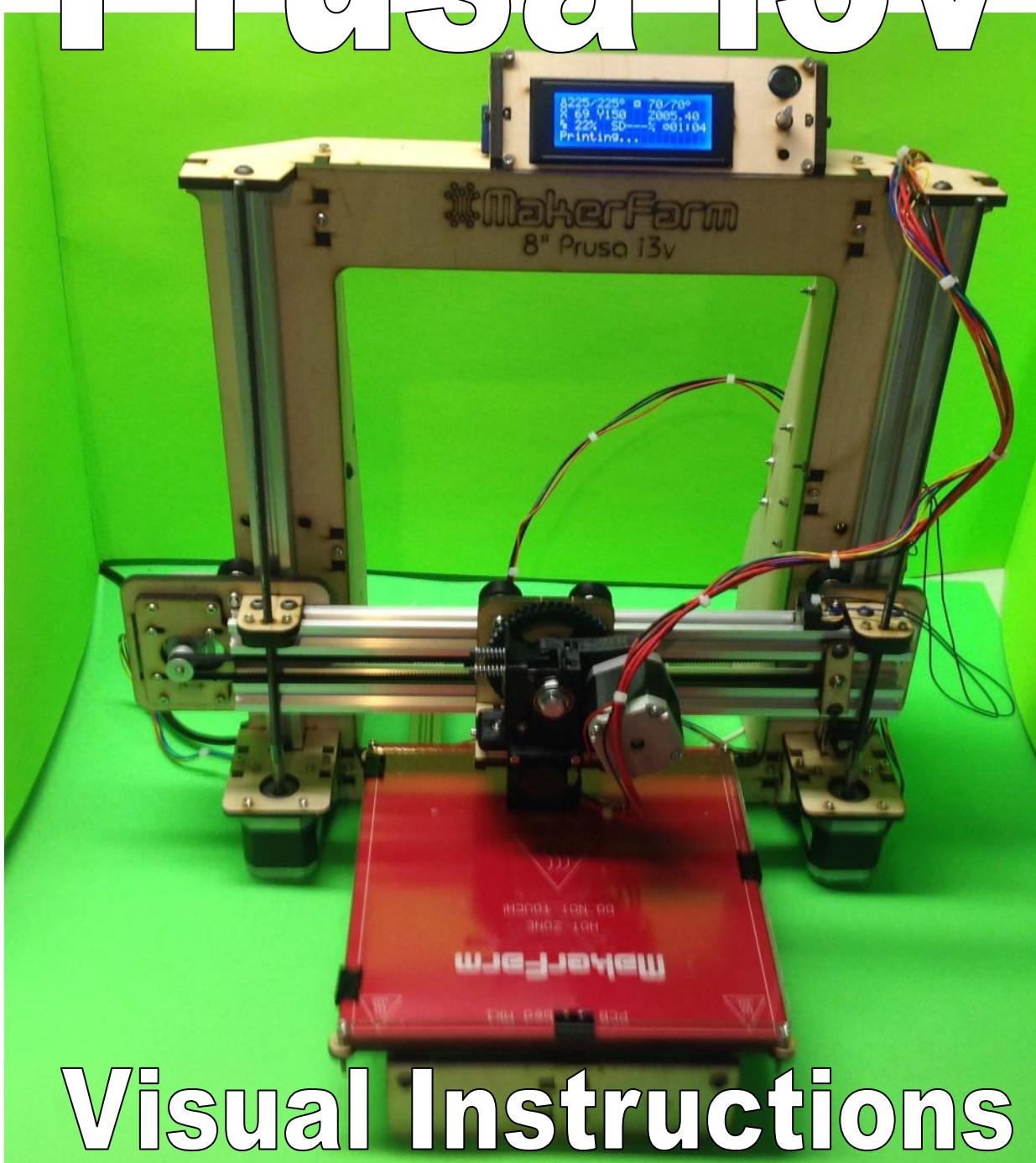


Laser Cut 8" Prusa i3v



Visual Instructions
MAKERFARM



Read before your build

Maker Farm Inc. Limited Warranty

1. Limited Warranty. Maker Farm Inc. (“MFI”) warrants to the original purchaser (the “Customer”) that the products purchased by Customer from MFI (the “Products”) are free from defects in material and workmanship for a period of thirty (30) days from the date of shipment to Customer for Products, unless otherwise specified by MFI. MFI will accept returns of any non-clearance, unopened, unused and unassembled item ordered directly from www.Makerfarm.com, after the warranty your purchase is final and no returns will be accepted. MFI charges a restocking fee of 20% of the purchase price (price of product, excluding tax and shipping), and in addition the buyer must pay all shipping charges (shipping charges on the initial purchase is not refundable). Once a kit has left our shop there is no way for us to know how it was handled. Therefore, only unopened, unbuilt, kits that have no evidence of an attempted build or use will be refunded less the 20% restock fee. Things like opened/unsealed plastic bags, any marks on the components, etc. Will result in no refund given on the kit. Should you purchase a kit and begin to assemble it, you will not be able to return that kit for a refund.

2. MFI’s Obligation. The sole obligation of MFI, at its option and without charge, is to repair, replace, or refund the original purchase price paid by Customer for, any Product or part, which MFI manufactures and which MFI agrees is defective. Repair parts or replacement Products may be new, remanufactured, or refurbished, at the sole discretion of MFI. All returned parts or Products that are replaced become the property of MFI.

3. Transfer of Other Warranties. In the case of equipment and accessories not manufactured by MFI, if a warranty is extended by the manufacturers thereof and transferable to Customer, MFI shall transfer such warranty to Customer.

4. Exclusions. MFI’s limited warranty provided herein does not cover: (i) normal wear and tear; (ii) transport damage; (iii) failure to follow operation or maintenance instructions; (iv) Customer’s negligent modification (including painting or staining wood pieces), disassembly or attempted repairs of the Product; (v) abuse, misuse or negligent acts; (vi) accidental or intentional damage; or (vii) cosmetic shortcomings which do not influence Product function.

5. Disclaimers. unless expressly set forth in this limited warranty, MFI makes no warranty of any kind whatsoever, express or implied, with respect to any products furnished hereunder. MFI expressly disclaims, where legally permitted to make such disclaimer, any warranties implied by law, including but not limited to any warranty of merchantability or fitness for a particular purpose.

6. Limitation of Damages. IN NO EVENT SHALL MFI BE LIABLE TO CUSTOMER FOR ANY INDIRECT, CONSEQUENTIAL, PUNITIVE, EXEMPLARY, INCIDENTAL OR SPECIAL DAMAGES, OR ANY DAMAGES WHATSOEVER RESULTING FROM LOSS OF USE, PROFITS, OR DOWN-TIME (HOWEVER CAUSED AND UNDER ANY THEORY OF LIABILITY, WHETHER THE BASIS OF LIABILITY IS BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE AND STRICT LIABILITY), STATUTE OR ANY OTHER LEGAL THEORY), EVEN IF MFI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. MFI’S TOTAL LIABILITY TO CUSTOMER, FROM ALL CAUSES OF ACTION AND UNDER ALL THEORIES OF LIABILITY, WILL BE LIMITED TO THE AMOUNTS PAID TO MFI BY CUSTOMER. THESE LIMITATIONS SHALL APPLY NOTWITHSTANDING ANY FAILURE OF ESSENTIAL PURPOSE OF ANY LIMITED REMEDY. THE REMEDIES UNDER THIS LIMITED WARRANTY ARE CUSTOMER’S SOLE AND EXCLUSIVE REMEDIES.

7. Return Merchandise Authorization (RMA) Process for Defective Products.

7.1 A Return Merchandise Authorization (“RMA”) number must be obtained from MFI before Customer can return any Product to MFI for warranty service. An MFI representative will gather the appropriate account and Product information and verify warranty status. MFI must receive notification of the need for warranty service before the end of the applicable limited warranty period. The RMA number must be included on the outside packaging of the returned Product. To obtain an RMA number, please contact MFI by email as follows: elderfarrer@gmail.com

7.2 Any approved RMA should be considered provisional, based on verification of in-warranty status when the Product is received at MFI. If MFI determines that the Product is out-of-warranty, Customer will be notified. At the Customer’s discretion, MFI will either scrap the out-of-warranty Product or return it to Customer.

7.3 Customer is responsible for all shipping charges for RMAs to MFI, and MFI is responsible for all shipping charges to return the Product or its replacement to the Customer. Standard Shipping is used to return products to Customers.

7.4 MFI will typically not decide whether to repair, replace, or refund the purchase price for, any returned Product until the returned Product is received at MFI and the warranty status is confirmed.

7.5 Under special circumstances, if the Customer would like to expedite the RMA process, MFI may agree from time to time to cross-ship a replacement Product after the issuance of an RMA number but before receipt of the returned Product, but MFI shall not be obligated to do so. Cross-ship orders require a valid credit card number or credit account to secure the MFI Product. The Customer’s credit card or credit account will be credited if MFI receives the returned Product within fifteen (15) days of the date on which MFI ships the replacement Product, and provided further that the returned Product was in-warranty.

8. Discontinuance of Products. Notwithstanding any language in this limited warranty to the contrary, MFI shall have the right to discontinue the availability of any Product or components or replacement parts therefor, or to make design changes or improvements in the Products at any time and such discontinuance or change shall not constitute a breach of warranty, or result in liability for MFI under any legal theory whatsoever. MFI shall have no obligation to retrofit, change or improve Products purchased by Customer prior to the discontinuance or change.

9. Other Rights. This limited warranty gives you specific legal rights, and you may also have other rights which vary from State to State, and from Country to Country.

9.1 EXCEPT TO THE EXTENT LAWFULLY PERMITTED, THIS LIMITED WARRANTY DOES NOT EXCLUDE, RESTRICT OR MODIFY STATUTORY RIGHTS APPLICABLE TO WHERE THE PRODUCT IS SOLD, BUT RATHER IS IN ADDITION TO THESE RIGHTS.

Table of Contents

Pg 2: Warranty information
Pg 4: Information on Power Supply, Glass and Filament
Pgs 5-6: Identification
Pgs 7-11: X Motor Assembly
Pgs 12-15: X Idler Assembly
Pgs 16-18: Z Nut Traps
Pgs 19-20: Y Idler Assembly
Pgs 21-26: Y Bed Assembly
Pgs 27-31: X Carriage Assembly
Pgs 32-34: Y Motor Assembly
Pgs 35-36: Z Motor Brackets
Pgs 37-42: Frame Assembly
Pgs 43-48: Y Axis Assembly
Pgs 49-58: X Axis Assembly
Pgs 59-63: LCD Installation
Pgs 64-65: Z Motors
Pgs 66-68: Heat Bed Installation
Pg 69: Extruder Assembly
Pgs 70-75: Endstop Installation
Pgs 76-77: Spool Holder Assembly
Pgs 78-83: RAMPS Install / Wiring Diagram
Pg 84: 12v Power Supply Wiring
Pg 85: Magma Assembly
Pg 86: J-Head Assembly
Pg 87 E3d-v6 Assembly
Pgs 88-92: Hexagon Assembly
Pgs 93-94 : Extruder and Hot End Install
Pgs 95-99: Software

Troubleshooting Section

Pgs 100-102: Adjusting Stepper Driver Current
Pg 103: LCD Menu
Pg 104: Shifting Prints
Pgs 105-106: Hot End Jamming/ Hobbed Bolt Chewing up filament
Pg 107: Warping Prints
Pgs 108-110: Driver Installation
Pg 111:

1. Slow Heating Magma Hot End
2. MaxTemp Error
3. Slow Heating Heat Bed
4. Hot Motors
5. Extruder Motor isn't turning

Pg 112:

1. X, Y or Z moving the wrong direction when I press home
2. D9 not functioning
3. Extruder motor not turning

Pg 113: Endstops not working / One axis only moves 10mm when I press home

Parts List

Laser Cut 8" i3v Prusa

This Guide has Hyper links, to use them please click File then Download and open the PDF in your PDF Viewer, if you view the Guide online the Hyper links will not function

Thank you for purchasing the Laser Cut i3v Kit. To complete your build you will need a couple other items.

Piece of Glass: 215mm X 215mm then break the corners off to avoid hitting the bolt heads (2.5mm to 3.5mm Thick, most hardware stores will cut it to the size you need, Inside the USA Lowes or Home Depot)

Power Supply: <http://openbuildspartstore.com/12v-30a-power-supply/>

(Get the wire kit also), if the power supply is out of stock you can get any good quality 12v 30amp power supply and 15 feet of 16awg speaker wire.

Insulation: Any insulation that can withstand temps of 120c will work, many people use a Fire Blanket

Hairspray: This will be used as a print surface on top of the glass, Garnier Fructis Extreme #5 is the best print surface, but others have used Blue Painters tape for PLA, Glue Stick or an ABS Slurry.

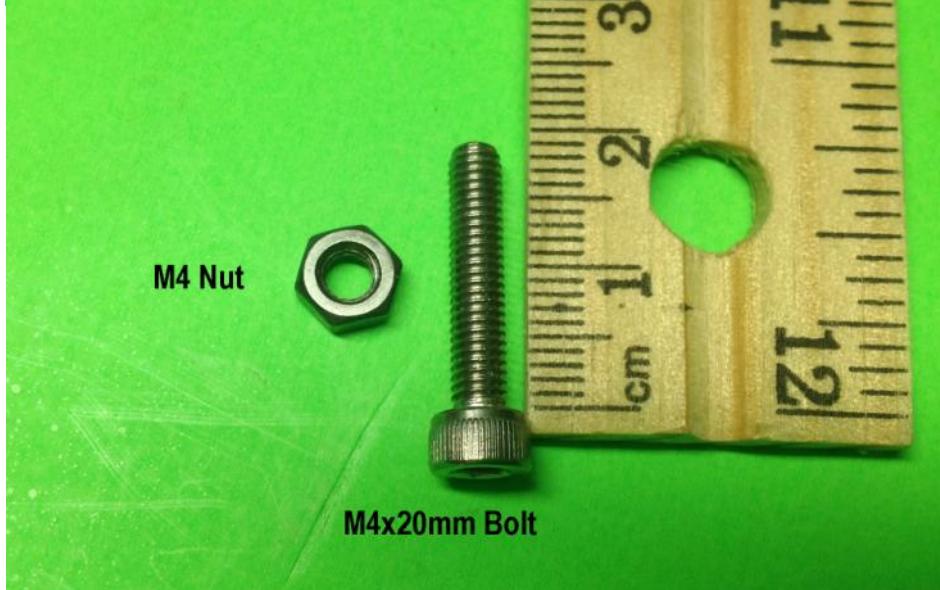
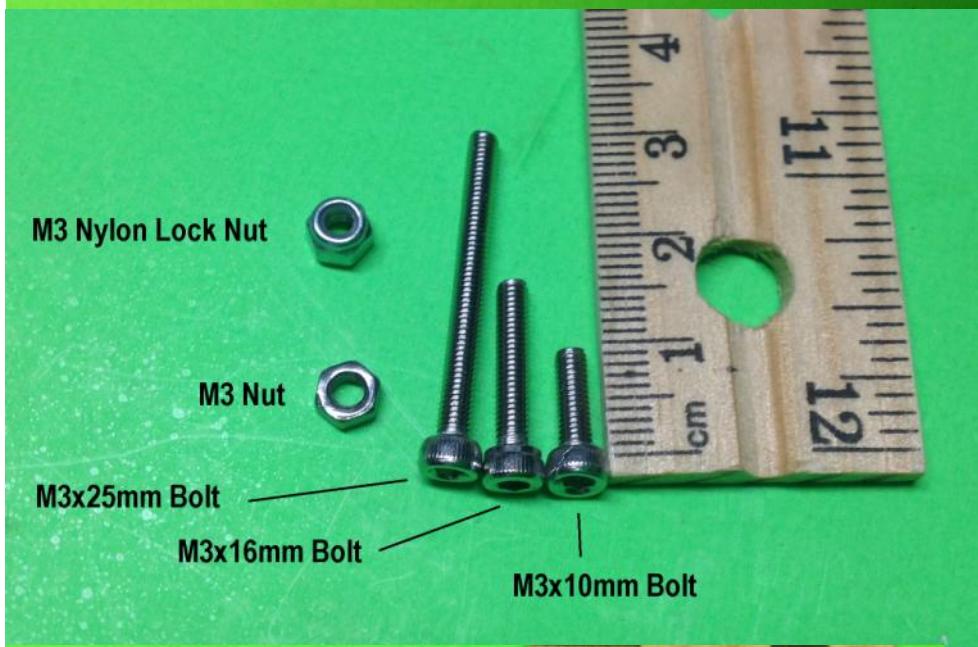
You may also want some filament to print with after you have built your printer. Makerfarm.com does sell filament and if you purchase it with your kit you will receive a discount. If you want to purchase your filament somewhere else make sure you get high quality filament, poor quality filament (Amazon and eBay) will jam and cause problems.

At any time if you have any questions feel free to e-mail or chat via google chat:
elderfarrer@gmail.com

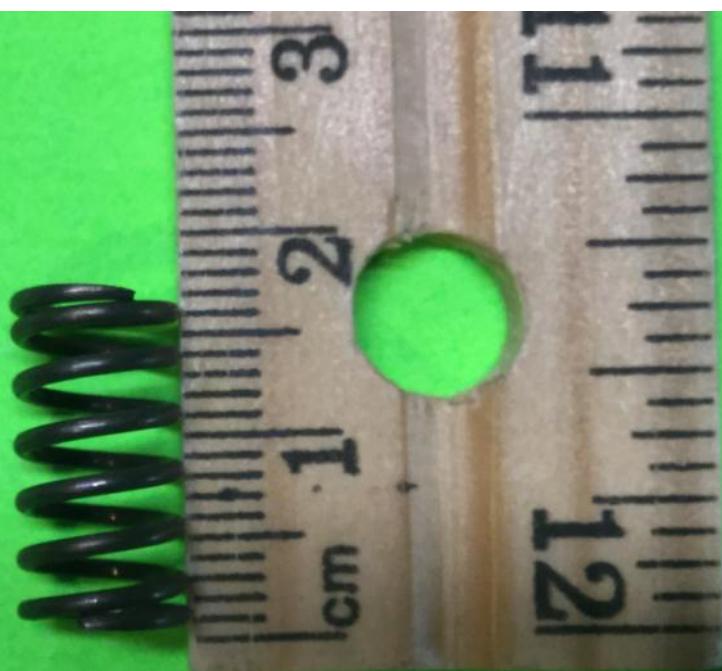
Thanks,
Colin Farrer



Hardware



Hardware



Bed Spring

Eccentric Spacer MR125 Bearing



PreBuilt Derlin Idler

Aluminum
Standoff



X Motor Assembly

X Motor

Gather the following parts

1 Set of X Motor Wood parts (Pictured Below)

4 x M3x16mm M3 Bolts

4 x M3 Nylon Lock Nuts

3 x Pre Assembled Delrin Idler's (Black Wheel)

