

# EMBLASER CORE

Kit Rev. 1.5

## User Assembly Manual



English

## **IMPORTANT**



The Emblaser Core contains a Class 4 laser device. This device could cause damage to your eyesight or blindness.

Always wear your safety glasses when operating your machine.

## **IMPORTANT**



## **BANNED MATERIALS**

PVC, VINYL, ABS,
FIBERGLASS, COATED CARBON FIBER,
ANY MATERIAL CONTAINING CHLORINE

Using these materials within your machine will produce extremely toxic fumes, leading to severe health issues and machine damage.

If you do not know what your material contains, DO NOT USE IT.

### **FOR YOUR SAFETY**

To prevent damage to your Emblaser Device or injury to yourself or to others, read the following safety precautions carefully. Keep these safety instructions where all those who use the product will read them.

WARNINGS

#### Sharp!

Take care of sharp edges and points when handling all parts in this kit (including the acrylic frame).

#### Crack!

Take care when handling all parts in this kit, some parts will be fragile and prone to breakage until assembled.

Take care when tightening fasteners. Over tightened fasteners can damage the parts around them.

#### Do not use in wet surroundings

Water and electricity are a dangerous combination. Ensure your workspace is dry and not subject to potential wet conditions.

## Do not operate the Emblaser Device if damaged

Damage to any part of the Emblaser Device could compromise its safety and cause injury. If any part of the Emblaser Device is damaged, contact your reseller or Darkly Labs directly before operation.

- Darkly Digital Pty Ltd (Darkly Labs) reserves the right to change the specifications of the hardware and software described in these manuals at any time and without prior notice.
- While every effort has been made to ensure that the information in this manuals is accurate and complete, we would appreciate it were you to bring any errors or omissions to the attention of the Darkly Labs (info@darklylabs.com)

## Ensure proper supervision of children and impaired users

The Emblaser Device is not intended for children under the age of 15 years. Children under the age of 15 years should be supervised to ensure they do not play with the Emblaser Device.

Teenagers aged between 15 and 18 years can use the Emblaser with the consent and/ or assistance of their parents or persons who have parental authority over them. The Emblaser Device is not intended to be used by persons (including children) with reduced physical, sensory or mental capabilities, unless they have been given supervision or instruction concerning use of the Emblaser Device by a person responsible for their safety.

### **GETTING STARTED**

#### **Preparation**

A medium size table should be enough space to construct your Emblaser Core. Allow yourself 2-3 hours to complete the kit assembly.

#### Use powered drivers at your own risk!

We recommend using hand tools supplied, as some parts may be damaged by overtightening.

#### Whats in the Box

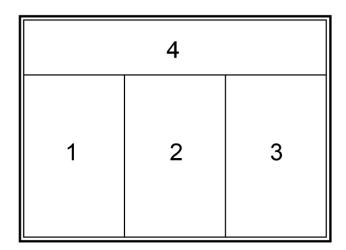
Box 1: Getting Started card, LightBurn license & assembly components.

Box 2: Contains the bulk of the assembly components.

Box 3: Contains optional extras.

Box 4: Contains the linear rails and Laser Board backing.

Underneath these four packages are the Base Plate and Acrylic Panels.



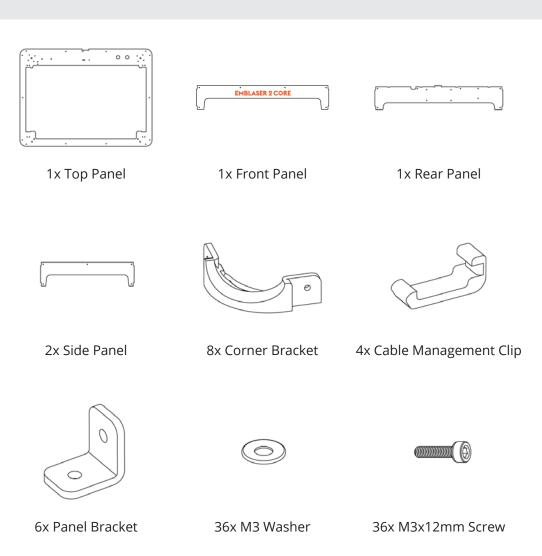
#### **Running into trouble?**

If you get stuck or have any questions, comments or feedback, please contact us at: help@darklylabs.com

### **CONTENTS** Misc. Parts

- 1x Power Supply
- 1x USB cable
- 1x Getting Started Card
- 1x Safety Glasses
- 4x Cutting Mats

### **PARTS** STAGE 1 Frame Assembly





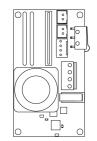
24x M3 Nut



### PARTS STAGE 3 Laser Board



1x Flexible Cable



1x Laser Board



1x Laser Unit



1x Flexible Cable Anchor





1x Laser Board



1x Flexible Cable Anchor Clip

### 3x M3x12mm Screw

4x M3x8mm Screws

Backing

### PARTS STAGE 4 Button PCB



1x Button PCB



1x Power Button



1x Enable Button



1x Ribbon Cable





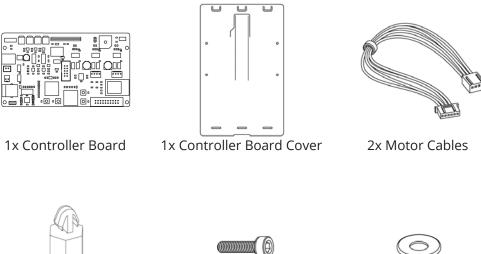


2x M3 Washer

2x M3x12mm Screw

2x M3 Nut

### PARTS STAGE 5 Controller Board

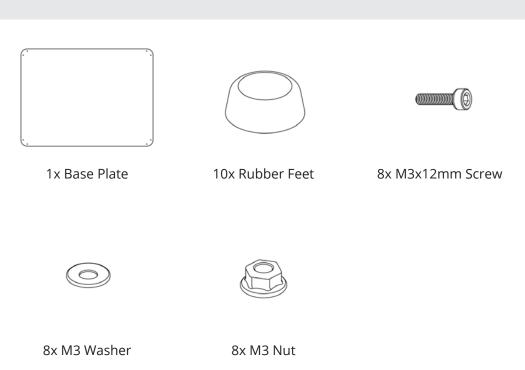


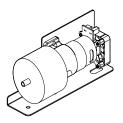
4x Standoff

4x M3x12mm Screw

4x M3 Washer

### PARTS STAGE 6 Assembly Completion

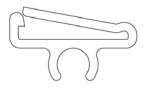








1x Air Assist Hose



3x Air Assist Hose Clips





2x M4x6mm Screw

2x M4 Washer

### **PARTS**

### Workspace Camera Accessory (OPTIONAL)



1x Workspace Camera



2x M3x12mm Screw



2x M3 Washer



2x M3 Nut

### **STAGE 1 FRAME ASSEMBLY**

Lay out the parts listed below. Refer to the 'PARTS Stage 1' section.

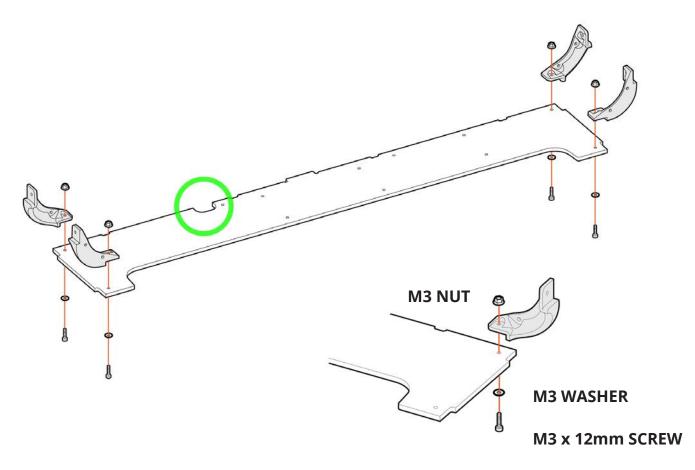
- Top Panel
- 2x Side Panel
- Front Panel
- Rear Panel
  - \*\*Remove protective film from panels before starting construction\*\*
- 8x Corner Bracket
- 6x Wall Bracket
- 4x Cable Management Clip
- 36x M3x12mm Screw
- 36x M3 Washer
- 24x M3 Nut

You will also need a **2.5mm Hex Tool.** (This and other tools can be found in Box 1 (Accessories).

#### **Step 1.01**

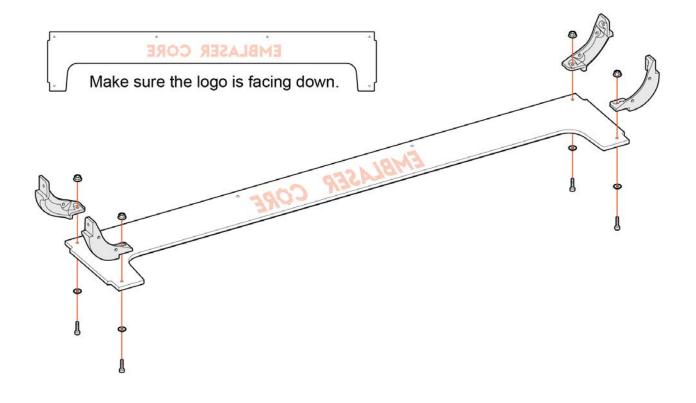
Attach 4x Corner Brackets to the Rear Panel.

Important: Keep the feature indicated in green to the left.



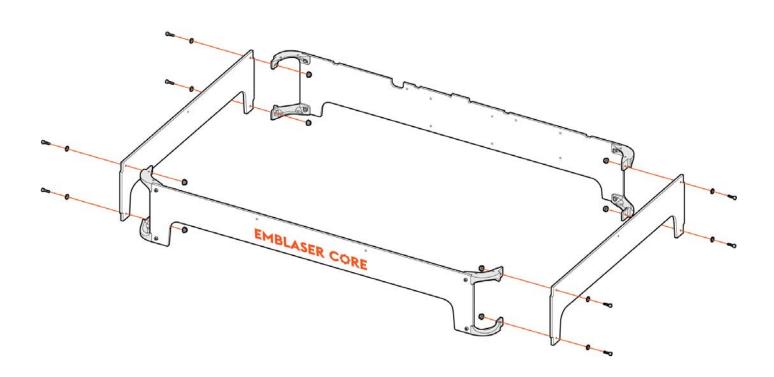
### **Step 1.02**

Place the **Front Panel** on the table with the logo facing down. Attach 4x **Corner Brackets** to the **Front Panel**.

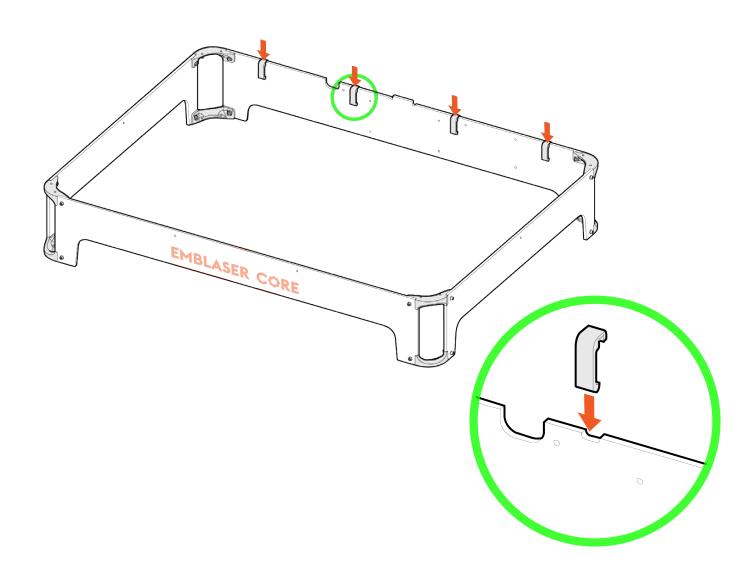


### Step 1.03

Attach the two **Side Panels.** 

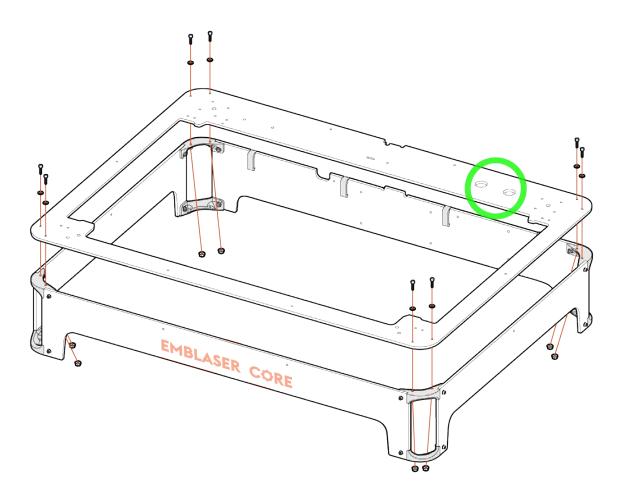


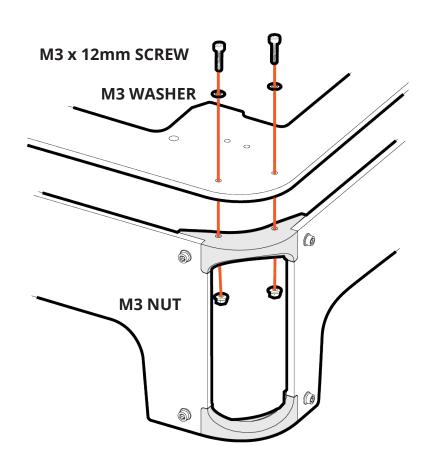
Place the 4x Cable Management Clips in the recesses on the Rear Panel.



### Attach the **Top Panel.**

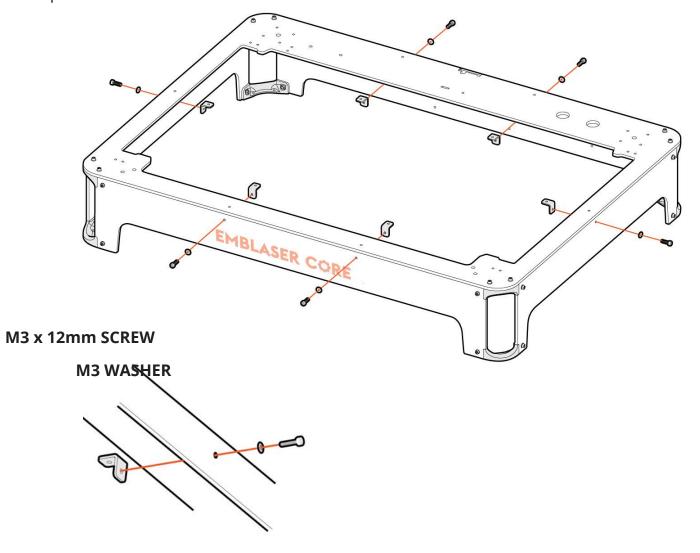
Important: Keep the holes indicated in green to the right.



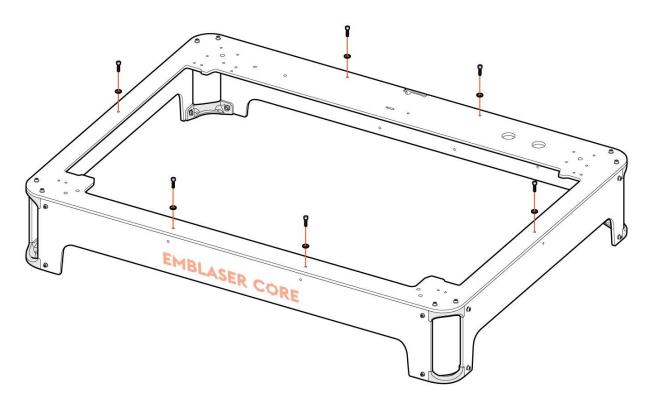


### **Step 1.06**

Attach the **Panel Brackets** to the **Front, Rear and Side Panels.** You do not need nuts for this step.



Attach the **Panel Brackets** to the **Top Panel.** 



### **STAGE 2 GANTRY ASSEMBLY**

Lay out the parts listed below. Refer to the 'PARTS Stage 2' section.

