Input wire.

Normally Open Contact

Normally Closed Contact

RazorGage DC Common

BMI P2E as viewed from the inside of the electrical enclosure.

The BMI P2E has one Normally Open and one Normally Closed contact. In this case the air signal is absent when the saw is up (safe). Since the RazorGage is looking for a closed contact when the saw is safe, we tied the RazorGage Tool Safe input wire to the Normally Closed contact.
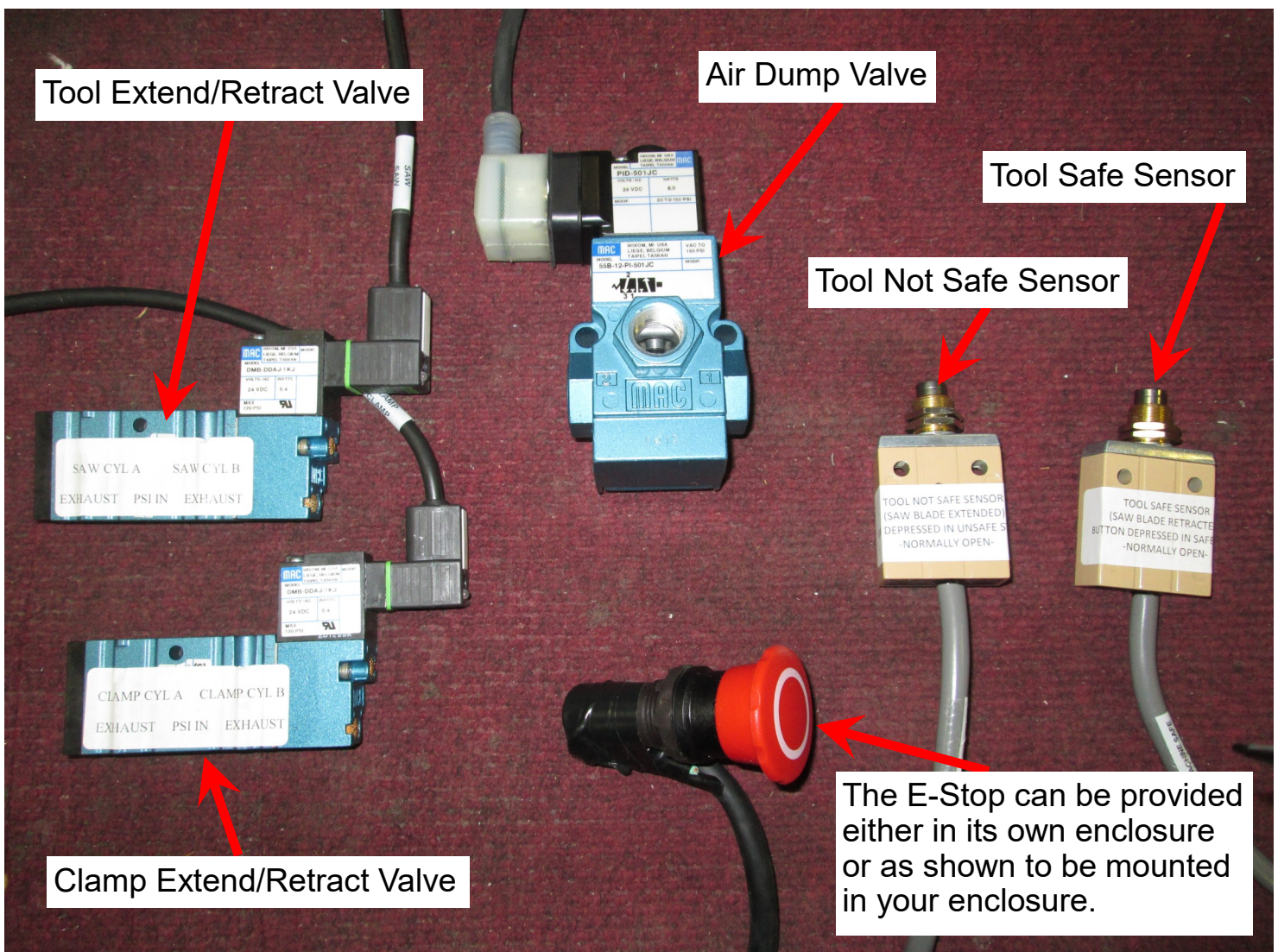
BMI Air Safety