1 x M5 Washers

3 x M5x30mm Bolts

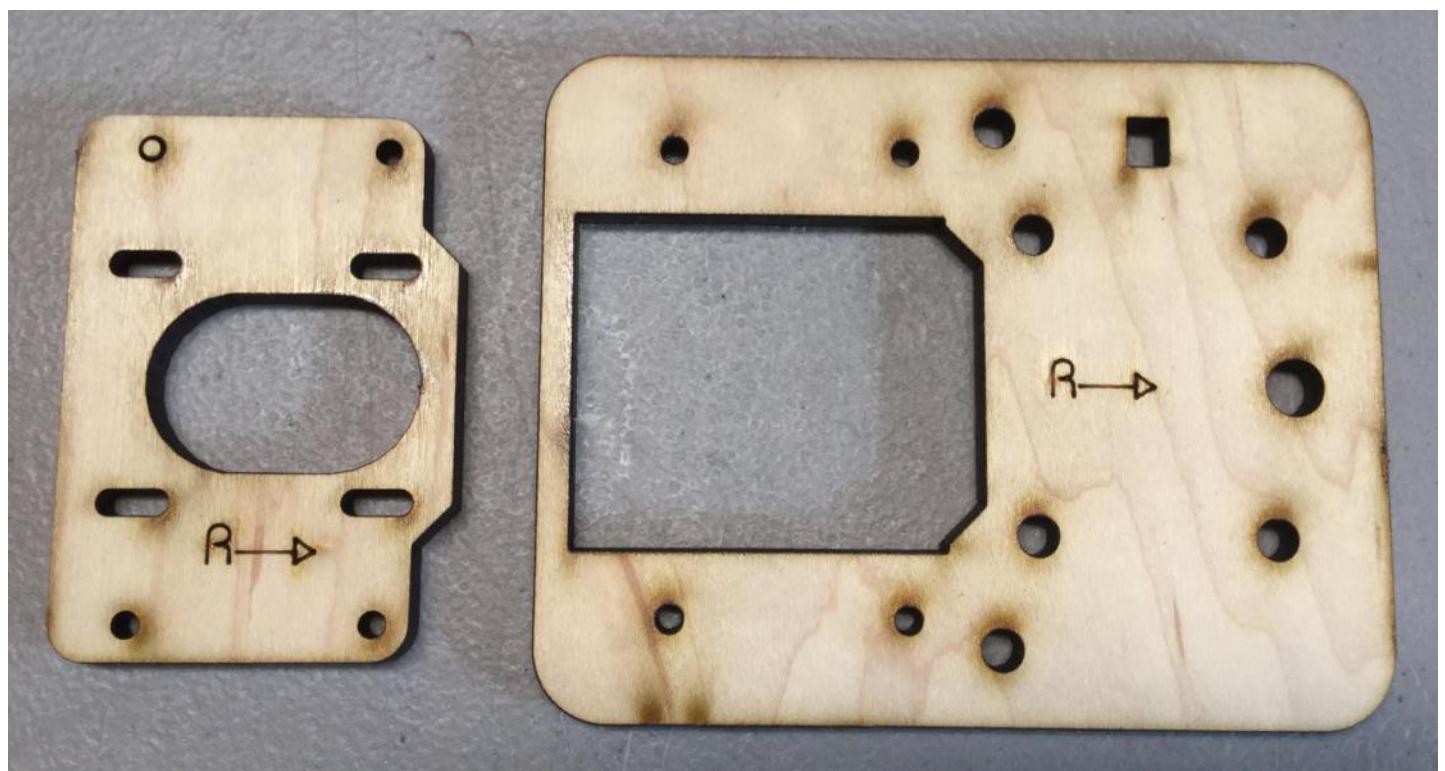
3 x M5 Nylon Locknuts

4 x M5x12mm Bolts

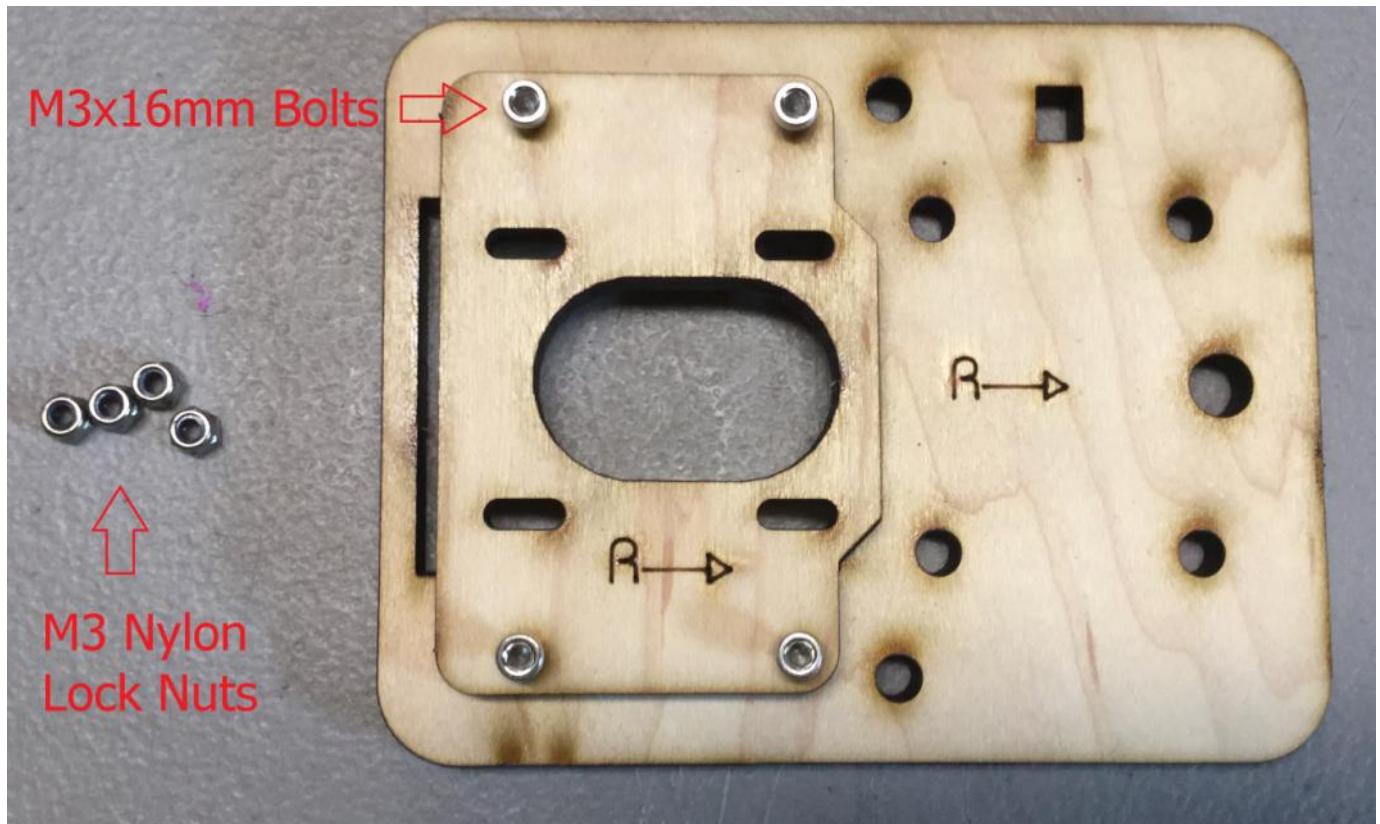
2 x Aluminum Standoff

1 x Eccentric Spacer

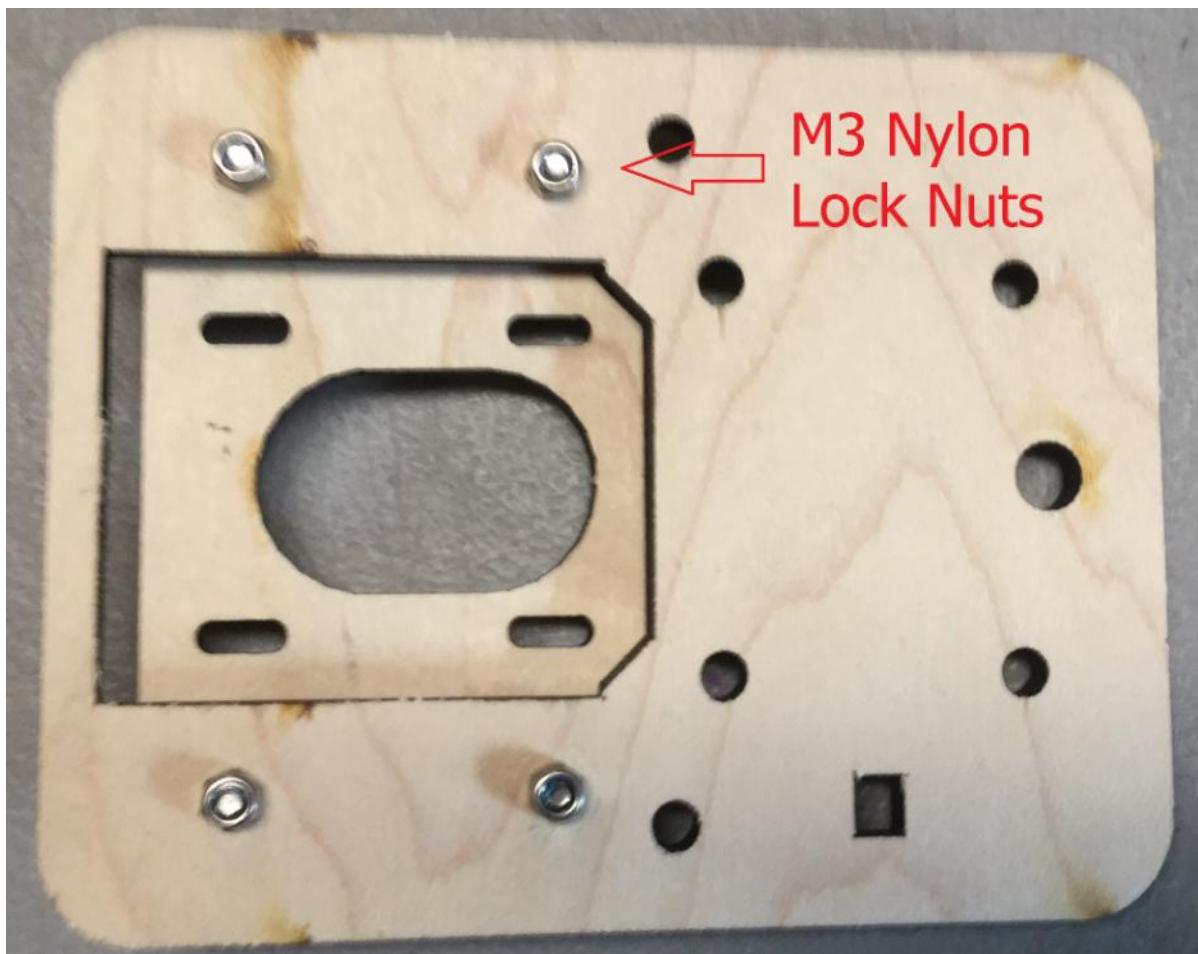
4 x T-Slot Nuts



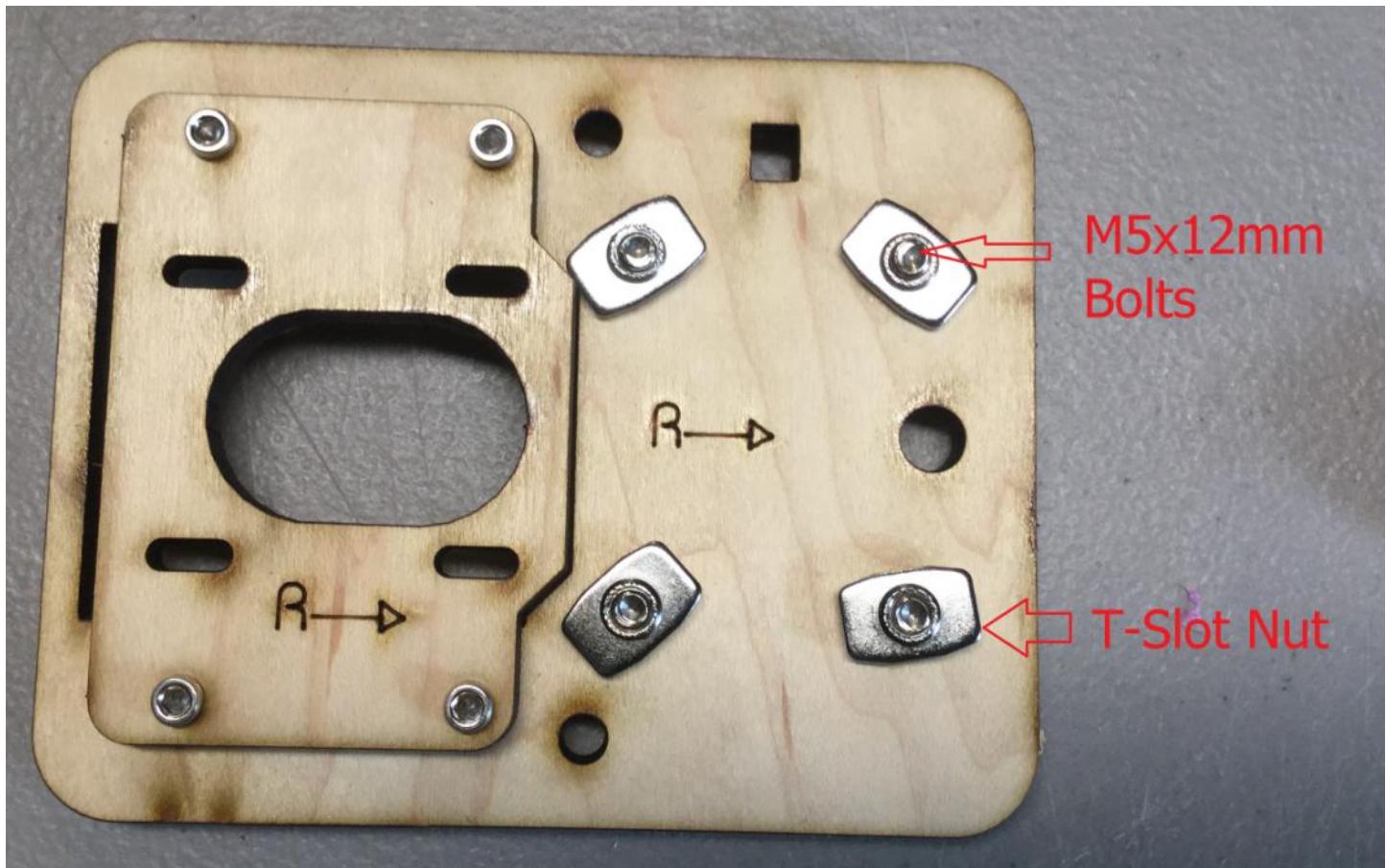
Align the two wood pieces so the R-> both point to the right and install the 4 M3x16mm Bolts as shown in the picture



Flip the wood pieces over and install the 4 M3 Nylon Lock Nuts on the bolts and tighten them down.



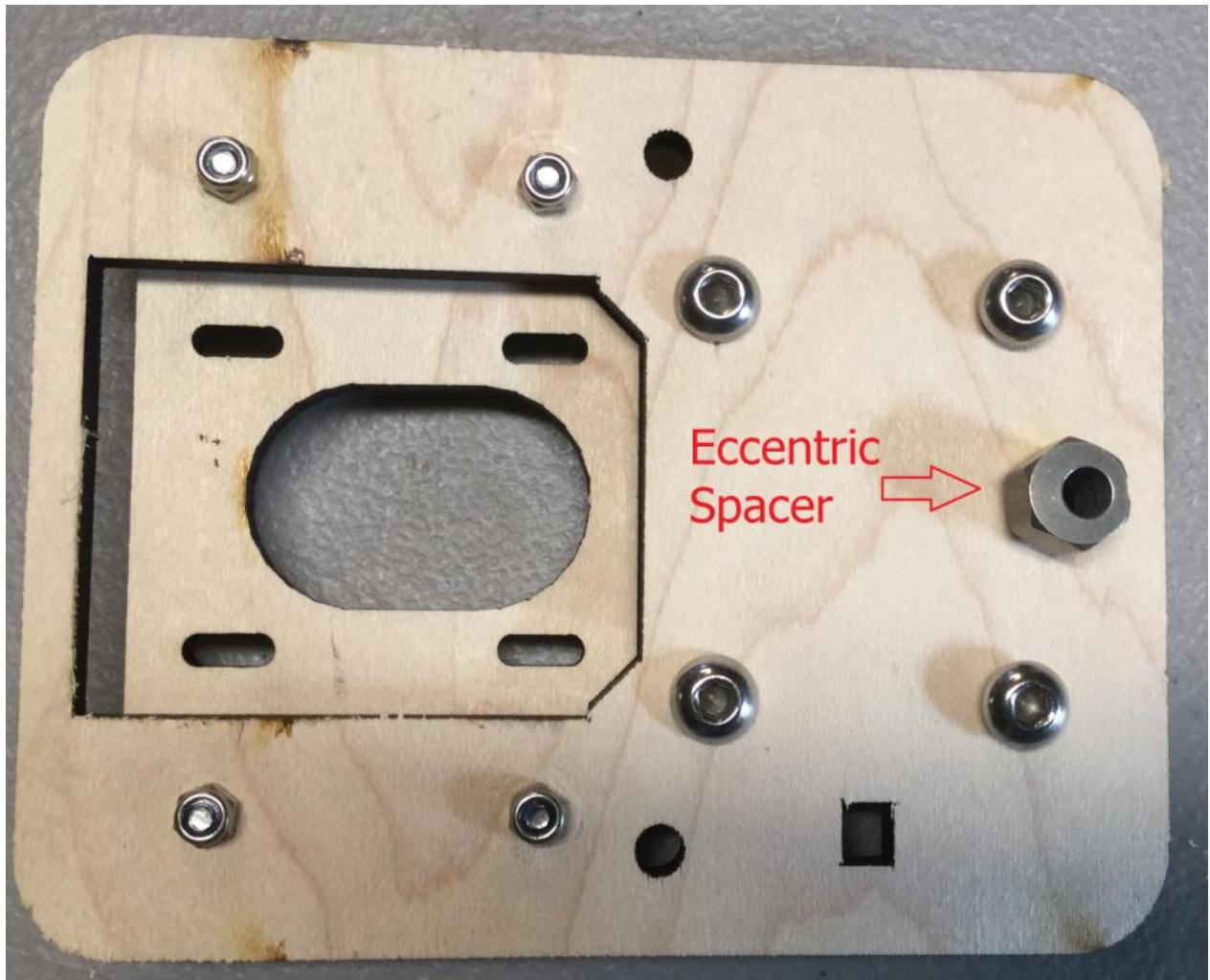
Next Install 4 of the M5x12mm bolts from the back side then flip the wood pieces over and install the 4 T-Slot nuts leaving them loose.



Get the remaining hardware ready for the next steps



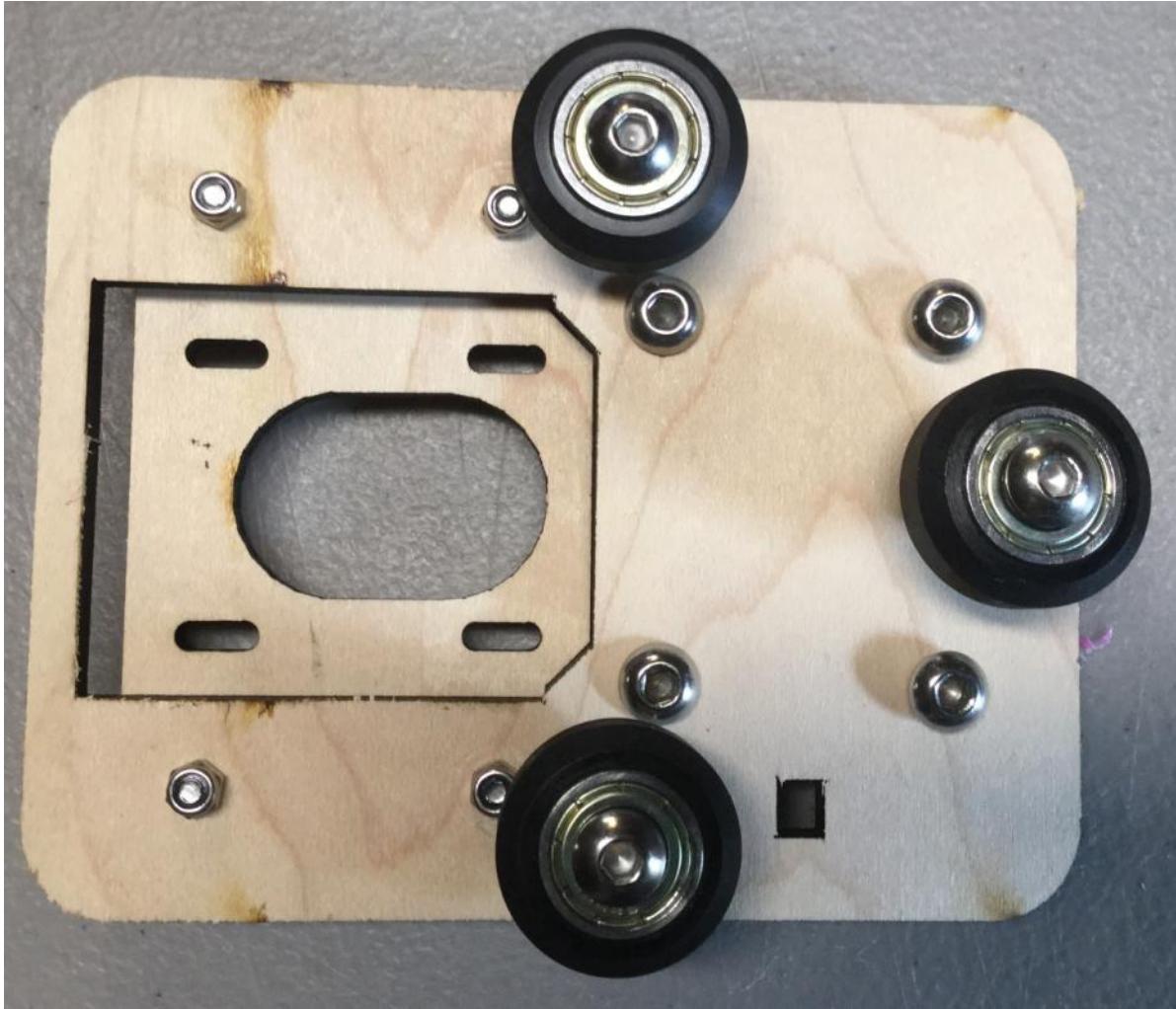
Flip the wood parts back over and install the eccentric spacer pushing it into the wood, make sure to align the eccentric spacer for the hole is as close to the edge of the wood piece as possible.



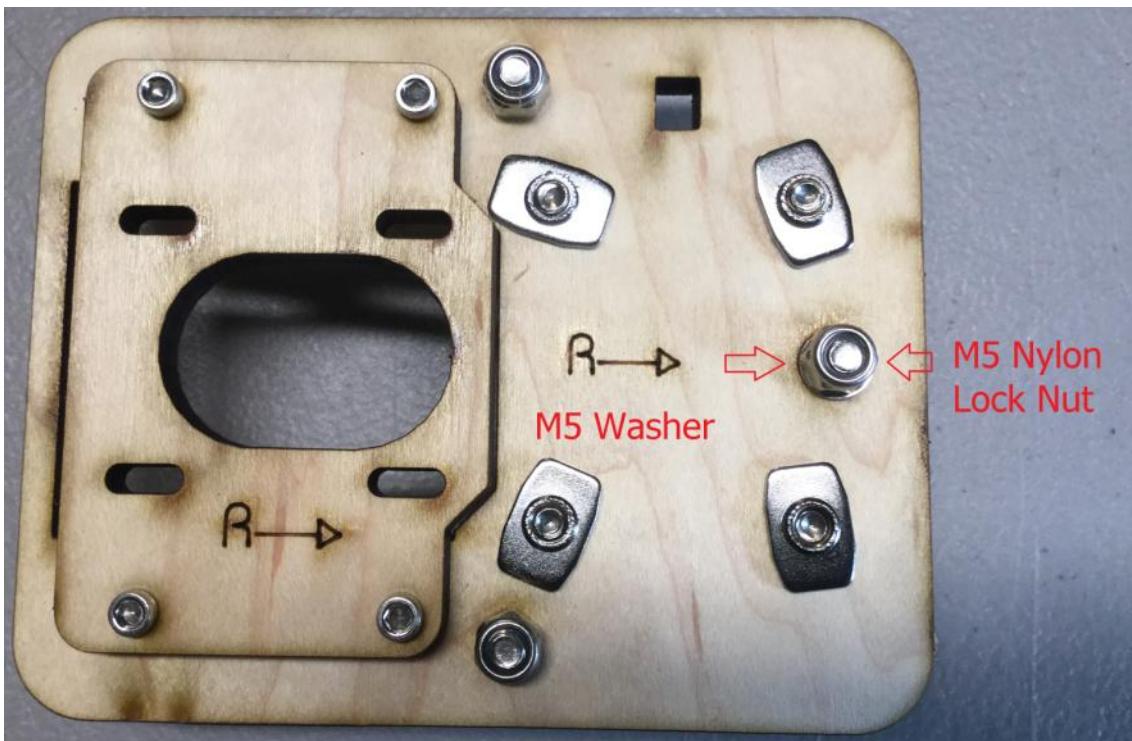
Get 3 Pre Assembled Delrin Idlers, 3 M5x30mm Bolts and two Aluminum Standoffs, install the bolts and aluminum standoffs as shown below



Install the Delrin assembly that does not have the Aluminum spacer in the eccentric spacer and the other two Delrin assemblies as shown below



Flip the Wood parts over and install a M5 Washer on the bolt with the Eccentric Spacer, then install M5 Nylon Lock Nuts on the 3 M5 bolts and tighten them down. Make sure you do not tighten the bolt with the eccentric spacer so much that the eccentric spacer gets pulled into the wood at an angle.

