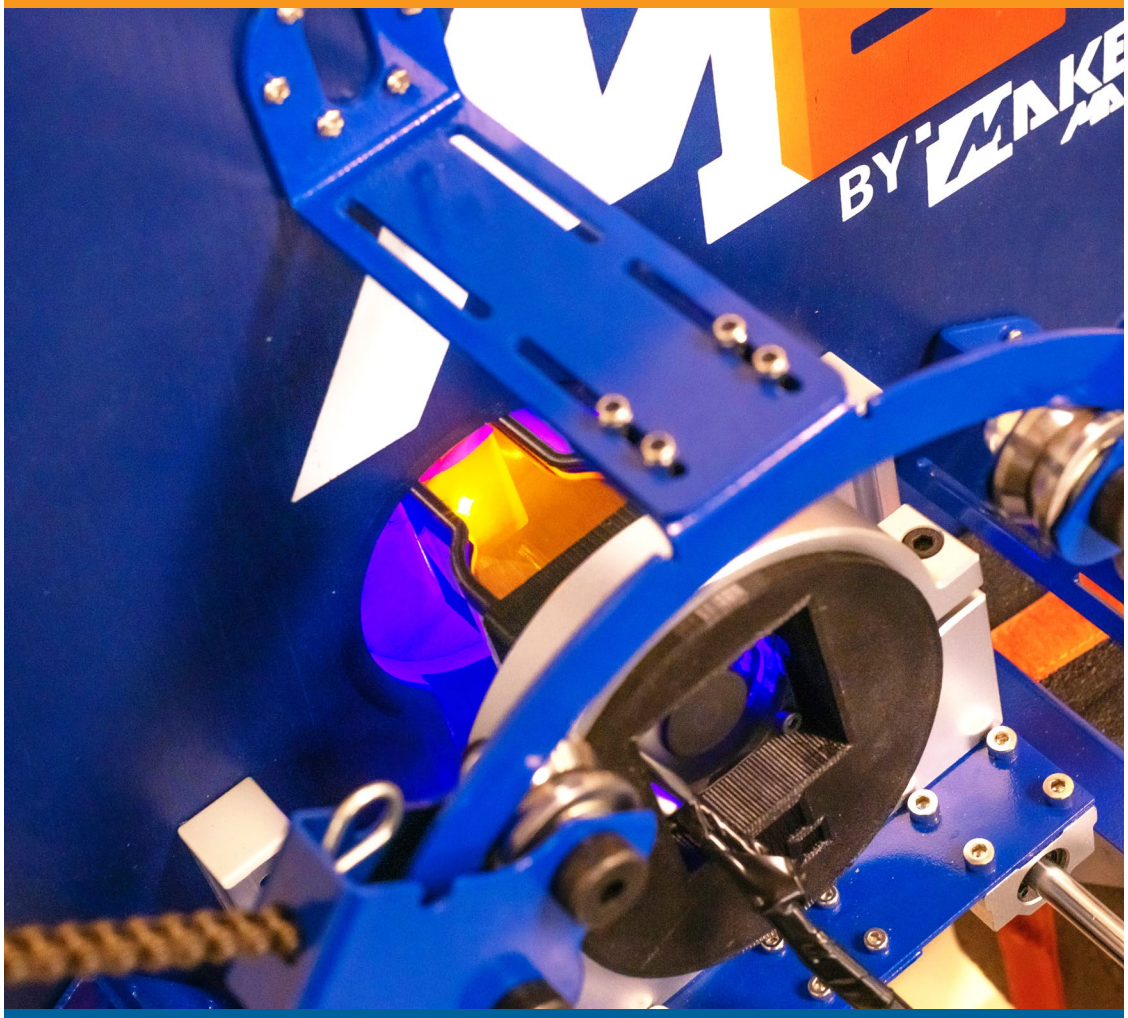

SET-UP GUIDE FOR

2.8W LASER ASSEMBLY

A guide to assembling a J Tech 2.8W laser module on your MakerMade M2 CNC Kit.

makermade

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WARNING: READ BEFORE ASSEMBLING AND USING YOUR LASER MODULE

By purchasing this component laser diode and driver kit you agree to the following:

- You are over 18 years of age.
- You will use these components in a safe and responsible manner and only for legal purposes.
- You fully understand and appreciate the inherent risks associated with use of a laser in any environment or circumstance.
- You expressly acknowledge that use of this product is at your own risk.
- You will exercise ordinary and reasonable care at all times while assembling and using the product. Prior to use of the product, you do not have, or are not aware of, any medical condition(s) that would prevent you from safely assembling or operating the laser device.
- You understand that these components are dangerous when not properly assembled into a finished product.
- You acknowledge and understand that you will be voluntarily engaging in use of a device which if used negligently or improperly, may result in the risk of serious injury, scarring, loss of an important bodily function, permanent disability, or death, and may cause severe social or economic losses.
- You understand and are responsible for any injury to you or any third parties or for any property damage related to your improper use or installation of the components.
- You have an understanding of electronic and mechanical devices, and are capable of incorporating this laser module safely into an existing device and as provided in the instructions.
- You will provide your own safety and protective gear, including use of appropriate eyewear. You are responsible for applying any and all appropriate safety measures during assembly and use of this product.
- You accept this laser diode module and driver as a component for integration within an appropriate machine and for the use and creation of your own materials and end products, and accept responsibility for any applicable regulations for use.
- You agree this product is designated for use solely as a component and therefore is exempt from compliance with 21 CFR § § 1040.11 and § 1040.11 for complete laser devices.
- You agree to be responsible and hold Maker Made LLC harmless from any injury to person or property resulting from the use of or assembly of these components or from any products created from use of the components.