The Air Safety Valve, one of the optional components of the RazorGage Basic Machine Interface (BMI) is used to divert an air signal in a machine's control circuit to keep it from cycling when the RazorGage is in motion. For example if you have a saw that uses a foot pedal or two hand trip that delivers an air signal to a control circuit when pressed the signal will be diverted to atmosphere when the RazorGage is moving. The RazorGage Air Safety Valve is a 4-way 2 position solenoid valve powered by 24 Volts DC current. When the RazorGage is not moving Port 1 is open to Port 4. When the RazorGage is in motion Port 1 is open to Port 2. See a typical plumbing example below. The BMI Air Safety can also be configured as a relay instead of an air valve. Contact the factory to customize a solution for your application.

TO LOGIC CONTROL THAT RECEIVES AIR SIGNAL FROM TWO HAND ANTI TIE DOWN MODULE OR FOOT PEDAL FOR THE PURPOSE OF CYCLING THE MACHINE.

Port 2   Port 4

Port 1

When the RazorGage is moving air will flow from Port 1 to Port

When the RazorGage is NOT moving air will flow from Port 1 to Port 4.

FROM FOOT PEDAL OR TWO HAND ANTI TIE DOWN MODULE

BMI Plus - AutoCycle Package

The BMI Plus consists of a Tool Safe Sensor, Tool UnSafe Sensor, a 4-way solenoid valve for operating the processing tool such as a saw or punch press, a 4-way solenoid valve for operating clamps that may be associated with the process, an E-Stop, and an air dump. The Tool Safe Sensor is mounted to indicate that the tool is out of the way for material advance and indicates that a cycle is complete. The Tool UnSafe Sensor is mounted at the extreme opposite end of the tool's process. For example, on a down cutting saw, the Tool UnSafe Sensor will be mounted to detect the maximum downward position of the saw. The Tool Valve's A & B ports are connected to the extend and retract ports of the air cylinder that operates the tool. The Clamp Valve's A & B ports are connected to the extend and retract ports of the clamping cyliners. Certain screens in the RazorGage software utilize this interface to automatically cycle the clamps and the tool to create an automatic machine. The E-Stop button kills power to the RazorGage motor, the solenoid valves, and the Air Dump Valve and can be tied into the E-Stop circuit of the attached machine. The BMI Plus has all you need to automate most machines but if you need a different integration package, contact the factory for a solution that works for your application.

Tool Extend/Retract Valve

Air Dump Valve

Tool Safe Sensor

Tool Not Safe Sensor

Clamp Extend/Retract Valve

The E-Stop can be provided either in its own enclosure or as shown to be mounted in your enclosure.

BMI+ Auto Cycle

The BMI+ Auto Cycle option includes two 24VDC single solenoid 4-way valves. When the solenoid is energized the spool shifts to divert compressed air from port 1 to port 4. When the solenoid is at rest air flows from port 1 to port 2. When the RazorGage is not trying to cycle the saw both valves will be de-energized so air will be diverted from port 1 to port 2 on each valve. Therefore your supply air should be connected to port 1 on both valves and the air line that goes to the retract side of your clamp cylinder should go to port 2 on the clamp valve and the air line that goes to the retract side of the saw cylinder should go to port 2 on the saw valve. When the RazorGage controller cycles the saw it energizes the valves according to the sequence on the next page. Therefore the air line that goes to the extend side of the clamp cylinder should go to port 4 on the clamp valve and the air line that goes to the extend side of the saw cylinder should go to port 4 on the saw valve.

