J TECH™ Photonics

Axiom Precision 4.2W Laser Kit by J Tech

For Basic, Pro - V5 and Elite with RichAuto Controller

Rev. 6/18/2024

GENERAL

This manual covers the installation of the Axiom Precision Laser Kit by J Tech Photonics.
Install videos for this and other accessories can be found by visiting the “Axiom Tool Group” YouTube channel at https://www.youtube.com/channel/UCQ8U81z1iM_fvE92uGDFAuQ

SAFETY

WARNING!

- When connected the output of the laser can be up to several watts of power. Always use proper safety eyewear and laser safety protection. When operated incorrectly the laser can cause severe damage to eyes and health.
- Never leave the laser unattended when operating. Unexpected operation of the machine can leave the laser in an ON state which can lead to a potential fire.
- Never expose skin directly to laser radiation.
- Focused light will increase the safety hazard.

DISCLAIMER

- All statements of safety are only applied when laser upgrade kit is used in its intended purpose.
- You are legally responsible for any injury to anybody resulting from the use of or assembly of the laser kit or their finished products.
- You Accept this laser kit for integration into your own system and will be legally responsible from any and all LIABILITIES.

AXIOM TOOL GROUP, INC.

State of California Prop 65 Disclaimer

WARNING: This product can expose you to chemicals, including dust from wood, wood byproducts, and a variety of plastics, which are known to the state of California to cause cancer.

For more information, please go to: www.p65warnings.ca.gov

UNPACKING

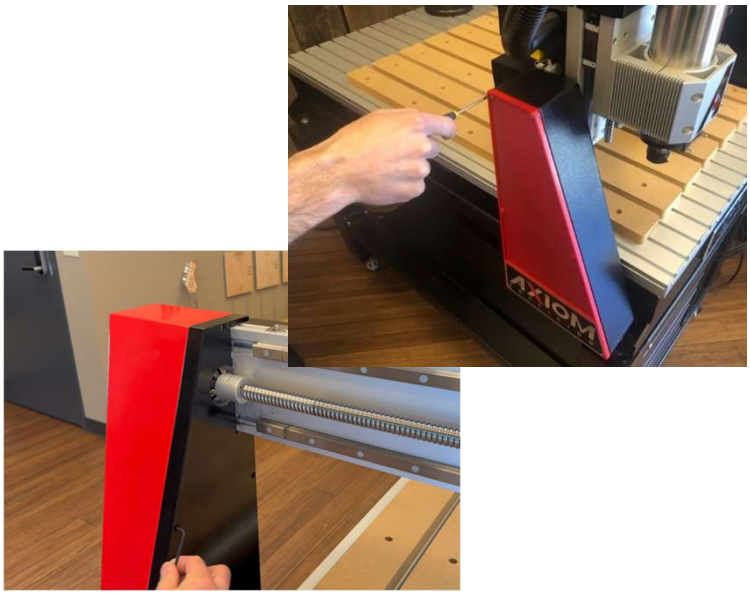
Inspect the shipping container for damage.

Verify the contents of the package:

- Axiom Custom Safety Interface Board with Laser/Spindle Switch
- Laser Shroud Housing and Spindle Mount
- Key switches
- 1 Pair of Safety Goggles
- Power Wall Adapter
- Extended cable assembly
- Red Electrical connector
- Sticky tape
- SI board plug in harness

Installation

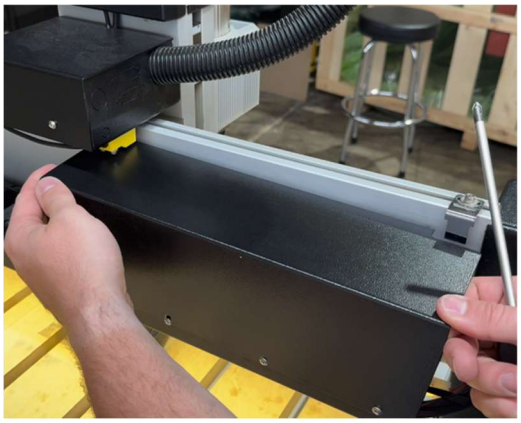
Elite Specific instruction outlined in Blue

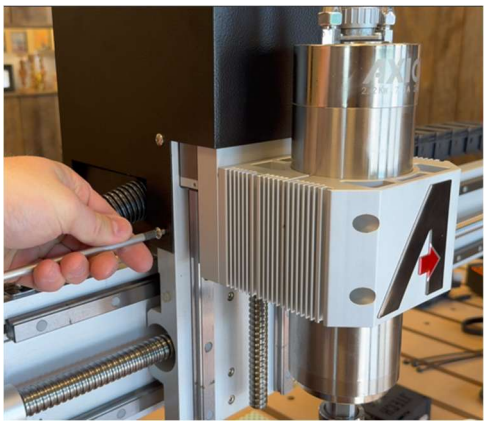


Step 1:

Remove the 6 cover screws on the left gantry leg.
Remove the 5 Cap screw securing the left metal leg.

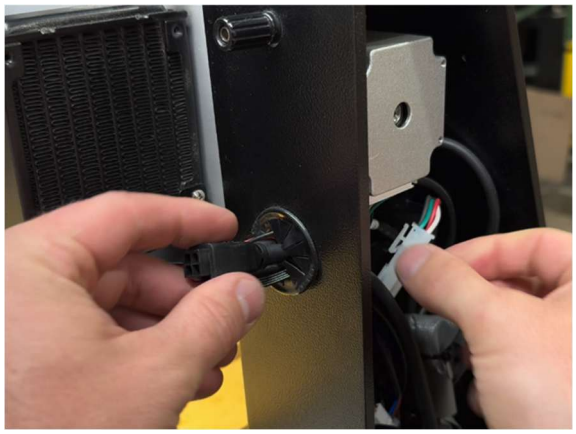
Step 2:
Remove the cooling system cover and Z axis covers.

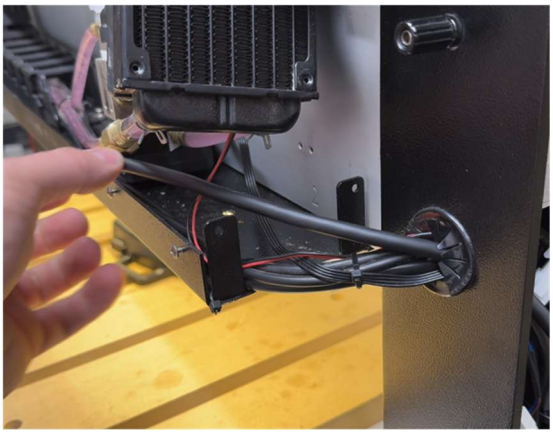


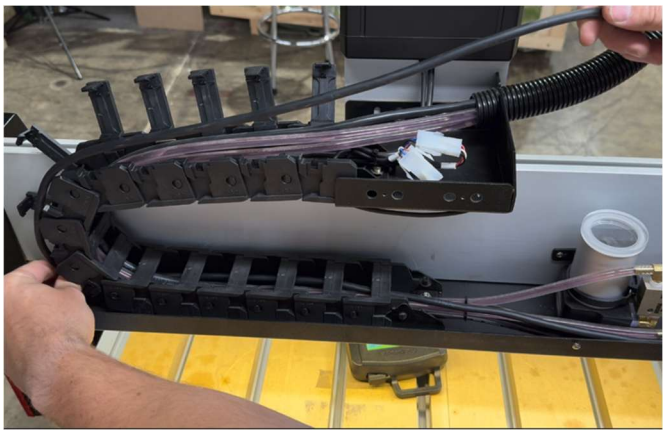


Step 3:

Feed the Female end of the main harness through the gantry leg leading up to the Z axis. You may need to unmount the radiator from the gantry shelf. Feed the harness through the wire chain. The chain links can be opened up to help with the installation.





