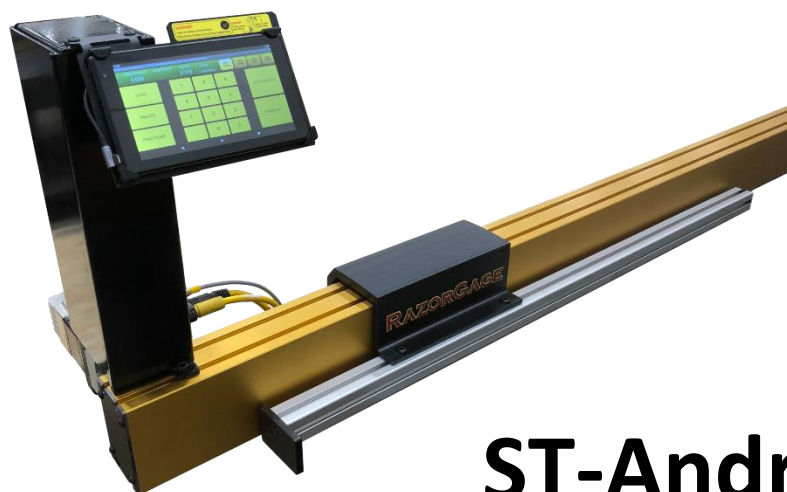


# RAZORGAGE ST



**ST-Windows**



**ST-Android**

## Table of Contents

<b>General Safety Rules for Woodworking Machinery.....</b>	<b>4</b>
<b>Arrival Inspection .....</b>	<b>6</b>
<b>Installation .....</b>	<b>7</b>
<b>Mounting RazorGage to Your Own Table .....</b>	<b>7</b>
<b>Mounting RazorGage to Table Provided by RazorGage .....</b>	<b>7</b>
<b>Table Attachment Bracket .....</b>	<b>8</b>
<b>Change the Hand of the RazorGage .....</b>	<b>9</b>
<b>Mount the Enclosure .....</b>	<b>10</b>
<b>Touchscreen Monitor Connections .....</b>	<b>10</b>
<b>Motor Cable Connections.....</b>	<b>11</b>
<b>Setup – PC &amp; Tablet .....</b>	<b>12</b>
<b>Adjust Stop Extension .....</b>	<b>12</b>
<b>Power Up the RazorGage .....</b>	<b>12</b>
<b>Calibration Procedure .....</b>	<b>13</b>
<b>General Operation – PC &amp; Tablet .....</b>	<b>18</b>
<b>Main Screen .....</b>	<b>18</b>
<b>Auto Calc Screen .....</b>	<b>19</b>
<b>Auto Pusher Screen .....</b>	<b>20</b>
<b>Work Order Screen.....</b>	<b>22</b>
<b>Presets Screen.....</b>	<b>24</b>
<b>Batch Parts Screen .....</b>	<b>25</b>
<b>Autolist Screen.....</b>	<b>27</b>

<b>Setup – Android .....</b>	<b>29</b>
<b>General Operation – Android .....</b>	<b>32</b>
<b>Main Screen – Android .....</b>	<b>32</b>
<b>Cutlist Screen – Android .....</b>	<b>33</b>
<b>Presets Screen - Android .....</b>	<b>34</b>
<b>Basic Machine Interface .....</b>	<b>35</b>
<b>Tool Safe – Limit Switch .....</b>	<b>35</b>
<b>Tool Safe – Pressure Switch.....</b>	<b>36</b>
<b>Tool Safe with Air Safety .....</b>	<b>37</b>
<b>Tool Safe &amp; Machine Enable.....</b>	<b>38</b>
<b>Cyclone BMI .....</b>	<b>39</b>
<b>BMI+ Auto Cycle.....</b>	<b>40</b>
<b>SUP .....</b>	<b>41</b>
<b>CPO .....</b>	<b>41</b>
<b>Machine Adjustments .....</b>	<b>42</b>
<b>Belt Tension Adjustment.....</b>	<b>42</b>
<b>Replacement Parts List.....</b>	<b>43</b>
<b>Troubleshooting .....</b>	<b>44</b>
<b>Electrical Schematics .....</b>	<b>44</b>
<b>Troubleshooting Guide.....</b>	<b>53</b>
<b>Troubleshooting E-stop PC Connection .....</b>	<b>56</b>

## General Safety Rules for Woodworking Machinery

### **WARNING**

**The operator must thoroughly read and understand this manual before operating the saw or starting any servicing. All safety and warning instructions should be followed. This manual must be available to all operators.**

1. For your own safety, read the operation manual carefully. Know your machine. Learn its applications and limitations, and any hazards specific to this machine. All personnel should be trained in the operational procedures and received safety instruction before operating this equipment. If you have not received proper training in the use of this machine, **DO NOT OPERATE THIS MACHINE**, damage to the equipment or injury to the operator is possible.
2. This machine should not be operated without all of the guards in place and safety devices in operation. Removal of any guards or disabling any of the safety devices may result in damage to the equipment or injury to the operator. If any of the guards or safety devices are missing, damaged or not working properly, **DO NOT OPERATE THIS MACHINE**, notify your supervisor immediately.
3. If the operator has any safety concerns or questions regarding the operation of this equipment, **DO NOT OPERATE THIS MACHINE**, the machine should be locked out and your supervisor notified immediately.
4. All Lock Out/Tag Out procedures must be followed before servicing or adjusting this equipment. If you have not received proper training in the Lock Out/Tag Out procedures for this machine, **DO NOT OPERATE THIS MACHINE**, damage to the equipment or injury to the operator is possible.
5. In case of any equipment malfunction or jam the machine should be powered off and locked out before clearing any materials from the operational areas of this machine. Once cleared the reset procedures need to be followed when powering up the equipment. At no time should any of the machine control systems including electrical, hydraulic or pneumatic circuits be manually overridden.
6. Check machine for damaged parts. Before continued machine use any damaged guard or part must be carefully checked for proper operation of its intended function. Check all moving parts for proper alignment, check for binding of moving parts, breakage of parts, proper secure mounting, and any other condition that may affect machine operation. Guards or other parts that are damaged must be properly repaired or replaced.
7. Machine must be properly grounded.

8. Maintain and clean machine at recommend intervals. Intervals may need to be adjusted due to work load or material type to keep machine in top condition. Follow instructions for lubrication, setup, and changing accessories
9. Disconnect machine from power source before, changing accessories, or any servicing activity.
10. Avoid accidental starting. Make sure switch is in the off position before connecting to power.
11. Remove any tools or loose objects from work surface of machine. Make sure any tools used for adjustment or maintenance are removed from machine before machine is restarted. Make a habit of scanning for tools and scraps every time the machine is started.
12. Keep work area clean. Cluttered work areas and workbenches increase the likelihood of an accident.
13. Do not use in dangerous environments. Do not use machine in damp or wet locations, or expose them to rain. Keep work area well illuminated.
14. Keep children away. All visitors should be kept at a safe distance from work area.
15. Make workshop childproof, with padlocks, master switches, or by removing starter keys.
16. Do not force the machine. It will function better and safer at its designed rate.
17. Use the right tools. Do not force the machine or attachments to do a job for which they were not designed. Contact the manufacturer or distributor if there is any question about the machine's suitability for a particular job.
18. Use only recommended accessories. Consult the operation manual for recommended accessories.
19. Wear proper apparel. Avoid loose clothing, gloves, neckties, rings bracelets, or jewelry which could be tangled in moving parts. Keep long hair contained to prevent entanglement. Non-slip footwear is recommended.
20. Always wear safety glasses.
21. Secure the work piece.
22. Keep proper footing and balance at all times.
23. Do not use machine while under the influence of drugs, alcohol, or any medication.
24. Always wear a face mask or dust mask if operation creates excessive dust or chips. Always operate machine in a well-ventilated area and provide proper dust removal.
25. Never leave machine running unattended. Turn power off. Do not leave machine until it comes to a complete stop.

## Arrival Inspection

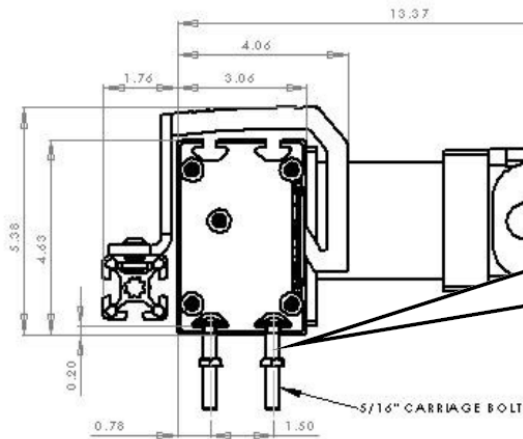
### **WARNING**

**The operator must thoroughly read and understand this manual before operating the saw or starting any servicing. All safety and warning instructions should be followed. This manual must be available to all operators.**

The RazorGage ST positioner, control cabinet, table and legs will ship in a crate. Unpack the items ensuring that all parts are present and free from damage. If any parts are missing or damaged contact your local distributor or RazorGage immediately. Do not assemble or attempt to operate the RazorGage without all components present and in undamaged condition.

## Installation

### Mounting RazorGage to Your Own Table



If you are mounting the RazorGage ST to your own table, use the dimensions at left to help you plan. You may use the 5/16\" carriage bolts provided with the RazorGage to bolt the RazorGage to your table. The head of the carriage bolt fits in the T Slots as shown.

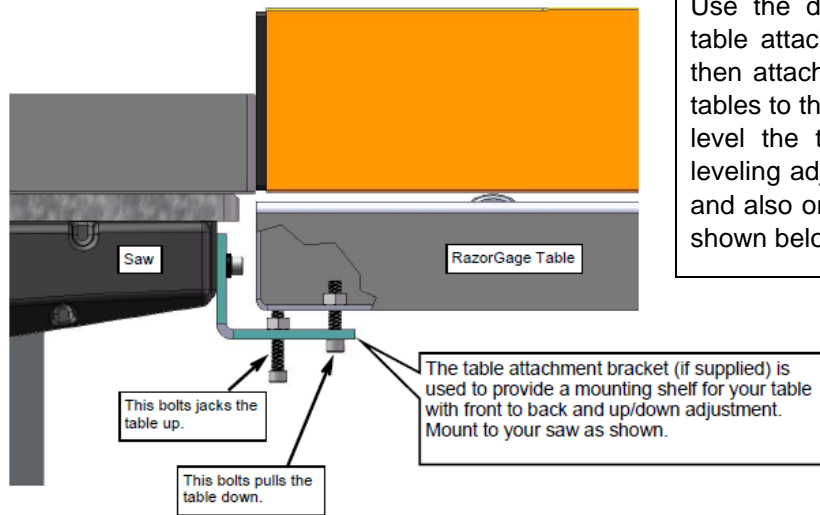
### Mounting RazorGage to Table Provided by RazorGage

Mount the leg(s) to the RazorGage table with the bolts provided then mount the RazorGage to the table with the carriage bolts provided. The RazorGage can mount over or behind the table rollers or PVC sheeting depending on the application. Use the 1/4\" shims provided to space the unit above the rollers.

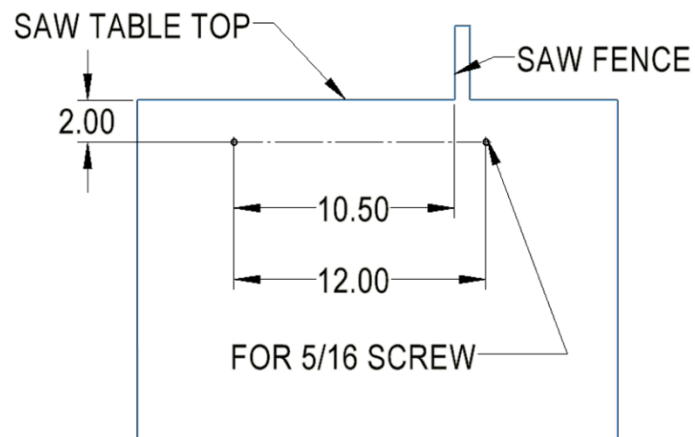


The table shown here is freestanding but unless you specifically ordered an extra leg, your RazorGage will only have one leg per table. The motor end is usually attached to the saw as shown on the next page.

## Table Attachment Bracket



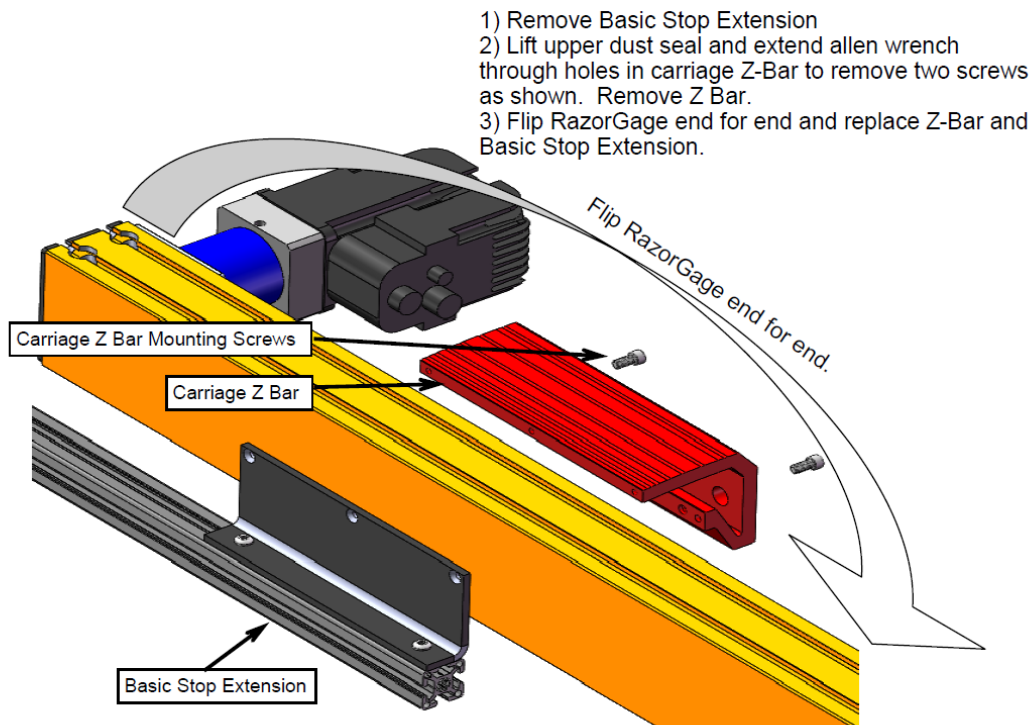
When the RazorGage is attached to a saw, a table attachment bracket is used. Use the diagram below to first bolt the table attachment bracket to the saw and then attach the table. After attaching the tables to the saw make sure to square and level the table to the saw. There are leveling adjustment bolts on the table legs and also on the table attachment brackets shown below.





## Change the Hand of the RazorGage

The RazorGage is able to be setup for either right or left-hand operation. Use the diagram and instructions below to make the adjustment. No software settings will need to be changed for this procedure.



## Mount the Enclosure

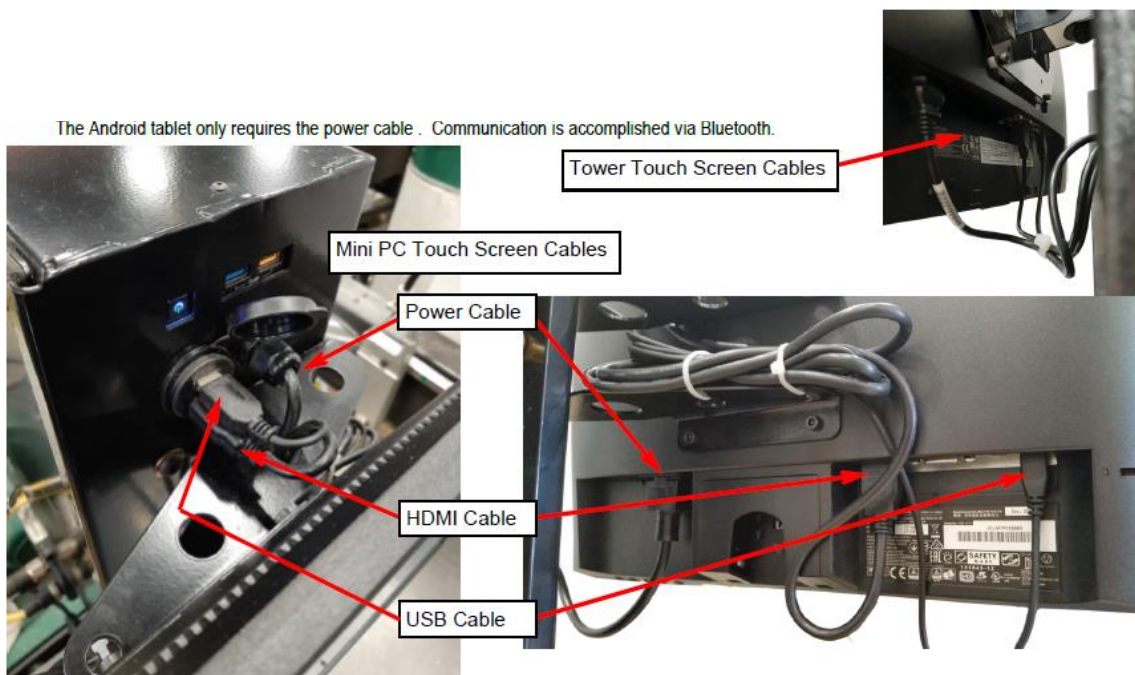
Disregard this step if you have the freestanding Tower Enclosure.

The Mini Enclosure **MUST** be flush with this edge when mounted to the RazorGage extrusion. Otherwise the carriage could hit the enclosure during homing.

Use the cap screws and T-Slot nuts provided to mount the enclosure to the RazorGage beam.

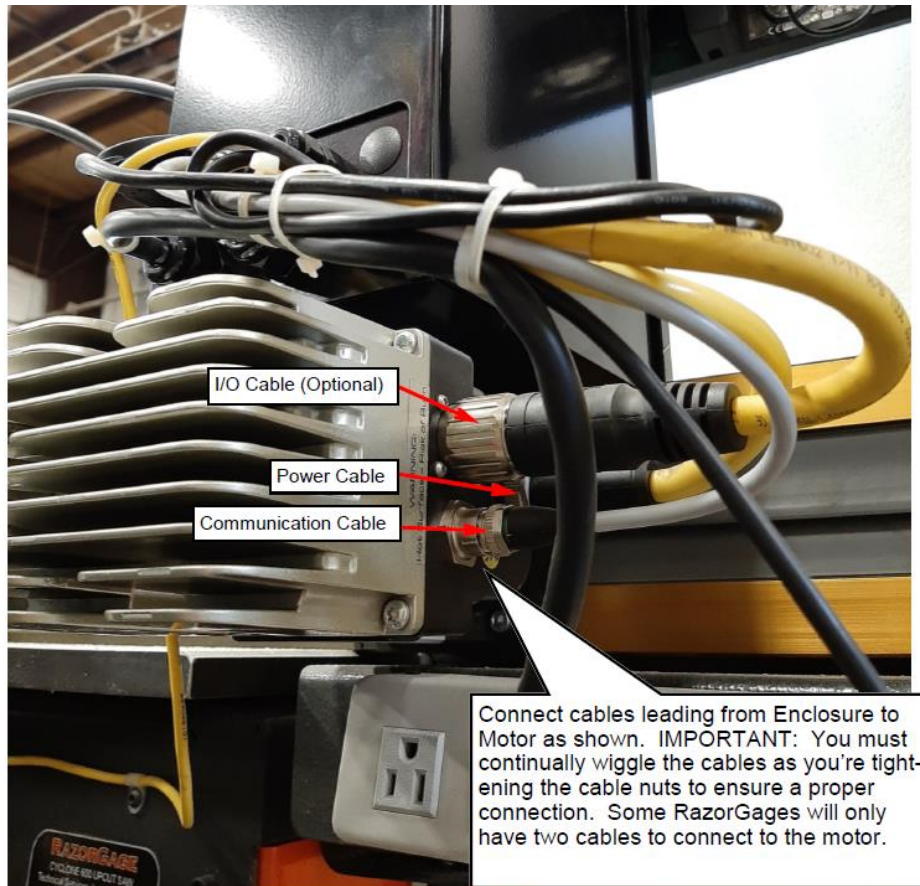
## Touchscreen Monitor Connections

The Android tablet only requires the power cable. Communication is accomplished via Bluetooth.