- Homing Trigger
- 2x Belts
- Belt Hub
- 4x Rail Bracket
- 2x Motor Bracket
- 2x Motors
- 2x Motor Pulleys
- 18x M3x30mm Screws
- 18x M3 Washers

- 10x M3 Nuts
- 4x Shoulder Bolts
- 4x M5 Lock Nuts
- 4x M5 Washer
- 8x Flanged Bearings
- 4x Spacers
- 2x Gantry Carriage
- Laser Carriage
- Flexible Cable Anchor
- Flexible Cable Anchor Clip

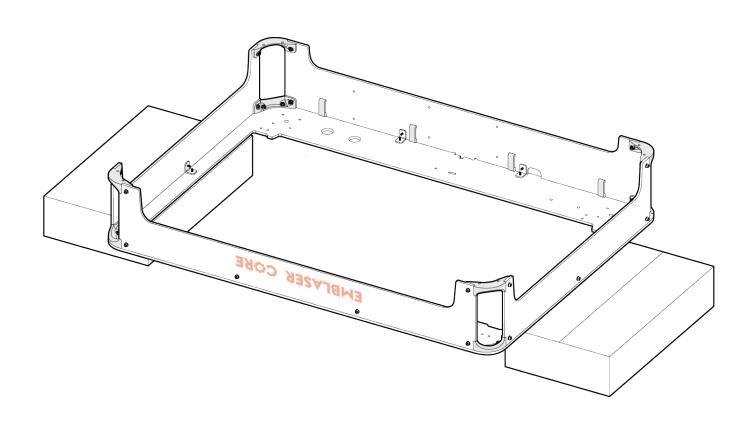
In addition, lay out the parts listed below.

- 2x Long Rails
- 2x Short Rails

You will also need a 2.0mm Hex Tool, a 2.5mm Hex Tool and a 3.0mm Hex Tool.

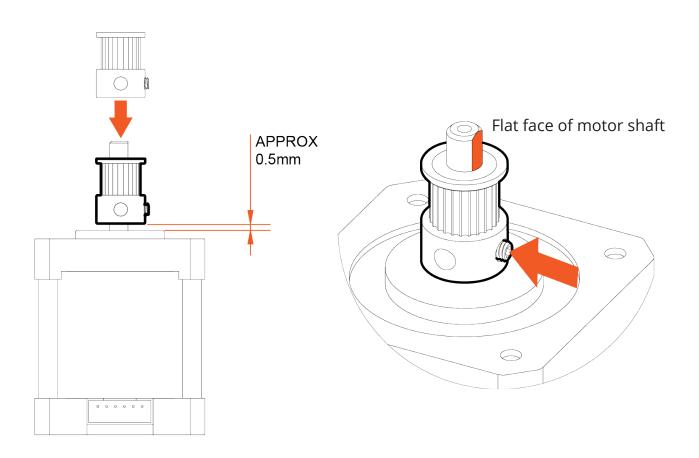
#### **Step 2.01**

Flip the **Frame Assembly** over and rest it on a pair of the small boxes included in the packaging.

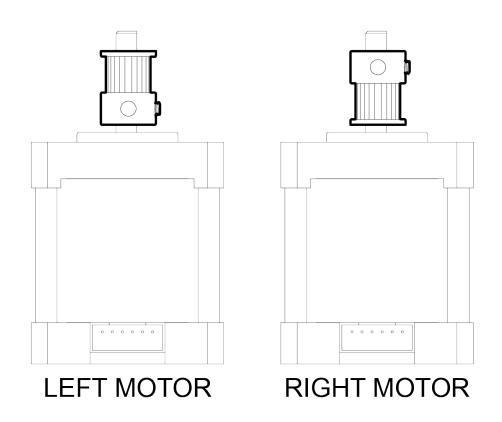


Place a **Motor Pulley** onto one of the **Motors**. Position the small screw in the **Motor Pulley** over the flat face of the **Motor** shaft and fasten using the **2.0mm Hex Tool**.

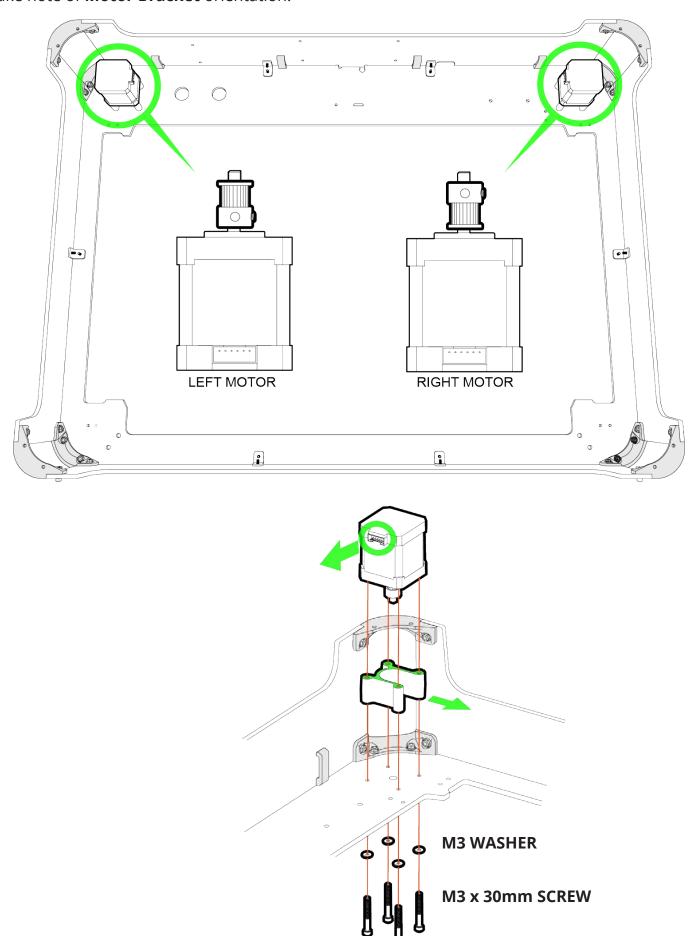
Important: Leave approx. 0.5mm gap between the Motor Pulley and the Motor.



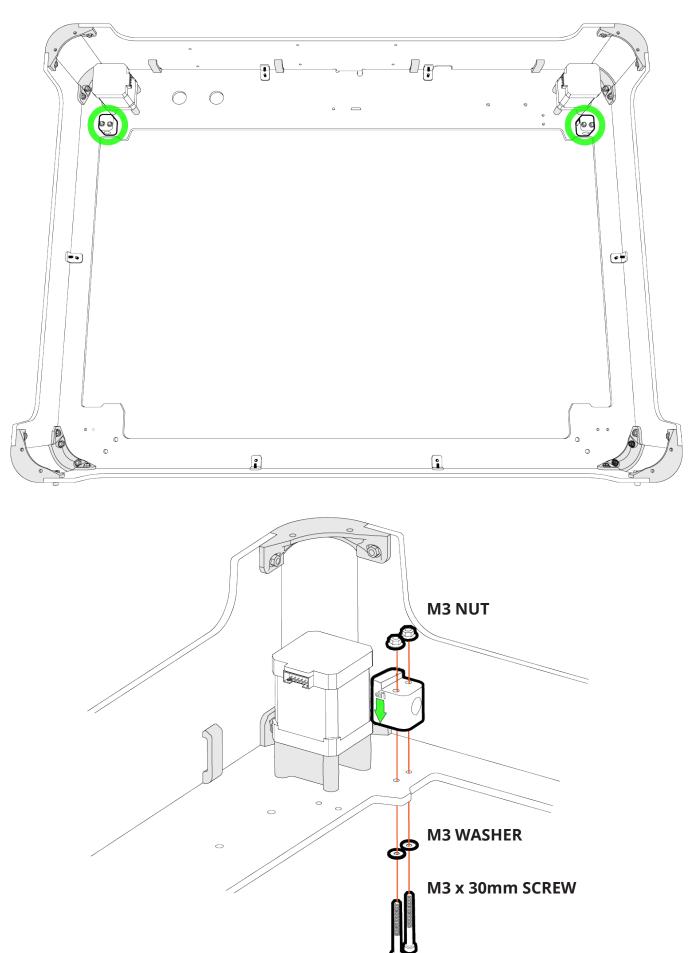
Place the second **Motor Pulley** <u>upside down</u> over the shaft of the remaining **Motor.** Repeat the previous step. The two **Motors** should now look like the ones in the image below.



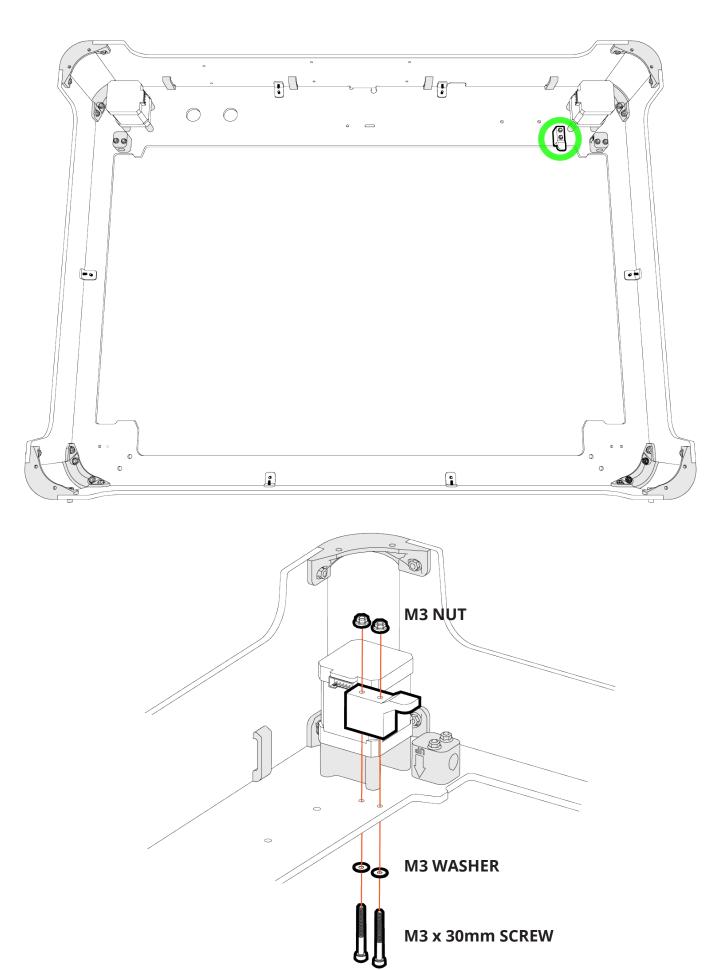
Attach the **Motors** to the underside of the **Top Panel** with the **Motor Brackets.**Make sure the **Motor** connectors are facing the centre of the machine.
Take note of **Motor Bracket** orientation.



Attach two **Rail Brackets** to the underside of the **Top Panel**. Make sure the arrow on the **Rail Bracket** points towards the **Top Panel**.

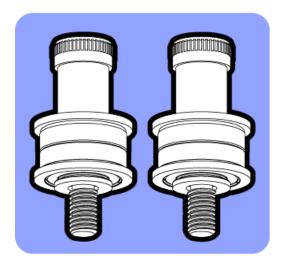


Attach the **Homing Trigger** to the underside of the **Top Panel.** 



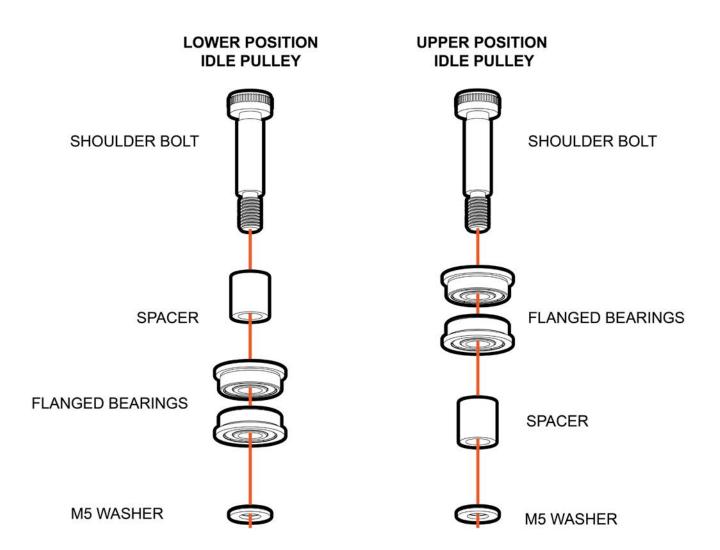
Assemble the four **Idle Pulleys**.

## LOWER POSITION IDLE PULLEY

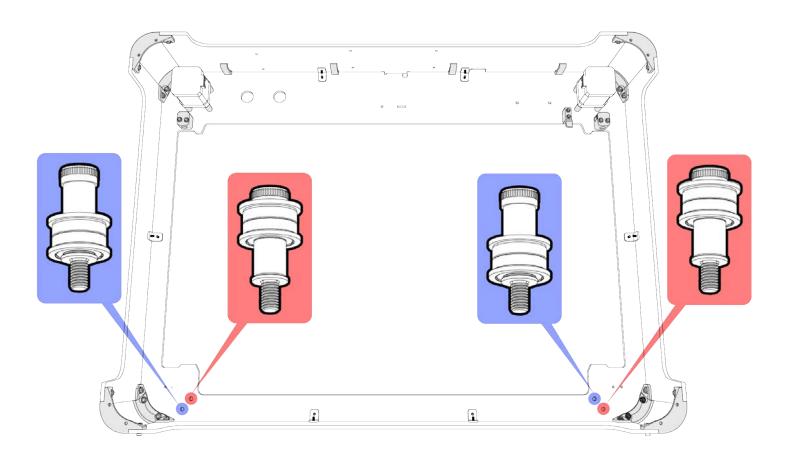


## UPPER POSITION IDLE PULLEY

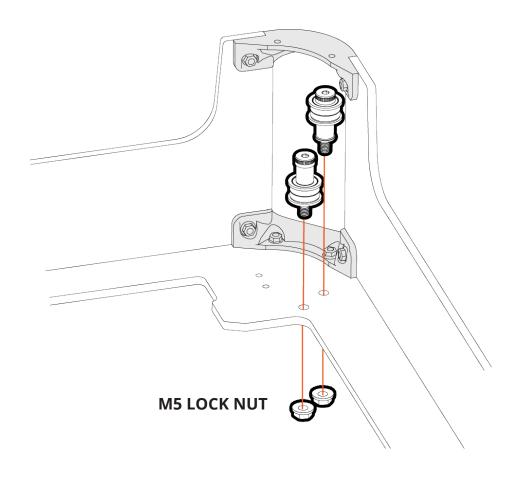




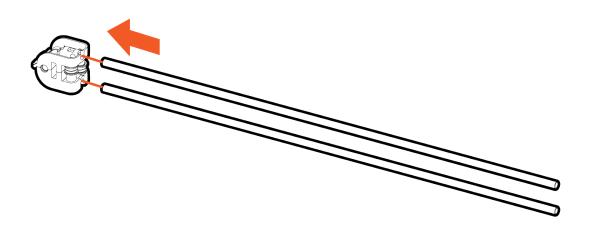
Attach the **Idle Pulleys** to the underside of the **Top Panel.** 



Important! Correct placement of UPPER and LOWER Idle Pulleys is critical to the function of your Emblaser device.

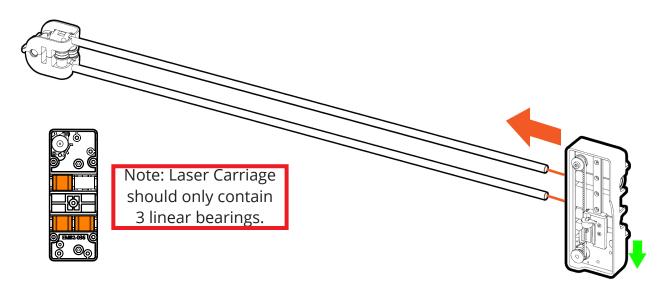


Insert the two **Long Rails** into one of the **Gantry Carriages.** 

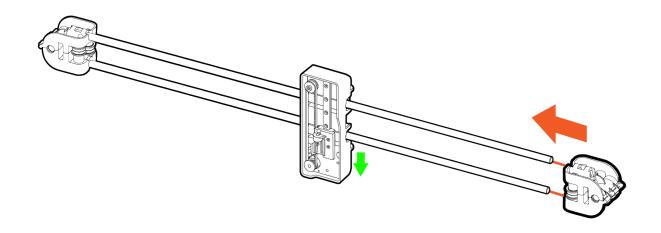


Slide the Laser Carriage onto the two Long Rails.

