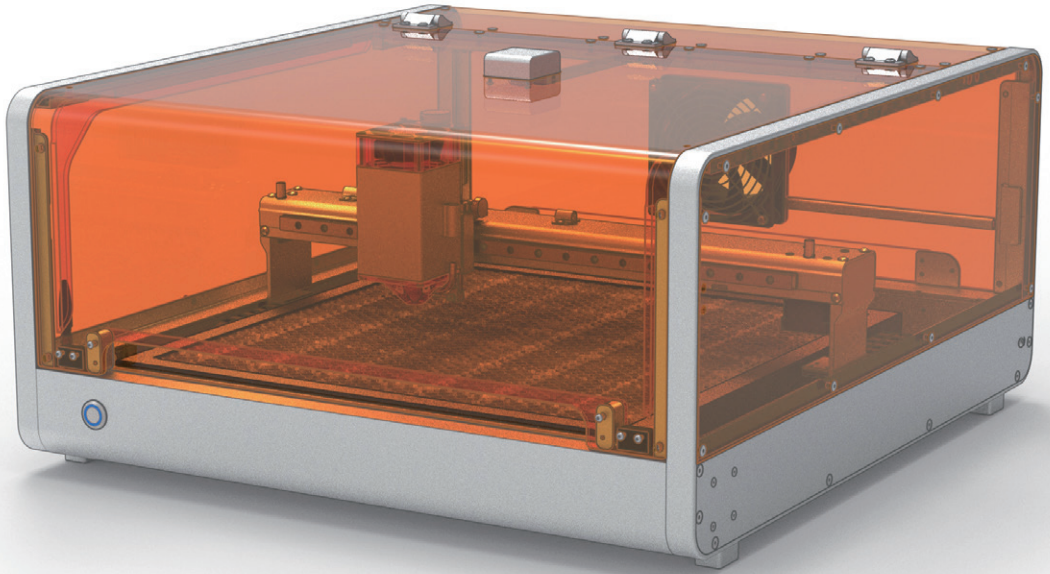
Roly

USER MANUAL

Laser**MATIC**



To Roland Anderson

WELCOME

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A Few Words on Safety

Laser safety

AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION.
CLASS 1 LASER PRODUCT

Warning: Physical injuries or damage to the machine may be caused by laser emission if you do not follow these instructions.

- Proper assembly of the enclosure is critical for intended operation. If you wish to use the machine without its enclosure, please wear proper eye protection;
- Some materials emit toxic fumes when hit by laser. Do not engrave or cut any material containing PVC or vinyl, or other materials that contain chlorine/chloride;
- Make sure your workspace is well ventilated. We recommend venting the exhaust outdoors; and
- Do not operate the machine when any part of it is removed. Removing part(s) may expose the laser system and cause damage to the machine.

Fire safety

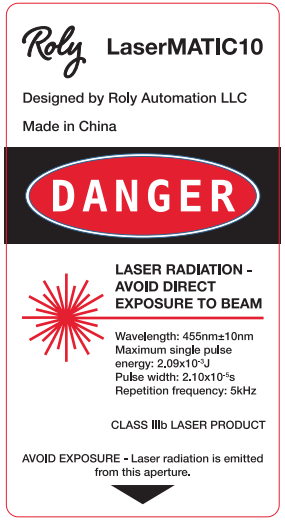
- This laser can light wood and other materials on fire. As practical advice, avoid cutting at speeds below 2mm/s (120mm/min). Use multiple passes instead;
- Serial communication can unexpectedly fail. In some situations, this can cause the machine to pause in place with the laser still firing, which in turn can result in the laser lighting materials on fire. **Do not leave this machine unattended while it is working**; and
- Use air assist when cutting to reduce the likelihood of fires.

General safety

- Do not touch any moving parts of the machine while it is in motion. This includes the pulleys, timing belts, drag chains and X/Y-axis. Do not attempt to physically stop the machine while it is in motion;
- Disassembling or modifying the machine's structure can compromise its ability to operate safely;
- Operating the machine outside its original parameters, such as changing maximum feed rate settings, can result in damage to the machine; and
- Do not touch the circuit board, power switch contacts, or other electrical components while the machine is connected to a power supply, as doing so may damage the machine and cause electric shock.

Labels and warnings

Please pay attention to the following labels placed on the laser engraver:



This label to the left appears on the side of the 10W laser module. A similar label appears on the 20W module.

This label appears on the frame of the machine.

We Are Here to Help!

Thank you! You placed a lot of trust in us with your LaserMATIC purchase, and we are committed to helping you make the most of your investment. We offer two technical support options, and want to work with you to get this machine in great working order and maintain it as such.

Book a video troubleshooting session (recommended)
Book a free 30-minute video troubleshooting session at ***calendly.com/rolysupport***. Slots available for after 8pm and before noon Eastern Time. We can do Zoom, Microsoft Teams, Google Meet, Skype, or set up the teleconferencing software of your choice.

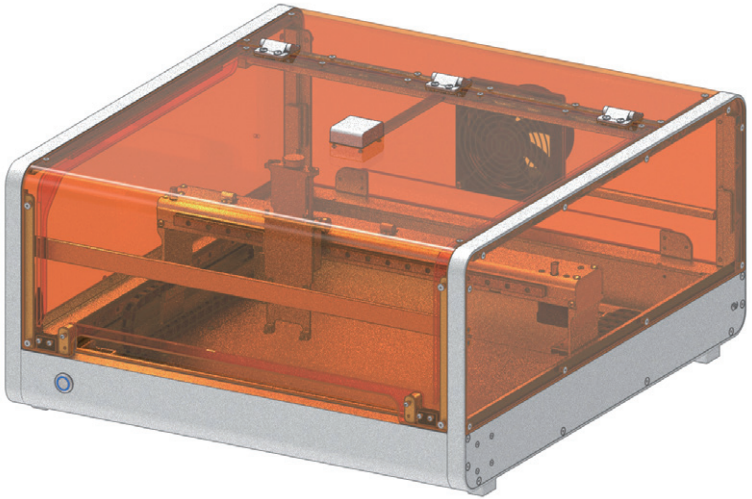
Send us an email
We'll respond within 24 hours to general and tech support emails at ***support@rolyautomation.com***.

We appreciate your business and are eager to earn your trust!

Cheers,
Leo, Founder

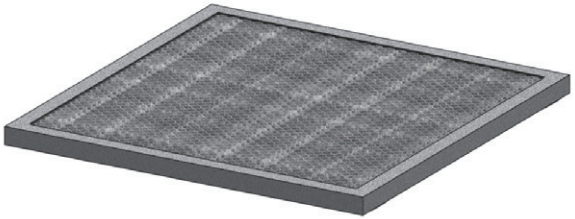
Package Contents - Box A

Your machine was shipped in 2 boxes. The box containing this user manual is Box B, and the machine frame is in Box A.



Machine frame with enclosure

Z-axis extension plate



Honeycomb panel

This machine has been carefully packaged to withstand moderate abuse during shipping. However, the unexpected can still happen. If you've received any damaged components, please send us an email at ***support@rolyautomation.com*** and we will send any needed replacements as quickly as possible.

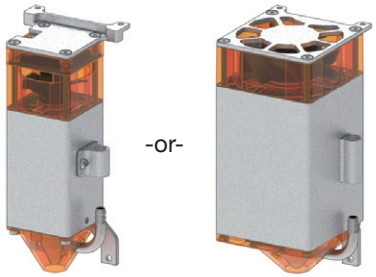
Package Contents - Box B

Core components

Our laser modules emit light in the 445nm range if you wish to purchase a pair of safety glasses.

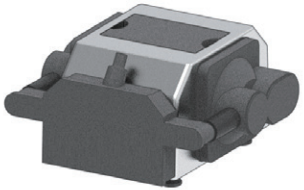
10W module

20W module or
30W module



-or-

Laser module (10W, 20W or 30W depending on machine model)



Air assist pump

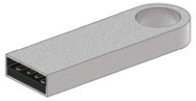
Starter material kit

Practice pieces to help you get started, please refer to *Recommended Parameters* on *pg. 22*.

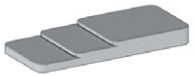
- 1/8” plywood - pine, bass and cherry
- Coated aluminum business cards in 5 colors
- Stainless steel pendants (x2)
- Factory calibration card

Important tools and accessories

We recommend copying files on the USB drive to a local folder on your computer before proceeding with the setup.



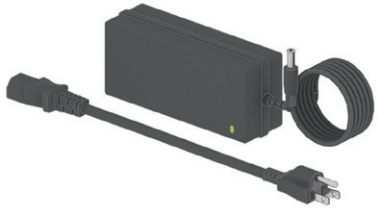
USB drive
for setup



-or-

Focus gauge
for 10W module

Focus gauge for
20W or 30W module



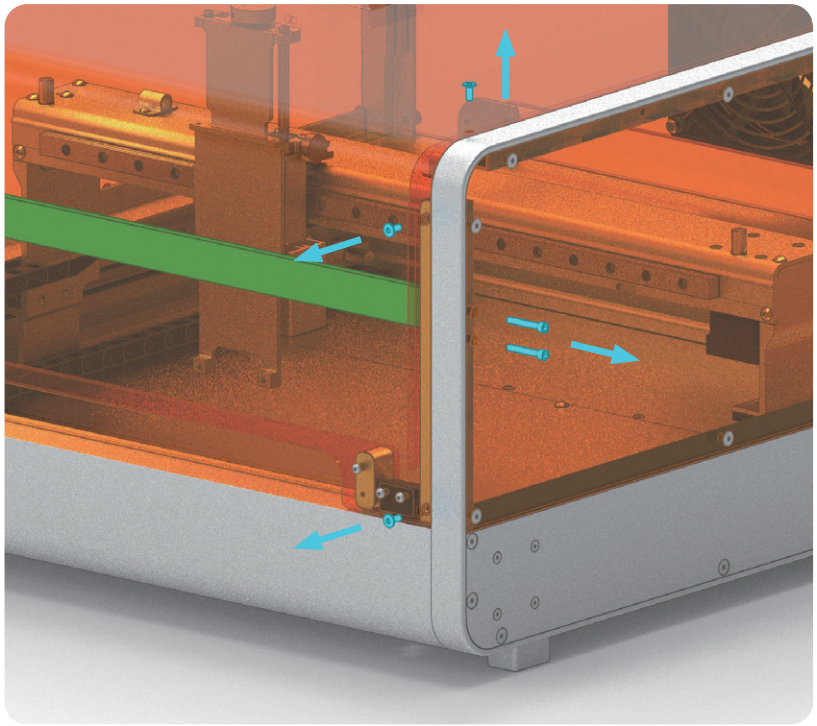
Power supply and power cord

Other items

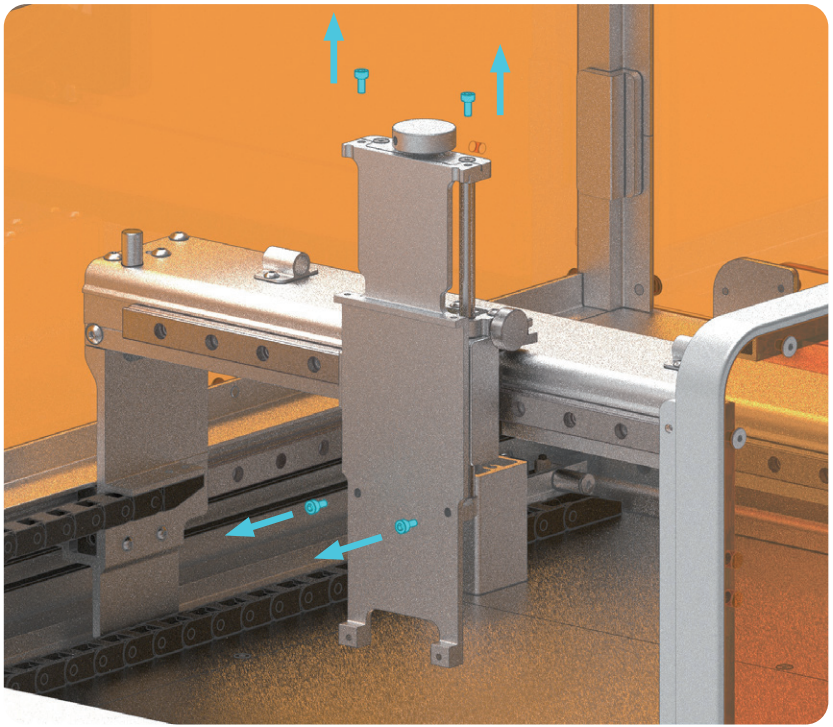
- Aluminum foil exhaust duct
- Allen keys for setup
- Microfiber cleaning cloth
- Zip ties, just in case
- 2-pin jumpers, insert into control board in place of enclosure lockout switches to disable laser lockout function (not recommended!)

Setting Up Your Laser

Your LaserMATIC traveled far to reach you! We buttoned things down to help with the rigors of shipping. A few screws have to be removed first.