## Motor Cable Connections

The RazorGage Mdrive motor requires either 2 or 3 cable connections, depending on option ordered, to be secured. The power and communications cable connections are required on all options. The I/O cable connection is used on any of the machine interface options.



## Setup – PC & Tablet

Once your RazorGage is securely mounted to your machine you begin the first-time calibration process by first adjusting the stop extension. The RazorGage will then be powered up. Next the Mdrive will be indexed. Then home offset will be set and finally the scale factor will be calibrated. Follow instructions below to complete setup of the RazorGage. **The RazorGage will be indexed and scaled upon arrival unless the extrusion is shipped in two pieces.**

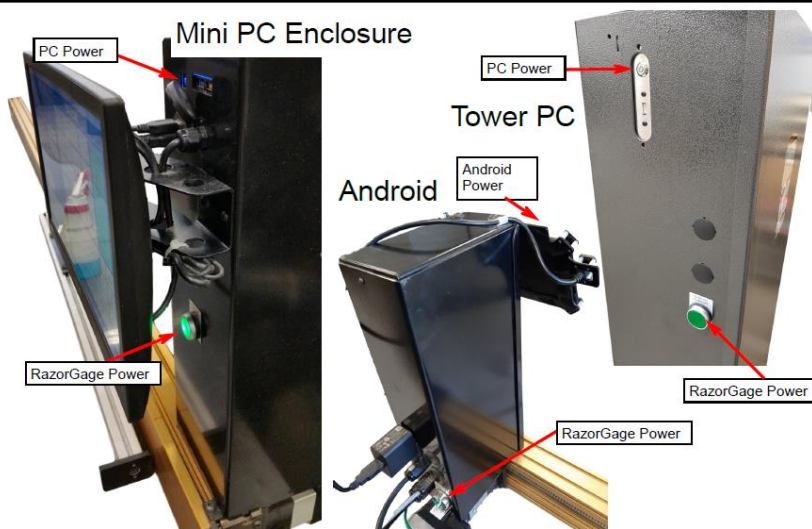
## Adjust Stop Extension

To adjust the stop extension, loosen the mounting screws on the stop extension and slide it away from the saw so that it won't hit your saw when you home the machine. With the power off, push the moving carriage toward the motor end of the RazorGage until the carriage hits the internal hard stop. Now extend the stop extension toward the saw blade until it is as close as you want it to be. If you're using the RazorGage as a pusher you will want the stop extension to reach almost all the way to the blade so that your final trim cut doesn't result in much waste. If you're using the RazorGage as a stop then adjust the stop extension so that the distance from the cut to the stop face is less than the shortest part you want to be able to cut. Tighten the stop extension screws.



## Power Up the RazorGage

It is very important to note that there are TWO things that must be turned on: The RazorGage AND the PC (or Android)





## Calibration Procedure

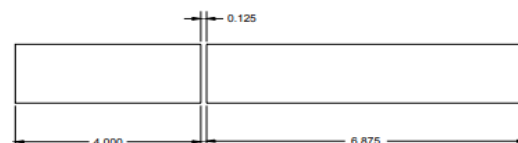
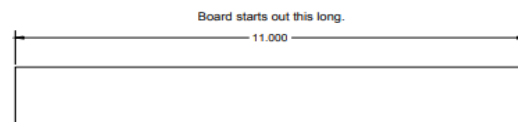
This section goes over how to set up the RazorGage ST. Although setup procedure is done prior to shipment of the machine, the parameters shown below are adjustable for calibrating and changes in application. Do not change any parameters if you are unsure how it will affect your system.

**NOTE: The MDrive is indexed and the scale factor is set at the factory. The RazorGage will need to be indexed and scaled if the MDrive is replaced or on long spliced extrusions. The scale factor may also need modified if the same length parts get incrementally smaller or larger than nominal length as the pusher advances. The home offset will need to be setup to reference the RazorGage to the interfaced saw or other equipment. It may also need adjusted if different length parts, small or large, are off of nominal length by the same amount.**

1. Turn on control power to the RazorGage tower and start the PC or tablet. The first time the software boots up it will call for the RazorGage stroke length and serial number. Enter these values and press OK.
2. Next, it will prompt you to press OK to home to the RazorGage pusher. Once pressed, homing will begin. On initial setup or if the MDrive has been replaced, homing process will likely be interrupted with a message stating the motor will need to be indexed.
3. Index the MDrive. (See images at the end of this sections for addition information).
  - a. Press the NEXT button.
  - b. Locate stepper motor gearbox. Remove set screw access cap.
  - c. Press START PROCEDURE.
  - d. Push the RazorGage carriage to the hard stop. Press STEP 2.
  - e. Slowly move the carriage by hand away from the stop until the set screw in the gearbox can be seen. Loosen set screw with 4mm or 5/32" Allen wrench (not ball-end) then leave it in place. This holds the gearbox in position when the motor indexes. Press STEP 3.
  - f. Tighten the screw in the gearbox. Replace access hole plug. Press the OK button to close the completed program.
4. Home the RazorGage. Verify that the short backup move at the end of the homing sequence is more than 3/16" but less than 7/16". If not enter the SETUP SCREEN and press the RUN INDEX LOCATOR button. Repeat the index the MDrive instructions from step 3.
5. Check that the Stroke under the system parameters is correct. The stroke is the overall length of the RazorGage extrusion minus 24 inches.
6. Set the Home Offset. The home offset is the distance from then end of the pusher arm at zero position to the center line of the saw. The calibration screen will help to accurately set this value. As part of the procedure a short piece of material will be cut and measured using calipers.
  - a. Enter in the 5239 for the password followed by the ENTER button.
  - b. Press CALIBRATE. The calibration screen will open and STEP 1 tab will guide through setting of the home offset.
  - c. Enter in a TARGET POSITION. Use a material length that can be accurately measured with calipers.
  - d. Press MOVE TO TARGET button and the RazorGage will move to target position.
  - e. Cut the Part. Make sure there is no one near the saw. Start the saw if not running. Press the CYCLE SAW button to cut the part or manually cycle the saw.
  - f. Accurately measure the cut part. Enter this value into PART MEASUREMENT box.
  - g. Press the SAVE TO HOME OFFSET AND EXIT button if RazorGage scale factor has already been calibrated or CONTINUE TO NEXT STEP to calibrate the RazorGage scale factor.
7. Calibrate the RazorGage scale factor. (See images at the end of this section for more

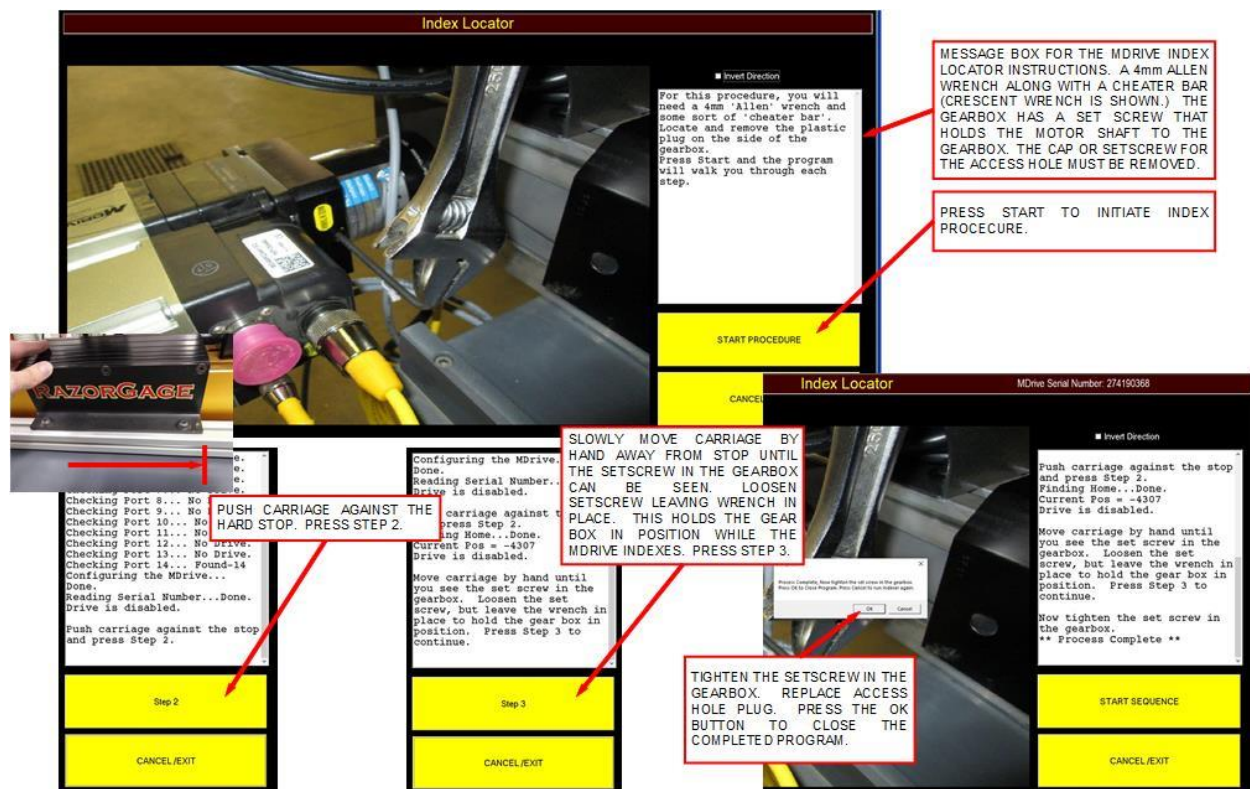
information). The scale factor is the number of stepper pulses per revolution. The calibration screen will assist in accurately setting this value. As part of this step a long part will be cut and measured.

- a. (If just completing the home offset go to step **6c**). Press SETUP SCREEN button to open screen. Enter password of 5239 and press ENTER button.
  - b. Press CALIBRATE. The calibration screen will open, the STEP 1 tab is for setting the home offset. STEP 2 guides the user through setting scale factor. Press USE THE CURRENT HOME OFFSET or CONTINUE NEXT STEP to get to STEP 2.
  - c. Enter in the 5239 for the password follow by the ENTER/OK button.
  - d. Enter in a TARGET POSITION. Use the length just 1-2 inches shorter than the longest stock material. The longer the length the more accurate the scale factor will be.
  - e. Press MOVE TO TARGET button and the RazorGage will move to target position.
  - f. Cut the Part. Make sure there is no one near the saw. Start the saw if not running. Press the CYCLE SAW button to cut the part.
  - g. Use a tape measure as accurately as possible to measure the cut part. Enter this value into PART MEASUREMENT box.
  - h. Press the DONE button to save the new scale factor and exit calibration.
8. Go to the SETUP SCREEN and set the User Parameters. See descriptions below for more information on these parameters. To change the parameters first enter 90210 as a password followed by the ENTER button. This will unlock the user parameters.
- a. Speed – This is the velocity at which the RazorGage moves. The units are in/sec or mm/sec. Default value is 30 in/sec.
  - b. Accel. – This is the acceleration rate of the RazorGage during the move. The units are in/sec<sup>2</sup> or mm/sec<sup>2</sup>. Default value is 90 in/sec<sup>2</sup>.
  - c. Decel. – This is the deceleration rate of the RazorGage as movement comes to a stop. The units are in/sec<sup>2</sup> or mm/sec<sup>2</sup>. Default value is 90 in/sec<sup>2</sup>.
  - d. Run Current – This variable is the percentage of current (amperage) applied to the motor which determines the effective torque of the motor during the RazorGage movement. Default value is 100%.
  - e. Load Speed – The speed at which the RazorGage returns to the load position. Default is 30 in/sec.
  - f. First Move Speed – This is the RazorGage speed to the first cut position. The speed is purposely reduced when a printer is used so the stock material does not damage the printer as it is initially fed under the unit. Default is 10 in/sec.
  - g. Unload Dist. – The unload distance is used when the RazorGage is used as a programmable stop (Main, Auto Calc, Presets, & Work Order). The unload distance is the incremental distance from the current RazorGage position away from the saw the positioner will move when the UNLOAD button is pressed. This allows for extra space to remove the cut material. Default is 5 inches.
  - h. Load Offset – The load offset is used when the RazorGage is used as an automatic pusher (APS, Batch, & Autolist modes). This is the length added to the stock material value for additional room to freely load stock material on the RazorGage table. Default is 5 inches.
  - i. Saw Kerf – This value is the length of material the saw blade removes with each cut. The information below demonstrates how to set the saw kerf. Default saw kerf is 0.162 inches.
  - j. Clamp Offset – The distance from the saw blade or RazorGage zero position to the infeed clamp. Default is 2 inches.



Cut board in two and measure the two parts made from that board.  
 Subtract the lengths of the two parts from the length the board was to start with to get the KERF:  
 $11.000 - 4.000 - 6.875 = .125 = \text{KERF}$

9. Check upper and lower movement limits of the RazorGage by using the MOVE TO UPPER LIMIT and MOVE TO LOWER LIMIT to move to these position limits. If the RazorGage stall from running into the end stop, check that the stroke length was entered correctly. If the stroke is correct check the calibration and recalibrate if necessary.
10. Check the belt tension by pressing the RUN BREAK-IN button to start break-in routine. The RazorGage will move back and forth from the lower limit to the upper limit. Let the break-in routine run for several minutes. Use the CANCEL BUTTON to stop the operation. If the positioner stalls anytime during this test reduce speed to 30 in/sec. If the speed is already set to 30 then check tensioning of the drive belt.
11. If the RazorGage is equipped with a printer press the PRINT SETUP button. On the print setup screen check the CHECK HERE TO ENABLE PRINTING box. Select which printer is used paper label or ink jet. See below for information on printer settings. When settings are complete Press the SAVE button.



Indexing the Mdrive

Setup Screen			
<b>System Parameters</b> Stroke: 120.000 Scale: 3472.618 Home Offset: 0.000 <input type="checkbox"/> Metric • Home Left • Home Right ST Extrusion <input type="checkbox"/>	<b>User Parameters</b> Speed: 30.000 Accel: 90.000 Decel: 90.000 Run Current: 100% Load Speed: 30.000 First Move Speed: 10 Unload Dist: 5.000 Load Offset: 5.000 Saw Kerf: 0.162 Clamp Offset: 2.000	7 8 9 RETURN 4 5 6 Help 1 2 3 PC Software Manual . 0 Backspace ENTER	
Move to Lower Limit Home The Positioner Move to Upper Limit Run Laser Routine Run Break-In Printer Setup	Run Index Locator Calibrate Generate Event Log Password: XXXXXX Save Changes		

RazorGage Setup Screen

**Calibration Screen**

STEP 1

First thing to do is set the Home Offset. To do this, you will need to cut a short piece that you can measure with Calipers.

NOTE: If the Home Offset has already been set, press the "Use Current Home Offset" button to continue to the next step.

A) Enter a distance in the "Target Position" (For Example 6")

B) Press "Move to Target"

C) Cut the Part.

D) Measure the part and enter into the "Part Measurement" box.

Target Position: 5

Part Measurement: 5.063

Buttons: Save the Home Offset And Exit, Continue to Next Step (Calibrate the Scale Factor), Move to Low Limit (0), Move to High Limit (48), Cancel and Return To Main

**CALIBRATION SCREEN**

STEP 1: Setup Home Offset.

STEP 2: Calibrate Scale Factor.

**Calibration Screen**

STEP 2

Second, we will need to cut and measure a long part. Note: The longer the part, the more accurate the scale factor will be.

A) Enter a distance in the "Target Position" (For Example 48")

B) Press "Move to Target"

C) Cut the Part.

D) Measure the part and enter into the "Part Measurement" box.

E) Press Done to Save and Exit.

Target Position: 96

Part Measurement: 95.813

Buttons: Move to Low Limit (1), Move to High Limit (48), Cancel and Return To Main, Done

Razorgage Calibration Screen



**Printer Setup**

☒ Check Here to Enable Printing

**SAVE** **CANCEL**

**Select Printer Type**

NO PRINTER

PAPER LABEL PRINTER

**INK JET PRINTER**

**Ink Jet Printer**

Print Head Offset 12

Label Offset 0.5

Ink Jet Printer Port 0

**INK JET**

THE PRINT SETUP SCREEN IS ACCESS FROM MAIN SCREEN > SETUP SCREEN > PRINT SETUP SCREEN

ADDITIONAL SETTINGS FOR THE EVOLUTION INK JET PRINTER OR TEST PRINT BUTTON FOR THE PAPER LABEL PRINTER

EXITS THE PRINTER SETUP SCREEN DISCARDING ANY CHANGES.

SAVES CHANGES AND EXITS THE PRINTER SETUP SCREEN

CHECK THIS BOX TO ENABLE PRINTING.

SELECT PRINTER TYPE BEING USE EITHER PAPER LABEL PRINTER OR AN INK JET PRINTER.

SETTINGS FOR THE INK JET PRINTER.  
**PRINT HEAD OFFSET** - LOCATION OF THE PRINTER TO THE CENTERLINE OF SAW BLADE.  
**LABEL OFFSET** - THE OFFSET DISTANCE FROM THE END OF THE BOARD WHERE THE LABEL IS PRINTED.  
**INK JET PRINTER PORT** - THE SERIAL PORT NUMBER THAT THE PRINTER USES.

SETTINGS FOR THE PAPER LABEL PRINTER.  
**FONT SIZE** - SIZE OF THE FONT USED.  
**LEFT MARGIN SPACES** - SETS THE LEFT TO RIGHT LOCATION OF THE LABEL TEXT.  
**BLANK LINES FROM TOP** - SETS THE TOP TO BOTTOM LOCATION OF THE LABEL TEXT.

