Rook Mk1

Build Guide

Rolohaun 3D

WELCOME TO THE ROOK MK1 BUILD GUIDE

DISCLAIMER:

Our goal with this 3D printer is to provide an affordable and easy-to-build option that's accessible to everyone.

The process of building this printer is designed to be both enjoyable and educational, allowing you to have a great time.

We cannot guarantee the printers final outcome, but with time invested, you can have an amazing result.

The instructions are provided to help achieve the best possible results.

Printed parts, hardware and these instructions are subject to change.

HAPPY BUILDING, HAPPY PRINTING!

Your first DIY CoreXY 3D Printer the Rook MK1 | Full Release

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INTRODUCTION

We're thrilled to have you join our community of passionate makers and creators. **The Rook Mk1**, crafted by **Rolohaun 3D**, is an incredible, budget friendly 3D printer that can open up a world of creative possibilities.

Please join the **Discord** channel where experienced members are ready to offer guidance and support.

Together, let's explore, share knowledge, and push the boundaries of what's possible with the Rook.

Let's harness the power of this remarkable little machine.

Here's a few links to get started.

Rolohaun 3D | Discord

Rolohaun Design | Printables.com

EXTRA RESOURCES

We appreciate your feedback, please understand that the manual is meant to be a reference.

If you come across any major errors or issues within the manual, we encourage you to report them directly to the Discord channel.
The community appreciates your input in improving the manual for everyone's benefit.

Want to explore more of Rolhaun’s 3D Printers?

GitHub

You can access **Rolohaun’s** additional resources, and printers on **Github**.

Rolohaun | GitHub

SPECIFICATIONS

Size approximate:

X (200mm)

Y (200mm)

Z (250mm)

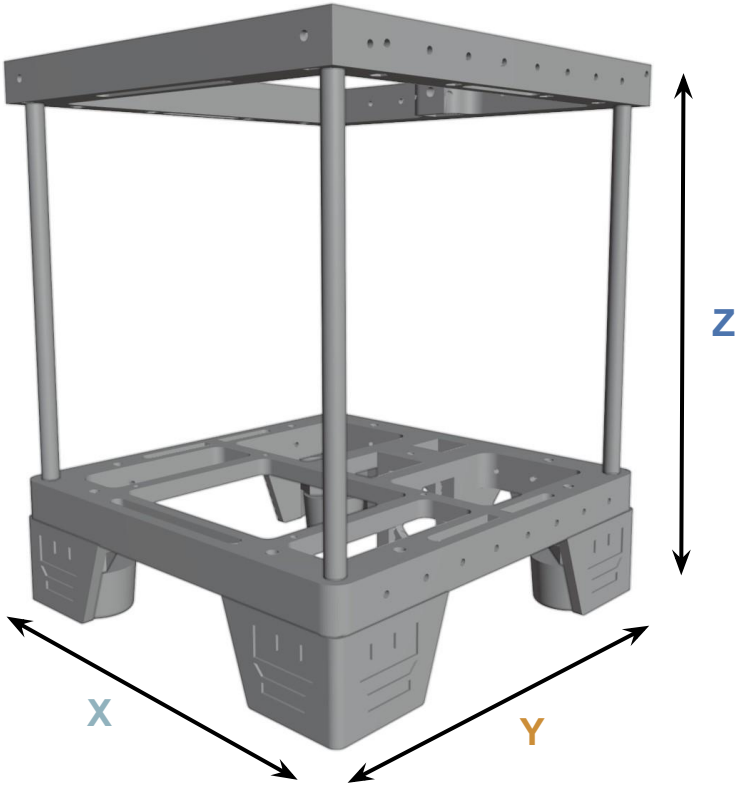
Weight approximate:

(10-15 lbs / 4.5 -7 kg)

Speed approximate:

(100 (mm/s) Speed)

(10K (mm/s²) Acceleration)



TOOLS ESSENTIAL

To help ensure a smooth assembly process, gather the following tools.

PLEASE NOTE:

Depending on the sourcing of materials, required tools may vary.

SCREWDRIVERS:

Different sizes and types (Flathead, Phillips) will be useful for assembling various pieces.

HEX / ALLEN KEYS:

Make sure to have a set with various sizes on hand.

TWEEZERS:

Fine-tipped tweezers can be helpful for handling small hardware, and routing belts.

RUBBER MALLET:

A small mallet or equivalent for gently tapping and aligning linear rods without causing damage.

GREASE / LUBRICANT:

White lithium grease, PTFE spray or equivalent bearing lubricants.

ISOPROPYL ALCOHOL:

Brake cleaner or another fast drying degreaser will work.

ZIP TIES:

Only six are required but lots are nice to have.

TOOLS ELECTRICAL

SOLDERING IRON:

A soldering iron for electrical connections and any heat inserts used.

MULTIMETER:

This tool can be useful for checking various types of electrical connections.

WIRE STRIPPER:

Cutting and stripping wires while connecting electrical components may be necessary.

CRIMPING TOOL / SET:

Crimping types include, but **NOT** limited to.

(2.54mm) JST-XH **(2.54mm) Dupont**

(2.54mm) JST-SM **(2.00mm) JST-PH**

Small Assortment Wire Terminals

Small assortment Ferrule Ends

TOOLS PRINTED

Want a helping hand in the build process?

Rook shim fork and spoon by jmsaltzman. Comes in handy for precisely inserting bearings and shims.

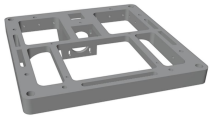
Rook shim fork and spoon by jmsaltzman | Download free STL model | Printables.com

Rook Belt Tie V2 by kyle davis. Great replacement for zip ties when securing the belts.

Rook Belt Tie V2 by kyle davis | Download free STL model | Printables.com

PRINT RECOMMENDATIONS

Materials:	Nozzle Diameter:	Layer Height:	Infill:	Top and Bottom:	Wall Count:
PLA, ABS, ASA, PETG	.4 - .6 mm	.2 - .3 mm	20 - 40%	3 - 5	3 - 5

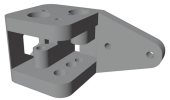


TOP/BOTTOM FRAME : x 2

BED FRAME : x 1

MCU MOUNT : x 1

A/B MOTOR MOUNTS : x 2



LEFT/RIGHT GANTRY : x 2

LEFT/RIGHT IDLERS : x 2

FEET : x 4

HOT END KEY : x 1

BELT CRADLE : x 1

ROOKERY : x 1

Check the quality of each part and reprint any defective pieces as needed.

REMOVE SKIRTS: Trim or peel off any thin lines or outlines printed around the base of the parts.

REMOVE SUPPORTS: Carefully break or cut away any temporary support structures added during printing.

VERIFY ALL PARTS: Confirm that you have all the necessary printed components mentioned above.

ABS / ASA

Equivalent,
May be preferred,
but not required,
for fan ducts.

COMPONENT RECOMMENDATIONS

PLEASE NOTE:
Recommended components, are shown to help reference key components of the 3D printer.

EXTRUDER:

Triangle Labs BMG Bowden: **x 1** **(Recommended)**

BED:

120mm Glass Bed: **x 1** **(Cheapest)**

150mm Bed **(Optional)**

MCU:

BTT SKR Mini E3 v3: **x 1** **(Recommended)**

Uses sensorless homing.

POWER SUPPLY:

24v 6 Amp Power Supply AC Adapter: **x 1** **(Cheapest)**

Meanwell 24v 150w or higher **(Optional)**

42MM NEMA 17:

X, Y, Z Axis, Extruder: **x 4**

Any you prefer

MGN9C LINEAR RAILS

150mm X Axis: **x 1**

200mm Y Axis: **x 2**

8MM LINEAR RODS:

200mm Z Axis

Any you prefer

LM8UU BEARING **x 2**

45mm length **(Recommended)**

20 TOOTH 5MM BORE PULLEY **x 3**

Any you prefer

ENDSTOP: **x 1**

Omron or a similar style.

Z Axis

RUBBER FEET: **x 4**

32mm x 22mm

Printed can work.

6MM GT2 BELT: **x 4 METERS**

Gates **(Recommended)**

HARDWARE RECOMMENDATIONS

PLEASE NOTE:

Hardware is referenced, from stock build.

An M2 bolt or alternative, may be required for Z endstop switch.

MOTOR MOUNTS:

M3 x 10mm: **x 26** **(Stepper Motors and Mounts)**

M3 x 18mm: **x 2** **(Rear Motor mounts)**

M3 Nuts: **x 13**

LINEAR RAIL HARDWARE:

M3 x 12mm: **x 4** **(X Linear Rail mounting)**

M3 x 25mm: **x 8** **(Y Linear Rails Mounting)**

MCU MOUNTING:

M3 x 6mm: **x 14** **(MCU and X/Y Carriage Mount)**

M3 x 16mm: **x 2** **(MCU Mount and Front Idlers)**

IDLERS:

M5 x 25mm: **x 4** **(XY Carriage Idlers)**

M5 x 30mm: **x 2** **(Front Idlers)**

M5 x 10 x 1mm Shims: **x 16**

F695 Bearings: **x 18**

FEET:

M5 x 16mm: **x 12**

BED HARDWARE:

Bed Springs: **x 3**

M3/M4 x 40mm: **x 3** **(Bed Bolts)**

HARDWARE ROOKERY

Rookery Bowden tool head by - Gulsifer

PLEASE NOTE:
Rookery is the recommended tool head for the Rook.

HOT END:

Volcano Block: **x 1**

or

CHC **(Ceramic Heating Core)**

FANS:

3010 Fan: **x 1** **(Hot End Cooling)**

3010/4010 Blower Fan: **x 2** **(Part Cooling)**

HEAT SINK:

CR-10 Style 24v: **x 1** **(Recommended)**

V6 Style **(Optional)**

HARDWARE:

M3 x 6mm: **x 4** **(Fan Shroud)**

M3 x 16mm: **x 2** **(Heat Sink Mount)**

HEAT INSERTS:

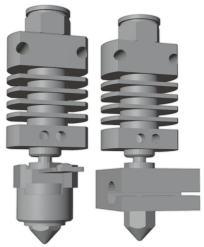
M3 x5 x6mm: **x 3** **(Heatsink mount)**

M3 x5 x4mm: **x 4** **Input shaper mount** **(Optional)**

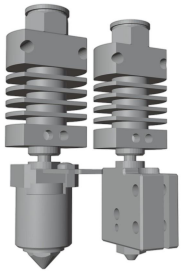
Fan Shroud Cradle mount **(Optional)**

Rookery Bowden tool head by Gulsifer | Download free STL model | Printables.com

HOTEND ROOKERY



Rookery Short



Rookery

Depending on the **Hot End** selected.

The version of **Rookery** needed will be different.

- **CHC** and **Mk8** heater blocks use the **short version.**

  Mk8 heater block not recommended.

3010 Hot End Fan is the same for both designs.

3010 and **4010 Blower Fans** depend on the **Rookery** size selected.

- **CHC Pro** and **Volcano** heater blocks use the **normal version.**

PLEASE NOTE:

Alternatives found on Printables.com

MGN9C RAIL PREPARATION

Cleaning linear rails before installation is essential for ensuring smooth operation and optimal performance:

GATHER MATERIALS: Materials include a clean cloth or rag, cleaning solution, new grease.

CAREFULLY!: With the rail and carriage facing the floor, slide to remove the carriage from the rails

INSPECT: Inspect the linear rails for deep scratches and defects. Gently remove any visible dirt or debris using a rag.

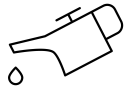
CLEAN:

Using isopropyl alcohol or brake cleaner.

Gently wipe with slight pressure to remove any OEM/factory dirt or grease.

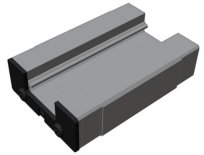
"Pay close attention to the crevices and hard-to-reach areas."

REPACKING BEARINGS:



IMPORTANT:

Add small amounts of grease in **between** the bearings.



Gently roll the bearings on linear rail or with fingers to thoroughly pack the lubricant

REMOVE BUILT UP RESIDUE:

There may be buildup or excess grease on the carriage and rails.

Wipe away all extra grease while leaving a thin layer across the rail.

LM8UU BEARING PREPARATION

Cleaning LM8UU bearings before installation is essential for ensuring smooth operation and optimal performance:

GATHER MATERIALS: Materials include a clean cloth or rag, cleaning solution, new grease.

INSPECT: Inspect the linear rods for deep scratches and defects. Gently remove any visible dirt or debris using a rag.

CLEAN:

RODS ONLY:

Using isopropyl alcohol or brake cleaner.

Gently wipe with slight pressure,

to remove any OEM/factory dirt or grease.

BEARINGS ONLY:

Using isopropyl alcohol or brake cleaner.

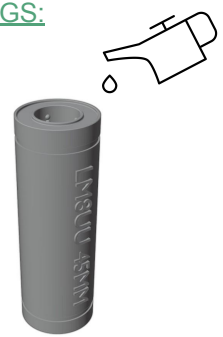
Lightly spray or wet the bearings,

to remove dirt and grease.

REPACKING BEARINGS:

IMPORTANT:

Add small amounts of grease in **between** the bearings.



Plugging the opposite end of the bearing while inserting the linear rod, may help force grease to the bearings.

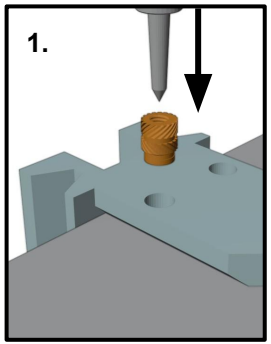
REMOVE BUILT UP RESIDUE:

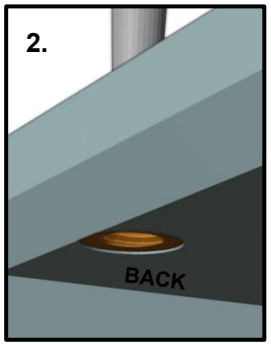
There may be buildup or excess grease on the bearings and rods

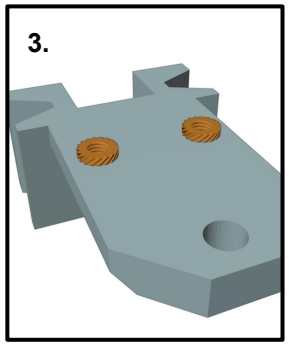
Wipe away all extra grease while leaving a thin layer across the rods.

HOT END CRADLE

TOOLS:
Soldering Iron
PRINTED PARTS:
Hot End Key
HARDWARE:
M3 x5 x6mm: **x 3**





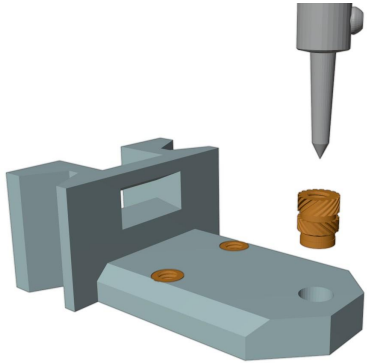


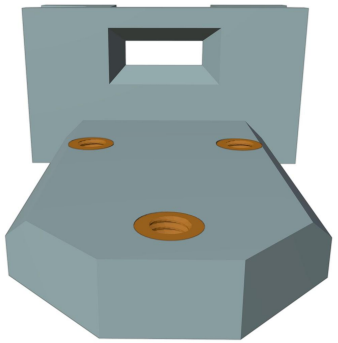
1. Using a **Soldering Iron**, press in the first **M3 x5 x6mm** length **Insert** from the front.

2. Make sure the **Heat Inserts** are flush with the back of the **Hot End Key.**

3. Repeat steps **(1 - 2)** for the next **Heat Insert** pictured above.

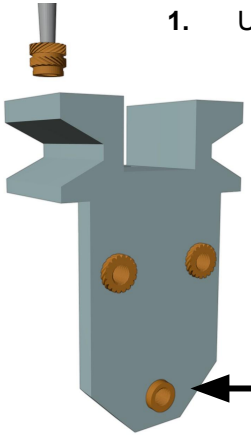
4. Insert the bottom **Heat Insert** from the back.





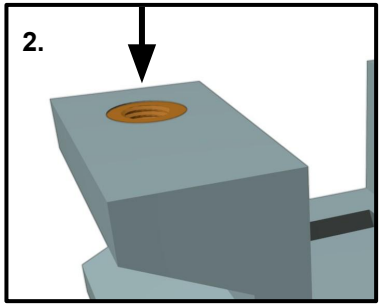
HOT END CRADLE

TOOLS:
Soldering Iron
PRINTED PARTS:
Hot End Cradle
HARDWARE:
M3 x5 x4mm: **x 2**

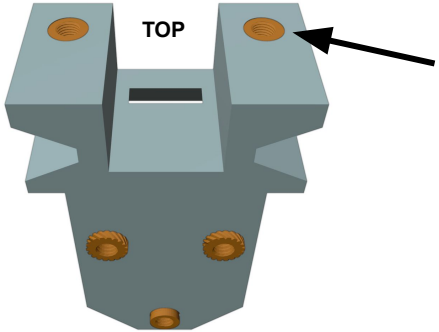


1. Using an **M3 x5 x4mm** length **Heat insert**.

Insert installed from the back side.



2. Install the **Insert** flush with the top of the **Hot End Key.**

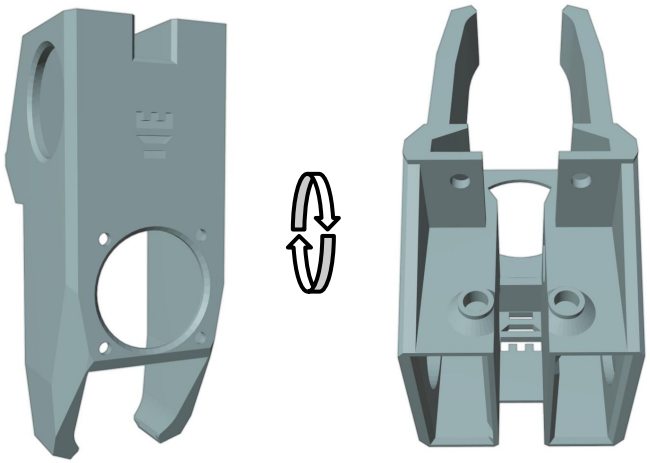


3. Repeat steps **(1 - 2)** on the right side.

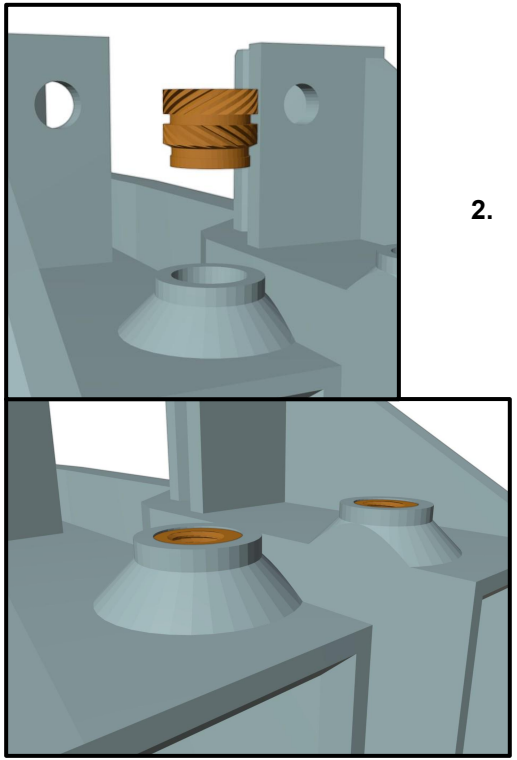
Please Note:
Use the edge of a table to help.

ROOKERY

TOOLS:
Soldering Iron
PRINTED PARTS:
Rookery
HARDWARE:
M3 x5 x4mm: **x 2**



1. Rotate the **Rookery** tool head face down.



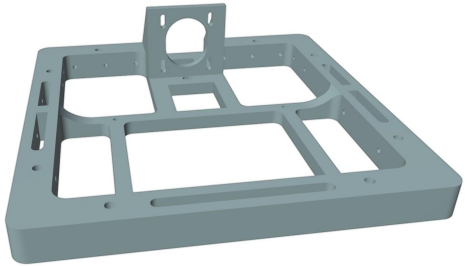
2. Install **M3 x5 x4mm** length **Heat Inserts**.