Never Cut These Materials

WARNING: Because many plastics are dangerous to cut, it is important to know what kind you are planning to use. Here's a How-To for identifying unknown plastics with a simple process.

Material	DANGER!	Cause/Consequence
PVC (Poly Vinyl Chloride)/ vinyl/pleather/ artificial leather	Emits chlorine gas when cut!	Don't ever cut this material as it will ruin the optics, causes the metal of the machine to corrode as chlorine is released and ruins the motion control system.
Thick (>1mm) Polycarbonate/ Lexan	Cuts very poorly, discolors, catches fire	Polycarbonate is often found as flat, sheet material. The window of the laser cutter is made of Polycarbonate because polycarbonate strongly absorbs infrared radiation! This is the frequency of light the laser cutter uses to cut materials, so it is very ineffective at cutting polycarbonate. Polycarbonate is a poor choice for laser cutting. It creates long stringy clouds of soot that float up, ruin the optics and mess up the machine.
ABS	Melts / Cyanide	ABS does not cut well in a laser cutter. It tends to melt rather than vaporize, and has a higher chance of catching on fire and leaving behind melted gooey deposits on the vector cutting grid. It also does not engrave well (again, tends to melt). Cutting ABS plastic emits hydrogen cyanide, which is unsafe at any concentration.
HDPE/milk bottle plastic	Catches fire and melts	It melts. It gets gooey. It catches fire. Don't use it.
PolyStyrene Foam	Catches fire	It catches fire quickly, burns rapidly, it melts, and only thin pieces cut. This is the #1 material that causes laser fires!!!
PolyPropylene Foam	Catches fire	Like PolyStyrene, it melts, catches fire, and the melted drops continue to burn and turn into rock-hard drips and pebbles.
Epoxy	burn / smoke	Epoxy is an aliphatic resin, strongly cross-linked carbon chains. A CO2 laser can't cut it, and the resulting burned mess creates toxic fumes (like cyanide!). Items coated in Epoxy, or cast Epoxy resins must not be used in the laser cutter. (see Fiberglass)
Fiberglass	Emits fumes	It's a mix of two materials that cant' be cut. Glass (etch, no cut) and epoxy resin (fumes)
Coated Carbon Fiber	Emits noxious fumes	A mix of two materials. Thin carbon fiber mat can be cut, with some fraying – but not when coated.
Any foodstuff (such as meat, seaweed 'nori' sheets, cookie dough, bread, tortillas...)	The laser is not designed to cut food, and people cut things that create poisonous/ noxious substances such as wood smoke and acrylic smoke.	If you want to cut foodstuffs, consider sponsoring a food-only laser cutter for the space that is kept as clean as a commercial kitchen would require.
Material with Sticky Glue Backing	Coats lens, cracks lens	There are many normally laserable items such as thin wood laminates that you can purchase that become un-cuttable when the manufacturer adds a layer of peel-off glue on the bottom to attach them to surfaces. Examples include cork tiles, thin wood laminate, acrylic tiles, and paper stickers. Never cut these materials in the laser cutter if they have this backing. The glue will vaporize forming a coating on the lens that will coat it, cloud it, heat it, and then potentially crack the lens. The glue residue is worse than resin, and can't be removed without risking damage to the lens ... requiring a lens replacement.