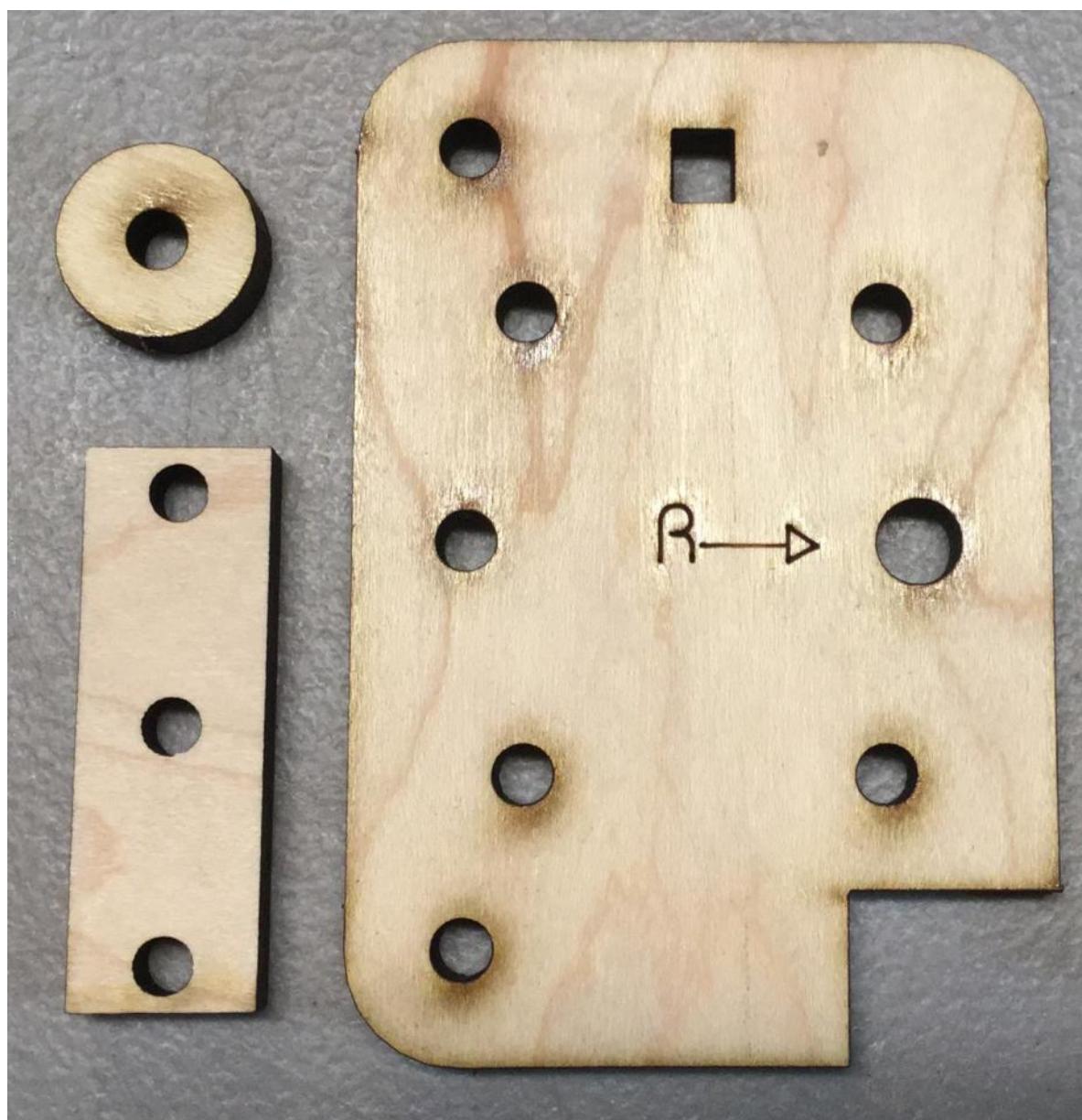


X Idler Assembly

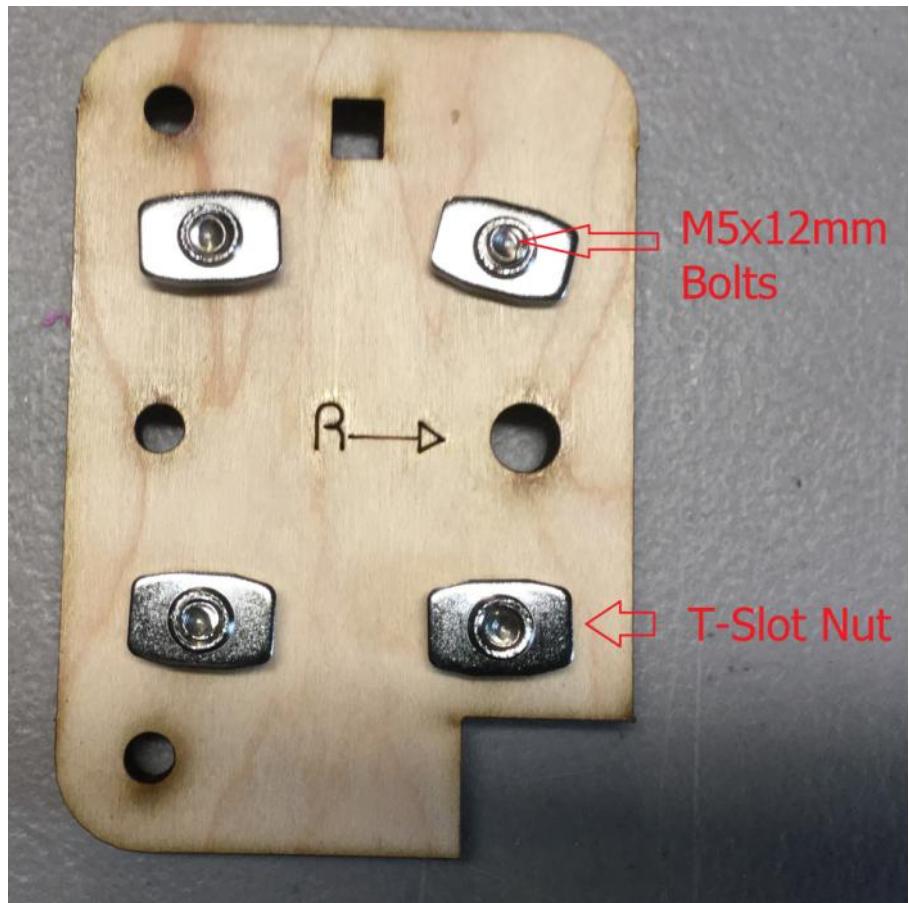
X Idler

Gather the following parts

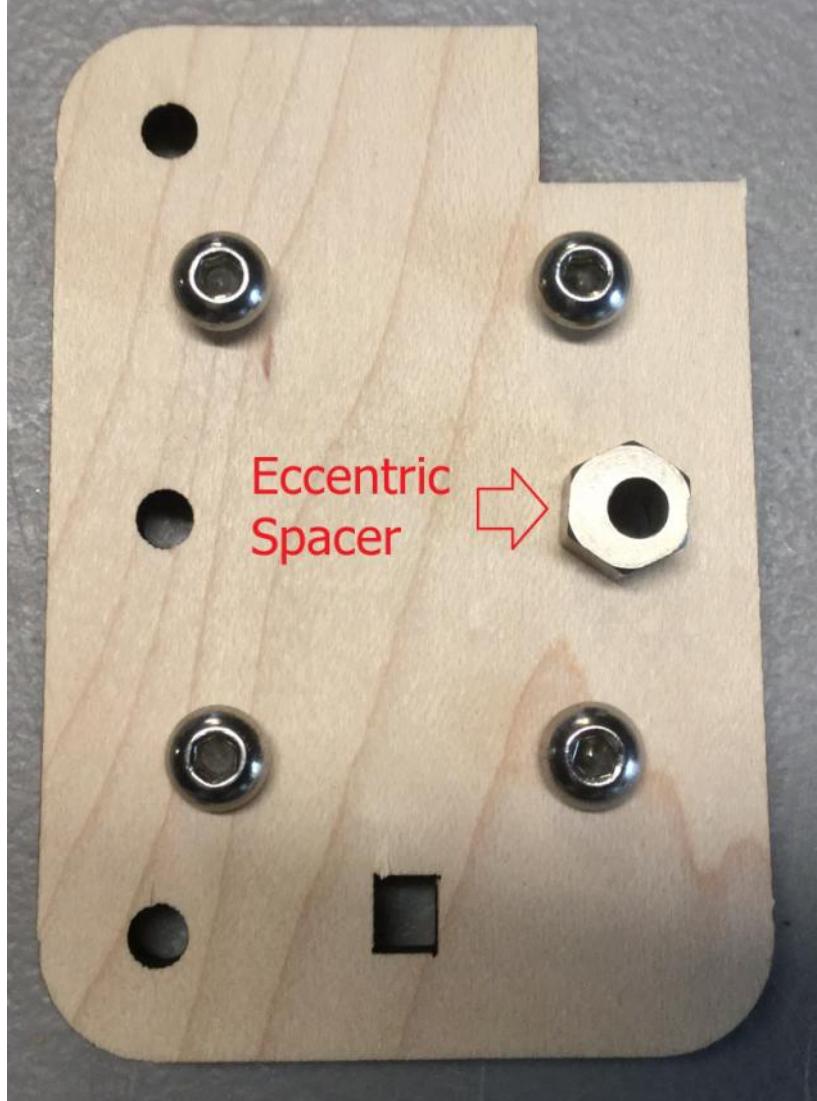
- 1 Set of X Idler Wood parts (Pictured Below)**
- 3 x Pre Assembled Delrin Idler's (Black Wheel)**
- 2 x MR125 Bearings**
- 3 x M5 Washers**
- 4 x M5x30mm Bolts**
- 3 x M5 Nylon Locknuts**
- 1 x M5 Nut (Regular)**
- 4 x M5x12mm Bolts**
- 2 x Aluminum Standoff**
- 1 x Eccentric Spacer**
- 4 x T-Slot Nuts**



Next Install 4 of the M5x12mm bolts from the back side then flip the wood pieces over and install the 4 T-Slot nuts leaving them loose.



Flip the wood parts back over and install the eccentric spacer pushing it into the wood, make sure to align the eccentric spacer so the hole is as close to the edge of the wood piece as possible.



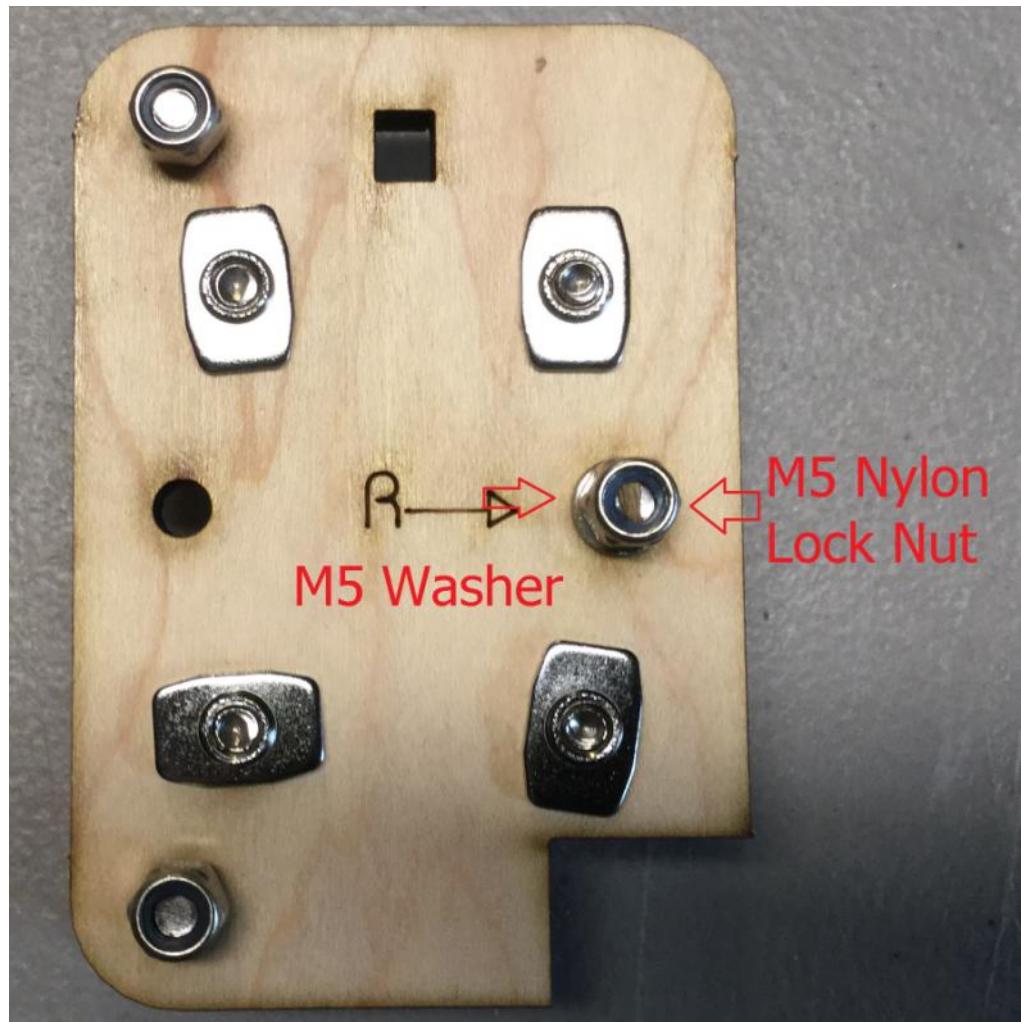
Get 3 Pre Assembled Delrin Idlers, 3 M5x30mm Bolts and two Aluminum Standoffs, install the bolts and aluminum standoffs as shown below



Install the Delrin assembly that does not have the Aluminum spacer in the eccentric spacer and the other two Delrin assemblies as shown in the picture on the right



Flip the Wood parts over and install a M5 Washer on the bolt with the Eccentric Spacer, then install M5 Nylon Lock Nuts on the 3 M5 bolts and tighten them down. Make sure you do not tighten the bolt with the eccentric spacer so much that the eccentric spacer gets pulled into the wood at an angle.



Last we will assemble the Belt idler, you will assemble it starting with an M5x30mm bolt, then the rectangular wood piece, an M5 Washer, Two MR125zz Bearings, another M5 washer, the wooden washer and last a regular M5 bolt.



Z Nut Traps

Z Nut Traps

Gather the following parts

1 Set of Wood parts (Pictured Below)

1 x Regular M5 Nut

4 x T-Slot Nuts

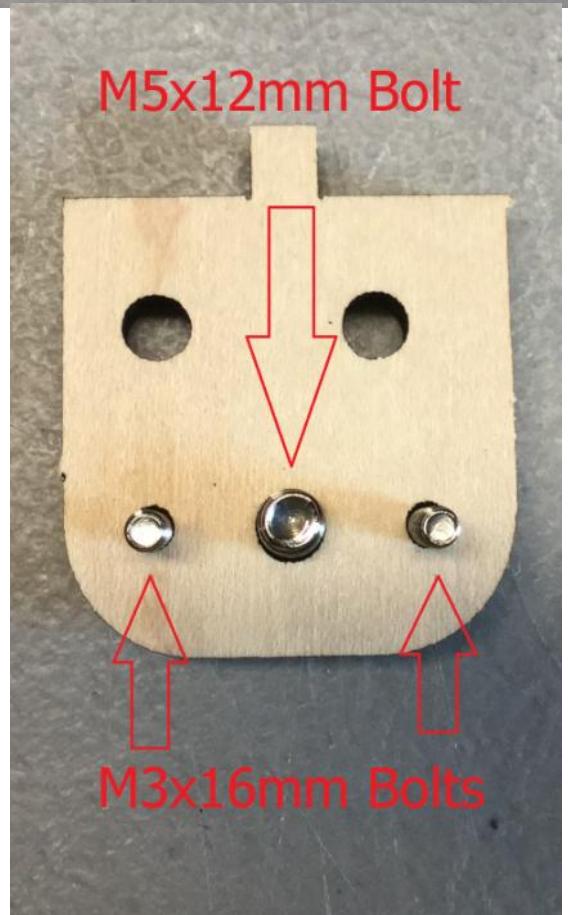
4 x M5x12mm Bolts

4 x M3 Nylon Lock Nuts

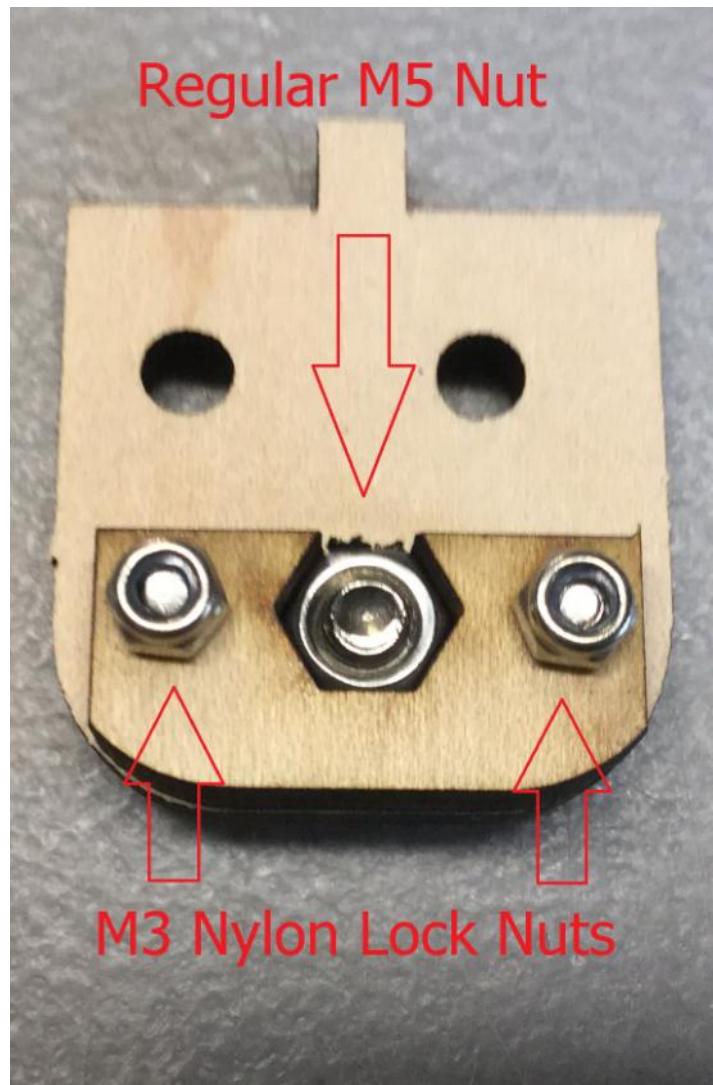
4 x M3x16mm Bolts



Install two M3x16mm Bolts and one M5x12mm Bolt into one of the large wood pieces.



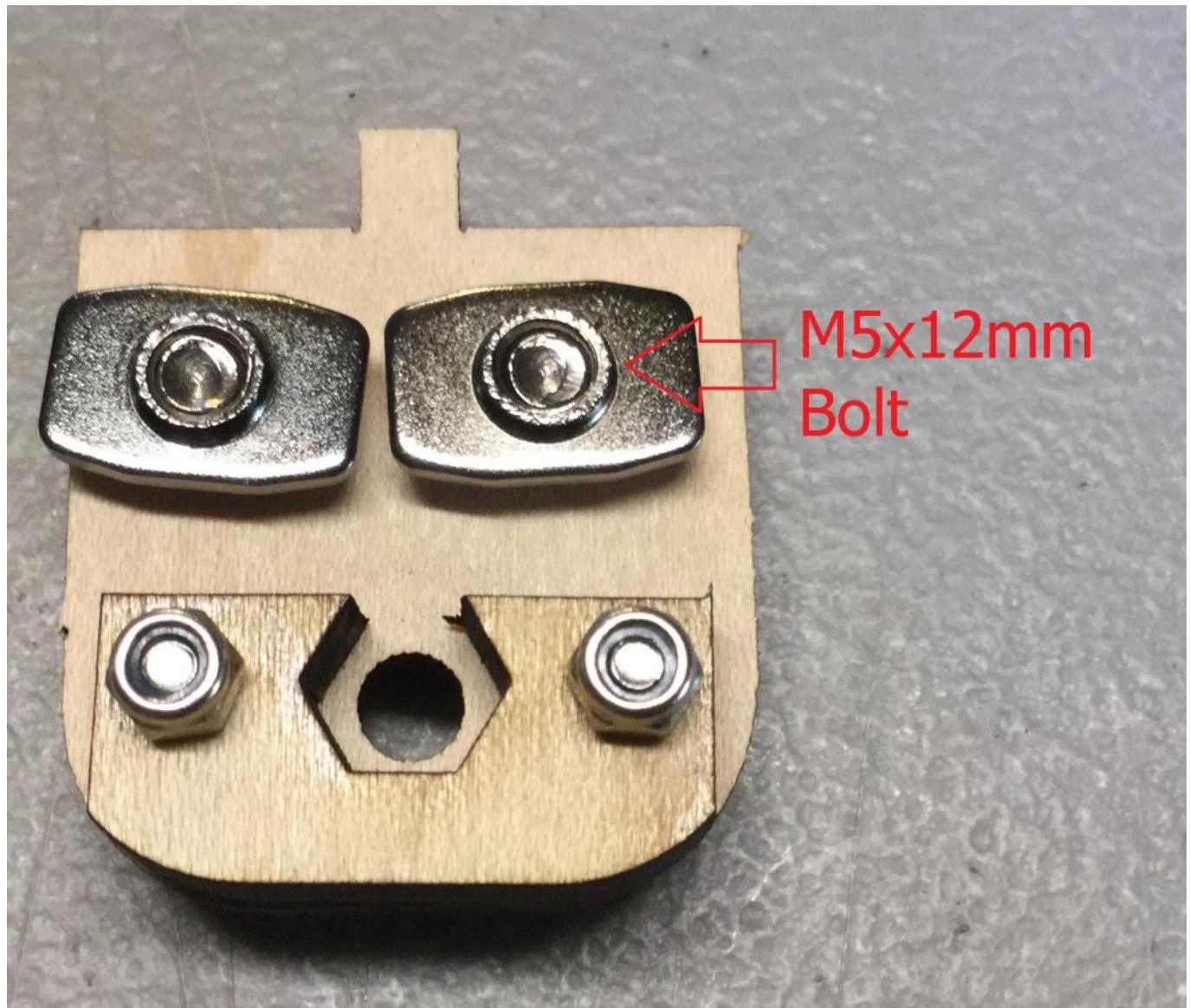
Install a regular M5 nut onto the M5x12mm Bolt, then align and install the wood piece, hand tighten the M5 bolt then install two M3 Nylon Lock nuts and tighten them with a wrench.

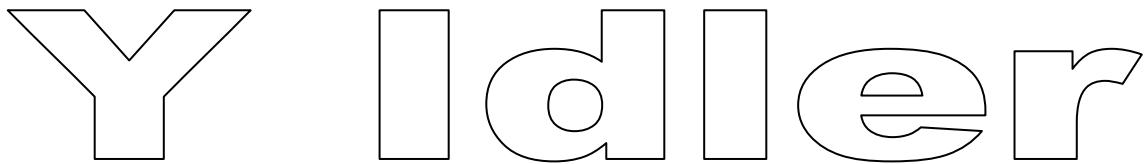


Remove the M5 Nut and bolt.

Install Two M5x12mm Bolts and Two T-Slot Nuts as shown below.