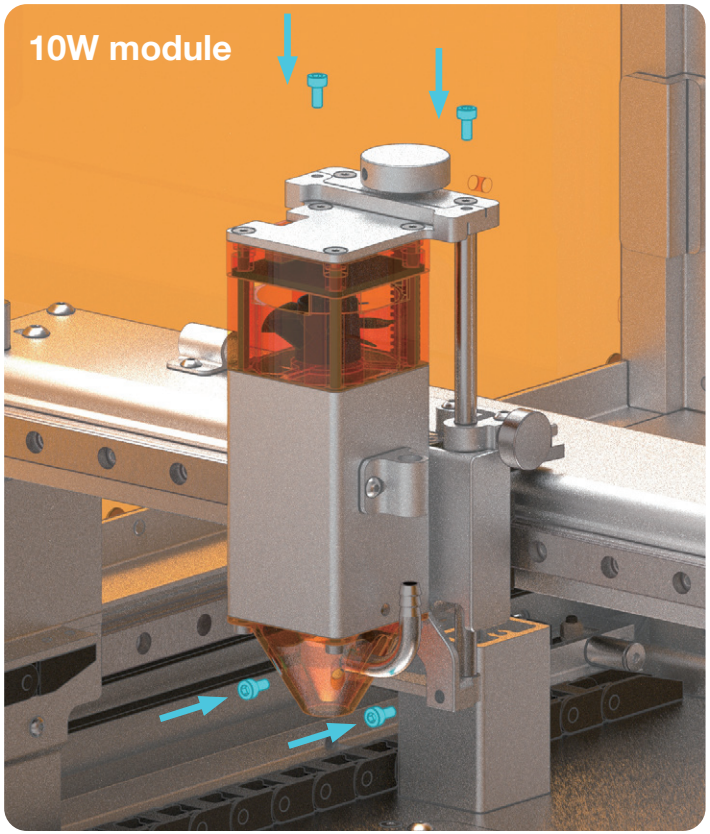
Remove 6 screws that are holding down the top cover, then remove the 4 screws securing the shipping brace going across the front of the machine.

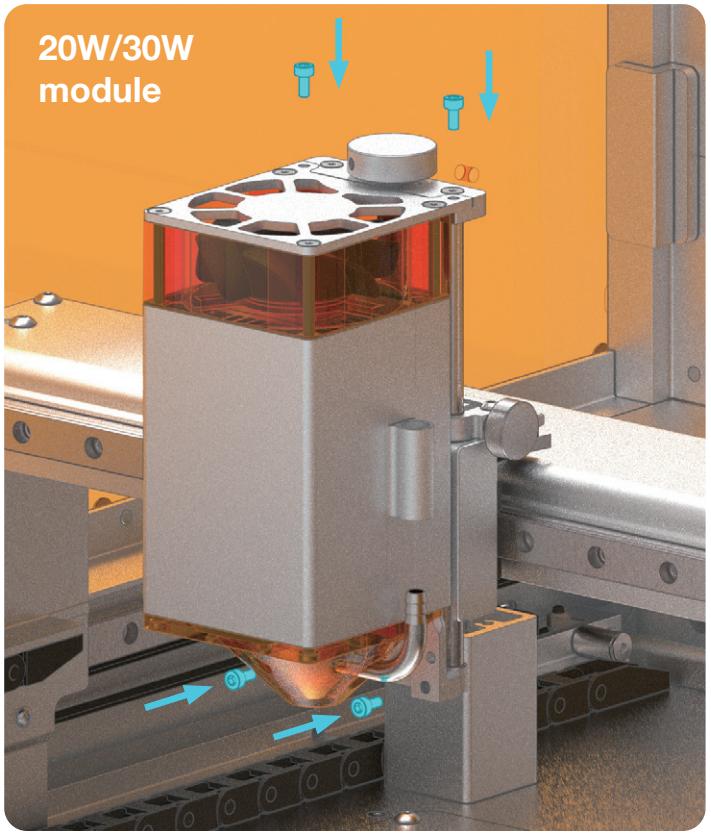


Remove the Z-axis extension plate. It may come in handy later. See *pg. 28* for more information. Hold onto the screws as they are used to attach the laser module.

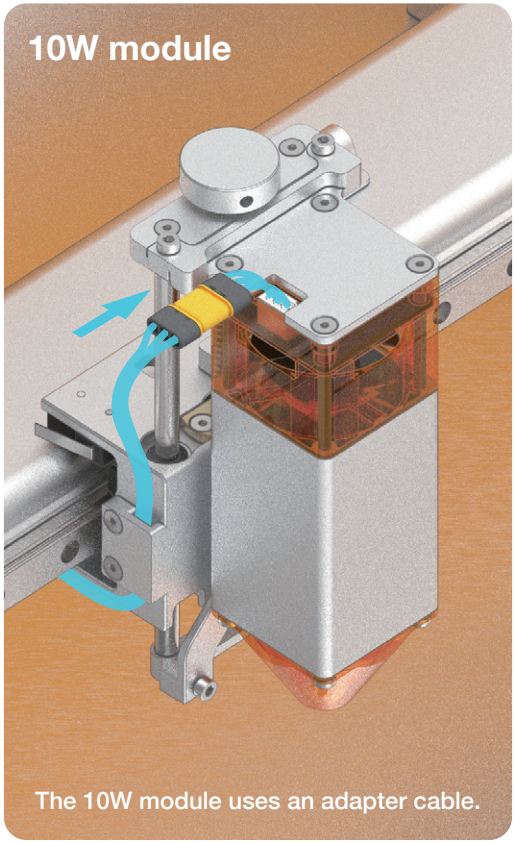
Installing the Laser Module

Use the four M3x6 screws that were holding the extension plate to secure the laser module.

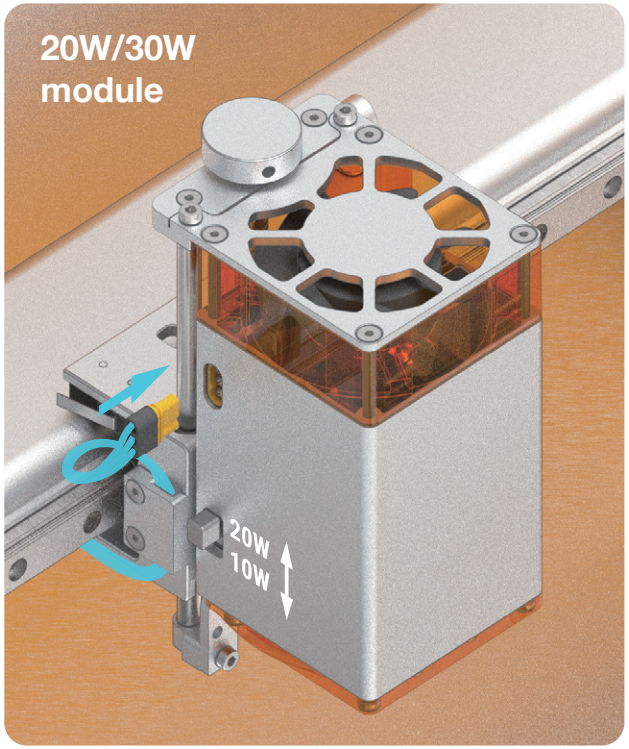




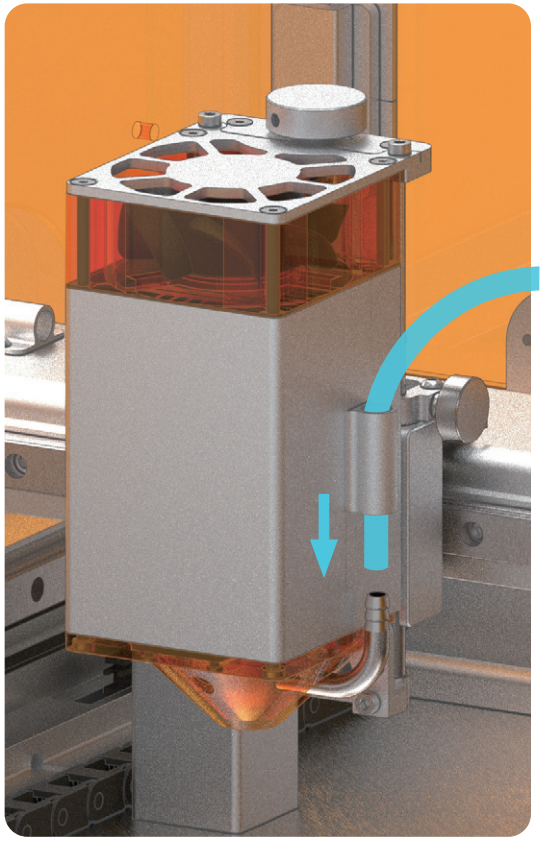
Plug in the laser module cable and hook up the air assist tube.



The 10W module uses an adapter cable.

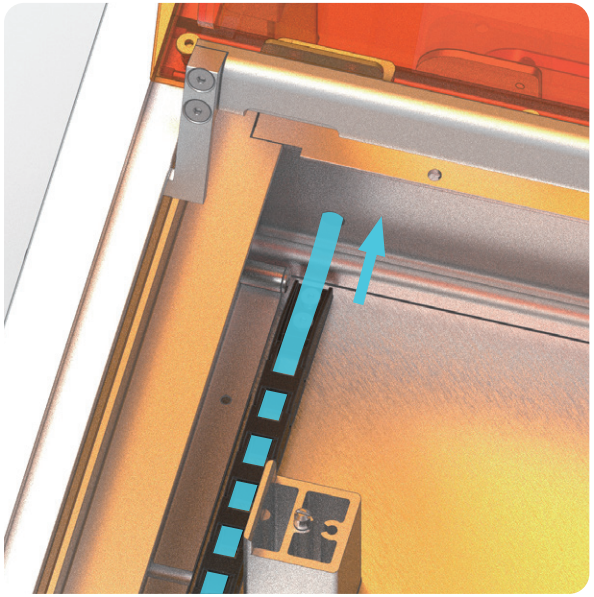


The 20W and 30W modules feature a 10W mode, where only 2 diodes are switched on to reduce the focus spot size, resulting in better results when engraving fine details. Toggle between the 10W and 20/30W modes with the switch located on the side of the module.

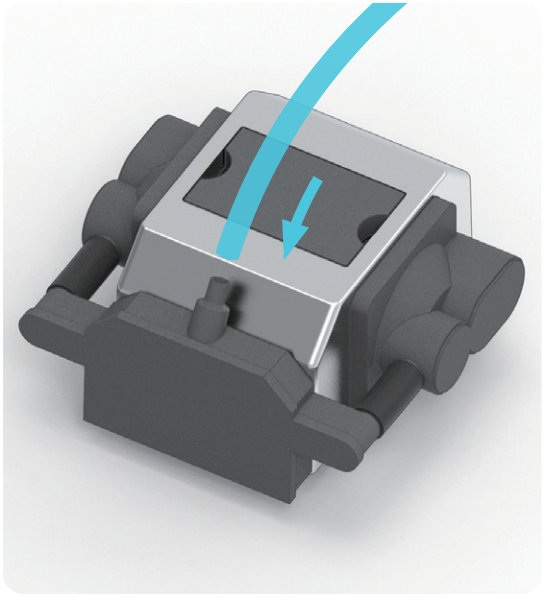


Connecting Air Assist Pump

The air assist can be controlled automatically by LightBurn or other engraving program using the M7 command. See *pg. 21* for more information.



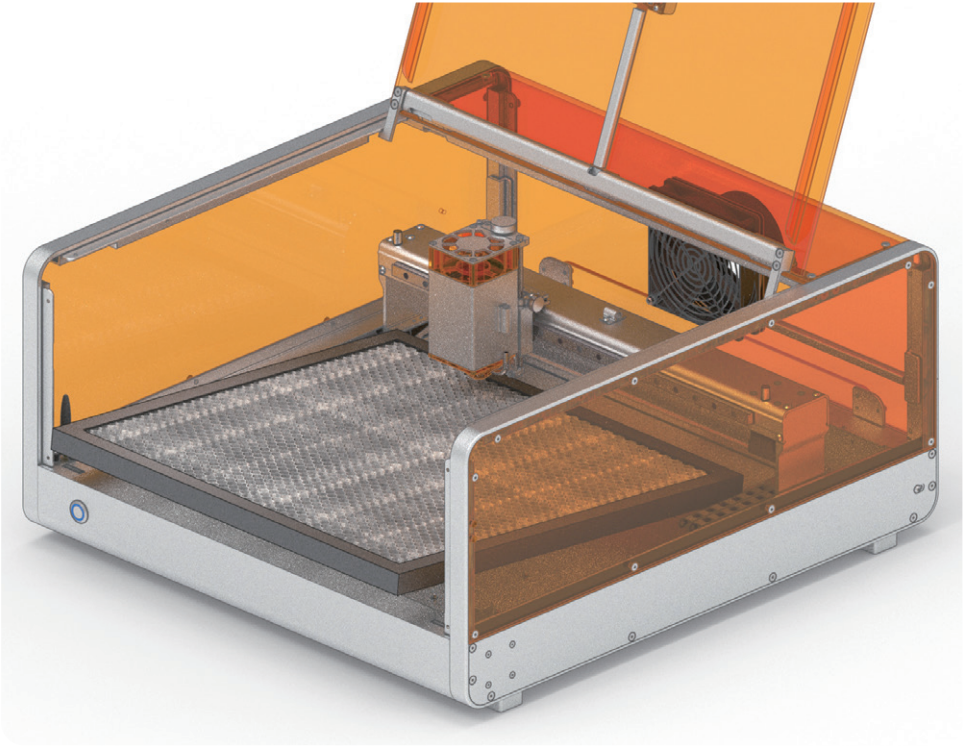
Thread the air assist tube through the hole on the back of the machine



Hook up the tube onto the air assist pump

Plug the air assist pump into the 24V output at the back of the machine

Honeycomb Table



Push the laser module towards the back and place the honeycomb table onto the support posts

Make sure that one of the screen-printed origins (metric origin is the primary datum) is located at the front left corner, and that the honeycomb falls onto the dowel pins. One or more corners may need a press for the dowel pin to engage and the honeycomb panel to sit flat.

Powering It Up!

Plug the provided USB cable into the USB Type-C connector, then plug in the power - that connector is at the back of the machine. Push the button on the front to turn on the machine, it should light up and the fans should start spinning.

[NOTE 1] The control board does not draw power from the computer via USB. Connecting it to the computer with the USB cable, without plugging in the power and turning on the whole machine as well, will not turn on the control board.

[NOTE 2] The exhaust fan and laser module fan will spin and the LED enclosure lights will stay lit as long as the machine is powered on.

Setup on Your Computer

The setup on your computer involves 3 quick simple steps.

1. Install laser engraving software

We recommend giving LightBurn a try, with LaserGRBL being a good free alternative.