3. Have the **Inserts** flush, with the printed surface.

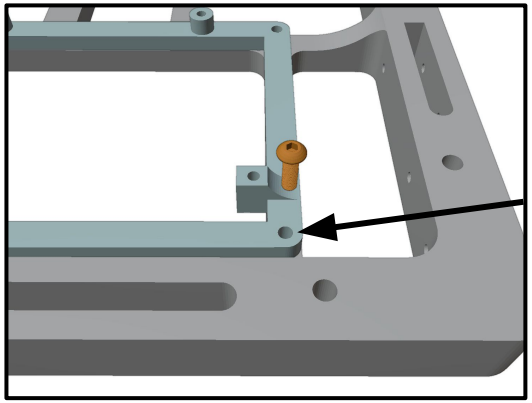
BOTTOM FRAME/ MCU MOUNT

TOOLS:
Allen Wrench
PRINTED PARTS:
Bottom Frame
MCU Mount
HARDWARE:
M3 x 10mm: **x 4**

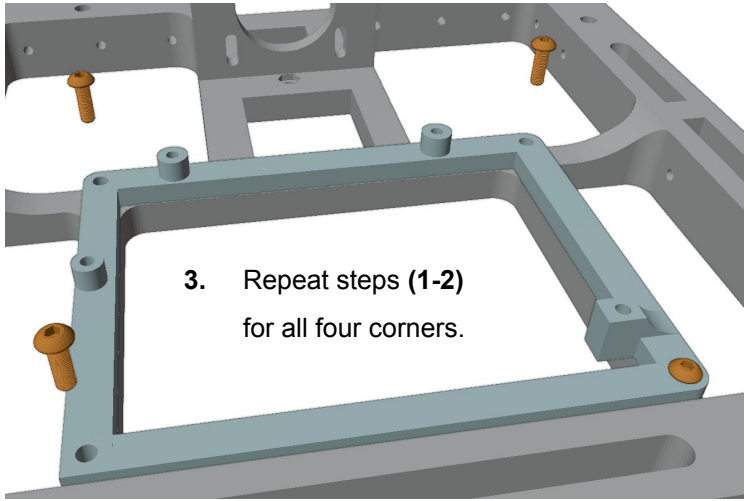
Please Note:
Orientation as it may help farther along in the build process.



1. Place the **Bottom Frame**, motor mount up on the table.



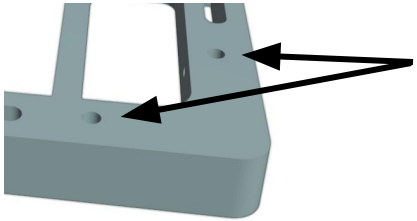
2. Using **M3 x 10mm** bolts. Install the **MCU Mount.**



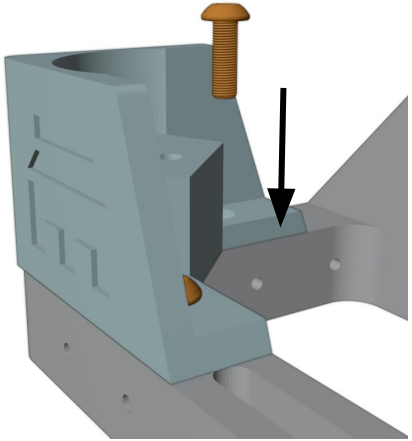
3. Repeat steps **(1-2)** for all four corners.

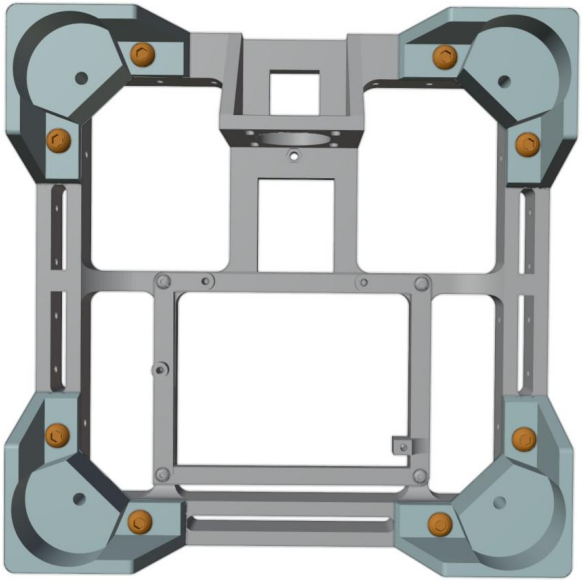
PRINTED FEET

TOOLS:
Allen Wrench
PRINTED PARTS:
Bottom Frame
HARDWARE:
M5 x 16mm: **x 8**



Note the **M5** holes on all four corners of the bottom frame.





1. **M5 X 16mm** bolts for mounting feet.
2. Thread in the **M5 x 16mm** bolts and tighten.
3. Repeat steps **(1-2)** on all four corners.

RUBBER FEET

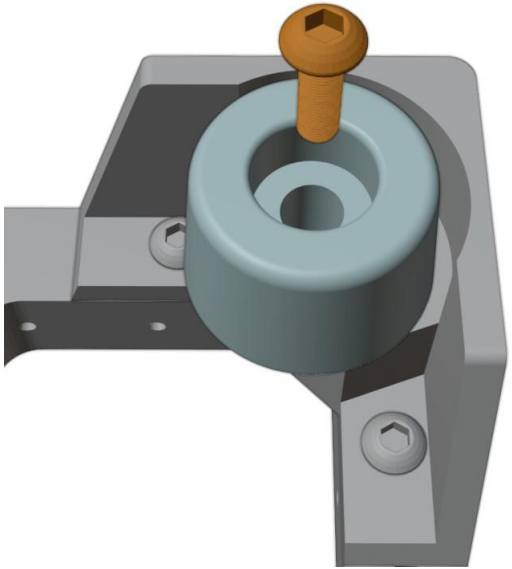
TOOLS:

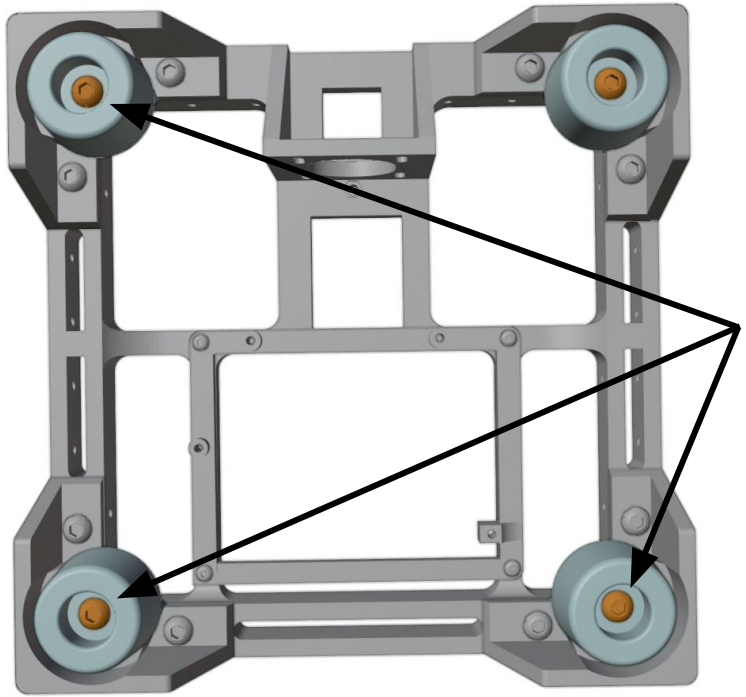
Allen Wrench

HARDWARE:

Rubber Feet

M3 x 16mm: **x 4**





1. Using an **M5 x 16mm** bolt, install the **Rubber Foot**.

2. Repeat step **(1)** on all four corners.

Z MOTOR TENSIONER

TOOLS:

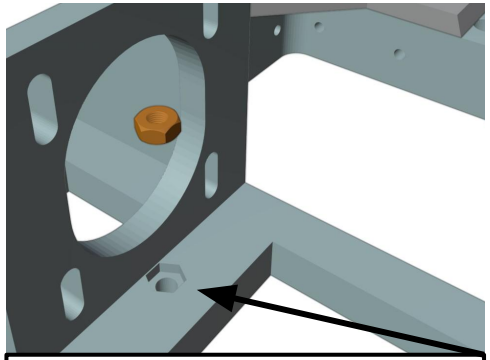
Allen Wrench

PRINTED PARTS:

Bottom Frame

HARDWARE:

M3 x 16mm: **x 1**
M3 Nut: **x 1**

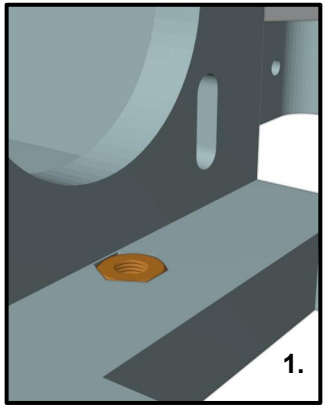


Please Note:

The cut out for the M3 Nut.

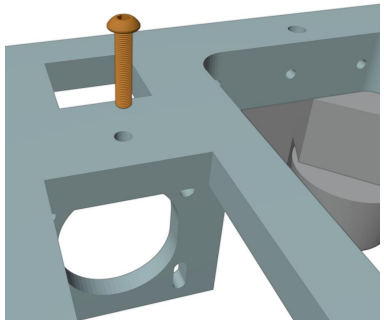
These will be used in various locations around the frame.

1. Insert the **M3 Nut** into the cut out in the bottom frame.



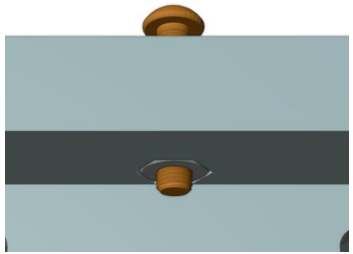
2. Rotate the frame 180° Degrees.

3. Insert an **M3 x 16mm** bolt from the top side of the frame.



4. Start the **M3 x 16mm** bolt by a few threads.

This will be used for belt tension later.



Z ENDSTOP

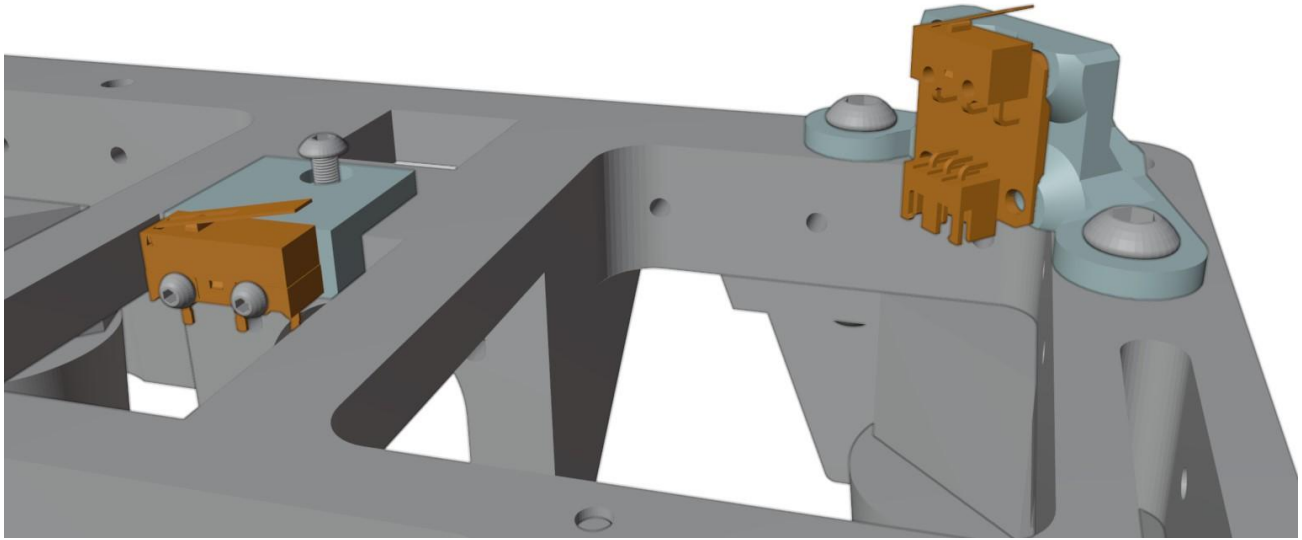
1. Now may be an appropriate time to install a Z endstop depending on your parts selection.

Rook MK1 low-profile endstop by Kanrog

Rook MK1 low-profile endstop by Kanrog | Download free STL model | Printables.com

Rook [MK1] [LEGACY] Creality-style Z-Endstop by Kanrog

Rook [MK1] [LEGACY] Creality-style Z-Endstop by Kanrog | Download free STL model | Printables.com



Please Note:

These are add ons from the stock build see Printables.com for details.

Depending on the creator's design, various bolt sizes may be required.

LINEAR RODS

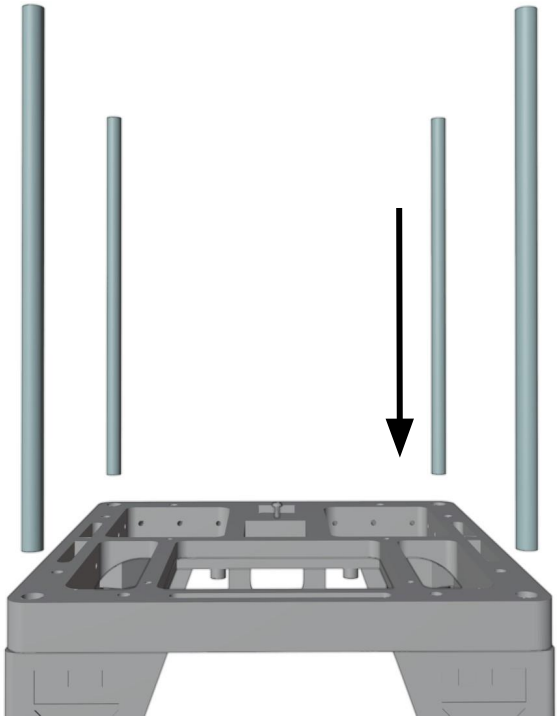
TOOLS:

Rubber Mallet

HARDWARE:

200mm Linear Rods: **x 4**

TOP



1. Insert the **8 x 200mm Linear Rod** into the bottom frame

   Apply pressure until fully seated.

2. Repeat step **(1)** on all four corners.

Please Note:

A Rubber Mallet

may be used to gently

seat the Linear Rods into place.

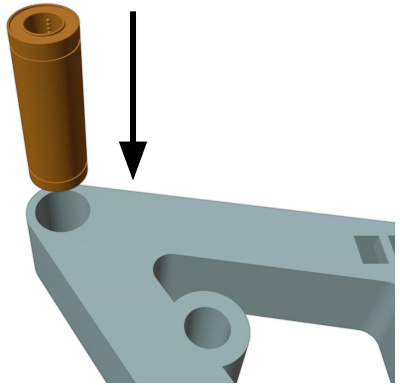
LM8UU BEARINGS

PRINTED PARTS:

Bed Frame

HARDWARE:

LM8UU Bearings: **x 2**

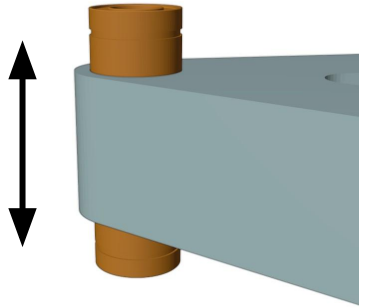


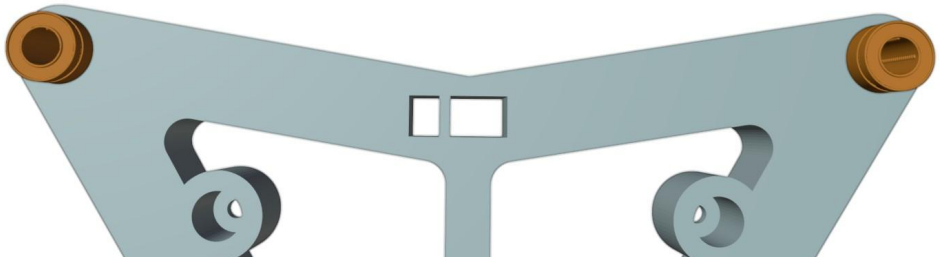
1. Press in the first **LM8UU Bearing**.

   The direction of insertion does not matter.

2. Install the second **Bearing**.

3. Make sure they are equal on both sides.





Please Note:

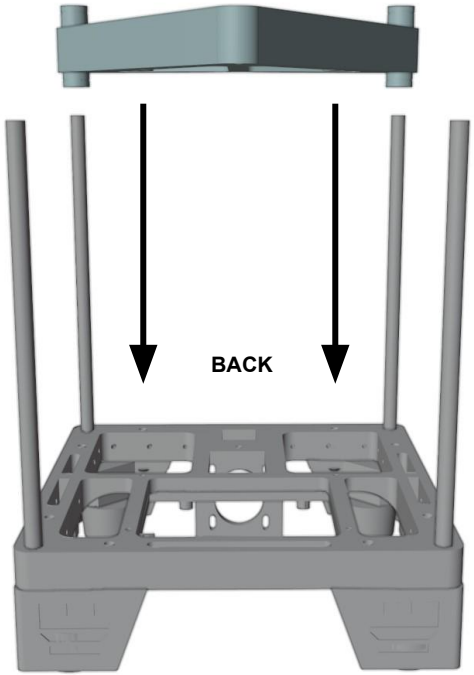
It best to start with your bearings centered.

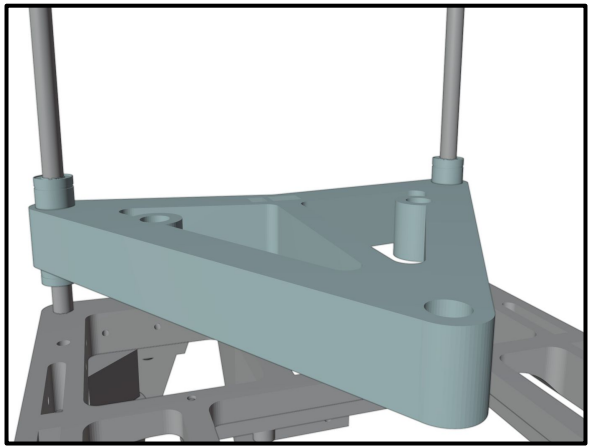
This may need to be adjusted later, depending on you parts selection.

BED FRAME

PRINTED PARTS:

Bed Frame



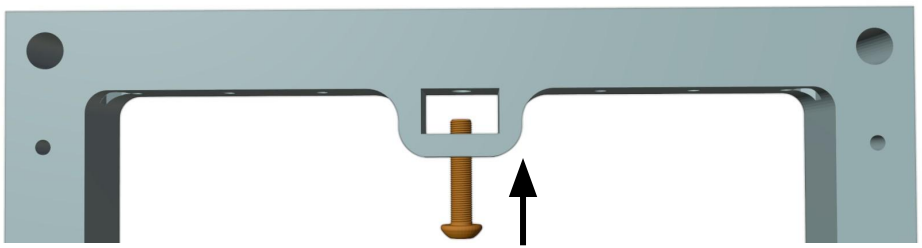


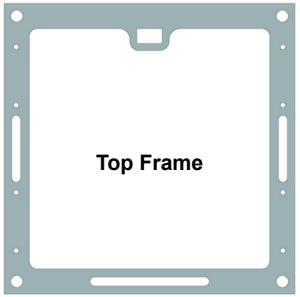
1. Install the **Bed Frame**.

   Gently slide the bed frame over the linear rods.

2. Let the **Bed Frame** rest on the bottom frame.

TOP FRAME / Z IDLER





TOOLS:

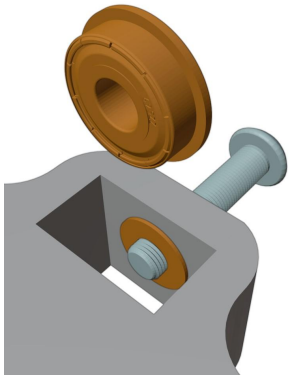
Allen Wrench

PRINTED PARTS:

Top Frame

HARDWARE:

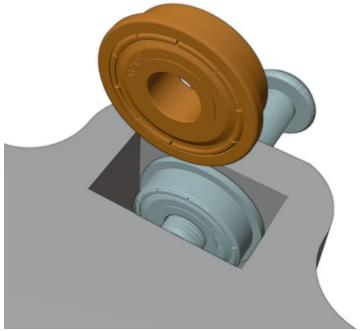
M5 x 25mm: **x 1**
M5 x 1mm Shim: **x 2**
695ZZ Bearing: **x 2**



1. Taking an **M5 x 25mm** bolt.
   Start the bolt a few threads past the frame.

2. Add a **M5 x 1mm Shim** on
   the **M5** bolt flush with the frame.

3. Install the **695ZZ Bearing**
   flange facing the <u>front</u> of the frame.



While adding each component,
thread in the **M5 x 25mm**.