Repeat the process for the other Z Nut trap





Y Idler

Gather the following parts

1 Set of Y Idler Wood parts (Pictured Below)

2 x M3x16mm M3 Bolts

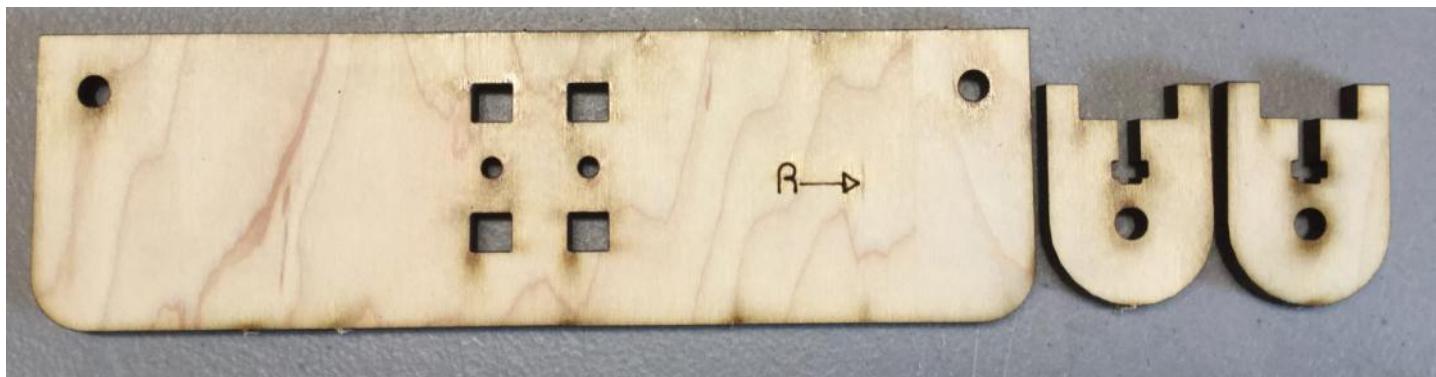
2 x M3 Nuts

2 x MR125 Bearings

2 x M5 Washers

1 x M5x30mm Bolts

1 x M5 Nylon Locknuts

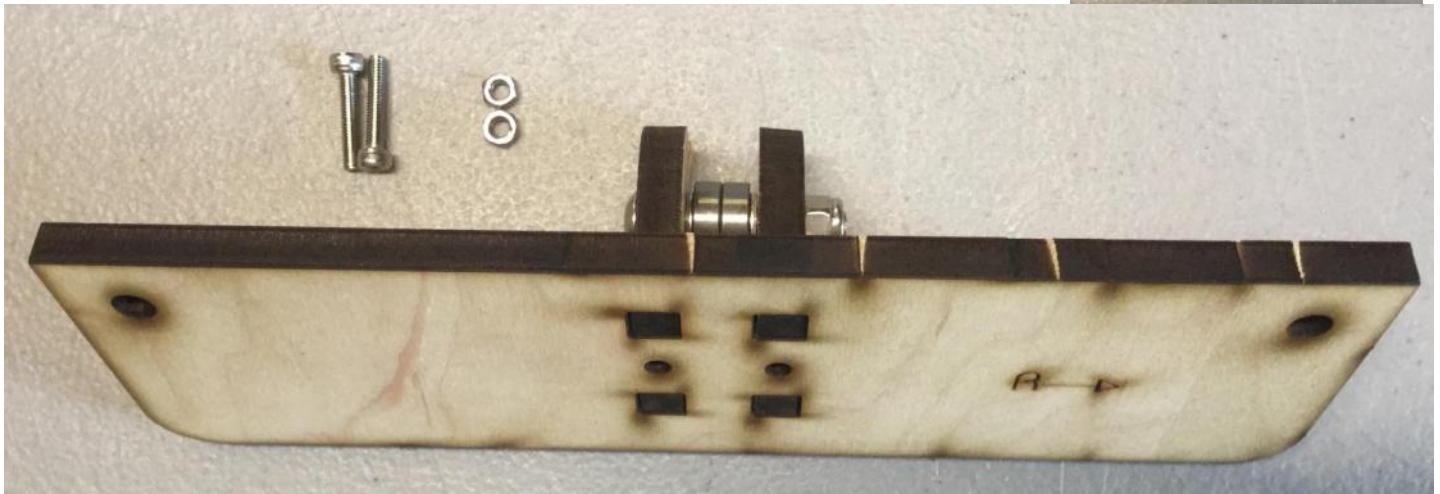


To assemble the Idler, get the M5x30mm Bolt, put the first wood piece on the bolt, then an M5 washer, two MR125 Bearings, another M5 washer, the other wood piece then an M5 Nylon Lock Nut.

Tighten the nut by hand as we still want it a little loose at this time.

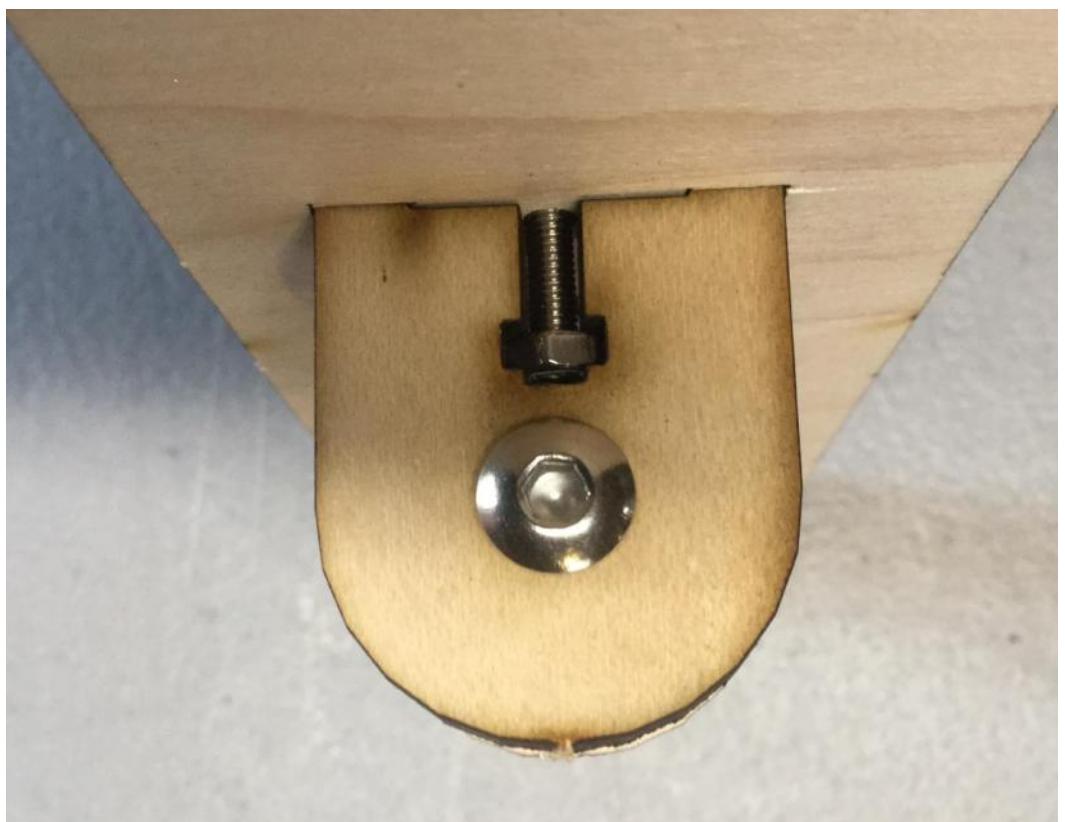


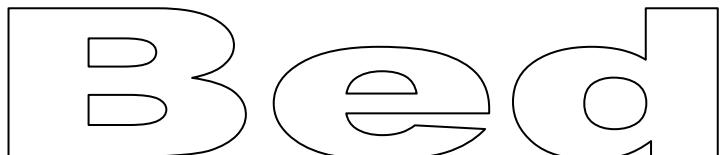
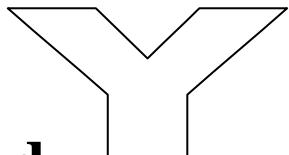
Now take the assembled Idler and install it in the large wood piece as shown below:



Then install two nuts in the Idler and screw the M3x16mm bolts to secure the Idler to the large wood piece.

Last tighten the M5 Bolt and Nylon Lock Nut

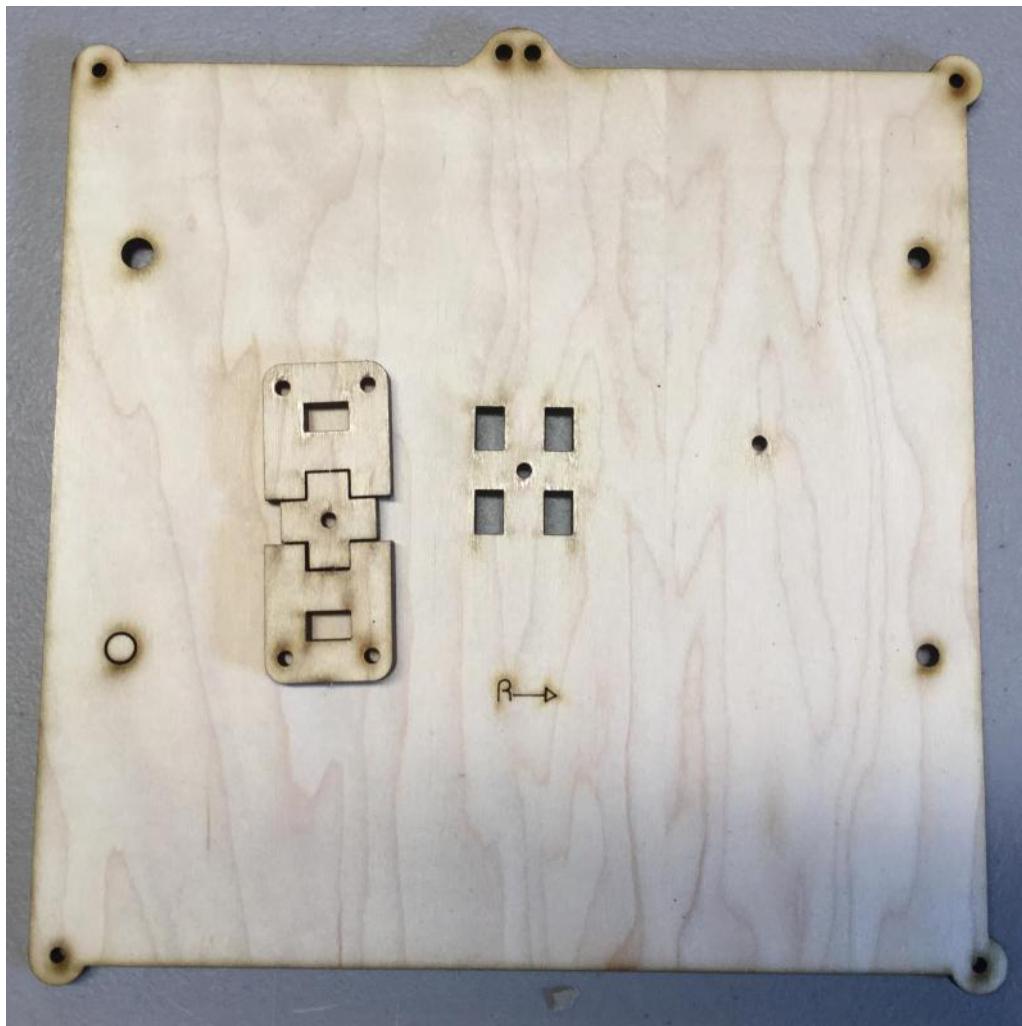




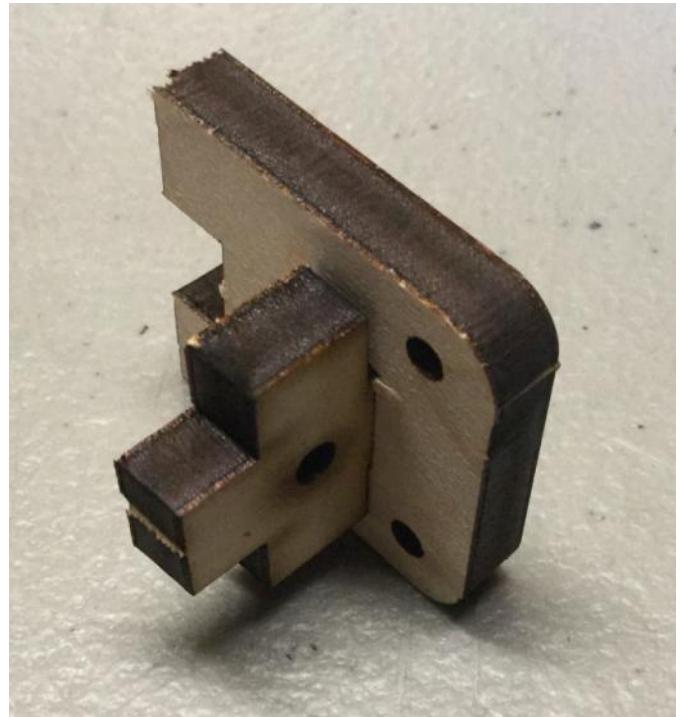
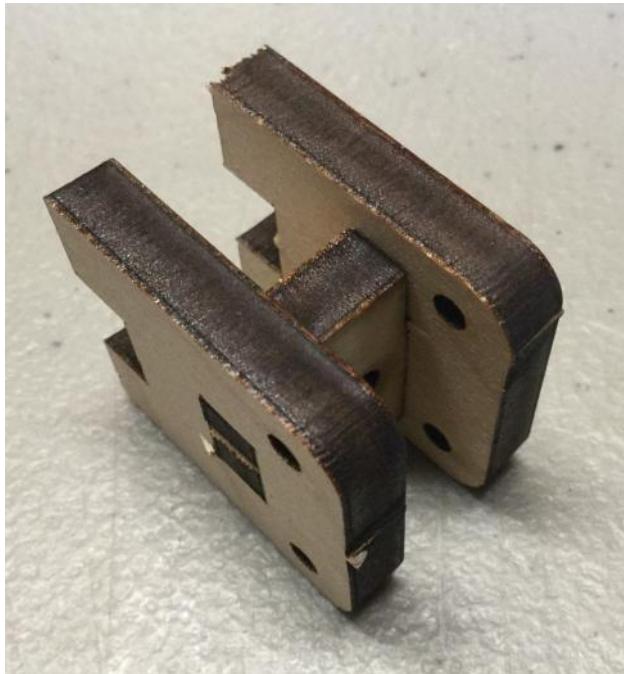
Y Bed

Gather the following parts

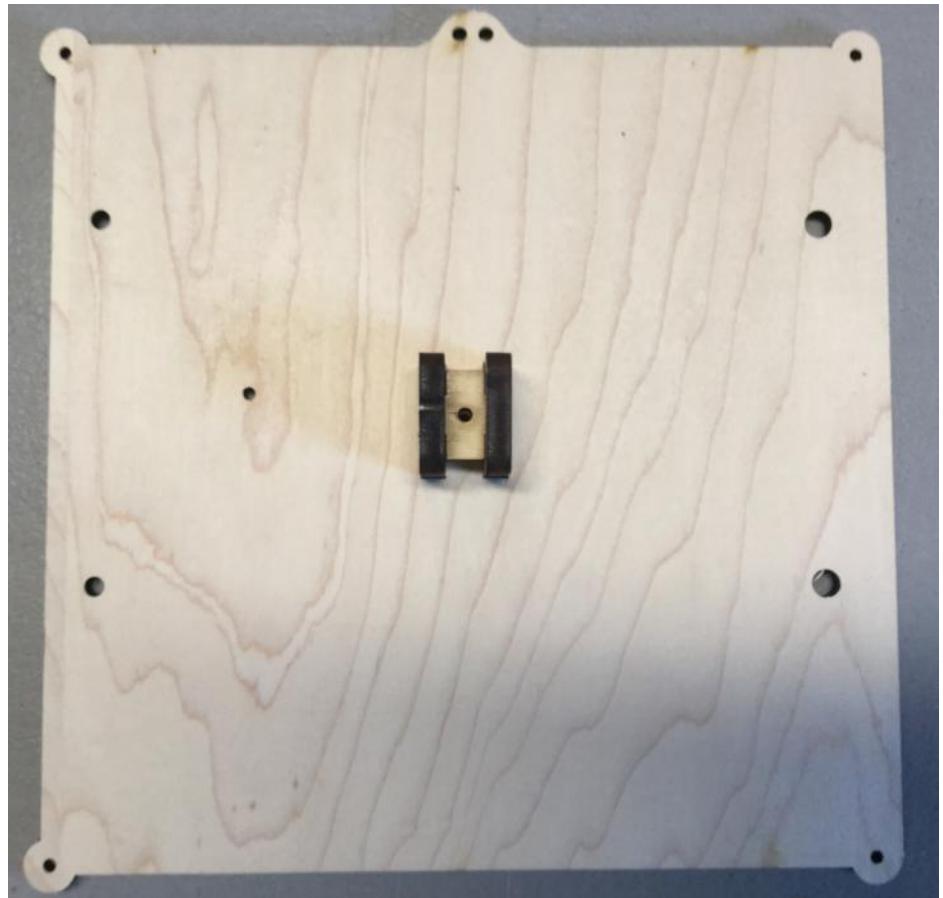
- 1 Set of Y Bed Wood parts (Pictured Below)**
- 1 x M3x25mm Bolts**
- 1 x M3x16mm Bolt**
- 2 x M3 Nylon Lock Nuts**
- 4 x Pre Assembled Delrin Idler's (Black Wheels)**
- 6 x M5 Washers**
- 4 x M5x30mm Bolts**
- 4 x M5 Nylon Locknuts**
- 2 x Aluminum Standoff**
- 2 x Eccentric Spacer**



Starting with the 3 small wooden pieces put the wooden + Piece into one of the A shaped piece as shown on the right, then install the other side as shown below.



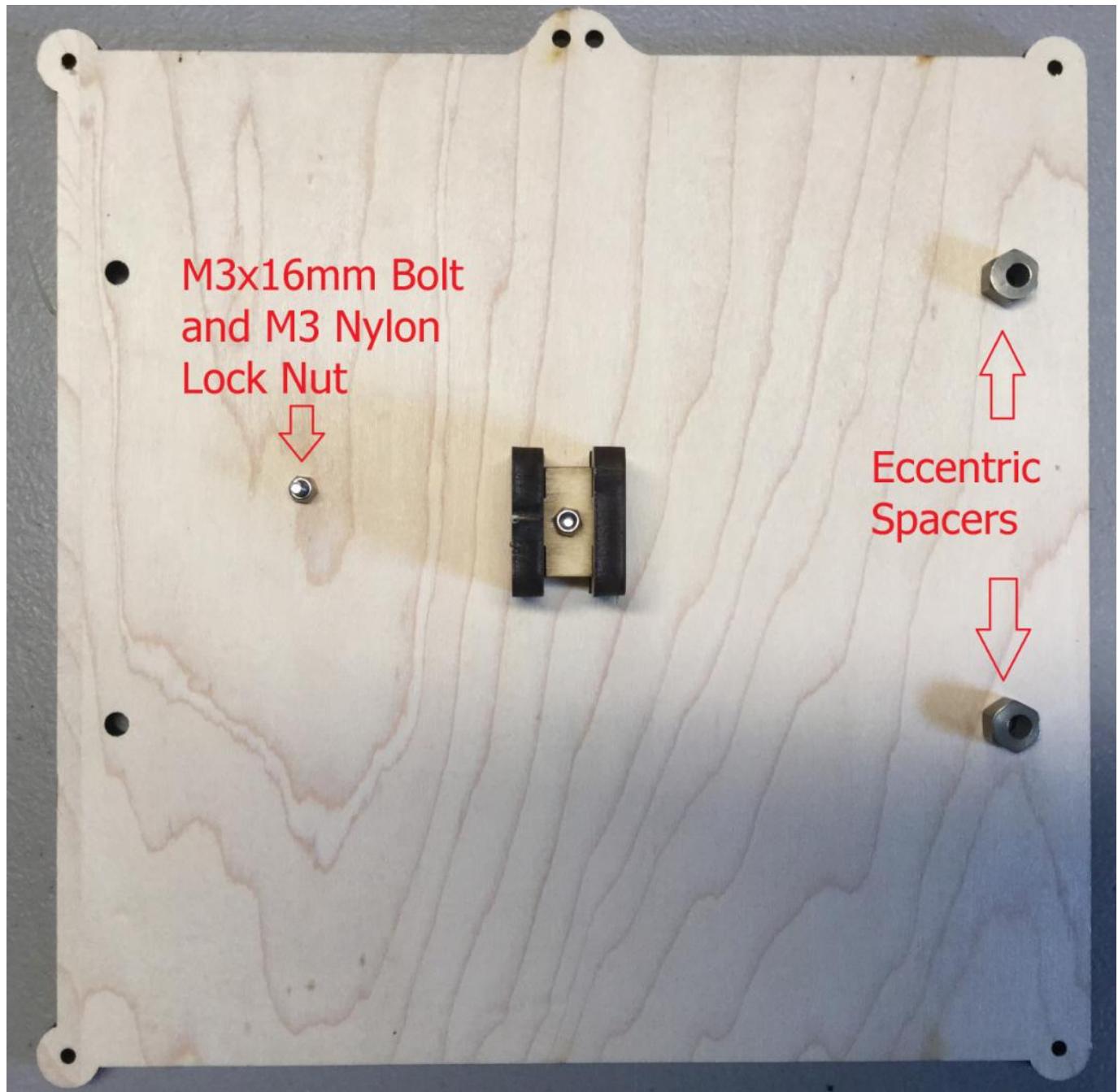
Last install these wood parts in the bottom of the main Y bed plate (The R → will be on the opposite side)



Next install an M3x25mm Bolt from the top of the main Y bed plate then install a M3 Nylon lock nut and tighten it down using an allen wrench and needle nose pliers or the included wrench.