*RazorGage Printer Setup Screen*

## General Operation – PC & Tablet

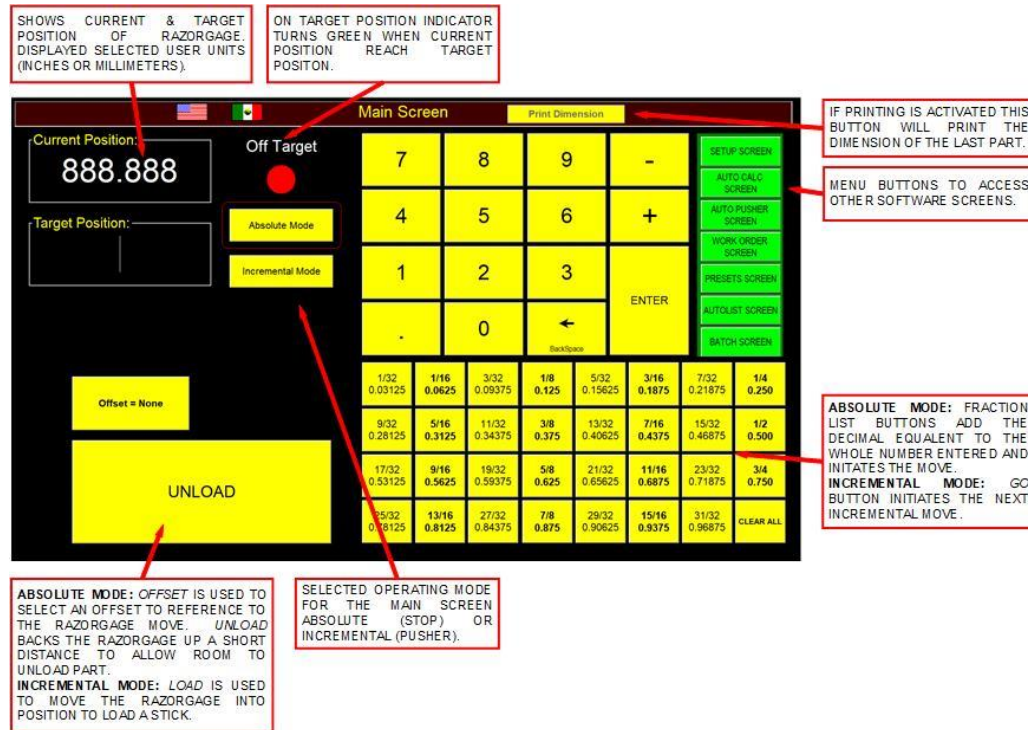
The RazorGage software offers 7 different operating screens. Of those 5 operating modes work when the RazorGage is setup as a stop and 4 operating screens work when the Razorgage is setup as a pusher. These different runtime modes offer the flexibility to set the RazorGage up to what suits the application best.

### Main Screen

The Main Screen is used to manually entering part lengths. The Main Screen can control the RazorGage as both a stop and a pusher. These two modes that change how the RazorGage is used are absolute mode and incremental mode.

When absolute mode is selected the RazorGage functions as a stop. A target position can be entered by punching in the number and decimal followed by the enter key. Alternatively when using fractions punching in the whole number followed by any of the fraction buttons will move the RazorGage to the selected position. The UNLOAD button will back the RazorGage up allowing room to remove completed part. Pressing this button a second time will return to the previously entered position.

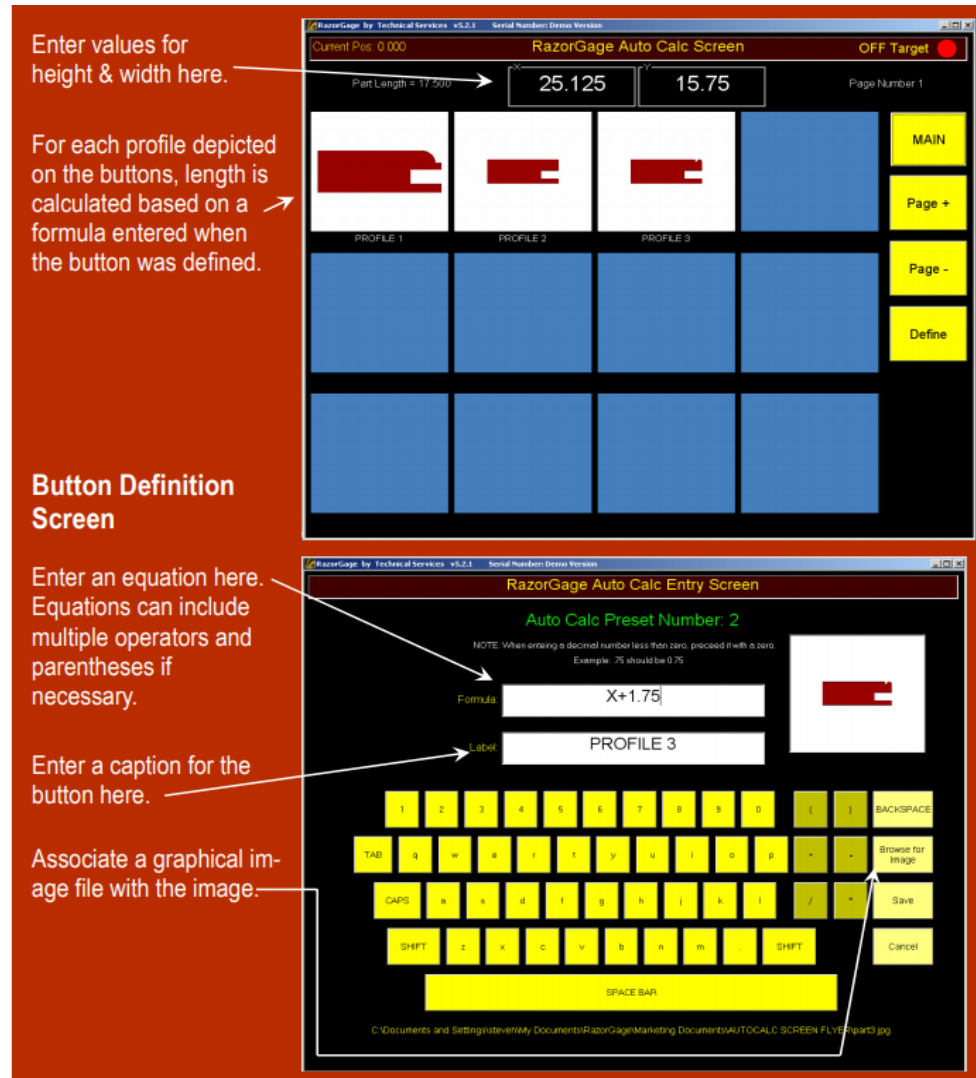
When incremental mode is selected the RazorGage functions as a pusher. The LOAD button is pressed. Then a stock length and trim cut value is entered followed by the GO button. The RazorGage will move to the position of the STOCK LENGTH + LOAD OFFSET (this offset is adjustable from the Setup Screen). A board of the selected length is loaded. Then an incremental value is entered. When the GO button is pressed, first the RazorGage will move to the trim cut position. After saw cut has been made. The GO button is pressed again and the RazorGage will increment forward by the previously entered increment value. The saw kerf is factored into each incremental move so the length of the processed parts will match the entered value. This process is repeated until no more cuts can be made on the board.



## Main Screen

## Auto Calc Screen

The Auto Calc Screen is useful when an application's parts sizes are calculated using a formula instead of derived from a cut list. With the Auto Calc Screen up to 3 variables can be used in a custom formula to determine a RazorGage position. This formula will be saved as a button with a label and image referenced to it. When the Auto Calc custom button is pressed the position is calculated using the current variable values for X, Y, and Z at the top of the screen and the equation associated with the button. The calculation returned is displayed as the part length and the RazorGage will move to that position. To create a new button, press the DEFINE button then select an unused button. The Auto Calc Entry Screen will open up. Enter in the equation which can include multiple operators and parentheses if necessary. Enter the caption label for the button. To use a graphical image for the button, press BROWSE FOR IMAGE and select an image file. Press Save to save changes to the selected button. Hundreds of these custom buttons can be created and used. When all the buttons on the one page are used up simply PAGE + to goto the next. The UNLOAD button is used to back the RazorGage up allowing room to remove completed part. Pressing this button, a second time will return to the previously calculated position.



Auto Calc Screen & Auto Calc Entry Screen

## Auto Pusher Screen

The Auto Pusher Screen is an operating mode where cut patterns can be defined to a bar of stock material of a desired length and saved as a CSV file. These saved files can then be opened as needed. To setup a bar file enter in the bar stock OAL, the Load Pos, and Lead Trim length in the Bar Settings. Then to add cuts to the bar locate the Add New Cuts settings to enter the quantity and length followed by the ENTER key. Repeat this until the bar is completely populated with desired cut lengths. The Status box will display the remaining length of the bar factoring in the lead trim, home offset, and current cuts. After the bar file has been setup, the part cuts making up the bar are displayed on the left side of the screen. When setup is complete the LOAD button is pressed and the RazorGage pusher will move to the load position. Once the stock material is loaded and the cycle initiated, the machine will continue to push the material and cut parts to the lengths on the active bar. It will continue until the all bar cuts are completed or the cycle is cancelled. The Auto Pusher Screen allows cutting of multiple bar stock pieces simultaneously using the Stacked setting. Whether one bar or multiple bars are selected, as parts are cut it will track this in the quantity of completed parts. Please note before running multiple bars of stock material make sure the saw has enough capacity and necessary saw adjustments (i.e. clamp pressures, clamp flows, saw cycle speed, etc.) have been made. Automatic ink

jet or label printing is an option with Auto Pusher. More information on Auto Pusher Screen is shown below.

**CURRENT BAR LAYOUT SHOWING THE TRIM CUT, ADDED CUT LENGTHS, AND HOME OFFSET.**

**IF LABEL PRINTING OPTION IS USED, PRESS THE SET LABELS BUTTON TO OPEN THE LABEL DESIGNER. SHOWN BELOW, IT HAS 4 FIELDS THAT CAN BE POPULATED. TO USE THE PART LENGTH IN A FIELD PRESS THE INSERT LENGTH BUTTON. PRESS DONE BUTTON TO SAVE CHANGES TO THE LABEL.**

**File Name:** C:\razorgage\lap\_1212.csv

**Home Offset (1.000")**

**Bar Options:**

- ☒ Auto Load
- ☒ Print Labels

**Delete Selected Cut**

**Status:**

Remaining: 0.203"  
Saw Kerf: 0.162"

**Part Counter**

Part	Length	Quantity
21.125"	2	2
18.375"	2	2
16.250"	3	3
10.625"	1	1
8.313"	2	2

**Bar Settings:**

OAL: 108  
Load Pos: 120  
Lead Trim: 0.25

**Add New Cut:**

Quantity: 1  
Length:

**LOAD**

**BAR SETTINGS**

**OAL** – ENTER THE OVERALL LENGTH OF THE BAR STOCK MATERIAL.

**LOAD POSITION** – ENTER THE RAZORGAGE POSITION FOR LOADING THE BAR ONTO THE TABLE. THE VALUE NEEDS TO BE GREATER THAN OR EQUAL TO THE OAL.

**LEAD TRIM** – THE LENGTH OF MATERIAL THAT IS CUT OFF THE LEADING END OF THE BAR BEFORE CUTTING PARTS.

**THE STATUS SHOW HOW MUCH BAR LENGTH REMAINS AFTER THE ADDED CUTS. IF THE USED BAR LENGTH IS GREATER THAN THE OAL OF THE BAR THIS NUMBER WILL BE A NEGATIVE AND AN ERROR MESSAGE POP UP. THE STATUS ALSO SHOWS THE SAW KERF LENGTH.**

**BAR OPTIONS**

**AUTO LOAD** – SELECT TO MAKE THE RAZORGAGE AUTOMATICALLY MOVE TO LOAD POSITION AFTER A BAR IS COMPLETED.

**PRINT LABELS** – ACTIVATES PRINTING. USE THE SET LABEL TO DESIGN LABEL FIELDS. SEE RAZORGAGE SETUP FOR PRINTER SETTINGS.

**DELETE SELECTED CUT** – TO DELETE A SELECTED CUT, CLICK ON THE CUT LENGTH FIELD OF DESIRED PART AND CLICK THIS BUTTON.

**EXITS AUTO PUSHER SCREEN TO THE MAIN SCREEN.**

**DISCARD CURRENT BAR AND START NEW BAR. ANY UNSAVED CHANGES WILL BE LOST.**

**OPEN A EXISTING BAR FROM THE SAVED CSV FILE.**

**SAVE THE CURRENT BAR CONFIGURATION AS A CSV FILE TO BE USED LATER.**

**ACCEPT NEW FIELD ENTRIES.**

**SELECT A BAR QUANTITY TO SIMULTANEOUSLY RUN. IF RUNNING STACKED BARS CHECK SAW ADJUSTMENT SETTINGS.**

**THE PART COUNTER TRACKS QUANTITIES OF THE ALL CUT PARTS LENGTHS MAKING UP THE BARS PROCESSED. ZERO BUTTON CLEARS THIS LIST.**

**TO ADD A NEW CUT TO THE ACTIVE BAR ENTER A QUANTITY AND A LENGTH FOLLOWED BY THE ENTER KEY. REPEAT UNTIL BAR IS POPULATED.**

**PRESS THE LOAD BUTTON TO RUN THE CURRENT BAR.**

Auto Pusher Setup Screen





Auto Pusher Runtime Screen

## Work Order Screen

Workorders can be downloaded to your PC RazorGage with the Workorder Screen. Press the OPEN WORKORDER button to find a file to open whether it is on the RazorGage PC or on a shared network drive. Once a file is open, the headings in that file will be displayed on the left-hand column of the screen and the values on the first line of the list will be placed next to their corresponding heading. If you have an existing file format you wish to use, just email it to RazorGage and we'll set up the Workorder Screen to accept it. If you wish to create a file in Microsoft Excel, you just create a cut list with Line #, Length, and Quantity as the first three columns, then populate up to seven more columns with whatever information you want. The headings will be displayed as shown below with the data for that column next to the heading.

With the Work Order Screen, the RazorGage can function as either a stop or a pusher. When Absolute Mode is selected the RazorGage functions as a stop. In Absolute Mode an offset can be referenced. Pressing the MOVE TO POSITION button will move the RazorGage to the position of current line of the workorder. As parts are cut the remaining part quantity on the line of the workorder will be tracked either automatically with the Tool Safe switch mode box checked or manually by pressing the PART WAS CUT button. When the quantity of the current line reaches zero the next line item of the workorder will be called. The UNLOAD button can be used after each cut to assist in unloading the part by backing the stop up a few inches (unload distance is adjustable in the settings).

When Incremental Mode is selected, the RazorGage will function as a pusher. Press the LOAD button to enter in the board or bar length and the trim cut length and press GO. The RazorGage will move to the entered Stock Length + Load Offset (adjustable on the Setting Screen). After the board is loaded, pressing the GO button will index the RazorGage to the first position of the current line in the workorder. The part is removed from the remaining quantity when the PART WAS CUT button is pressed. After a finished part has been remove, pressing the GO or MOVE TO NEXT POSITION button will increment the RazorGage to the next position in the workorder. With each incremental move of the saw kerf is factored in. When the quantity of the current line reaches zero then next line item of the workorder will be called. The LOAD button is pressed again when the board is used up and the next one needs to be loaded. The process is repeated until the workorder is completed. If the Tool Safe mode box is checked the processed part is automatically deducted from the quantity and the RazorGage automatically advances after the Tool Safe switch transitions from the off to on state.

**Work Order Screen**

Line #: 1  
Length: 7  
Remaining Qty: 8 of 8  
Thickness 1.5  
Desc Pine  
Layout 2  
Finish Paint

Current Position: 0.000  
Off Target

Buttons: OPEN WORKORDER, MAIN SCREEN, PREVIOUS LINE, NEXT LINE, CREATE NEW WORKORDER FILE, MOVE TO POSITION, PART WAS CUT

File Name: C:\RG Workorder\wo2.csv

Buttons: Absolute Mode, Incremental Mode, LOAD, GO

Saw Kerf: 0.162 Trim Cut: 0

**Callouts:**

- EXITS WORKORDER SCREEN BACK TO THE MAIN SCREEN.
- OPENS A SAVED WORKORDER CSV FILE.
- USE PREVIOUS & NEXT LINE BUTTONS TO SCROLL THROUGH ITEMS OF THE WORKORDER LIST.
- INITIATES THE RAZORGAGE MOVE TO THE NEXT POSITION IN THE WORKORDER.
- TRIGGERS THE PROGRAM THAT A PART WAS CUT AND REMOVES IT FROM THE WORKORDER.
- OPENS THE WORKORDER ENTRY SCREEN WHERE A WORKORDER FILE CAN BE CREATED.
- THE WORKORDER LIST DISPLAYS LENGTH AND REMAINING QUANTITY OF EACH LINE ITEM BY DEFAULT. ADDITIONALLY UP TO 7 OTHER USER PARAMETERS CAN BE DISPLAYED FOR EACH LINE ITEM OF THE WORKORDER.
- IN ABSOLUTE MODE THIS WILL BE AN UNLOAD BUTTON WHICH WILL BACK THE RAZORGAGE UP A SET DISTANCE FROM THE WORKORDER POSITION TO ALLOW ROOM TO REMOVE THE FINISHED PART.
- IN INCREMENTAL MODE THIS WILL BE LOAD AND GO BUTTONS. LOAD MOVES THE RAZORGAGE TO THE PROGRAMMED POSITION FOR LOADING THE BOARD OR BAR. GO STARTS INDEXING THE RAZORGAGE TO PROCESS THE PARTS IN THE WORKORDER.

**Mode Descriptions:**

ABSOLUTE MODE RUNS THE RAZORGAGE AS A PROGRAMMABLE STOP. WHEN THIS MODE IS USED AN OFFSET WILL NEED TO BE SELECTED.

INCREMENTAL MODE RUNS THE RAZORGAGE AS A PUSHER.

Work Order Screen

**Work Order Entry Screen**

LENGTH: 20.313,16  
16.875,12  
32.250,20

QUANTITY: 7, 8, 9, 4, 5, 6, 1, 2, 3, ., 0, Backspace

Buttons: Return to Work Order Screen, Save List, Clear List, Delete Selected Item from List, Add Position & Quantity to List

**Callouts:**

- ENTER THE PART LENGTH FOR NEXT LINE OF WORKORDER.
- ENTER QUANTITY OF PARTS FOR NEXT LINE OF WORKORDER.
- RETURNS TO WORKORDER SCREEN WITH OPTION TO SAVE OR DISCARD WORKORDER.
- SAVES THE CURRENT WORKORDER LIST TO A CSV FILE.
- CLEAR THE CURRENT WORKORDER LIST.
- DELETES THE HIGHLIGHTED LINE FROM THE WORKORDER LIST.
- ADDS THE ENTERED LENGTH AND QUANTITY AS AN ITEM TO THE WORKORDER LIST.
- WORKORDER LIST DISPLAYS LENGTH AND QUANTITY OF EACH LINE ITEM CREATED.
- NUMERIC KEYPAD FOR ENTERING LENGTH AND QUANTITY VALUE FOR CREATING A WORKORDER LIST.

Work Order Entry Screen



## Presets Screen

The Presets Screen is for an application where the RazorGage is used as a stop and part lengths are selected by individual buttons. With the Presets Screen customizable buttons can store various part lengths referenced by a label. There can be 56 buttons on each of 4 pages that can be setup. Once a button is setup simply press the customized button and the RazorGage will move to that position. Since the Presets Screen uses the RazorGage as a stop an offset can be referenced if needed. After the machine tool the RazorGage is interfaced with has cycled, the Unload button is used to back the stop up a specified distance (adjustable in the Setup Screen). This allows room to remove the completed part. A preset button can be setup by pressing the SET A PRESET button and selecting a button to modify. A window will popup where a label and a position value can be entered. Press the OK button to finish the setup.