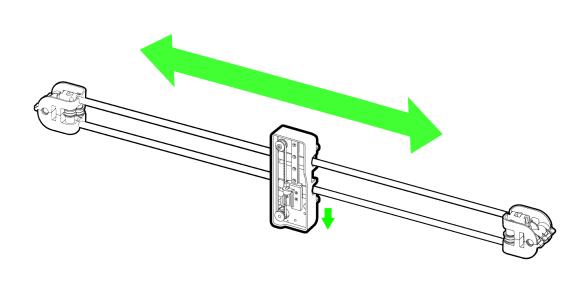
Important! Orientate the Laser Carriage so its motor is at the bottom.



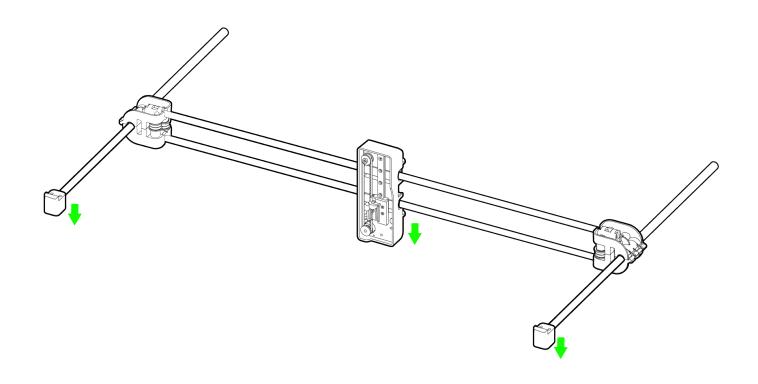
Attach remaining **Gantry Carriage**.



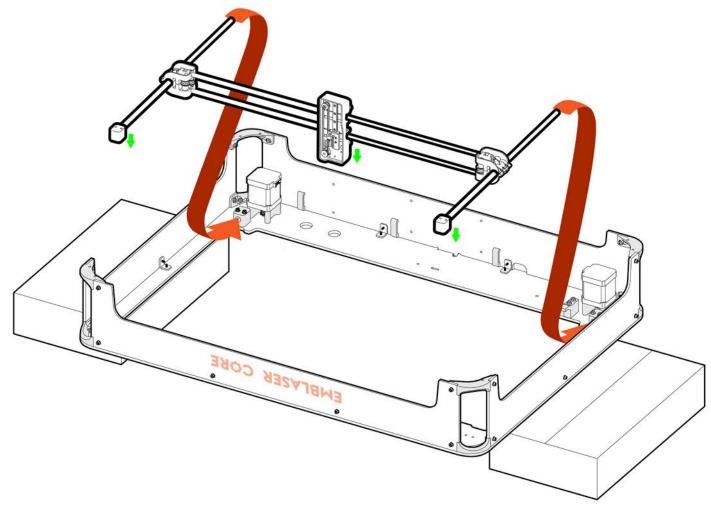
Slide the **Laser Carriage** back and forth the motion should be smooth and constant. If it feels tight near the gantry carriages can adjust the tightness of the shoulder bolts in the **Gantry Carriages** accordingly.



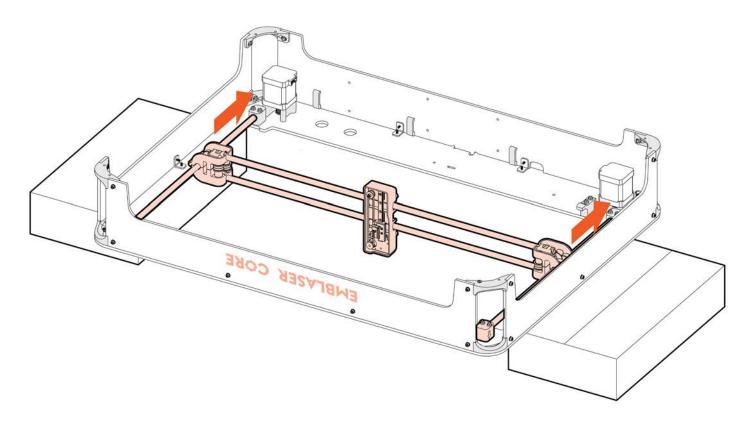
Insert the two **Short Rails** into the **Gantry Carriages** and attach the remaining **Rail Brackets** as shown.



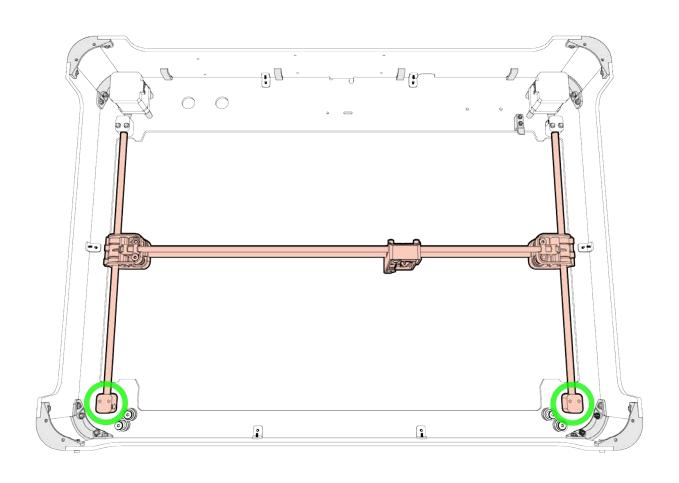
Pick up the **assembly** from the previous step and place it in the **Frame Assembly** as shown. Take note of arrow direction in the diagram.

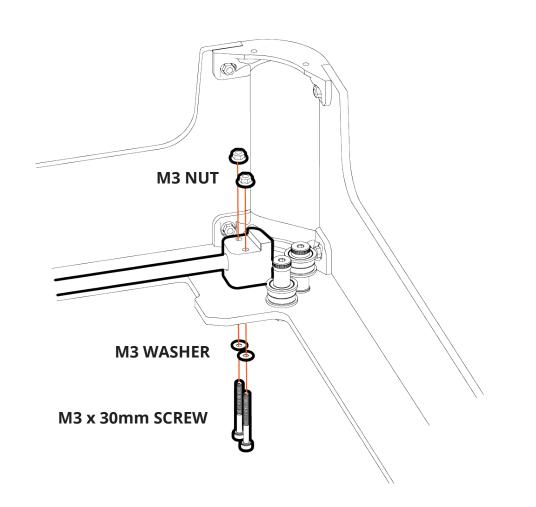


Insert the Gantry Assembly into the Rail Mounts attached to the Top Panel.

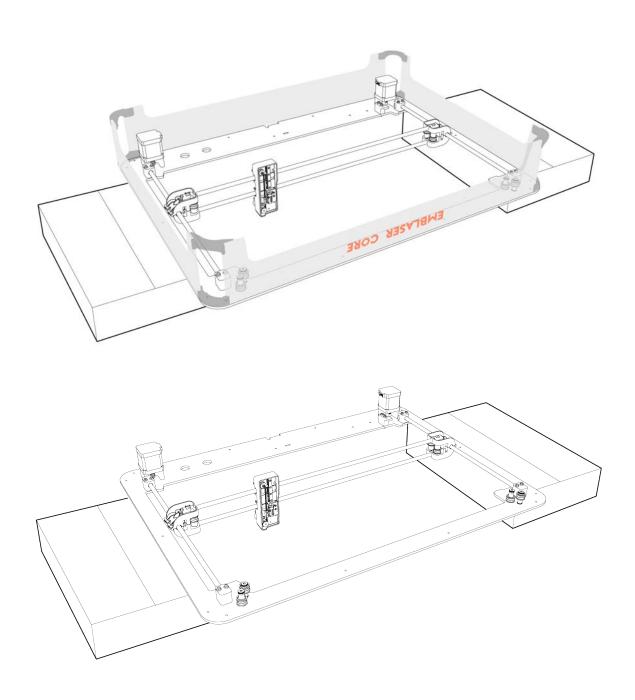


Attach the final two **Rail Brackets** to the underside of the **Top Panel.** 



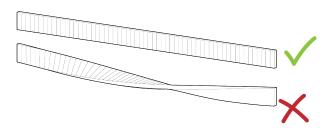


Keep the **Frame Assembly** upside down and held up by the small boxes. The **Front**, **Rear and Side Panels** have been hidden in the following illustrations.

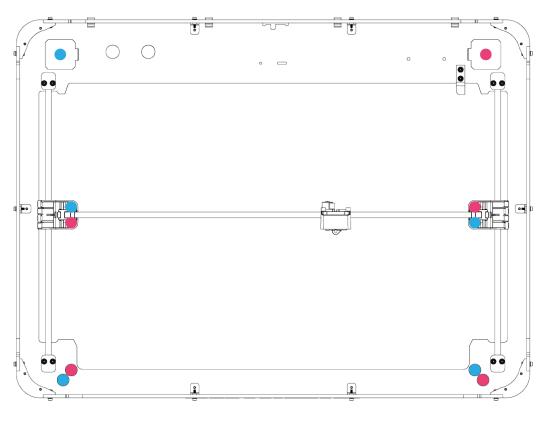


This is by far the trickiest part of the kit to assemble but don't worry! Here is a list which guarantee success.

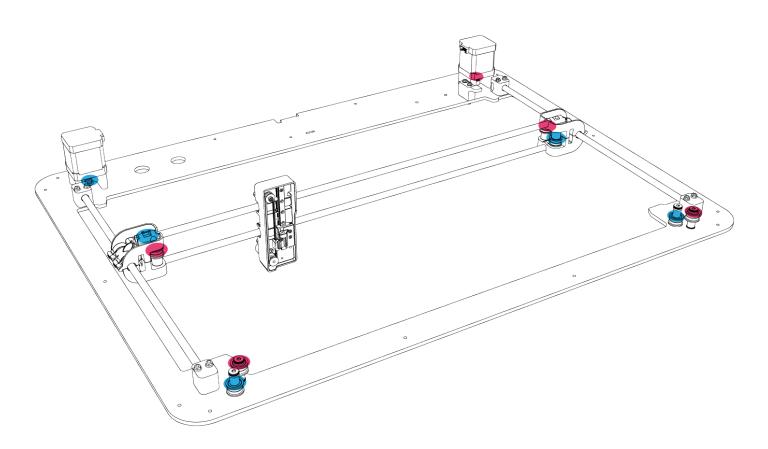
- Take note of which way the belt teeth are facing in the diagrams.
- Take note of which pulleys are specified in each diagram.
- If a belt gets twisted or tangled, don't panic! Pull it out, untwist it and try again.
- Take your time.



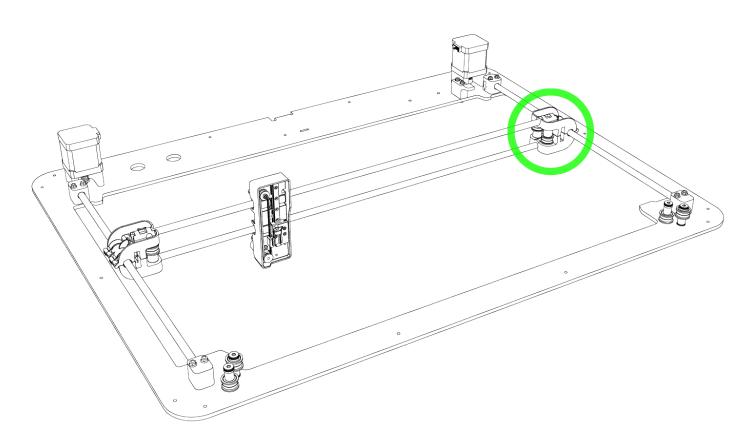
The diagrams below highlights the position of **Belt Pulleys.**There are Upper Position pulleys and Lower Position pulleys.



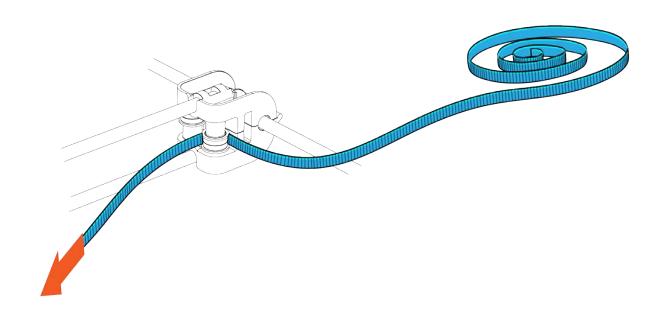
- LOWER POSITION BELT PULLEYS
- UPPER POSITION BELT PULLEYS



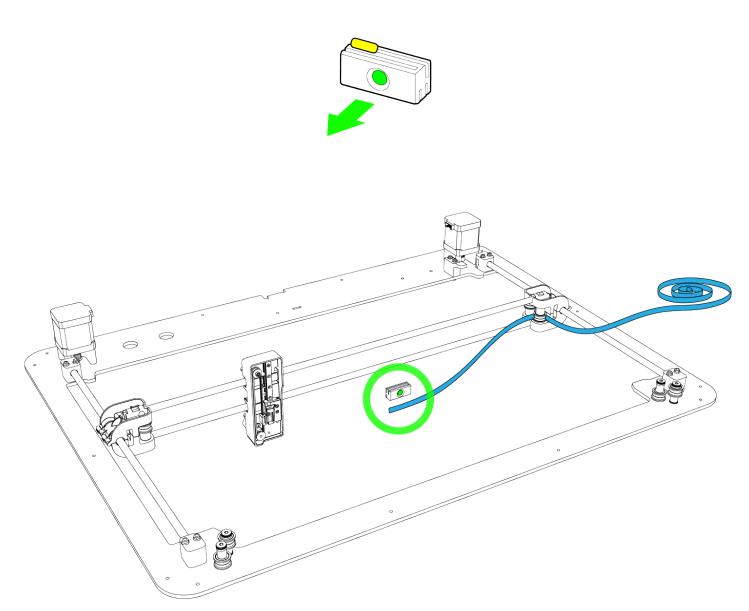
Thread one end of a **Belt** through the **Gantry Carriage** indicated in the diagram.



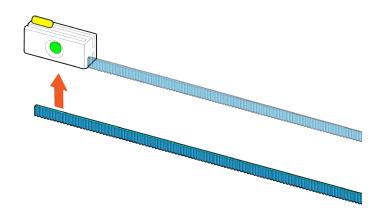
The teeth of the **Belt** should be touching the **Flanged Bearing.** 



The front of the **Belt Hub** (indicated by the circle) always faces the **Front Panel.** 

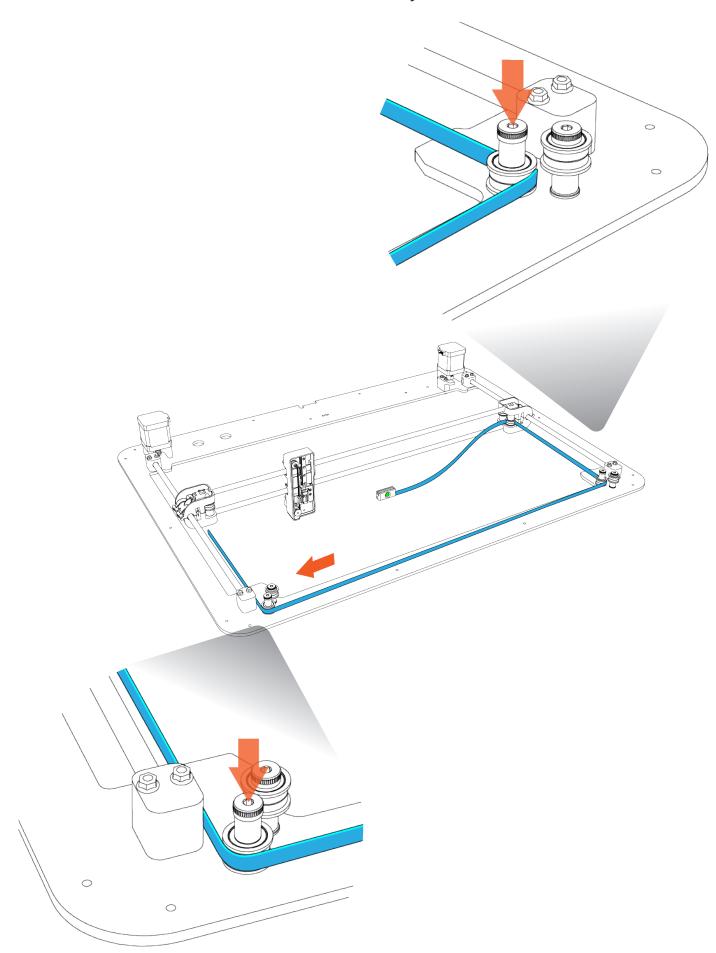


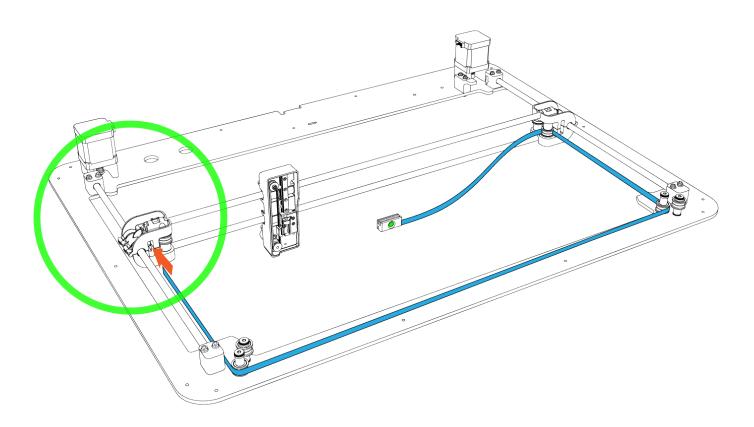
Insert the end of the **Belt** into the channel in the bottom of the **Belt Hub** next to the **GREEN** tab as shown in the image below.