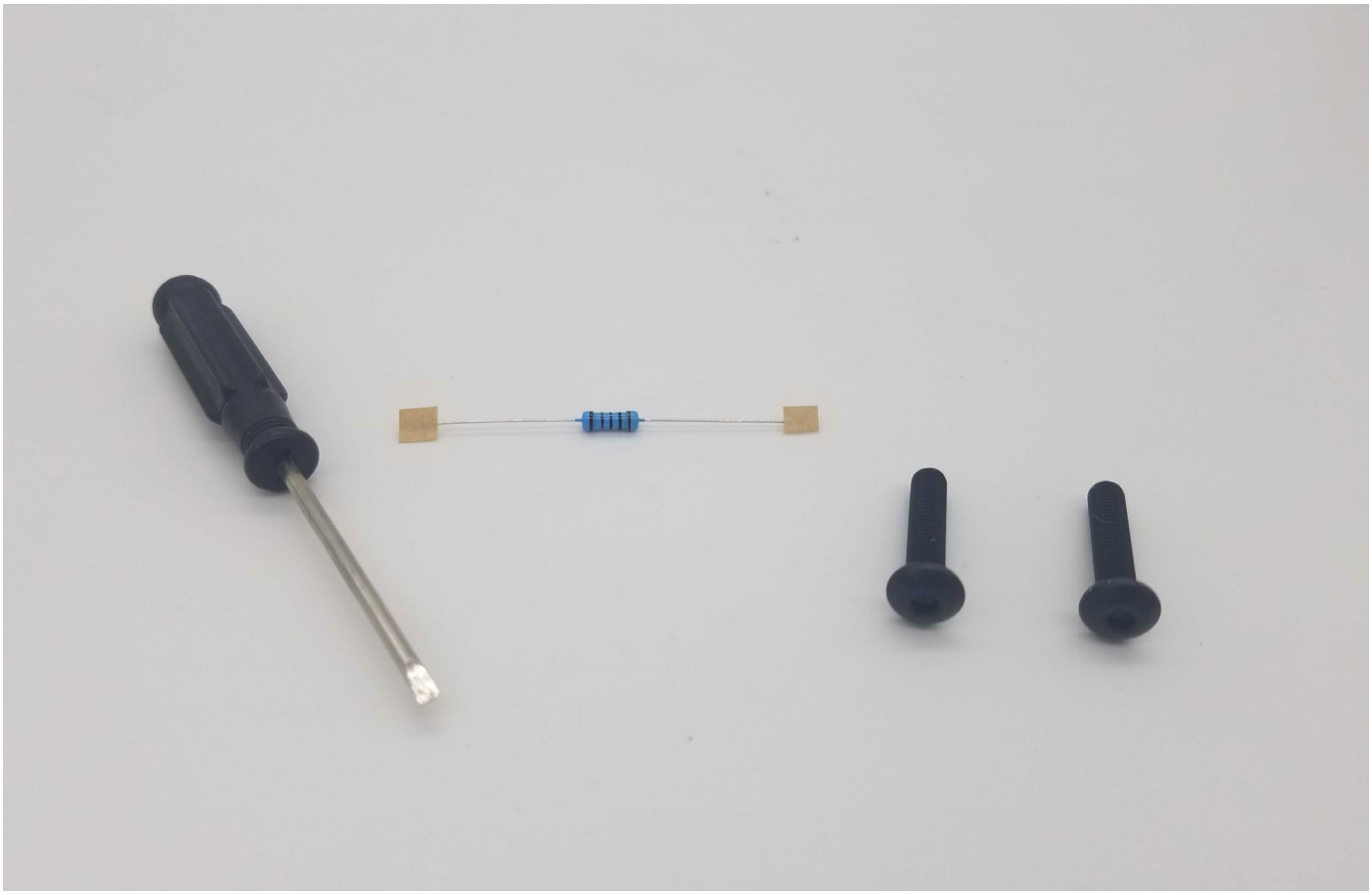
Safe Materials

We only recommend the J Tech 2.8W laser for engraving/etching. This can be done on almost anything, including wood, cardboard, aluminum, stainless steel, some plastics, marble, stone, tile, and glass. Here is an example material list from J Tech to use as reference:

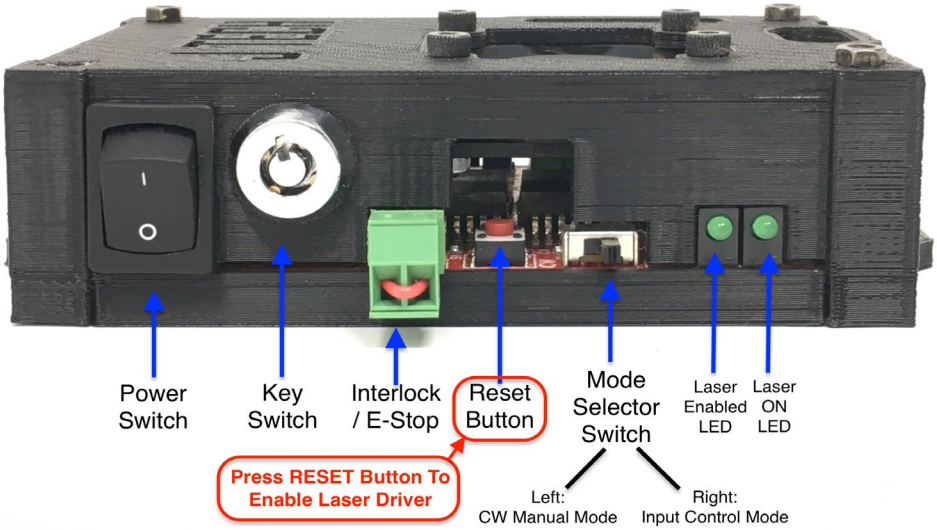
Material	Max thickness	Notes	WARNINGS!
Many woods	Engrave Only	Avoid oily/resinous woods	Be very careful about cutting oily woods, or very resinous woods as they also may catch fire.
Plywood/Composite woods	Engrave Only	These contain glue, and may not laser cut as well as solid wood. Plywood with “filler” will cut better than multiple boards of hardwood glued together. Check for the least dense plywood when shopping for this.	
MDF	Engrave Only	These are okay to engrave but are very hard to cut with our lasers. The glue in the mixture makes it very hard to cut so we recommend engraving only.	
Paper, card stock	thin	Cuts very well and also very quickly.	
Cardboard, carton	thicker	Cuts well but may catch fire.	Watch for fire.
Cork	1/8”	Thin cork can be cut, but the quality of the cut depends on the thickness and quality of the cork. Engineered cork has a lot of glue in it, and may not cut as well. This takes a lot of passes to get done.	Avoid cutting thicker cork (5mm). Engraves well, cuts poorly.
Acrylic/Lucite/ Plexiglas/PMMA	1/8”	Cuts extremely well leaving a beautifully polished edge. Only can cut dark colors like black. Clear will not cut and light colors like white are hard or near impossible to cut. Takes a ton of passes depending on the thickness and color.	
Thin Polycarbonate Sheeting (<1mm)	Engrave Only	Very thin polycarbonate can be cut, but tends to discolor badly. Extremely thin sheets (0.5mm and less) may cut with yellowed/discolored edges.	Watch for smoking/burning
Delrin (POM)	Engrave Only	Delrin comes in a number of shore strengths (hardness) and the harder Delrin tends to work better. Great for gears!	
Kapton tape (Polyimide)	1/16”	Works well, in thin sheets and strips like tape.	
Mylar	1/16”	Works well if it’s thin. Thick mylar has a tendency to warp, bubble, and curl	Gold coated mylar will not work.
Solid Styrene	1/16”	Smokes a lot when cut, but can be cut.	Keep it thin.
Depron foam	1/4”	Used a lot for hobby, RC aircraft, architectural models, and toys. 1/4” cuts nicely, with a smooth edge.	Must be constantly monitored.
Gator foam		Foam core gets burned and eaten away compared to the top and bottom hard paper shell.	Not a fantastic thing to cut, but it can be cut if watched.
Cloth/felt/hemp/ cotton		They all cut well. Our lasers can be used in lace-making.	Not plastic coated or impregnated cloth!
Leather/Suede	Engrave Only	Leather is very hard to cut, but can be if it’s thinner than a belt (call it 1/8”). Smells really bad when cut.	Real leather only! Not ‘pleather’ or other imitations .. they are made of PVC.
Magnetic Sheet		Cuts depending on the type. You need to get the “laserable” magnetic sheet from a proper supplier like Johnson Plastics.	
NON-CHLORINE-containing rubber		Fine for cutting.	Beware chlorine-containing rubber!
Teflon (PTFE)	thin	Cuts OK in thin sheets. See https://www.ulsinc.com/materials/teflon ; the issues listed in https://en.wikipedia.org/wiki/Polymer_fume_fever should not matter because our lasers are fully vented and exhausted.	
"Carbon fiber mats/ weave			
that has not had epoxy applied"		Can be cut, very slowly.	You must not cut carbon fiber that has been coated!!
Coroplast (‘corrugated plastic’)	Engrave Only	Difficult because of the vertical strips. Three passes at 80% power, 7% speed, and it will be slightly connected still at the bottom from the vertical strips.	

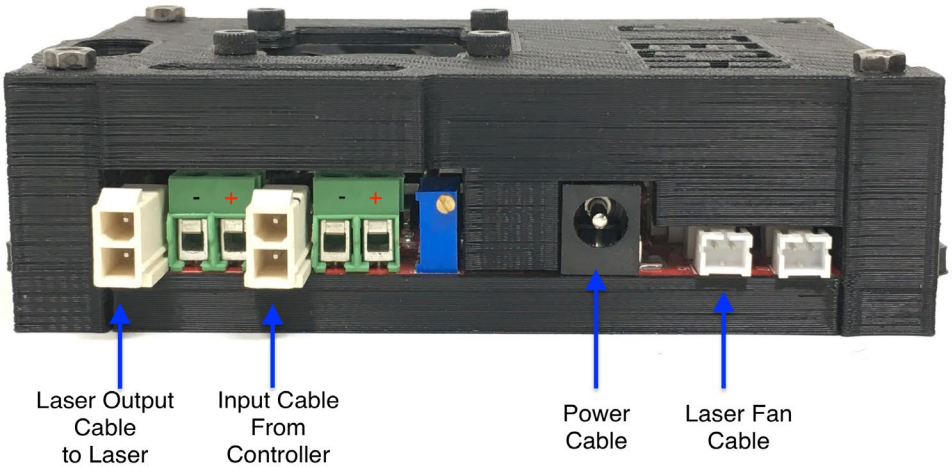
Tools and Hardware Required

- Small Mini Flathead Screwdriver (included)
- M3 Allen Wrench for 71 mm clamp, or M5 Allen Wrench for 91 mm clamp
- 2 - 25 mm M3 screws to use with the 71 mm clamp (included)
- 1KhZ resistor (included)