CLAMP RETRACT   CLAMP EXTEND

CLAMP VALVE

SUPPLY

SAW RETRACT   SAW EXTEND

SAW VALVE

SUPPLY
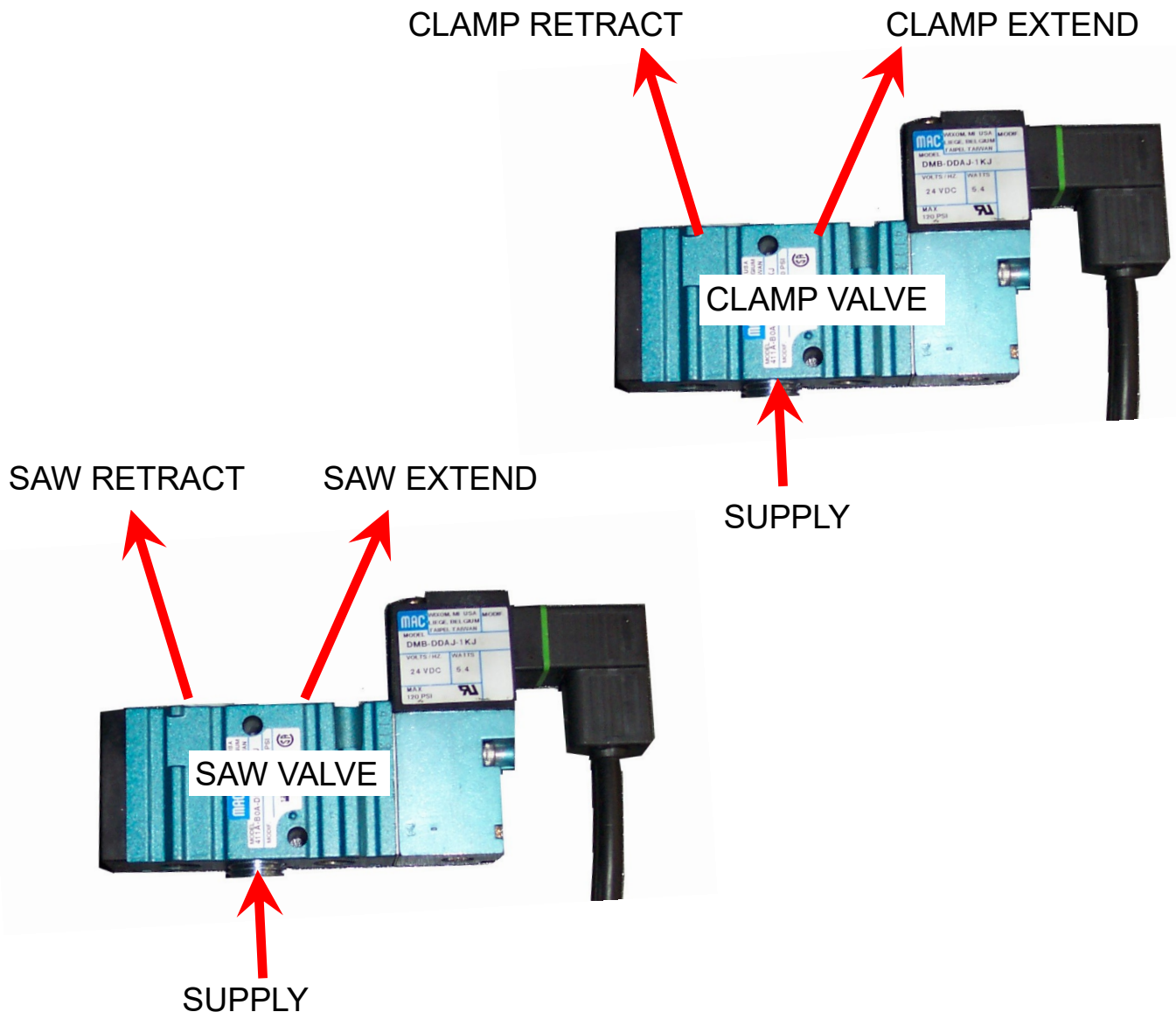
Setup Screen

System Parameters
Stroke: 48.000

Scale: 3468.000

■ Metric

Saw Parameters
Timer 1 = 500ms

Timer 2 = 4000ms

Timer 3 = 500ms

User Parameters
Speed: 25.000

Accel: 30.000

Decel: 30.000

Run Current: 100%

Load Speed: 30.000

Unload: 5.000

Load: 5.000

Saw Kerf: 0.162

Offset: 0.000

Calibrate

Defecting I/O Board
○ NONE ● Com1 ● Com2 ● Com3

● Com4 ● Com5   Test Com

Home: (Zero)
● Left
● Right
☑ ST Extrusion

Move to Lower Limit | Move to Upper Limit | Controls Test | Run Index Locator

Home The Positioner | Run Laser Routine | Run Break-In | Printer Setup

Keypad
7 8 9 Return to Main
4 5 6 Help
1 2 3 PC Software Manual
. 0 ← Backspace ENTER

1. Clamp Valve - ON
2. Timer 1 - Delay
3. Saw Valve - ON
4. Timer 2 - How long to wait for 'Extend' switch to make.
5. Saw Valve - OFF
6. Timer 3 - Delay
7. Clamp Valve - OFF

☐ Generate Event Log

Password:

Save Changes

Saw Parameters
Timer 1 = 500ms

Autocycle I/O timing can be adjusted in the Setup Screen. The Saw Parameters frame contains a value for Timer1. The Autocycle sequence starts by energizing the CLAMP VALVE solenoid which is intended to engage clamps. Immediately after the CLAMP output is set, TIMER 1 begins to count down. This timer is intended to give the clamps time to clamp the part. Adjust TIMER 1 to allow enough time to adequately clamp the part without so much delay that unnecessary time is wasted. When TIMER 1 counts down the SAW VALVE is energized, causing the saw (or punch, drill, or other tool) to extend. The SAW VALVE is de-energized when the TOOL NOT SAFE sensor is activated. Typically this