The screenshot shows the Presets Screen interface. At the top, it displays 'Current Pos: 0.000', flags for US and Mexico, 'Page 1', 'Print Dimension', and 'OFF Target'. The main area is a grid of 56 yellow buttons arranged in 8 rows and 7 columns. The first two columns contain labels: 'Part#1 (35.875)' and 'BOARD 48 (47.625)' in the first row, and 'Part#20 (12.625)' in the third row. The remaining columns contain the number '0'. To the right of the grid are four green buttons labeled 'Main Screen', 'Page 1', 'Page 2', and 'Page 3'. Below these are three more green buttons: 'Offset =NONE', 'Set a Preset', and 'Unload'. Red callout boxes with arrows point to these buttons and the grid, providing the following explanations:

- RETURN TO THE MAIN SCREEN.** (Points to 'Main Screen' button)
- THE PRESET SCREEN IS CAPABLE OF SCORING 4 PAGES OF PRESETS. THE PAGE 1-4 BUTTONS SWITCH BETWEEN THE 4 PAGES OF SAVE PRESET VALUES.** (Points to 'Page 1', 'Page 2', 'Page 3', and 'Page 4' buttons)
- THERE ARE 56 PRESET BUTTONS ON EACH PAGE. THE PRESET BUTTONS WILL MOVE THE RAZORGAGE STOP TO THE DIMENSION STORED IN THAT PRESET.** (Points to the grid of preset buttons)
- IF AN OFFSET IS USED THIS BUTTON OPENS THE LIST OF SAVED OFFSETS TO SELECT FROM.** (Points to 'Offset =NONE' button)
- THIS BUTTON OPENS THE EDIT SCREEN WHERE ANY PRESET BUTTON CAN BE SELECTED MODIFIED WITH A NEW NAME AND PRESET VALUE.** (Points to 'Set a Preset' button)
- THE UNLOAD BUTTON WHEN PRESS WILL BACK THE RAZORGAGE UP A SPECIFIED DISTANCE ALLOWING ROOM TO REMOVE THE COMPLETED PART.** (Points to 'Unload' button)

## Presets Screen

The screenshot shows the Presets Setup Screen interface. It features the same top bar and grid of buttons as the previous screen. An 'Entry Screen' dialog box is open in the foreground, prompting the user to 'Please enter a label for the button (up to 16 chars)' and 'Please enter the actual Position for the button'. The dialog box includes a numeric keypad with buttons for digits 0-9, a decimal point, and 'ENTER/OK' and 'CANCEL' buttons. Two callout boxes with arrows point to the input fields in the dialog box:

- ENTER THE LABEL FOR THE SELECTED PRESET.** (Points to the label input field)
- ENTER THE ACTUAL POSITION VALUE FOR THE SELECTED PRESET.** (Points to the position input field)

## Presets Setup Screen

## Batch Parts Screen

The Batch Parts Screen is designed for applications that demand cutting a large quantity of the same length parts. With batch mode an user can setup parts of varying part numbers, lengths, and/or material type. The created parts are saved as a text file (default path C:\Batch Parts\[part#].txt). After the part files have been created, they are added to a parts list to be selected from. Stock material overall length is entered along with a desired quantity. The RazorGage will be moved to the load position. Once the stock material is loaded and cycle is initiated the machine will continue to push the material and cut parts to the same length. This will continue stopping only when the next stock material needs loaded, desired part quantity was reached, or the cycle is cancelled. The Batch Parts Screen will allow cutting of multiple, stacked bar stock pieces at once. As it cuts it will track this in the quantity of completed parts. Before running stacked bars make sure the saw has enough capacity and any necessary saw adjustments (i.e. clamp strokes, clamp pressures, clamp flows, saw cycle speed, etc.) have been made. More information on Batch Parts Screen is shown below.

Since the Batch Screen is used for push feeding, a load position must be determined based on stock length. When a new piece of stock is to be introduced to the machine its length is indicated and the software instructs the RazorGage pusher to move out to a position suitable for the part to be loaded. Typically the value of this position must be greater than the stock length to ease the loading of the stock. To accommodate this condition the software adds the LOAD parameter to the stock length when calculating the load position. For example if the stock length is 10 feet and the LOAD parameter is set to 12 inches then the RazorGage will calculate the load position by adding 12 inches to the stock length for a position of 11 feet. To set the LOAD parameter follow the instructions below.

**STEP 1:** From the Main Screen press the SETUP SCREEN button.

**STEP 2:** In the SETUP SCREEN enter the password then tap in the yellow box labeled LOAD and enter a value.

The image shows two screenshots of the RazorGage software interface. The top screenshot is the 'Main Screen' with a numeric keypad and various function buttons. A red box highlights the 'SETUP SCREEN' button. The bottom screenshot is the 'Setup Screen' with a numeric keypad and various function buttons. A red box highlights the 'LOAD' button, which is labeled 'Load: 10.000'. Another red box highlights the 'Saw Kerf: 0.125' field.

RazorGage Setup Screen

To add a part/material configuration click CREATE NEW PART.

Once you have entered your part lengths and material types they will appear in the white box at the left of the Batch Parts Screen. Choose a part to bring up that part's information as shown below.

Enter the leading edge trim cut length here. This is a global variable that will stay constant regardless of which part you choose. It may be changed at any time by pressing the CHANGE button.

Press the + or - button to change the number of stock pieces you are going to push. This will enable the software to keep a count of how many finished pieces you've cut.

Enter the desired quantity for the current run here by pressing the CHANGE button.

Press the USE A NEW STOCK LENGTH to tell the RazorGage how long of a piece you will be introducing to the machine.

Press the USE LAST STOCK LENGTH to tell the machine that you will be feeding the same size stock that you had previously entered.

Enter a name for the part / material configuration, the length of the parts you want to cut, and the material designation that will tell the operator what kind of stock to use. Then press Save.

## Batch Parts Setup Screen

### THE CONTROL BUTTONS FOR RUNNING A BAR

**LOAD OUT** – THIS INDICATOR DISPLAYS WHEN THE RAZORGAGE IS MOVING TO LOAD POSITION.

**GO** – AFTER LOADING THE NUMBER OF BAR STOCK PIECES INDICATED IN THE UPPER LEFT CORNER, PRESS THIS BUTTON TO START THE MACHINE CYCLE PROCESSING THE BAR WITH THE CUTS IN THE FILE.

**CANCEL RUN** – THIS BUTTON WILL ABORT THE CYCLE EXITING TO THE SETUP SCREEN.

THE BAR STOCK DIAGRAM SHOW THE PARTS THAT WILL BE CUT OUT OF THE BAR STOCK. THE RED LINE ON LEFT IS THE LEADING TRIM AND ON THE RIGHT IS THE HOME OFFSET OR END TRIM. THE GAPS BETWEEN THE PARTS SHOW THE SAW KERF. THE STATUS OF THE CYCLE IS DISPLAYED BY YELLOW AND RED DOTS. THE YELLOW INDICATES THE POSITION OF THE RAZORGAGE PUSHER AND THE RED DOTS SHOW THE COMPLETED CUTS.

## Batch Parts Runtime Screen

## Autolist Screen

Autolist Screen is useful when an operation is using design software to determine a list of part sizes used in making their products. After running this design software parts file through the Parts List Processor, the RazorGage parts list file created can be utilized by the Autolist software. Autolist takes this parts list file and sorts it by first material, then width, then thickness, and lastly by length longest to shortest. This is the default sorting arrangement for the part groups but can be easily modified to better fit an application. After a parts list file is open in Autolist, a sorted group of parts, or cutlist, is selected. Stock material length is entered and load out is requested. The run screen comes up and the RazorGage moves to the load position. The bar(s) of stock material are loaded on the table in front of the pusher. Based on the length of the stock material and the cutlist, Autolist will optimize cuts using the entire list of remaining parts in the cutlist to efficiently populate the stock material cuts to maximize yield and minimize the amount of scrap produced. Once stock material is loaded and cycle is initiated the machine will start pushing the stock material into position and cut parts from the cutlist. As parts are cut the software keeps track of the quantity left. When all quantities of a part size are completed it is crossed out. The RazorGage will continue feeding and cutting parts until the next piece of stock material needs loaded, the cutlist is completed, or the cycle is cancelled. Below describes the printer setup, parts list file, and runtime screens for Autolist.

*Autolist does require a software license in order to use. Contact your local distributor or RazorGage about obtaining a license.*

**Autolist Label Setup**

NOTE: The type of printer can be selected by going into the Main > Setup Screen.

☒ Check Here to Enable Printing

**SAVE** **CANCEL**

**Printed Fields:**

	FIELD 1	FIELD 2	FIELD 3
LINE 1	ROOM NUM	THICKNESS	MATERIAL
LINE 2	CABINET NUM	WIDTH	LENGTH

**VIRTUAL LABEL FONT SIZE** 10

☒ Print Dimensions (Length, Width, Thickness) as fractions

**Callout Boxes:**

- CANCEL:** CANCELS ANY CHANGES AND RETURNS TO THE AUTOUST CONFIG SCREEN.
- SAVE:** SAVES CHANGES TO THE LABEL SETUP AND RETURNS TO THE AUTOUST CONFIG SCREEN.
- Check Here to Enable Printing:** CHECK TO ENABLE PRINTING. GOTO MAIN>SETUP SCREEN>PRINTER SETUP TO SELECT TYPE OF PRINTER USED.
- Printed Fields:** USE THE DROP-DOWN LISTS TO POPULATE THE AS MANY OF THE PRINT FIELDS AS NEEDED. ALL FIELDS OF THE AUTOUST CUTLIST ALONG WITH THE DATE&TIME ARE AVAILABLE FOR PRINT FIELDS.
- VIRTUAL LABEL FONT SIZE:** SELECT THE FONT SIZE FOR THE LABEL.
- Print Dimensions:** CHECK TO PRINT ANY DIMENSIONS USED IN LABEL AS A FRACTION INSTEAD OF A DECIMAL.

*Autolist Label Setup Screen*



QTY +/- BUTTONS ARE USED TO CHANGE THE QUANTITY OF A SELECTED GROUP IN THE CUTLIST GROUP.

EDIT QTY BUTTON IS USED TO CHANGE QUANTITIES OF ALL THE PARTS IN THE CUTLIST GROUP.

THE OFFSET BUTTON BRINGS UP THE LIST PREVIOUSLY SETUP OFFSET TO SELECT FROM.

THE TWO LOAD BUTTONS SETS THE BAR LENGTH AND RUNS THE CURRENT CUTLIST GROUP. LEFT BUTTON SETS A NEW BAR LENGTH AND THE RIGHT BUTTON USES PREVIOUS BAR LENGTH SHOWN ON BUTTON.

OPEN/CLOSE FILE IS USED TO OPEN OR CLOSE A AUTOLIST CUTLIST FILE.

TO SELECT THE CUTLIST GROUP USE THE NEXT OR PREV GROUP BUTTON TO CYCLE THROUGH ALL THE PART GROUPINGS OR THE GROUPING LIST TO VIEW ALL THE PART GROUPING AT ONCE TO SELECT THE CUTLIST GROUP.

OPENS THE EMBEDDED PARTS LIST PROCESSOR APPLICATION TO MANUALLY CREATE A CUTLIST.

EXITS AUTO PUSHER SCREEN TO THE MAIN SCREEN.

OPEN THE SETTING SCREEN FOR AUTOLIST SOFTWARE.

SELECTS THE WAY THE RAZORGAGE IS USED PUSHER OR STOP. FOR A CYCLONE APS USE PUSHER MODE.

THE CURRENT CUTLIST GROUP STATUS IS SHOWN HERE. AS THE PARTS ARE CUT THE QUANTITIES ARE TRACKED AND WHEN PARTS ARE COMPLETED THEY ARE CROSSED OFF OF THE CUTLIST. AT THE TOP A TOTAL QUANTITY OF ALL PART IS LISTED ALONG WITH THE PART GROUPING NUMBER. USE THE PAGE UP AND DOWN KEYS TO SCROLL THROUGH CUTLIST.

PART	QUANTITY	WIDTH	MATERIAL	THICKNESS	LENGTH	ROOM NAME	ROOM NUM	CABINET NAME	CABINET NUM	MANUAL SCRIBE	UF_7	UF_9	ORIG_QTY
Top Rail	6	1.5	Solid Wood	0.8125	10.25	Room 1	1	Base 4 Drawer	5/22				1
Bottom Rail	6	1.5	Solid Wood	0.8125	10.25	Room 1	1	Base 4 Drawer	5/22				1
Left Side	6	1.5	Solid Wood	0.8125	10.25	Room 1	1	Top Cabinet (Stove)	6/11/1				1
Right Side	6	1.5	Solid Wood	0.8125	9.5	Room 1	1	Base 4 Drawer	5/22				1
Left Exp Side	6	1.5	Solid Wood	0.8125	7.875	Room 1	1	Top Cabinet (Stove)	6/11/1				1
Middle Rail	6	1.5	Solid Wood	0.8125	6.75	Room 1	1	Base 4 Drawer	5/11				1
Middle Side	6	1.5	Solid Wood	0.8125	6.75	Room 1	1	Base 4 Drawer	5/11				1
Middle Rail	6	1.5	Solid Wood	0.8125	6.75	Room 1	1	Base 4 Drawer	5/11				1
Left Side	6	1.5	Solid Wood	0.8125	6.625	Room 1	1	Top Cabinet (Stove)	6/11				1
Right Side	6	1.5	Solid Wood	0.8125	6.625	Room 1	1	Top Cabinet (Stove)	6/11				1
Middle Side	6	1.5	Solid Wood	0.8125	5.625	Room 1	1	Base 4 Drawer	5/11				1
Middle Side	6	1.5	Solid Wood	0.8125	5.5	Room 1	1	Top Cabinet (Stove)	6/11				1
Middle Side	6	1.5	Solid Wood	0.8125	5.5	Room 1	1	Top Cabinet (Stove)	6/11				1
Middle Rail	6	1.5	Solid Wood	0.8125	5.5	Room 1	1	Base 4 Drawer	5/11				1

Autolist Cutlist Setup Screen

PUSHER MODE - RUNNING A BAR

Running a Bar

LOAD OUT

CANCEL RUN

THE CONTROL BUTTONS FOR RUNNING A BAR

LOAD OUT - THIS INDICATOR DISPLAYS WHEN THE RAZORGAGE IS MOVING TO LOAD POSITION.

GO - AFTER LOADING THE NUMBER OF BAR STOCK PIECES INDICATED IN THE UPPER LEFT CORNER, PRESS THIS BUTTON TO START THE MACHINE CYCLE PROCESSING THE BAR WITH THE CUTS IN THE FILE.

CANCEL RUN - THIS BUTTON WILL ABORT THE CYCLE EXITING TO THE SETUP SCREEN.

THE CURRENT CUTLIST GROUP STATUS IS SHOWN HERE. AS THE PARTS ARE CUT THE QUANTITIES ARE TRACKED AND WHEN PARTS ARE COMPLETED THEY ARE CROSSED OFF OF THE CUTLIST.

THE BAR STOCK DIAGRAM SHOW THE PARTS THAT WILL BE CUT OUT OF THE BAR STOCK. THE RED LINE ON LEFT IS THE LEADING TRIM AND ON THE RIGHT IS THE HOME OFFSET OR END TRIM. THE GAPS BETWEEN THE PARTS SHOW THE SAW KERF. THE STATUS OF THE CYCLE IS DISPLAYED BY YELLOW AND RED DOTS. THE YELLOW INDICATES THE POSITION OF THE RAZORGAGE PUSHER AND THE RED DOTS SHOW THE COMPLETED CUTS.

#	DONE	PART	WIDTH	MATERIAL	THICKNESS	LENGTH	ROOM NAME	ROOM NUM	CABINET NAME	CABINET NUM	MANUAL SCRIBE
1	NO	Middle Side	1.5	Solid Wood	0.8125	5.5	Room 1	1	Top Cabinet (Stove)	6/11	
2	NO	Middle Side	1.5	Solid Wood	0.8125	5.5	Room 1	1	Top Cabinet (Stove)	6/11	
3	NO	Middle Rail	1.5	Solid Wood	0.8125	5.5	Room 1	1	Base 4 Drawer	5/11	
4	NO	Middle Side	1.5	Solid Wood	0.8125	5.625	Room 1	1	Base 4 Drawer	5/11	
5	NO	Middle Side	1.5	Solid Wood	0.8125	5.625	Room 1	1	Base 4 Drawer	5/11	
6	NO	Right Side	1.5	Solid Wood	0.8125	5.625	Room 1	1	Top Cabinet (Stove)	6/11	
7	NO	Left Side	1.5	Solid Wood	0.8125	6.625	Room 1	1	Top Cabinet (Stove)	6/11	
8	NO	Middle Rail	1.5	Solid Wood	0.8125	6.75	Room 1	1	Base 4 Drawer	5/11	
9	NO	Middle Rail	1.5	Solid Wood	0.8125	6.75	Room 1	1	Base 4 Drawer	5/11	
10	NO	Middle Rail	1.5	Solid Wood	0.8125	6.75	Room 1	1	Base 4 Drawer	5/11	
11	NO	Middle Rail	1.5	Solid Wood	0.8125	6.75	Room 1	1	Base 4 Drawer	5/11	
12	NO	Left Exp St	1.5	Solid Wood	0.8125	6.75	Room 1	1	Top Cabinet (Stove)	6/11/1	
13	NO	Right Side	1.5	Solid Wood	0.8125	9.5	Room 1	1	Base 4 Drawer	5/22	
14	NO	Left Side	1.5	Solid Wood	0.8125	9.5	Room 1	1	Base 4 Drawer	5/22	
15	NO	Top Rail	1.5	Solid Wood	0.8125	10.25	Room 1	1	Base 4 Drawer	5/22	
16	NO	Bottom Rail	1.5	Solid Wood	0.8125	10.25	Room 1	1	Top Cabinet (Stove)	6/11/1	
17	NO	Bottom Rail	1.5	Solid Wood	0.8125	10.25	Room 1	1	Top Cabinet (Stove)	6/11/1	
18	NO	Bottom Rail	1.5	Solid Wood	0.8125	10.25	Room 1	1	Base 4 Drawer	5/22	

Autolist Runtime Screen

## Setup – Android

Setup with the Android controlled RazorGage is much like the PC control version. The stop extension will be adjusted and then the controls will be powering up. When the RazorGage is homed for the first time the Mdrive will need to be indexed. Finally, the calibration will take place with the setting of the home offset or saw kerf and the scale factor.