Laser Diode Driver Box Diagram

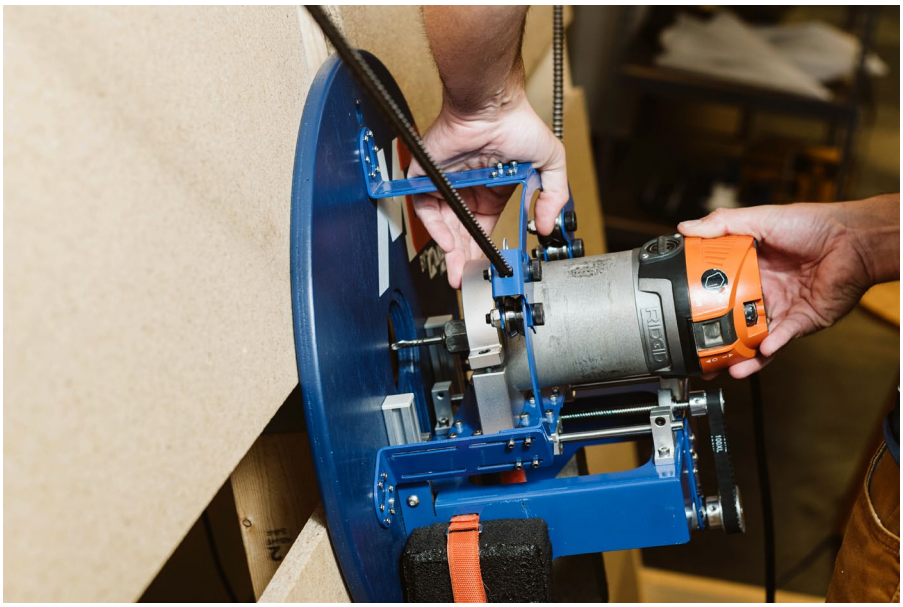




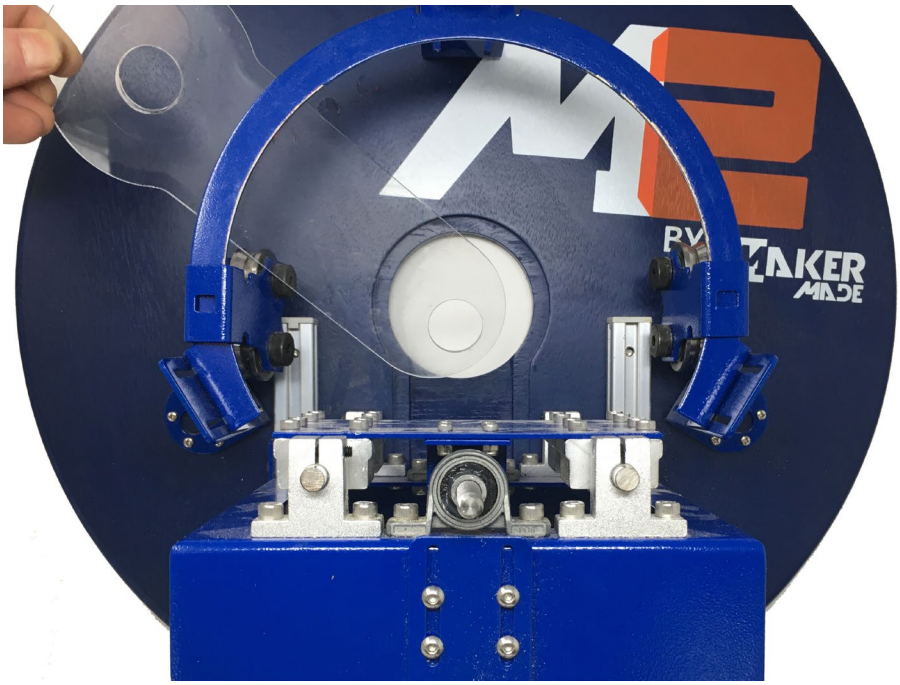
Assembling the Laser Upgrade

1. Attach the Laser Mount

Loosen the router clamp and remove the router.