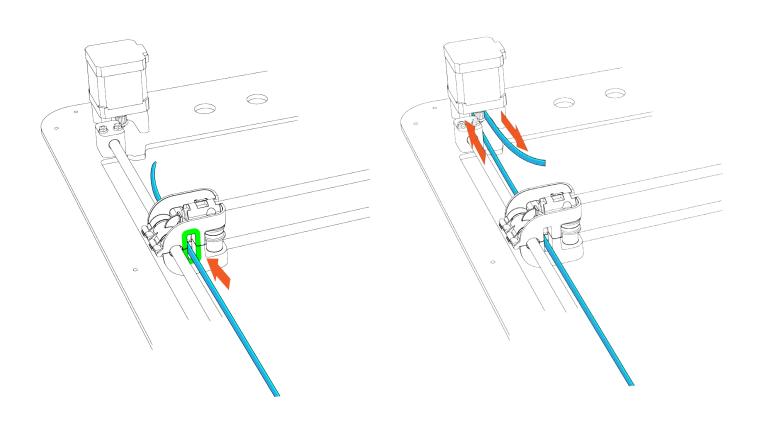
**Step 2.15** 

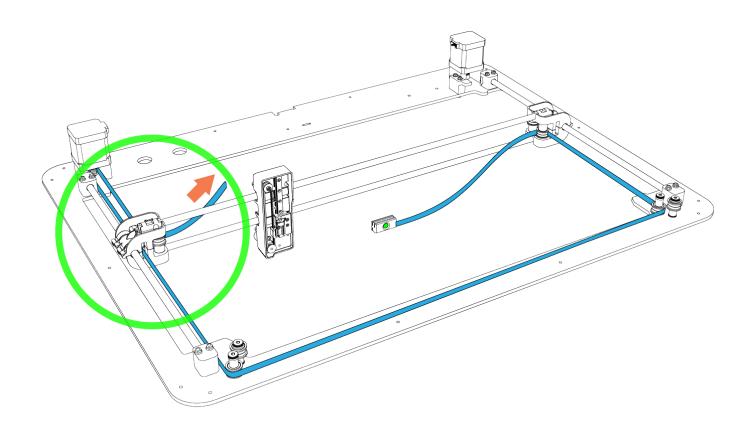
Route the **Belt** around the two Lower Position Idle Pulleys as shown.



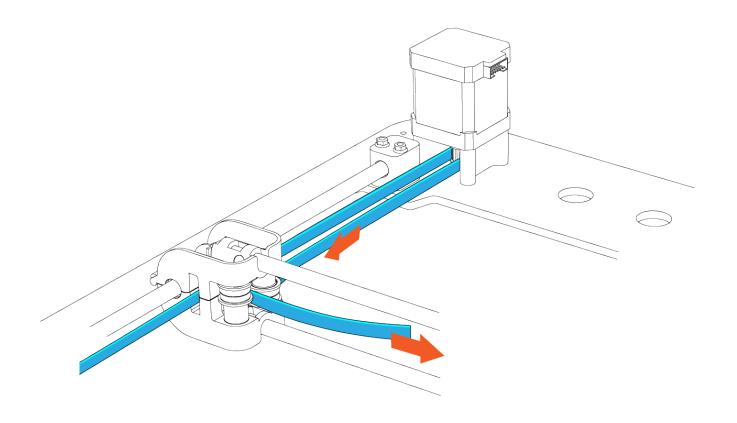


Pass the **Belt** straight through the **Gantry Carraige** and around the **Motor Pulley.** 

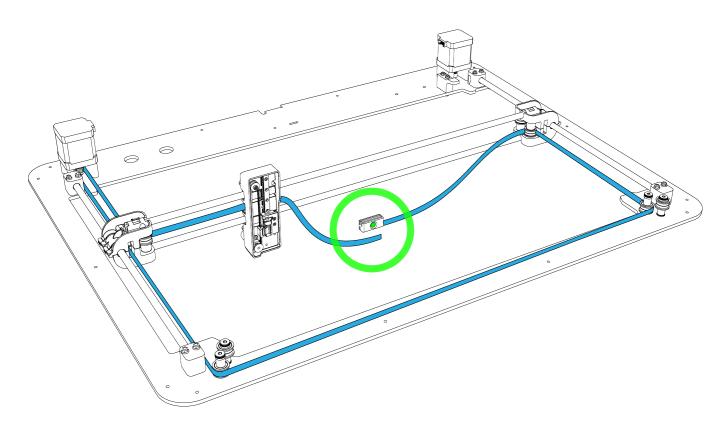




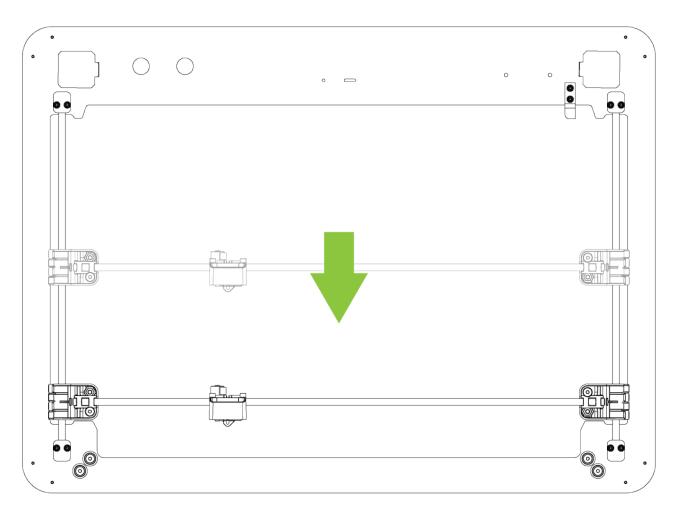
Route the **Belt** behind lower position pulley in the **Gantry Carriage.** 



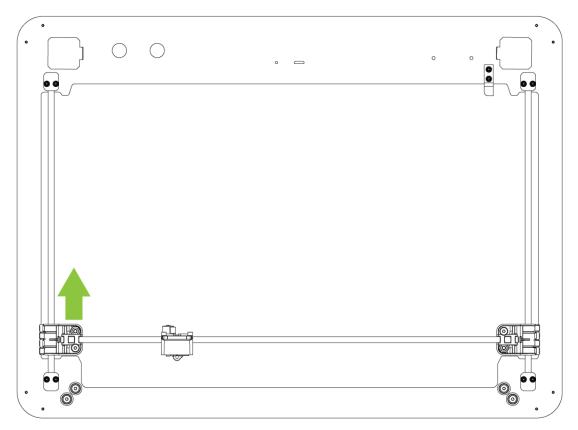
Bring the **Belt** around behind the **Laser Carriage**.



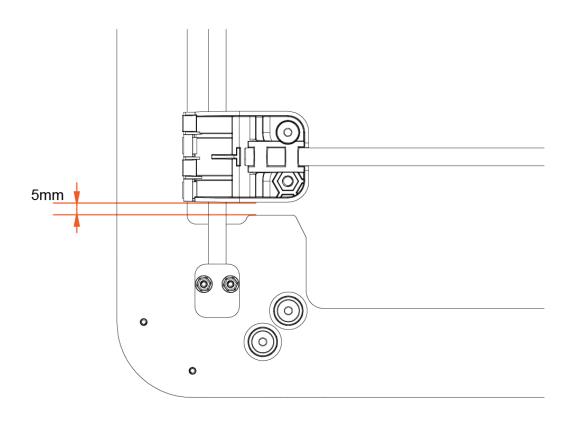
Move the **Gantry Carriages** to the front of the machine so that both are touching the **Top Panel.** 



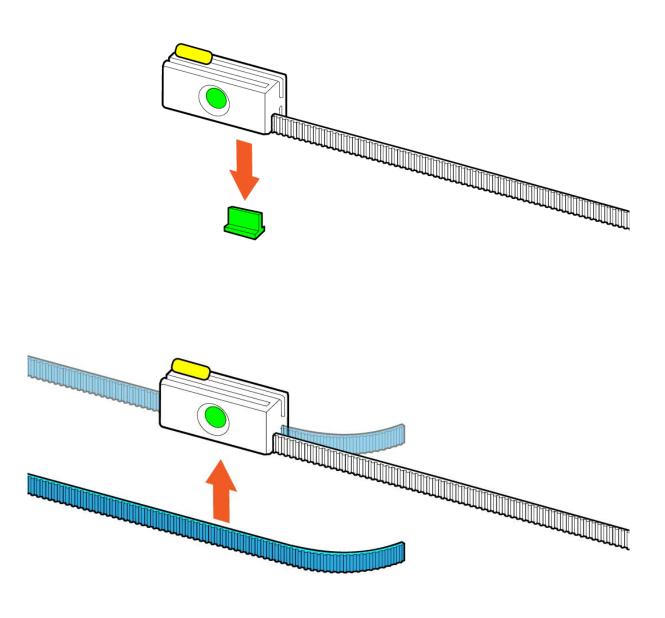
Pull the belt tight. This should cause the left hand side **Gantry Carriage** to pull away from the **Top Panel.** 



Apply just enough tension to the belt so the gap between the left hand side **Gantry Carriage** and the **Top Panel** is approximately 5mm.



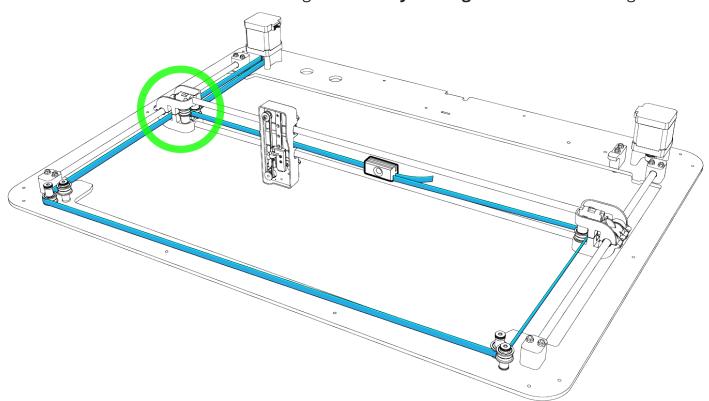
Remove the **Green Tab** from the **Belt Hub** and insert the loose end of the **Belt** into that channel.



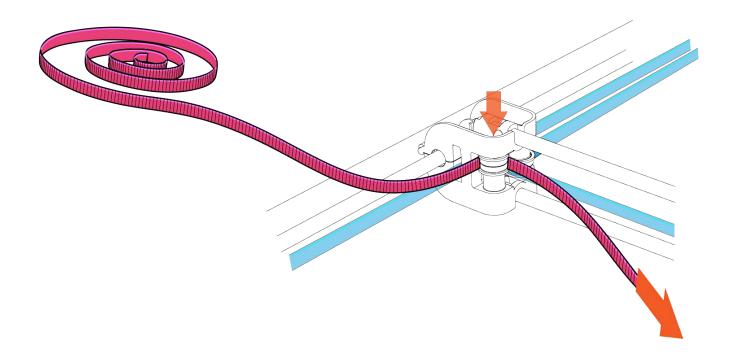
Check the position of the **Gantry Carriages** again. When the left hand **Gantry Carriage** is touching the **Top Panel**, the right hand **Gantry Carriage** should be 5mm away from the **Top Panel**.

Note: The **Gantry Assembly** will now be on an angle, this is corrected when tensioning the second **Belt**.

Step 2.19
Thread one end of the second **Belt** through the **Gantry Carriage** indicated in the diagram.



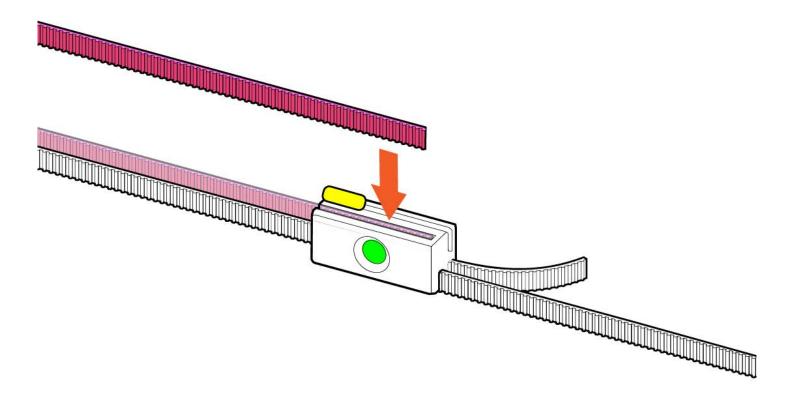
The teeth of the **Belt** should be touching the **Flanged Bearing.** 



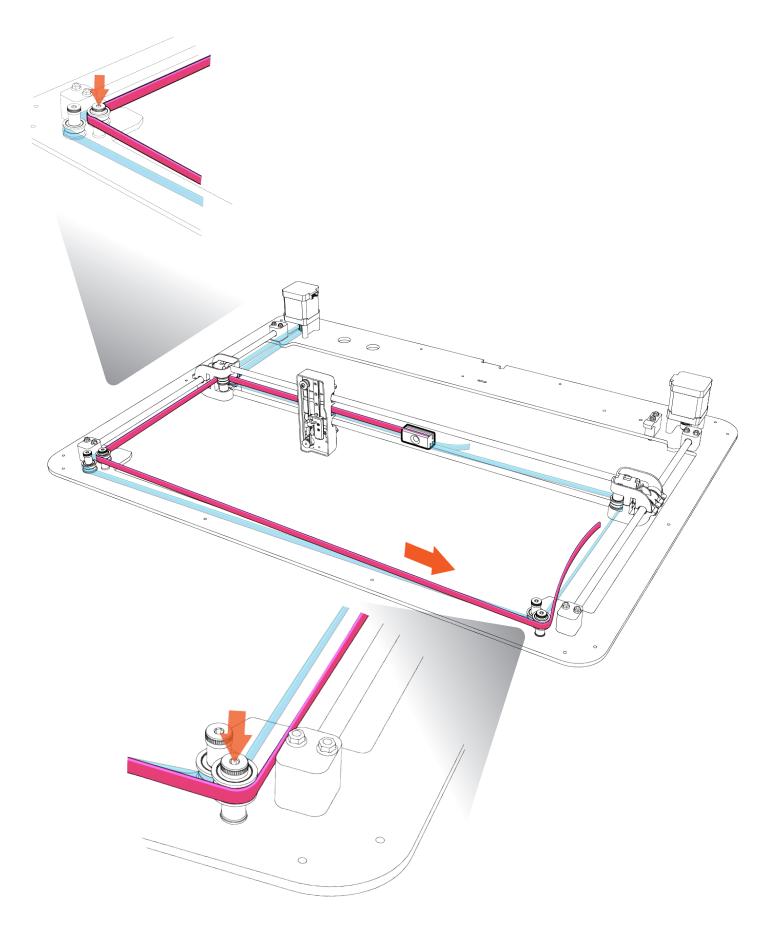
## Step 2.20

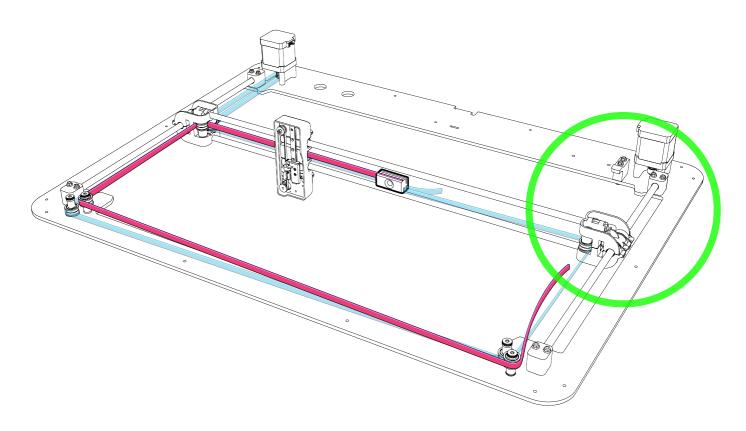
Insert the belt into the channel in the top of the **Belt Hub.** 

Use the empty channel, NOT the channel containing the yellow tab.