4. Install the **695ZZ Bearing**
   flange facing the <u>back</u> of the frame.

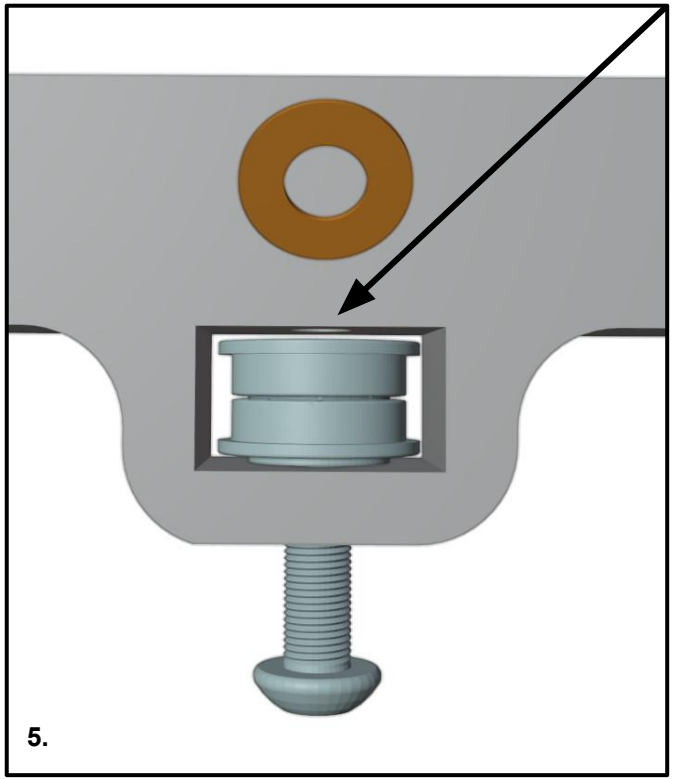
TOP FRAME / Z IDLER

PRINTED PARTS:

Top Frame

HARDWARE:

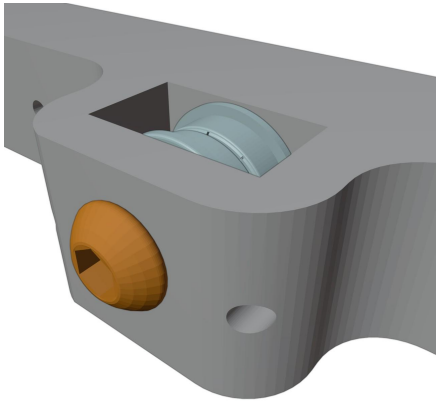
M5 x 25mm: **x 1**
M5 x 1mm Shim: **x 2**
695zz Bearing: **x 2**



5.

Continuing from step **(5)** on the previous page.

5. Insert the final **M5 x 1mm Shim**.



6. Tighten the **M5 x 25mm** bolt with an **Allen Wrench**.

7. Check to make sure the **Bearings** are snug, but spin freely.

TOP FRAME

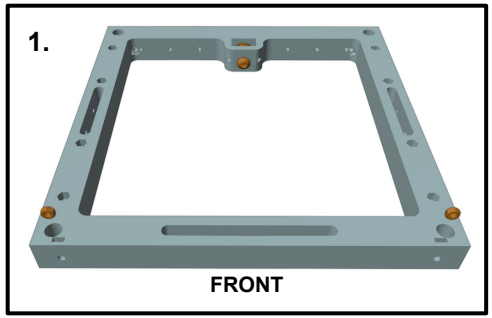
PRINTED PARTS:

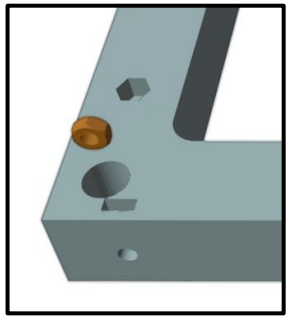
Top Frame

HARDWARE:

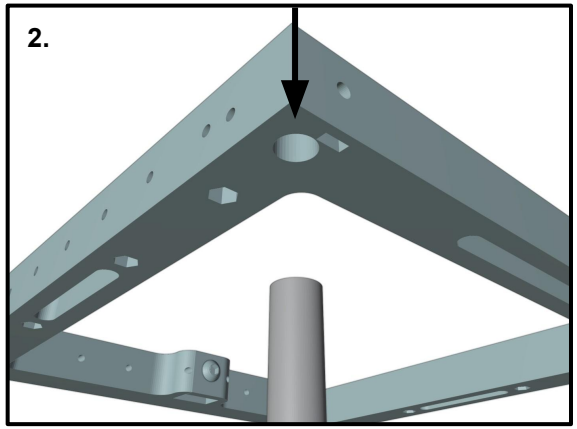
M3 Nut: **x 2**

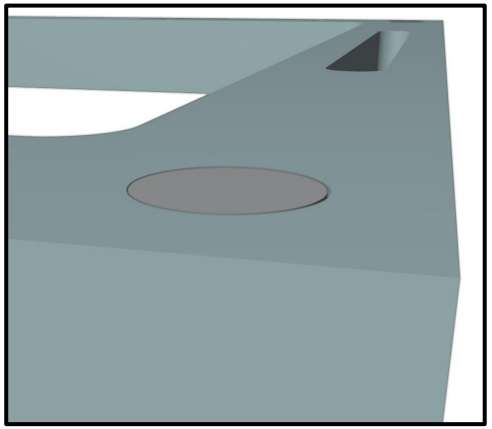
8mm Linear Rods





1. Press fit **M3 Nuts** into the **Top Frame.**
One each for the left and right side.

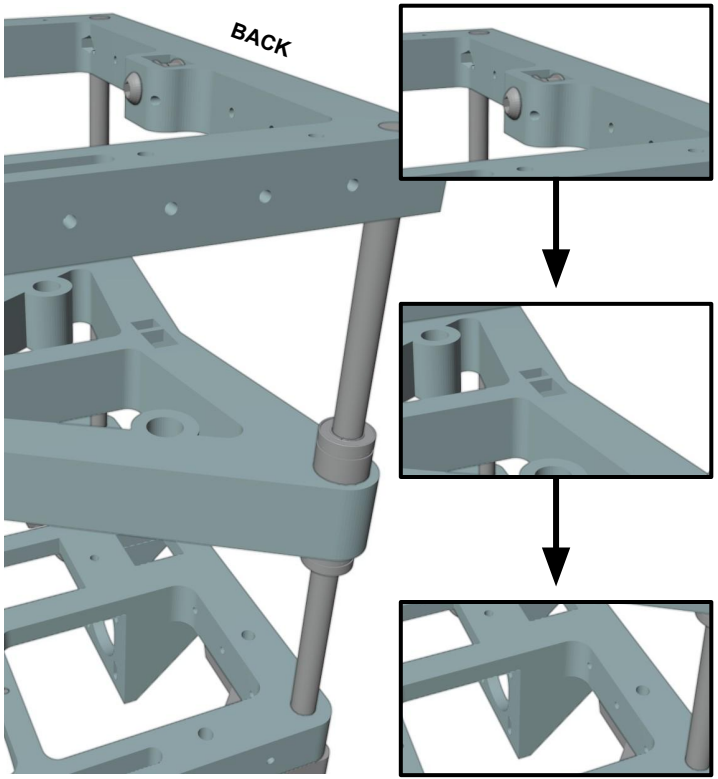




2. With light pressure,
press the **Top Frame** onto the **Linear Rods.**

3. Press the **Top Frame**,
flush with the highest point on the **8mm Linear Rods.**

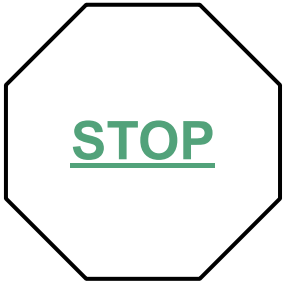
FRAME



Top Frame: Z Idler

Bed Frame: Belt Loops

Bottom Frame: Z Motor



1. Check the **Orientation** of each frame section.

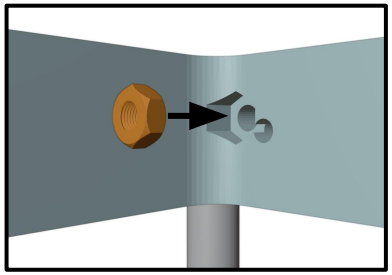
INSERT NUTS

PRINTED PARTS:

Top Frame

HARDWARE:

M3 Nut: **x 2**



1. Firmly insert the **M3 Nut** on the left side of the **Top Frame.**

2. Repeat step **(1)** for the right side.

Please Note:

If the M3 Nuts are loose,

note the steps above

for pages (33-34)

LEFT MOTOR MOUNT

TOOLS:

Allen Wrench

PRINTED PARTS:

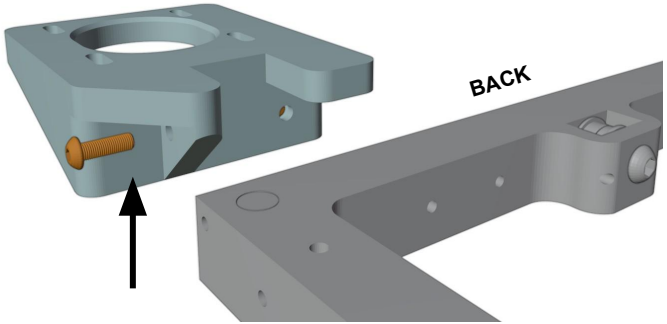
Left Motor Mount

Right Motor Mount

HARDWARE:

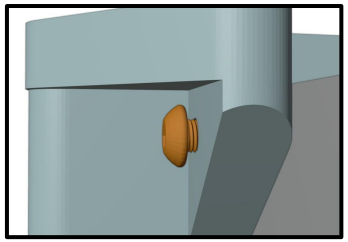
M3 x 10mm: **x 2**

M3 x 18mm: **x 2**



1. Taking a **M3 x 10mm** bolt.

Start to thread the **Left Motor Mount** onto the top frame.

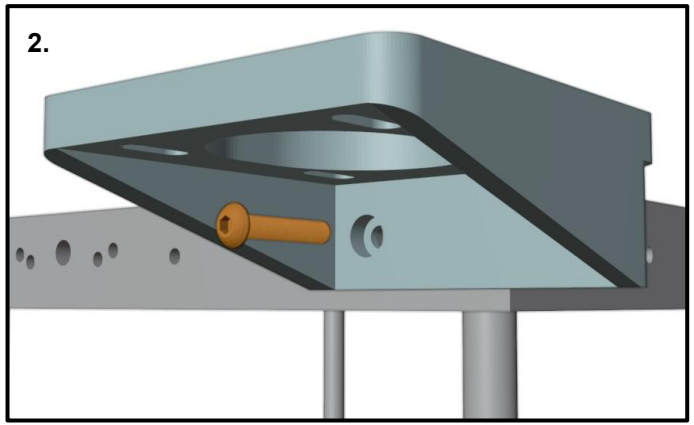


2. From the back side of the frame.

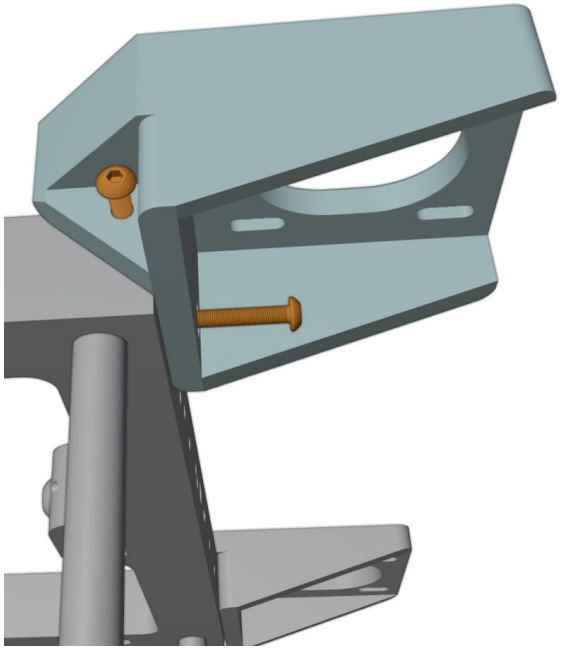
Insert a **M3 x 18mm** bolt, threading

into the **M3 Nut** installed on page **(32)**

2.



RIGHT MOTOR MOUNT

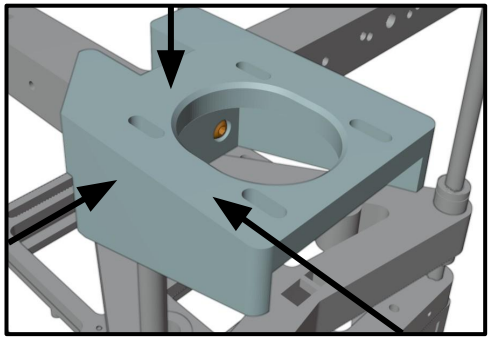


Continuing from the previous page.

3. Take the **Right Motor Mount**.
   Thread in a **M3 x 10mm** bolt into the right side of the frame.

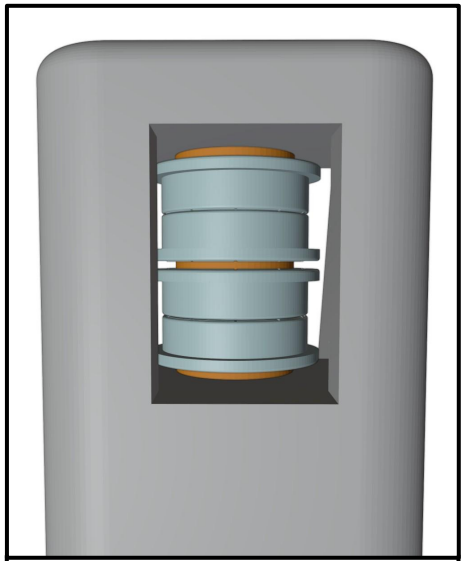
4. Insert the **M3 x 18mm** bolt, from the back side of the frame into the **M3 Nut**.

   If not already done.



5. Apply square pressure.
   Use an **Allen wrench** to tighten all four **M3** bolts found on pages **(33-34)**

IDLERS BUILD



Please Note:

The picture above shows a finished idler.
Note the spacing and orientation
of each component.

The hardware used, and process to build
will be the same
for both the **Left** and **Right Idler**

You will need:

- M5 x 30mm: **x 1**
- M5 x 1mm Shim: **x 3**
- 695zz Bearing: **x 4**

Per side.

TOOLS:

Allen Wrench

Tweezers

Shim Fork

PRINTED PARTS:

Left Idler

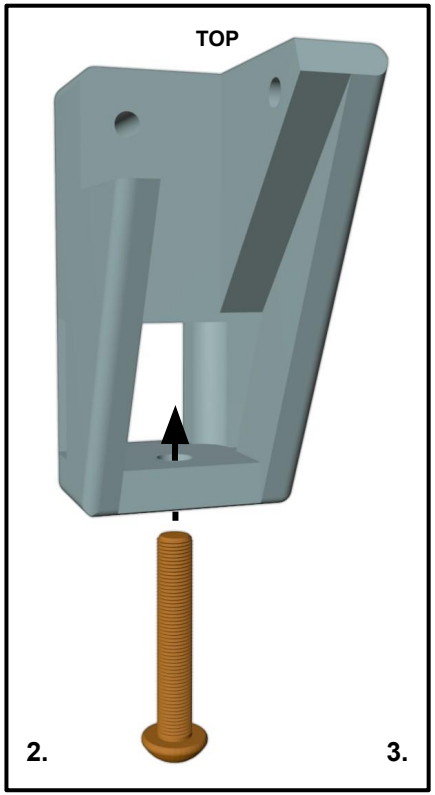
Right Idler

HARDWARE:

M5 x 30mm: **x 2**
M5 x 1mm Shim: **x 6**
695zz Bearing: **x 8**

1. Start with either side **Idler** and a **M5 x 30mm** bolt.

IDLERS BUILD

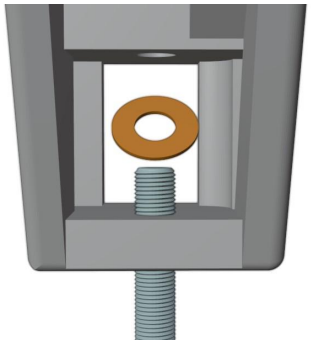


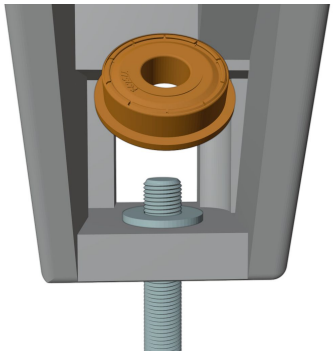
2. Start the **M5 x 30mm** bolt into the **Idler**

3. Rotate the **Idler** upside down to make assembly easier.

The **Shim Fork** found on page (10) or a pair of **Tweezers** may be helpful.

4. Taking a **M5 x 1mm Shim** and slide it onto the **M5** bolt.





5. Place a **695zz Bearing** on top of the **M5 Shim**, flange facing the bottom.

IDLERS BUILD

TOOLS:

Allen Wrench

Tweezers

Shim Fork

PRINTED PARTS:

Left Idler

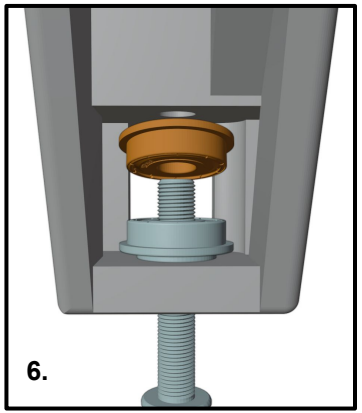
Right Idler

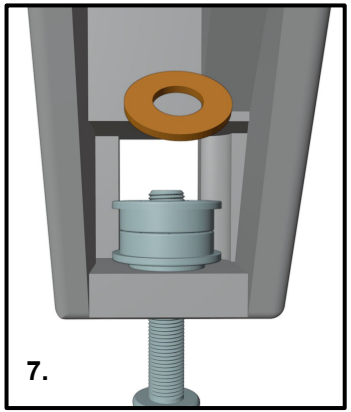
HARDWARE:

M5 x 30mm: **x 2**
M5 x 1mm Shim: **x 6**
695zz Bearing: **x 8**

6. Slide a second **Bearing** onto the bolt, with the flange facing the top.

7. Place another **M5 x 1mm Shim** on top of the second **Bearing**.





Please Note:

Remember to thread in the bolt as each component is added.

IDLERS BUILD

PLEASE NOTE:

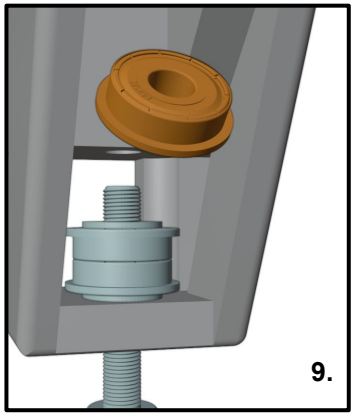
Repeat pages (34-37) for both left and right idlers.

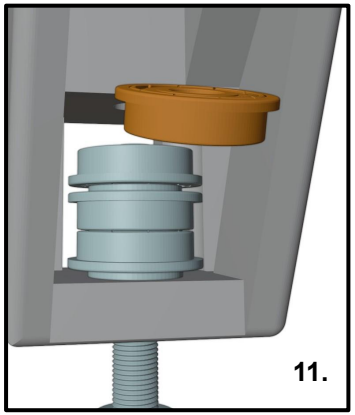
9. Add a **Bearing** flange facing the bottom

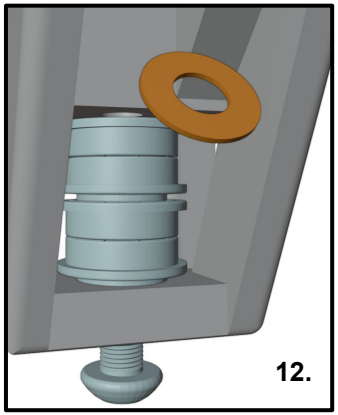
11. Add in a **Bearing,** flange facing the top.

12. Slide in the final **M5 x 1mm Shim.**

Tighten the **M5 x 30mm** with an **Allen Wrench**.