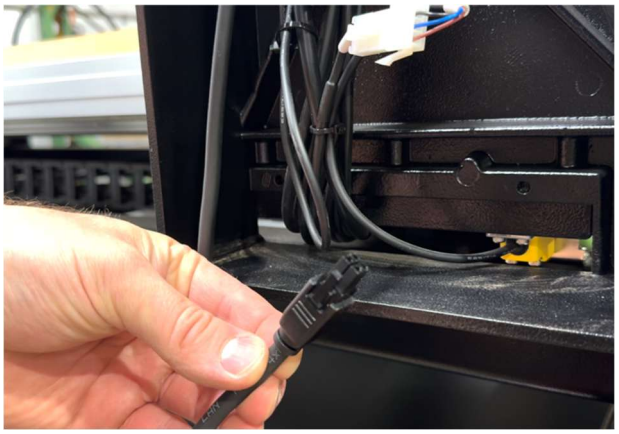


Step 4:

Pull Enough of the harness through the wire chain and gantry leg so that the plug can be mounted about 8-10 inches up the corrugated spindle lines. Use zip ties to secure the female plug to the corrugated spindle lines. Reinstall all upper covers and the close the chain links if opened.

Step 5:

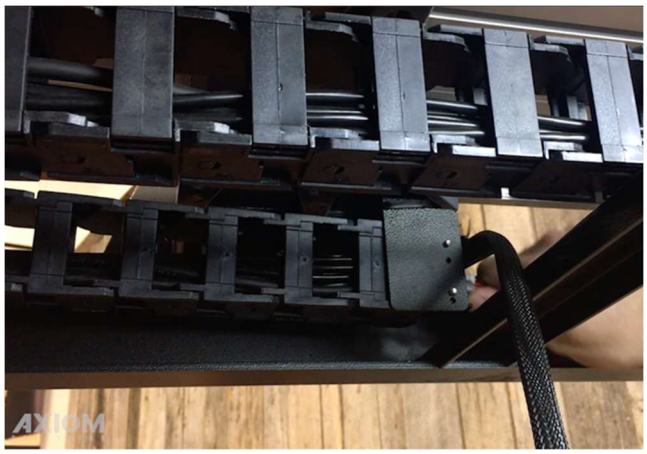
Feed the male 4 pin connector found on the other end of the cable through the hole found on the bottom of the gantry. These wires will be pulled through the gantry leg and follow alongside the other wires found in the wire chain. Run these cables to the back of the wire chain.

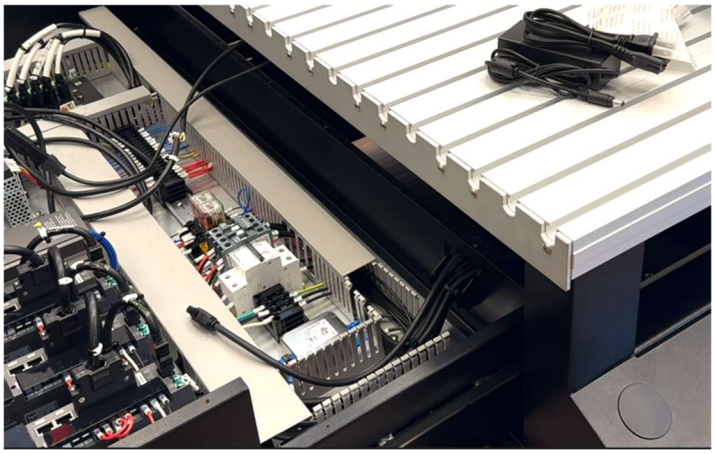


Step 6:

Feed the cable assembly through the wire chain under the machine. The harness will be running parallel with the power cables to the back of the machine, exiting the wire chain to the rear of the machine. Pull the necessary amount of cable through the chain, so that the male 4 pin plug reaches to the front of the machines control box.

For AR16 Elite machines this cable will run directly into the rear mounted control box.



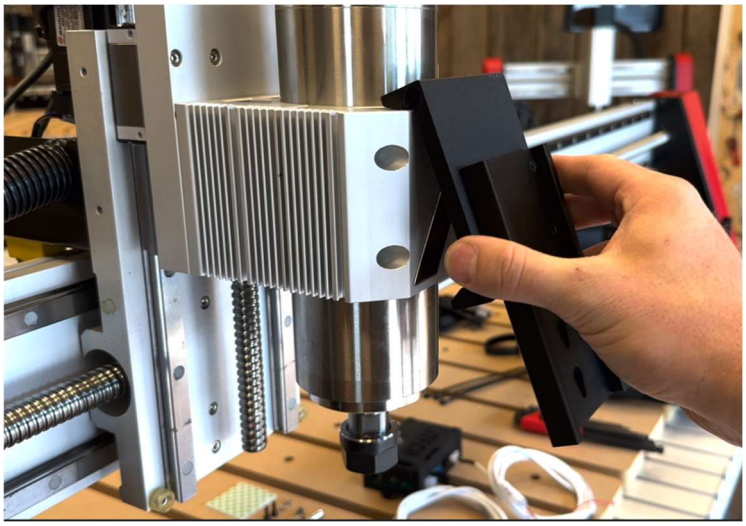


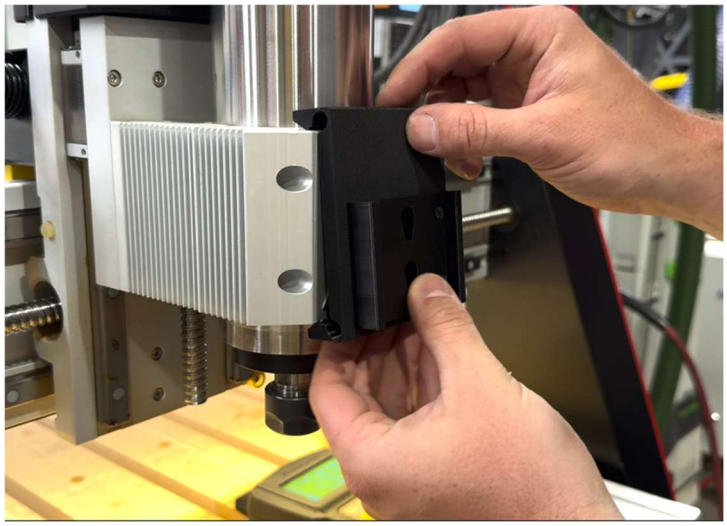
Note: The excess wire can be pulled back through the wire chain and coiled up inside the gantry leg.

Step 7:

The laser head assembly will mount directly in front of the spindle/router motor. The laser head assembly is two pieces.

1. Laser Base Plate – This will snap on to the front of the spindle extrusion.
2. Magnetic Laser Shroud – This will attach to the laser base plate via magnets. There are notches on the sides to guide the laser in place onto the base plate. Note: Elite machines use a larger drop down bracket if your laser was purchased with your machine one should have been included if not be sure to reach out to the Axiom team.