### 1. Adjust the Stop Extension

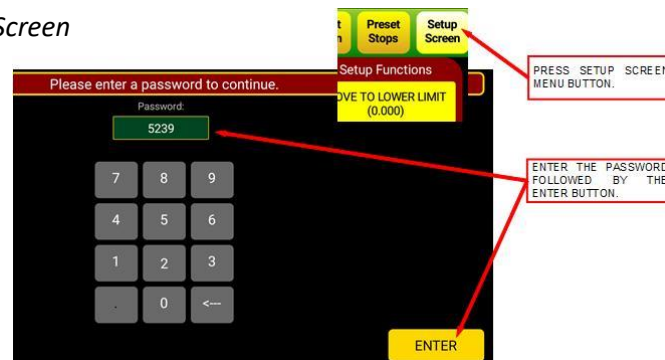


To adjust the stop extension, loosen the mounting screws on the stop extension and slide it away from the saw so that it won't hit your saw when you home the machine. With the power off, push the moving carriage toward the motor end of the RazorGage until the carriage hits the internal hard stop. Now extend the stop extension toward the saw blade until it is as close as you want it to be. If you're using the RazorGage as a pusher you will want the stop extension to reach almost all the way to the blade so that your final trim cut doesn't result in much waste. If you're using the RazorGage as a stop then adjust the stop extension so that the distance from the cut to the stop face is less than the shortest part you want to be able to cut. Tighten the stop extension screws.

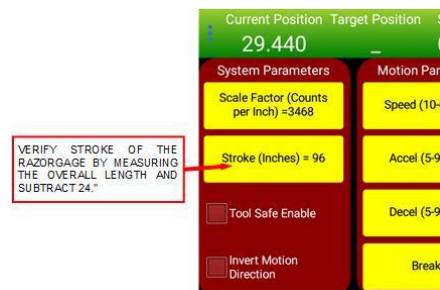
### 2. Cut a Short Piece of Material & Measure with Calipers.

From the Main Screen using the RazorGage as a stop cut a short piece of stock material and measure it with calipers. Take note of the intended length and the actual length of the part cut.

### 3. Open Setup Screen



### 4. Check the Stroke



## 5. Index the MDrive

**Current Position:** 29.440  
**Target Position:** 0.125  
**Saw Kerf:** 0.125

**System Parameters:**  
Scale Factor (Counts per Inch) = 3468  
Stroke (Inches) = 96  
Tool Safe Enable  
Invert Motion Direction

**Motion Parameters:**  
Speed (10-60) = 35  
Accel (5-90) = 90  
Decel (5-90) = 90  
Break-In

**Machine Parameters:**  
Saw Kerf = 0.125  
Home Offset = 0.000  
Unload = 5.000  
Holding Current % (30-100) = 45

**Setup Functions:**  
MOVE TO LOWER LIMIT (0.000)  
MOVE TO UPPER LIMIT (96.000)  
HOME THE RAZORGAGE  
MY PARTS ARE INCORRECT

**Step 1:** This wizard will step you through the process of positioning the Drive's Index marker. This procedure should be performed if the Drive has been removed or replaced.  
Buttons: Cancel, Just Home The RazorGage, Use this Wizard

**Step 2:** Drive has been disabled. Push carriage against the hardstop and press Step 2.  
Button: STEP 2

**Step 3:** Home Found. Move carriage by hand until you see the set screw in the gearbox. Loosen the set screw, but leave the wrench in place to hold the gear box in position. Press Step 3 when you are ready.  
Button: STEP 3

**Final Screen:** Process Complete. Now tighten the set screw in the gearbox.  
Button: EXIT

**Instructions:**  
SELECT HOME THE RAZORGAGE BUTTON TO BEGIN CALIBRATION OF THE SCALE FACTOR. NEXT PRESS THE USE THIS WIZARD BUTTON.  
FOLLOW THE ONSCREEN DIRECTIONS AND PUSH THE CARRIAGE AGAINST THE HARDSTOP. THEN PRESS THE STEP 2 BUTTON  
FOLLOW THE ONSCREEN DIRECTIONS TO LOOSEN THE SET SCREW ON THE GEAR BOX AND LEAVE THE WRENCH IN PLACE. PRESS STEP 3 BUTTON WHEN FINISHED  
TIGHTEN THE SET SCREW ON THE GEAR BOX AND PRESS THE EXIT BUTTON.



## 6. Set Home Offset or Saw Kerf

Current Position: 29.440 Target Position: 0.125 Saw Kerf: 0.125

System Parameters: Scale Factor (Counts per Inch) = 3468, Stroke (Inches) = 96, Tool Safe Enable, Invert Motion Direction.

Motion Parameters: Speed (10-60) = 35, Accel (5-90) = 90, Decel (5-90) = 90, Break-In.

Machine Parameters: Saw Kerf = 0.125, Home Offset = 0.000, Unload = 5.000, Holding Current % (30-100) = 45.

Setup Functions: MOVE TO LOWER LIMIT (0.000), MOVE TO UPPER LIMIT (96.000), HOME THE RAZORGAGE, MY PARTS ARE INCORRECT.

Select which mode you are using. Note: by selecting 'Stop' we will be adjusting the Home Offset. By selecting 'Pusher' we will be adjusting the Saw Kerf.

I am using the RazorGage as a Stop

I am using the RazorGage as a Pusher

SELECT MY PARTS ARE INCORRECT BUTTON TO BEGIN SETTING HOME OFFSET. DETERMINE HOW THE RAZORGAGE WILL BE USED AND SELECT THE APPROPRIATE OPTION STOP OR PUSHER.

If Short & Long part lengths are all off by the same amount, use this Wizard. Otherwise use the Factory Calibration.

SELECT USE THIS WIZARD TO CONTINUE SETTING UP THE HOME OFFSET.

Select if your parts are Long or Short.

My parts are shorter than they are supposed to be.

My parts are longer than they are supposed to be.

FROM THE SHORT PART CUT AND MEASURED IN STEP 2 DETERMINE IF THE PART WAS LONGER OR SHORTER THAN IT SUPPOSED TO BE THEN SELECT THE APPROPRIATE OPTION.

Enter the distance they are short by.

Enter a distance:

7 8 9

4 5 6

1 2 3

0 <-

CANCEL SAVE

ENTER IN THE DISTANCE THE CUT PART WAS EITHER LONG OR SHORT BY. THEN PRESS THE SAVE BUTTON.

## 7. Calibrate Scale Factor

Current Position: 29.440 Target Position: 0.125 Saw Kerf: 0.125

System Parameters: Scale Factor (Counts per Inch) = 3468, Stroke (Inches) = 96, Tool Safe Enable, Invert Motion Direction.

Motion Parameters: Speed (10-60) = 35, Accel (5-90) = 90, Decel (5-90) = 90, Break-In.

Machine Parameters: Saw Kerf = 0.125, Home Offset = 0.000, Unload = 5.000, Holding Current % (30-100) = 45.

Setup Functions: MOVE TO LOWER LIMIT (0.000), MOVE TO UPPER LIMIT (96.000), HOME THE RAZORGAGE, MY PARTS ARE INCORRECT.

If Short & Long part lengths are all off by the same amount, use this Wizard. Otherwise use the Factory Calibration.

SELECT MY PARTS ARE INCORRECT BUTTON TO BEGIN CALIBRATION OF THE SCALE FACTOR. NEXT PRESS THE FACTORY CALIBRATION BUTTON.

FACTORY CALIBRATION

This process must be carried out correctly in order to avoid serious inaccuracy issues. Go back to the main screen and, using the RazorGage as a STOP, cut the shortest part possible and the longest part possible. Use a calipers to measure the short part and a tape measure to measure the longest part. Enter the intended and actual lengths on the next page.

FOLLOW THE DIRECTIONS AT THE TOP OF THIS SCREEN TO CUT AND MEASURE A SHORT AND LONG PART. WHEN TASK IS COMPLETED PRESS THE NEXT BUTTON

Enter the intended and actual lengths below.

Short Part Intended Length Short Part Actual Length Long Part Intended Length Long Part Actual Length

MAIN NEXT

7 8 9

4 5 6

1 2 3

0 <-

CANCEL SAVE

ENTER IN THE INTENDED AND ACTUAL LENGTH FOR BOTH THE SHORT AND LONG PART PREVIOUSLY CUT. THEN PRESS THE SAVE BUTTON.



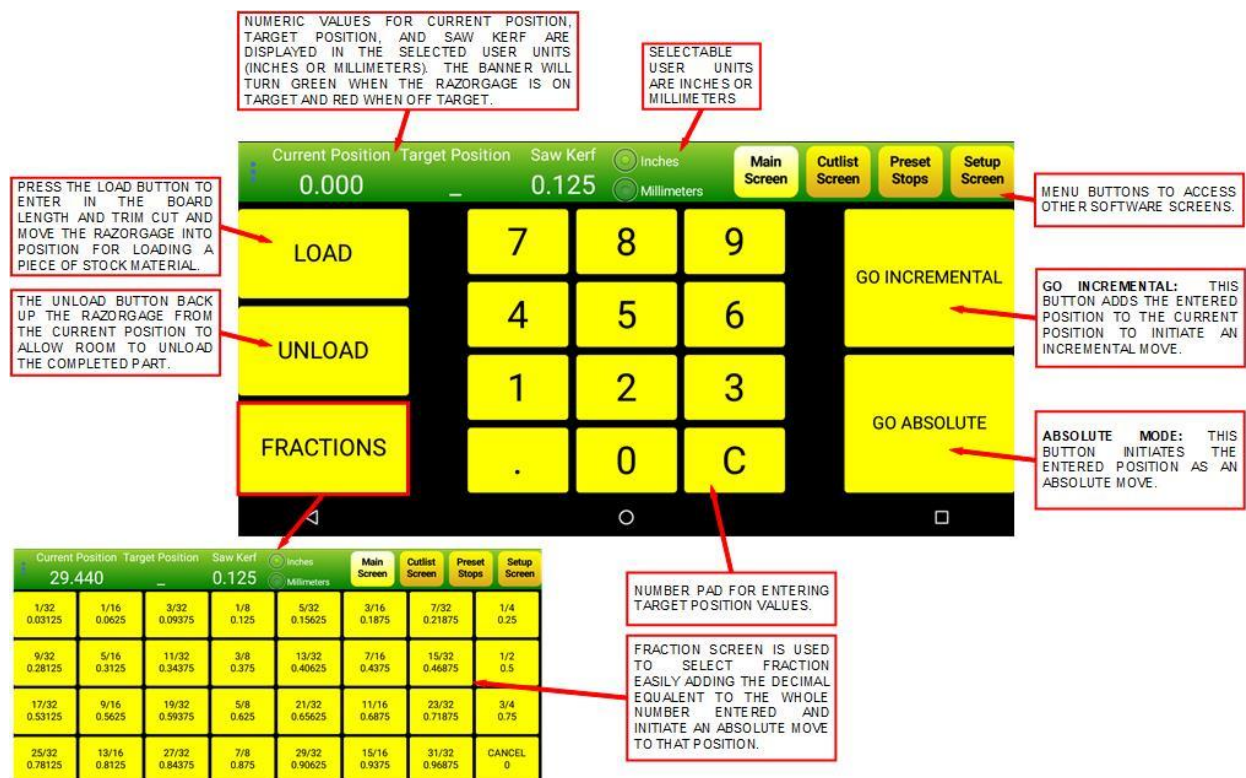
## General Operation – Android

### Main Screen – Android

The Main Screen is used for manually entered part lengths. The Main Screen can control the RazorGage as both a stop and a pusher. The two modes that change how the RazorGage is used with the Main Screen are absolute mode and incremental mode.

In absolute mode, a target position can be entered by punching in the number and decimal followed by the enter key. Alternatively when using fractions punching in the whole number followed by pressing the FRACTIONS button followed by the desired fraction will move the RazorGage to the selected position. The UNLOAD button will back the RazorGage up allowing room to remove completed part. Pressing this button a second time will return to the previously entered position.

When incremental mode is selected the RazorGage functions as a pusher. The LOAD button is pressed. Then a stock length and trim cut value is entered followed by the GO button. The RazorGage will move to the position of the STOCK LENGTH + LOAD OFFSET (this offset is adjustable from the Setup Screen). A board of the selected length is loaded. Then an incremental value is entered. When the GO button is pressed, first the RazorGage will move to the trim cut position. After saw cut has been made. The GO button is pressed again and the RazorGage will increment forward by the previously entered increment value. The saw kerf is factored into each incremental move. This process is repeated until no more cuts can be made on the board.



## Cutlist Screen – Android

Cutlists can be created or downloaded to your Android tablet with the Cutlist Screen. Press the OPEN FILE button to find the cutlist CSV file you wish to open. Cutlist files from a network drive or cloud storage will need to be save to the download folder on the tablet to be used. Once you selected a file to open the cutlist will be displayed on the screen. The cutlist file can be edited by selecting a line item and pressing EDIT LIST. Editing options of adding a line, deleting a line, or editing a line are available. A cutlist file can be created in the RazorGage software by selecting CREATE NEW FILE. Quantity can be edited individually through the edit menu or all together by selecting SET ALL REM. QTY which will allow you to change all quantities at once. Select a line item by touching it and highlighting it yellow. When a line is selected the RazorGage will move into position for that part length. As a part is cut pressing the PART CUT (-1) button will track the complete part by removing one from the quantity of the selected cutlist item. When the current line item quantity reaches zero the next item in the list will be automatically selected and the RazorGage will move to that position. The cutlist doesn't need to be completed in order and at any time a different line item can be selected to work from.

**NUMERIC VALUES FOR CURRENT POSITION, TARGET POSITION, AND SAW KERF ARE DISPLAYED IN THE SELECTED USER UNITS (INCHES OR MILLIMETERS). THE BANNER WILL TURN GREEN WHEN THE RAZORGAGE IS ON TARGET AND RED WHEN OFF TARGET.**

**SELECTABLE USER UNITS ARE INCHES OR MILLIMETERS**

**THIS BUTTON WILL ALLOW THE USER TO CHANGE THE VALUE OF ALL THE REMAINING QUANTITIES IN THE CUTLIST BY A MULTIPLIER OF THE ORIGINAL QUANTITY**

**YOU MAY APPLY A MULTIPLIER TO THE ORIGINAL QUANTITY.**

**MENU BUTTONS TO ACCESS OTHER SOFTWARE SCREENS.**

**USE TO OPEN A SAVE CUTLIST CSV FILE.**

**CREATE NEW FILE**

**OPEN FILE**

**SET ALL REM. QTY.**

**EDIT LIST**

**TOTAL REM. QTY.: 24**

**PART CUT (-1)**

**USE THIS BUTTON CREATE A NEW CUTLIST FILE. WHEN PRESSED THE EDIT SCREEN SHOWN BELOW WILL OPEN AND LENGTH, QUANTITY, NAME, AND DESCRIPTION CAN BE ENTER FOR EACH LINE ITEM.**

**THIS DISPLAY SHOW THE CUTLIST FILE INFORMATION. BY DEFAULT IT CONTAINS AN INDEX #, LENGTH, QUANTITY, MATERIAL TYPE, AND DESCRIPTION.**

Index #	Length	Orig. Qty.	Rem. Qty.	Material	Description
1	24.44	4	4	2x6T	TREATED BOTTOM PLATE
2	29.44	3	3	2x6	V-TOP PLATE
3	18	2	2	2x6	V-TOP PLATE
4	30	4	4	2x6T	TREATED BOTTOM PLATE
5	24	3	0	2x6	V-TOP PLATE
6	12	2	2	2x6T	TREATED BOTTOM PLATE
7	13	4	1	2x6T	TREATED BOTTOM PLATE

Current Position: 18.000  
Target Position: —  
Inches  
Millimeters

FileName: /SampleCutlist.csv

**TO EDIT A CUTLIST PRESS THE EDIT LIST BUTTON. THIS WILL START EDIT MODE INDICATED BY A RED BACKGROUND. IN EDIT MODE LINES CAN BE ADDED, DELETED OR EDITED.**

**EDIT THE LINE ITEM AS NEEDED.**

Enter a Length	Enter a Quantity	Enter a Name	Enter a Description
18	2	2x6	V-TOP PLATE

**IN EDIT MODE**

**ADD A LINE**  
**DELETE A LINE**  
**EDIT LINE**  
**EXIT EDIT**

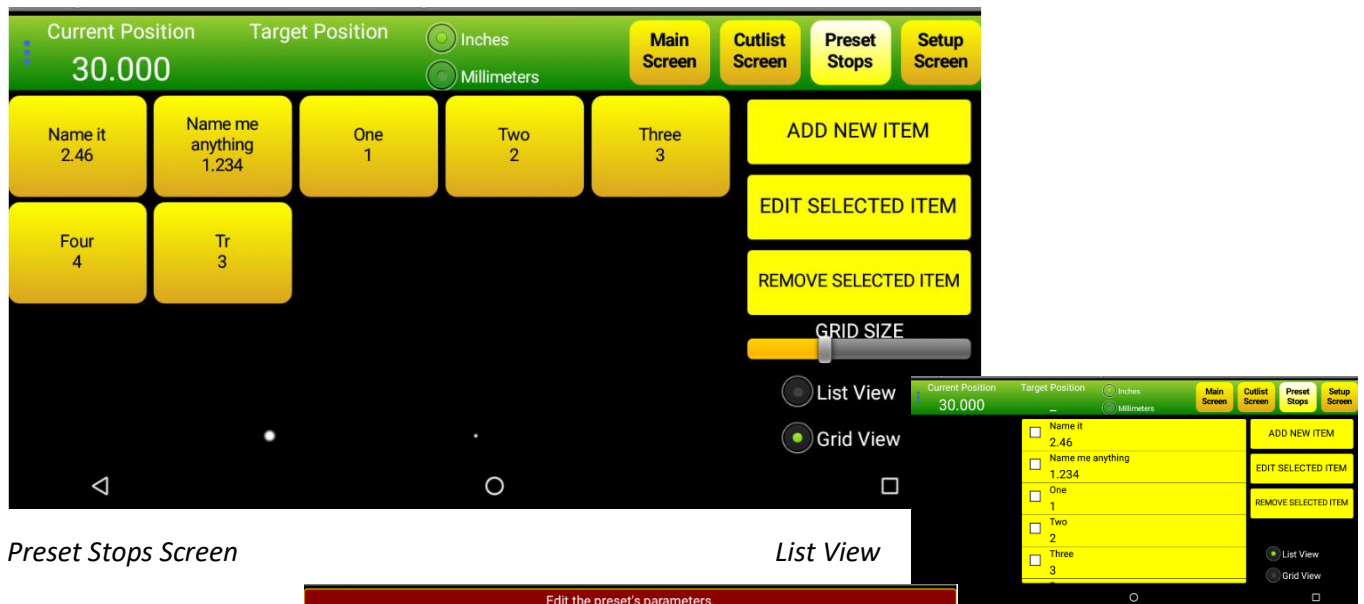
**PART CUT (-1)**

**CANCEL**  
**SAVE**

Cutlist Screen

## Presets Screen - Android

The Presets Screen is for an application where the RazorGage is used as a stop and part lengths are individually selected buttons. With the Presets Screen customizable buttons or list items can store various part lengths referenced by a label. A preset button can be setup by pressing the ADD NEW ITEM button. A window will popup where a length and label can be entered. When editing an existing button, the same Edit Presets Parameter window will open to make changes. Press the SAVE button to finish the setup. Once a button is setup simply press the customized button or list item and the RazorGage will move to that position.