IDLERS INSTALL

TOOLS:

Allen Wrench

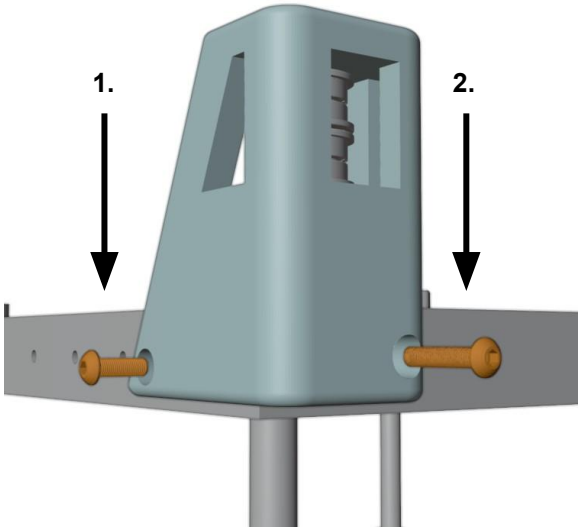
PRINTED PARTS:

Left Idler

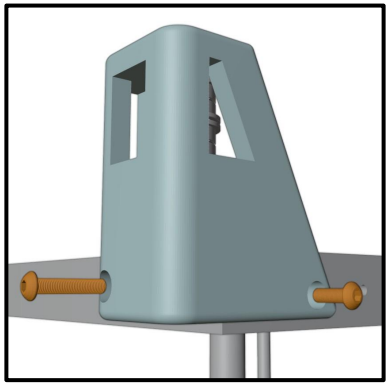
Right Idler

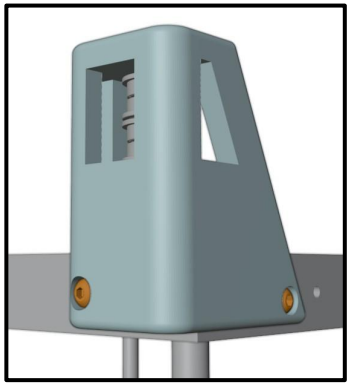
HARDWARE:

M3 x 10mm: **x 2**
M3 x 16mm: **x 2**



1. Installing the **Left Idler**.
   Insert a **M3 x 10mm** bolt from the left side of the frame.
2. Next insert a **M3 x 16mm** bolt from the front.
3. Squarely tighten the **Left Idler** into place.





4. Repeat steps **(1-3)** for the **Right Idler**.

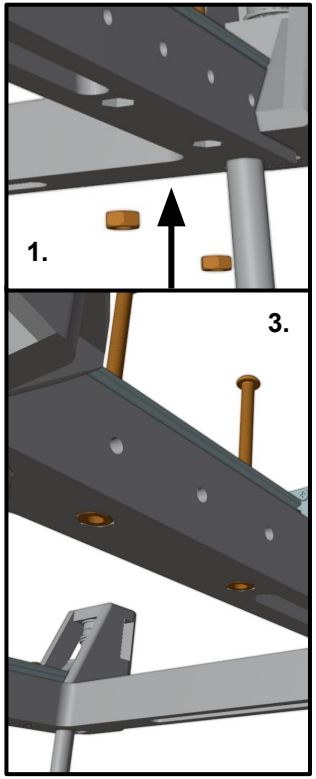
LINEAR RAILS

TOOLS:

Allen Wrench

HARDWARE:

M3 x 25mm: **x 8**
M3 : **x 8**
200mm MGN9C: **x 2**



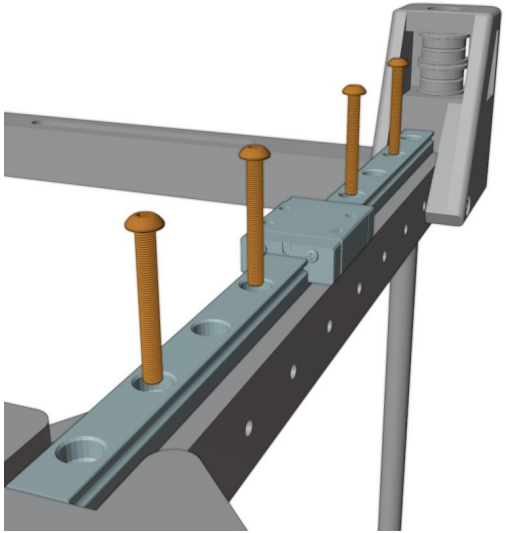
1. Start by pressing in each **M3 Nut** into the top frame.

   There are four **M3 Nuts** per side.

2. Align the **200mm MGN9C Linear Rail** over the **M3 Nuts** installed in step **(1)**

3. Using **M3 x 25mm** bolts attach the **Linear Rail** to the frame**.**

4. Do not fully tighten the **M3 x 25mm** bolts.



LINEAR RAILS

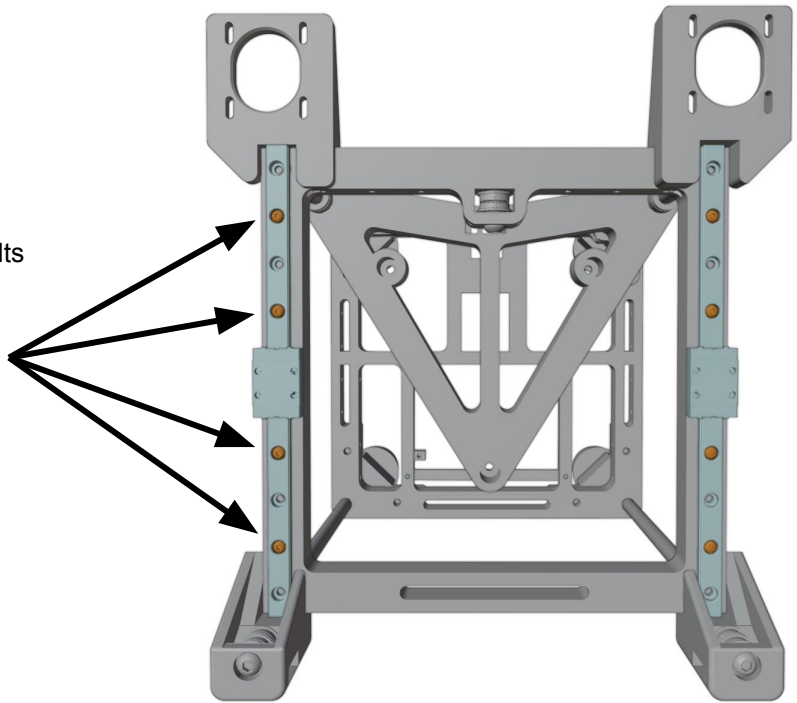
PLEASE NOTE:

Y Axis.
150mm Linear Rails
are compatible.

5. Repeat steps **(1-4)** for the opposite side **Linear Rail**.

6. Verify all eight **M3 x 25mm** bolts and **M3 Nuts** are installed.

They can be tightened now or later.



CARRIAGE INSTALL

TOOLS:

Allen Wrench

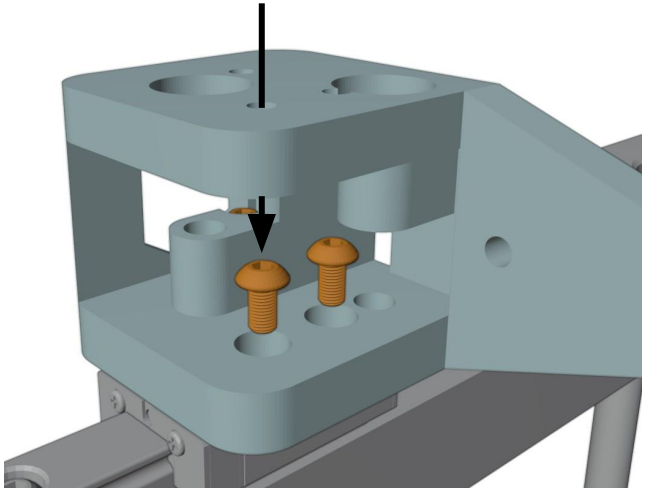
PRINTED PARTS:

Left Carriage

Right Carriage

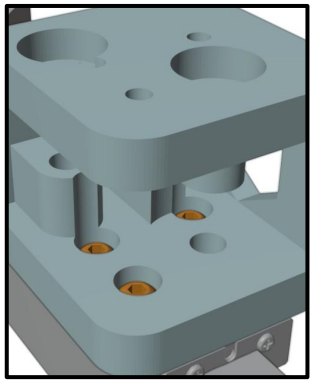
HARDWARE:

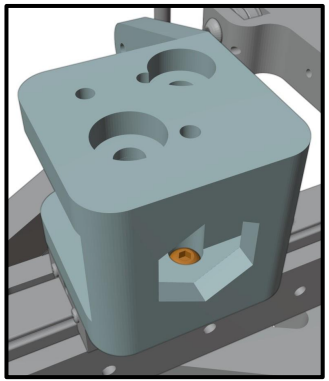
M3 x 6mm: **x 6**



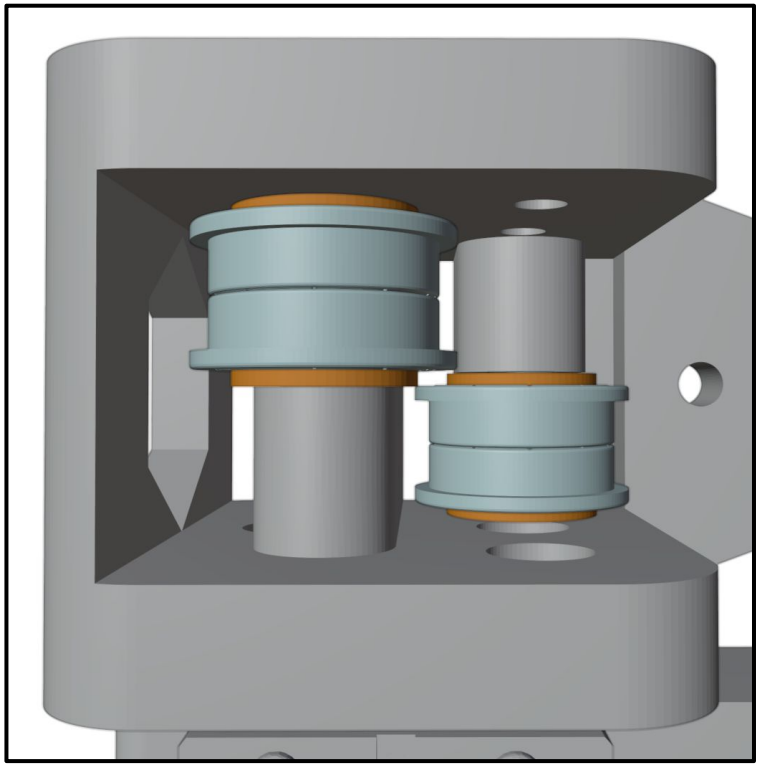
1. Using **M5 x 6mm** bolts.

   Tighten the Left and Right Carriage to the linear rails.





CARRIAGE BUILD



Take advantage of any available tools.

This is a finished carriage to help reference.

TOOLS:

Allen Wrench

Tweezers

Shim Fork

PRINTED PARTS:

Left Carriage

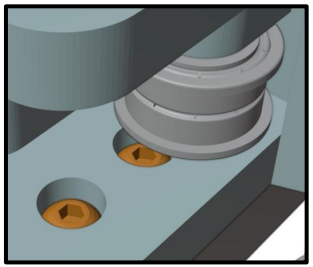
Right Carriage

HARDWARE:

M5 x 25mm: **x 4**
M5 x 1mm Shim: **x 8**
695zz Bearing: **x 8**

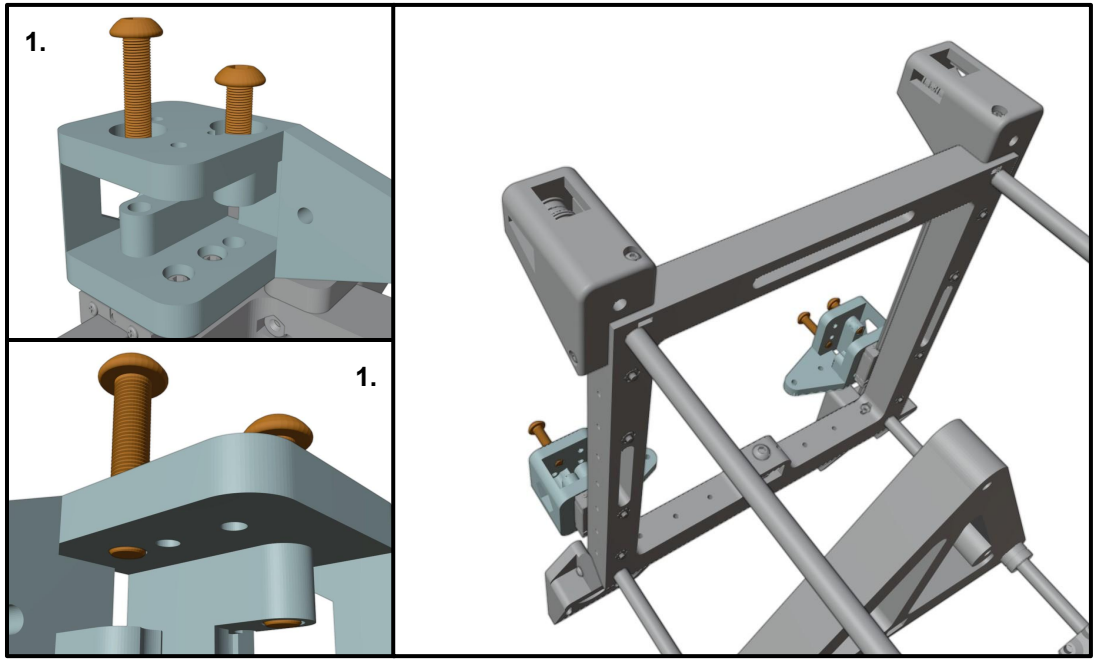
PLEASE NOTE:

It may be tempting to assemble the carriage off the linear rails, however the bearings interfere.



CARRIAGE BUILD

1. Start each of the four **M5 x 25mm** bolts. Two per side.



2. Rotate the printer, laying it on it's back

Different ways of installation may works best.

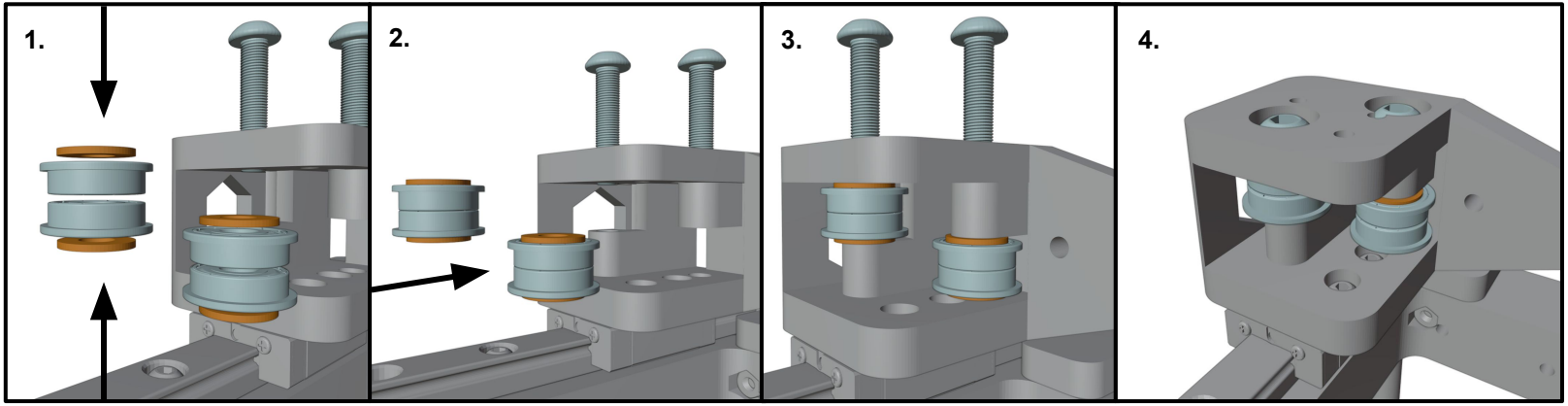
Pinching the hardware together.

or

Stacking each piece individually.

CARRIAGE BUILD

Compression Method



1. Take each piece of hardware as pictured
   stacking each piece on top of eachother.

2. Compress the full **Bearing** stack sliding it into place

3. Align the **Bearings**.
   Slowly tighten the **M5 x 25mm** bolts.

4. Check the **Bearing**s.
   Make sure each they spins freely.

CARRIAGE BUILD

TOOLS:

Allen Wrench

Tweezers

Shim Fork

PRINTED PARTS:

Left Carriage

Right Carriage

HARDWARE:

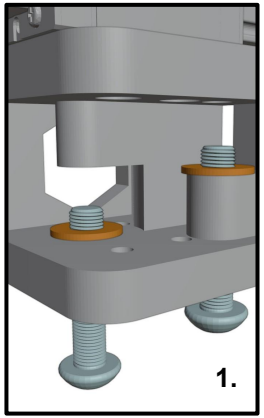
M5 x 25mm: **x 4**
M5 x 1mm Shim: **x 12**
695zz Bearing: **x 8**

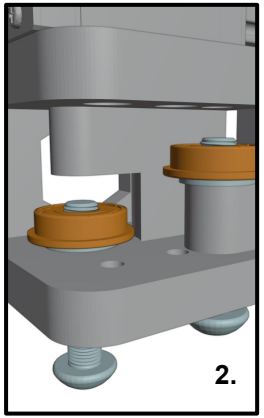
PLEASE NOTE:

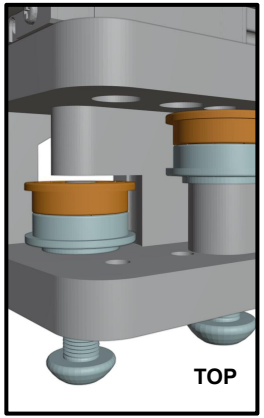
Bearing stacks may be done one at a time.

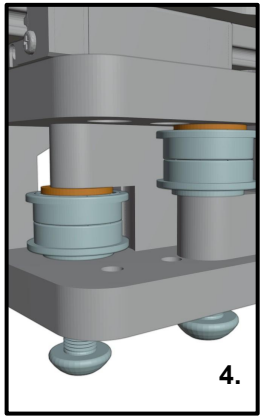
Back bearing stack maybe easier to install first.

Stacking Method









Start the **M5 x 25mm** bolts.

1. Start by inserting a **Shim** over the bolt.

Tighten the **M5 x 25mm** as each part is added.

2. Add a **Bearing** flange facing the top.

3. Add a **Bearing** flange facing the bottom.

4. Slide in the final **M5 x 1mm Shim.**

Tighten the **M5 x 25mm** bolt.

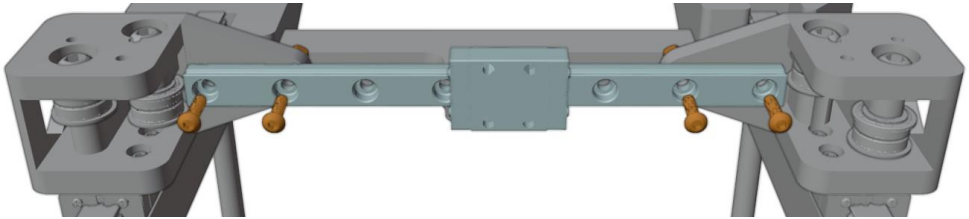
LINEAR RAIL INSTALL

TOOLS:

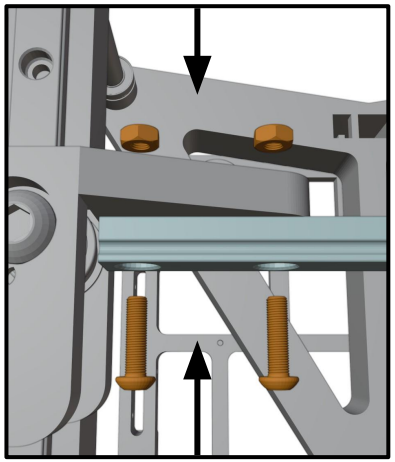
Allen Wrench

HARDWARE:

M3 x 12mm: **x 4**
M3 Nut: **x 4**
150mm MGN9C: **x 1**



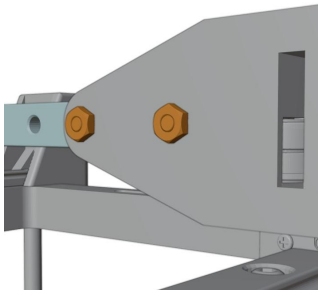
1. Using the **M3 x 12mm** bolts hold the **Linear Rail** in place.

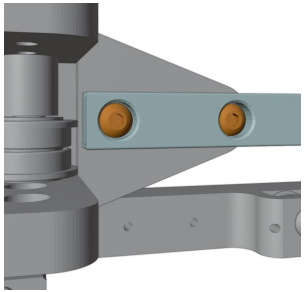


From the back side.

2. Twist **M3 Nuts** onto the inserted **M3 x 12mm** bolts.

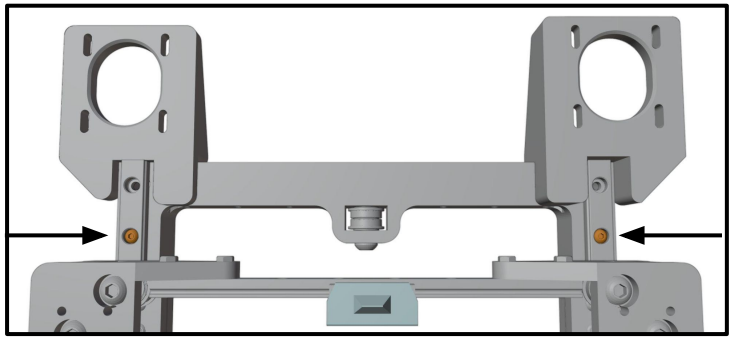
3. Tighten all four the **M3** bolts.