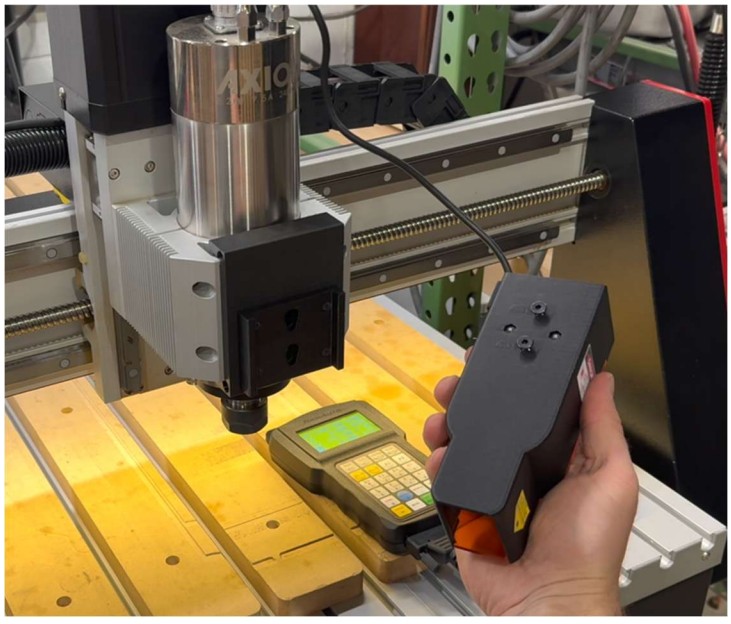




***** Note: The base plate may be left on the machine when the laser is not being used. It will not interfere with the dust boot or operation of the spindle. ***** **The AR16 Base Plate will need to be removed after use**

Laser head:

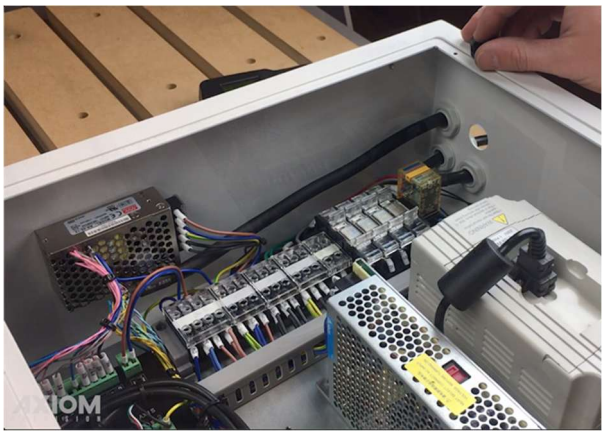
The laser head will attach to the baseplate with the alignment pins and magnets. Once the laser head is attached plug the connector into the harness at the top of the machine. The included Velcro cable tie will be attached to the laser head harness to secure it to the cooling tubes when in use.



Step 8:

Control Board Installation:

Remove the cover panel from the white control box, and locate the black insert cap, on the back of the box.
Early machines may not have this cap

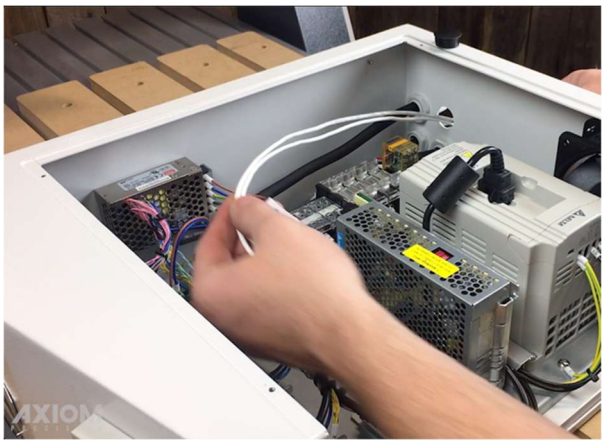


The red/black wires from the Laser control board will feed through this hole.

(A grommet is recommended in this case to protect the wires over time.)

You may remove the black insert and drill a hole for the wires to feed through if desired. If the cap is not present, DO NOT drill through the box. Instead drill a hole into the cover thus, preventing any metal shavings from entering the box.

Step 9:



Insert the wires from the Laser control board into the white control box from the back side, through the insert.

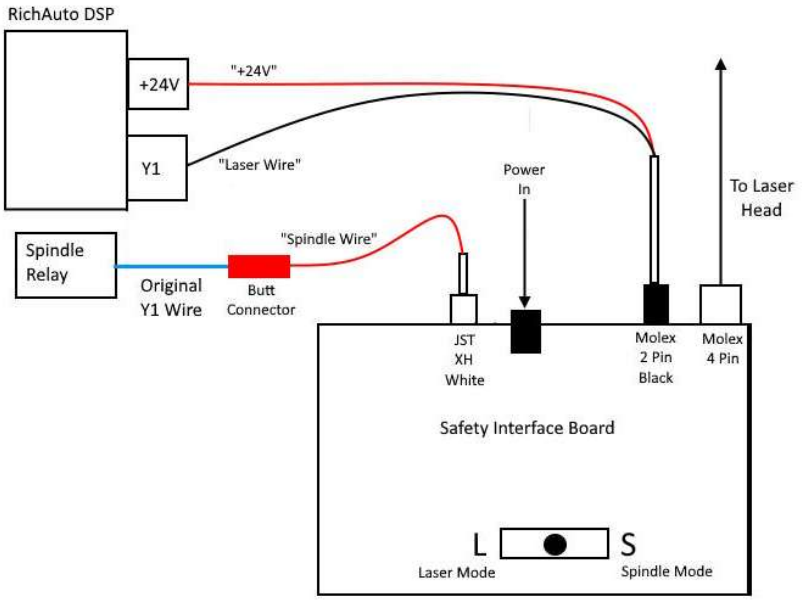
(If installing on an Elite machine see page 8 and continue)

Step 10:

Locate the RichAuto DSP board inside the white control box pictured here.

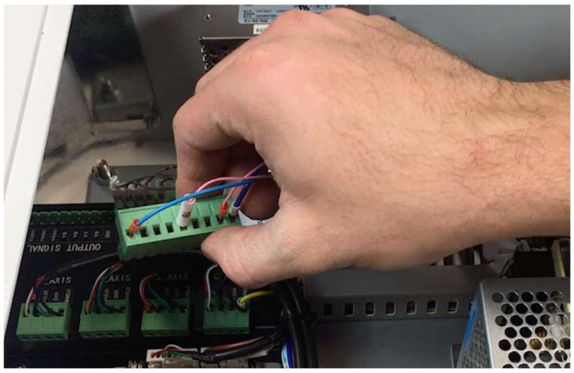
AR SERIES WIRING DIAGRAM

For the next steps, we will be wiring the laser to the RichAuto DSP control board. We will be using the following wiring diagram. **NOTE: ELITE Machines will have the Y1/FWD wire attached to the relay switch (see page 8).**

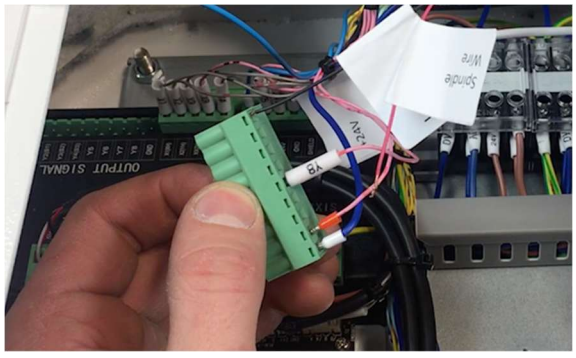


Step 11:

RichAuto controlled Machines: Find the blue wire name (Y1). Wiggle and pull to remove the green terminal block. Then use a small flat head screwdriver to loosen the clamping screw on the (Y1) wire. Remove this blue wire. We will use it again in another step.