sensor is placed to detect that the saw (or other tool) is fully extended. At this point the SAW VALVE is de-energized and the saw retracts. When the TOOL SAFE SENSOR is made, typically when the saw is fully retracted, the clamp output is de-energized causing the clamps to retract. If your saw cycle is extremely slow, such as would be the case sawing through a thick piece of aluminum or steel, there is another timer which may come into play. This timer is called the SawTimeout_Seconds and is set in the config.ini file located in the folder C:\PositionerRuntimeFiles. If you get a saw timeout error due to very long saw cycle times then you may need to adjust this timer to a larger value.

From the RazorGage Setup Screen, press CONTROLS TEST to check to see if the controller is receiving the signals from the switches.

Setup Screen

System Parameters
Stroke: 48.000
Scale: 3468.000
■ Metric

User Parameters
Speed: 25.000
Accel: 30.000
Decel: 30.000
100%
30.000

Unload: 5.000
Load: 5.000
Saw Kerf: 0.162
Offset: 0.000

Calibrate

Board
● Com1   ● Com2   ● Com3
● Com5   Test Com

1. Clamp Valve - ON
2. Timer 1 - Delay
3. Saw Valve - ON
4. Timer 2 - Delay
5. Saw Valve - OFF
6. Timer 3 - Delay
7. Clamp Valve - OFF
■ Generate Event Log

Home: (Zero)
● Left
● Right
■ ST Extrusion

Move to Lower Limit
Move to Upper Limit
Controls Test
Run Index Locator
Home The Positioner
Run Laser Routine
Enter Setup

7 8 9 Return to Main
4 5 6 Help
1 2 3 PC Software Manual
. 0 ← Backspace ENTER

Password:

Save Changes

Controls Test Screen

USB Saw Cycle Button 1

'Defect' Input

USB Saw Cycle Button 2

'RG Enable' Input ← Tool Safe Input (Saw Retracted)

USB Next Button

'Saw Up' Input ← Saw Extended Input

Analog Position =

DONE