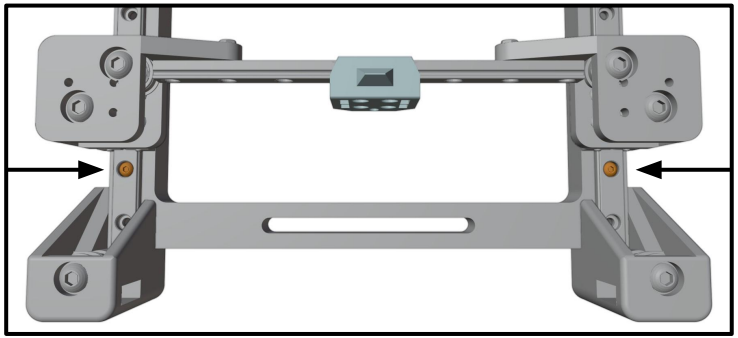




LINEAR RAIL INSTALL

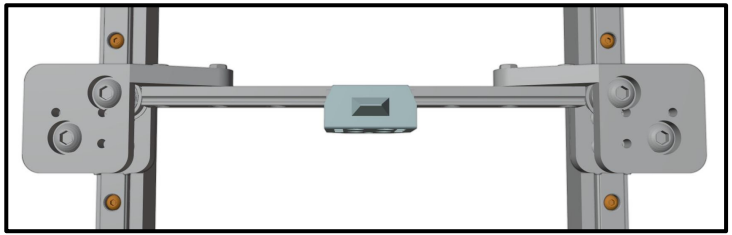
TOOLS:
Allen Wrench





1. Slide the gantry front to back multiple times.

Stop when the movement is smooth.



2. Tighten the **M3 x 25mm** bolts on each side, while moving the gantry from the back to front.

Hardware found on pages. **(40-41)**

BELT CRADLE

TOOLS:

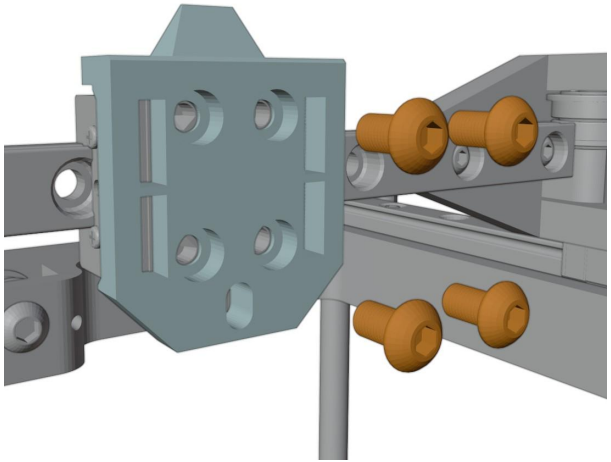
Allen Wrench

PRINTED PARTS:

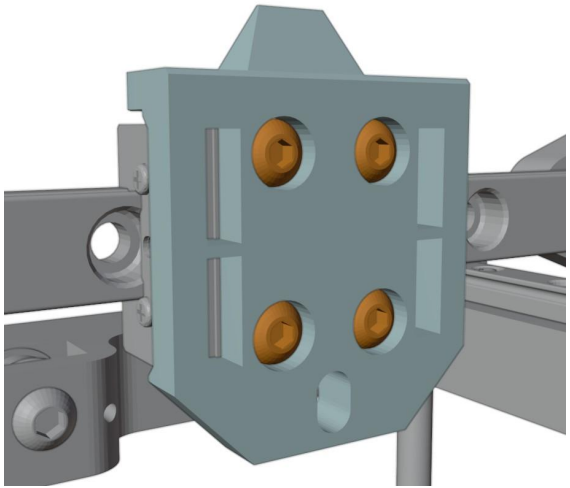
Belt Cradle

HARDWARE:

M3 x 6mm: **x 4**



1. From the front insert the **M3 x 6mm** bolts through the **Rookery Belt Cradle**.



2. Tighten the **M3 x 6mm** bolts into the linear rail carriage.

   Do not over tighten the **M3** bolts causing interference with rails.

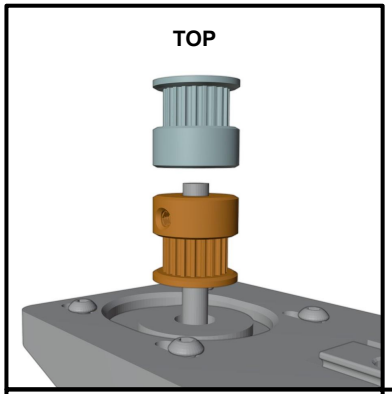
INSTALL PULLEYS

TOOLS:

Allen Wrench

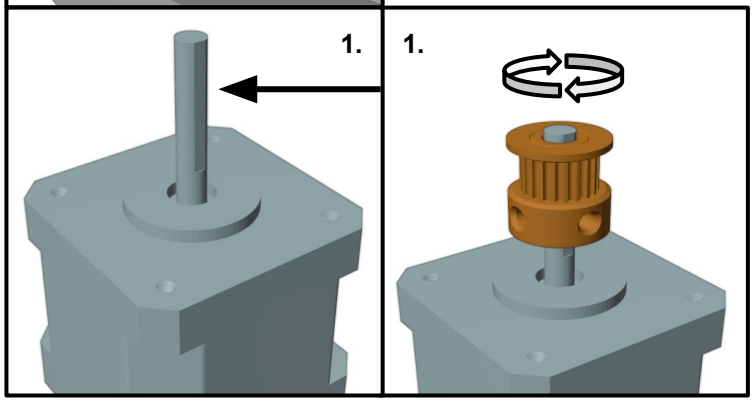
HARDWARE:

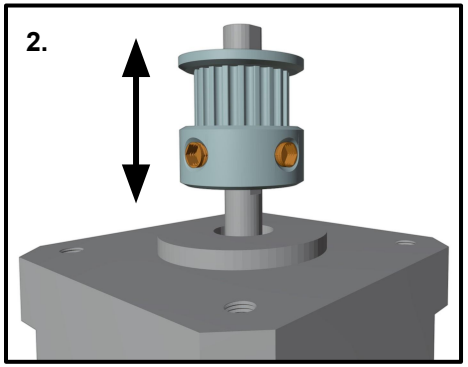
Nema 17: **x 3**
20T 5B Pulley: **x 3**



- **20T Pulley** teeth facing the <u>top</u>: **x 2**
- **20T Pulleys** with teeth facing the <u>bottom</u>: **x 1**

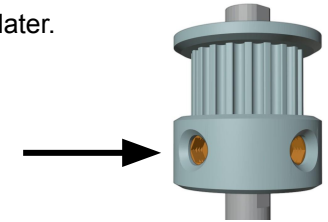
1. If the sourced **Stepper Motors** have a shaft flat, align with one set screw.





2. The alignment of the **Pulley** will be adjusted later.

3. Snug the pre-installed grub screws.



A MOTOR

TOOLS:

Allen Wrench

HARDWARE:

Nema 17: **x 1**

M3 x 10mm: **x 4**

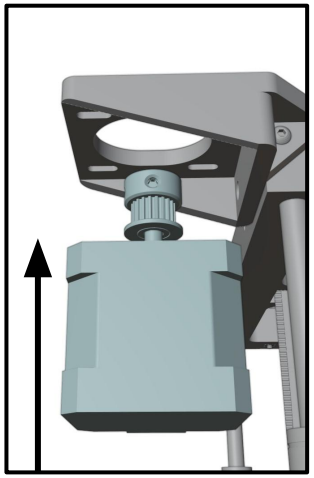
Please Note:

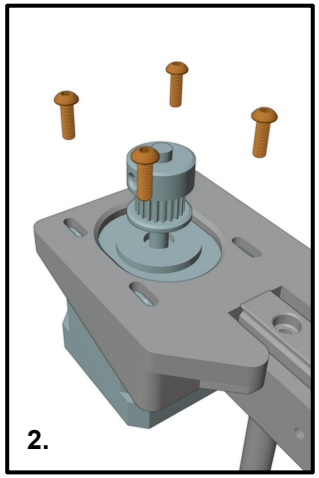
Choose the best

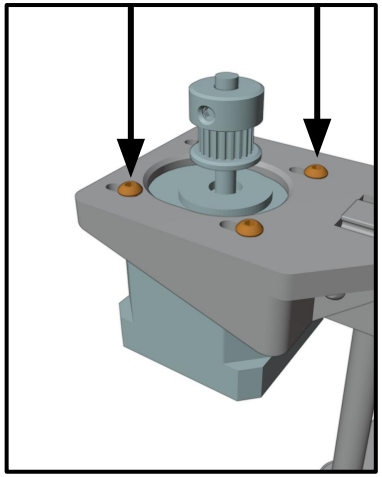
Nema 17

wiring orientation.

Back may be best.







1. Taking the **Nema 17 Stepper Motor**.
   From the bottom,
   hold the **Stepper Motor** to the mount.

2. Insert four **M3 x 10mm** bolts from the top.
   Secure the **Nema 17 Stepper** into place.

3. Snug the **M3 x 10mm** Bolts.
   Do not over tighten as this will be adjusted later.

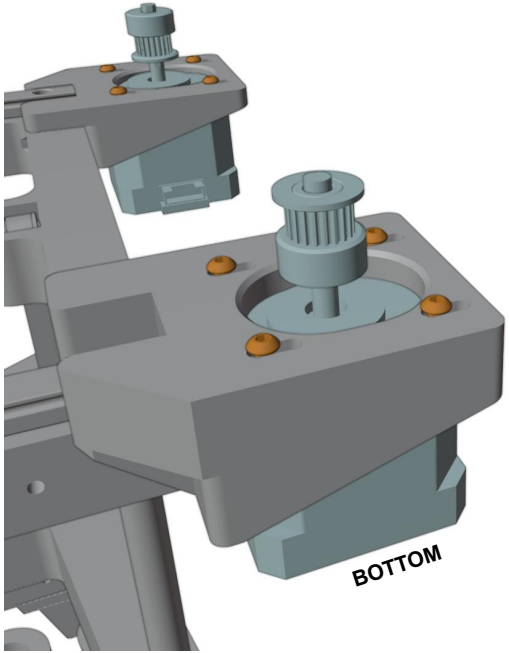
B MOTOR

TOOLS:

Allen Wrench

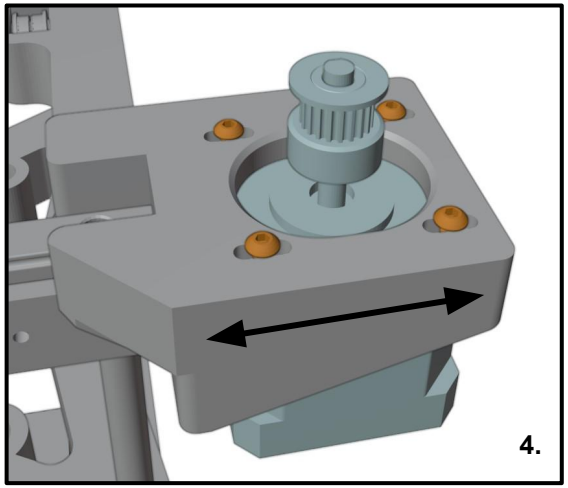
HARDWARE:

Nema 17: **x 1**
M3 x 10mm: **x 4**



1. From the bottom
   hold the **Nema 17** in place.

2. Start threading four **M3 x 10mm** bolts
   into the **Stepper Motor**.



3. Tighten the **M3** bolts into the **Motor**

4. Make sure the **Nema 17**
   can slide front to back.

   This will be adjusted later.

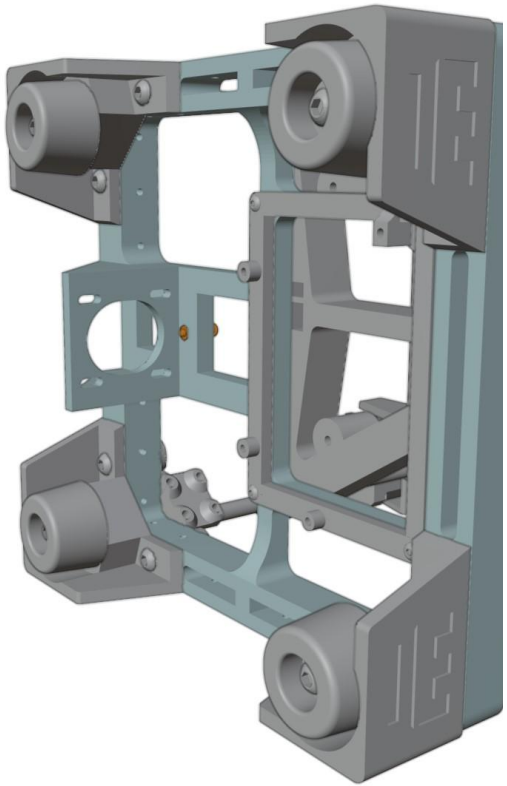
Z MOTOR

PRINTED PARTS:

Bottom Frame

HARDWARE:

Nema 17: **x 1**
M3 x 10mm: **x 4**



Please Note:

It is completely fine

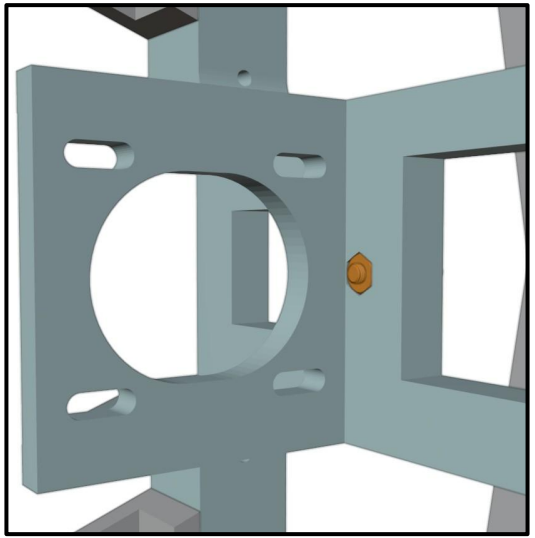
to rotate the Rook.

Just be gentle.

1. Rotate the printer for easy access

2. Locate the Z motor mount under the **Bottom Frame**.

Belt tension bolt found on page **(23)**



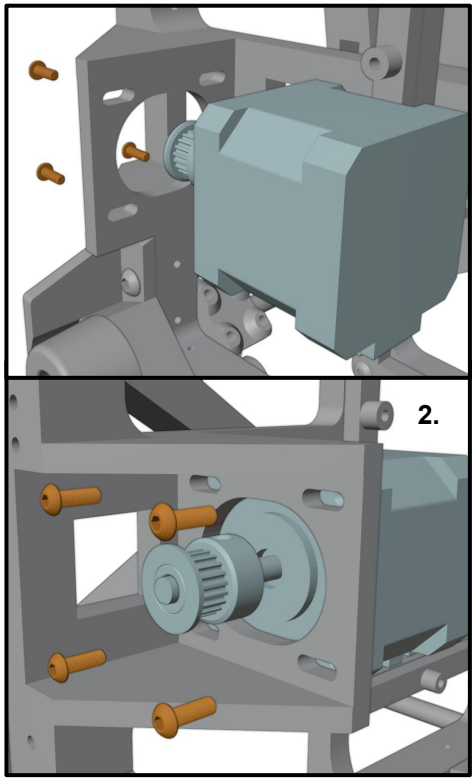
Z MOTOR

TOOLS:

Allen Wrench

HARDWARE:

Nema 17: **x 1**
M3 x 10mm: **x 4**



Please Note:

Choose an Orientation

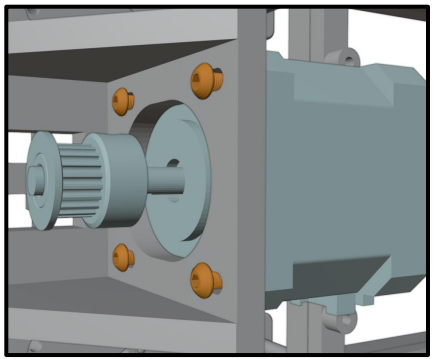
for the Stepper Motor plug.

Left / Right may be best

1. Hold the **Nema 17** in position on the Z motor mount.

2. From the back, insert four **M3 x 10mm** bolts into the **Stepper Motor.**

3. Tighten the **M3** bolts enough to prevent sag.



Z BELT INSTALL

TOOLS:

Tweezers

Zip Tie / Belt Clip

PRINTED PARTS:

Top Frame

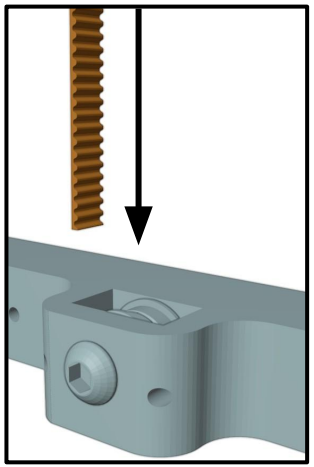
HARDWARE:

GT2 Belt: **x .5 Meters**

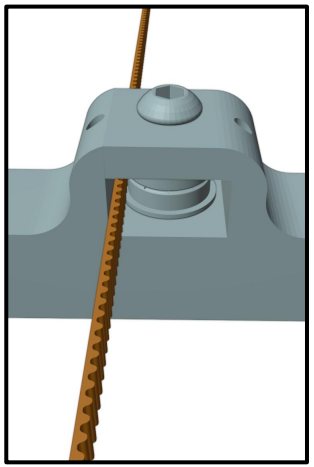
Do not cut your belts short.

Leave them as **long** as possible,

for as long as possible.



1. From the top, insert the end of the **GT2 Belt** on the left side of the **Top Frame** idler.

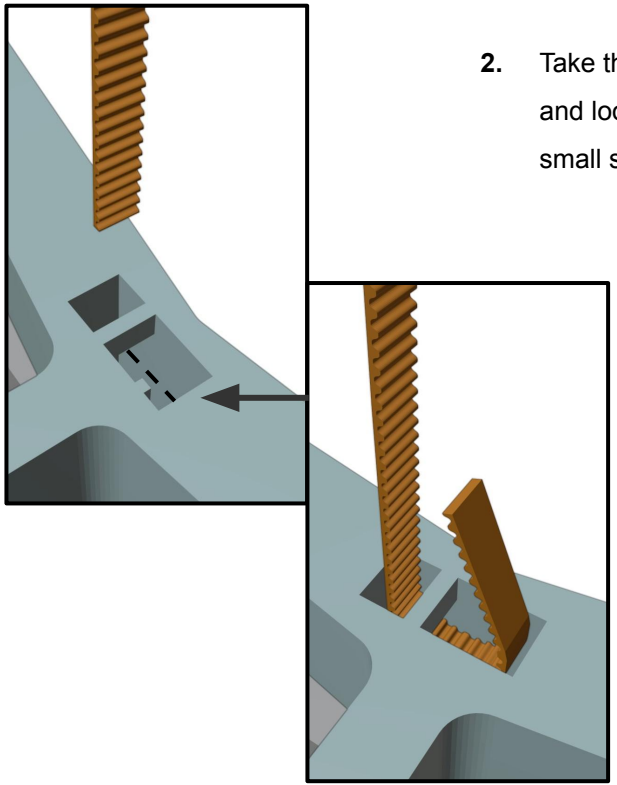


Please Note:

Some previous steps maybe be left out of pictures for clarity during belt installation.

Z BELT INSTALL

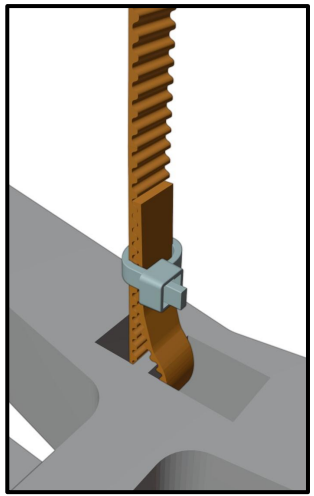
TOOLS:
Zip Tie / Belt Clip



2. Take the **GT2 Belt** and loop it around the left, small side of the **Bed Frame**.

Please Note:

Do not stick the belt through the bed frame.