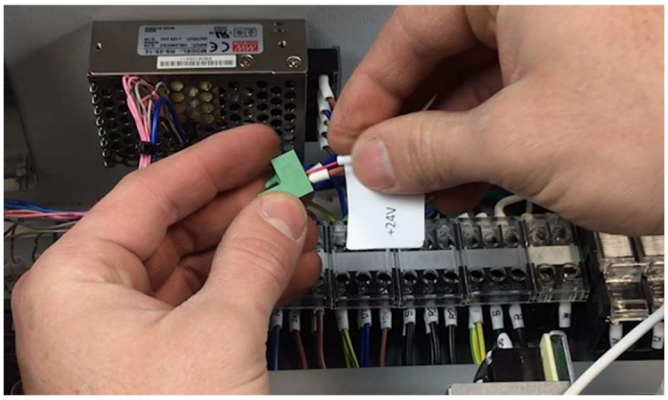


Insert the black lead (labeled “Laser Wire”) from Laser control board into the (Y1) location and retighten the clamping screw. Be sure that the clamp is tight against the wire, and not on the insulation which will prevent proper signal.



Step 12:

Next, pull the DC24V green terminal block from the DSP board. The RED wire from the laser, labeled “+24V” will need to be inserted in to the block alongside the existing wire.

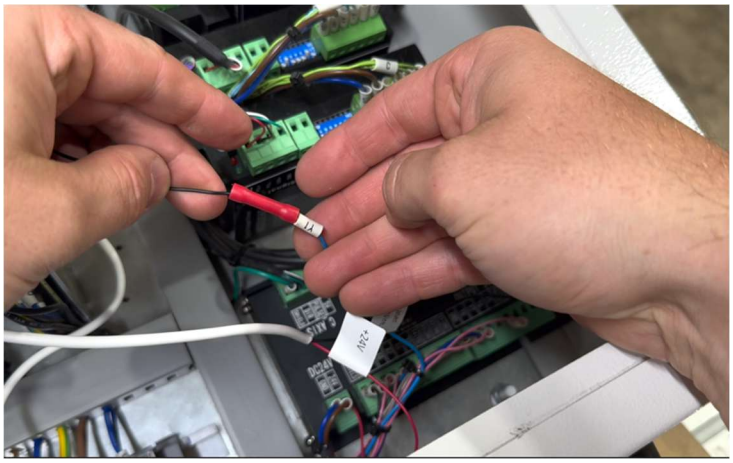


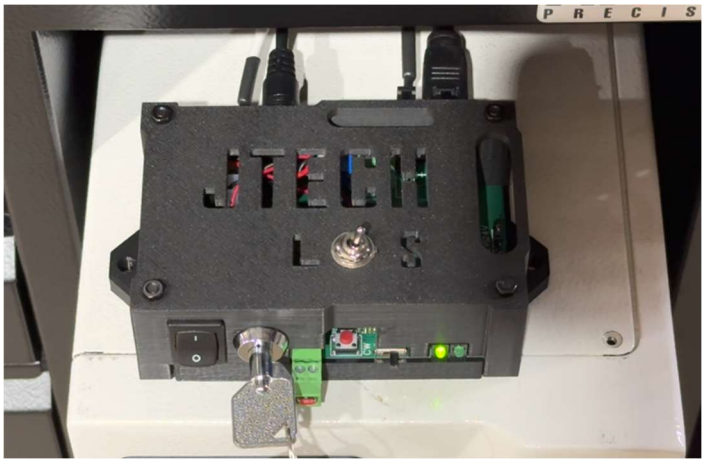
Step 13:

The remaining red wire from the Laser control board switch (labeled “Spindle Wire”) will need to be connected to the original (Y1 wire “Basic, Pro+ & V5 machines only”). Use the provided electrical butt connector or a similar connector to join the two wires. Be sure to insulate the new connection if needed to prevent shorts. Electrical tape may be used to insulate the connection.

After all connections have been made reinstall the green terminal block. Be sure to press firmly on the connector when reinstalling on the RichAuto control board.

This connection will allow the toggle switch on top of the SI module to control the flow of power between the Spindle/Router and the laser.





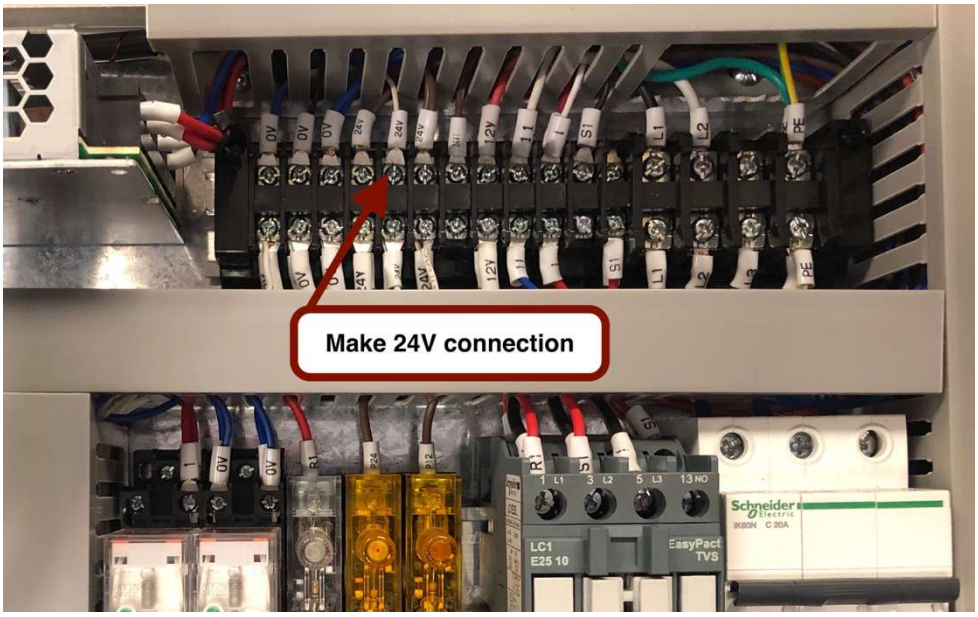
ELITE SERIES WIRE DIAGRAM

For the Elite machines, the electrical connections will be slightly different from the BASIC & PRO models.

You can see them illustrated in the pictures.