*Preset Stops Screen*

*List View*

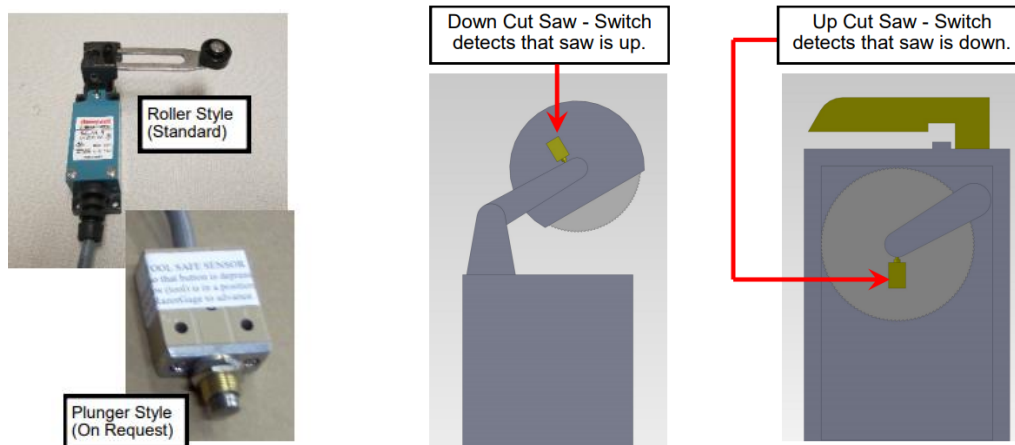
*Edit Preset Parameters Screen*

## Basic Machine Interface

The RazorGage has several interface options to make it operate with different types of machinery. The correct interface option allows the processing machine tool (i.e. saw, drill press, punch press, notcher, shear, router, etc) to work with the RazorGage safely to create accurate parts. The Basic Machine Interface options include Tool Safe, Tool Safe with Air Safety, Tool Safe & Machine Enable, Cyclone BMI, BMI+ AutoCycle, SUP, and CPO.

### Tool Safe – Limit Switch

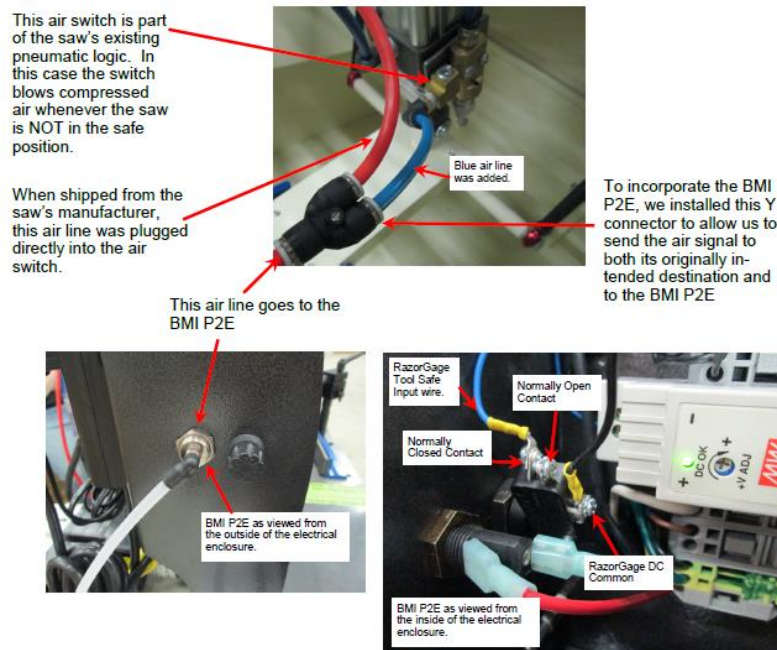
The Tool Safe option uses a limit switch on the process machine that when depressed indicates to the RazorGage software that the machine tool is in a safe position for movement of the positioner to occur. The switch is mounted on the process machine in a way that the switch turns on when the cycle is completed and the machine tool is retracted so it's clear for the RazorGage to move. Only when the tool safe switch is active(closed) can movement of the RazorGage occur. If the switch opens while the RazorGage is in motion the RazorGage comes to an abrupt stop and a motion error occurs. 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.





## Tool Safe – Pressure Switch

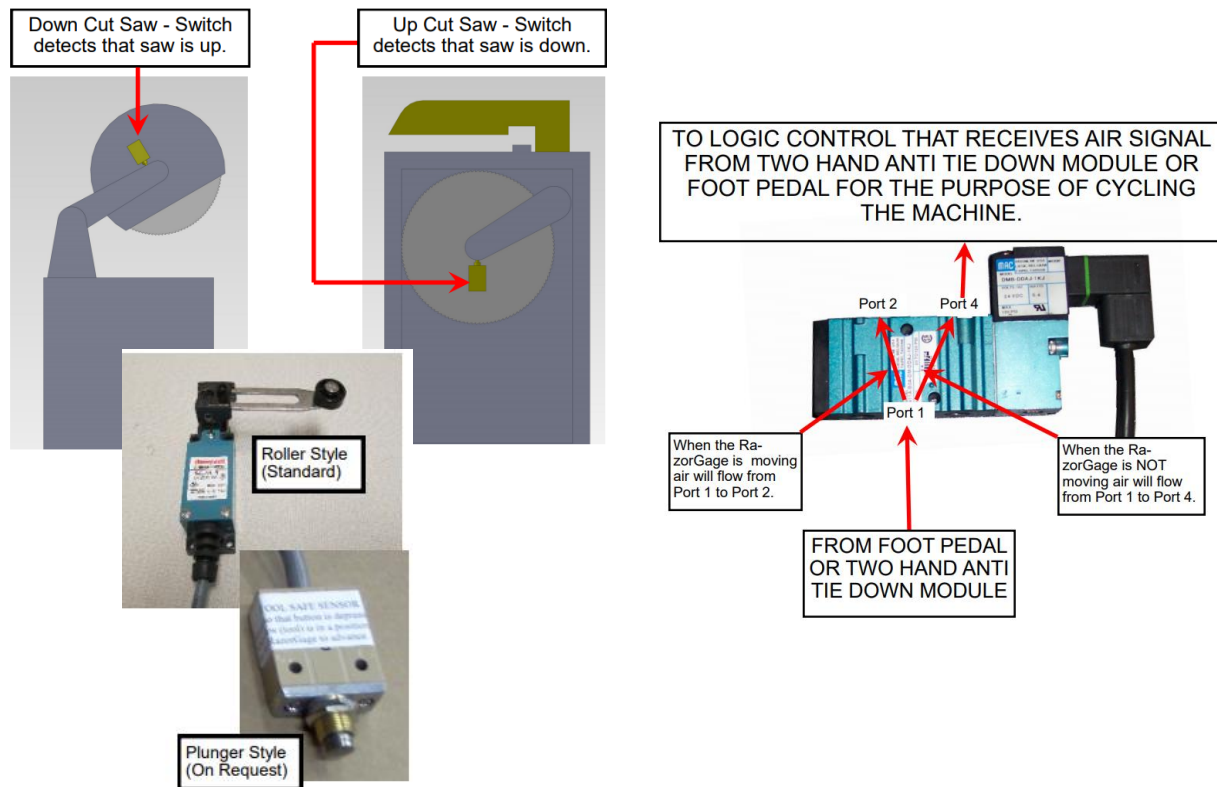
The Pressure Switch Tool Safe option uses a switch on the process machine to indicate to the RazorGage that the tool is in a safe position for movement to occur. This pressure switch is plumbed into the process machine's pneumatic circuit in a way that the pressure switch detects pressure when the cycle is completed and the machine tool is retracted so it's clear for the RazorGage to move. Only when the tool safe switch is active(closed) can movement of the RazorGage occur. If the switch opens while the RazorGage is in motion the RazorGage come to an abrupt stop and a motion error occurs. 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.



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.

## Tool Safe with Air Safety

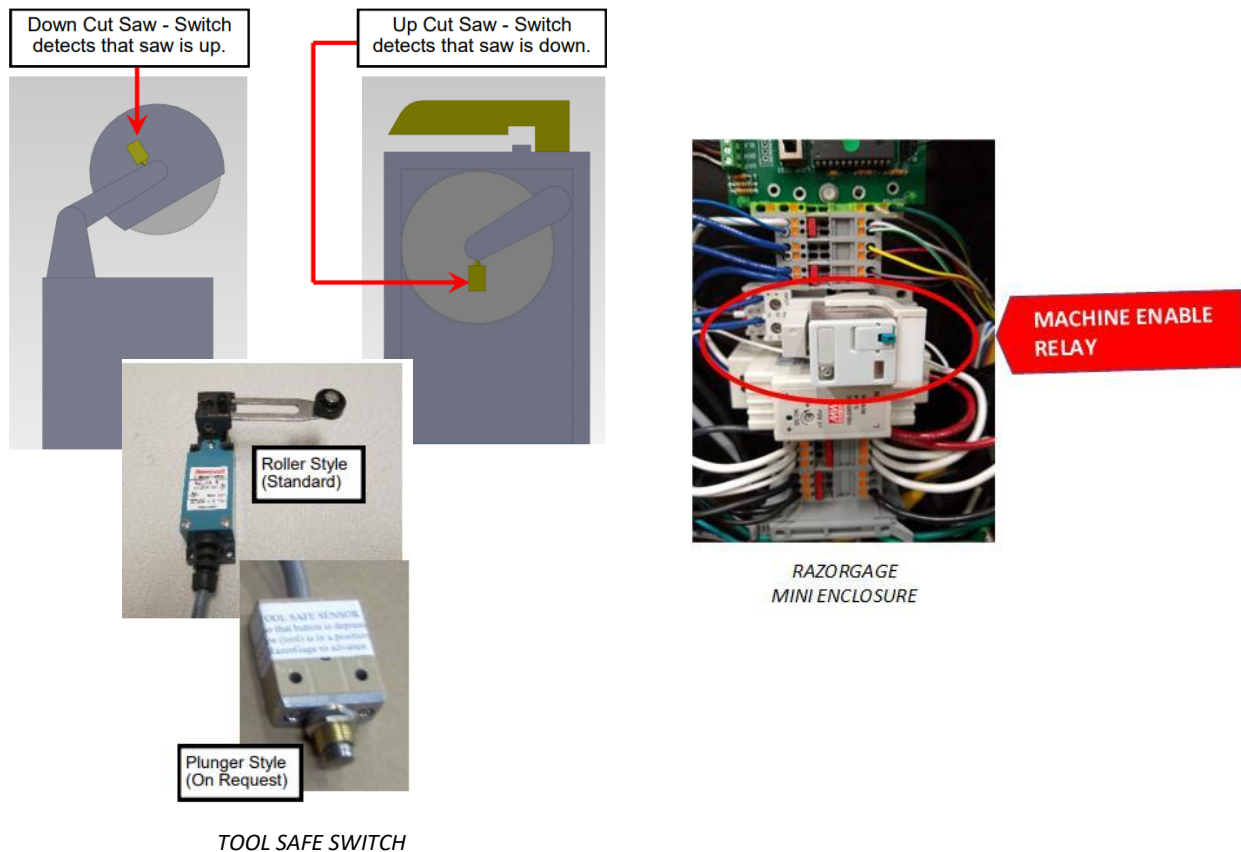
The Tool Safe with Air Safety option uses a switch and a valve to complete the interface with the process machine. The switch, usually a limit switch or pressure switch, is mounted on the process machine in a way that the switch come on when the cycle is completed and machine tool is retracted so it's clear for the RazorGage to move. Only when the tool safe switch is active(closed) can movement of the RazorGage occur. If the switch opens while the RazorGage is in motion the RazorGage come to an abrupt stop and a motion error occurs. The Air Safety valve is to be plumbed in line with the process machine air supply. While the RazorGage is in motion the valve is off, removing compressed air supply to the process machine, so that it cannot be cycled by the operator. When the RazorGage come to a complete stop the valve will shift, supplying compressed air to the machine, and allowing the machine to be cycled.



TOOL SAFE SWITCH

## Tool Safe & Machine Enable

The Tool Safe & Machine Enable option uses a cable to connect a switch and a relay to complete the interface with the process machine. The Tool Safe switch usually a limit switch, pressure switch, proximity sensor, or relay contact is mounted on the process machine in a way that the switch come on when the cycle is completed and machine tool is retracted so it's clear for the RazorGage to move. Only when the tool safe switch is active(closed) can movement of the RazorGage occur. If the switch opens while the RazorGage is in motion the RazorGage comes to an abrupt stop and a motion error occurs. The Machine Enable relay normally open contact is to be wired to the enabling circuit of the process machine. While the RazorGage is in motion the relay is off opening the enable circuit of the machine so that it cannot be cycled by the operator. When the RazorGage comes to a complete stop the relay will turn on, closing the Machine Enable relay contact, completing the enabling circuit of the machine, and allowing the machine to be cycled.



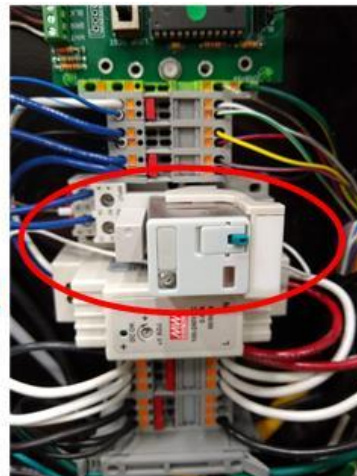
## Cyclone BMI

The Cyclone BMI option uses relays connected by a cable to the interface the RazorGage with the Cyclone 600 Upcut Saw. The RazorGage's Tool Safe circuit is wired to a relay output of the saw. When the saw cycle is completed and clamps and saw blade are retracted, the saw's output turns on signaling to the RazorGage that it is clear to move. Only when the Tool Safe saw output is active(closed) can movement of the RazorGage occur. If the Tool Safe output opens while the RazorGage is in motion the RazorGage come to an abrupt stop and a motion error occurs. The Machine Enable relay normally open contact is to be wired to the enabling circuit of the Cyclone 600 Upcut Saw. While the RazorGage is in motion the relay is off, opening the enable circuit of the saw, so that it cannot be cycled by the operator. When the RazorGage comes to a complete stop the relay will turn on, closing the Machine Enable relay contact, completing the enabling circuit of the saw, and allowing the Cyclone 600 Upcut Saw to be cycled.



**TOOL SAFE SAW  
RELAY OUTPUT**

*CYCLONE 600  
SAW ENCLOSURE*



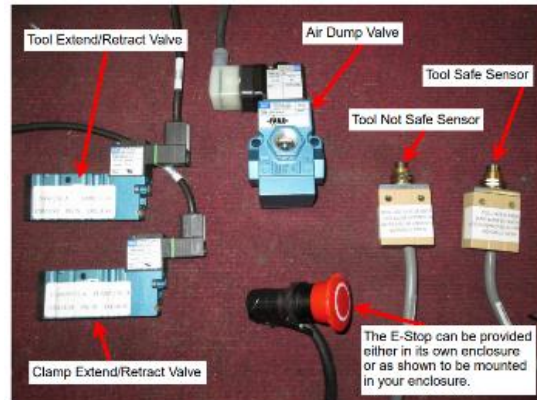
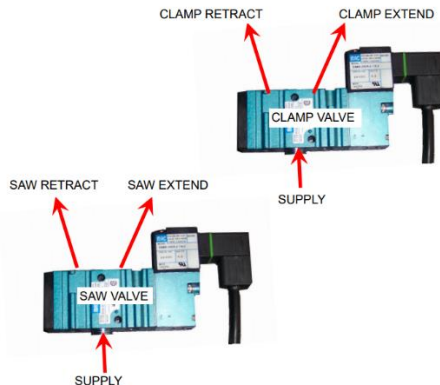
**SAW ENABLE  
RELAY**

*RAZORGAGE  
MINI ENCLOSURE*

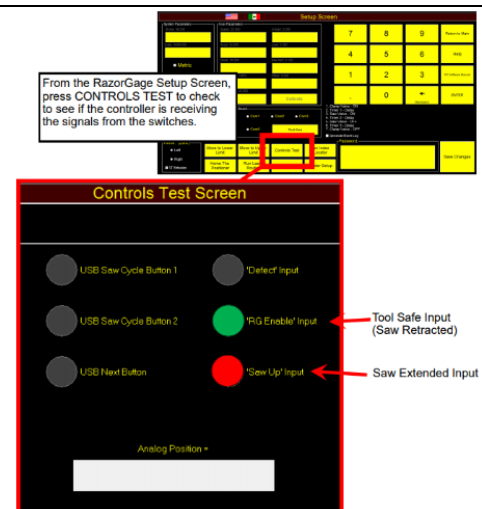


## BMI+ Auto Cycle

The BMI+ Auto Cycle option used to interface the RazorGage with a machine tool for automatic operation. This option includes two 24VDC single solenoid 4-way valves. One valve will control the machine's clamp cylinder and the other the advances the tooling (i.e. saw blade). 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. The supply connects to port 1 on the valve. The retract side of the clamp and saw cylinders will be connected to port 2 on their respected valves. The advance side of the clamp and saw cylinders will be connected to port 4 on the valves. Also included are two limit switches one is mounted in a manner for tool safe (i.e. saw blade retracted) and the other for tool unsafe (i.e. saw blade advanced).



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 punch, drill, 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.



## SUP

The SUP option used to interface the RazorGage with a saw for automatic operation. This option uses a Tool Safe (saw retracted) input along with a saw extend input. The SUP also has 2 outputs one to control clamping on the saw and the other to initiate the saw cycle. These inputs & outputs are wired to switches and valves mounted on the saw using a 12-pin interface cable. For safety with the automatic function of this option the saw E-stop is tied into the RazorGage's safety circuit.

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 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 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.

## CPO

The CPO option used to interface the RazorGage with a saw for automatic operation. This option uses a Tool Safe (saw retracted) input. This is wired to a switch mounted on the saw. The CPO also has 1 output which is pulsed to initiate the complete saw cycle. The output is wired to a valve mounted on the saw. The RazorGage I/O wiring to the saw is completed using a 4-pin pico interface cable. For safety with the automatic function of this option the saw E-stop is tied into the RazorGage's safety circuit.

Autocycle I/O timing can be adjusted in the Setup Screen. The Saw Parameters frame contains a value for Timer1. The CPO Autocycle sequence starts by energizing the CYCLE VALVE solenoid which trigger the saw cycle. When TIMER 2 counts down the CYCLE VALVE is de-energized. When the saw cycle is complete the TOOL SAFE SENSOR will come on and the RazorGage can move to next position. 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.