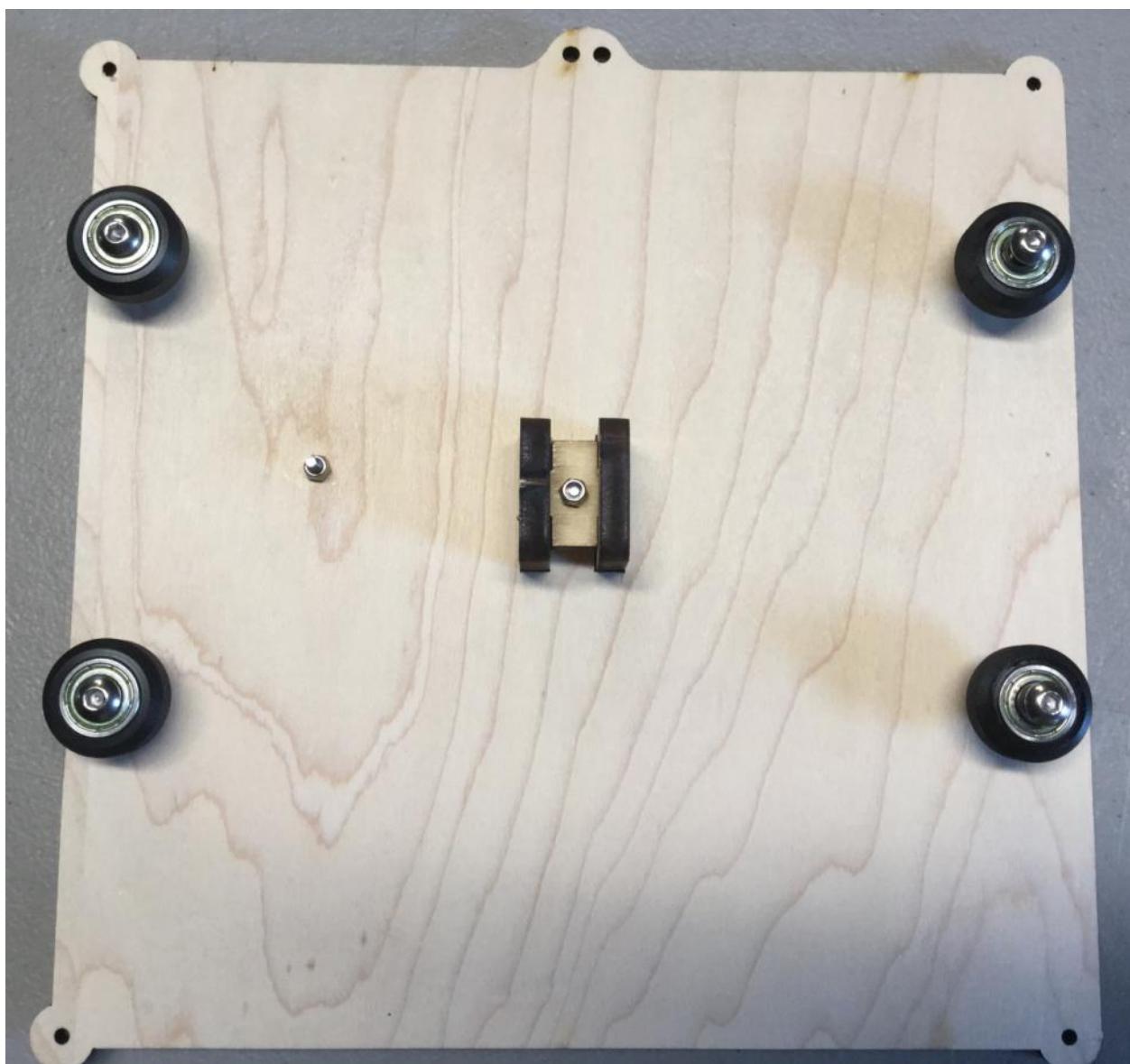
Next install an M3x16mm Bolt in with a M3 Nylon Lock nut and two Eccentric spacers as shown below. Make sure to align the eccentric spacer for the hole is as close to the edge of the wood piece as possible



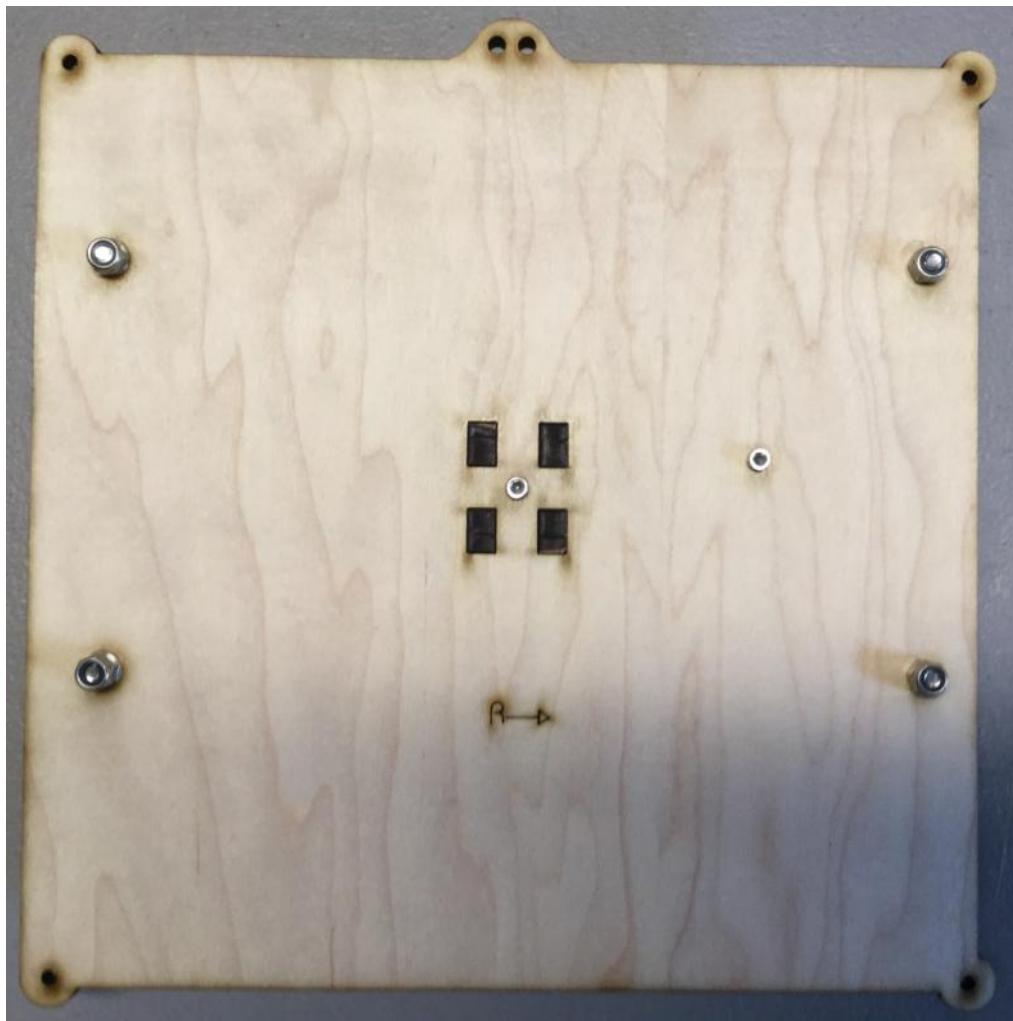
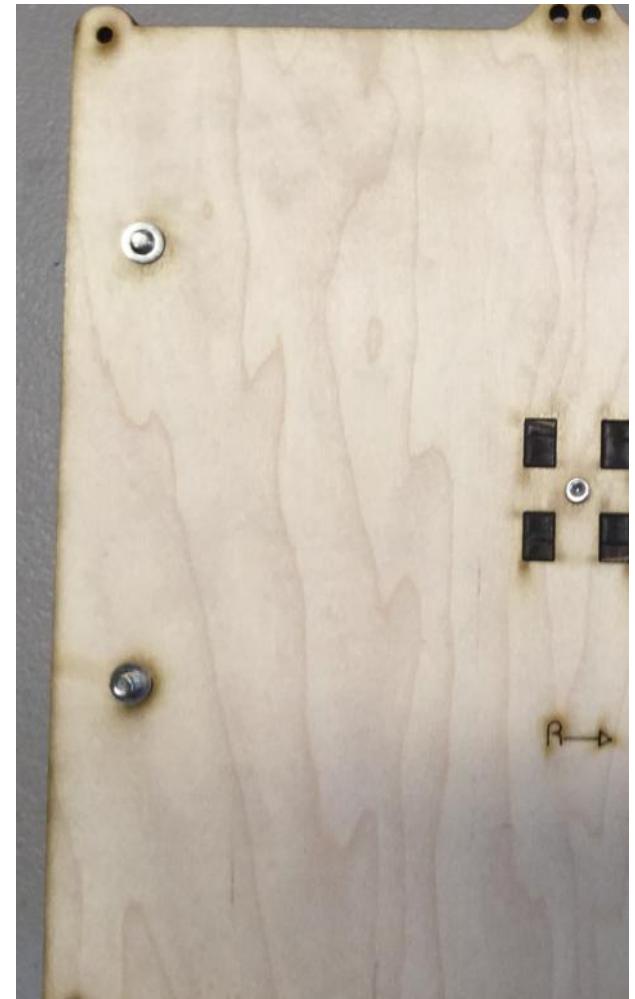
Next get 4 M5x30mm Bolts, 4 Preassembled Delrin Idlers, 4 M5 Washers and 2 Nylon Standoffs then assemble as shown in the picture below.



Install the two Delrin assemblies with the aluminum spacers onto the left side of the be and the two without Aluminum spacers onto the Eccentric Spacers on the right as shown in the picture below.



Flip the wood mount over and install two M5 washers on the bolts that go through the Eccentric spacers.



Last install M5 Nylon Lock nuts on the 4 M5 Bolts and tighten them down.

Make sure you do not tighten the bolt with the eccentric spacer so much that the eccentric spacer gets pulled into the wood at an angle.

X Carriage

X Carriage

If you have the Greg's Accessible Extruder continue with the X Carriage section of this guide.

If you have the Bulldog Extruder use this guide for the X Carriage: [Bulldog i3v X Carriage](#)

Gather the following parts

1 Set of X Carriage Wood parts (Pictured Below)

8 x M3x16mm Bolt

8 x M3 Nuts

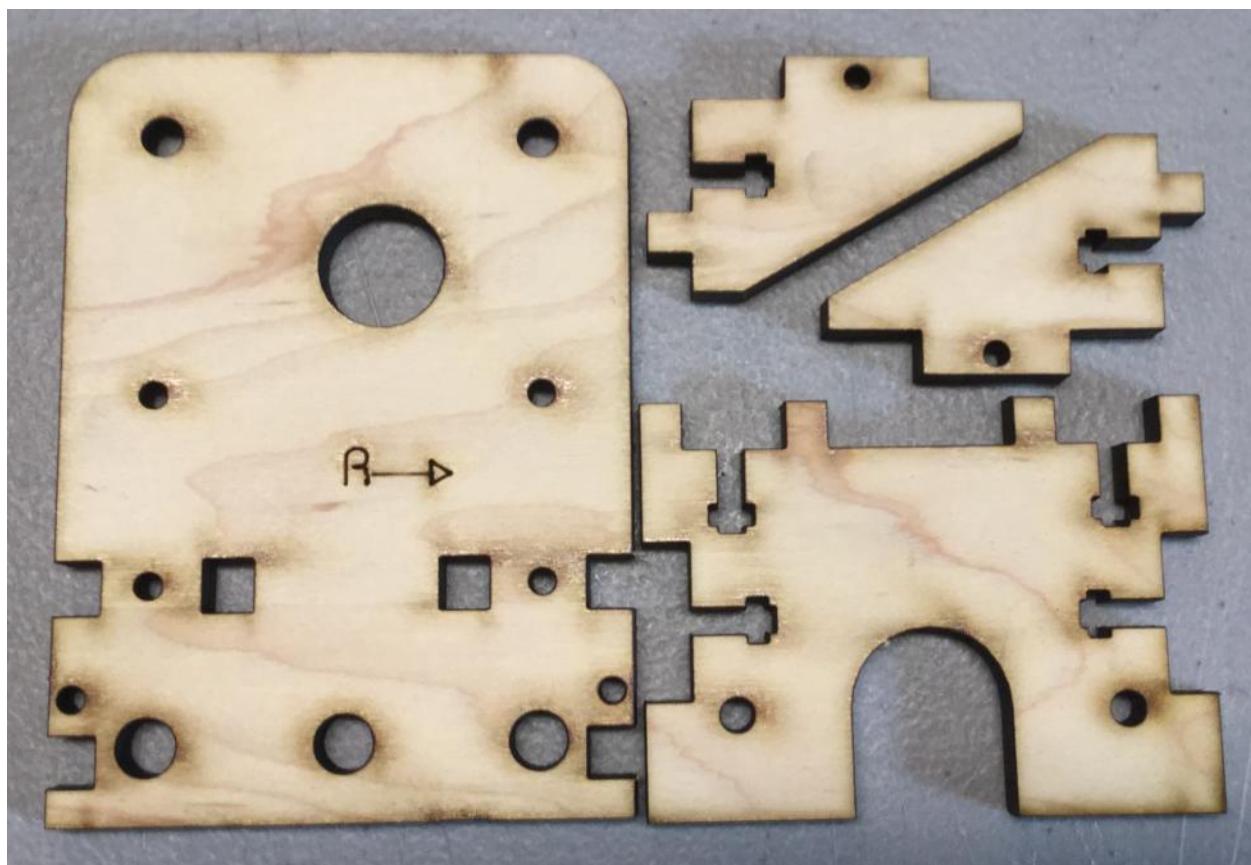
3 x Pre Assembled Delrin Idler's (Black Wheels)

3 x M5x30mm Bolts

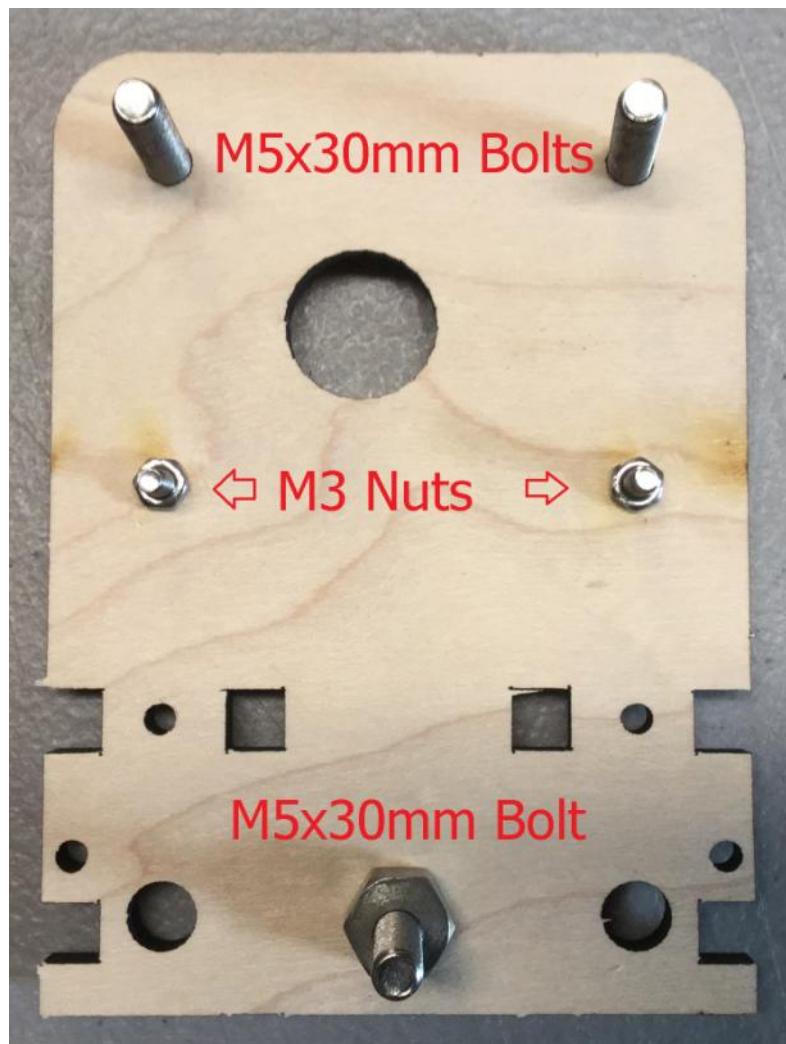
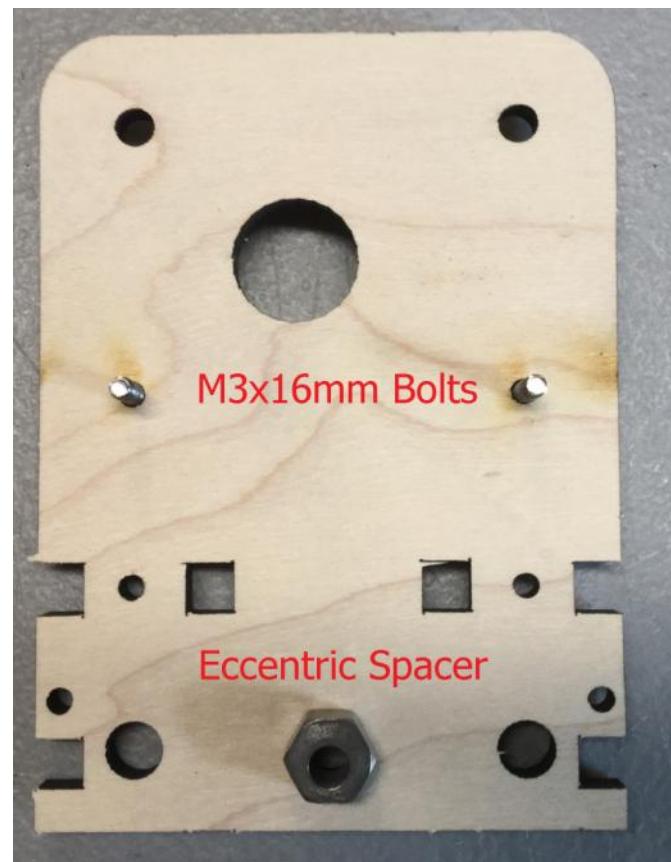
3 x M5 Nylon Locknuts

2 x Aluminum Standoff

1 x Eccentric Spacer



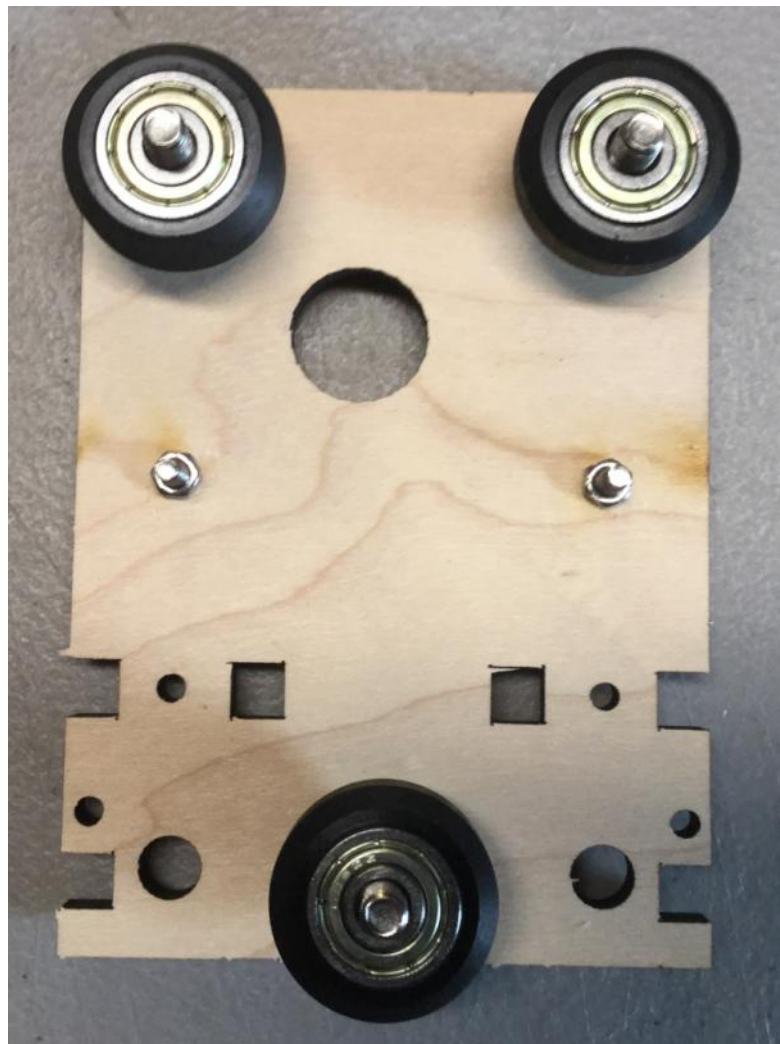
Flip the X Carriage backplate over and install two M3x16mm Bolts and the Eccentric Spacer. Make sure to align the eccentric spacer for the hole is as close to the edge of the wood piece as possible



Install 3 M5x30mm Bolts, two in the top holes and one through the eccentric spacer.

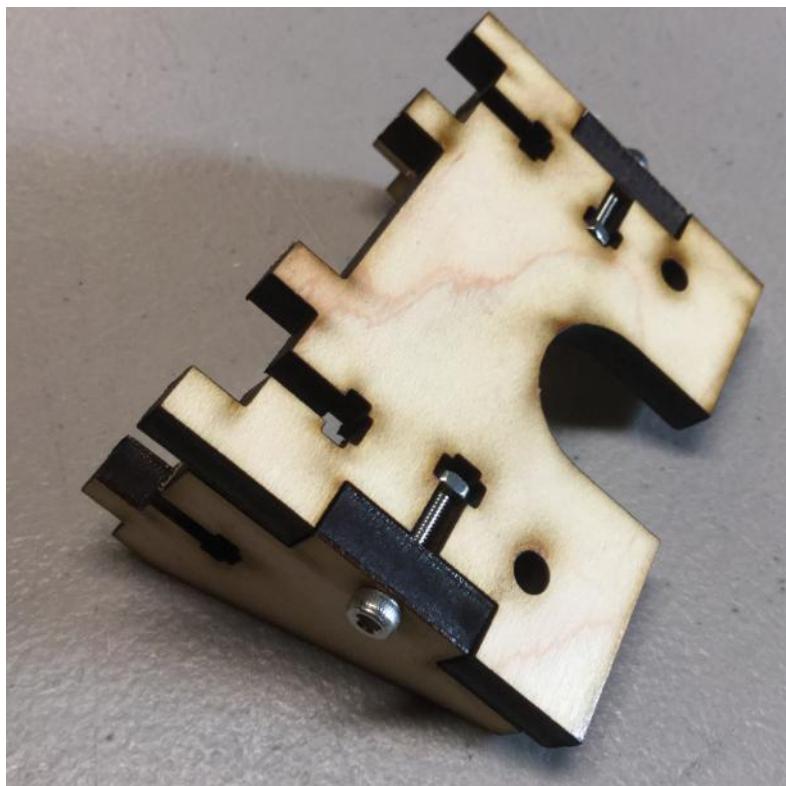
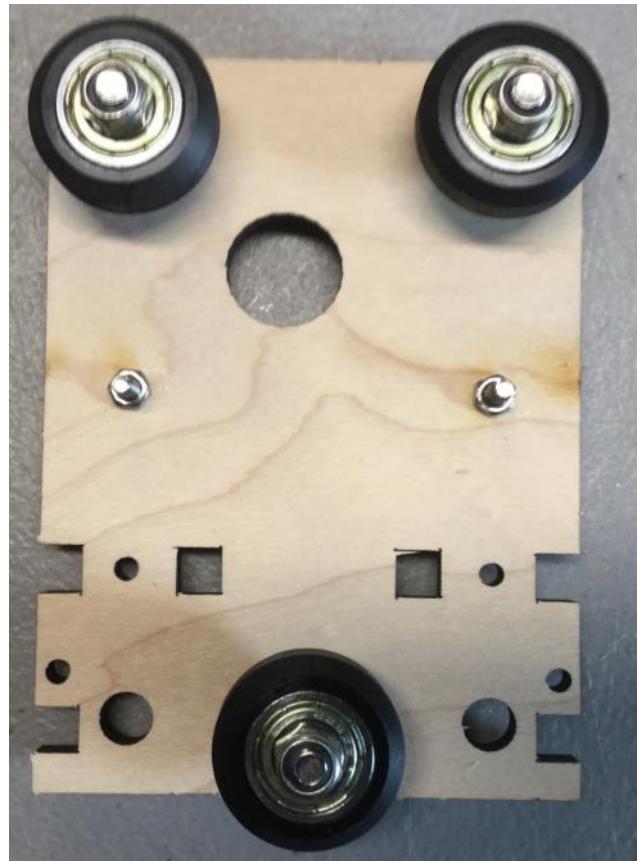
Install a regular M3 nut on the two M3x16mm Bolts

Install an Aluminum Standoff on each of the top two M5x30mm bolts as shown in the picture on the right



Install a Delrin Idler on each of the 3 M3x30mm Bolts

Install a M5 Nylon Lock Nut on each of the 3 M5x30mm Bolts. Make sure you do not tighten the bolt with the eccentric spacer so much that the eccentric spacer gets pulled into the wood at an angle.