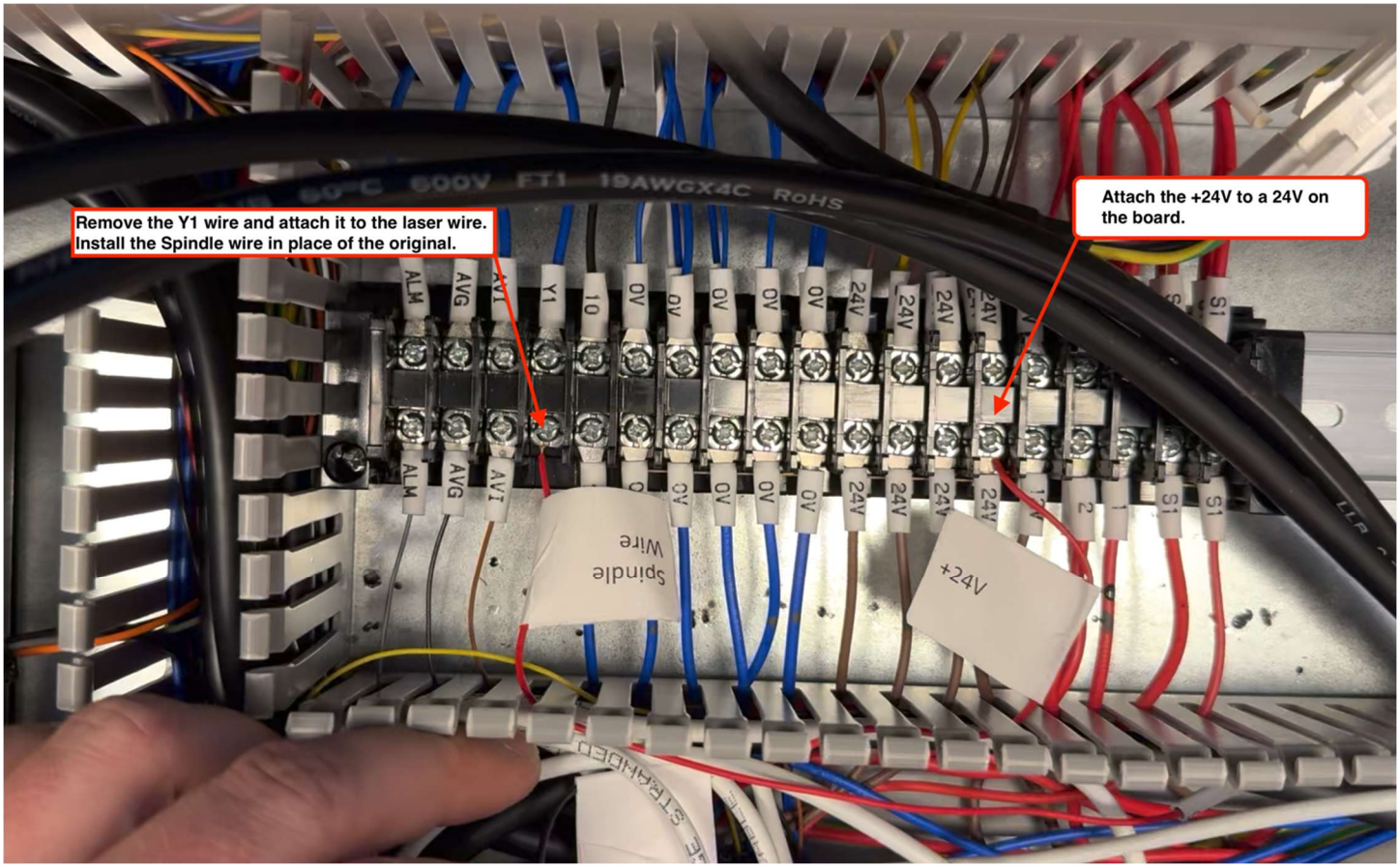
Note: If you are installing this on an AR16 The control boards are located in the drawer on the back of the machine. The gantry of the machine will need to be moved to the back of the table to be able to pull the drawer forward.

Remove the FWD/Y1 wire that leads to the contact switch and connect it to the “laser wire” using the butt connector.



Connect the 24V wire from the SI module to the +24V screw terminal.

Connect the “spindle wire” to the empty FWD/Y1 screw terminal.



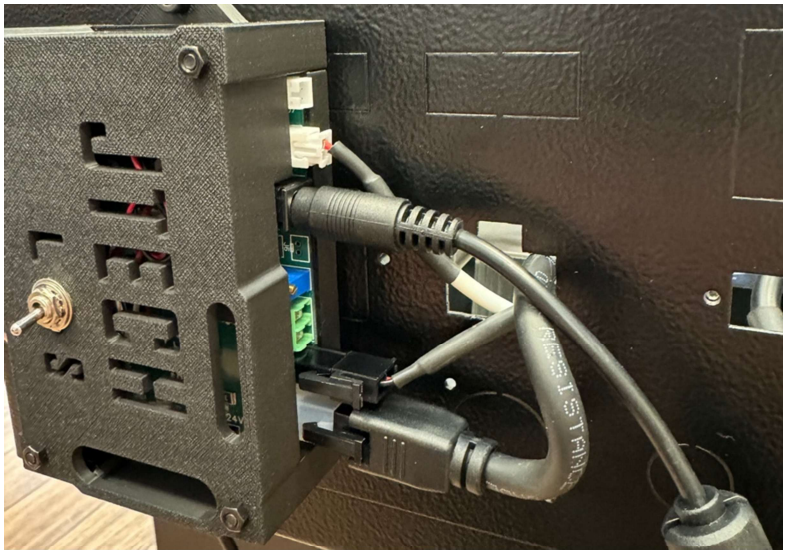
Note: Wire color may differ depending on build date.

Step 14:

Reinstall the white control box cover and mount the laser board to the top of the white control box. Use the included double sided tape or the built in magnets to keep it secured in place.

Note: Due to the size of the control box on Elite series machines and alternative mounting location will be needed. Use the included tape to mount your control board to the stand or toolbox of your Elite series machine.

The included wall adapter can now be plugged into a 110 Volt Outlet and then be connected to the back of the laser board.



Make all the connections to the back of the laser control board.

Once the wiring has been completed, the excess cable can be pulled through the wire chain then coiled up inside the gantry arm and under the table.

B11 & B18 RichAuto Controller Operations (Basic, Pro+ & V5) Elite Machines see pg. 12

Several configuration changes must be made to your controller pendant to allow the laser to operate properly. Please follow these steps closely to ensure safe, correct operation of this laser accessory.

The laser control board will allow the manipulation between the normal Router/Spindle operation and the use of the laser accessory.

The Spindle Delay function will need to be deactivated, when using the Laser.

This function allows the program to pause briefly as the Router/Spindle reaches the correct RPM. Adjustment is needed to prevent the laser from turning on for the same duration and burning the material. To make these changes, please follow these steps:

Press MENU
Highlight MACHINE SETUP and press OK to select
Scroll down and select SPINDLE SETUP, Then select the SPINDLE DELAY
The default setting here is typically programmed to 4000 (4-seconds)
Highlight that setting and press DELETE
Enter 0 and press ENTER

Use the Stop/Cancel button to go back one screen at a time to return to the main coordinate screen.

IMPORTANT - This setting will need to be returned to the Default 4000 Microseconds prior to resuming normal Router/Spindle operation.

The G-Code settings within the controller need to be verified for the correct function of the Laser On/Off process. To check these settings, please follow these steps:

Press MENU
Highlight AUTO PRO SETUP and press OK to select Scroll down and select GCODE SETUP
Scroll down to the SPINDLE
The setting here should be set to NTLLG
If changes are required: Highlight that setting and press DELETE
Highlight NTLLG and press ENTER

Again, use the Stop/Cancel button to go back one screen at a time to return to the main coordinate screen.