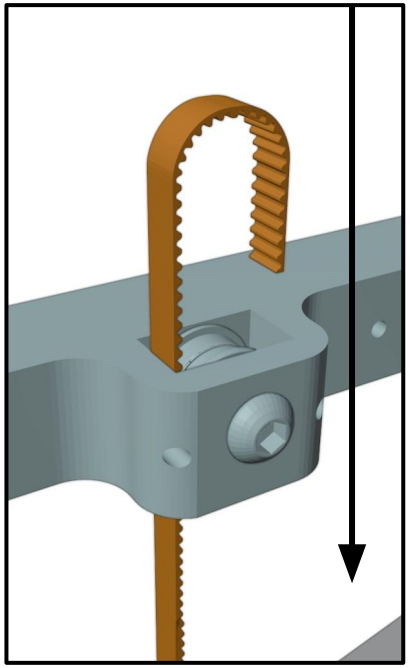


3. Use a **Zip Tie** or **Belt Clip** to secure the **Belt** to the Bed Frame.

Z BELT INSTALL

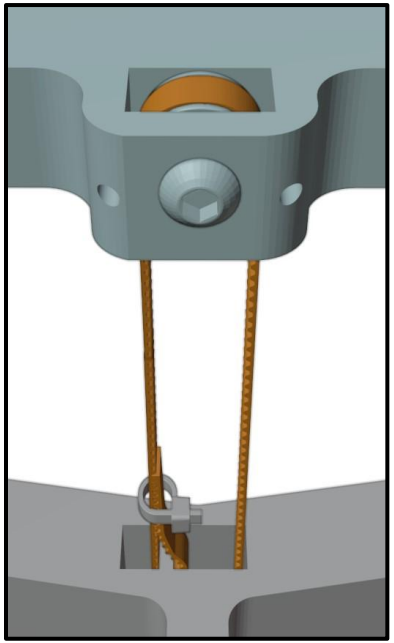
PRINTED PARTS:

Top Frame



4. Take the opposite end of the **GT2 Belt**.

5. Loop the **Belt** around the **Top Frames** idler.

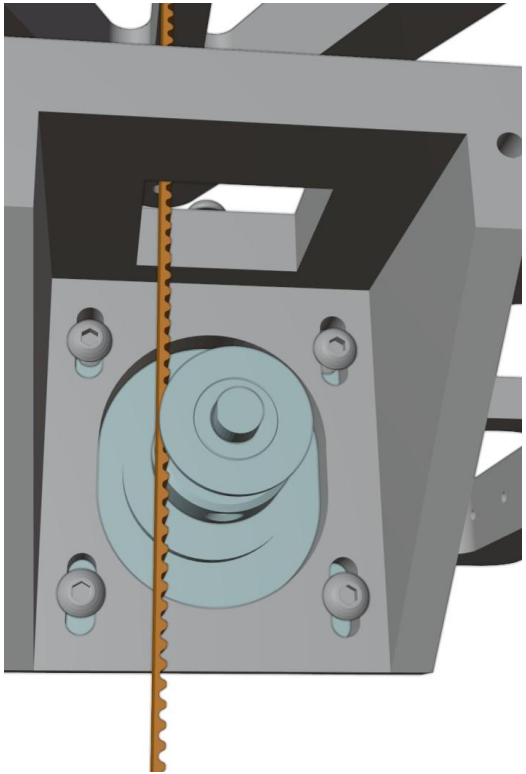


6. Take the **Belt** through the bed, to the bottom frame.

Z BELT INSTALL

HARDWARE:

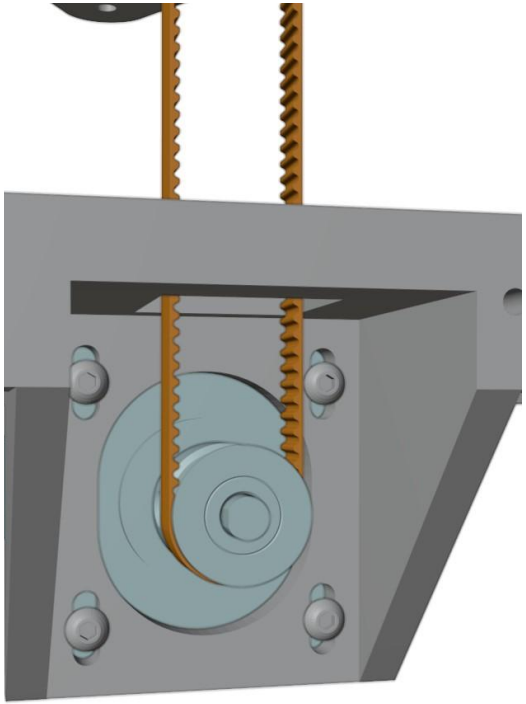
Nema 17



7. With the **Belt** straight, through the bed and lower frame.

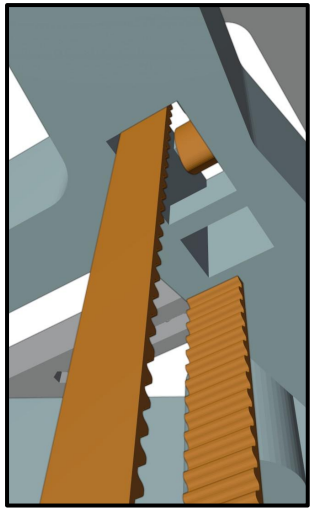
8. Loop the **GT2 Belt** around the Z motor

9. Direct the **Belt** back up to the top of the printer.



Z BELT INSTALL

TOOLS:
Zip Tie / Belt Clip

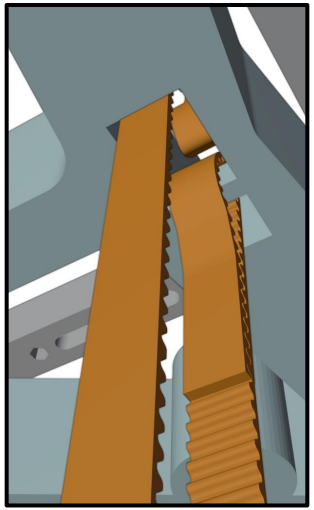


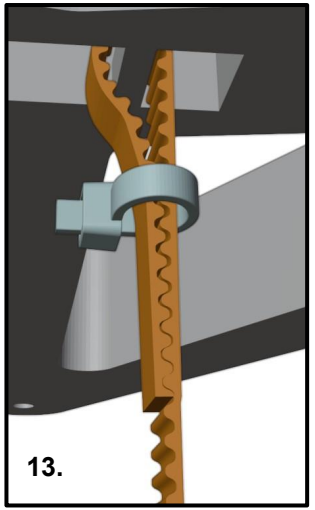
10. Loop the **Belt** up and around, the small side of the **Bed Frame**.

11. Pull the **Belt** back down towards the bottom.

12. Verify the **Belt** path in steps **(1-12)**

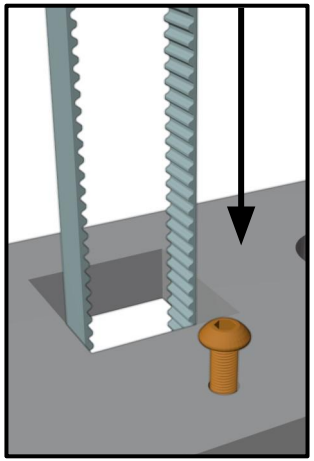
13. Remove any slack in the **Belt**. Interlock the teeth.



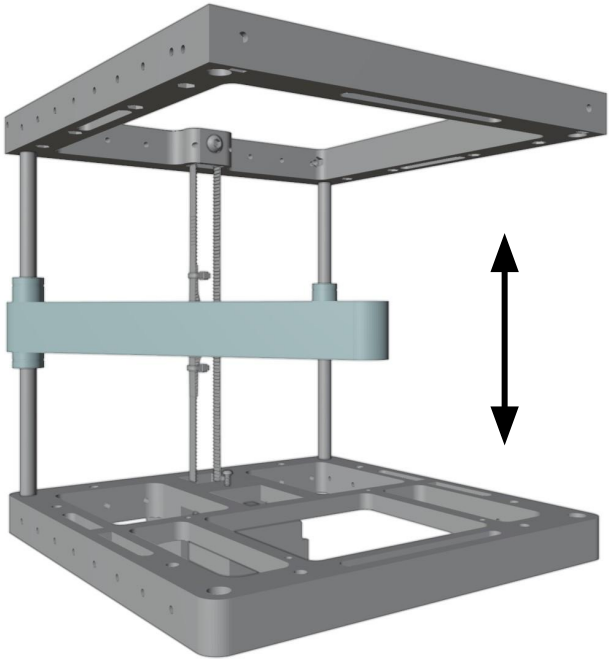


Use a **Zip tie** or **Belt Clip** to secure.

Z BELT ADJUSTMENT

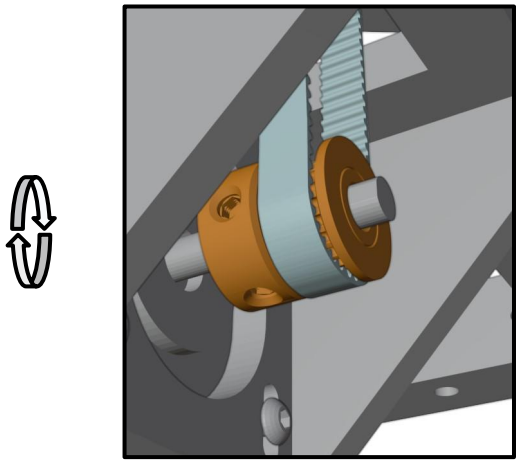


1. Use the **M3 x 16mm** bolt to add tension to the belt.

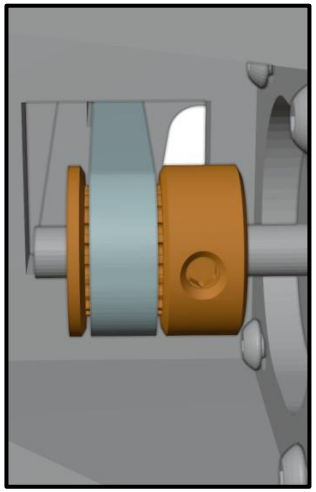


2. Check the movement of the **Bed Frame.**
   Move from top to bottom

3. Rotate the printer to access the **Pulley**.



Z BELT ADJUSTMENT

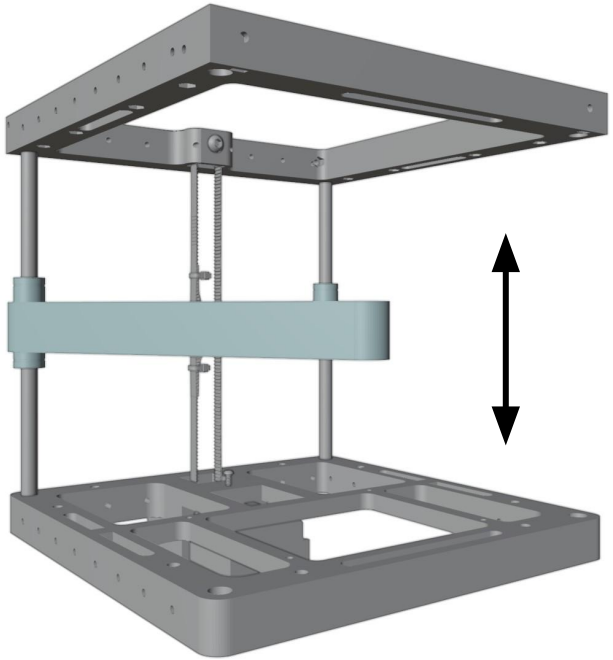


4. Check the **Pulley** to make sure the **belt** is centered.

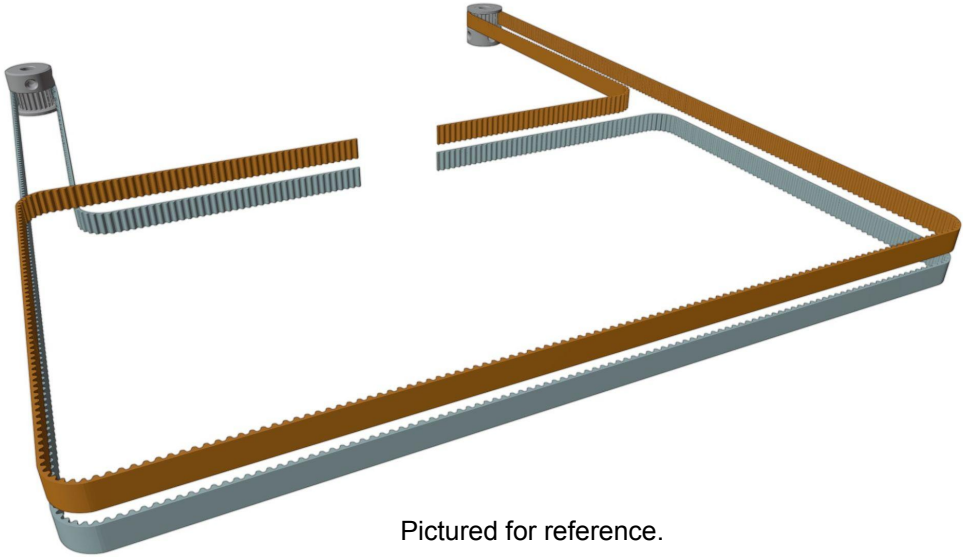
5. Repeat steps **(2-4)** a few times until the belt is centered.

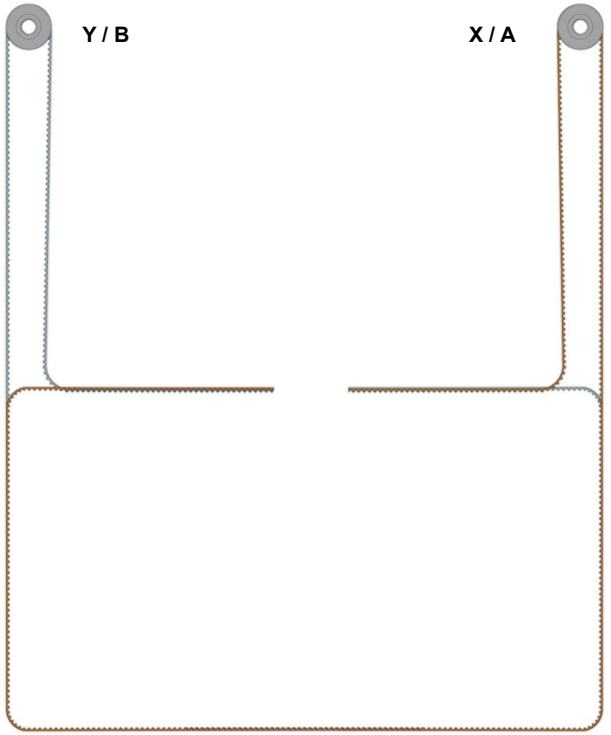
6. Once satisfied with alignment, fully tighten both grub screws on the **Pulley**.

7. Trim only the excess **Belt.**



A / B BELT PATH





Pictured for reference.

Steps will be shown over the next pages.

B BELT PATH

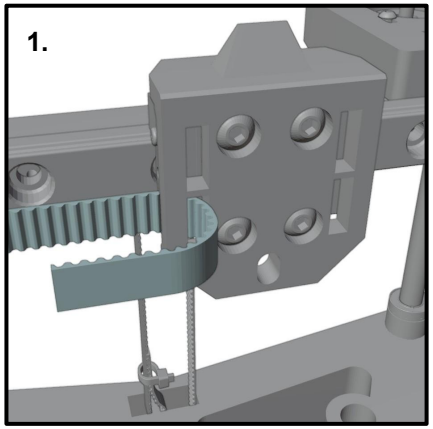
TOOLS:

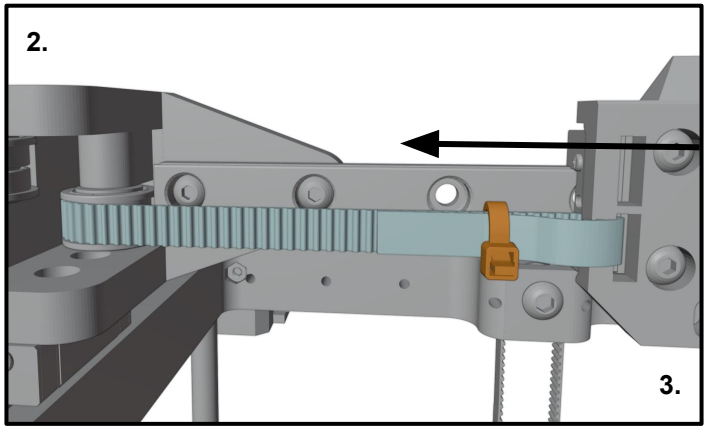
Tweezers

Zip Tie / Belt Clip

HARDWARE:

GT2 Belt: **x 2 Meters**

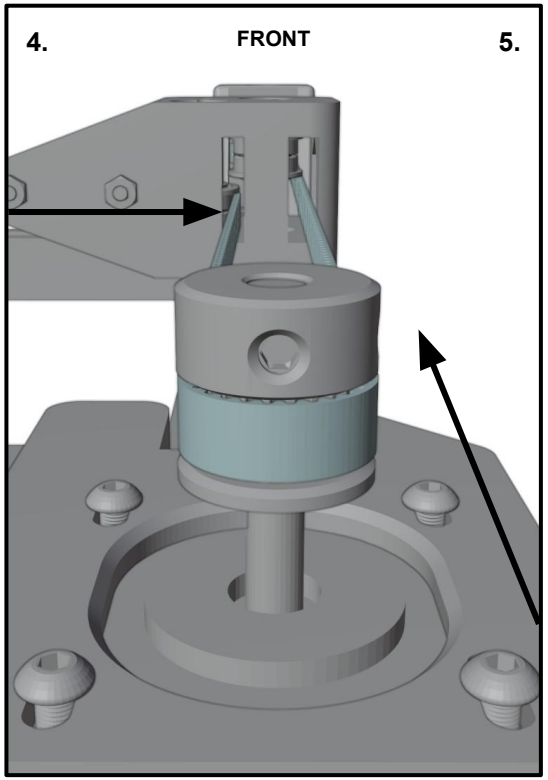




Start with the bottom belt.

1. Loop the **Belt** through the **Belt Cradle**.
2. Secure the **Belt** with a **Zip Tie.**
3. Direct the **GT2 Belt** towards the lower **Carriage** idler.

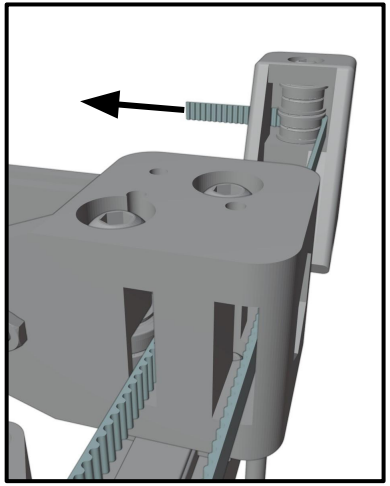
B BELT PATH

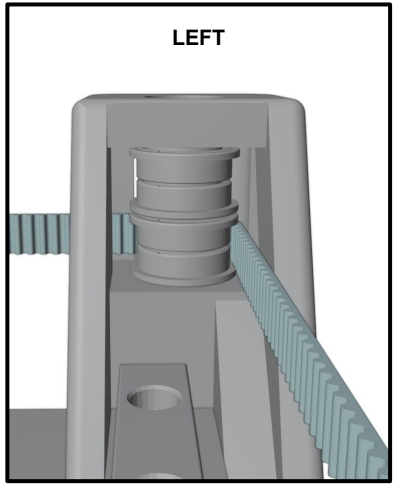


4. Route the **Belt** around the first **Bearing** stack.

5. Loop the **Belt** around the **20T Pulley**.

6. Take the **Belt** back through the **Carriage** to the front **left Idler**.



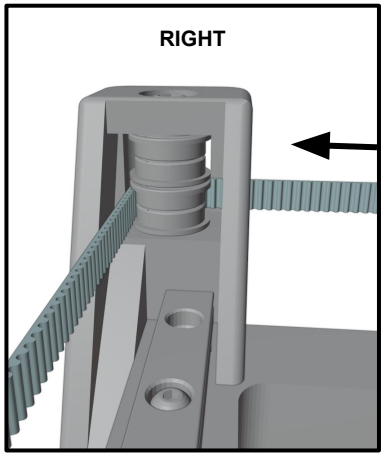


Please Note:

Leave as much extra belt as possible.