2. Install driver for USB-to-serial chip (CH340 driver)

The LaserMATIC, like many other laser engravers and 3D printers, communicates with your computer through a serial communications chip, namely the CH340. A driver needs to be installed.

3. Import the device definition file (LightBurn only)

This step is extremely important, and can help save a bunch of time and streamline the setup process. The device definitions file is located on the setup USB drive that comes with your LaserMATIC, though we recommend keeping a copy of the file locally on your computer.

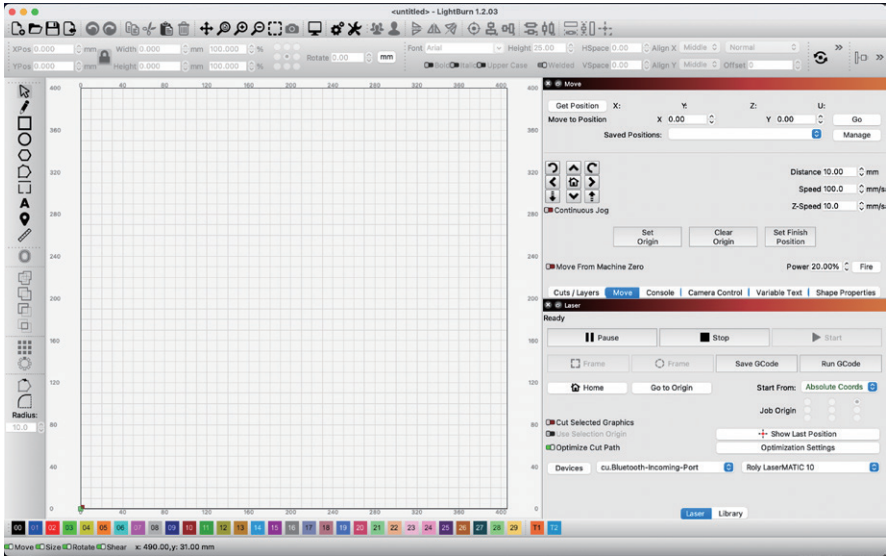
[IMPORTANT] The USB drive in your accessories kit contains all the files you'll need for the setup process. We've also included relevant links with each step if you wish to refer to online resources.

If you encounter any trouble setting up your machine, please contact us at ***support@rolyautomation.com***, or schedule a free tech support video call at ***calendly.com/rolysupport***.

[NOTE] An introduction to LightBurn is not within the scope of this user manual. If you are new to laser engraving, we strongly encourage you to check out one of many beginner tutorials on YouTube, including a few from the official LightBurn channel. That said, please refer to pages 16 and 17 which goes over some very important concepts.

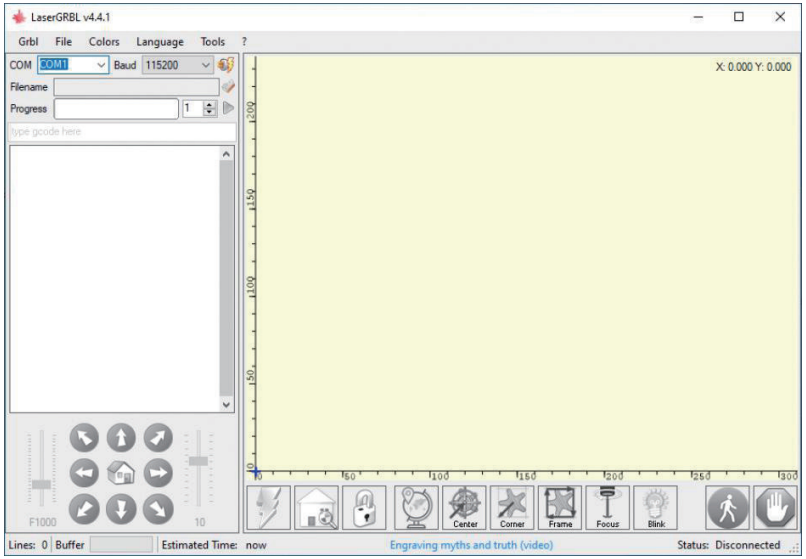
Installing Laser Engraving Software

We recommend using LightBurn. It is a fully featured and very powerful tool, and can best leverage the air assist and camera included with the LaserMATIC. It also has a dedicated rotary mode. LaserGRBL is a free and capable alternative. In theory, the LaserMATIC can be controlled by any software that interfaces with GRBL controllers using G-code.



LightBurn is widely considered the gold standard for operating tabletop lasers. Each license costs $60 and they offer a 30-day trial period. LightBurn supports Windows and macOS.

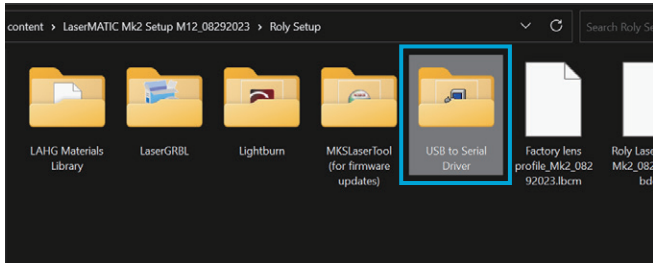
Install using the file provided in your USB or download the latest version at: *https://lightburnsoftware.com/*



LaserGRBL is a capable, free and open-sourced engraving program. It supports Windows.

Install using file provided in your USB or download the latest version at: *https://github.com/arkypita/LaserGRBL/releases*

Installing CH340 Driver

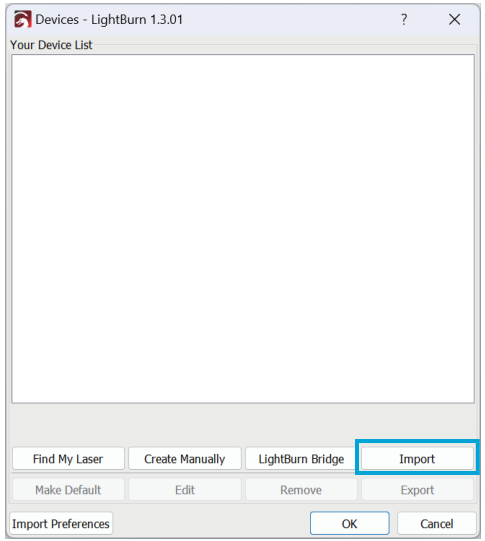


The CH340 driver is included on your USB drive. The installation is straightforward.

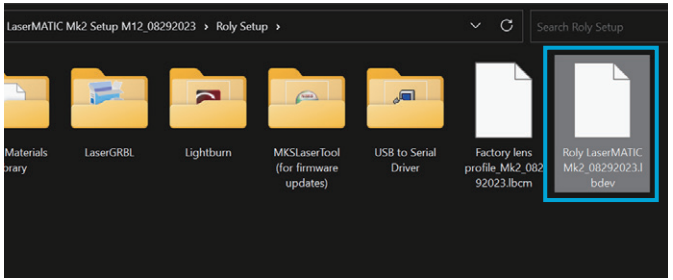
SparkFun has a very comprehensive guide: *https://learn.sparkfun.com/tutorials/how-to-install-ch340-drivers/all* which does a great job walking through the process step-by-step.

We recommend installing the driver with the machine powered on and connected to your computer, though this is not strictly necessary. A COMs port will not appear on your laptop (in Device Manager or LightBurn) until the machine is powered on and connected.

Import Device Settings (LightBurn Only)



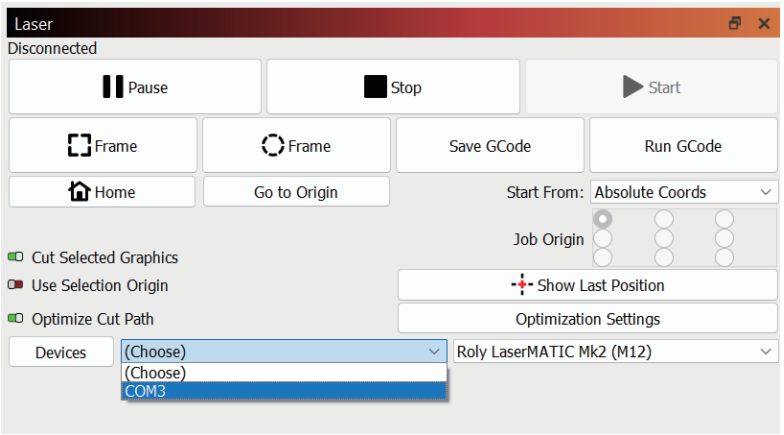
When you first open LightBurn, it will prompt you to set up a device. Choose *Import* and select the device definitions file ***Roly LaserMATIC Mk2_08292023.lbdev*** from the setup USB drive or a copy of the same on your computer. This file contains all the necessary settings such as size of work area, serial comms baud rate, rotary parameters, air assist settings etc. After the import, *Roly LaserMATIC Mk2 (M12)* will appear in your device list. If you have multiple devices in LightBurn, be sure to select the LaserMATIC from the dropdown in the *Laser* panel.



IMPORTANT

It is critical that this device definitions file is imported into LightBurn. Please do not proceed with the rest of the setup without doing completing this step. Simply put, things won't work without it.

Connecting to Your Laser



Check device connections on the *Laser* panel

Before doing your first engrave or cut, check to make sure communication has been established between the laser and your computer. On Windows, the connection should show up as ***COM3*** or similar. On macOS, it'll have a name similar to ***cu.usb-serial-210***.

If there is no serial port connection shown, then most likely the CH340 driver was not correctly installed.

[IMPORTANT] The LaserMATIC has to be powered on and connected to the computer via USB cable for the serial connection to show up.

[IMPORTANT] Some Type-C to Type-C USB cables may not work with some computers, such as MacBooks. If your computer only has USB Type-C ports, we recommend using the provided USB Type-C to Type-A cable in conjunction with an adapter or dongle.

Not seeing the connection? Based on our experience, the following are the most common causes for connection issues:

1. CH340 driver is not installed. The driver is included on the USB that came with your laser;
2. Device definitions file was not imported, which means serial baud rate is likely still set to the LightBurn default of 115,200. The LaserMATIC uses 250,000;
3. The laser is not powered on. The control board cannot be powered by the computer via the USB cable. The whole machine has to be powered on (power button glowing blue);
4. Wrong USB cable plugged into the computer. The LaserMATIC has two USB cables, one for the camera and one for the control board. Make sure it's the control board that's connected to the computer;
5. Not using an adapter for computers that only have USB Type-C ports, such as MacBooks. If your computer only has Type-C ports, use an adapter or dongle with the provided cable instead of using your own Type-C to Type-C cable;
6. Unsupported operating system. Linux and virtual machines are currently not officially supported, though they can be made to work; and
7. Bad USB cable. It's possible that the cable which came with your machine is bad. Try a different cable. We can order one for you if needed.

Homing and Different “Start From” Modes In LightBurn

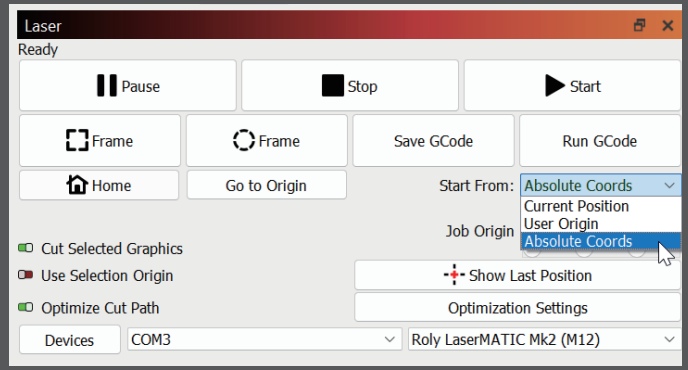
IMPORTANT

At this point in the setup process, you should be able to manually jog the laser around. Congratulations! As you run your first program, the machine may move in unexpected directions and crash into the edges. To better understand what is happening, it may help to familiarize yourself with the different *Start From* modes in LightBurn. There are some excellent videos online that go over this topic, and we recommend two in particular:

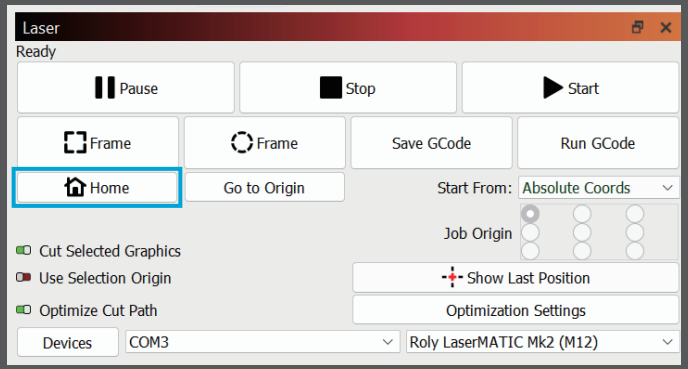
- *https://youtu.be/aphiLTUWcjE*, from the official LightBurn YouTube channel
- *https://youtu.be/T8DZLI1O0xo*, from Rich the Louisiana Hobby Guy

In short, LightBurn has 3 different modes to choose from when it comes to locating what’s on your screen onto the physical workspace of the machine.

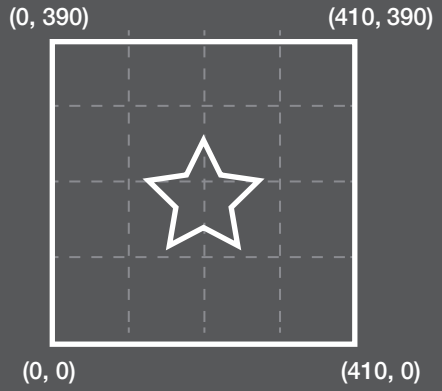
1. **Absolute Coordinates**: What you see on the screen is what you get on the work table. If a job or artwork is positioned at the center of your screen, then the machine will go to the center to engrave that artwork. This requires an absolute (0, 0) position to be established by homing the machine;
2. **User Origin**: Works like absolute coordinates except instead of anchoring to (0, 0), it will anchor to a previously user-set origin, for example (100, 100); and
3. **Current Position**: The machine starts the job at its current position, regardless of where the laser module is located, while still keeping track of its position in the background.