## Machine Adjustments



### WARNING

**The operator must remove from and lock out all power sources to positioner before servicing.**

### Belt Tension Adjustment

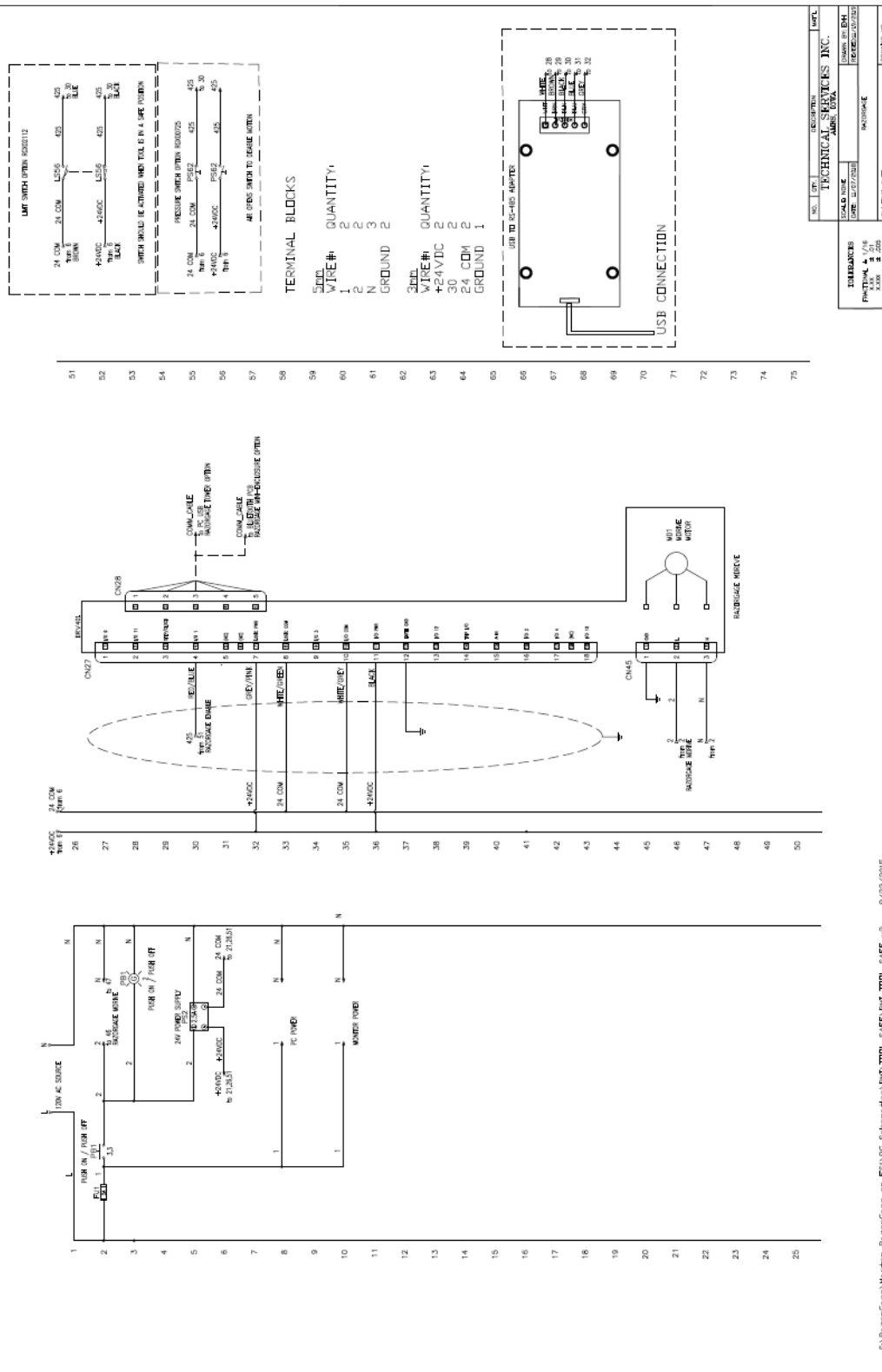
The belt tension may need to be adjusted after re-assembling a long RazorGage that has 2 sections of extrusion or if the motor gearbox is replaced. To adjust the belt, find the end of the RazorGage opposite the motor. Next, locate the 2 mounting bolts on the pulley assembly. Refer to the pictures below. Loosen but don't remove these two bolts. Then on the end cap of the extrusion is the jack bolt for the pulley assembly bracket. Turning this bolt clockwise will tighten the belt and counter-clockwise will loosen it. Adjust the belt just until the slack and droop is taken out of the top section of the belt. **Do not over-tension.** When adjustment is finished retighten the 2 mounting bolts on the pulley assembly bracket.



## Replacement Parts List

ITEM	RGX#	DESC
1	RGX02052	NUC PC
2	RGX01640	DDR3L RAM
3	RGX00036	SOLID STATE HARD DRIVE
4	RGX00009	MDRIVE STEPPER MOTOR
5	RGX00119	MDRIVE POWER CABLE
6	RGX01154	MDRIVE COMMUNICATION CABLE
7	RGX00378	MDRIVE I/O CABLE
8	RGX01957	Gearbox for units after 4/1/18
9	RGX01609	Gearbox for units before 4/1/18
10	RGX00795	24VDC POWER SUPPLY, 0.63A, 120-240V INPUT
11	RGX00146	SAW ENABLE RELAY (CUBE RELAY REPLACEMENT ONLY)
12	RGX02186	INTERFACE RELAY, SPDT, 24VDC
13		RS232 TO RS485 COMMUNICATIONS BOARD
16		
17		
TOOL SAFE LIMIT SWITCH OPTION		
25	RGX02112	LIMIT SWITCH
TOOL SAFE PRESSURE SWITCH OPTION		
25	RGX00725	PRESSURE SWITCH
TOOL SAFE AND AIR SAFETY		
TOOL SAFE AND MACHINE ENABLE		
CYCLONE BMI		
BMI+ AUTOCYCLE		
SUP		
CPO		
<p>A full list of field replaceable parts can be accessed at our web site:  <a href="https://razorgage.com/product-line/replacement-parts/">https://razorgage.com/product-line/replacement-parts/</a> </p>		

## Troubleshooting - Electrical Schematics

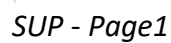


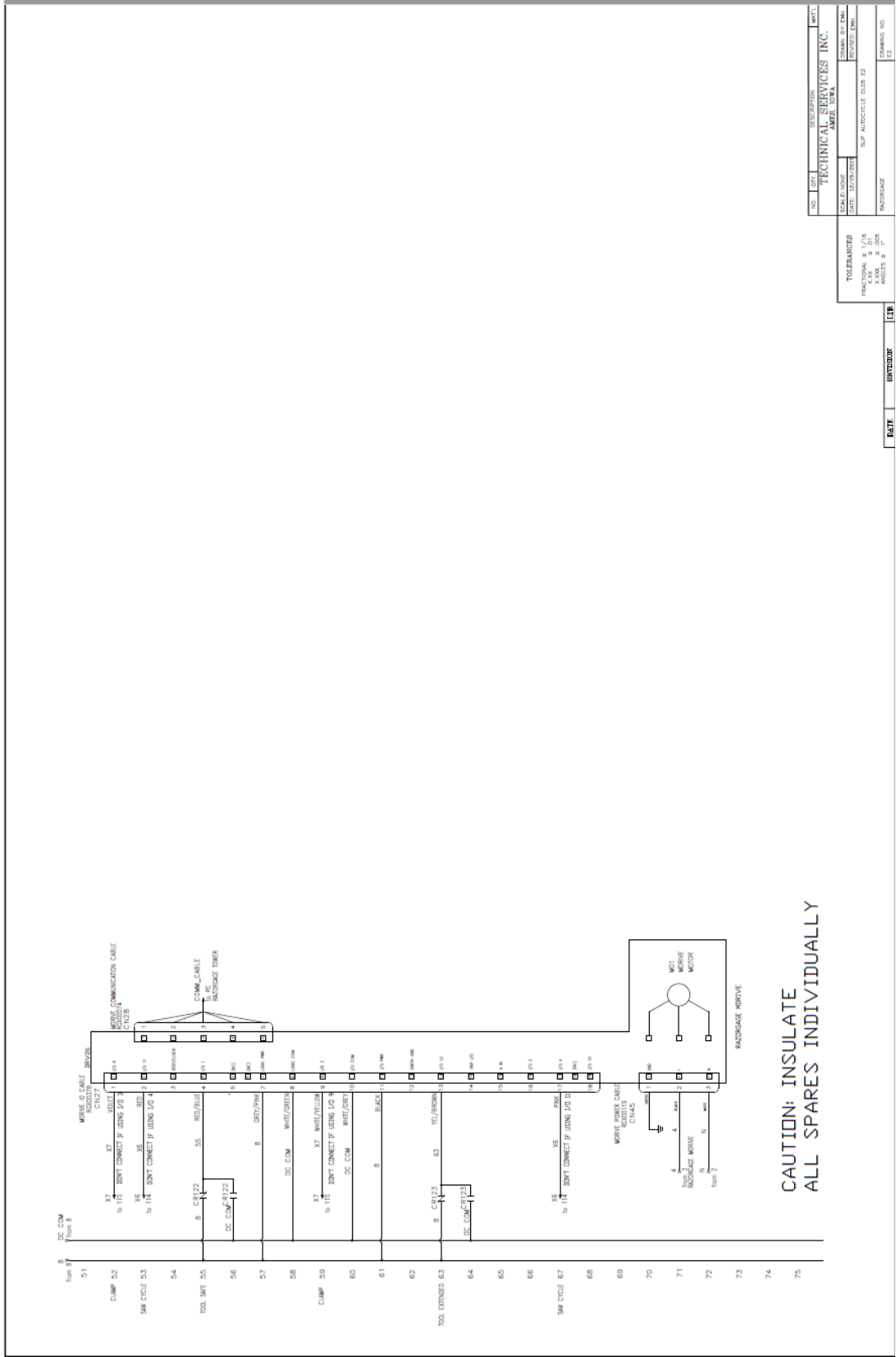
S:\RazorGageMaster\RazorGage on F3140\_Schematics\Bld\_Tool\_Safe\Bld\_Tool\_Safe\_v2 9/22/2015