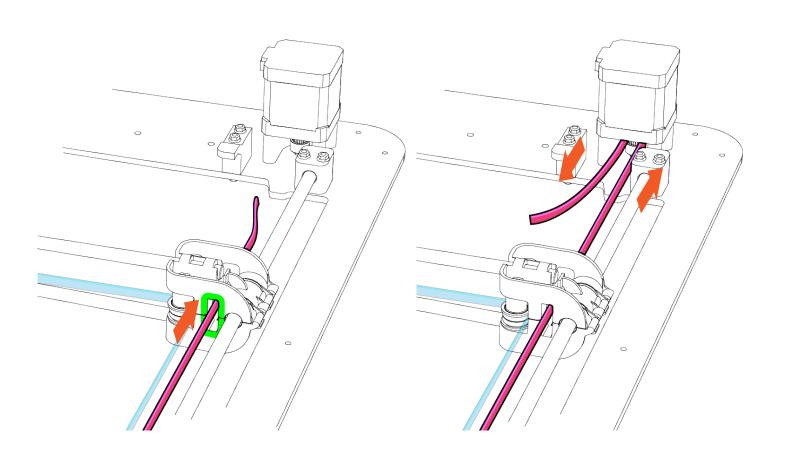


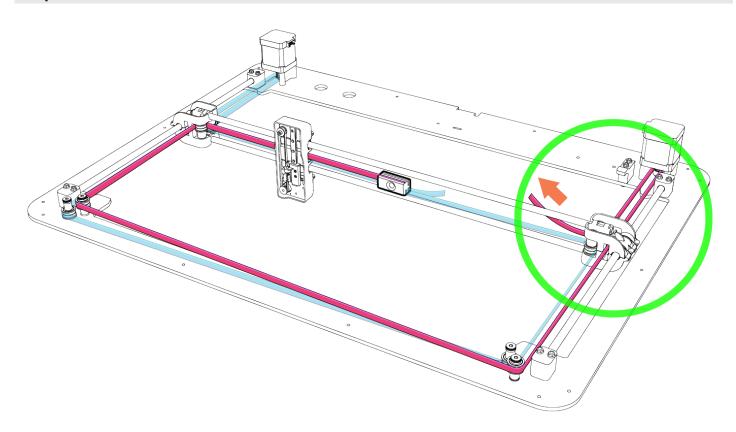
Route the **Belt** around the two Upper Position Idle Pulleys as shown.



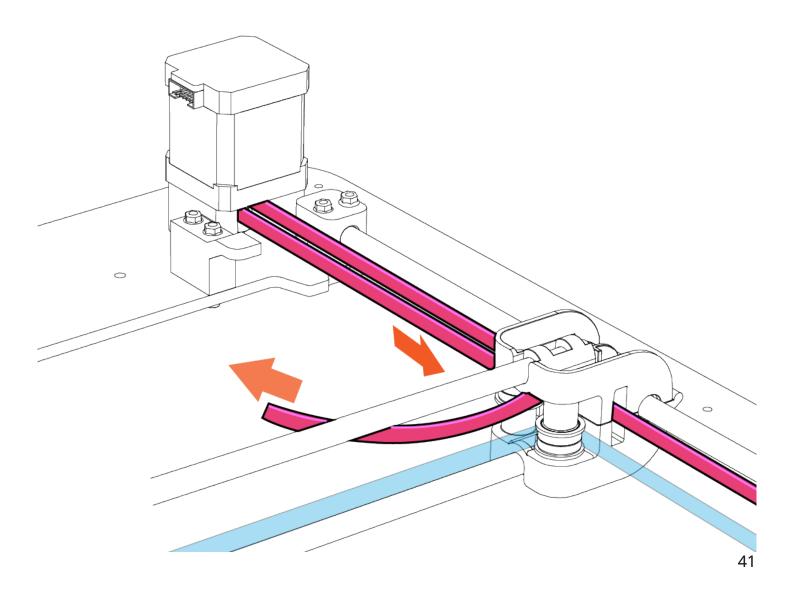


Pass the **Belt** through the **Gantry Carraige** and around the **Motor Pulley.** 

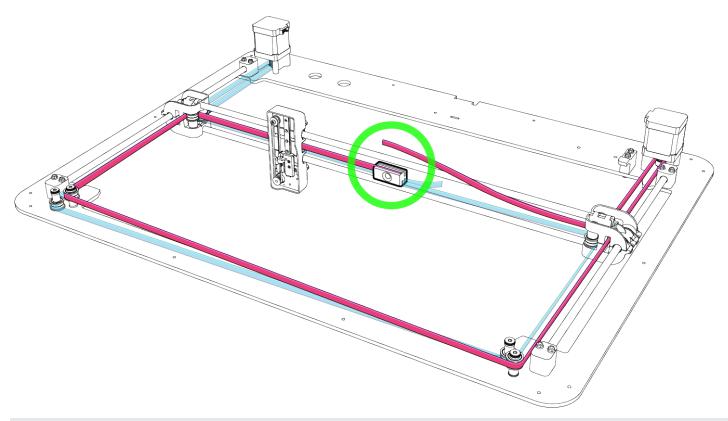




Route the **Belt** behind lower position pulley in the **Gantry Carriage.** 



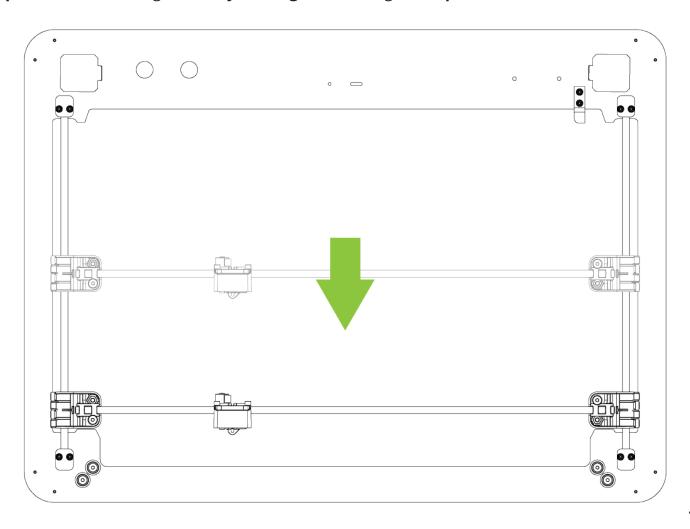
## Step 2.24



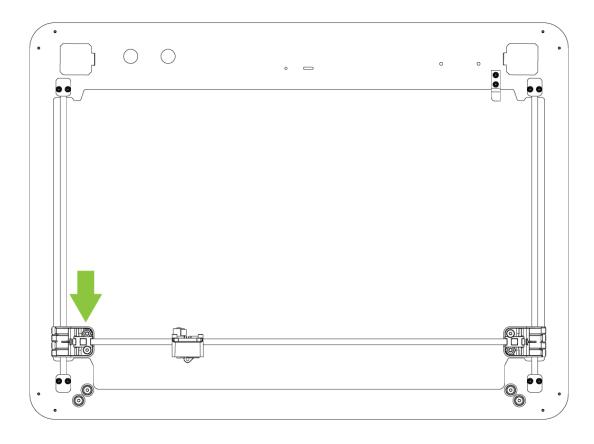
**Step 2.25** 

Move the **Gantry Carriages** to the front of the machine.

If the first belt has been tensioned correctly, the left **Gantry Carriage** will sit 5mm back from the **Top Panel** when the right **Gantry Carriage** is touching the **Top Panel**.

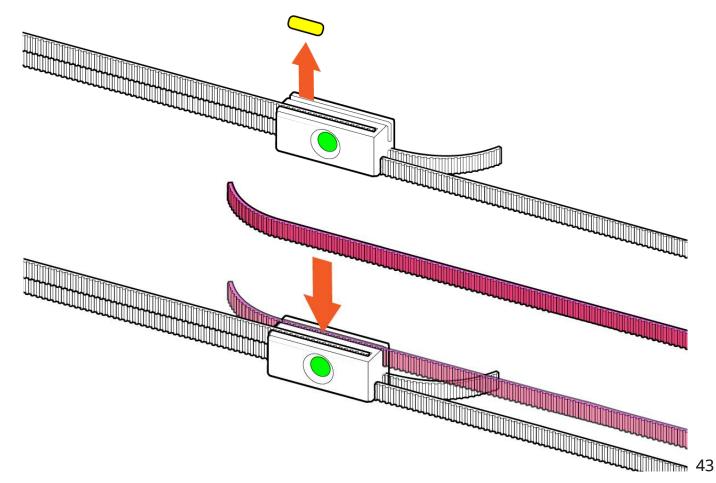


Pull the belt tight. This should cause the left hand side **Gantry Carriage** to get closer to the **Top Panel.** 



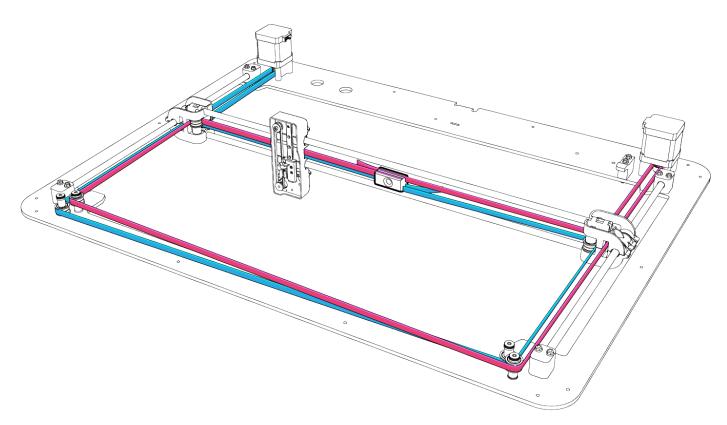
Apply just enough tension to the belt to remove the gap between the left hand side **Gantry Carriage** and the **Top Panel**.

Remove the yellow belt tab and and press the **Belt** into the **Belt Hub** as shown in the diagram.

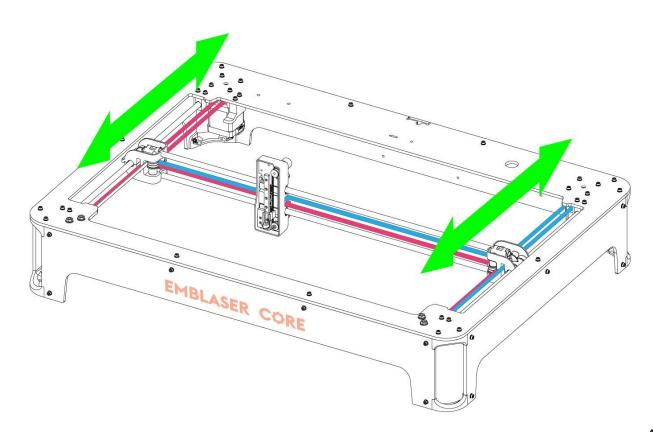


#### **Step 2.26**

Take this oportunity to check the **Belts** for twists and to make sure the correct pulleys are used for each **Belt** and that the gantry carriages meet the front of the **Top Panel** without any gaps.



Flip the **Frame Assembly** back over onto its feet and test one last time that the **Gantry Carriages** meet the **Top Panel** at the same time.



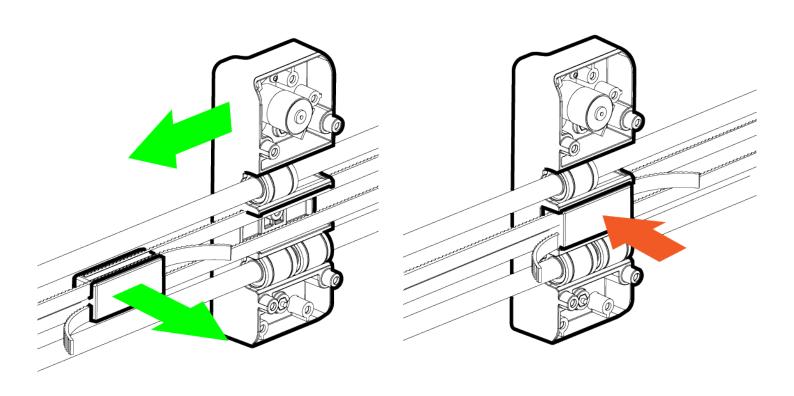
IMPORTANT: If the **Gantry** is not square, your designs will not be square.

If the **Gantry** is not square, your machine may fail to home correctly.

The **Gantry** is not square if the **Gantry Carriages** do not touch the **Top Panel** at the same time when pushed backwards and forwards. Take a moment to redo the **Belts** now.

## **Step 2.27**

Insert Belt Hub into the Laser Carriage.



## **STAGE 3 LASER BOARD**

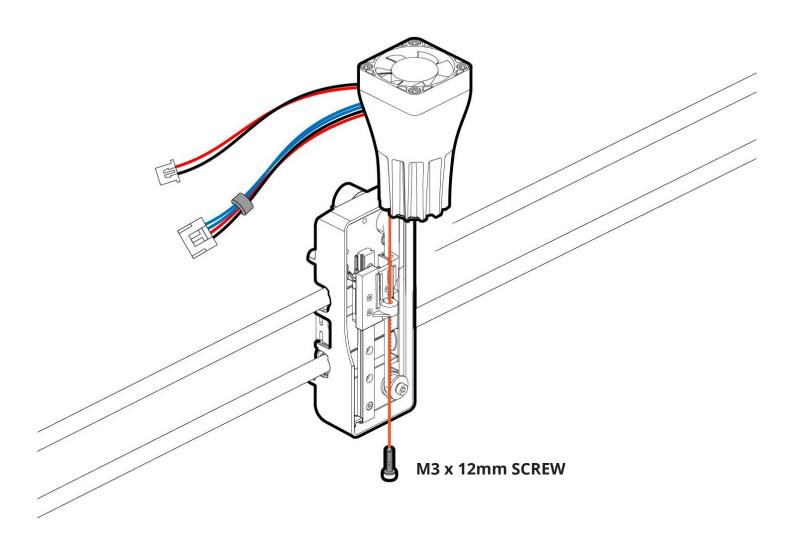
Lay out the parts listed below. Refer to the 'PARTS Stage 3' section.

- Flexible Cable.
- Laser Board.
- Laser Unit.
- Flexible Cable Anchor.
- Flexible Cable Anchor Clip.
- Laser Board Backing.
- 3x M3x12mm Screws
- 4x M3x8mm Screws

You will also need a 2.5mm Hex Tool.

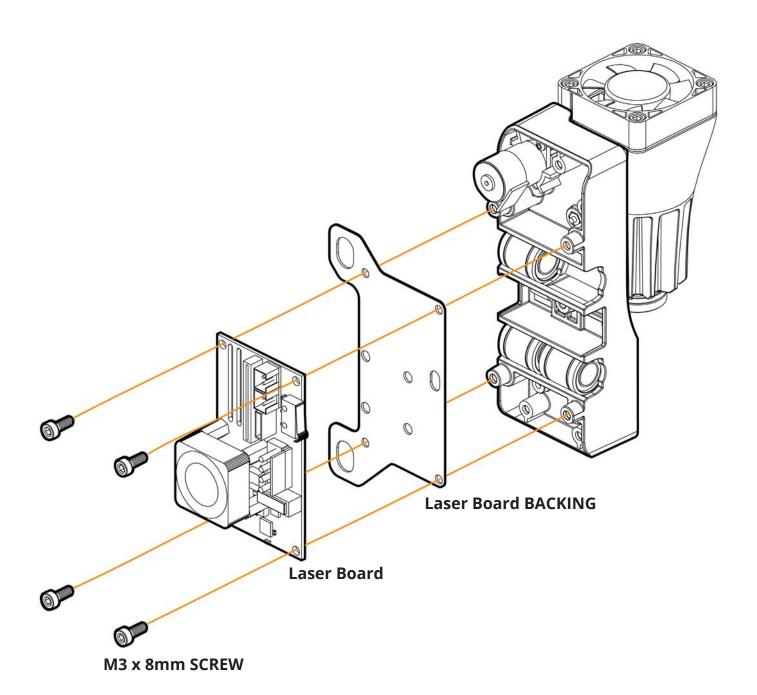
## Step 3.01

Attach the Laser Unit to the Laser Carriage.