Install the two side plates on the Extruder mount then secure each side with an M3x16mm bolt and regular M3 nut.

Install the Extruder mount into the X carriage back plate and secure using 4 M3x16mm Bolts and 4 regular M3 Nuts.



Y Motor

Y Motor

Gather the following parts

1 Set of Y Motor Wood parts (Pictured Below)

4 x M3x16mm Bolt

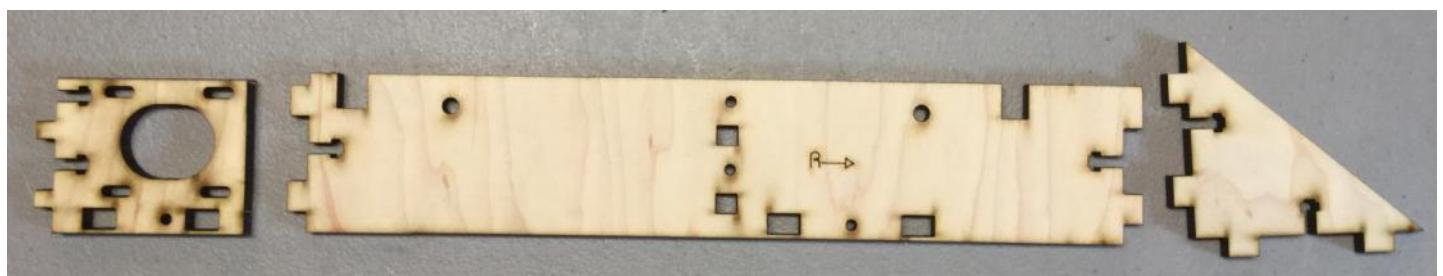
4 x M3 Nuts

4 x M3x10mm Bolts

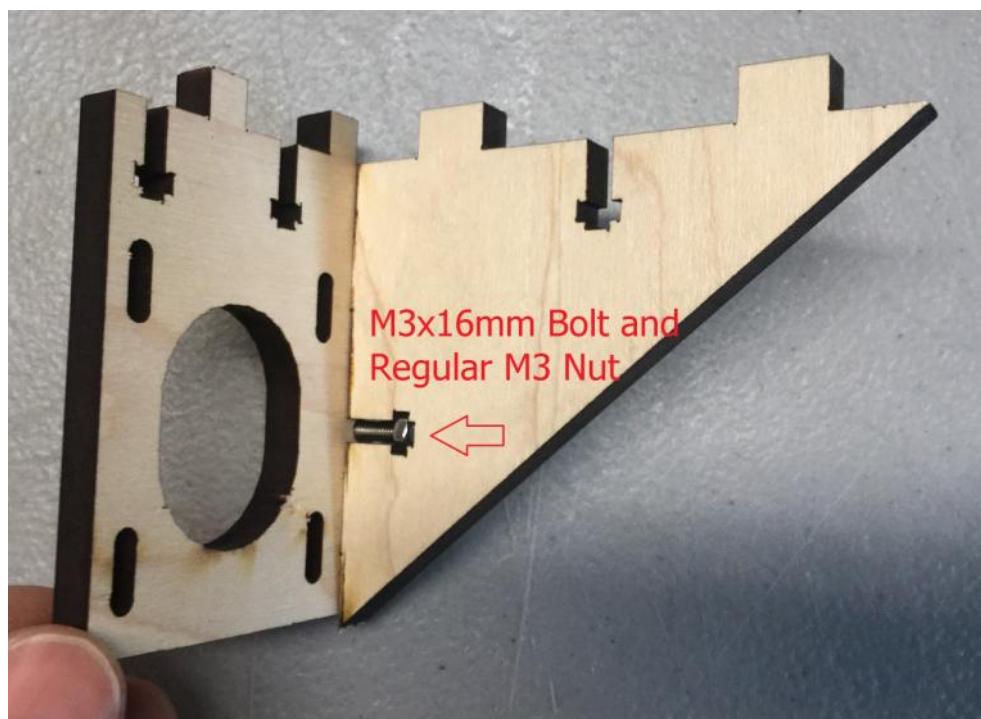
1 x Motor

1 x GT2 Gear

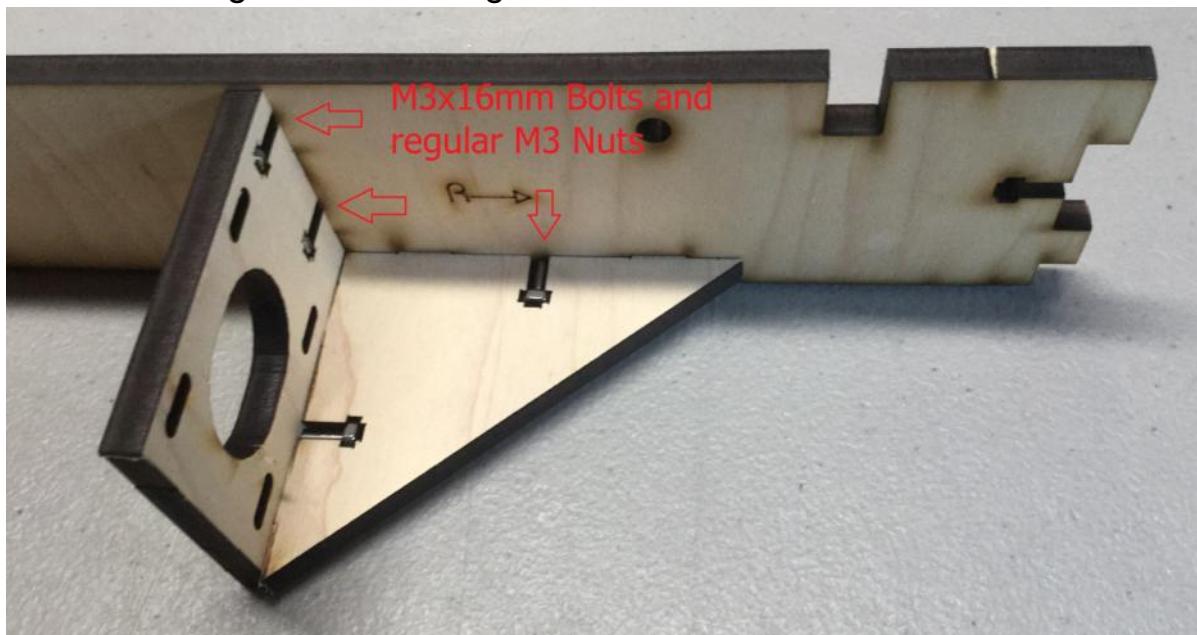
2 x Set Screw (for the gear M3x5mm grub)



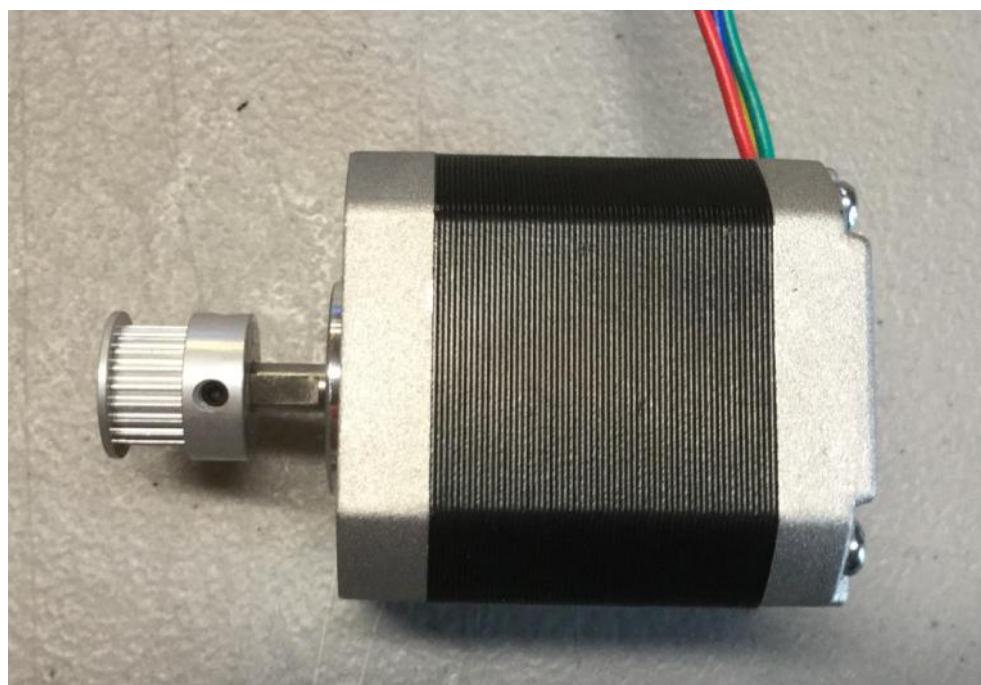
Connect the two wood pieces as shown in the picture below and install a M3x16mm Bolt and regular M3 nut to connect them.



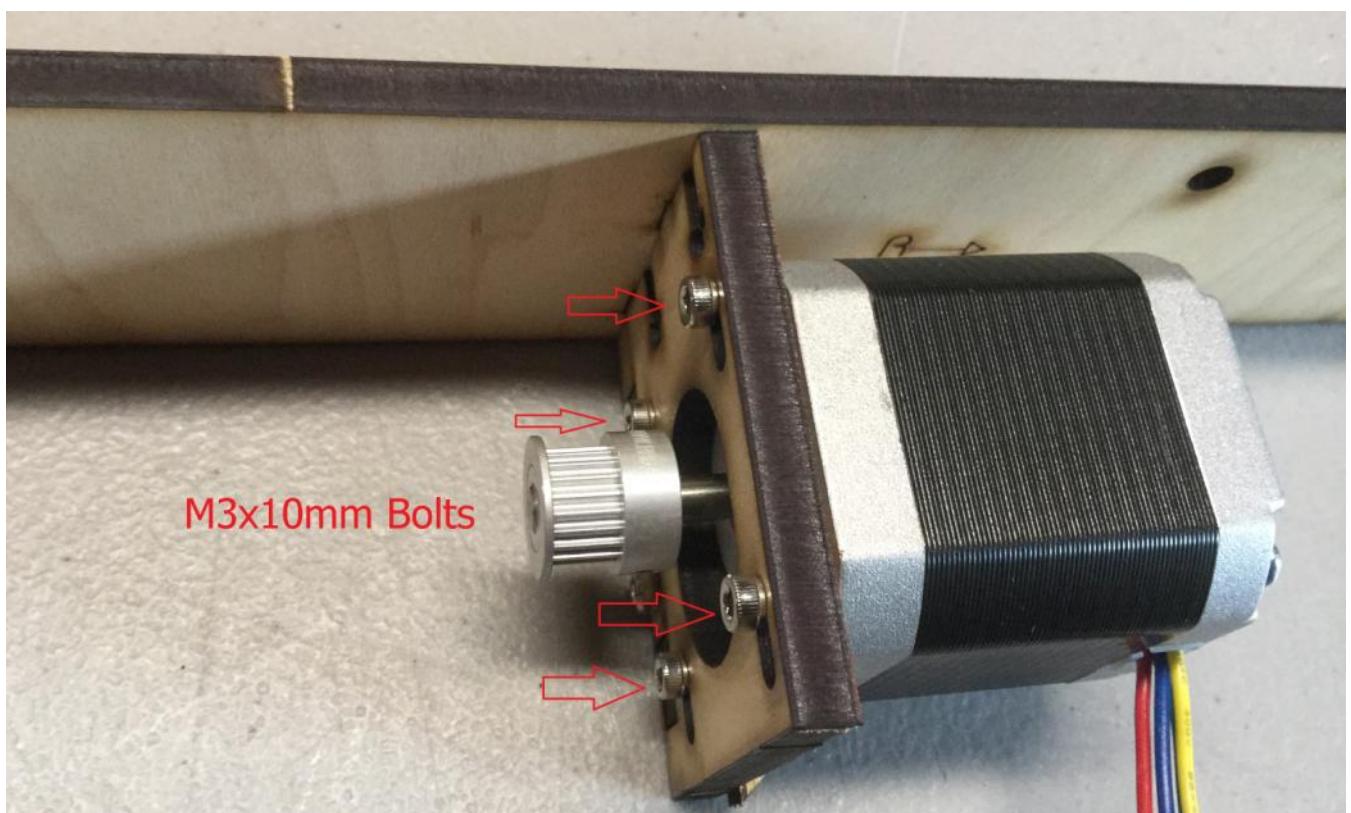
Now Connect the Motor Bracket to the large wood piece as shown below using 3 M3x16mm long bolts and 3 regular M3 nuts



Install a gt2 gear on one of the motors with a set screw, make sure to align the set screw with the flat spot on the motor shaft before tightening it.



Last install the motor in the Y motor bracket with 4 M3x10mm long bolts, make sure you route the Motor wires to the front so they are not pinched in between the wood and the motor.



Z Motor Brackets

Z Motor Brackets

Gather the following parts

1 Set of Z Motor Wood parts (See Below)

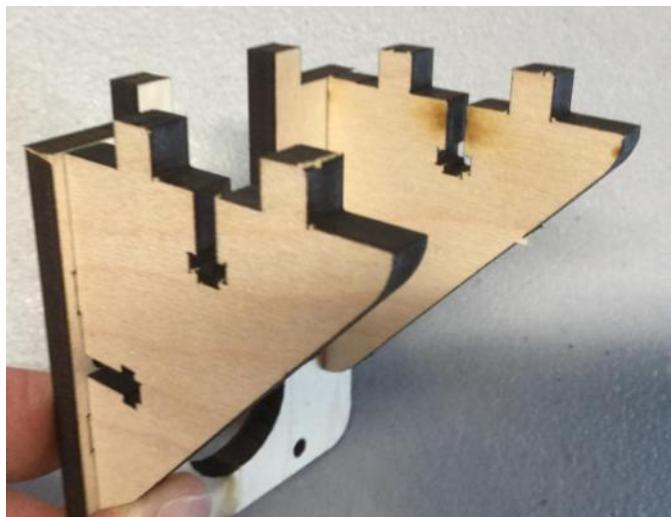
4 x M3x16mm Bolt

4 x M3 Nuts

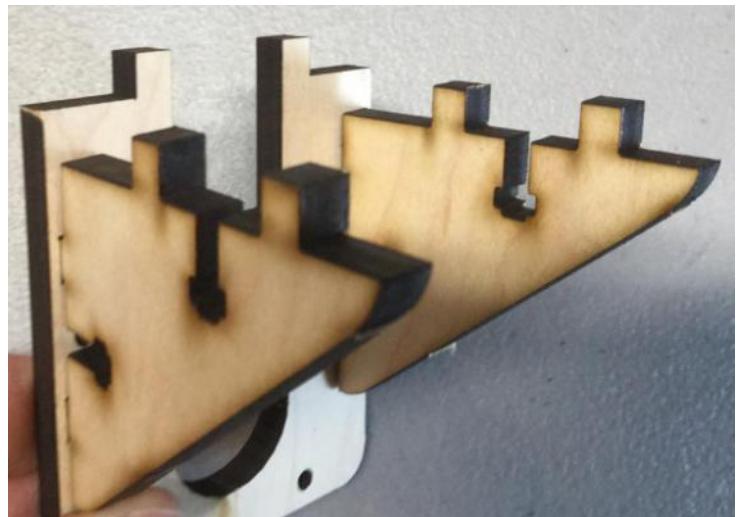


Install the two Triangle legs onto the Z motor Mount, make sure you have the wood pieces installed like the picture on the left.

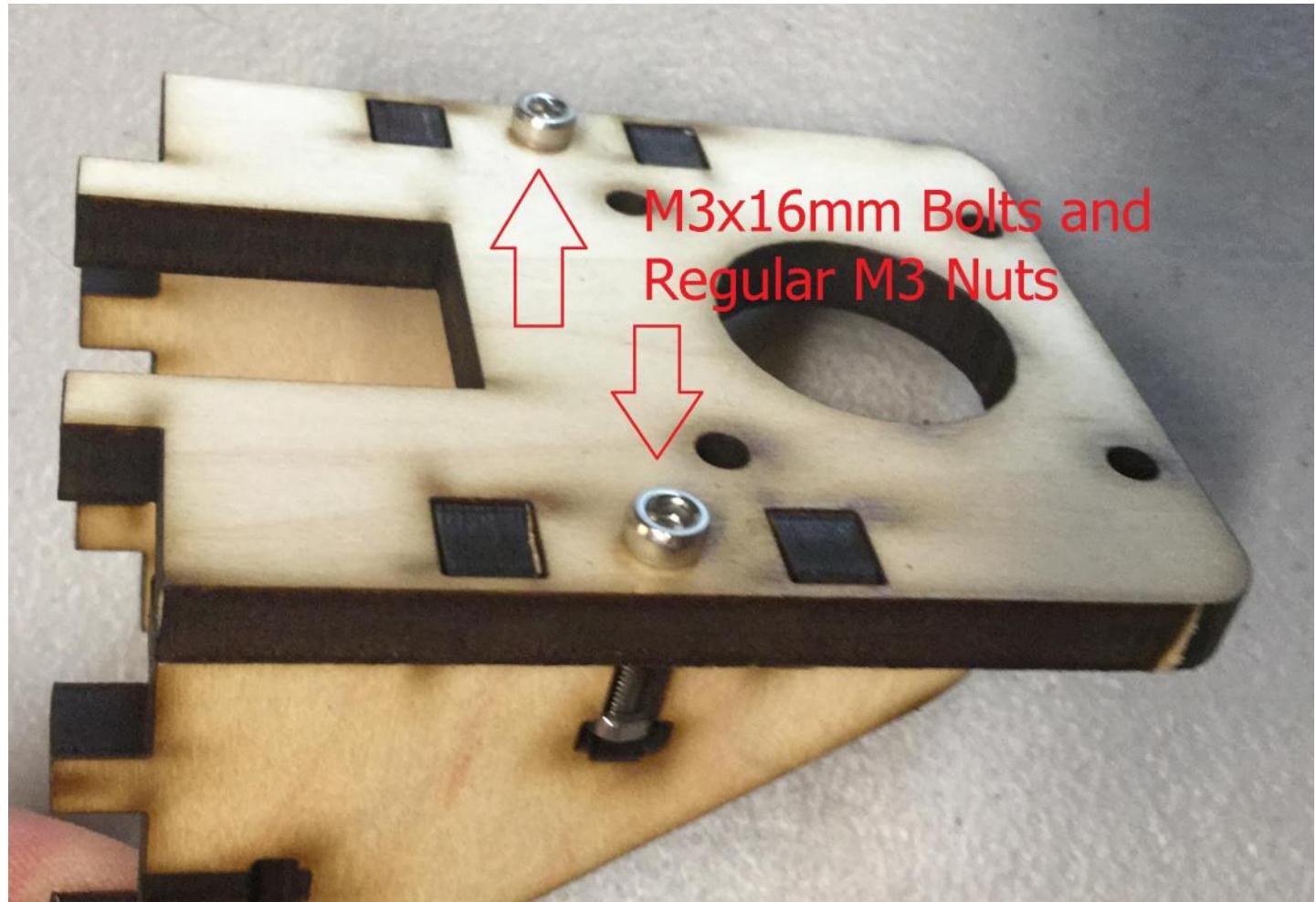
Correct



Incorrect



Install the M3x16mm Bolts and Regular nuts to secure the legs to the Z motor mount, then repeat for the 2nd Z motor Bracket