Different *Start From* modes can be selected using this dropdown in the *Laser* panel.



Home the machine to establish an absolute (0, 0) position. This is required in order to work in the *Absolute Coordinates* or *User Origin* modes.

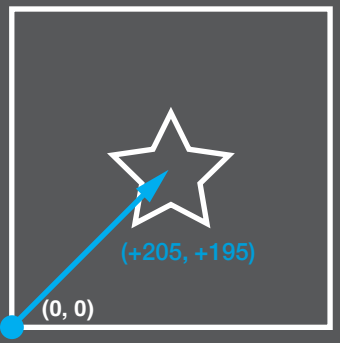


As an example, suppose we are to engrave a star, and it is located at the center of the LightBurn workspace as shown on the computer screen, at (205, 195). Below diagrams show how the machine will behave when working under each of the three *Start From* modes.

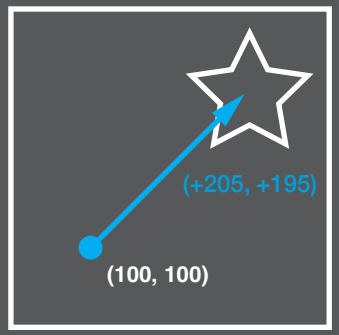
Problems can arise when moving the laser module by hand while working in *Absolute Coordinates* or *User Origin* mode. This is because the machine doesn't know it has been moved. It has no way of knowing its real time position other than homing which re-establishes the (0, 0) position.

Consider the following sequence of actions while working in Absolute Coordinates:

1. Machine is home to (0, 0);
2. User physically drags the laser to somewhere around (300, 300). The machine still thinks it's at (0, 0); and
3. User runs the star program. The machine starts moving up and to the right in order to reach the "center", and crashes into the top right corner.



A) Absolute Coordinates: The machine will move to the center. The finished star will be located at (205, 195).



B) User Origin: Suppose the user origin was set at (100, 100), then the finished star will be located at (305, 295).

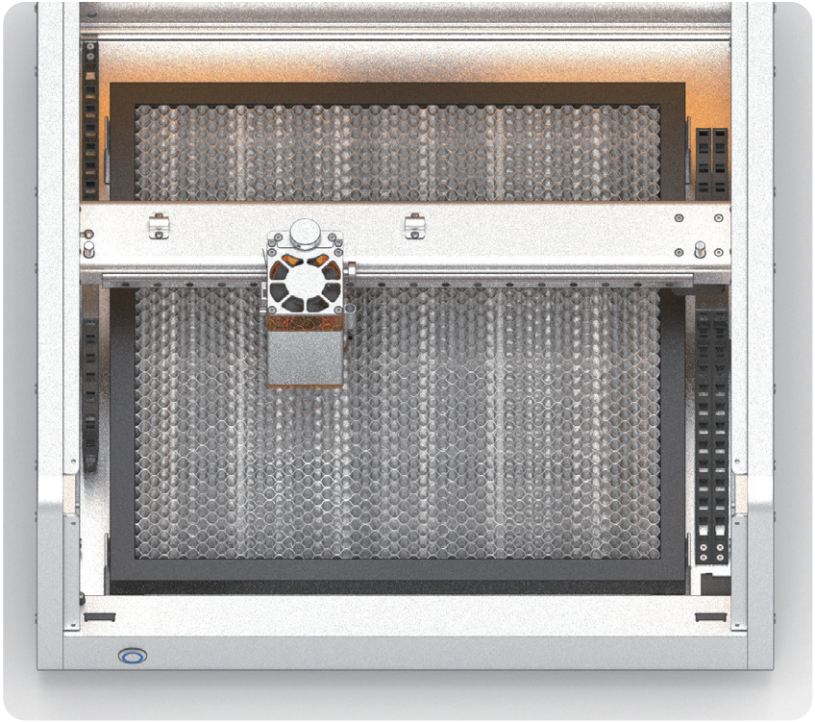
C) Current Position: The star will be wherever the laser module was at the moment of program start.

IMPORTANT

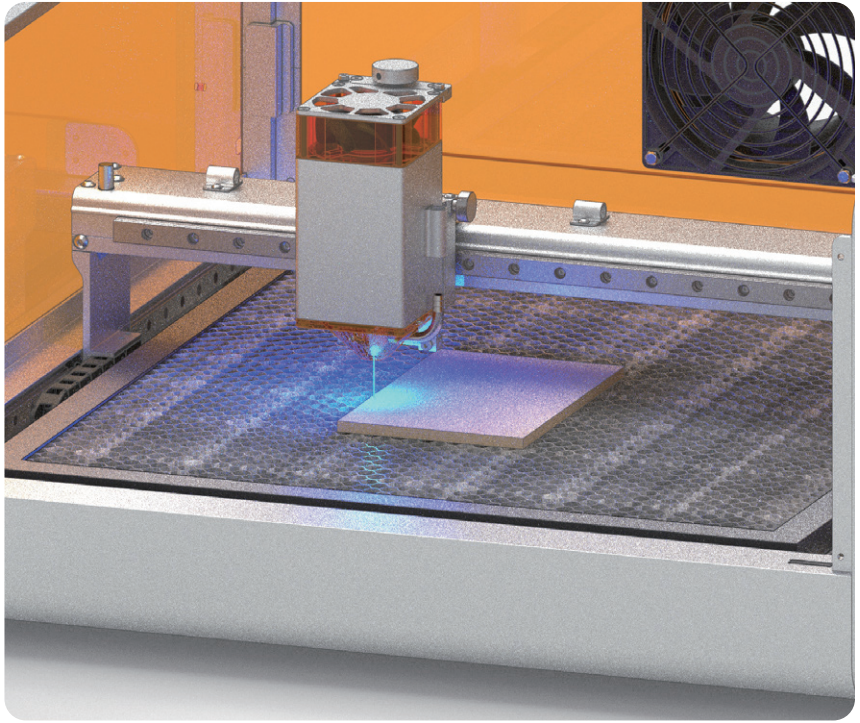
If the machine has crashed, be sure to manually pull the laser back toward the center a bit before homing.

Here is why. There are two limit switches on the X and Y-axis (four total). If either of the two limit switches on an axis is pressed down, the machine will not move that axis while homing. For example, suppose the laser has just crashed into the extreme right edge. If homed immediately after the crash, then the X-axis will not move and be "stuck" to the right edge, causing homing to fail. Manually pull the laser away from the edges makes sure none of the limit switches are triggered.

Locating Your Work Piece

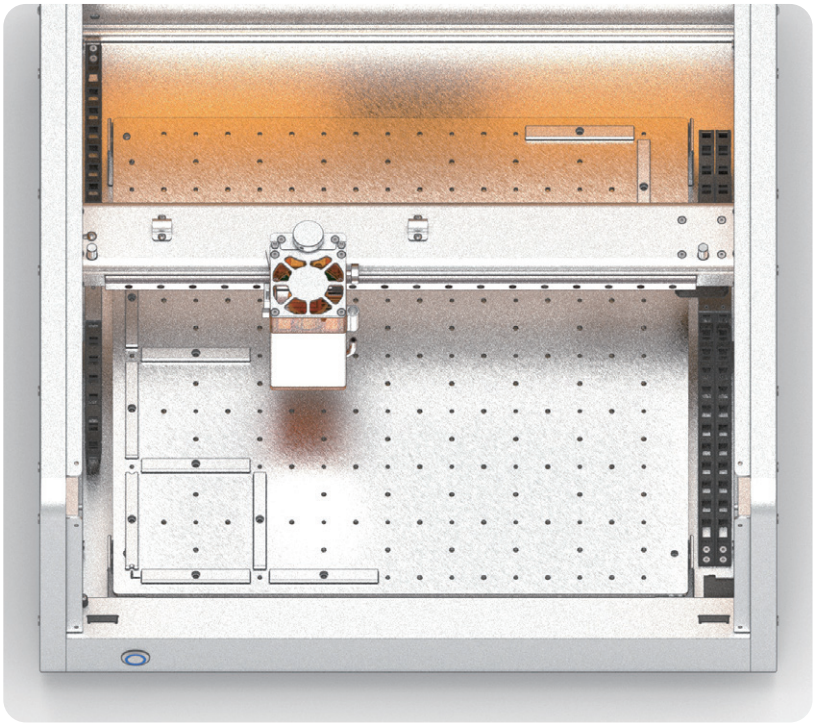


When working in absolute coordinates, the (0, 0) position matches up with the front-left corner of the honeycomb panel, within 0.020” or 0.5mm. Lining up your workpiece with this origin or against the edges of the honeycomb is usually a safe bet.

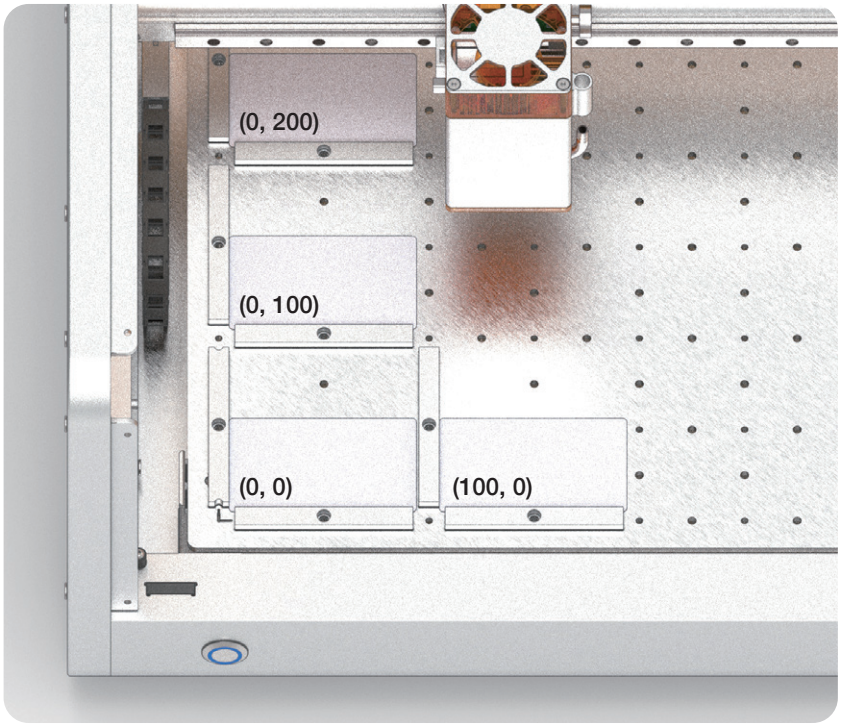


You can also tell where the workpiece should be positioned by using the *Fire* command in the *Move* panel. Jog your laser until it’s in a satisfactory position on the workpiece, and start from that position by using *Current Position* mode.

Using the jig table

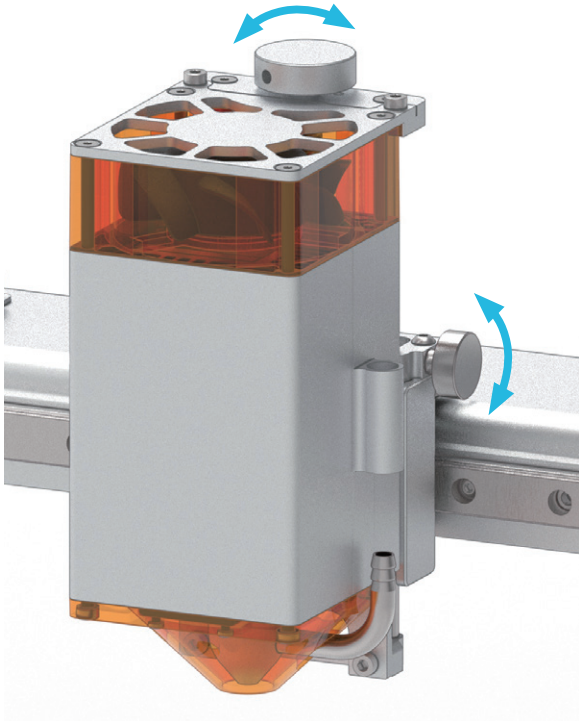


If you are looking to make multiple copies of the same part, we offer a jig table that can help. This platform goes on the support posts in place of the honeycomb panel, and comes with a set of movable bars against which to position your workpiece.



The movable positioning bars can be placed and secured at 50mm (close to but not 2 inches) increments. This allows you to locate pieces accurately. Link for the jig table: ***https://rolyautomation.com/products/jig-table-x53***

Adjusting Laser Module Height

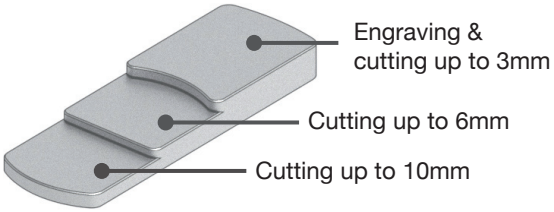


To adjust the Z-axis, first loosen the clamp on the side, then turn the adjustment knob up top. Clockwise to lower, counter-clockwise to raise.

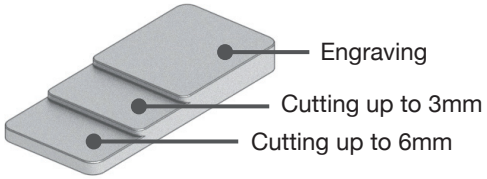
To focus your laser, place the focus block (included in the accessories kit) on top of the workpiece, then bring down the laser module until it just touches the top of the focus block.

For engraving, the focal point should be on the surface of the material, while for cutting it can be beneficial to lower the focal point into the material. This is why the focus block has 3 steps.