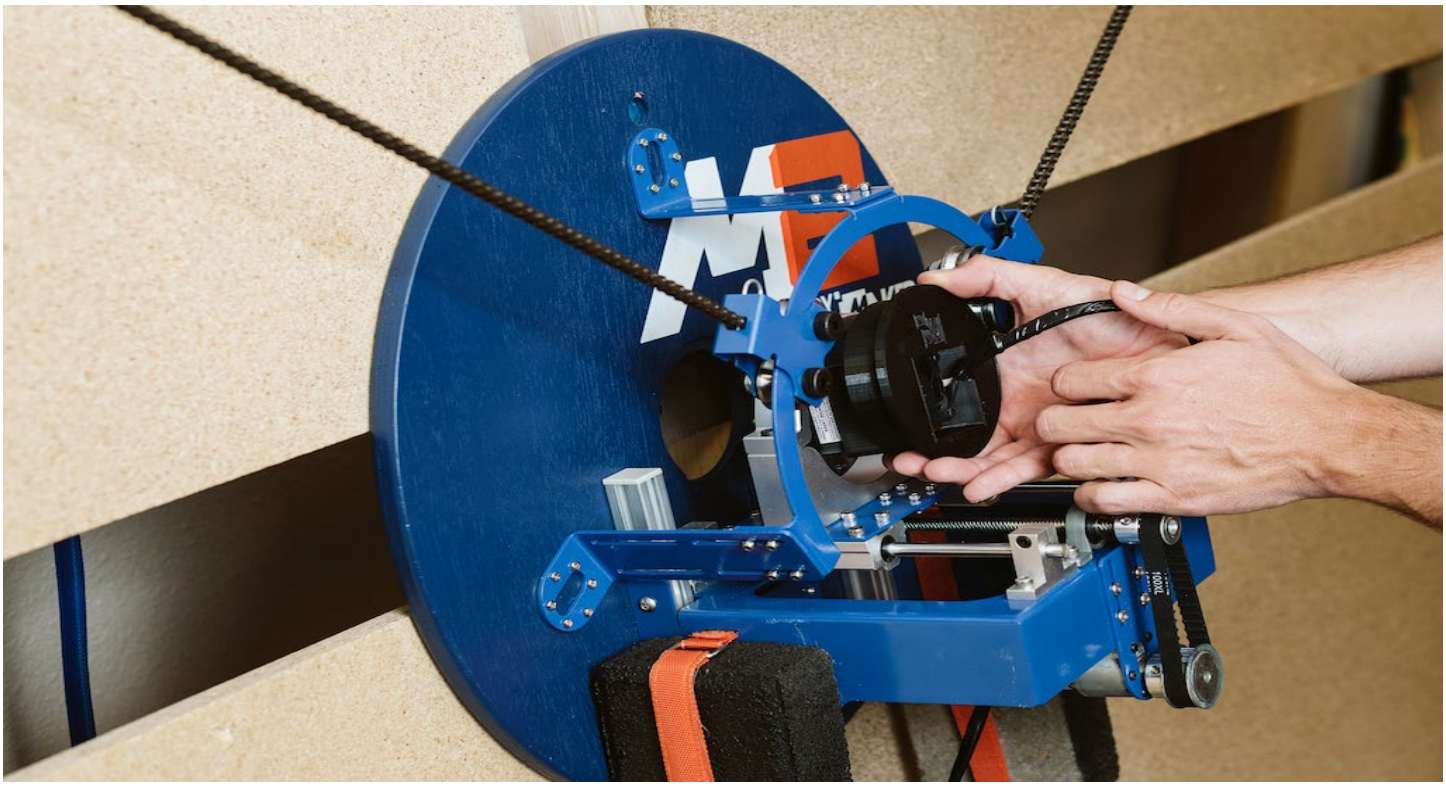
Remove the clear plastic dust channel cover.



Insert Laser Module Into Laser Mount

**for 71 mm mount: Remove exsisting clamp screws and insert the laser mount. Use the longer 25mm screws provided to secure the mount into the clamp.*

Insert Laser Mount Into Router Clamp. Tighten Clamp.



Use the Z-Axis controls in the Controls widget in Makerverse to move the Z-Axis toward the work surface until the laser shroud is 1/8” above the work surface.

Use the focusing tool provided in the laser kit to make sure the laser shroud is 1/8” above the work surface.

Focusing Tool is 1/8”

You can do this by tilting the sled back slightly to slide the focusing tool behind the sled. The focusing tool should be flush with the bottom of the sled.


1/8" Height Set Tool
Lay Flat Under Shroud
Adjust Height
1/8" Height Set Tool
Lay Flat Under Shroud
Adjust Height

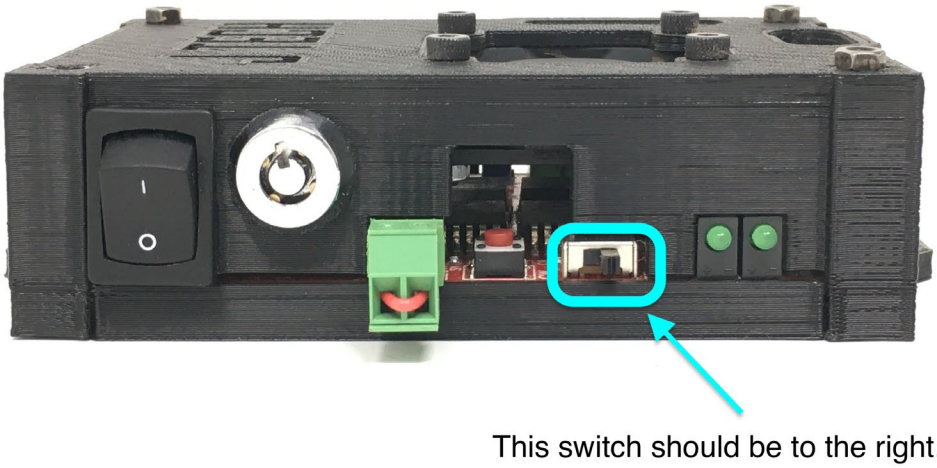
2. Mount the Laser Driver

Mount the laser driver close to the M2 control board.