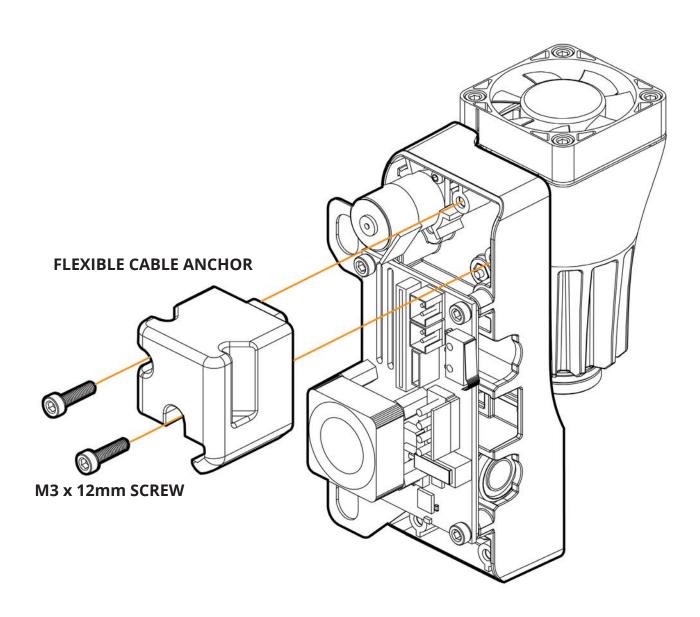


## Step 3.02

Place the **Laser Board** over the **Laser Board Backing** and attach to the **Laser Carriage**. Note: Don't let any cables to be trapped under the **Laser Board** or the **Laser Board Backing**.



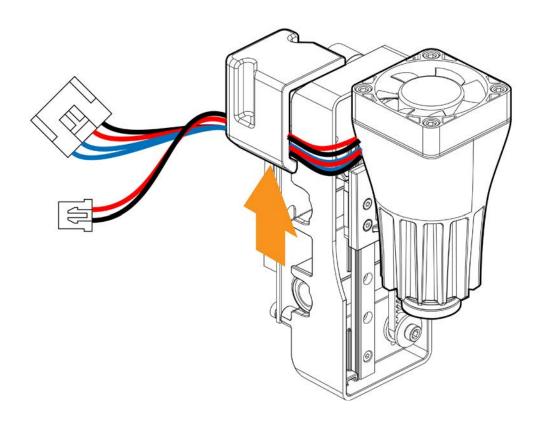
Attach Flexible Cable Anchor to the Laser Carriage.



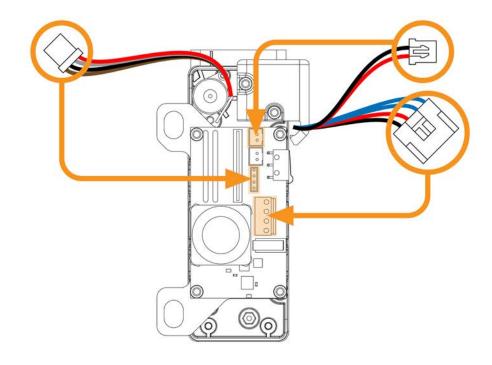
## Step 3.04

Route the **Laser Unit** cables around the side of the **Laser Carriage** and under the hook in the **Flexible Cable Anchor.** 

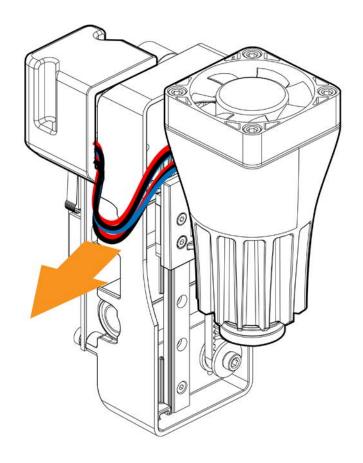
The hook keeps the cables clear of the limit switch.



Connect the cables to the **Laser Board** sockets.

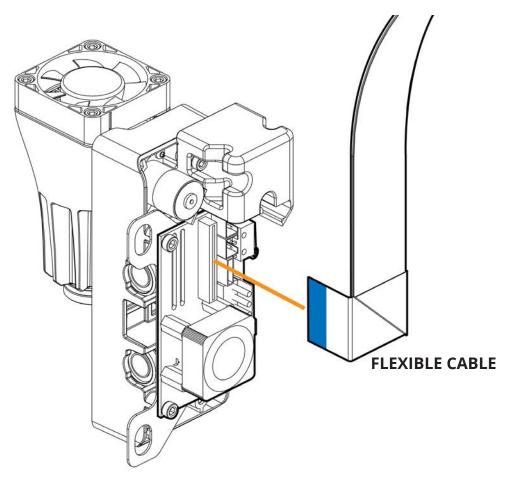


Pull excess wire back through the hook. This allows the **Laser Unit** to move up and down freely.

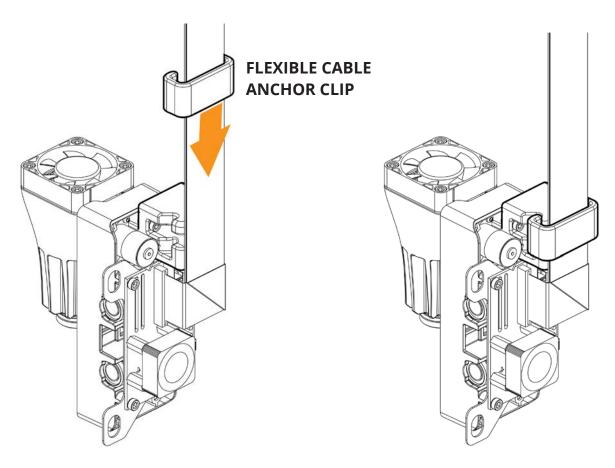


Step 3.05

Insert the **Flexible Cable** as shown below.



Slide the **Flexible Cable Anchor Clip** onto the **Flexible Cable Anchor** to secure the **Flexible Cable**.



## **STAGE 4 BUTTON PCB**

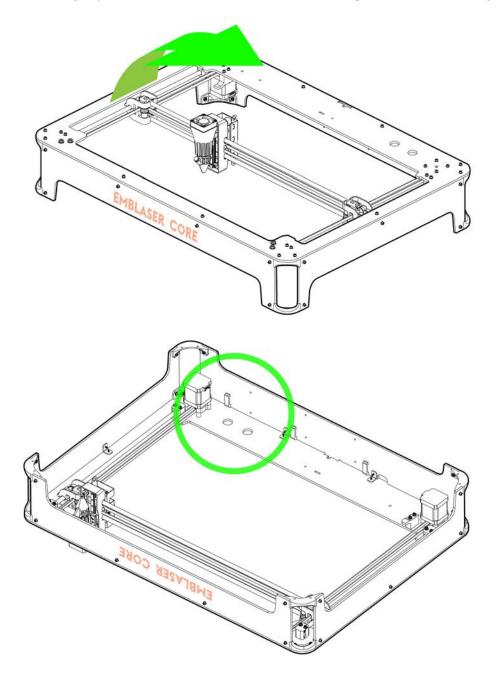
Lay out the parts listed below. Refer to the 'PARTS Stage 4' section.

- Button PCB
- Enable Button
- Power Button
- Ribbon Cable
- 1x M3x12mm Screws
- 1x M3 Washer
- 1x M3 Nut

You will also need a 2.5mm Hex Tool.

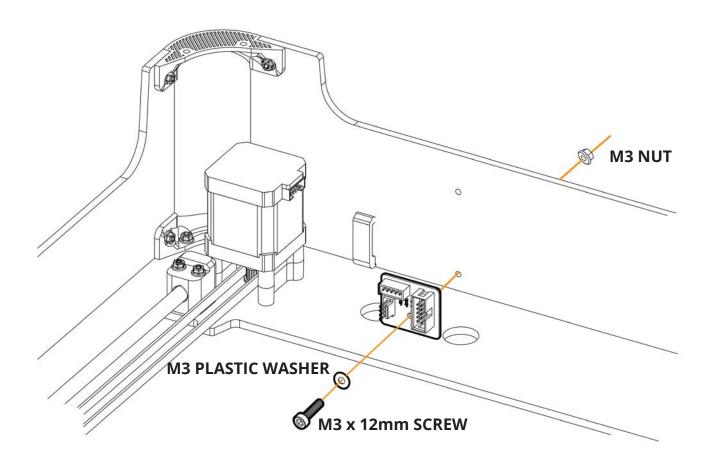
## Step 4.01

Turn the Frame Assembly upside down. Use the small boxes again to raise it off your table.



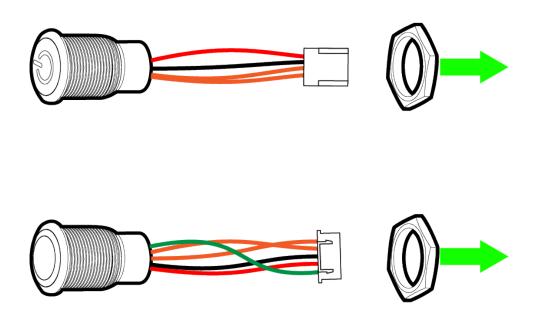
## Step 4.02

Attach the **Button PCB** to the **Rear Panel.** 

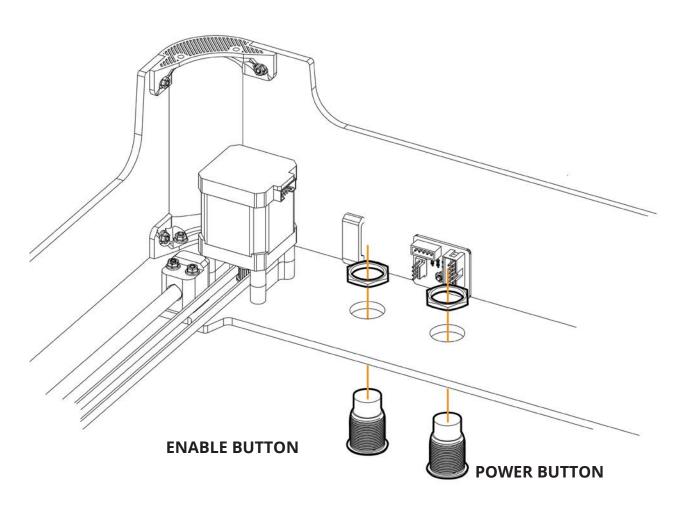


Step 4.03

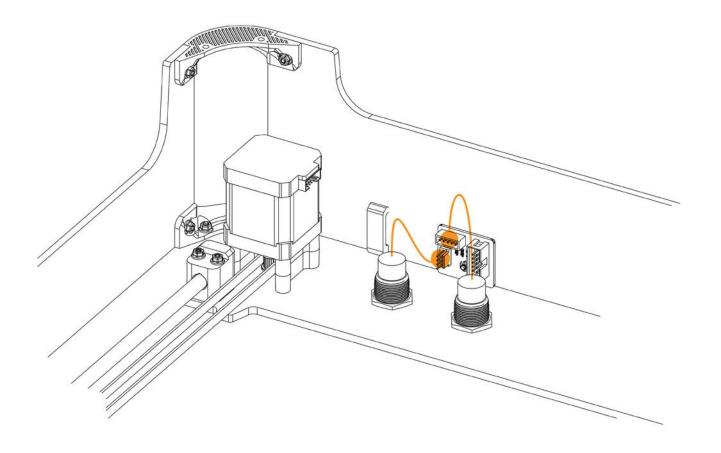
Completely remove the hexagonal nuts from the **Power Button** and the **Enable Button**.



Insert the buttons into the indicated holes in the Top Panel. Return the hexagonal nuts to the buttons and tighten by hand.



Connect the Power and Enable Buttons to the Button PCB.



## **STAGE 5 CONTROLLER BOARD**

Lay out the parts listed below. Refer to the 'PARTS Stage 5' section.

- Controller Board \*\*Do not remove from anti-static bag until instructed\*\*
- Controller Board Cover
- 2x Motor Cables
- 3x Support Strip Clips
- 4x M3x12 Screws
- 4x M3 Washer
- 4x Standoff

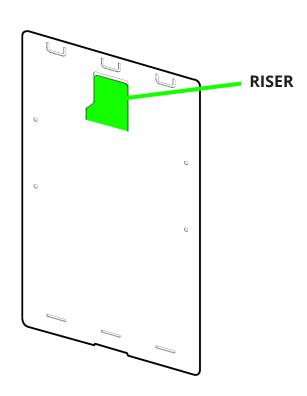
You will also need a 2.5mm Hex Tool.

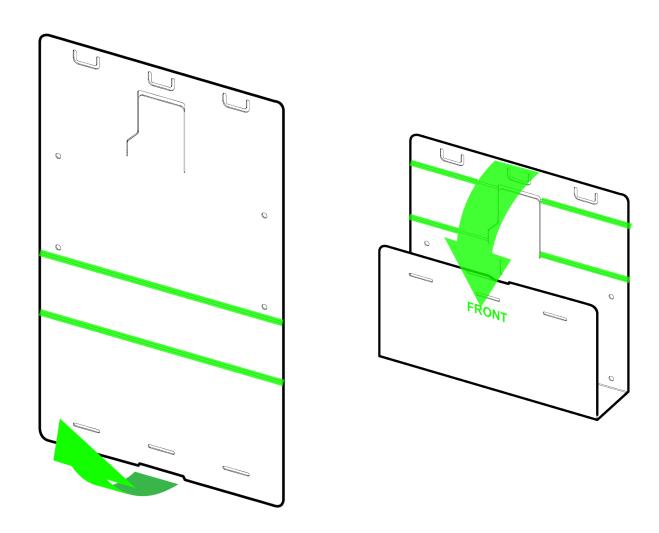
## This stage of the assembly has components that are sensitive to damage from static. Please read and follow these steps:

- Only handle the controller board by its edges.
- Only remove the controller board from its bag when you are ready to install it.
- Do not walk around with the controller board.
- Avoid handing the controller board from one person to another.

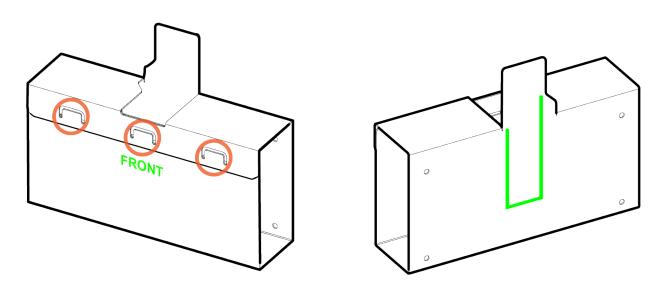
#### Step 5.01

Familiarise yourself with the Controller Board Cover using the following diagrams.

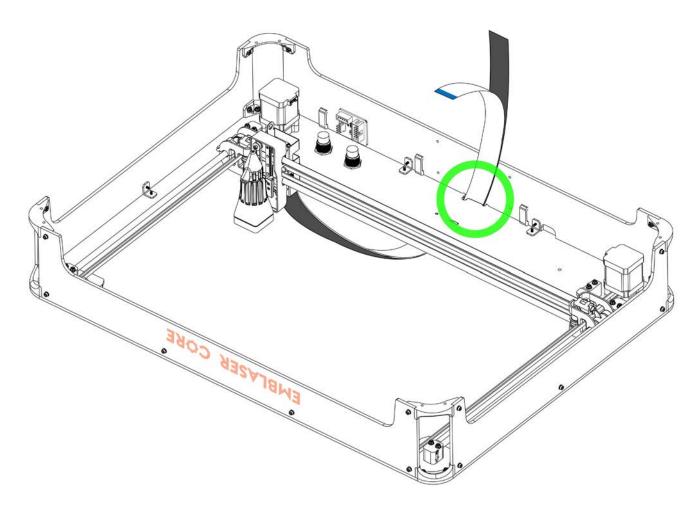




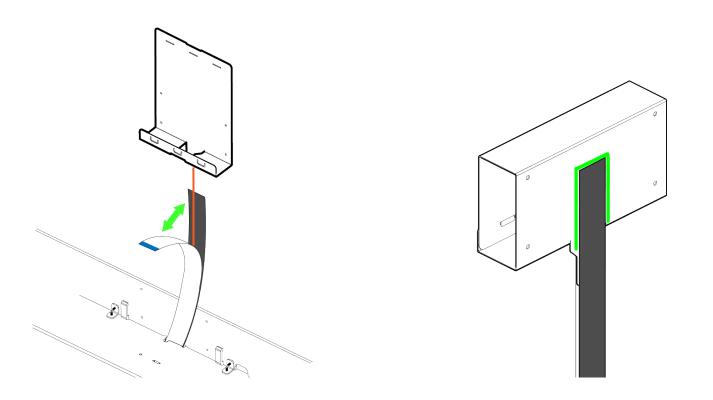
When the **Contoller Board Cover** is fully folded; the lines on the back face should be visible from the outside.