B58 Controller Operation (Elite series)

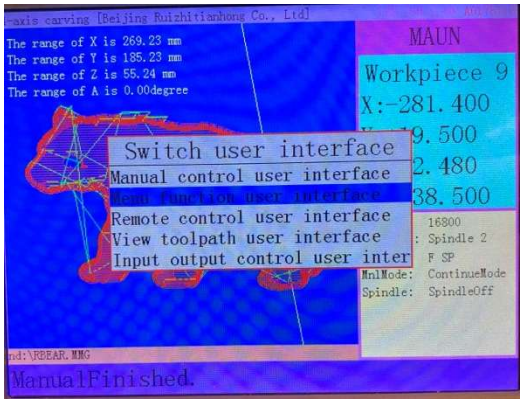
In this step, we will discuss the changes needed in the settings menu for the RichAuto B58 Controller.

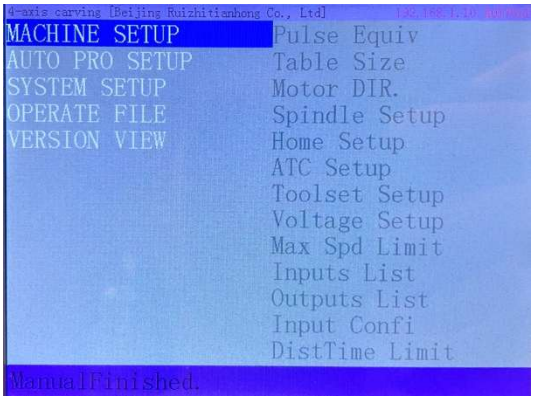
The Spindle Delay function will need to be deactivated, when using the Laser.

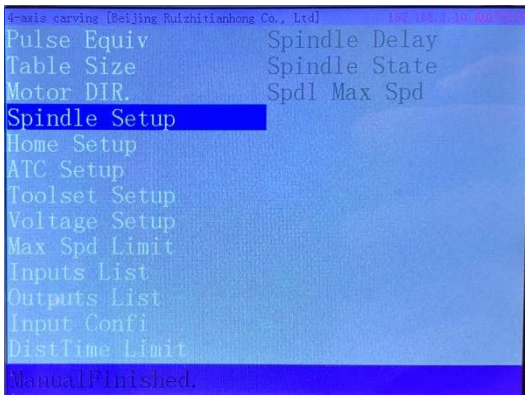
This function allows the program to pause briefly as the Router/Spindle reaches the correct RPM. Adjustment is needed to prevent the laser from turning on for the same duration and burning the material. To make these changes, please follow these steps:

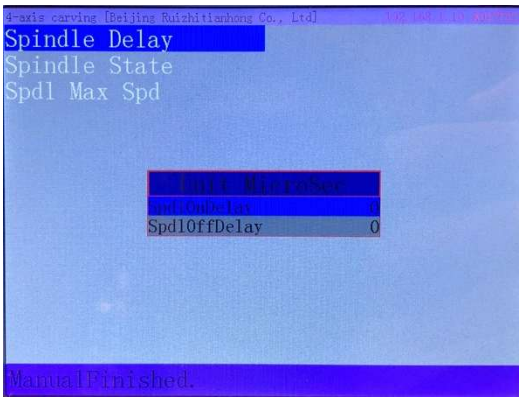
Press MENU
Highlight MACHINE SETUP and press OK to select
Scroll down and select SPINDLE SETUP
Then select the SPINDLE DELAY
The default setting here is typically programmed to 4 seconds Highlight that setting and press DELETE
Enter 0 Seconds and press ENTER

Use the Stop/Cancel button to go back one screen at a time to return to the main coordinate screen.









IMPORTANT - This setting will need to be returned to the Default 4000 Microseconds prior to resuming normal Router/Spindle operation.

Important Post Processor Information:

With the purchase of the J Tech laser accessory, there will also be a new Post Processor that will need to be installed into the VCarve or Aspire software.

Attached to the original invoice/tracking information for your order is a download link for the required post processor to use within the VCarve or Aspire software.

Be sure when saving your files to use with the correct post processor.

If you have not received this file, please contact Axiom Tool Group by calling 844-642-4902, or by email: support@axiomtoolgroup.com
Or simply download any of our available post processors by visiting: www.axiomprecision.com/post

Installing Post Processors (VCarve or Aspire)

To load these Post Processor files: (VCarve or Aspire)
Open the software, click File and select to Open "Application Data Folder".
Click and drag, or copy (Crtl+C) and paste (Crtl+V) the files into the PostP folder.
Once you have moved the file …if the software is currently running you will need to close and restart it before it will appear in the Post Processor list when saving your toolpath/s.

Laser Start Up

On initial startup of the laser, you will need to perform the following steps.

1. On the front of the SI module controller, press the small red RESET button. This will reset the laser interlock.
2. Insert the key and turn it to the right.
3. Press the power switch to ON.

The laser fan will start to run, and the left green LED will light up showing the laser is ready.

The mode selector switch should be switched to the right to accept signals from the controller.

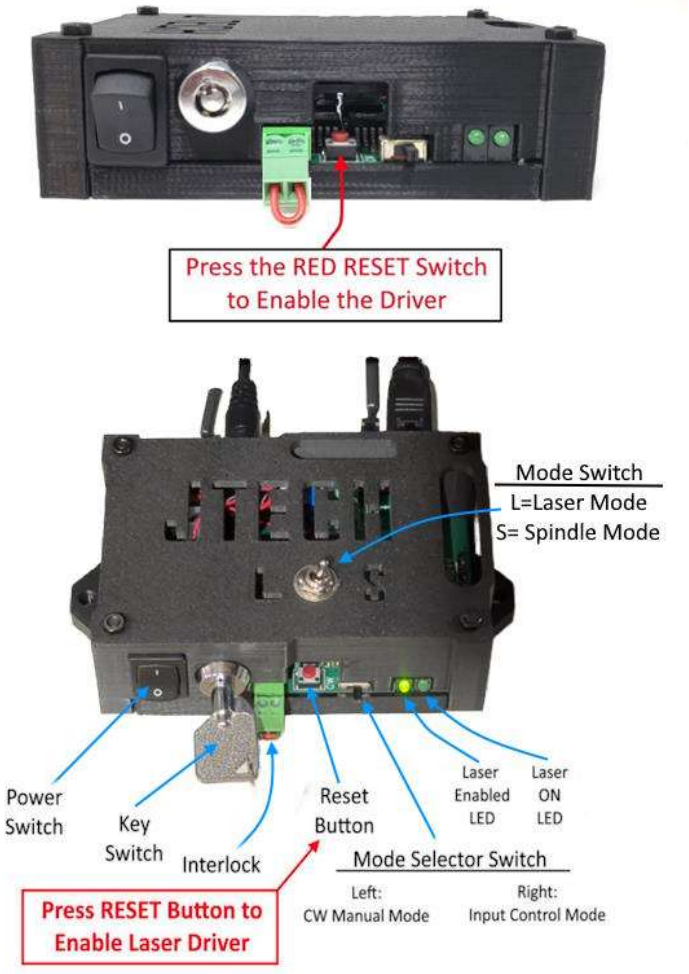
If you want to manually turn on the laser, turn the switch to CW manual mode on the left.

Note: The laser will only fire when it is pointed down towards the work surface.

For more information, visit our documentation page here: https://jtechphotonics.com/?page_id=602

For troubleshooting information visit:

https://jtechphotonics.com/?page_id=8541



Setting origin:

You may find it easiest to loosely fit a V bit into the spindle, which will act as a pointer when setting the XY-0 (ORIGIN). The distance between the laser and the center of the bit is approximately 80mm. Lower the bit to the designated ORIGIN location and set the XY-0. Then use the controller to manually move Y+ (80.00mm) to position the laser over that same point. Press XY-0 again to set the ORIGIN for the laser.