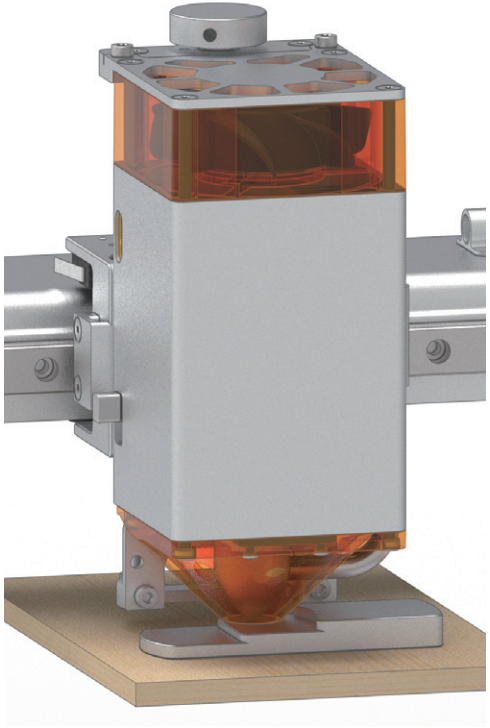
Lower module onto the indicated surface for:



Focus gauge for 20W/30W module



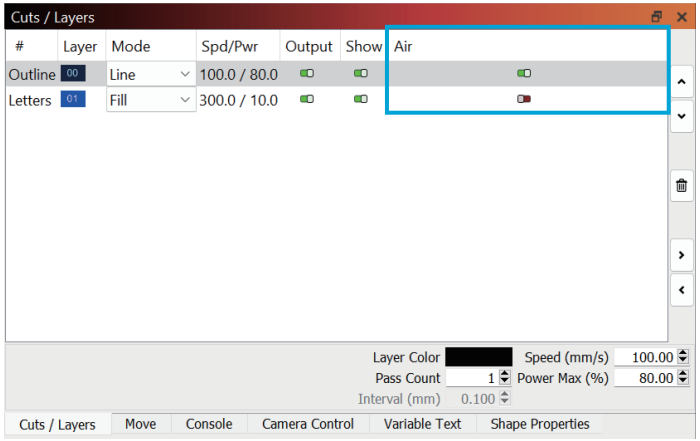
Focus gauge for 10W module



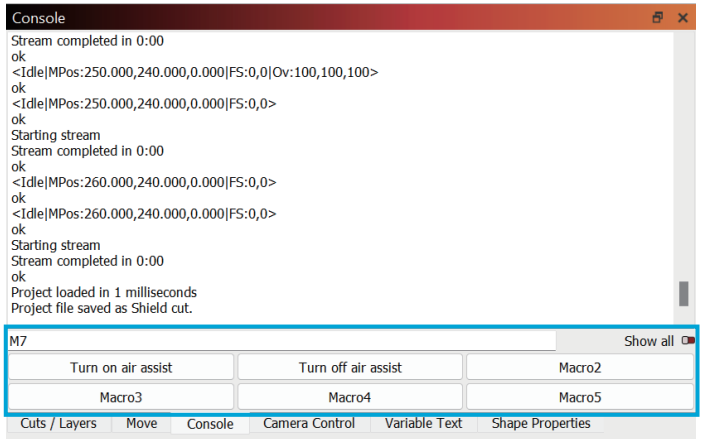
Touch the focus gauge with tip of the orange shroud or bottom of the Z-axis

Using the Air Assist

You can control the air assist in LightBurn in one of two ways. First is by toggling the *Air* option for each layer in the *Cuts/Layers* panel. The other option is to manually pass on commands to the laser via the *Console* panel. To turn on the air assist, issue the command: **M7**, and to turn it off, issue the command: **M9**. To make things easier, we've also added macro buttons for controlling the air assist.



The air assist can be toggled on and off in the *Cuts/Layers* panel.



Control the air assist directly by issuing the M7 and M9 commands through the *Console* panel

A word on the LightBurn console

The LaserMATIC can communicate with LightBurn via the *Console* panel. Upon power up, the machine will send a startup message with basic information such as device name, firmware version and Wi-Fi status etc. If an alarm is triggered, an error code will be displayed in the console, typically in red text. You can also issue commands to the machine via the *Console.* This will be used a few times throughout the manual.

Recommended Parameters

We've included a few common engraving materials with your LaserMATIC to help you get started right away! The table below contains feed rate and power parameters which serve as good starting points. Engraving speeds can be pushed higher at the cost of a slight degradation to image quality.

Material	Operation	Thickness	10W module (or 10W mode on the 20/30W module)		20W module		30W module	
			Speed (mm/min)	Power	Speed (mm/min)	Power	Speed (mm/min)	Power
Basswood plywood	Engraving	N/A	7200	40%	12000	35%	18000	40%
			12000	60%	18000	60%	24000	55%
	Cutting	3mm	360	100%	660	100%	840	100%
		6mm	180	100%	330	100%	420	100%
Pine	Engraving	N/A	7200	40%	12000	35%	18000	40%
			12000	60%	18000	55%	24000	55%
	Cutting	3mm	300 (2 passes)	100%	300	100%	390	100%
Cherry	Engraving	N/A	7200	25%	12000	15%	18000	20%
			12000	35%	18000	20%	24000	30%
	Cutting	3mm	300	100%	600	100%	780	100%
Stainless, uncoated	Engraving	N/A	1500 (dark black)	90%	3000 (dark black)	90%	4800 (dark black)	90%
Coated tumblers	Engraving	N/A	4200	80%	6000	80%	7800	80%
Coated business cards	Engraving	N/A	9000	30%	18000	30%	24000	30%

[IMPORTANT] We recommend always using the air assist when cutting any material, as it enables faster feeds and produces a cleaner finish. It will also prevent particulates from building up on the lens of your laser and reduce the likelihood of fires.

Engraving stainless steel

You'll have more success engraving stainless steel using lower laser pulse frequencies. You can lower the frequency to 1,000 Hz by issuing the following command through GRBL or through the *Console* in LightBurn:

```
$28=1000
```

If you wish to switch back to the default setting (10,000 Hz) for engraving other materials such as wood, send this command:

```
$28=10000
```

Louisiana Hobby Guy's material settings library

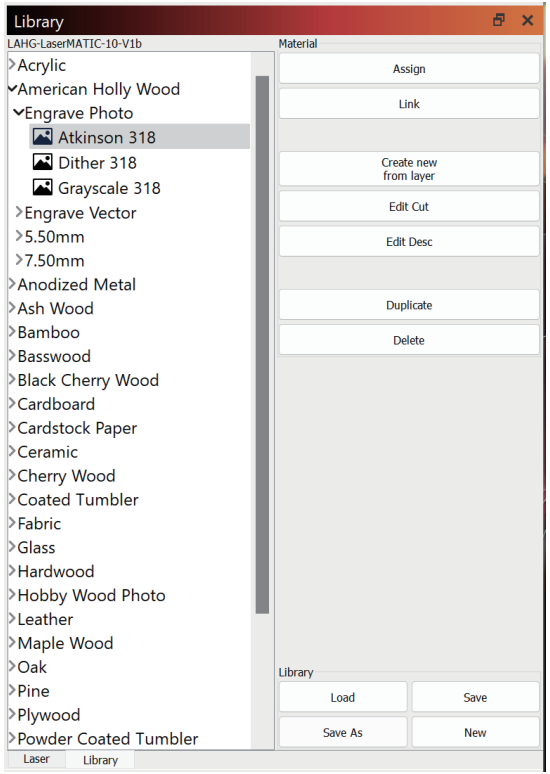
A more comprehensive materials library is included with your purchase of the LaserMATIC, courtesy of Rich the Louisiana Hobby Guy. At the time of writing in August 2023, the 10W library is included on the setup USB drive, inside the *LAHG Materials Library* folder. It contains speed and power settings for engraving and cutting a variety of materials. The 20W library is currently still in the works. Please shoot us an email and we'll send you a copy if it's not on the USB drive.

Taking the 10W library as an example, in order to load it into LightBurn, first **copy it from the USB drive onto your computer** as LightBurn needs constant access to the file. Then bring up the *Library* tab by going to *Window* on the top menu bar, choose *Load* and select the file ***LAHG-LaserMATIC-10W-V3.1.clb***.

To use the Library, select one of the layers in your LightBurn project, navigate to the relevant material in the *Library* tab, and hit *Assign*. Note cutting parameters in the library can only be applied to layers that are of the *Line* type.

Please allow us a moment to give Rich and his website a shoutout here! You may have run into some of his tutorial videos on YouTube. Rich updates this library on a fairly regular basis, and you can find the latest version of the library, along with a whole catalog of laser engraving files on his website: *https://engraveandcutfiles.com/*.

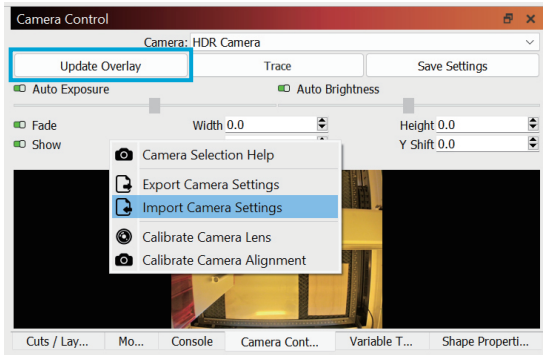
You can also check out his YouTube channel at: *https://www.youtube.com/@TheLouisianaHobbyGuy*, and his forum filled with old school charm at: *https://lahobbyguy.com/forum/*.



The library contains settings for a wide variety of popular materials.

Camera Setup (LightBurn Only)

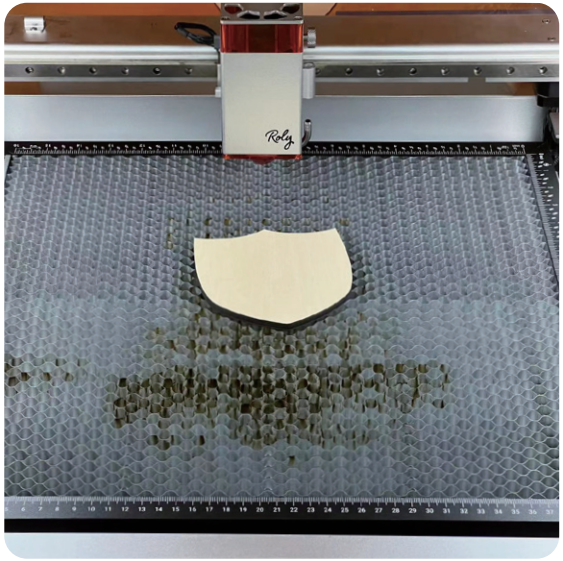
The camera is not required for regular LaserMATIC operation. However, it can help speed things up when working in LightBurn. The *Update Overlay* command in the *Camera Control* panel will project the camera image onto your workspace, allowing you to visually place a job onto the workpiece, taking the guesswork out of positioning and providing an alternative to using a jig table or repeatedly framing a project.



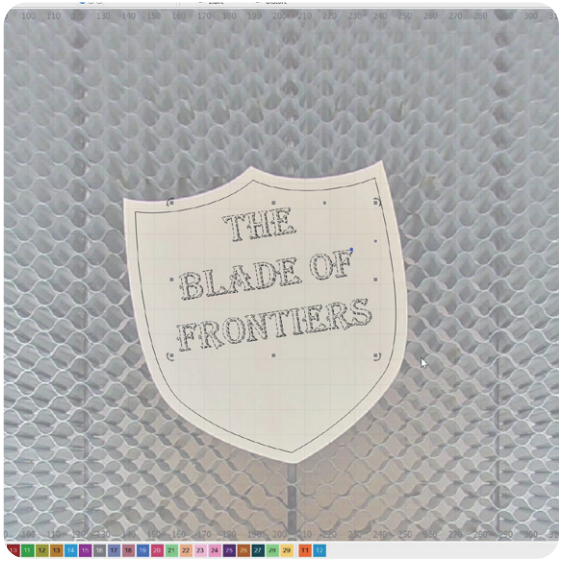
Above: the *Camera Control* panel in LightBurn.

- The *Update Overlay* command will project your camera image onto the work area; and
- Right clicking anywhere on the panel will bring up a menu with options to import and export camera settings.

Factory camera settings are included on the setup USB, it's the file named ***Factory Lens Profile-Mk2.lbcm***. Please import it now.



Matching artwork to a workpiece can be tricky and time consuming, especially if the workpiece is oddly shaped.



It can be a lot quicker to drag and drop your artwork onto the workpiece!

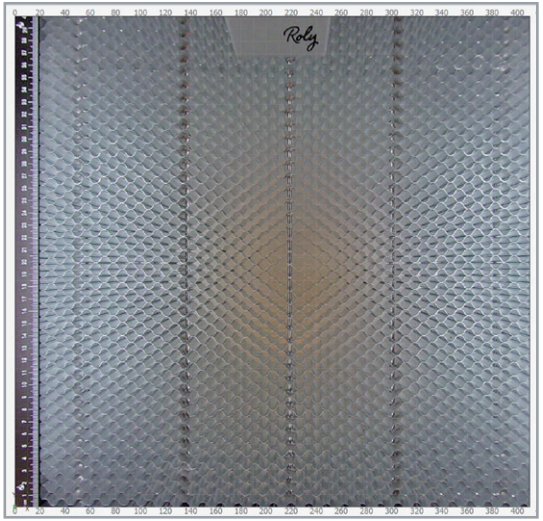
The camera is not perfect! If you need to be dead accurate to within 0.1-0.2mm, relying on the jig table or the (0, 0) position on the honeycomb panel is still your best bet. If properly calibrated, the camera can place images and texts anywhere in the 410x390mm work area with an error of 1mm or less. On certain parts of the work area, it can be accurate to 0.5mm or less.