You can use the sticky pads to attach the laser driver near the M2 control board or you can mount it using screws.

Make sure the Mode Selector Switch on the front of the laser driver is to the right. (Input Control Mode)

Front View



3. Run the Laser and Fan Extension Cables

The two cables in the mounting kit are the Laser Extension Cable (thicker cable) and the Fan Extension Cable (thinner cable).

Find the female end of each extension cable.

You can put a small piece of tape on the ends to keep them together.

Feed the female ends of the extension cables down behind the frame and pull the extension cables out far enough to attach to the sled.

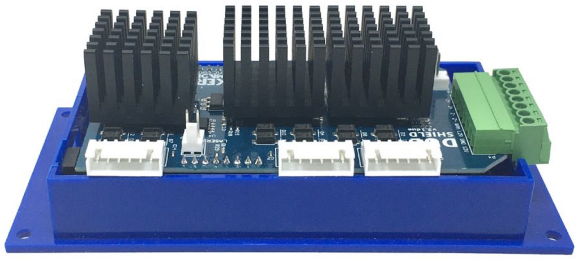
4. Connect the Laser Driver to the Control Board

Find the Molex Mini Fit Jr. Input cable. (pictured below)

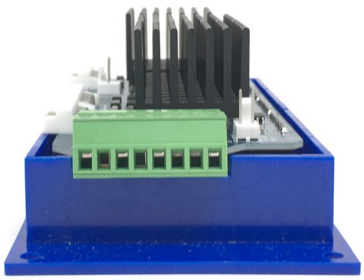
On one end is a black connector. On the other end are two wires.

The BLACK wire is the Ground.
The RED wire is the PWM or spindle speed control.

These two wires will connect to the M2 control board.



Remove the case cover from the M2 control board.



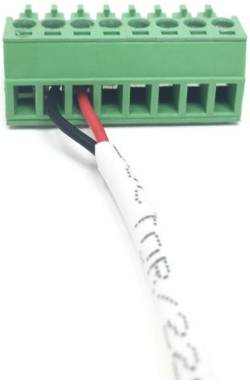
Find the green connector on the M2 control board.

If it makes it easier, you can remove the green connector plug from the motor shield by gently pulling it straight out.

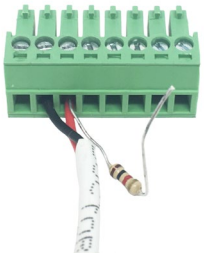
Loosen the screw in the 1st position Labelled 12V.
Loosen the screw in the 2nd position Labelled GND.
Loosen the screw in the 3rd position Labelled LSR.

Insert the BLACK wire from the cable into the 2nd position on the green connector labelled GND. Tighten the screw.

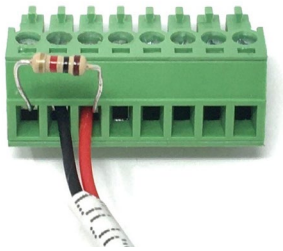
Insert the RED wire from the cable into the 3rd position on the green connector labelled LSR.



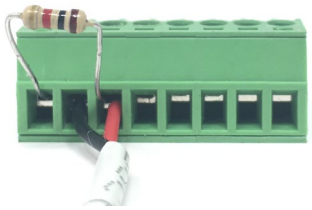
Insert one end of the 1K resistor into the 3rd position on the green connector labelled LZR.
Tighten the screw.



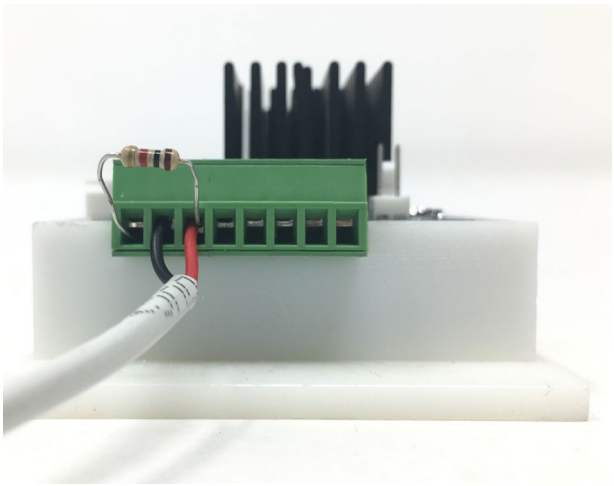
Insert one end of the 1K resistor into the 1st position on the green connector labelled 12V.
Tighten the screw.