NOTE: 80mm is an approximate offset distance. Which may vary laser to laser. To find the exact offset see the steps below under offset calibration.

Since this laser has a 4" focal length (measured from the body of the laser, not the lens) the gap between the material and the laser shroud should not exceed 1/8". Jog the shroud to the correct operating height, and depress Z-0 to set. You may use the included Z set up chip to help with this operation. Remember your Z origin should always be set to the top of your material in your initial design set up.

Finding your lasers offset

The offset from the center of the spindle to the center of the laser should be roughly 80mm. It is recommended that you find your lasers exact offset. After you have found your lasers offset take note and use those settings when setting up your laser. Use the following the steps below to find your offset.

Begin by securing a scrap piece of material to your table. Attach the laser head and set it to the proper focal length above the material. Using the Spindle button on the controller quickly turn the laser on and off to allow it to just mark your material. Be sure not to jog the machine in the X or Y axis. After a visible mark has been made set this position to 0.0 for X&Y by pressing the XY-0 button on the controller. Remove the laser and insert a V bit into the spindle. With the V bit inserted jog, the machine in either X or Y until the V bit is over the mark made by the laser. Now looking at your controller take note of the new numbers displayed. These will become your new offset setting. The numbers for the Y direction will display as -Y but will need to be changed. When setting your offset, you will want to change this to +Y for example if your controller reads Y -78.500 & X + 1.500 then the new offset will be set at Y +78.500 & X +1.500 when setting up your laser.

Tips for Laser operation:

Note: Vectric's Laser modular will not support the use of your J Tech laser.

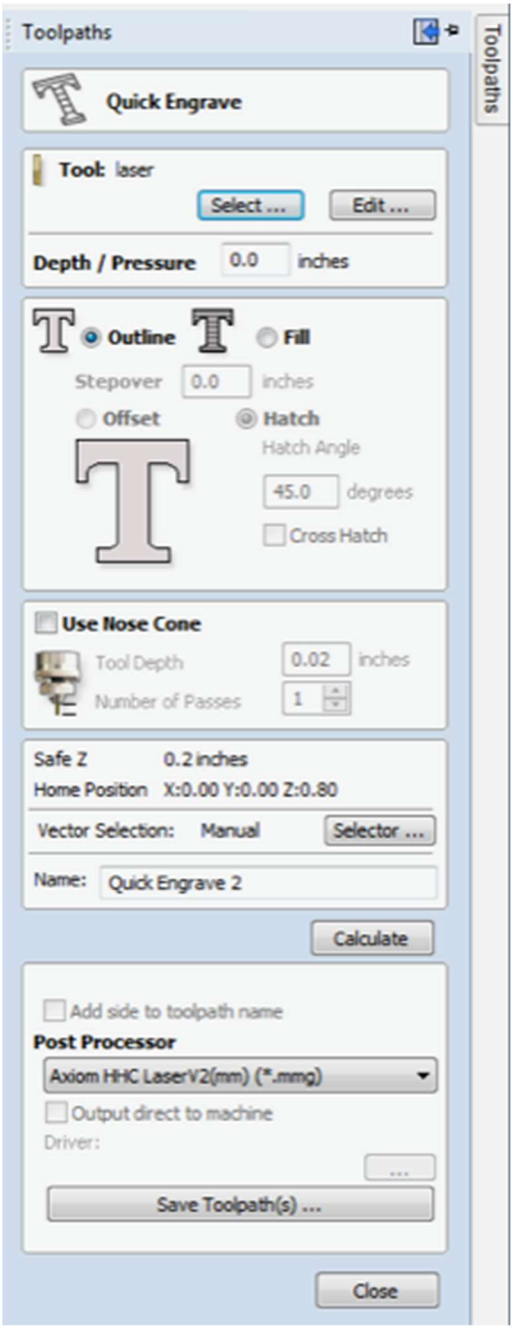
We recommended that you use the Quick Engrave tool path with the following settings:
Hatch Angle = 45deg, Fill option selected
Feed-rate = 100 inch per minute
Set the Laser shroud to approx. 1/8" from the surface of the material for optimal focal length. Beam diameter at optimal focal length = .012"

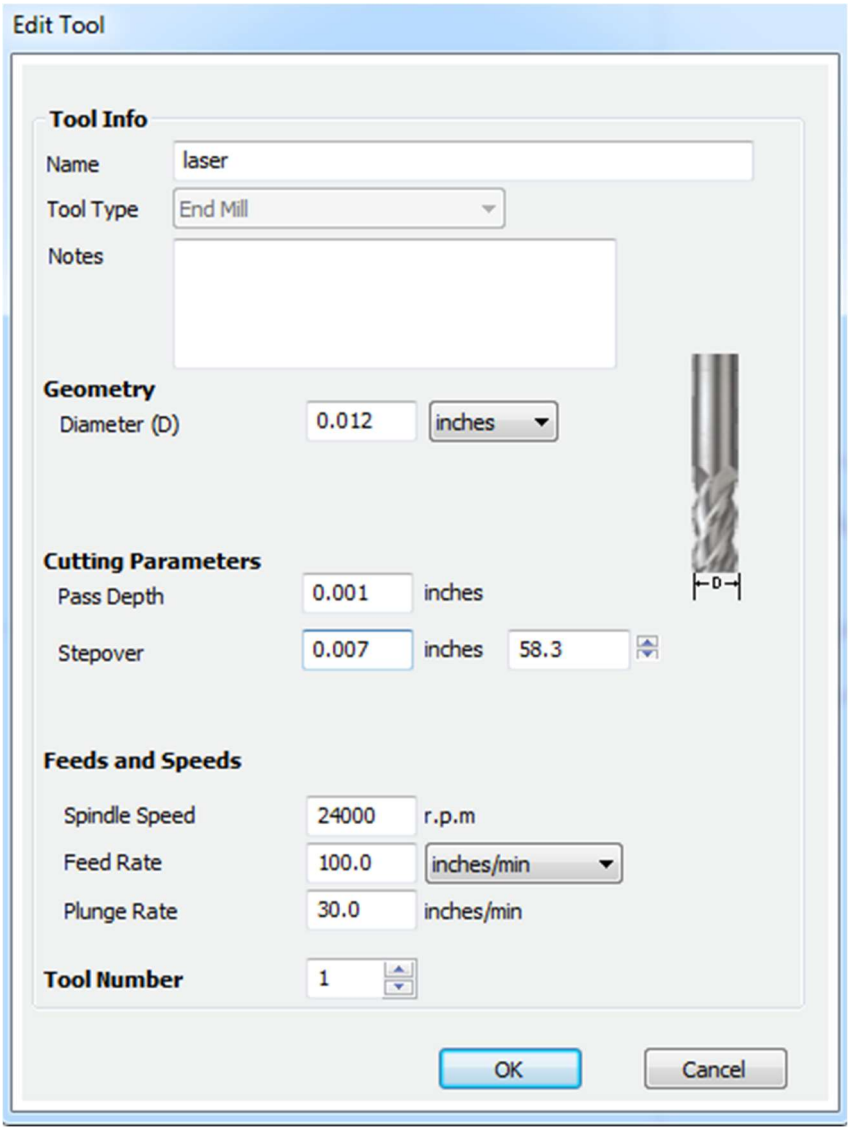
When engraving, set feed rate to 50-125ipm (Inch Per Minute) When cutting, set feed rate to 5-10ipm (1/8" thick material at most)

It is required that a new tool is created within the tooling library and labeled as Laser. A standard End Mill is ideal with a diameter of 0.012" and a pass depth of 0.001"

Stepover can vary, to allow lighter or darker fill and can be adjusted within the Quick Engrave tool-path. During testing a 75% step over was used with great results* (See image on next page)

Additional setup recommendations and support are available at https://jtechphotonics.com or be sure to Subscribe to the Axiom YouTube channel for setup and training videos.