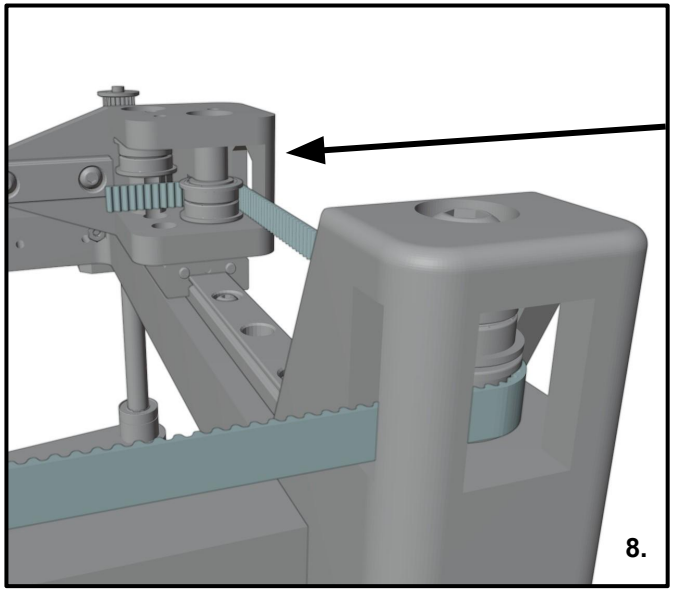
B BELT PATH

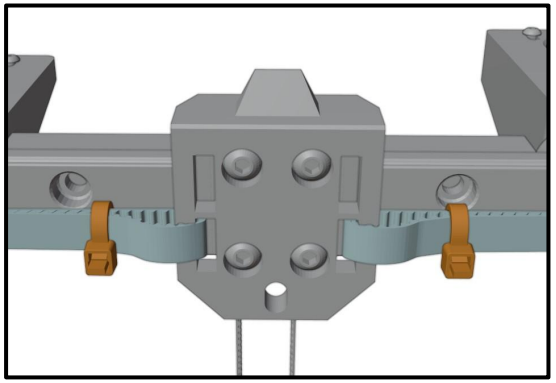
TOOLS:
Tweezers
Zip Tie / Belt Clip



7. Route the belt around the front **Right Idler.**

8. Insert the **Belt** around the lower **Bearing** on the **Carriage**.

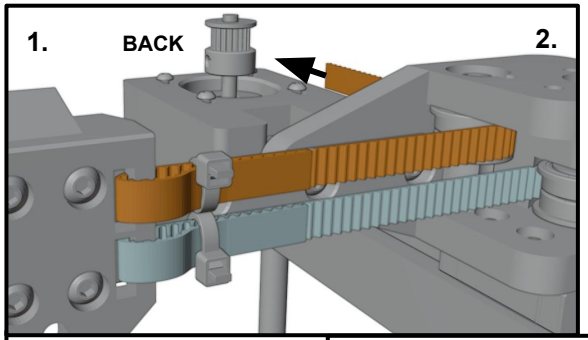




9. Exit the right **Carriage** back to the **Belt Cradle.**

10. Loop the **Belt**, pull snug and secure.

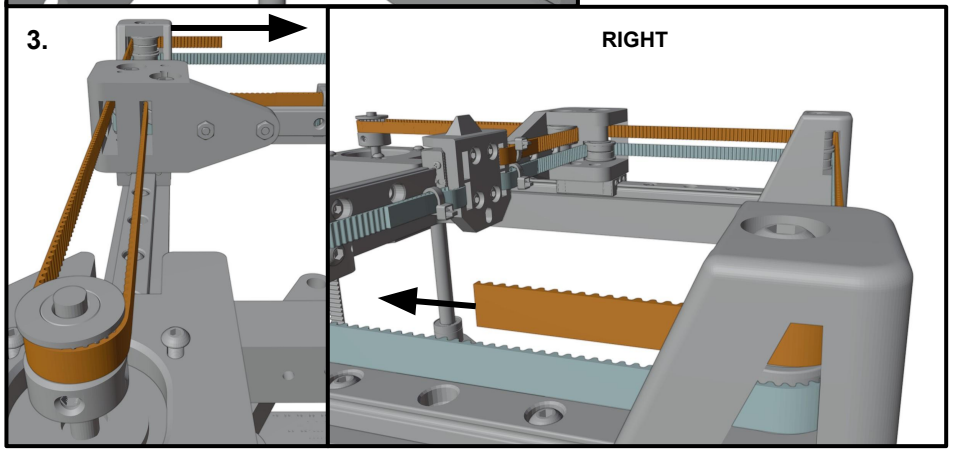
A BELT PATH



1. Start by securing the top **Belt** around the **Belt Cradle.**

2. Take the **Belt** to the right **Carriage** and around the **Bearings.**

3. Route the **Belt** out the **Bearings**, to and around the back **Pulley**.



4. Route from the **Pulley** to the front **Right Idler.**

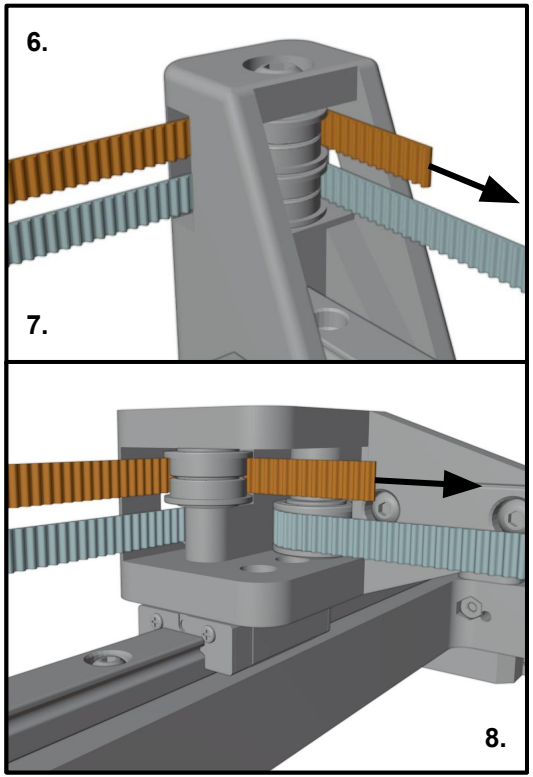
5. Take the **Belt** from the right, to the front **Left Idler.**

A BELT PATH

TOOLS:

Tweezers

Zip Tie / Belt Clip

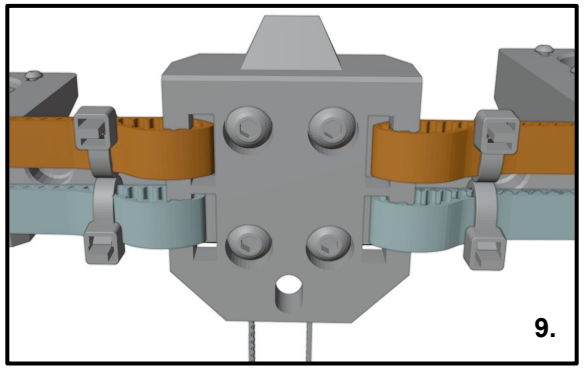


6. Wrap the **Belt** around the front **Left Idler.**

7. Exit the **Left Idler**, routing the **Belt** towards the **Left Carriage**.

8. Route the **Belt** around the top **Bearings** towards the **Belt Cradle**.

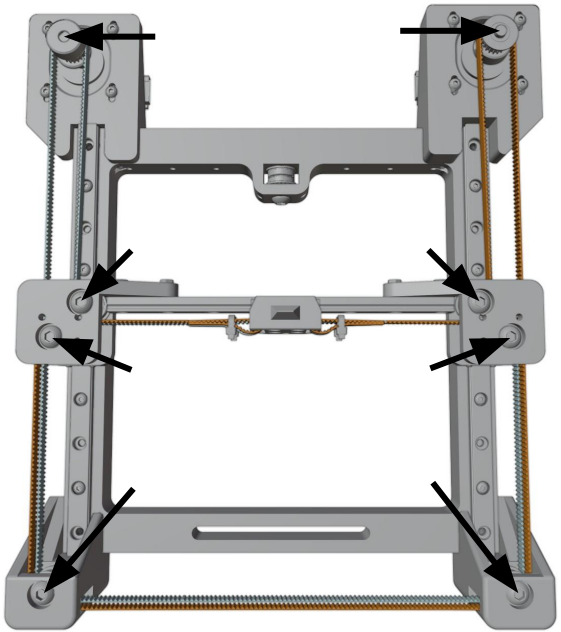
9. Snug and secure the **Belt** to the **Belt Cradle**.



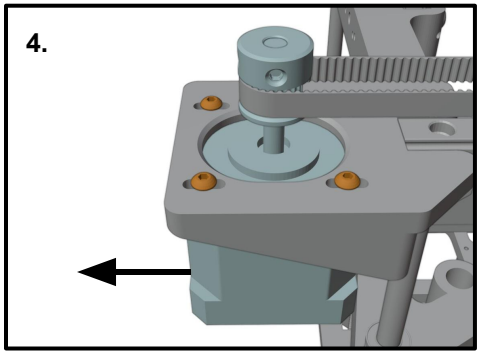
BELT / PULLEY ALIGNMENT

TOOLS:
Allen Wrench

1. Check to make sure the **Belts** have been properly routed.



4.



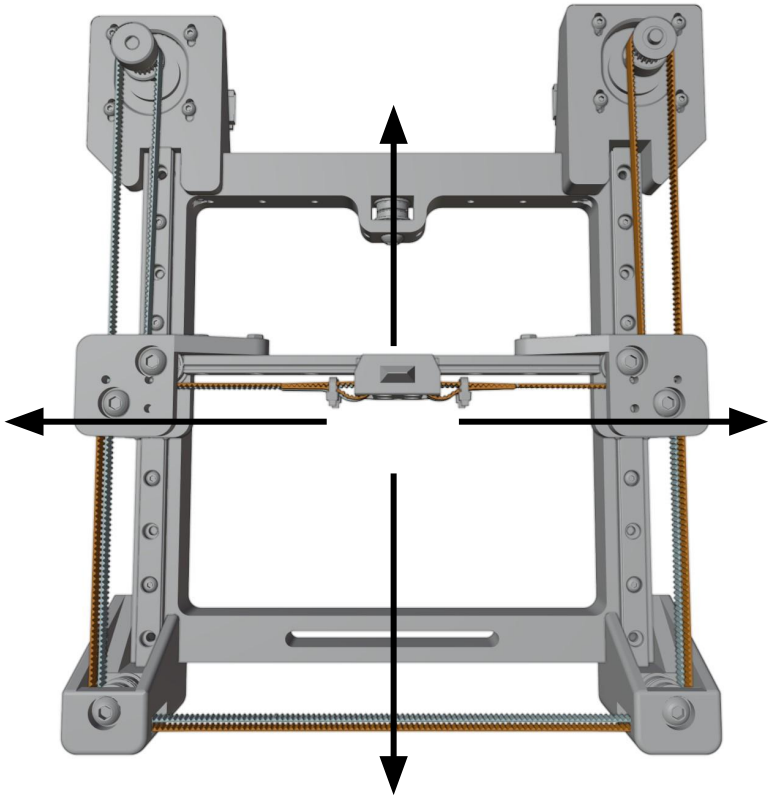
2. Make sure the **Belts** seated correctly on all **Idlers**,
In between each set of **Bearings**.

3. Tension the **Belts** taught prior to **Motor** adjustment.

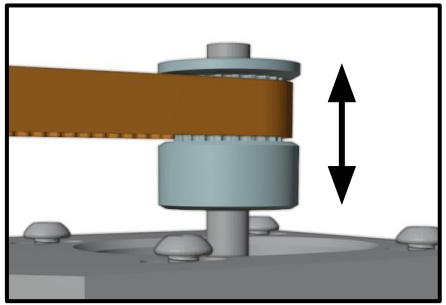
4. Adjust final **Belt** tension.
Tighten the **M3 x 10mm** in the **Stepper Motors**.

BELT / PULLEY ALIGNMENT

TOOLS:
Allen Wrench



1. Move the gantry front to back.
2. Move the **Belt Cradle** left to right.
3. Check the alignment of the **20T Pulley.**
4. Adjust the **Pulley** if necessary.
5. Repeat steps **(1-4)** until the **Belt** stays centered.



HOT END

Installing the **Hot End** onto the **Hot End Key**.

The stock Rookery uses a low profile heatsink.

Please Note:

Other versions available on Printables.com

TOOLS:

Allen Wrench

PRINTED PARTS:

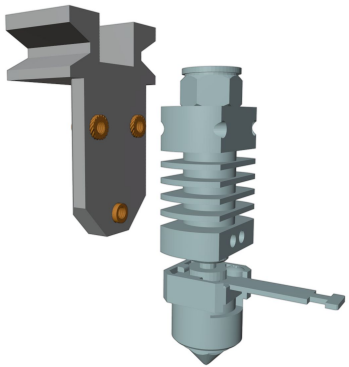
Hot End Key

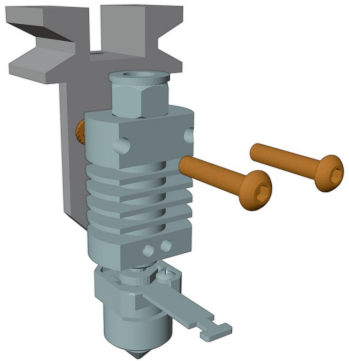
HARDWARE:

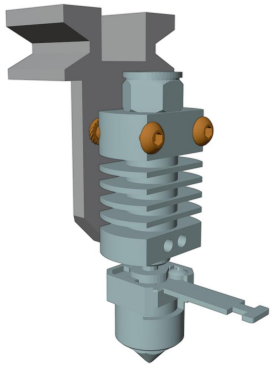
Hot End / Heat Sink

M3 x 16mm: **x 2**

1. Using **M3 x 16mm** bolts install the **Hot End** onto the **Hot End Key.**







Rookery V6-CHC Mount by Gulsifer

ROOKERY CRADLE

TOOLS:

Allen Wrench

PRINTED PARTS:

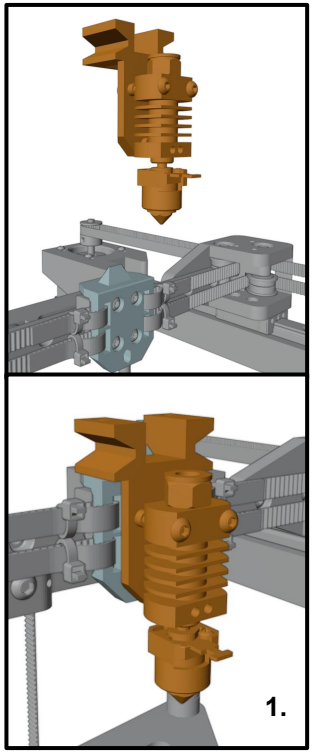
Belt Cradle

Hot End Key

HARDWARE:

Hot End

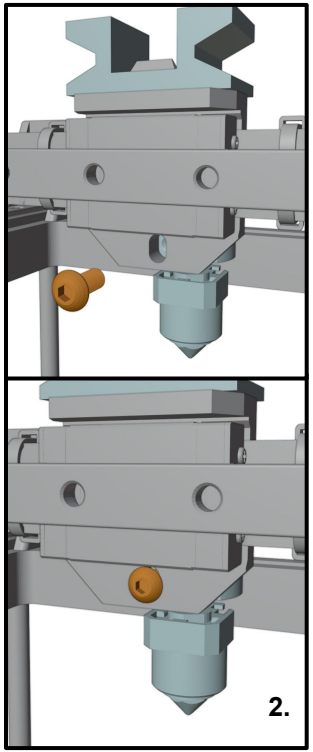
M3 x 6mm: **x 1**



1. Set the **Hot End Key**, on <u>top</u> of the **Belt Cradle**.

2. From the <u>back</u>, insert a **M3 x 6mm** bolt.

   If available, a longer bolt can be used.



ROOKERY FANS

TOOLS:

Allen Wrench

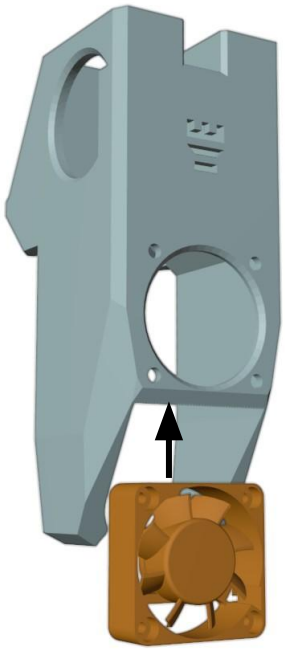
PRINTED PARTS:

Rookery

HARDWARE:

3010 Fan: **x 1**
M3 x 16mm: **x 4**

1.

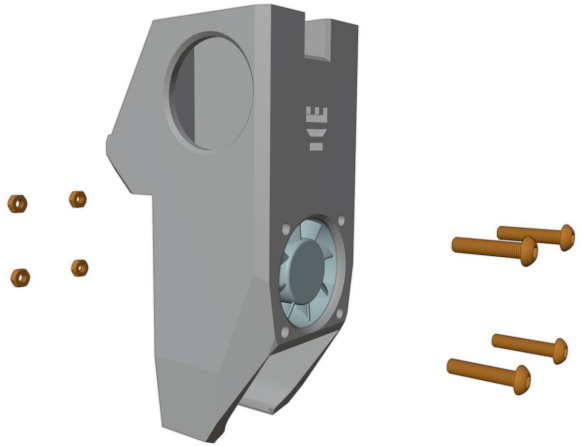


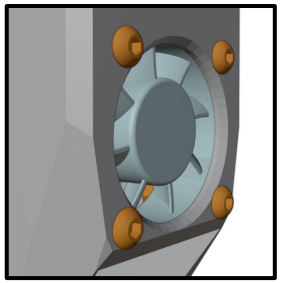
BOTTOM

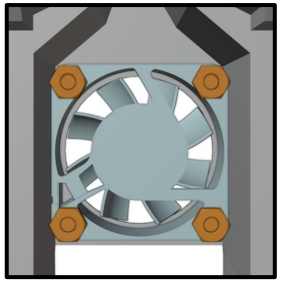
1. Slide the **3010 Fan** into place from the bottom.
   Route each **Fan** wire out the top.

2. Using two - four **M3 x 16mm** bolts hold the **Fan** in place.

3. Attach the **Fan** to the **Rookery** using **M3** nuts on the back side.







ROOKERY FANS

TOOLS:

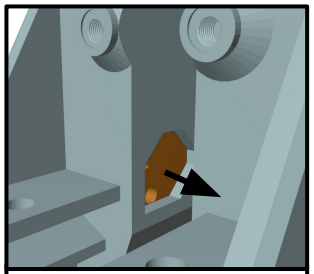
Allen Wrench

PRINTED PARTS:

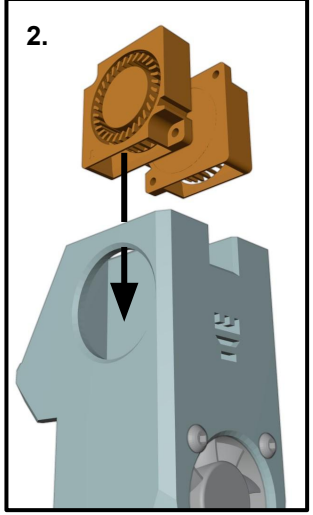
Rookery

HARDWARE:

3010 / 4010 Fan: **x 2**



2.



1. Make sure to route the **Fan** wires first.

Insert the wires from the top, through the fan slot.

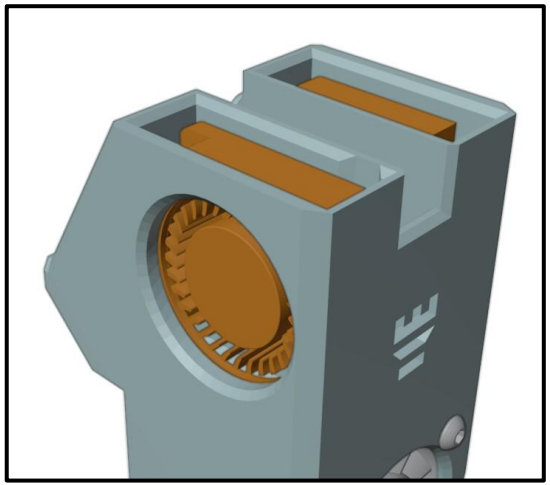
Exit the wires out the back side cutout.

2. Slide in the **3010** or **4010 Blowers Fans**

Blower Fan size depends on **Rookery** size selected

Feed the wires through the whole in the shroud prior

To sliding in the **Blower Fans**.