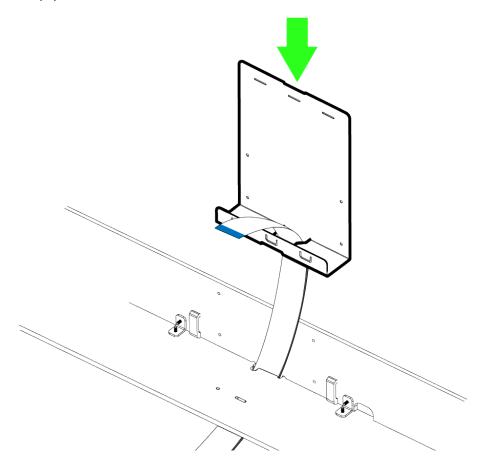
Pull the Flexible Cable through the indicated gap between the Top Panel and Rear Panel.



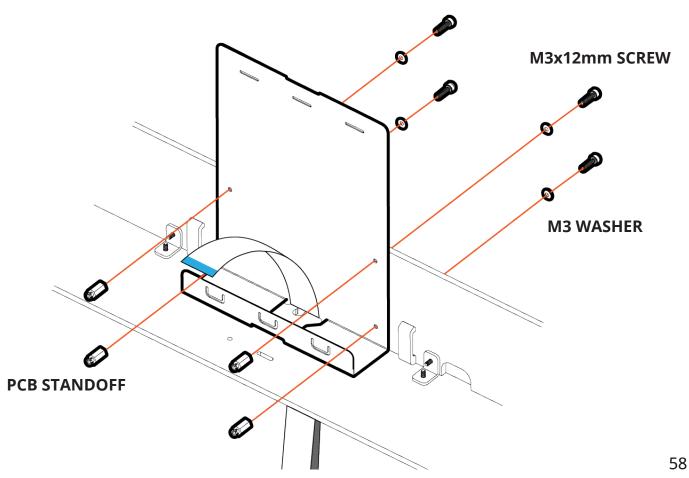
Poke the white layer of the **Flexible Cable** through the hole in the **Controller Board Cover**. The black layer of the **Flexible Cable** should sit outside the **Controller Board Cover**. Expose the adhesive on the black layer and adhere it to the indicated area.

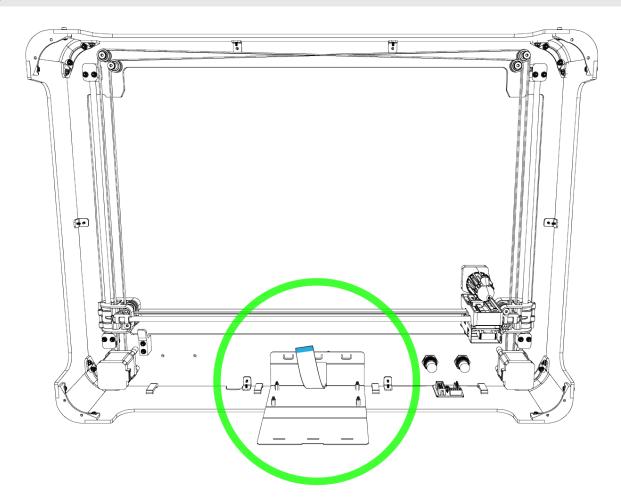


Pull the **Flexible Cable** back down through the **Top Panel** until the **Controller Board Cover** is resting on the top panel.

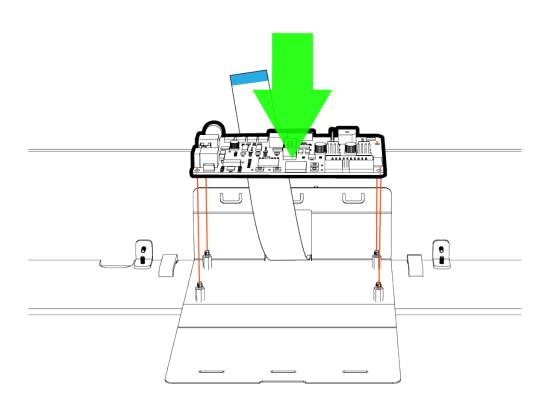


Attach the Controller Board Cover to the Rear Panel.



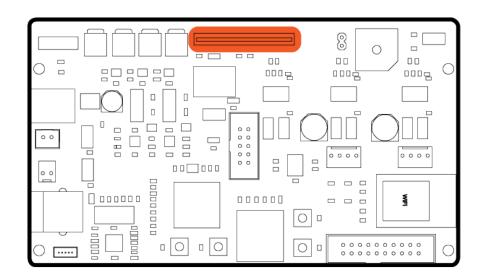


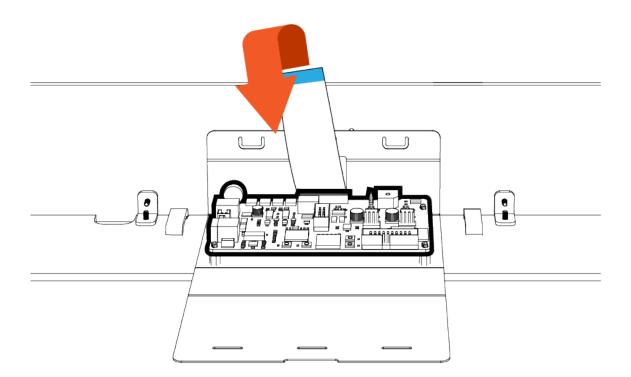
Taking care not to put creases in the **flexible cable**, hold it up against the **Top Panel** to prevent it getting trapped underneath, then clip the **Controller Board** to the standoffs in the **Rear Panel**.



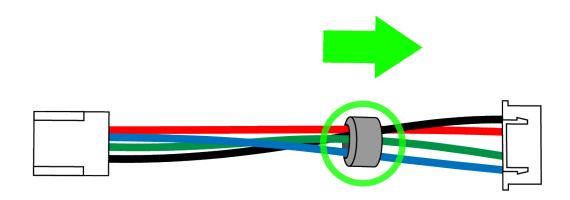
Insert **flexible cable** into **Controller Board** socket indicated in the diagram below.

Note: To avoid damage, position **FFC** as squarely as possible to the connector before inserting.

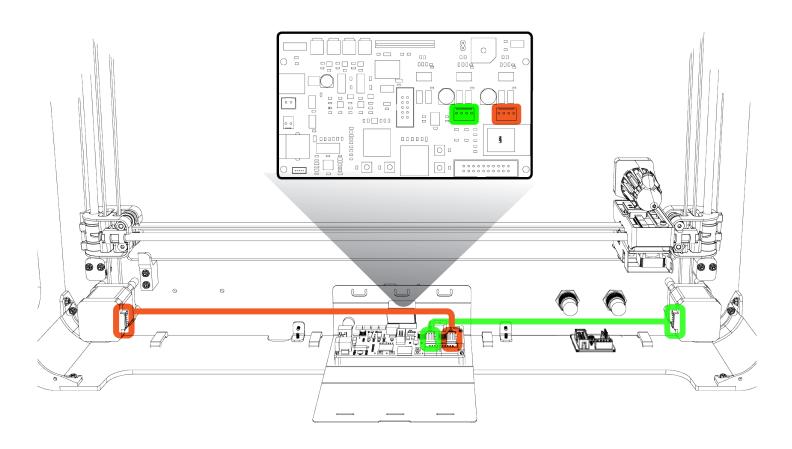




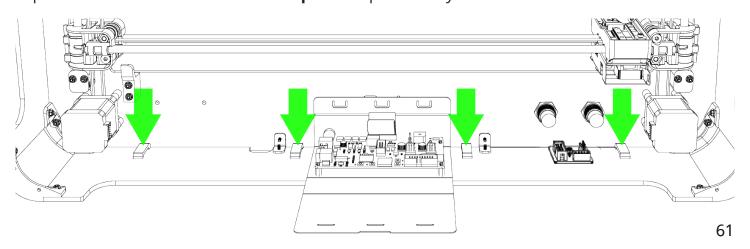
Move the ferrite rings on the **Motor Cables** all the way to the indicated connector.



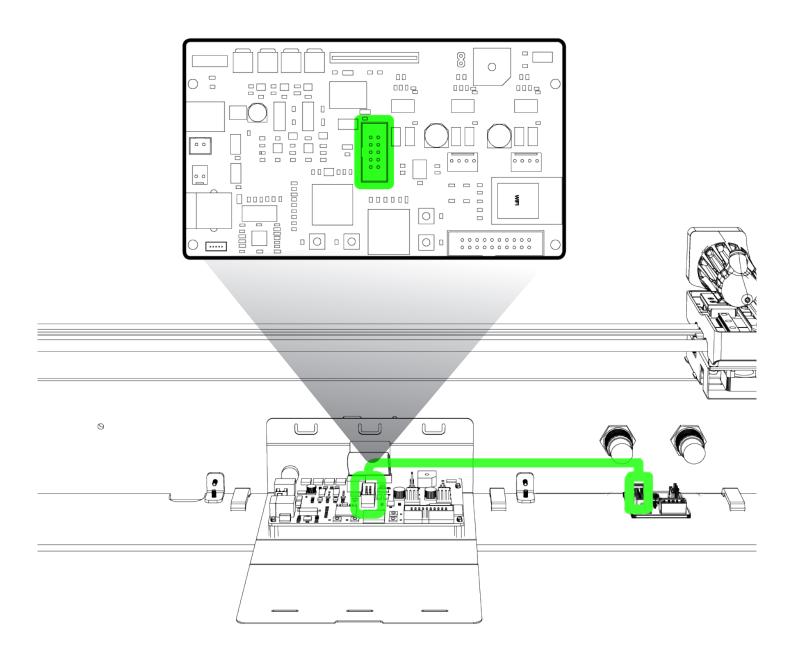
Connect the Motor Cables to the Motors and the indicated sockets in the Controller Board.



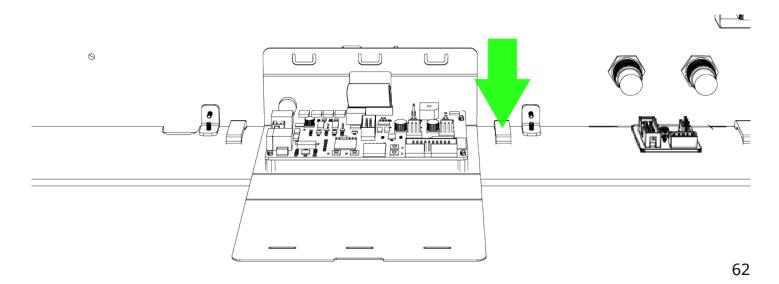
Slip the loose cables into the **Cable Clips** to keep them tidy.



Connect the **Ribbon Cable** to the **Button PCB** and to the indicated socket in the **Controller Board.** 



Slip the loose cables into the **Cable Clips** to keep them tidy.



## STAGE 6 ASSEMBLY COMPLETION

Lay out the parts listed below. Refer to the 'PARTS Stage 8' section.

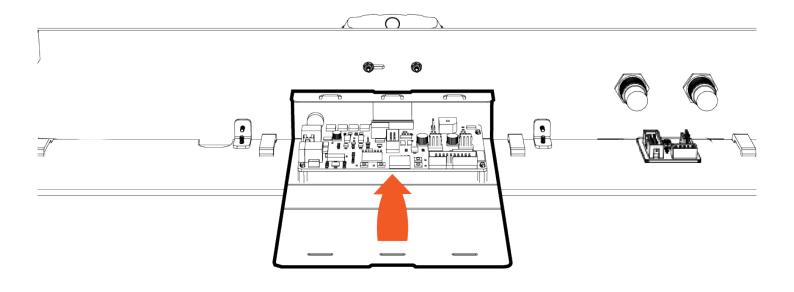
- Base Plate.
- Rubber Feet. (10x)
- 8x M3x12mm Screws.
- 8x M3 Washers.
- 8x M3 nuts.

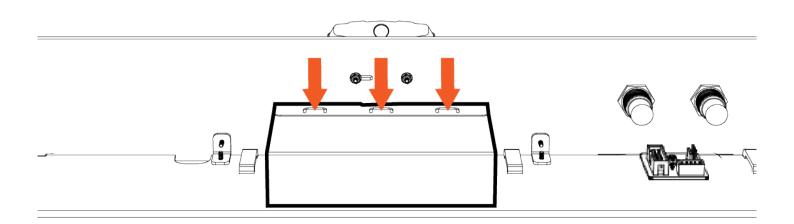
You will also need a 2.5mm Hex tool.

#### Step 8.01

Close Controller Board Cover.

Tip: Manage free cables using **Cable Clips** in **Rear Panel.** Group excess cable inside **Controller Board Cover** before closing.

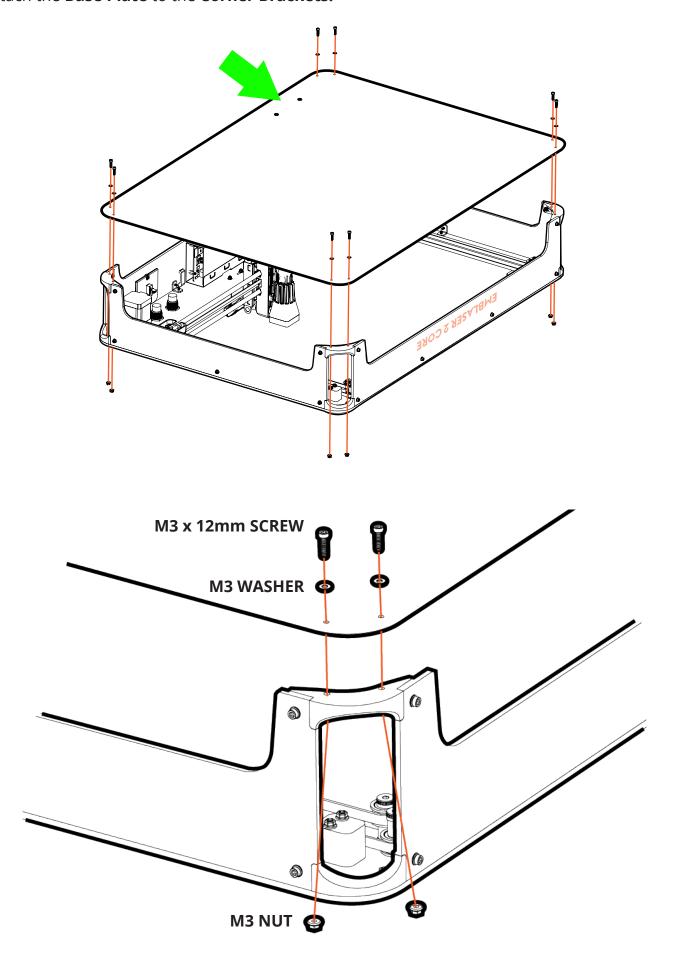




## Step 8.02

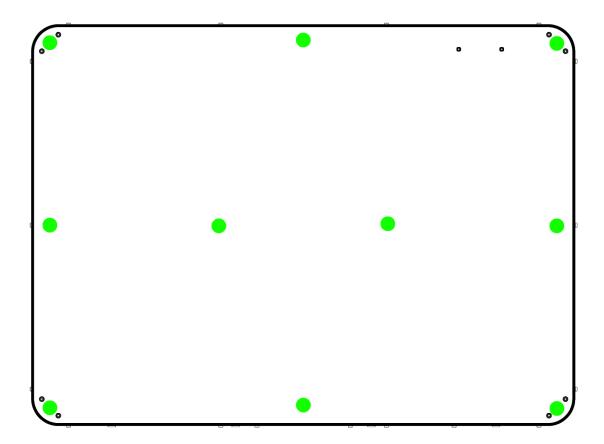
Align **Base Plate** to the **Corner Brackets** making sure the holes indicated by the green arrow are in the orientation as shown.