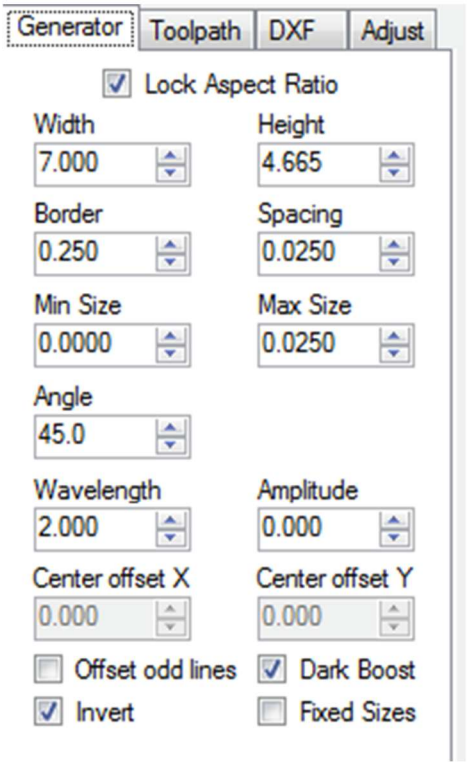
Half-toned Images

Using half-toned images will allow you to create etched photos on a variety of different materials. Use the provided link to download the free half-toner software. Remember, different materials will burn at different rates, so setting will vary depending on the material being used.

Start by downloading the free Half-toner software from the link below.

http://jasondorie.com/page_cnc.html

Click on Download Halftoner V1.7 to download the software. After the download has completed you can open the software and click the Load image button to import an image. Use the settings listed below as a starting point then adjust them till you get the desired look for your image.



After your half-toned image has been created, save it using the DXF tab. Note: Saving your files as a .png will help to reduce the calculation time in the Vectric software and this will provide a more accurate vector creation.

Import your image into the Vectric software and use the Bitmap tracing tool to create the vectors. After your vectors have been created you can use the quick engrave toolpath with your laser tool selected to create your toolpaths.

Be sure to visit our YouTube channel to watch the full video tutorial on using this technique.

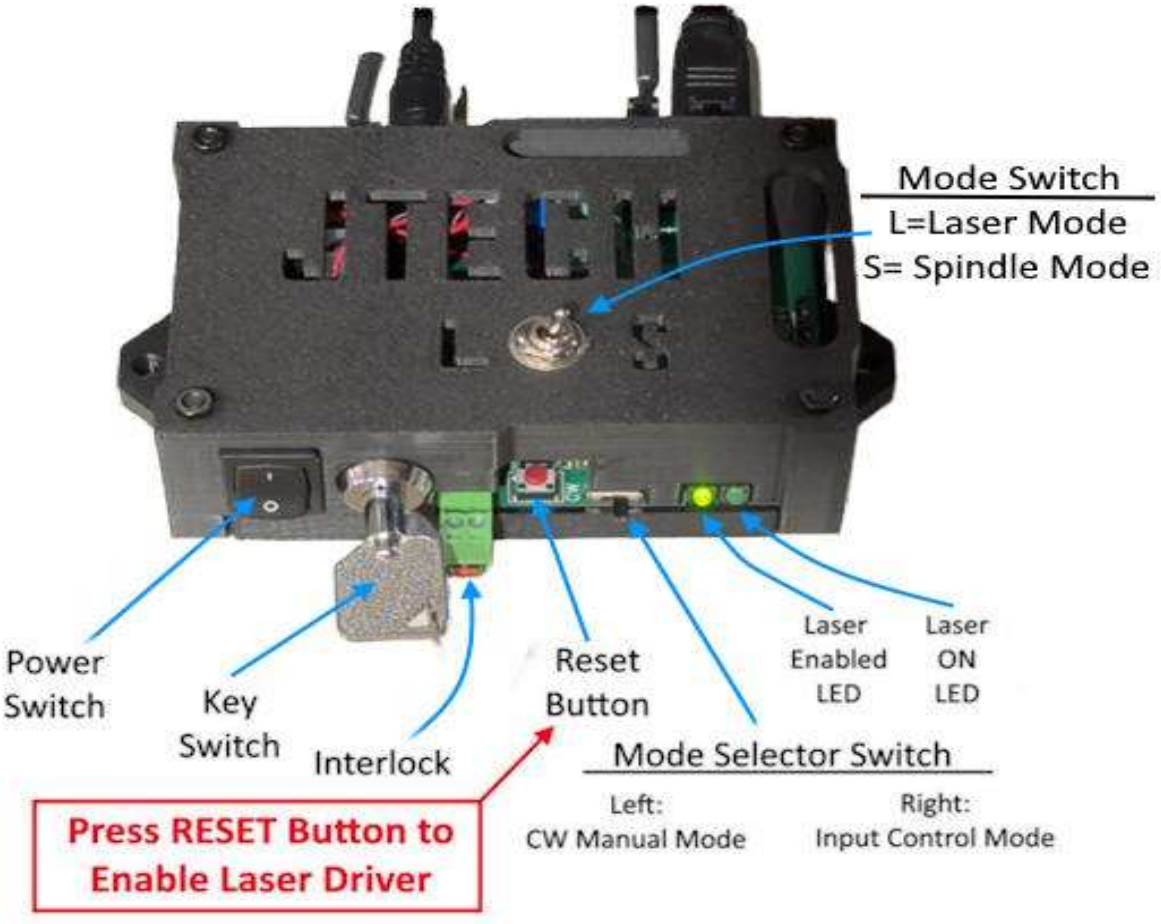
YouTube Tutorial link: https://www.youtube.com/watch?v=1qu6l7clWP4

Troubleshooting FAQ

My black SI module box does not turn on – Make sure the green interlock plug is secure in the front of the SI module and the power cable is connected and plugged in with the LED on the power brick on. Press the RED RESET switch on the SI module. It should turn on the SI module with the laser fan running and one green LED on the left on.

My laser is always on. I can't get it to control with a file – Make sure the small black switch on the front is turned to the RIGHT. If it is to the left, it will be in "manual" CW mode and always be on. It needs to be in "input control mode" from the picture below.

My laser is on the mount and pointed down, and my reset button is pressed, but the laser still won't turn on - Make sure your power adapter is pushed in all the way and is not loose. Also, make sure your laser is seated on the magnet base plate and is pointed down. Check your connections to the black SI module and verify the cables are connected fully. Make sure the green interlock plug with the red wire is secure as well.



Contact Us:

For software related inquiries, training videos, software updates, free projects and more…visit Vectric Ltd directly at:

http://support.vectric.com

Having trouble setting up your laser? Contact Axiom Support at:

support@axiomtoolgroup.com

Need Assistance with your laser? Reach out the J Tech Team at:

support@axiomtoolgroup.com

customerservice@jtechphotonics.com

Stay up to date with the latest Axiom news, product information, tutorial videos, customer projects and more.