Understanding camera calibrations

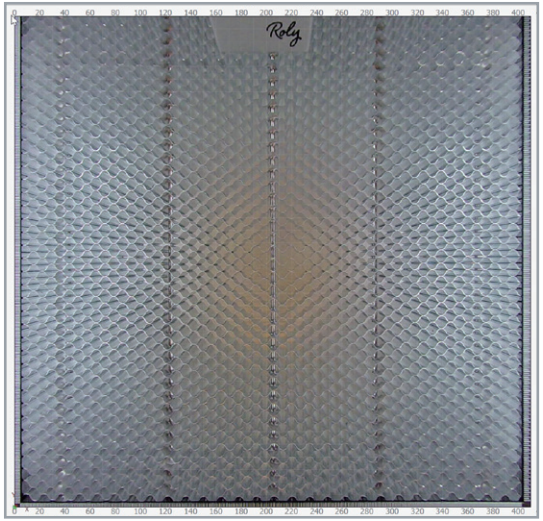
Using cameras with LighBurn requires setup, which normally involves two calibration steps, listed below. **With the LaserMATIC, you only have to perform alignment calibration**. Lens calibration was done at the factory and the results are included as part of the device definitions file (see *pg. 14*) as well as the camera settings file (see *pg. 24*). The screenshots below show what the camera overlay looks like after each step of the calibration process.

1. *Lens calibration:* Most camera lenses have inherent distortion. This calibration lets LightBurn collect data on the lens, and use it to compensate for lens distortion. When you imported the device definitions and camera settings, the lens data was also brought into LightBurn, so this step is to be avoided; and
2. *Alignment calibration:* each camera is mounted slightly differently. This calibration takes the position, rotation and tilt of the camera into account by engraving four location markers of known position, then aligning the camera image to these markers.

Raw camera image. Note the edges of the honeycomb are bowed outward. If this is what you see, import the camera settings file before proceeding further.



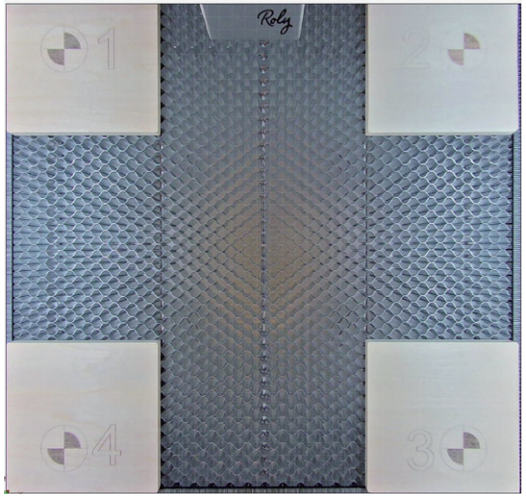
Camera overlay after importing the device definitions file (or factory camera settings file) into LightBurn. The edge of the honeycomb now appears straight. The honeycomb as a whole still appears slightly shifted.



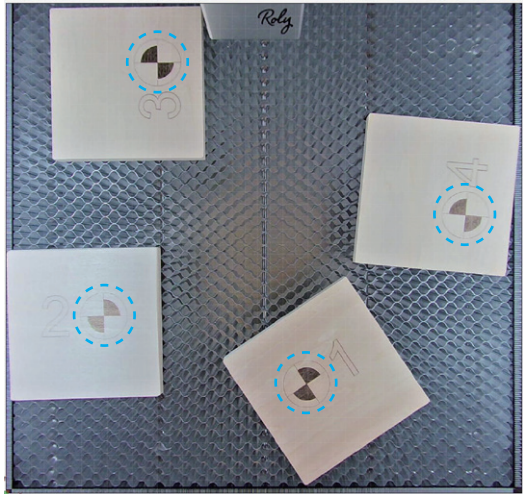
Camera overlay after alignment calibration, the honeycomb appears square and centered within the work area.

Alignment calibration tips

We will now go over some tips and best practices for performing the alignment calibration in Lightburn.



Calibration can be done on four spearate pieces to conserve material.



Scramble the pieces into random positions before verifying results.

The alignment calibration can be accessed via the top menu under *Laser Tools*. Choose the overhead camera option. This calibration should be done on a large piece of plywood covering almost the entire work area, such as one measuring 380x380mm. Alternatively, four separate 120x120mm pieces, one placed at each corner, work just as well if they are the same thickness. The steps laid out in LightBurn are fairly straight forward. A few tips to keep in mind:

1. Home the machine before performing the calibration, and work in *Absolute Coordinates*;

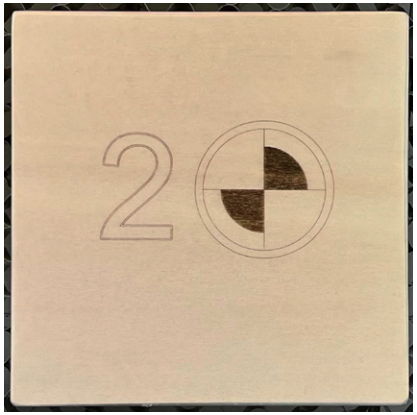
2. The default speed and feed tend to be a bit too slow. At 10W power, 9000mm/s at 80% tend to work well for basswood ply; and

3. Make sure the calibration is done with the pattern scaled to at least 160%.

After the alignment calibration, you can verify your results with the following steps:

1. Scramble the pieces of wood to random locations. If the calibration was done using one large piece of wood, put down a few dots using a sharpie. Update the camera overlay; and
2. Draw circles concentric to the rearranged calibration crosshairs and/or sharpie marks. Make sure to switch the layer to *Line* instead of *Fill* before engraving these circles.

If the new circles are roughly concentric to the existing crosshairs, that indicates the camera is functioning as intended. If the newly engraved circles are off center, adjustments may be needed. The following are examples for what type of result can be expected.



An excellent result. You may see this around the center and/or a certain part of the work area.

An typical (above average?) result

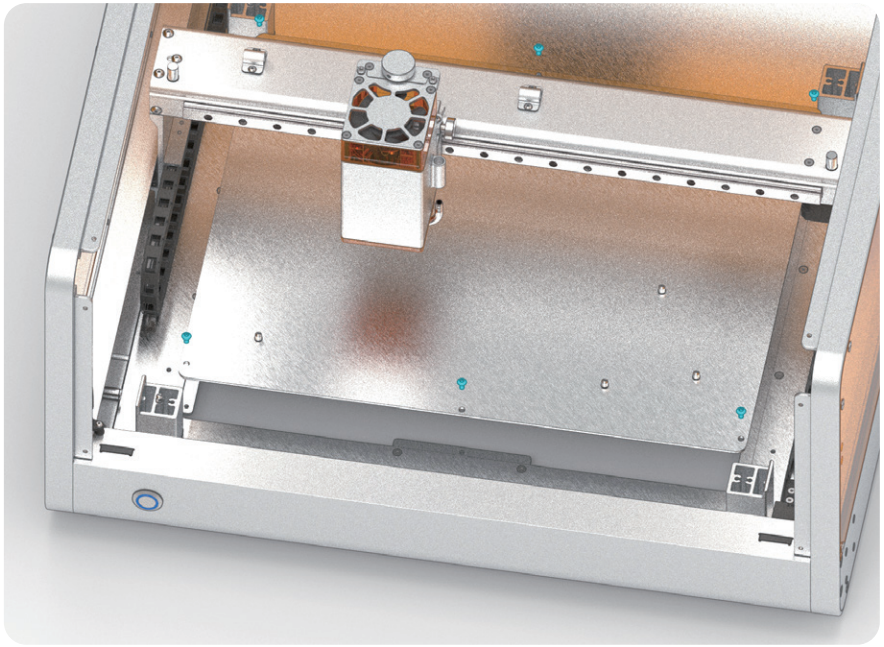
A poor result. Likely can be improved with proper calibration.

Working with different thicknesses

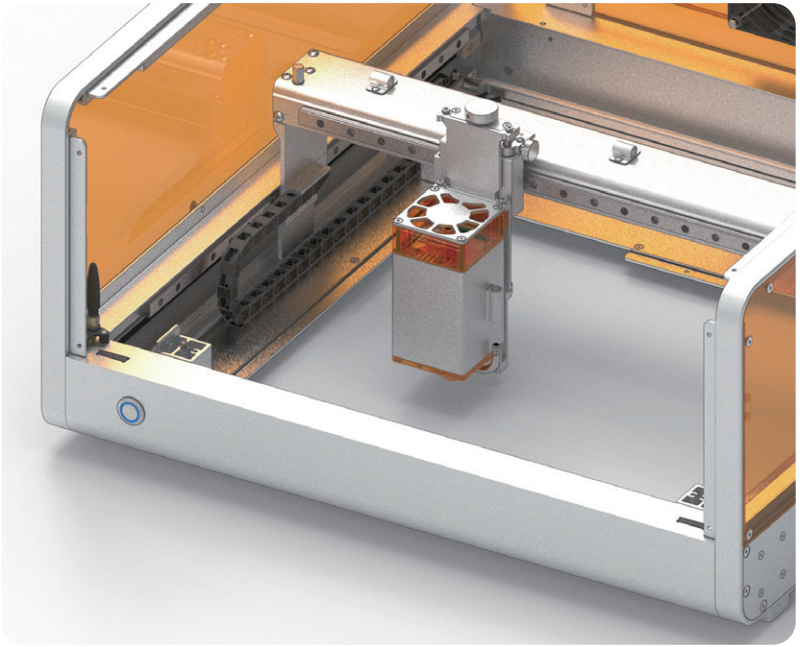
Each alignment calibration is for a specific thickness of material. If you plan to use the camera when working with materials of varying thickness, you'll need to calibrate the camera once for each thickness. Save the calibration results via the *Export Camera Settings* options in the *Camera* panel (right click on the panel to bring up the relevant menu), then whenever you switch to a new thickness, you can import the corresponding camera setting for that thickness.

Working with Large Pieces

The LaserMATIC offers a couple options if you need to work with very large pieces such as tabletops or porch signs. The first of which is to remove the bottom panel. The laser module can then reach all the way down to the table top surface by installing an extension plate for the Z-axis.



Remove the center bottom plate by removing 6 screws

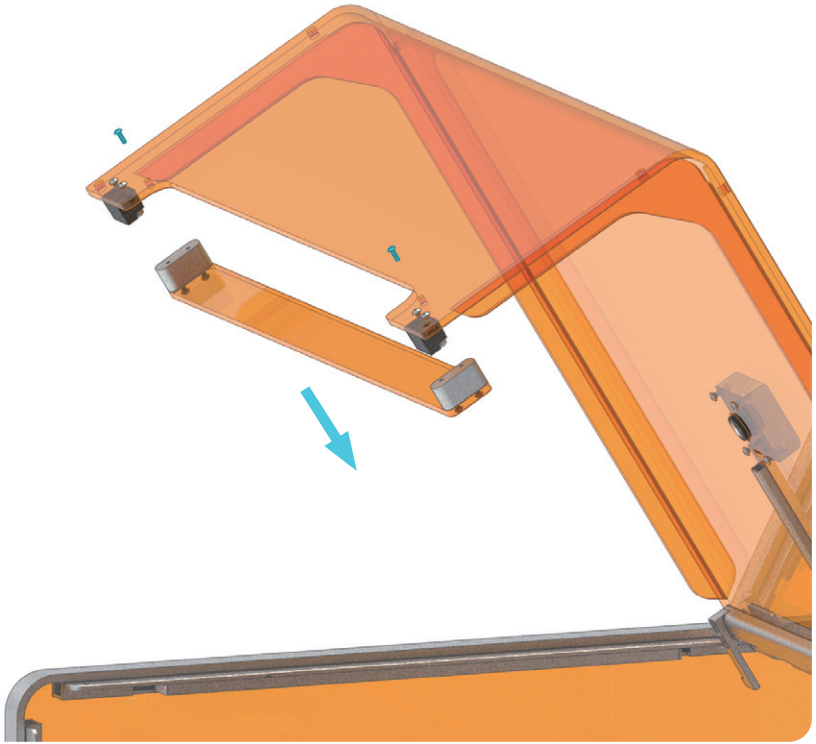


Install the Z-axis extension plate and attach to laser module to the plate

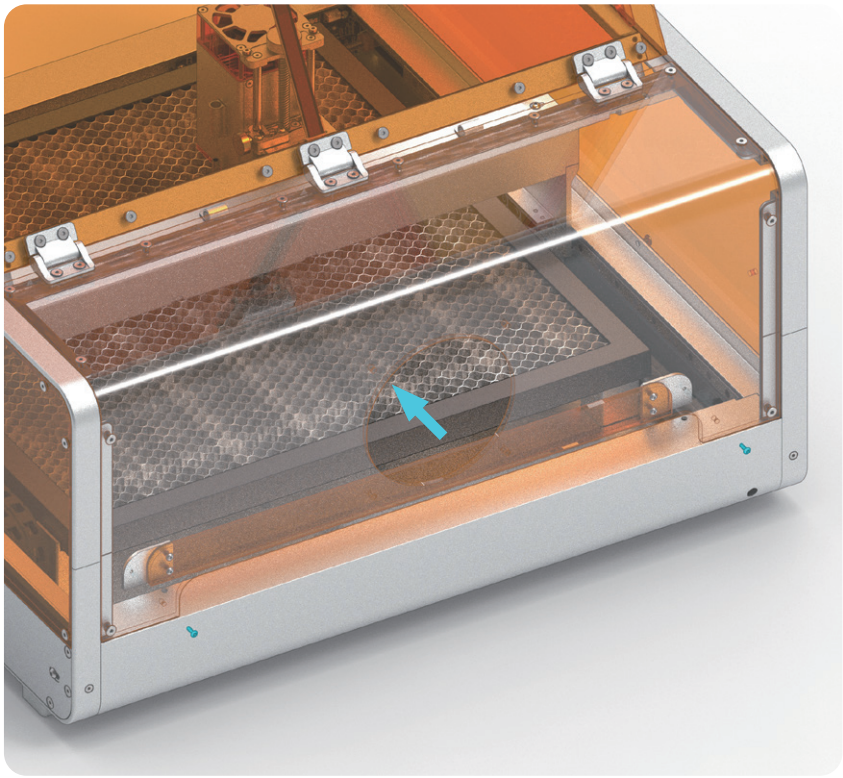
IMPORTANT Do NOT home the machine with the Z axis below the frame surface. The laser module will bump into the front member and/or front connector shaft before the limit switches are triggered.