When you have done that, the green connector should look like the picture to the right.



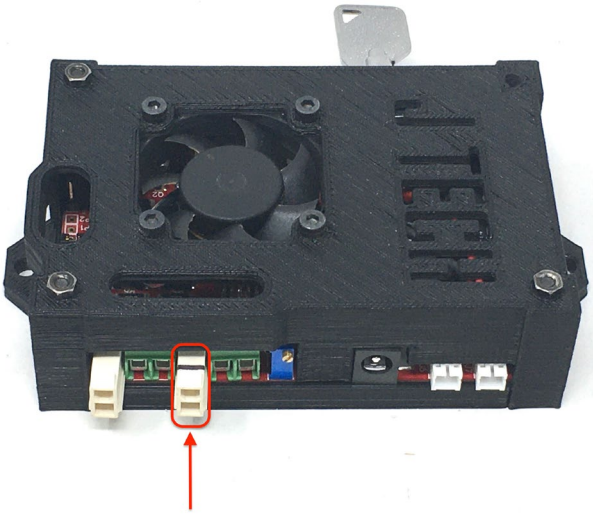
If you removed the green connector plug to make these connections, snap it back into the motor shield.



The other end of the cable you just connected to the M2 control board will have a black Molex connector on it.

This black connector goes into Terminal H4 on the back of the laser driver.
(Input cable from controller)

Terminal H4 may have a black dot or line on the driver connector.
(see picture on right)



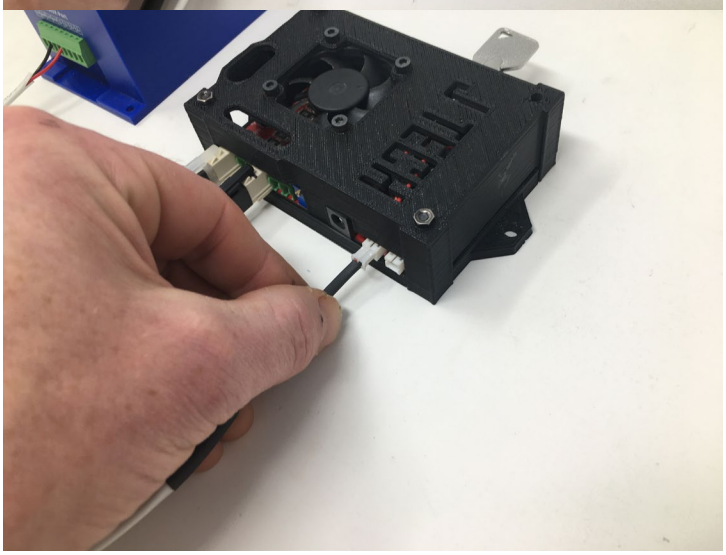
Double check to make sure this is correct. You can cause damage to the laser driver if the cable is not plugged in to the correct terminal.

6. Connect the Laser Cable to the Laser Driver

Find the opposite end of the extension cables you fed under the frame with the male connectors.

Connect the thick laser extension cable (with the clear end) to the laser driver board in Terminal H3. (Laser Output)

Connect the thin fan extension cable to the laser fan connector on the driver board.



7. Connect the Laser to the Extension Cables

Connect the laser and fan cables to the extension cables.

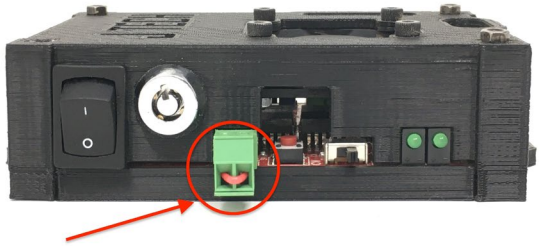
Ensure you have enough slack so the extension cables will be able to move freely as the sled moves around the work space.

Use zip ties to keep laser and fan extension cables neat and together.

8. Connect Emergency Stop Button (Optional)

Connect E-Stop Cable to green connector on front of laser driver.

**Please Note:*
Laser will not work without the included jumper OR E-Stop connected.



To reset the E-Stop, twist the red button to the right and the button will pop up.

Your Laser is Now Assembled!

The next step is to get started engraving projects with LightBurn and Makerverse. You can find our LightBurn configuration guide on the laser resource page on our site at makermade.com/laser-resources.

Have a question or need guidance?

The MakerMade technical team is available to help! You can fill out a support ticket at: https://makermade.freshdesk.com/support/tickets/new

We can't wait to see what you make! Be sure to tag us in any of your projects and use our hashtags #madewithMM and #makermadeCNC!

Find us on Instagram, Facebook, YouTube and TikTok!

Happy Making!

– Team MakerMade