Frame

Frame

Gather the following parts

1 Set of Frame Wood parts (See Below)

12 x M3x16mm Bolt

12 x M3 Nuts

6 x M5x12mm Bolts

2 x Aluminum Extrusion

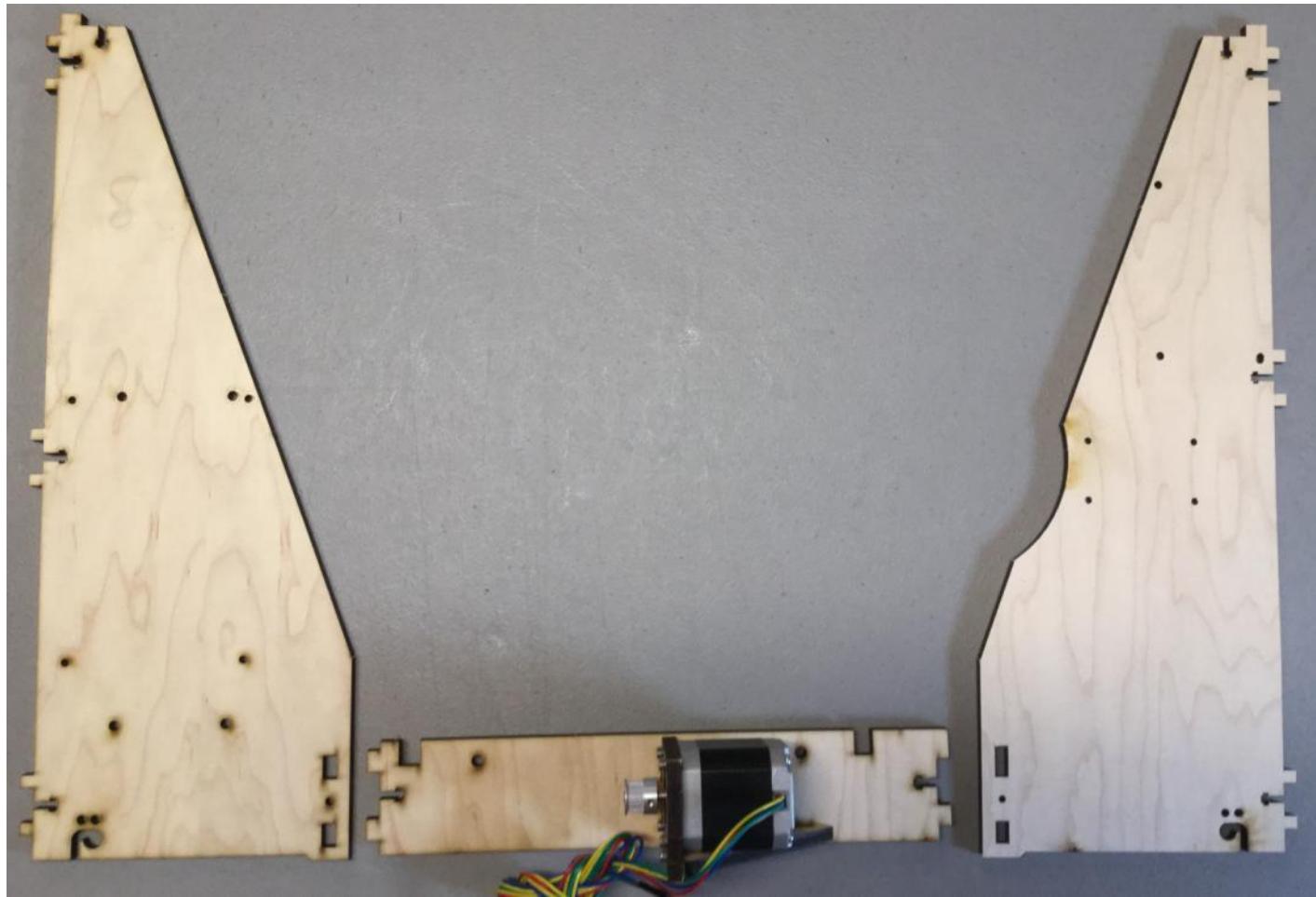
6 x M5 T-Nut

1 x Assembled Y Motor Assembly

2 x Z Motor Brackets

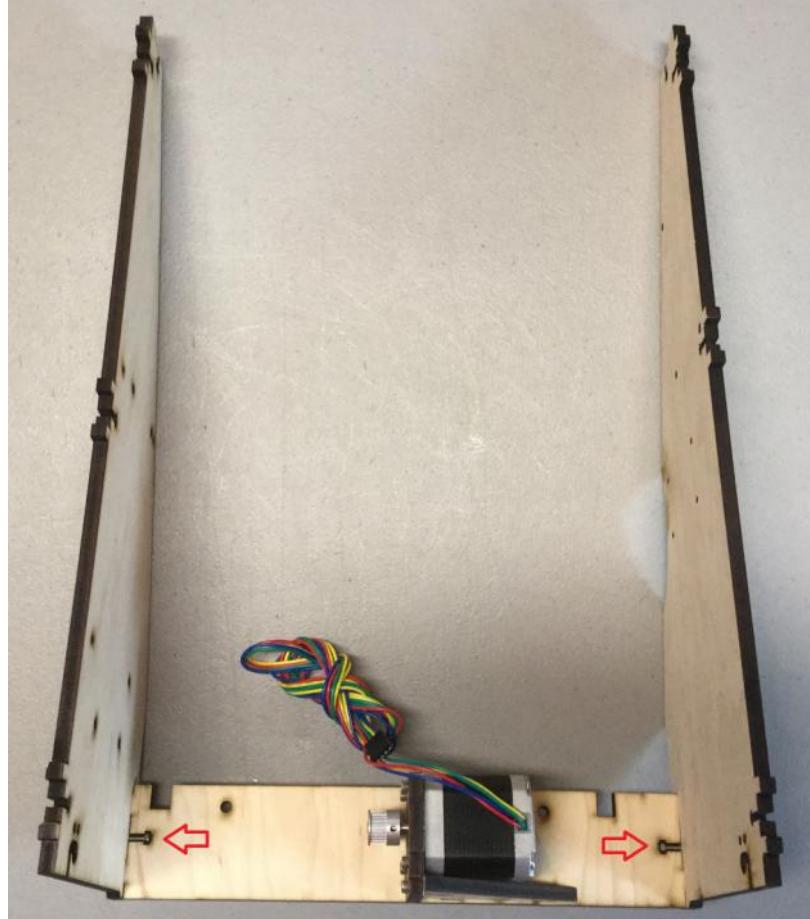


Get the two large triangular legs and the Y Motor Assembly,

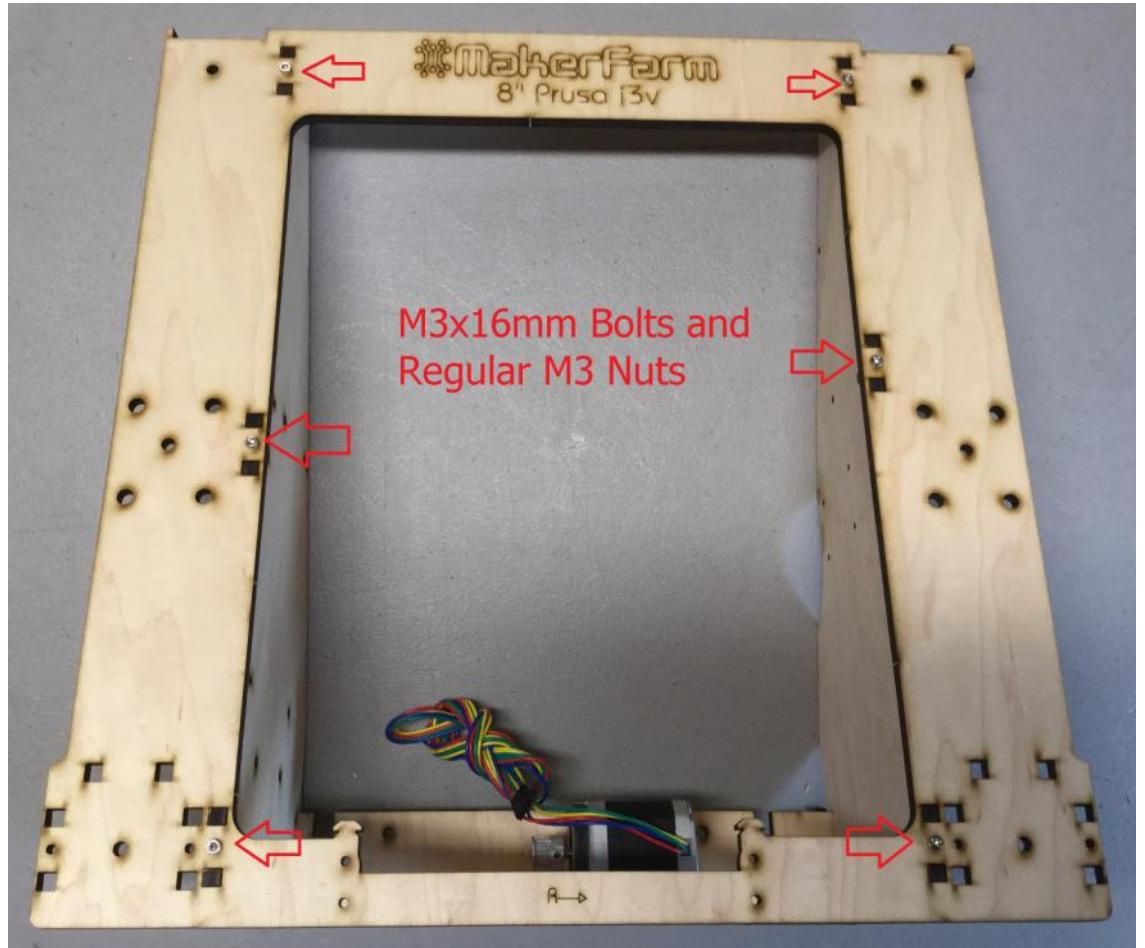


Push the legs onto the Y Motor Assembly then secure each leg with an M3x16mm bolt and regular M3 nut as shown by the red arrows in the picture on the Right.

The legs are keyed so you will not be able to install the legs on the wrong sides.

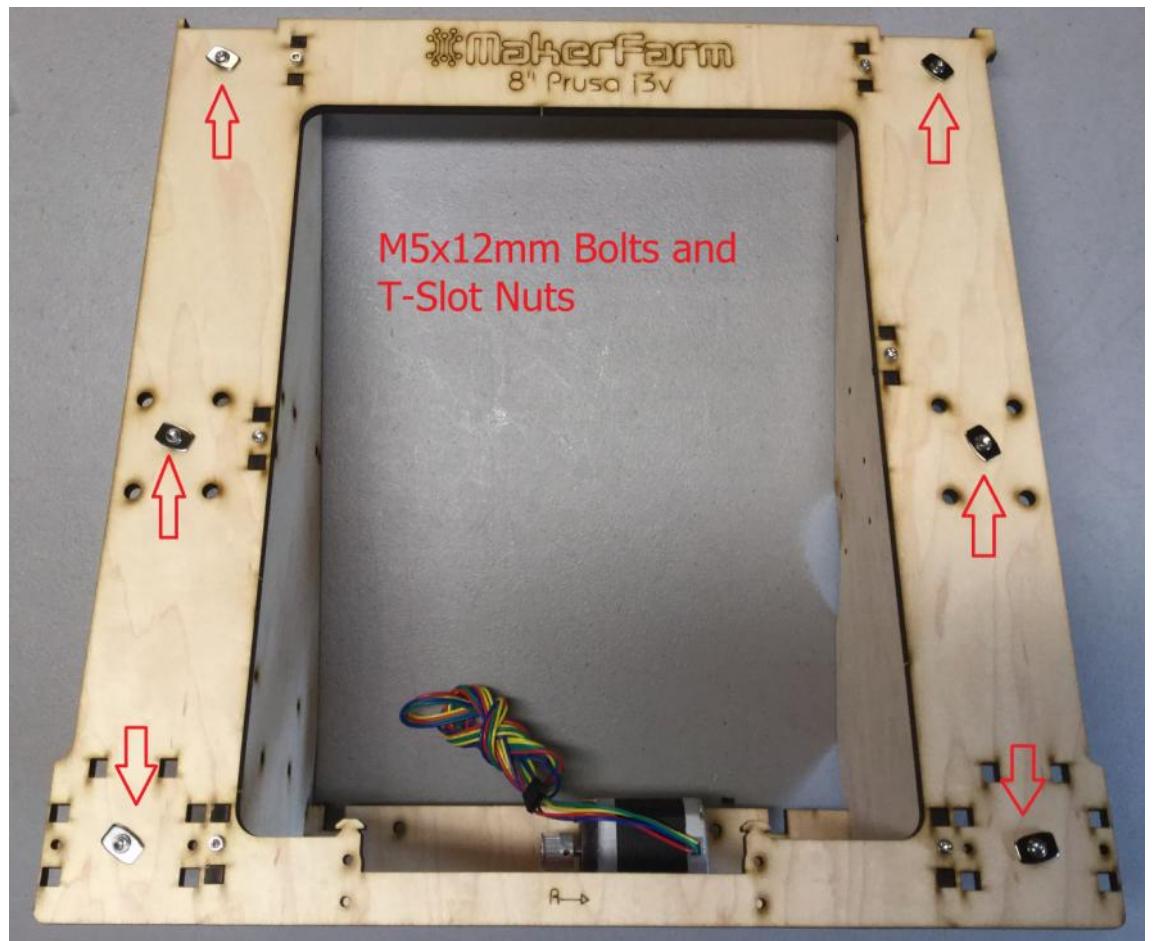


Next align the Main Frame piece with the legs and using 6 M3x16mm Bolts and 6 regular M3 nuts secure the Main Frame to the legs.

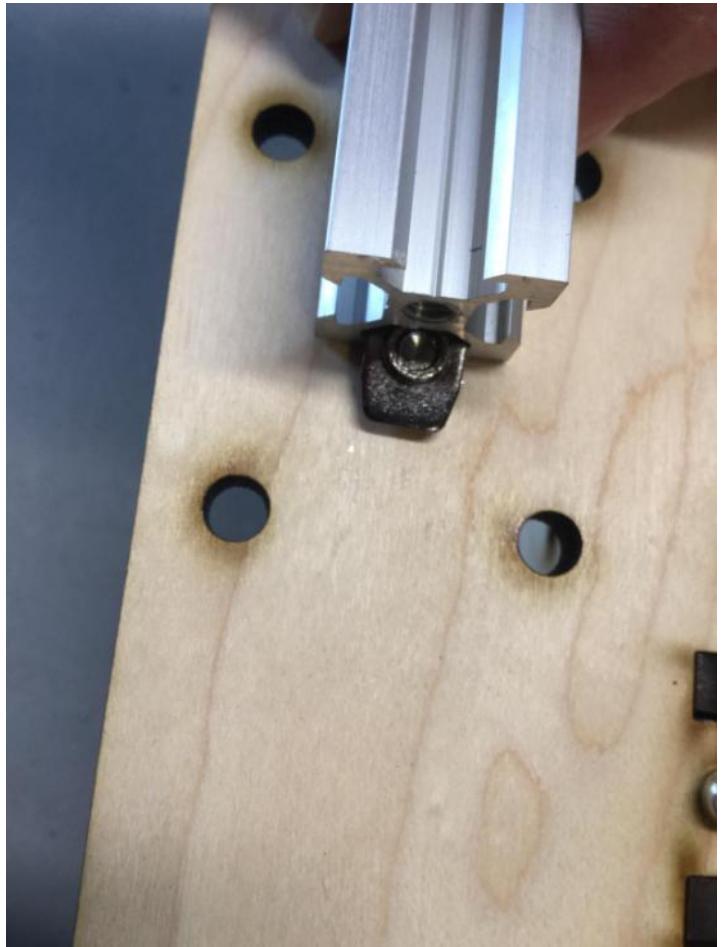


Next Install 6 M5x12mm Bolts and T-Slot nuts in the locations shown with red arrows in the picture on the right.

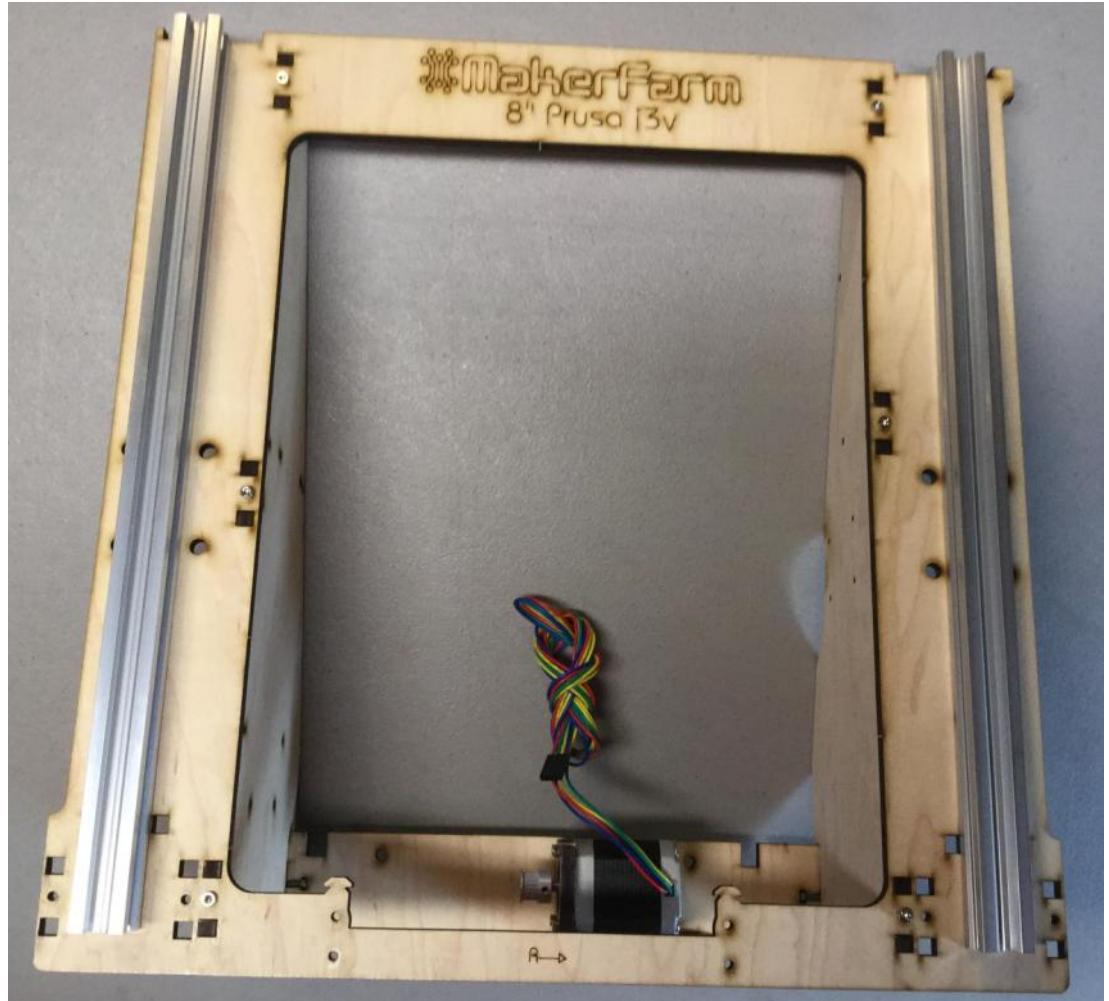
Keep the T-Slots loose



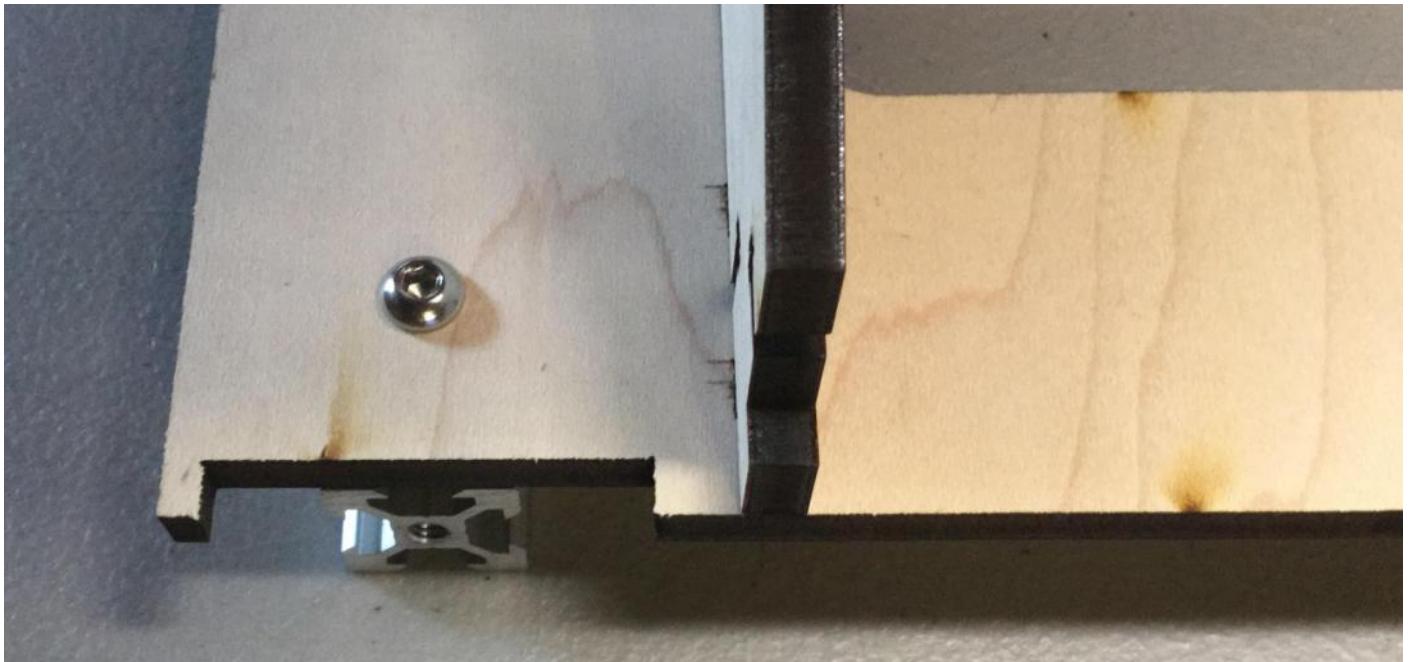
Now we are going to install one of the Aluminum Extrusion onto three of the T-Slot Nuts, make sure the T-Slot nut slides into the channel in the Aluminum extrusion



Repeat the process with the other three T-Slot Nuts on the other side of the frame

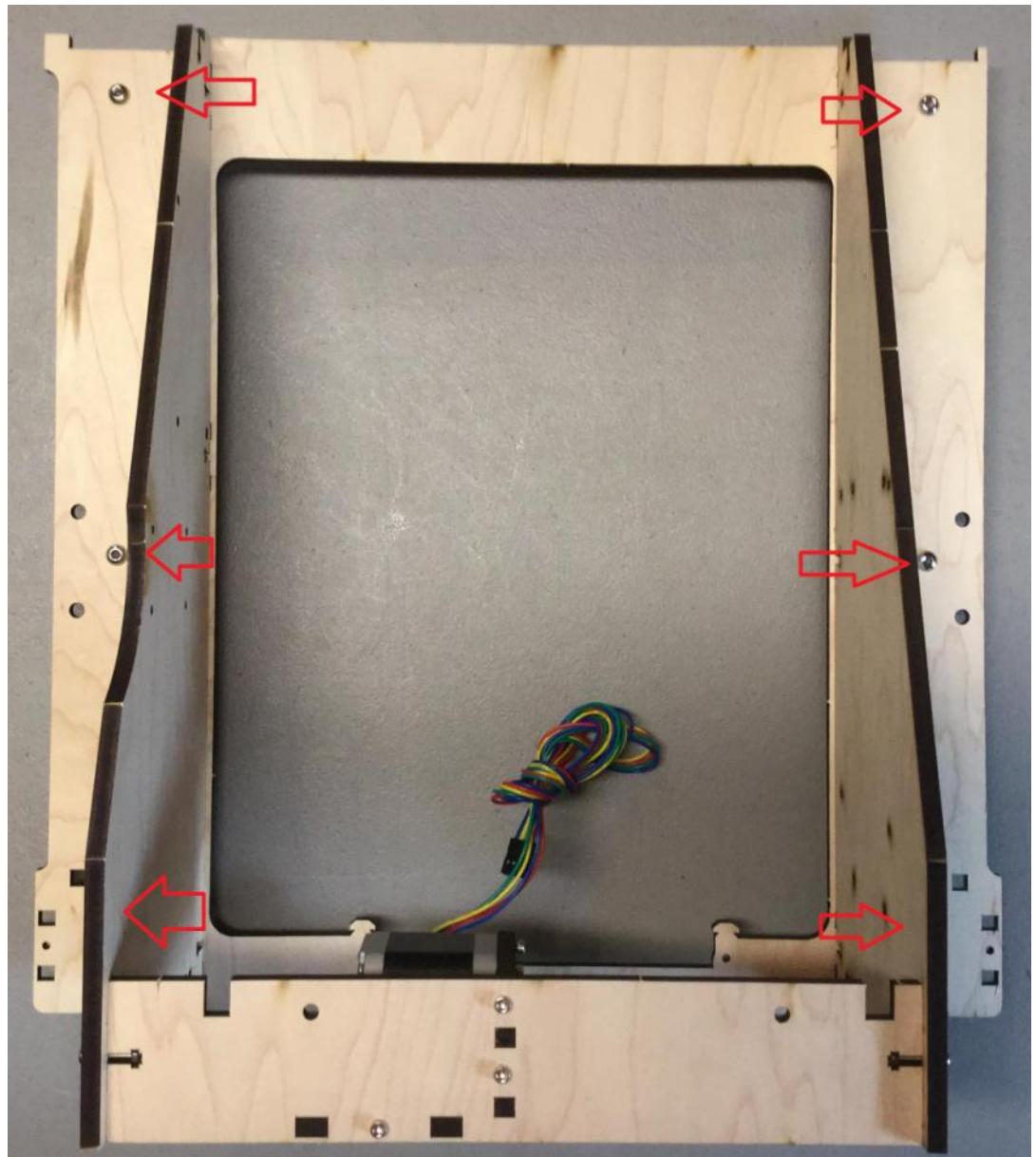


Align the Aluminum Extrusion so it is flush with the wood piece at the top of the frame