Passthrough slot

The LaserMATIC also features a passthrough slot. You can access the through slot by removing the cover handle, along with a similar piece at the back of the machine.



Remove the front handle

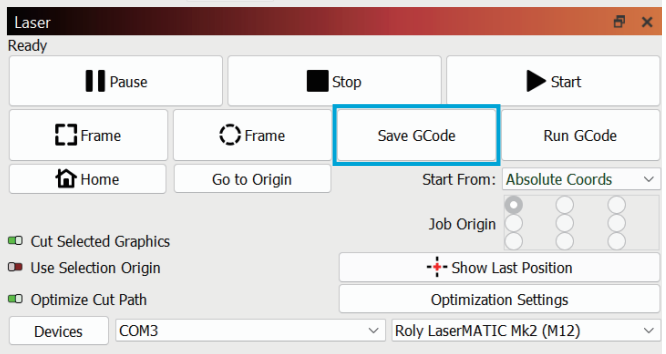


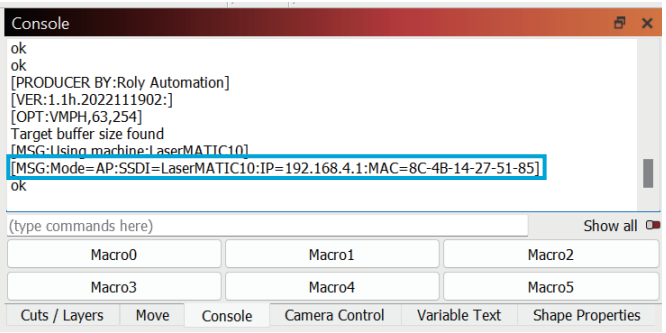
Remove the back passthrough plate

Wireless Operation

The LaserMATIC can run saved programs without being physically connected to a computer. To set this up involves 4 simple steps, listed below. You will need a microSD card. One is included with your machine. Please note the biggest SD card the control board can read is 32GB.

1. Plug the microSD card into the control board;
2. Save your project as a G-code file and copy it onto the SD card;
3. Connect to LaserMATIC through Wi-Fi. You can either join the engraver's default Wi-Fi network, or configure it to connect to your own network; and
4. Open the web interface and upload the G-code file onto the SD card.





STEP 2: Saving project as G-code

In regular wired operation, the computer streams G-code commands to the engraver's controller. The same commands can be saved to a G-code file.

To do so in LightBurn, choose *Save Gcode* in the right *Laser* panel. In LaserGRBL, it's under *Files --> Quick Save* in the top menu.

STEP 3: Connecting via Wi-Fi

By default, the LaserMATIC will host the following Wi-Fi network (AP mode):

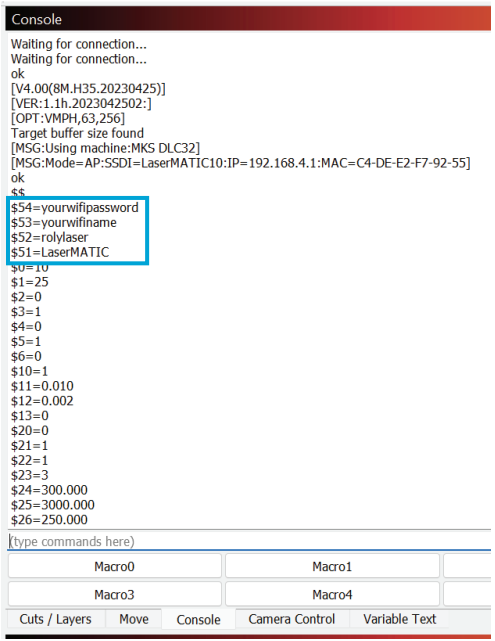
Wi-Fi name: **`LaserMATIC`**
Wi-Fi password: **`rolylaser`**

The engraver's default IP address on its own network is: **`192.168.4.1`**. It will report this IP when first connecting to LightBurn or LaserGRBL.

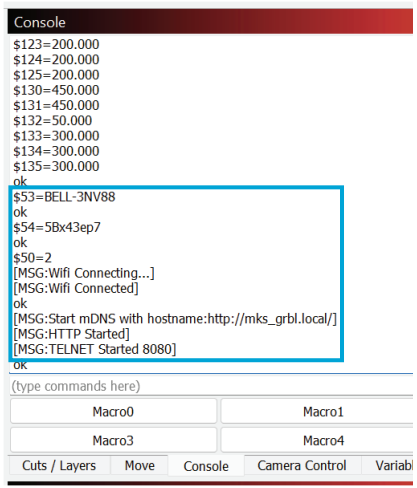
STEP 3 cont'd: Connecting to your own Wi-Fi network

If you want the laser to connect to your own Wi-Fi network, the network name and password can be passed onto the LaserMATIC via the LightBurn *Console*. There are 3 parameters involved.

$50 - Wi-Fi mode (0, 1 or 2): A value 0 means no Wi-Fi functionality. The default value of 1 tells the machine to broadcast its own network, which is called AP mode. A value of 2 tells the machine to join an outside network, this is called STA mode.
$53 - Network name (STA mode): Name of the Wi-Fi network for the laser to join, network names with spaces are accepted.
$54 - Wi-Fi password (STA mode): Password for said Wi-Fi network, at least 8 digits are required.



Wi-Fi related information are at the top of the parameter list.



Message on successful connection

To change one of these values, issue the command inside the *Console* panel in LightBurn.

`$$` - this command pulls up the complete parameter list from the laser. At the top of the list are parameters related Wi-Fi setup, $51 to $54, with $50 further down the list. For example, to connect the laser to my home network, I issue the following commands:

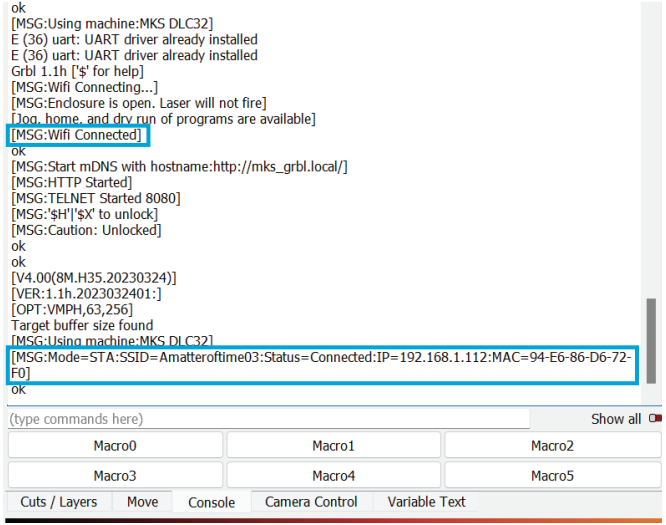
`$53=BELL-3NV88` (replace with your Wi-Fi name)
`$54=5Bx43ep7` (replace with your Wi-Fi password)
`$50=2`

The left screenshot shows how the machine responds inside the console to these commands. After the machine has connected to my WiFi network, as indicated by the message *[MSG: Wifi Connected]*, the web interface can be accessed by going to *http://mks_grbl.local/* or by visiting the laser's new IP address (different from 192.168.4.1), provided my computer is also connected to the same network. To get this new IP address, issue the command `$i` via the console.

There are still some things to note with this setup process. We'll go over some of them on the next page.

STEP 3 cont'd: additional notes

1. After the LaserMATIC has been set up to connect to your designated network, it will seek to connect to the same network each time it is powered up. The left screenshot shows messages sent by the laser at startup. Note it declares "Wifi Connected" and reports that it is in STA mode, along with its IP address on your Wi-Fi network;
2. If this attempt at startup fails however, $50 is automatically reset to 0. To retry the connection, issue the command `$50=2`. This reset only happens if the connection failure occurs at startup;
3. If the LaserMATIC is unable to connect to the designated network, try power cycling the machine and/or resetting Wi-Fi functionality by issuing the command `$50=0`;
4. Please note the LaserMATIC can only connect to 2.4GHz networks and not 5GHz ones. On some routers, a computer can stay on the 5GHz network and still be able to talk to devices on 2.4GHz;
5. Also note the LaserMATIC will stay connected to Wi-Fi as long as it is powered up, including after LightBurn has been closed;
6. The camera cannot be connected to the computer via Wi-Fi and still requires a physical USB connection; and
7. You may have noticed in LightBurn the option to add an "LightBurn Bridge" device. This requires purchasing a separate Raspberry Pi-based bridge, which is compatible with Ruida controllers only, and is not compatible with the LaserMATIC.



The LaserMATIC connects to the designated network each time it is powered up and typically sends the above messages.

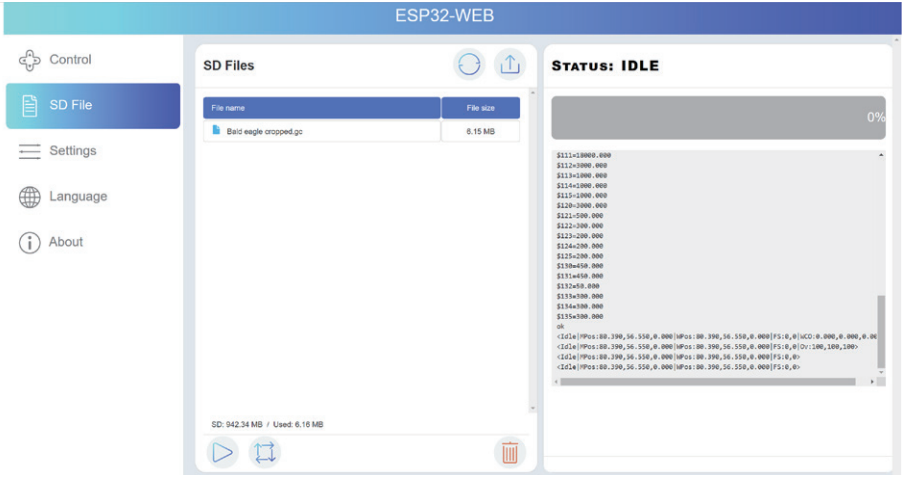
STEP4: access browser controller

Once connection to the LaserMATIC has been established, open up your browser and visit the previously noted IP address, similar to what you would do when managing a Wi-Fi router.

The web interface includes simple manual controls, with jog options similar to the *Move* panel in LightBurn. The maximum speed when jogging using this web interface is 3000mm/min.

STEP 4: Web interface overview

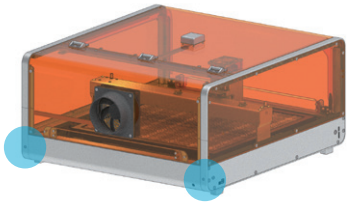
On the *Control* page, basic machine functions are presented. The *Soft Home* option instructs the machine to return to the (0, 0) position, while the *Hard Home* option behaves the same as the *Home* command in LightBurn, which asks the machine to move towards the bottom left corner until the limit switches are triggered.



On the *SD File* page, a list of files on the SD card is presented, along with options to frame, start and pause the G-code program stored on the SD card.

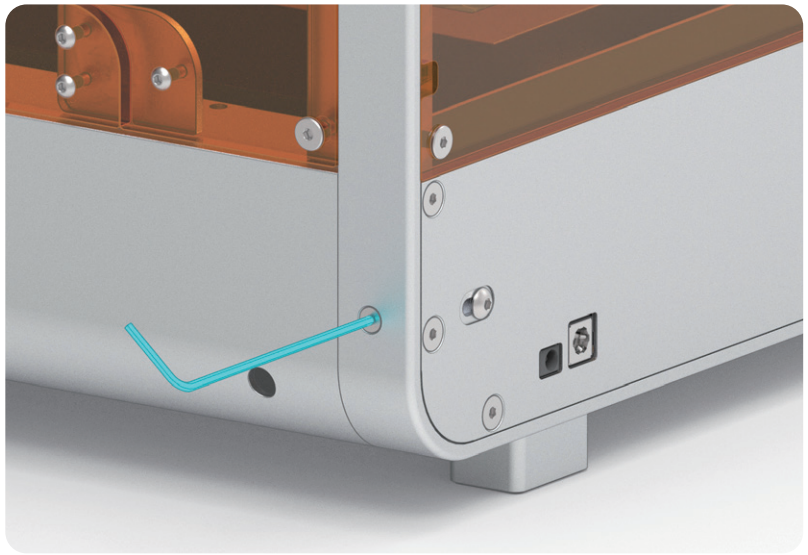
The web interface also has options to read and write GRBL parameters, such as the previously mentioned $28 parameter.

Adjusting Belt Tension

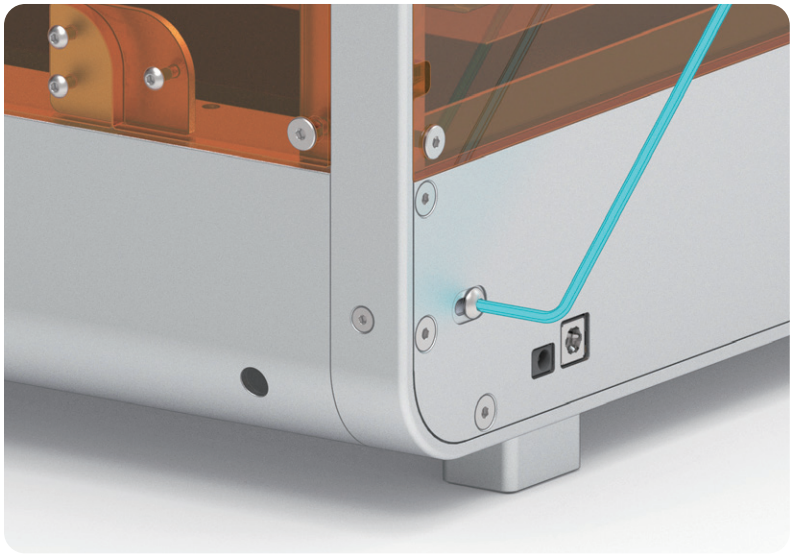


The belts on your LaserMATIC are already tensioned out of the box. However, a time may come when you may need to adjust belt tension. The below illustrations show adjusting tension for the Y-axis, which should be done for both the left and right side.