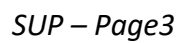




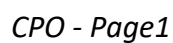


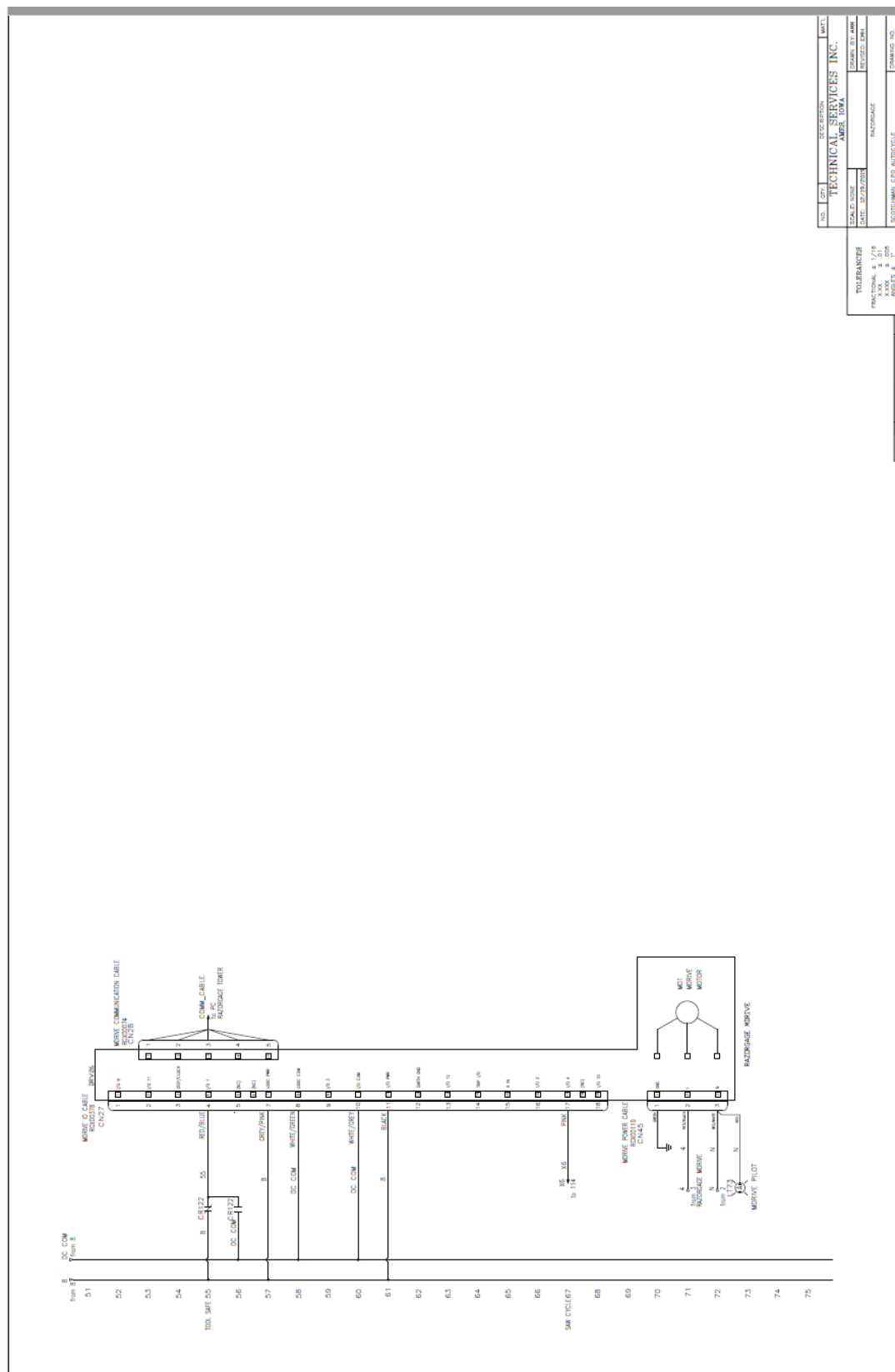


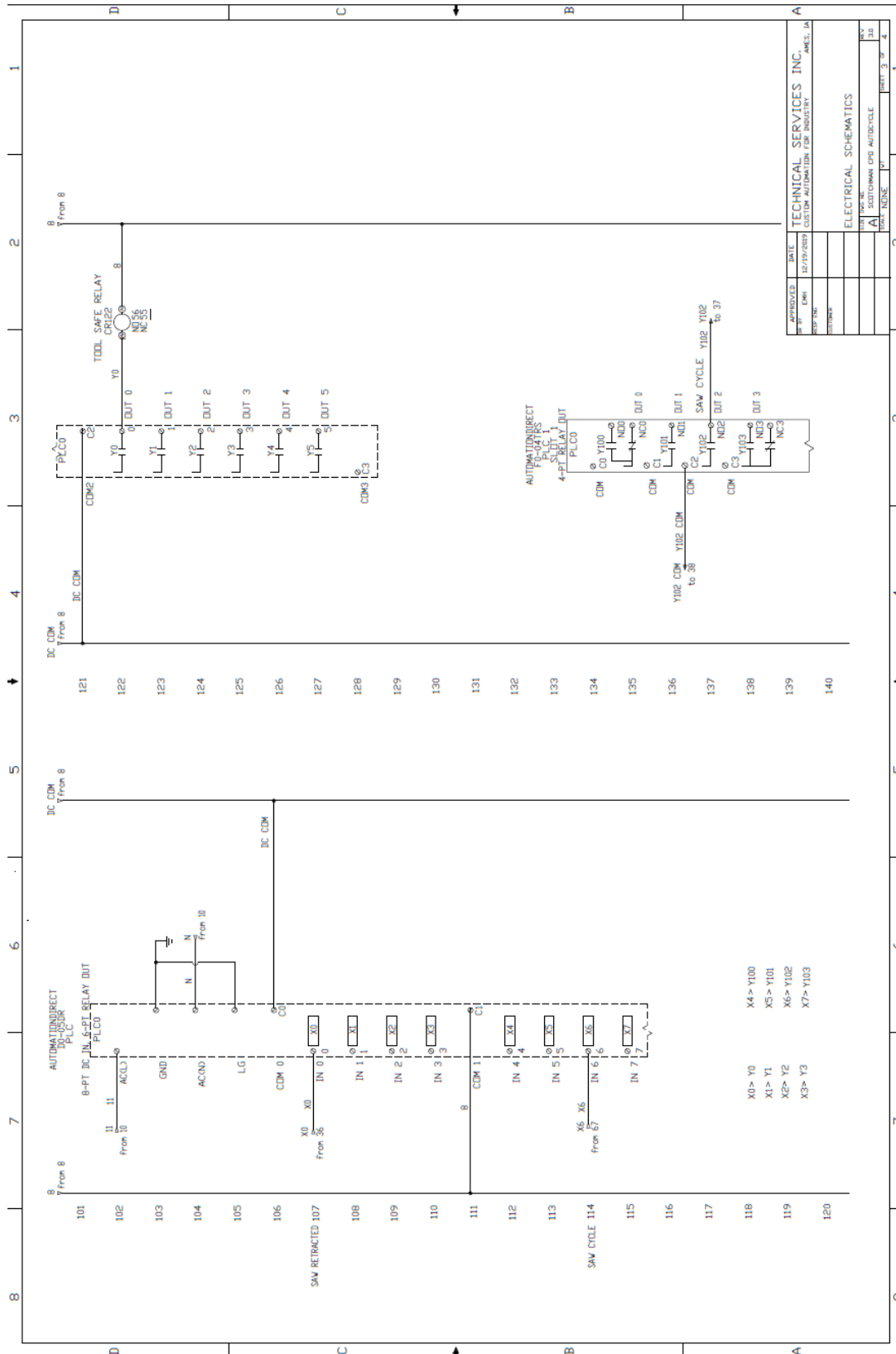












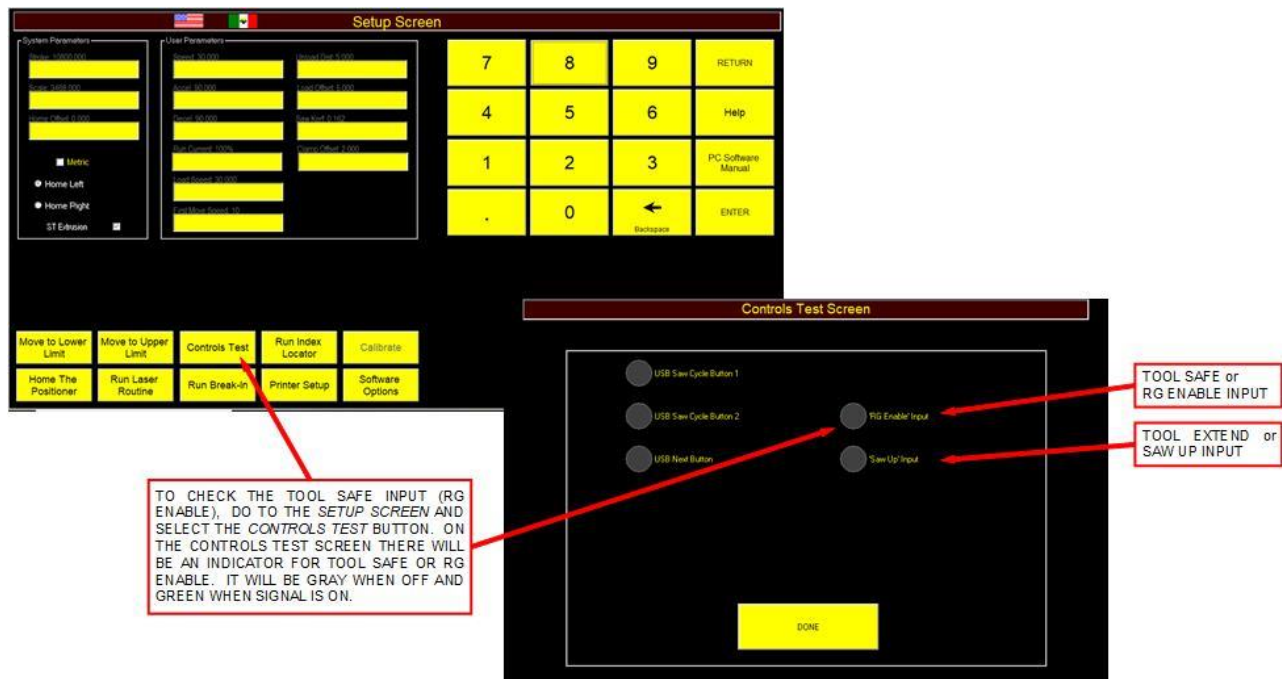
## Troubleshooting Guide

	Description	Possible Causes	Corrective Action
1	MOTION ERROR (STALL) DURING PUSHER BAR RUN.	<ul style="list-style-type: none"> <li>Bar stock or pusher arm are physically bound up.</li> <li>The RazorGage speed is set too high.</li> <li>The RazorGage accel and/or decel is set too high for the application.</li> <li>The RazorGage run current is set too low for the application.</li> <li>The RazorGage drive belt is tensioned too tightly.</li> </ul>	<ul style="list-style-type: none"> <li>Press BACK PUSHER UP button. Remove the source of the bind and press the RE-SEND THE LAST MOVE button to resume operation.</li> <li>Press the RE-SEND THE LAST MOVE button to resume operation. After bar is completed or if motion error reoccurs, go to the SETUP SCREEN and check the user parameter speed. Set the speed to 30 or less.</li> <li>Press the RE-SEND THE LAST MOVE button to resume operation. After bar is completed or if motion error reoccurs, go to the SETUP SCREEN and check the user parameters accel &amp; decel. Set each to 90 or less.</li> <li>Press the RE-SEND THE LAST MOVE button to resume operation. After bar is completed or if motion error reoccurs, go to the SETUP SCREEN and check the user parameter current. Set the current to 100%.</li> <li>Press the RE-SEND THE LAST MOVE button to resume operation. After bar is completed or if motion error reoccurs, check the drive belt tension and loosen the belt tension if it is too tight. Check RazorGage scale factor anytime belt tensioning is adjusted.</li> </ul>
2	MOTION IS LOCKED OUT.  A MOVE WAS REQUESTED WHILE THE SAW WAS NOT IN A SAFE CONDITION FOR PUSHER MOVEMENT.  THE REQUEST HAS BEEN CANCELLED.	<ul style="list-style-type: none"> <li>MDrive tool safe input lost</li> <li>The retract switch opened during the RazorGage move.</li> <li>A move was requested with the SAW DONE MOVE TO NEXT on-screen button.</li> </ul>	<ul style="list-style-type: none"> <li>Check MDrive I/O cable connection is tight.</li> <li>Check the saw retracted prox. switch and adjust if necessary. If adjustment is ok, check the cable connection and wiring back to RazorGage tower enclosure. Press OK to recover from the error. The recovery from this error exits the runtime screen back to the setup screen.</li> <li>Press OK to recover from the error. The recovery from this error exits the runtime screen back to the setup screen.</li> </ul>
3	E-STOP FAULT	<ul style="list-style-type: none"> <li>E-stop switch is active.</li> <li>PC lost USB connection to Joystick board.</li> <li>USB Joystick board lost wired connection to MCR contact.</li> <li>USB Joystick board Button#10 input failed.</li> </ul>	<ul style="list-style-type: none"> <li>Reset E-stops switches. Press Power ON button on the RazorGage panel.</li> <li>See section <i>Troubleshooting Estop PC Connection</i>.</li> <li>See section <i>Troubleshooting Estop PC Connection</i>.</li> <li>See section <i>Troubleshooting Estop PC Connection</i>.</li> </ul>
4	MACHINE IS NOT IN 'SAFE' POSITION. MOTION IS LOCKED-OUT. ENSURE THE I/O CABLE ON THE MDRIVE IS TIGHT AND THE TOOL-SAFE SWITCH IS ACTUATED	<ul style="list-style-type: none"> <li>MDrive tool safe input lost</li> <li>Tool extend switch out of alignment.</li> <li>Machine tool was cycle was triggered during RazorGage move.</li> </ul>	<ul style="list-style-type: none"> <li>Check MDrive I/O cable and make sure the connection is tight.</li> <li>Check tool extend switch alignment make sure switch is ON in extend position. Adjust if necessary.</li> <li>Make sure RazorGage has complete its move before triggering machine tool.</li> </ul>
5	TOOLS SAFE SWITCH IS	<ul style="list-style-type: none"> <li>Lost MDrive tool safe input</li> </ul>	<ul style="list-style-type: none"> <li>Check MDrive I/O cable and make sure the connection is tight.</li> </ul>

	CURRENTLY OFF. IT MUST BE ON TO START A CYCLE.	<ul style="list-style-type: none"> <li>• Tool extend switch out of alignment.</li> <li>• Loose connection or open in Tool Safe switch wiring</li> <li>• Failed Tool Safe switch.</li> <li>• Failed Mdrive input.</li> </ul>	<ul style="list-style-type: none"> <li>• Check tool extend switch alignment make sure switch is ON in extend position. Adjust if necessary.</li> <li>• Check the Tool Safe switch cable and wiring on the both on switch and running back to RazorGage enclosure for any loose or open connections. Check MDrive I/O cable wiring any loose or open connections.</li> <li>• Use to Control Test Screen to check the status of the Tool Safe (RG Enable) Input. Activate/deactivate the Tool Safe switch and check to see if the RG Enable Input is turning ON and OFF with the switch. If input remains off, replace the switch.</li> <li>• Use to Control Test Screen to check the status of the Tool Safe (RG Enable) Input. If ON disconnect the Tool Safe switch from the terminal strip and if the signal stay ON the MDrive input has likely failed. Replace the MDrive.</li> </ul>
6	THE TOOLSAFE SWITCH DID NOT TURN OFF WHEN EXPECTED.	<ul style="list-style-type: none"> <li>• Short in the switch wiring.</li> <li>• Failed Tool Safe switch.</li> <li>• Failed Mdrive input.</li> <li>• Cycle time is too slow. Program timed out before switch became unactive.</li> </ul>	<ul style="list-style-type: none"> <li>• Check the Tool Safe switch cable and wiring on the both on switch and running back to RazorGage enclosure for any damaged insulation or other shorts. Check MDrive I/O cable wires for any damaged insulation or other shorts.</li> <li>• Check the Tool Safe switch cable and wiring on the both on switch and running back to RazorGage enclosure for any damaged insulation or other shorts. Check MDrive I/O cable wires for any damaged insulation or other shorts.</li> <li>• Use to Control Test Screen to check the status of the Tool Safe (RG Enable) Input. If ON disconnect the Tool Safe switch from the terminal strip and if the signal stay ON the MDrive input has likely failed. Replace the MDrive.</li> <li>• Adjust Tool Safe switch so it deactivates faster or speed up machine tool cycle.</li> </ul>
7	THE TOOLSAFE SWITCH DID NOT TURN ON AFTER A SAW CYCLE.	<ul style="list-style-type: none"> <li>• MDrive tool safe input lost</li> <li>• Tool extend switch out of alignment.</li> <li>• Loose connection or open in Tool Safe switch wiring.</li> <li>• Failed tool safe switch.</li> <li>• Failed Mdrive input.</li> </ul>	<ul style="list-style-type: none"> <li>• Check MDrive I/O cable and make sure the connection is tight.</li> <li>• Check tool extend switch alignment make sure switch is ON in extend position. Adjust if necessary.</li> <li>• Check the Tool Safe switch cable and wiring on the both on switch and running back to RazorGage enclosure for any loose or open connections. Check MDrive I/O cable wiring any loose or open connections.</li> <li>• Use to Control Test Screen to check the status of the Tool Safe (RG Enable) Input. Activate/deactivate the Tool Safe switch and check to see if the RG Enable Input is turning ON and OFF with the switch. If input remains OFF, replace the switch.</li> <li>• Use to Control Test Screen to check the status of the Tool Safe (RG Enable) Input. If ON disconnect the Tool Safe switch from the terminal strip and if the signal stay ON the MDrive input has likely failed. Replace the MDrive.</li> </ul>
8	TOOL EXTENDED SWITCH IS CURRENTLY ON. IT MUST BE OFF TO START A CYCLE.	<ul style="list-style-type: none"> <li>• Short in the switch wiring.</li> <li>• Failed tool extend switch.</li> </ul>	<ul style="list-style-type: none"> <li>• Check the Tool Extended switch cable and wiring on the both on switch and running back to RazorGage enclosure for any damaged insulation or other shorts. Check MDrive I/O cable wires for any damaged insulation or other shorts.</li> <li>• Use to Control Test Screen to check the status of the Tool Extended (Saw Up) Input. Activate/deactivate the Tool Extended (Saw Up) switch and check to see if the Saw Up Input is turning ON and OFF with the switch. If input remains ON, replace the switch.</li> </ul>



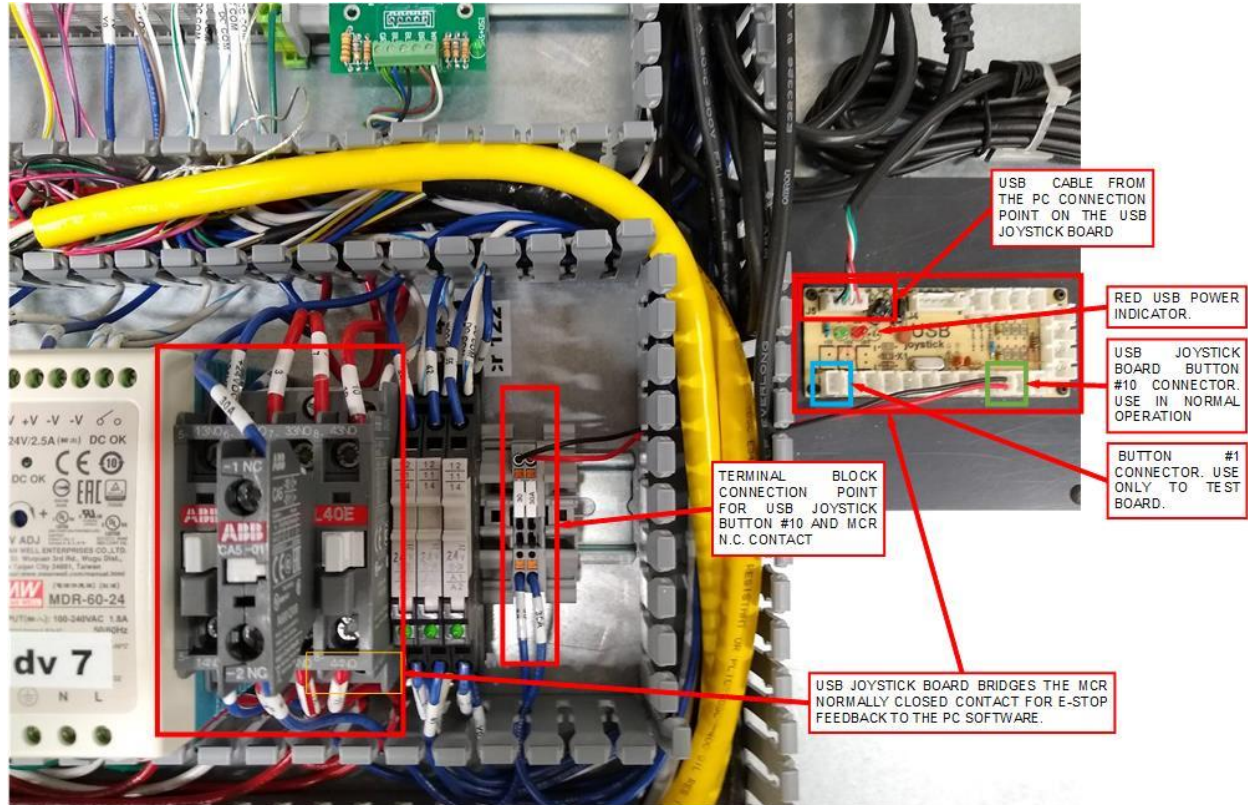
		<ul style="list-style-type: none"> <li>Failed Mdrive input.</li> </ul>	<ul style="list-style-type: none"> <li>Use to Control Test Screen to check the status of the Tool Extend (Saw Up) Input. If ON disconnect the Tool Extend switch from the terminal strip and if the signal stay ON the MDrive input has likely failed. Replace the MDrive.</li> </ul>
9	TOOL EXTENDED SWITCH DID NOT TURN ON WHEN EXPECTED.	<ul style="list-style-type: none"> <li>Tool extend switch out of alignment.</li> <li>Cycle time is too slow. Program timed out before switch was made.</li> <li>Open or loose connection in the switch wiring.</li> <li>Failed tool extend switch.</li> <li>Failed Mdrive input.</li> </ul>	<ul style="list-style-type: none"> <li>Check tool extend switch alignment make sure switch is ON in extend position. Adjust if necessary.</li> <li>Increase the length of the SawTimeout_Seconds timer. This timer can be found in the CONFIG.INI file in following folder on the harddrive C:\PositionerRunTimeFiles\RGST</li> <li>Check the Tool Safe switch cable and wiring on the both on switch and running back to RazorGage enclosure for any loose or open connections. Check MDrive I/O cable wiring any loose or open connections.</li> <li>Use to Control Test Screen to check the status of the Tool Extend (Saw Up) Input. Activate/deactivate the Tool Safe switch and check to see if the Saw Up Input is turning ON and OFF with the switch. If input remains OFF, replace the switch.</li> <li>Use to Control Test Screen to check the status of the Tool Extend (Saw Up) Input. If ON disconnect the Tool Extend switch from the terminal strip and if the signal stay ON the MDrive input has likely failed. Replace the MDrive.</li> </ul>
10	REQUESTED POSITION EXCEEDS THE MAXIMUM TRAVEL	<ul style="list-style-type: none"> <li>The requested move is smaller than the offset or larger than the stroke + offset.</li> </ul>	<ul style="list-style-type: none"> <li>Enter position value that meet these requirements. Position &gt; home offset Position &lt; stroke + home offset</li> <li>Adjust home offset if it is larger than the smallest part needed.</li> </ul>

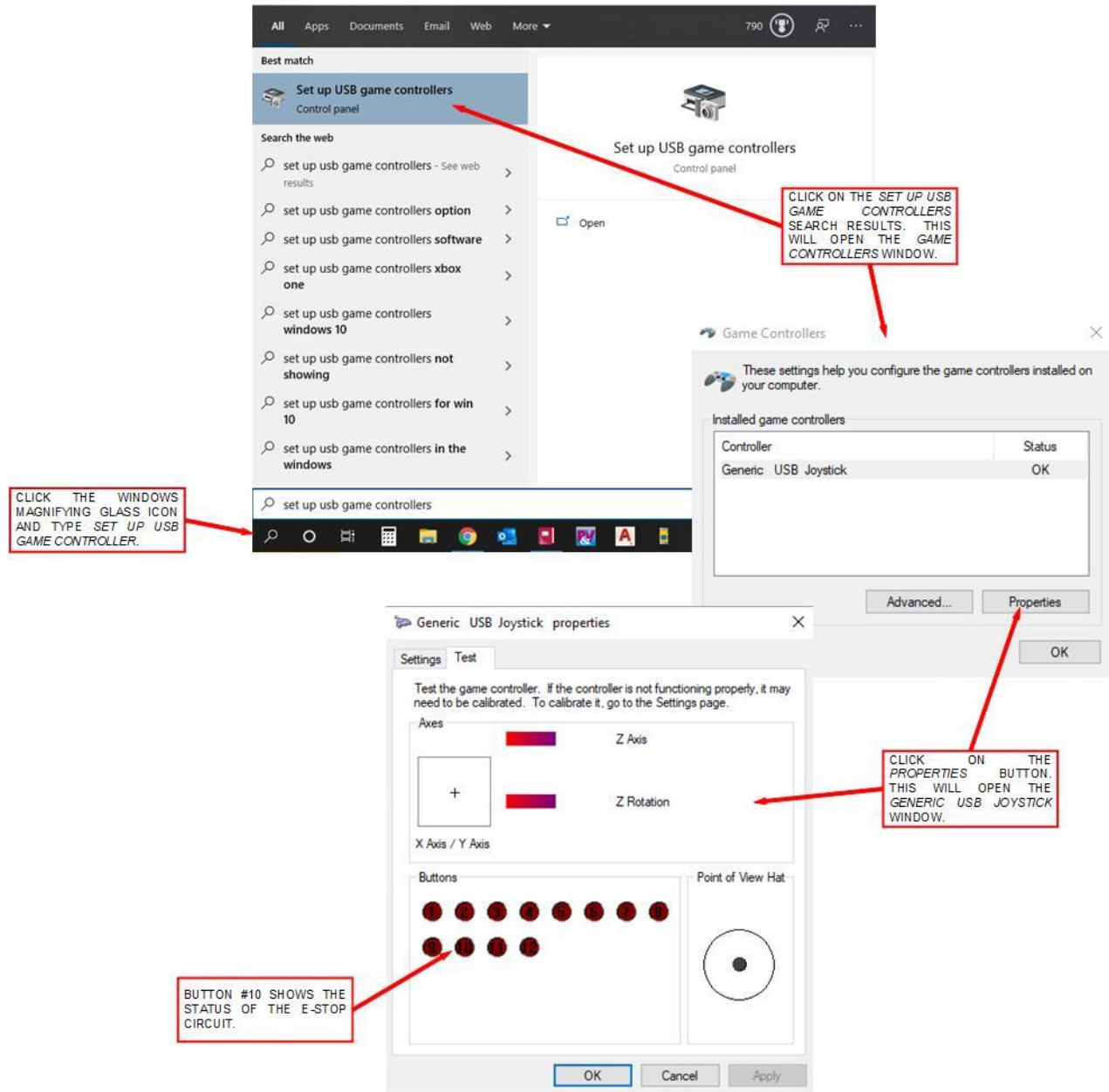


Checking Tool Safe & Tool Extend Input

## Troubleshooting E-Stop PC Connection

An E-Stop circuit is a hard-wired system intended to drop power and air whenever any component in the E-Stop circuit changes from closed to open. This circuit cannot rely on software to drop power and air yet it is helpful if the software informs the user that an E-Stop condition is present. On RazorGage systems we use an USB joystick board to bridge the physical switch contact on the Master Control Relay of the safety circuit to the PC through an USB port. When an E-stop is activated, an event in the software will be triggered and the E-Stop screen will be displayed. If your system randomly displays E-Stop screens even though all E-Stop switches are deactivated then it is possible that the software E-Stop circuit is compromised. To troubleshoot this potential problem, find the USB joystick board on the inside of the RazorGage electrical enclosure. The USB joystick board receive its power from the USB connection to the PC. This is displayed by a red power LED on the board. If the red LED is off, check the USB connection both on the joystick board and PC. Use the instructions below in *Checking E-Stop Software Input Status* to open the Generic USB Joystick Properties. With the E-stop circuit reset, the Button #10 status should be on indicated by a bright red indicator. If the indicator is off, check the MCR normally closed contact and the wiring back to the USB joystick board. If contacts and wiring checks out try moving the plug connector on Button #10 to the connector for Button #1. If the indicator for Button #1 turns on then the USB joystick board has a failed input and will need to be replaced. The pictures on the following pages will lead you through the troubleshooting process. Your enclosure may vary from the one shown in the photos but the basic components and methods will be the same.





*Checking E-Stop Software Input Status*

If you have more questions about RazorGage products visit our Downloads page and our You Tube channel. Both are accessible from the RazorGage home page, [www.razorgage.com](http://www.razorgage.com). If you would like to discuss an application, feel free to call us at (515) 232-3188.