ROOKERY INSTALL

TOOLS:

Allen Wrench

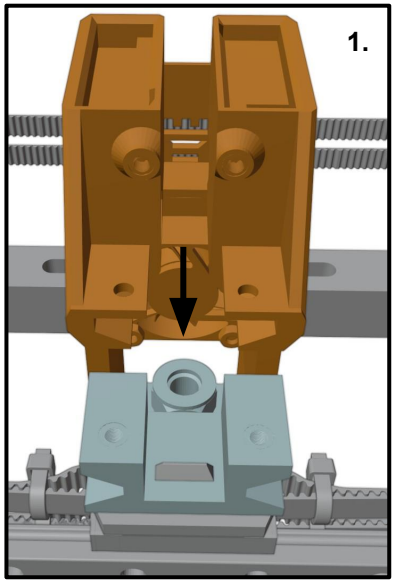
PRINTED PARTS:

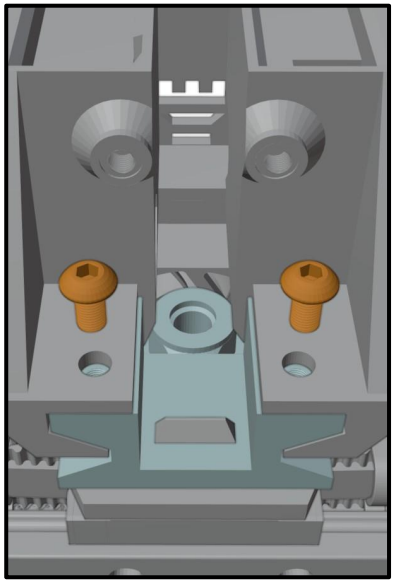
Rookery

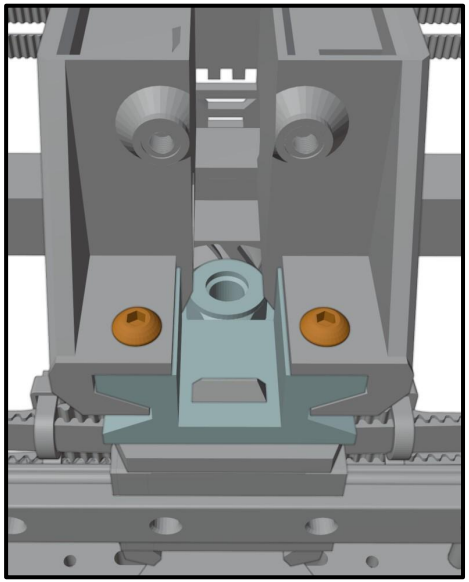
Hot End Key

HARDWARE:

M3 x 6mm: **x 2**







1. Slide the **Rookery** onto the **Hot End Key**.

2. Insert and tighten both **M3 x 6mm** bolts.

MCU

TOOLS:

Allen Wrench

PRINTED PARTS:

SKR Mount

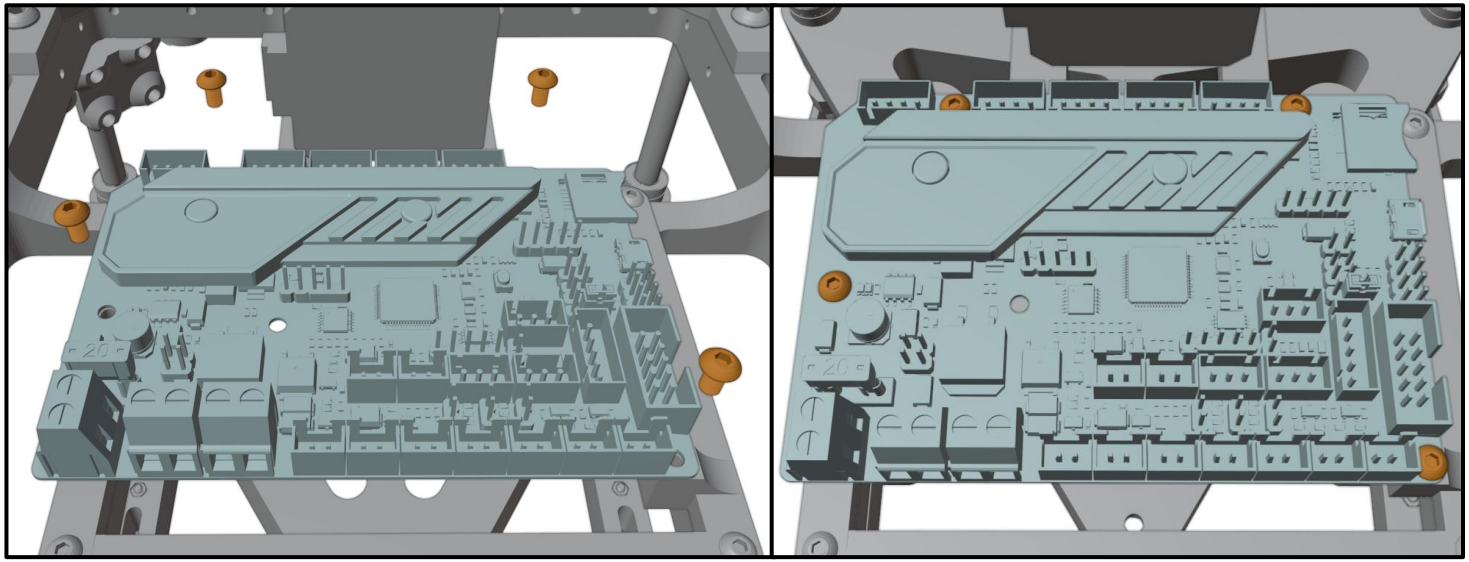
HARDWARE:

SKR Mini E3

3 x 6mm: **x 4**

Rotate the printer to gain access to the bottom.

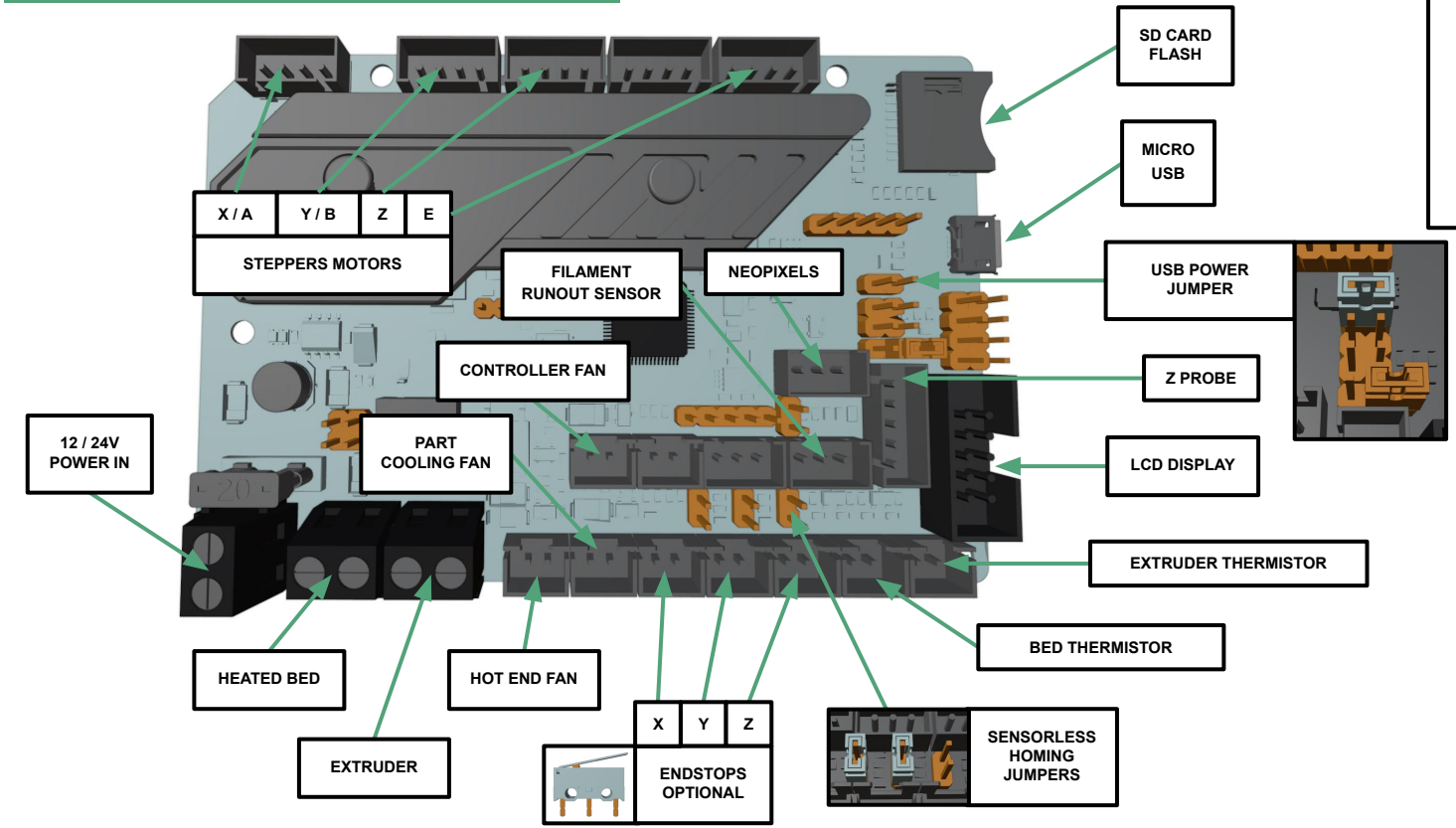
1. Attach the **SKR Mini** using four **M3 x 6mm** bolts



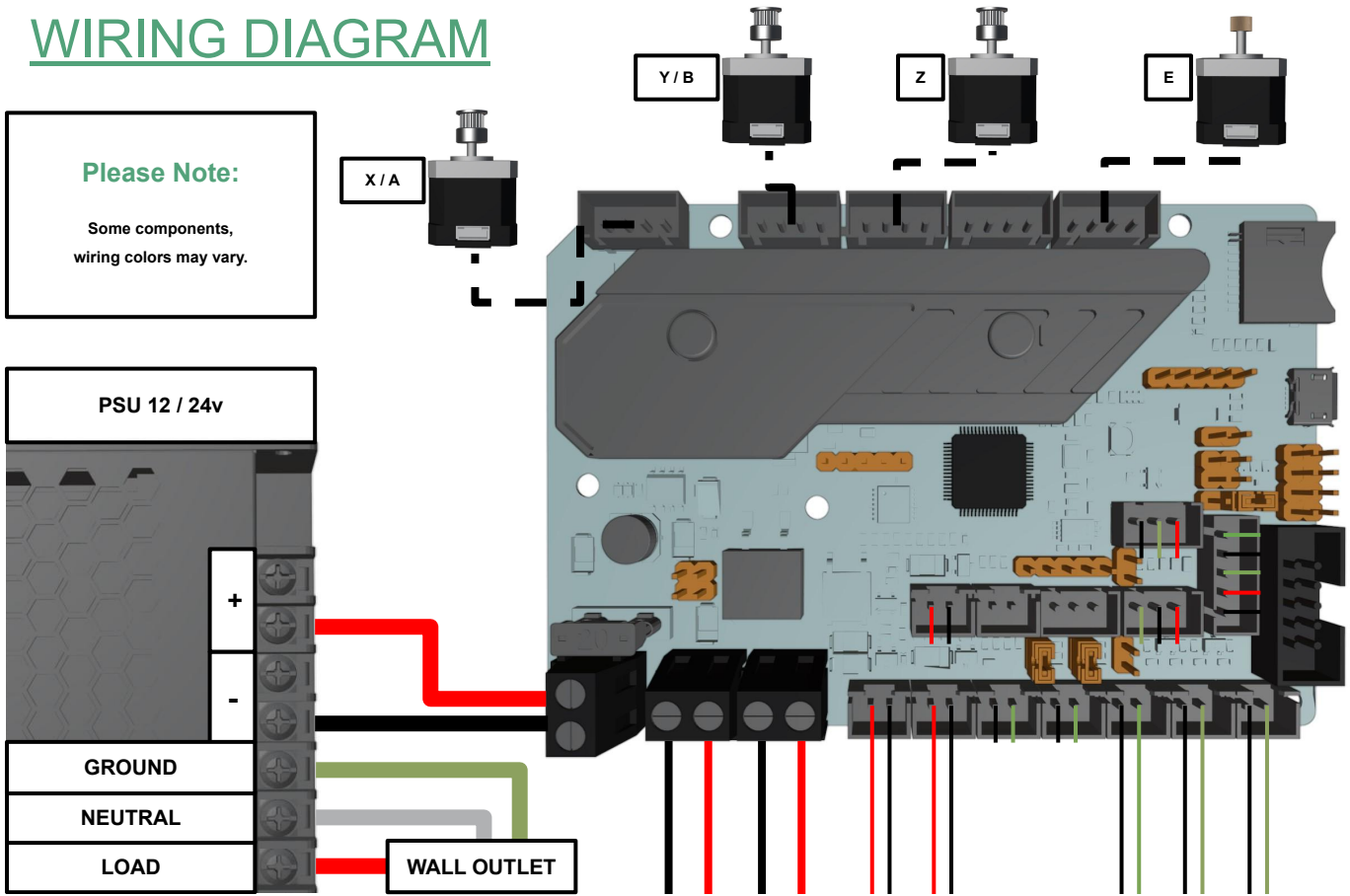
SKR E3 V3 REFERENCE

TOOLS:

- Philips / Flathead
- Wire Stripper
- Crimping Tools
- Ferrule Ends
- Wire Terminals
- Zip Ties



WIRING DIAGRAM



WIRING

24 - 28 AWG

20 - 22 AWG

16 - 18 AWG

POSITIVE

NEGATIVE

SIGNAL / DATA

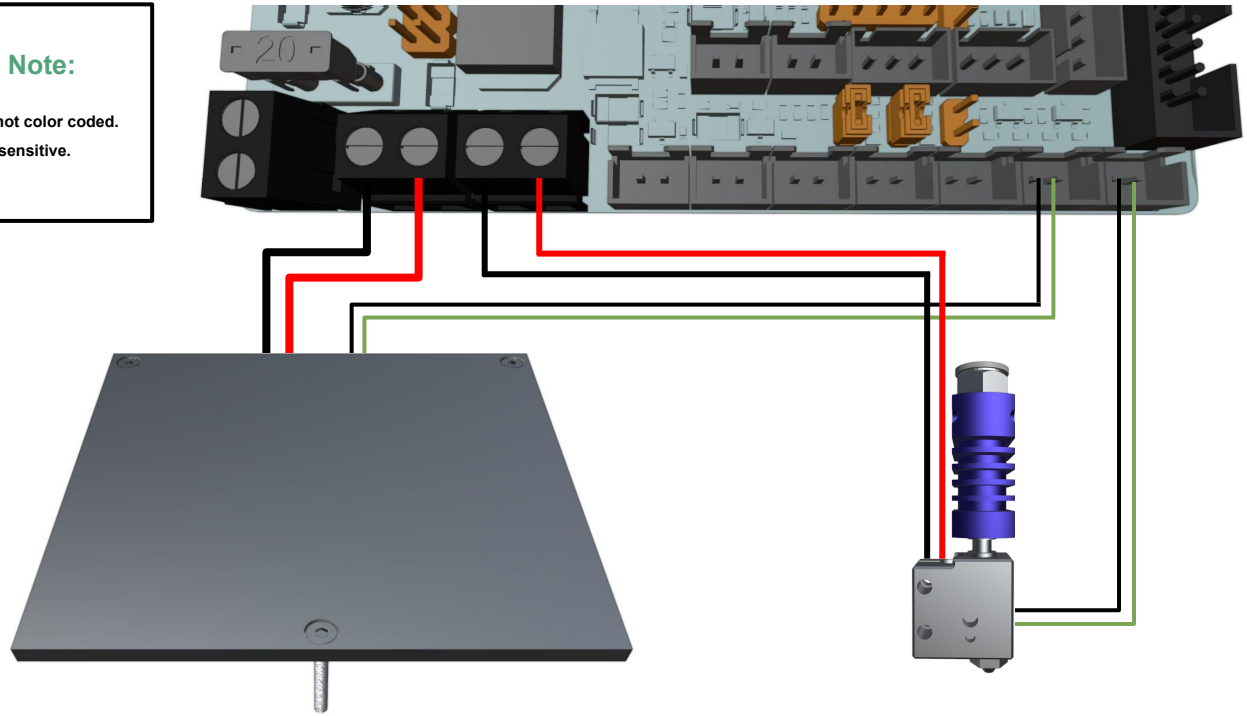
STEPPERS

WIRING DIAGRAM

Please Note:

Some wires are not color coded.

Polarity insensitive.



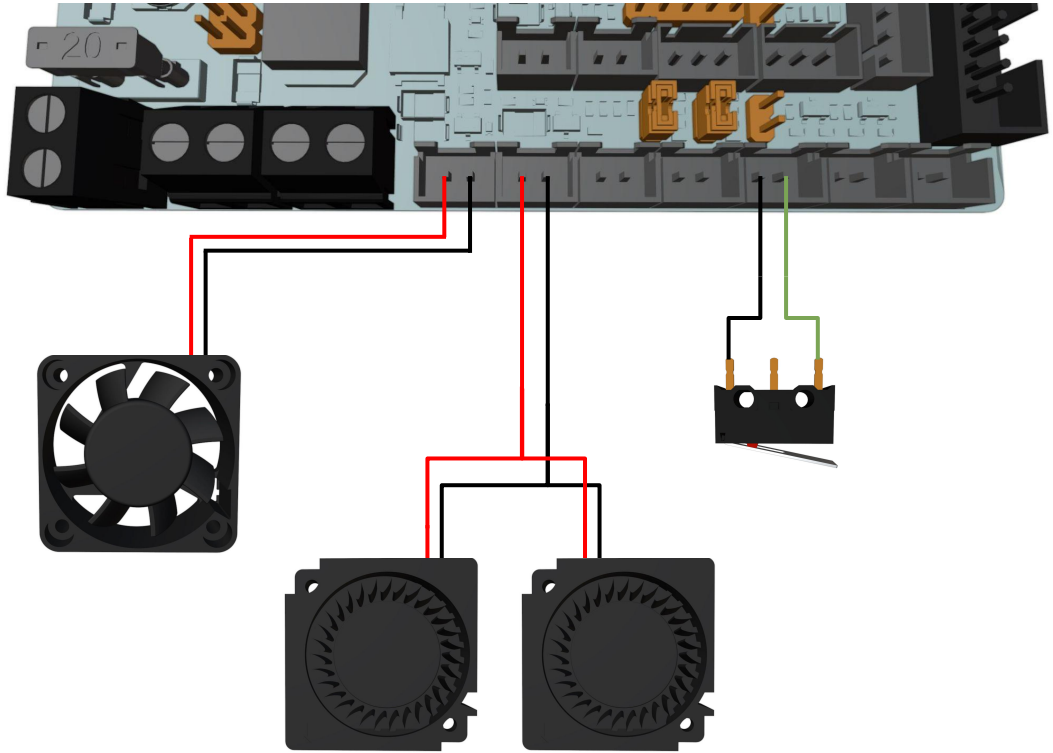
WIRING
24 - 28 AWG
20 - 22 AWG
16 - 18 AWG

POSITIVE
NEGATIVE
SIGNAL / DATA

WIRING DIAGRAM

Please Note:

Fans sizes and designs vary by manufacturer.



WIRING

24 - 28 AWG

20 - 22 AWG

16 - 18 AWG

POSITIVE

NEGATIVE

SIGNAL / DATA

PRINTER CONFIGURATION

Skr Mini E3 V3 / Fabreeko Kit

Klipper Config | Kanrog

Skr Mini E3 V1 and V2

Klipper Config | Rolohhaun

VIDEO REFERENCE

Rook Mk1 Build Series.

Rook 3D Printer Build Series Part 1 | Rolohaun 3D

Fabreeko Kit Build Series.

Rook Build Part 1 | Kanrog Creations

Rookery Guides.

Rookery Tool Head Playlist | Gulsifer

Rook Mk1 Build Stream.

Mostly 3D Printed CoreXY Printer | Hedgehog Makes

Klipper Installation.

How to install Klipper!

Other Informative Videos Available.

Rolohaun | YouTube

Please Note:

More videos and resources coming in the future.

Please share what you would like to see in the discord.

CAD REFERENCE

Links to any reference CAD files used in this manual.

BTT E3 mini V3 | 3D CAD Model Library | GrabCAD

CHC & CHC PRO Trianglelab | 3D CAD Model Library | GrabCAD

Ender 3 Hot End | 3D CAD Model Library | GrabCAD

E3D Volcano (with sensor cartridge) | 3D CAD Model Library | GrabCAD

M3 Heat Set Screw Inserts for 3D Printing | 3D CAD Model Library | GrabCAD

Timing Pulley GT2 | 3D CAD Model Library | GrabCAD

Cable Tie | 3D CAD Model Library | GrabCAD

LRS-150 MEAN WELL | 3D CAD Model Library | GrabCAD

Nema 17 | 3D CAD Model Library | GrabCAD

Omron D2F Series Switch | 3D CAD Model Library | GrabCAD

Creality Limit Switch (Z stop) | 3D CAD Model Library | GrabCAD

40mm DC Fan | 3D CAD Model Library | GrabCAD

30mm Blower Fan Mockup | 3D CAD Model Library | GrabCAD

LM8UU Linear bearing | 3D CAD Model Library | GrabCAD

MGN9C Linear Rail and Carriage | 3D CAD Model Library | GrabCAD

2.54mm Pitch Jumper | 3D CAD Model Library | GrabCAD

ATTRIBUTIONS

We would like to express our **appreciation** and **gratitude,**

to the following individuals for their contributions to the development of the **Rook**:

DEVELOPMENT:

@Rolohaun

@Kanrog87

@Gulsifer

@Zombiehedgehog

@Joejoe317

MANUAL:

@Lolthekidison

@Mitsubishi

SUPPORT US:

Rolohaun | Patreon

Kanrog | Ko-fi

Gulsifer | Patreon

Rolohaun 3D

Thanks for following along.