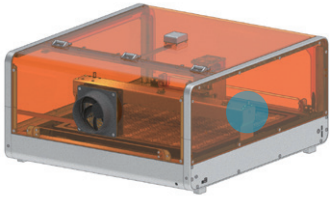
How much tension is the right amount? It's not an exact science. The belt should not be so loose that it slacks in the middle. When plucking the lower half of the belt, as one would do a guitar string, you should hear a low-pitched twang.



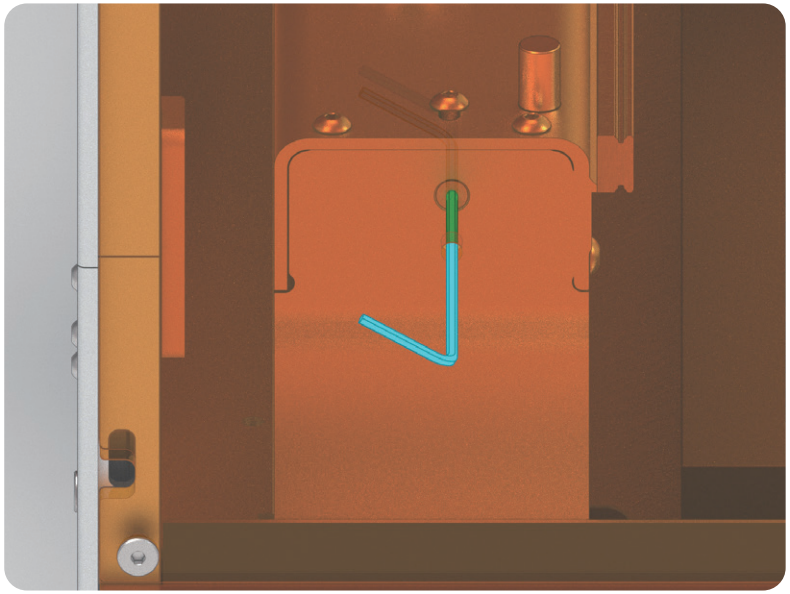
Turn this screw at the back to adjust tension. Clockwise to make the belt more taut and counter-clockwise to loosen it up.



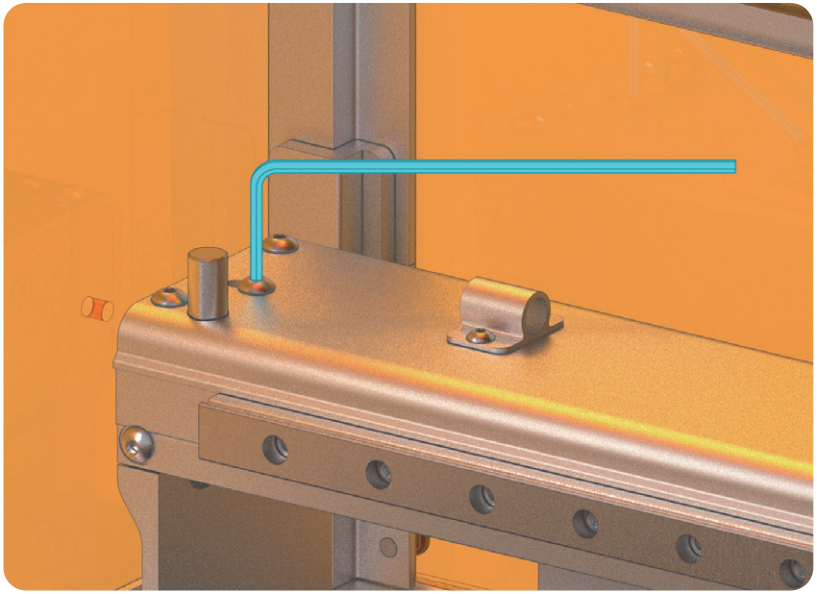
This screw on the side locks the tensioner in place when tightened. Loosen before adjusting tension and tighten again afterwards.



To adjust X-axis belt tension, slide the Y-axis towards the back of the machine, until the tension adjustment screw lines up with a service hole on the left enclosure panel.



The X-axis tensioner screw is accessed through a hole in the side panel. Turn clockwise to add tension and counter-clockwise to reduce it.



Similar to the Y-axis, tighten this screw to lock the tensioner, loosen before making adjustments.

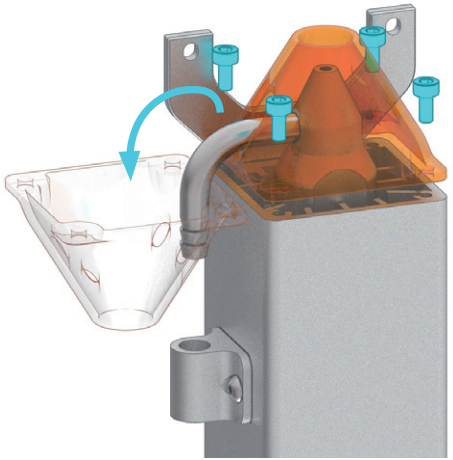
Maintaining Your Machine

There are a few things you can do periodically to keep your LaserMATIC in great working condition and reduce wear on the engraver.

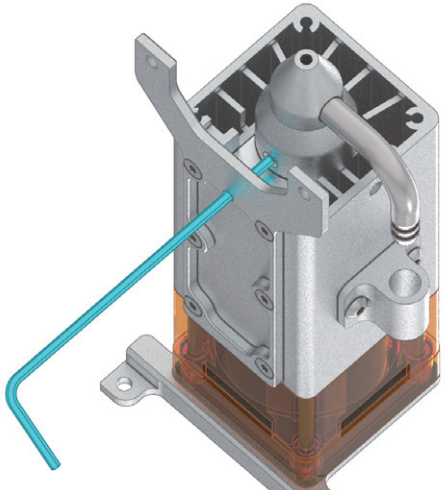
1. Clean laser module lens

Over time, particulates can deposit onto the outer lens of the laser module. This can reduce the module's power output, and heat up the lens. If you notice your laser struggling to cut through material it previously had no trouble with, it may be time to clean the lens. Disassemble the bottom of the laser module by following the steps outlined, then use a Q-tip dipped with alcohol, or an alcohol wipe to gently clean the lens. The particulates should be easily removed. The lens should be cleaned every 50 hours of burn time. Always use an air assist when cutting as without it particulates can accumulate much faster.

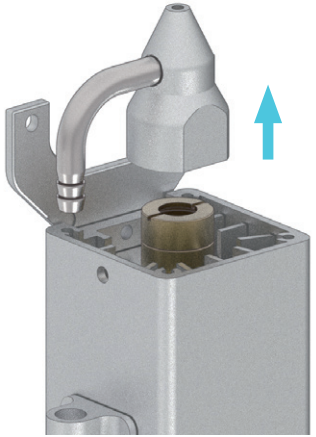
Steps for disassembling the 10W module:



1. Loosen the 4 screws holding down the bottom acrylic shroud, and remove it by moving it along the L-shaped tube.

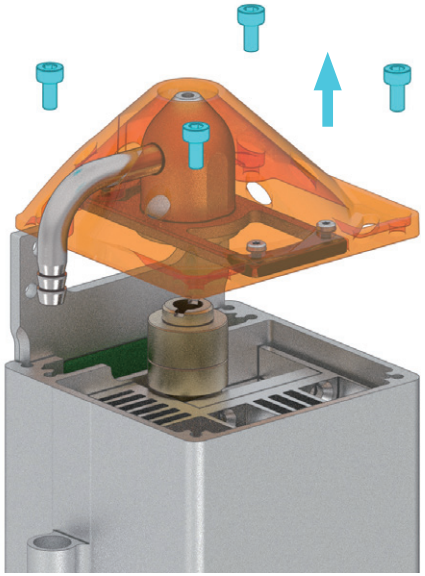


2. Loosen (no need to remove) the nozzle set screw. Access it through the back of the module.



3. Lift up the nozzle and the L-shaped air assist tube

Steps for disassembling the 20W and 30W modules:



1. Remove 4 screws on the corners of the bottom shroud; and
2. Lift up the bottom shroud together with the nozzle and the L-shaped air assist tube as one piece.

2. Clean enclosure surfaces

Particulates can also gather on the enclosure panel surfaces, and so can fingerprints. Wipe the panels using plastic cleaner periodically. Do not use alcohol such as ethanol, methanol, isopropanol, or acetone! They can damage the acrylic material and make it appear cloudy. See below for recommended cleaners.

3. Take care of linear rails

- Avoid touching the linear rails, as sweat can cause rust over time; and
- Periodically wipe the linear rail, and reapply grease, spray grease (white lithium grease), or rust-preventive oil such as regular WD-40.

Below are some recommended accessories to go along with your LaserMATIC. We are not affiliated with these brands but found them to work well.

- Acrylic cleaner: from Plexi Safe or Plexi-Clean, both can be found on Amazon (*https://www.amazon.com/dp/B000LNQGEU/*);
- Inline fan: If additional exhaust power is needed, we recommend getting a 4” inline fan (*https://www.amazon.com/dp/B0BJDMV5MF/*) and hooking it up to the extensible exhaust tubing. Another segment of tubing is then required, going from the inline fan and venting to the outdoors;
- Handheld vacuum: Handy for cleaning up smaller pieces left on the honeycomb after a cut operation; and
- Safety glasses: most pairs designed for 445nm lasers will work well.

Warranty, Returns & Refund Policy

WARRANTY

Your machine is covered by our one (1) year limited manufacturer's warranty. This warranty covers the entire machine through normal user operation, including the laser module. This warranty does not cover scratches on the acrylic panels, or damage caused by dropping the machine or water damage.

RETURNS

All returns must be postmarked within thirty (30) days of the original delivery date. Returned items do not have to be in new or unused condition, though it must be properly re-packaged and contain all of the original components. Within this 30 days window, no reason needs to be provided for returns, though we would very much appreciate your feedback.

RETURN PROCESS

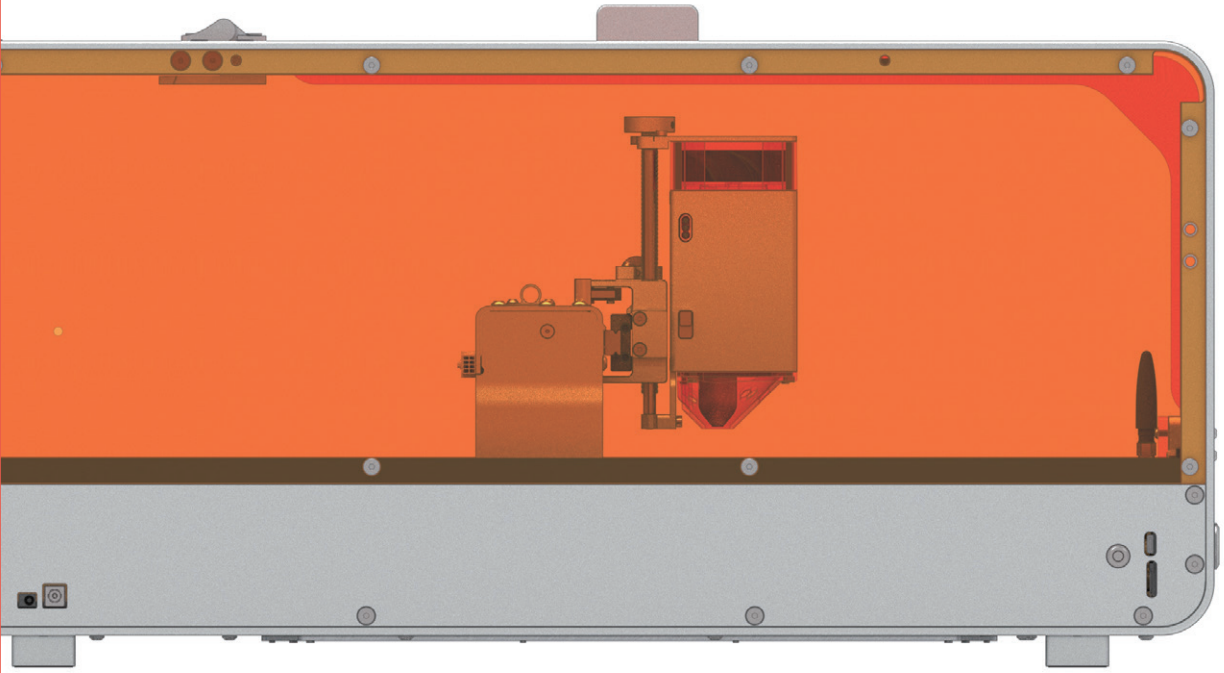
To return an item, please email customer service at support@rolyautomation.com to obtain a Return Merchandise Authorization (RMA) number. After receiving a RMA number, place the item securely in its original packaging, and mail your return to the following address. We will provide a prepaid shipping label.

Allstars Corporation (YCYS)
3550 East Francis St, Unit 200
Ontario, CA 91761

REFUNDS

We charge a 20% restocking fee for returns. After receiving your return and inspecting the condition of your item, we will process your return or exchange. Please allow at least fourteen (14) days from the receipt of your item to process your return or exchange. Refunds are usually processed within 3-4 business days, but can take 1-2 billing cycles to appear on your credit card statement, depending on your credit card company. We will notify you by email when your return has been processed.

Written for Roly Automation's LaserMATIC
by Leo Qu with
input from the laser engraving community
Rev 2 - Dec, 2023



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