Attach the Base Plate to the Corner Brackets.



## Step 8.03

Attach the **Rubber Feet** to the **Base Plate** as shown below.



## AIR-ASSIST ACCESSORY (OPTIONAL)

Only perform this stage if you have purchased the Air-Assist accessory.

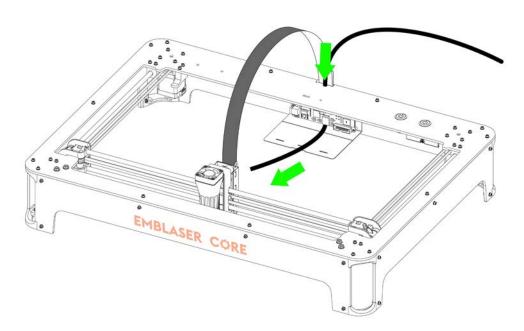
Lay out the parts listed below. Refer to the 'PARTS Stage 6' section.

- Air assist pump
- Air Assist hose
- 3x Air Assist hose clips
- 2x M4x6mm screw
- 2x M4 washer

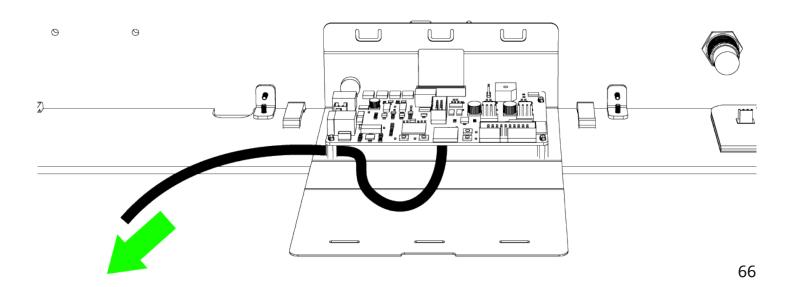
You will also need a 2.5mm Hex Tool.

#### Step 01

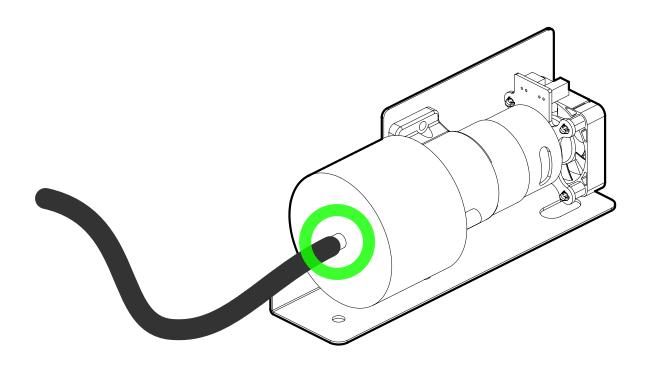
Insert one end of the **Air-Assist Hose** through the **Top Panel** as indicated. Pull the end of the **Air-Assist Hose** past the **Controller Board**.



Loop the Air-Assist Hose back under the Controller Board and out the left-hand side.

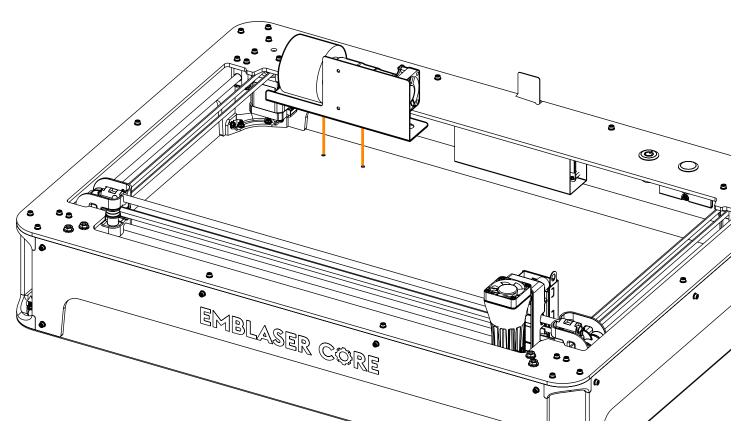


Attach the end of **Air-Assist Hose** to the OUTPUT of the **Air Assist accessory**.

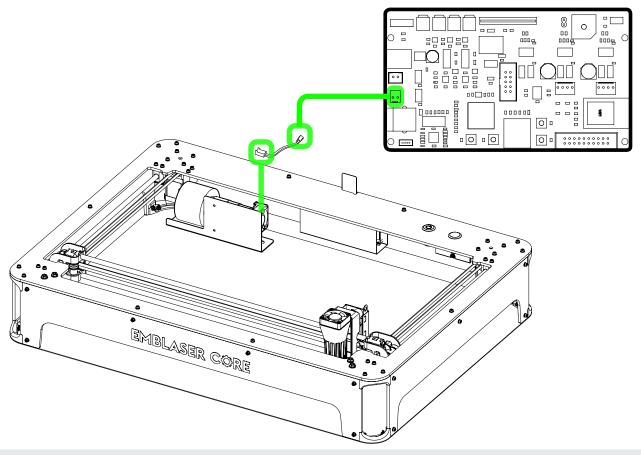


## Step 03

Attach the Air-Assist pump to the baseplate using the two M3x6mm screws and washers provided.

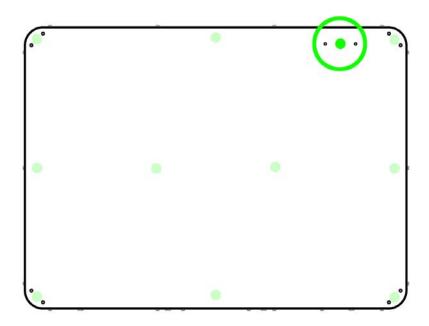


Connect Air-Assist cable to the Controller Board and Air-Assist PCB.

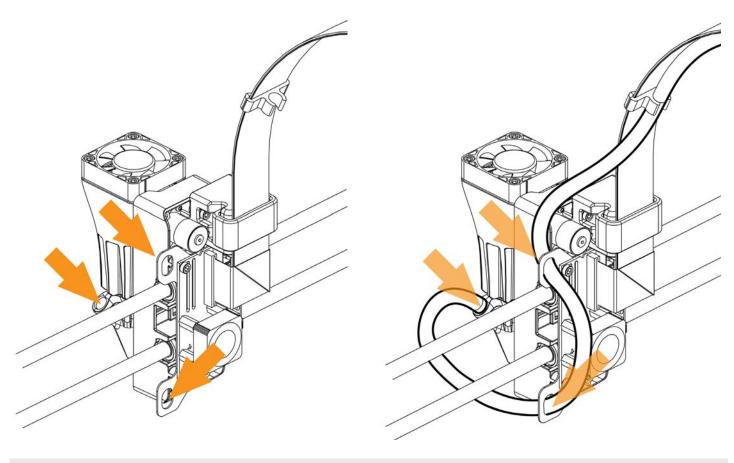


Step 05

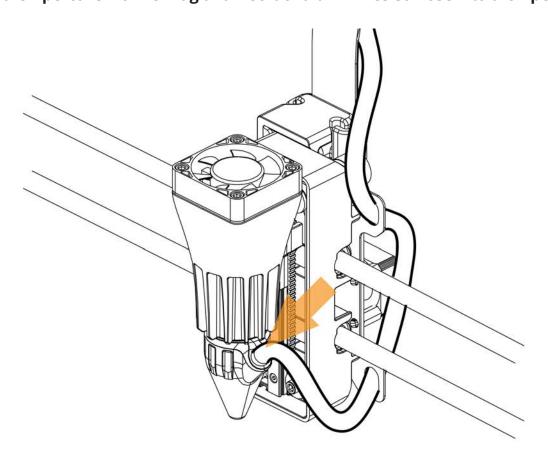
Attach the additional rubber foot supplied with the Air-Assist Accessory to the base plate between the fasteners as indicated.



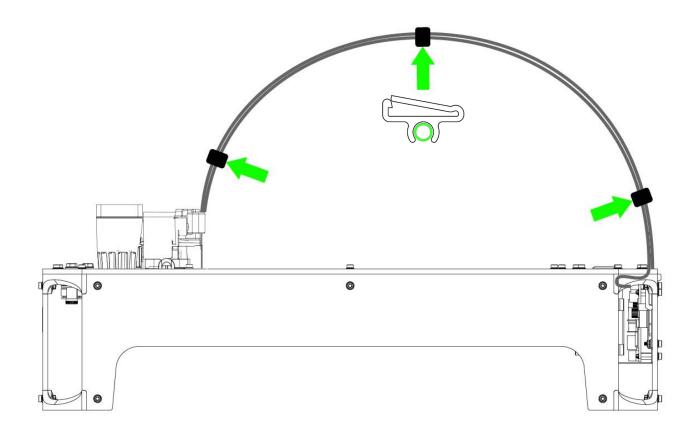
Route the free end of the **Air-Assist Hose** through the **Laser Board Cover** as shown.



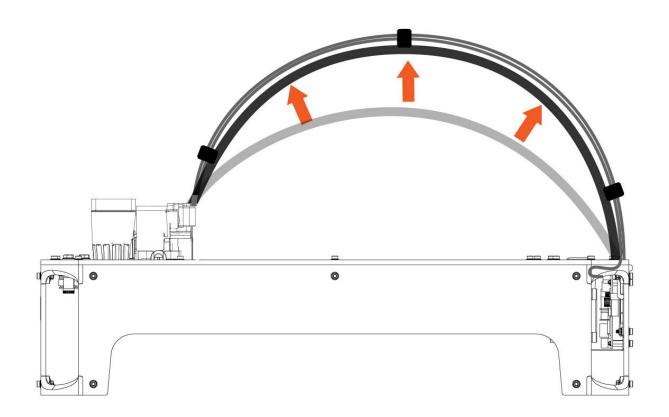
Step 07
Remove the Aperture Nozzle Plug and insert end of Air-Assist Hose into the Aperture Nozzle.



Attach three **Air-Assist Hose Clips** in the positions shown below. The air-assist hose catch on the clips should face downwards.



Attach the air-assist hose into its clips.



# WORKSPACE CAMERA ACCESSORY (OPTIONAL)

Only perform this stage if you have purchased the Workspace Camera accessory.

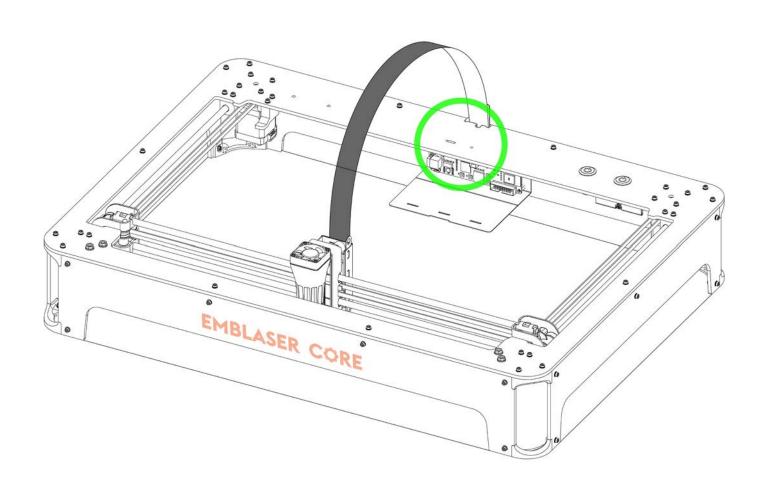
Lay out the parts listed below. Refer to the 'PARTS Stage 7' section.

- Workspace Camera
- 2x M3x12mm Screw
- 2x M3 Washer
- 2x M3 Nut

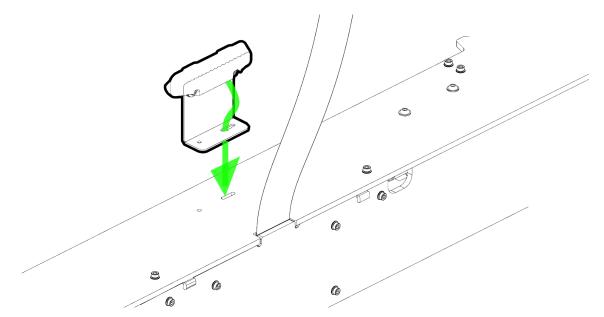
You will also need a 2.5mm Hex tool.

#### Step 01

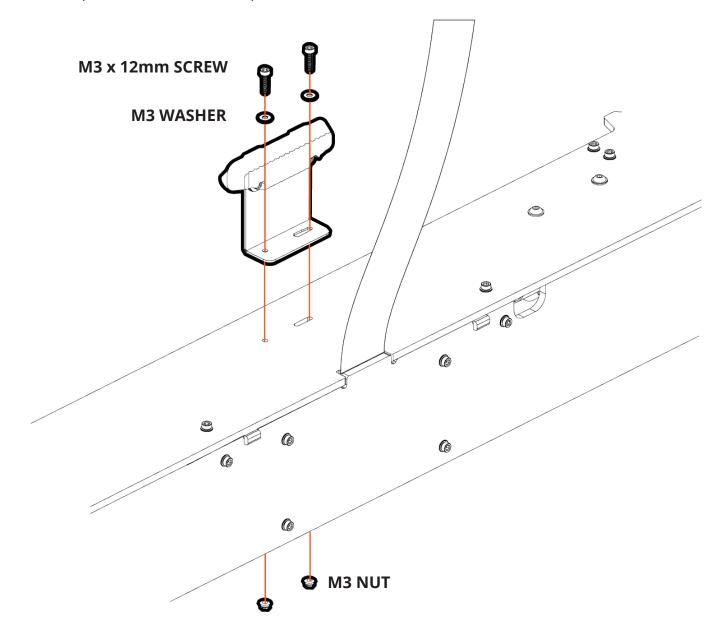
The Workspace Camera accessory attaches to the top panel as indicated below.



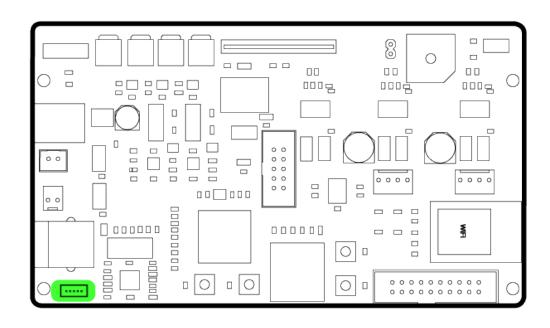
Pull the **Workspace Camera** cable through slot in **Top Panel** as shown.

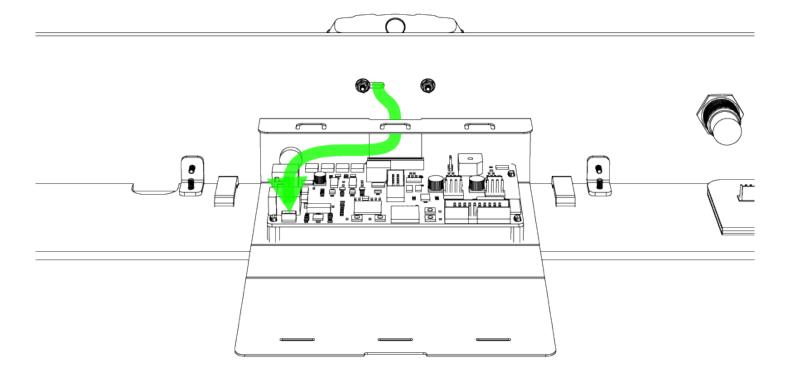


Attach Workspace Camera to the Top Panel as shown.



Connect Workspace Camera cable to the Controller Board socket indicated.





## **CONGRATULATIONS!**

You have compeleted assembling your Emblaser Core.

Your next step is to continue with your 'Getting Started Guide':

https://darklylabs.com/help-centre/start-emblaser-core/

## **Technical support**

If you need more inforamtion about the assembly or operation of your Emblaser Core, check the Help Centre:

darklylabs.com/help

Otherwise, please email us at:

help@darklylabs.com



Unit 3, 99-101 Western Ave, Westmeadows, 3049 Australia

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