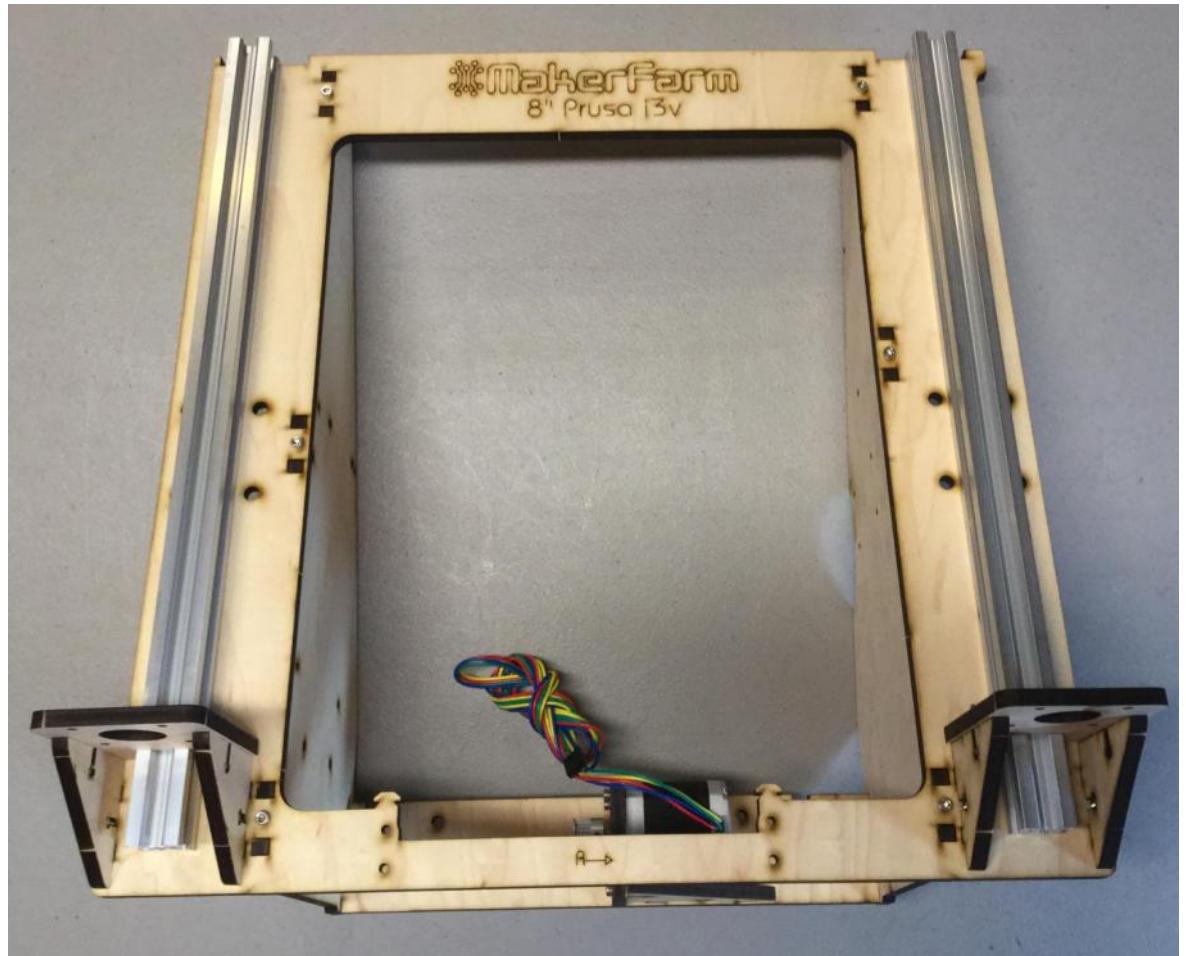


Now that the Extrusion is flush with the top wood of the frame you can tighten the 6 M5x12mm Bolts to hold the Aluminum Extrusion in place.

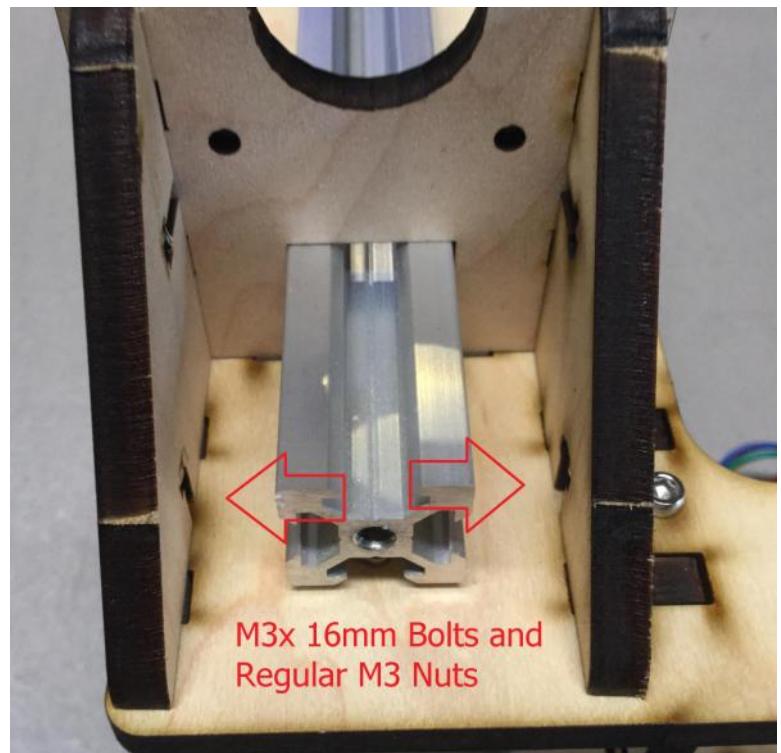
The two arrows on the bottom are pointing at the approximate location of the bolts since you can't see them in this photo.

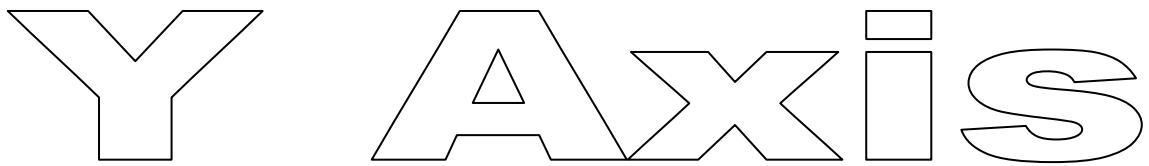


Next install the Z motor brackets onto the Frame, you may need to loosen the bolts holding the Z motor brackets together to properly align them



Last install two M3x16mm Bolts and two regular M3 nuts on each Z Motor Bracket to secure them to the frame.





Y Axis Assembly

Gather the following parts

Wood parts shown in the picture including Assembled Y Idler, Partially Assembled Frame, Assembled Y Bed

2 x Aluminum Extrusion

4 x M3x16mm Bolts

2 x M3x25mm Bolts

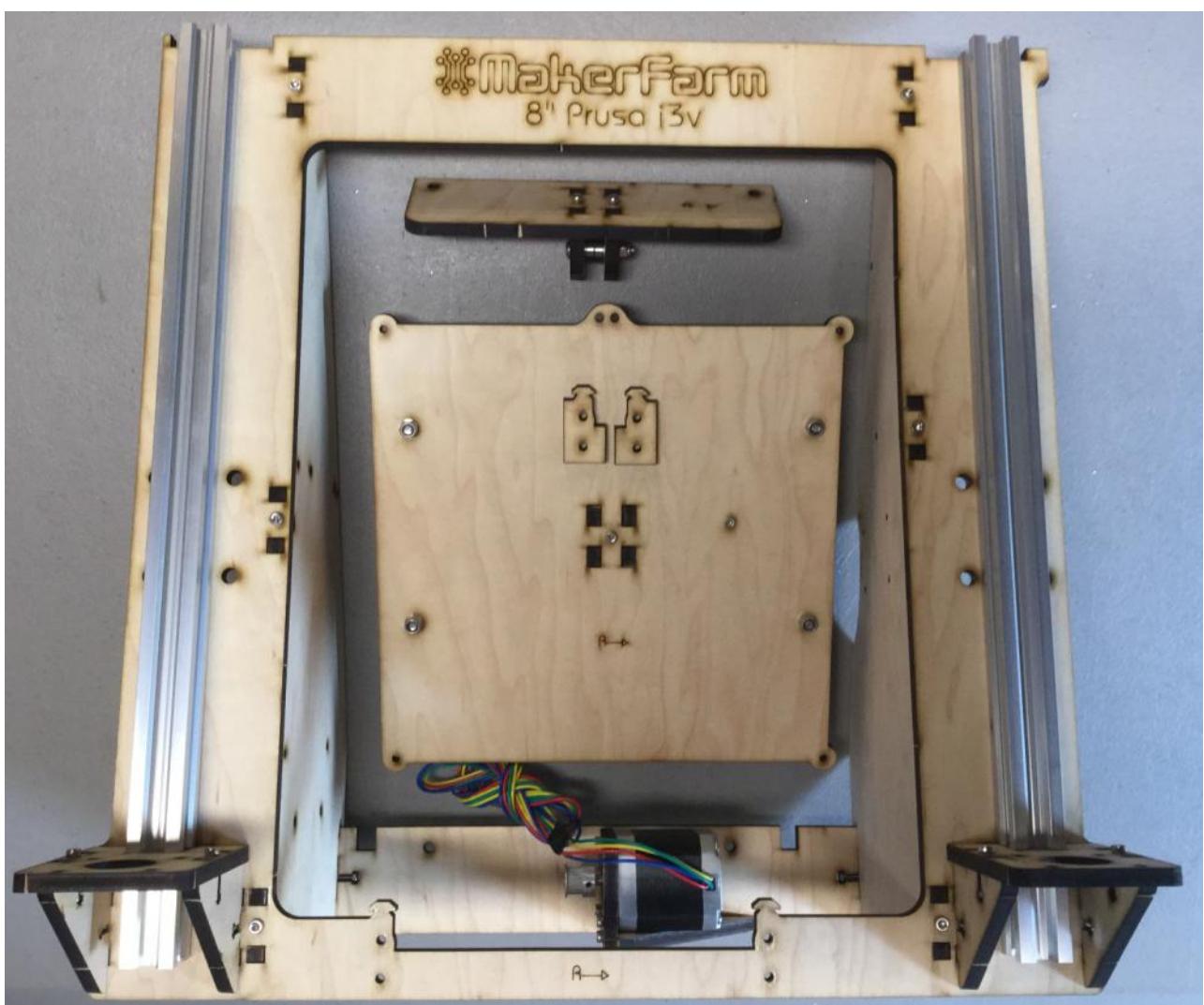
6 x M3 Nylon Lock Nuts

5 x M5x12mm Bolt

1 x 28 inch (711mm) length of belt

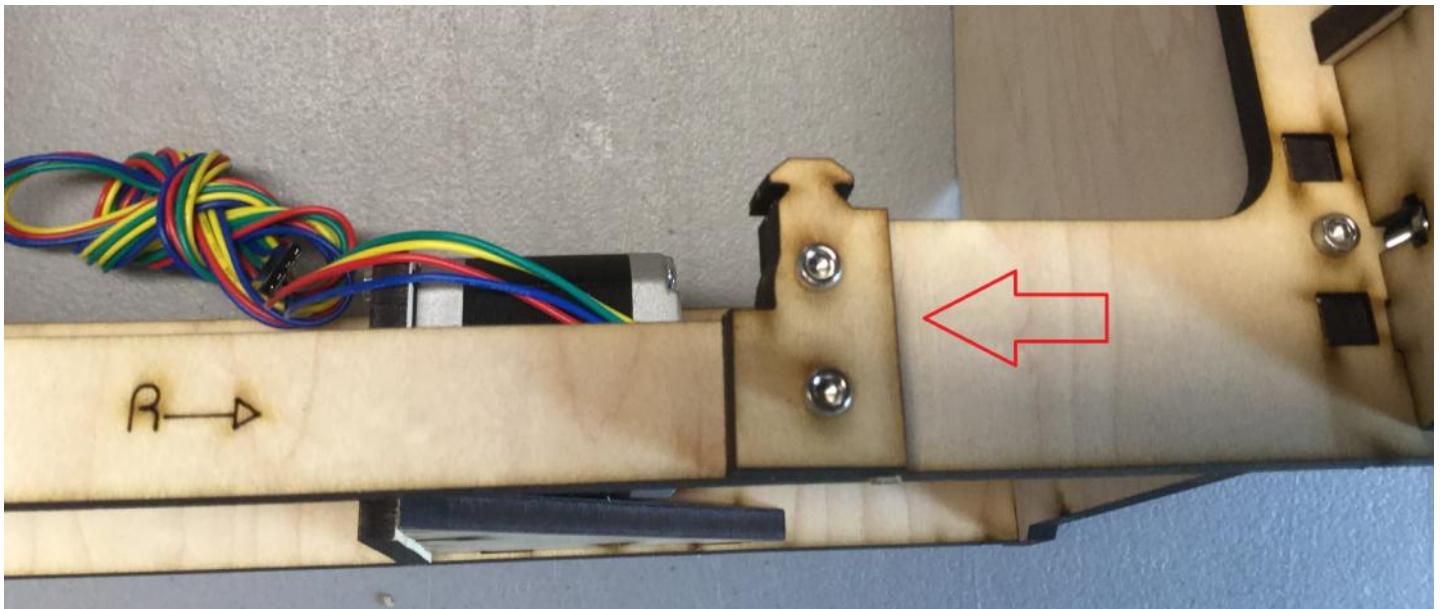
2 x Zip Ties

1 x T-Slot Nut



Note: If you cut your belt to the wrong length you can purchase more belt here:
<http://www.makerfarm.com/index.php/hardware/1-foot-gt2-belt.html>

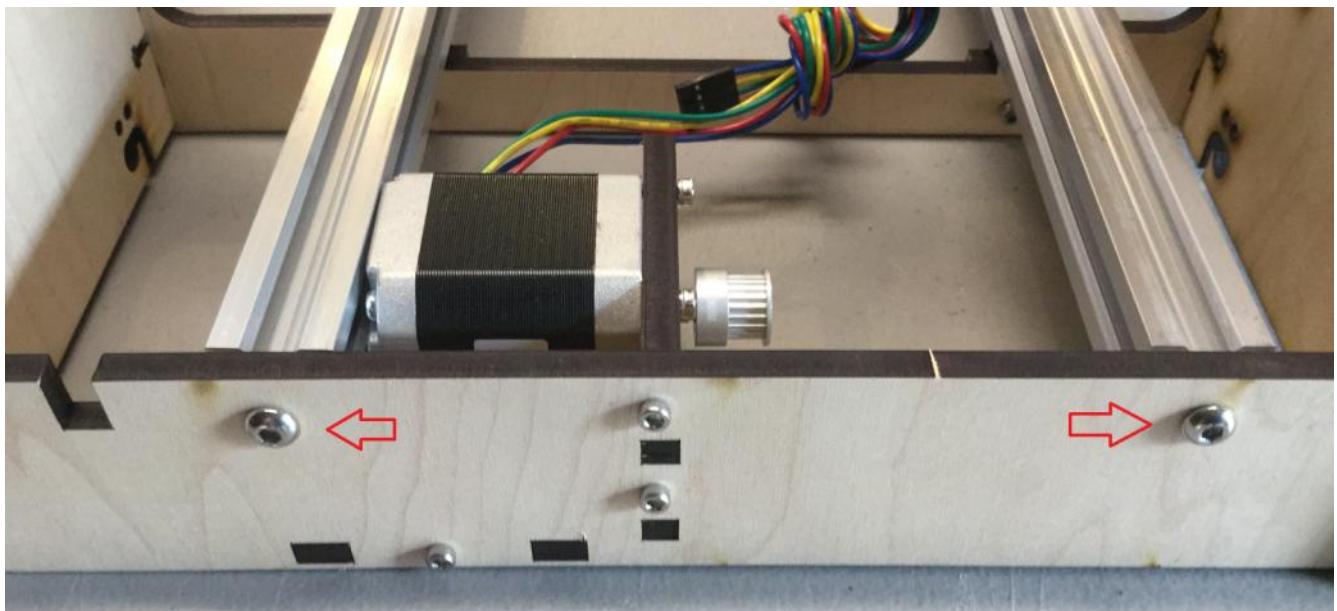
First get wood part shown in the picture below, align it with the holes at the bottom of the frame, install two m3x16mm bolts and m3 nylon lock nuts but do not tighten them yet. Repeat this process for the matching part on the other side of the frame.



Next get one of the Aluminum extrusions and carefully feed it through the wood part we just attached and the frame. Repeat for the other side.

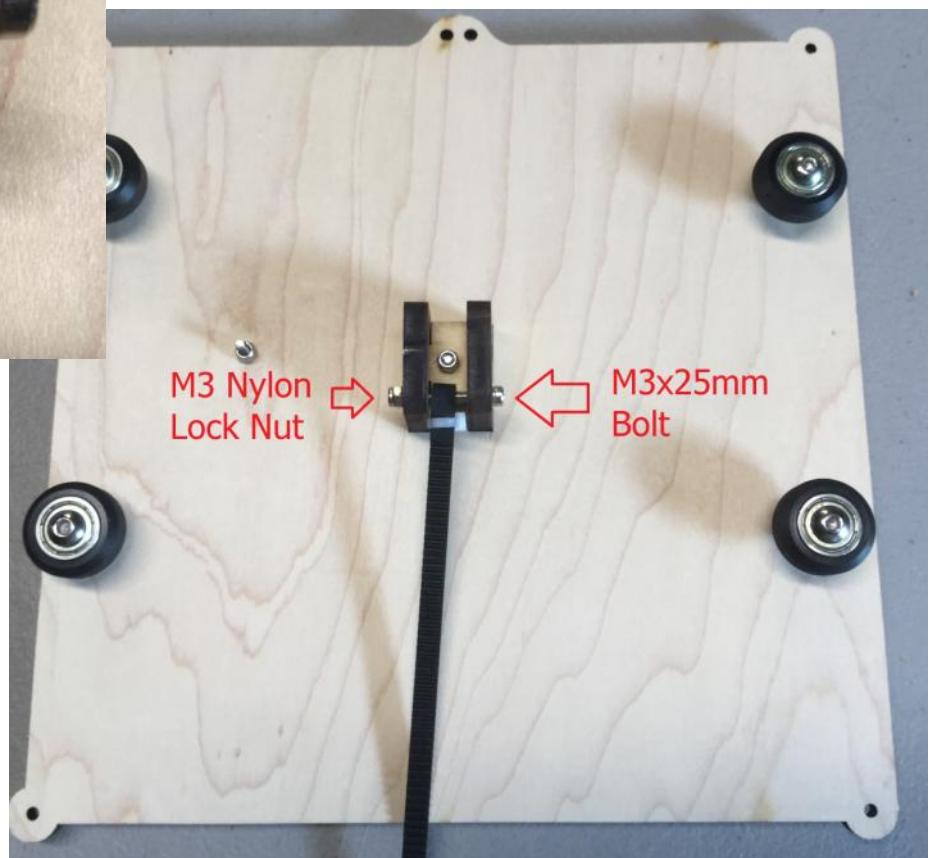


Next Install an M5x12mm bolt through the Y motor bracket and into the Aluminum Extrusion, do not tighten these bolts yet.

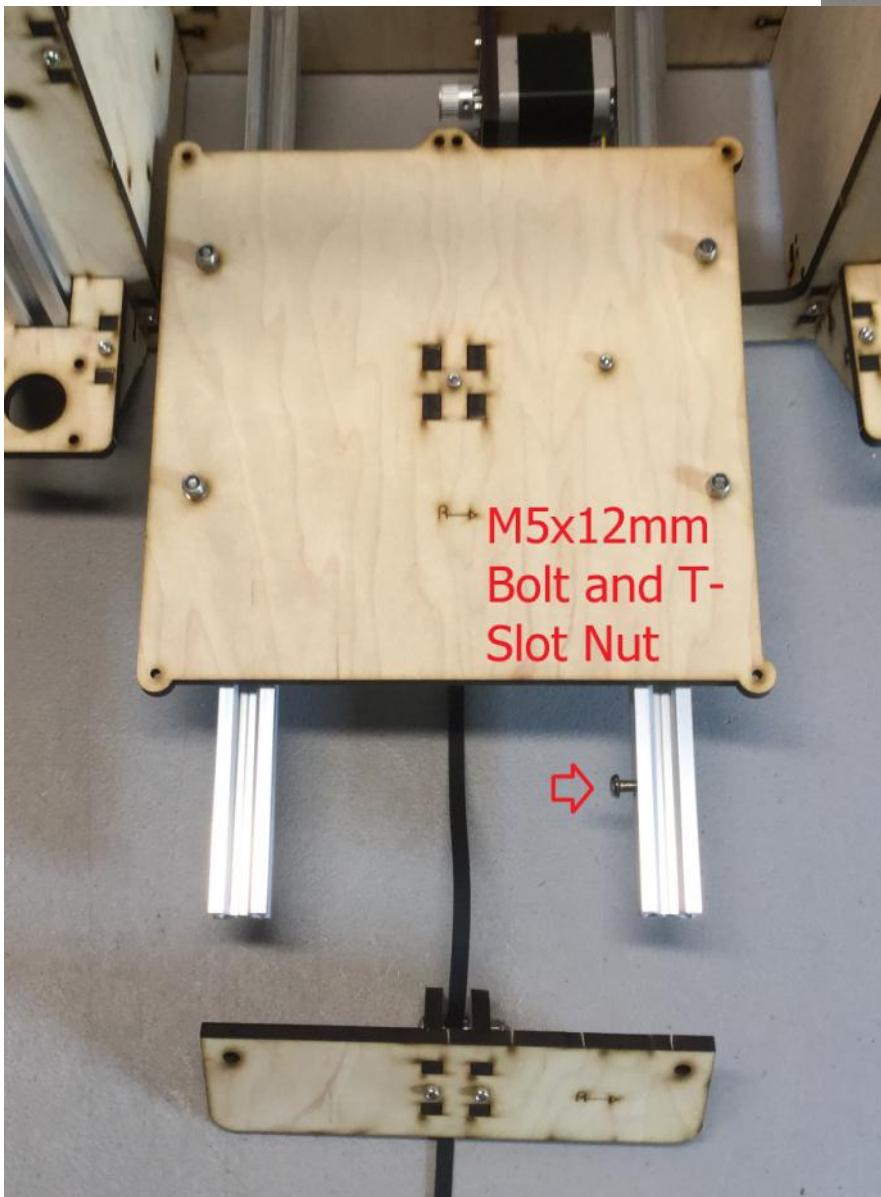
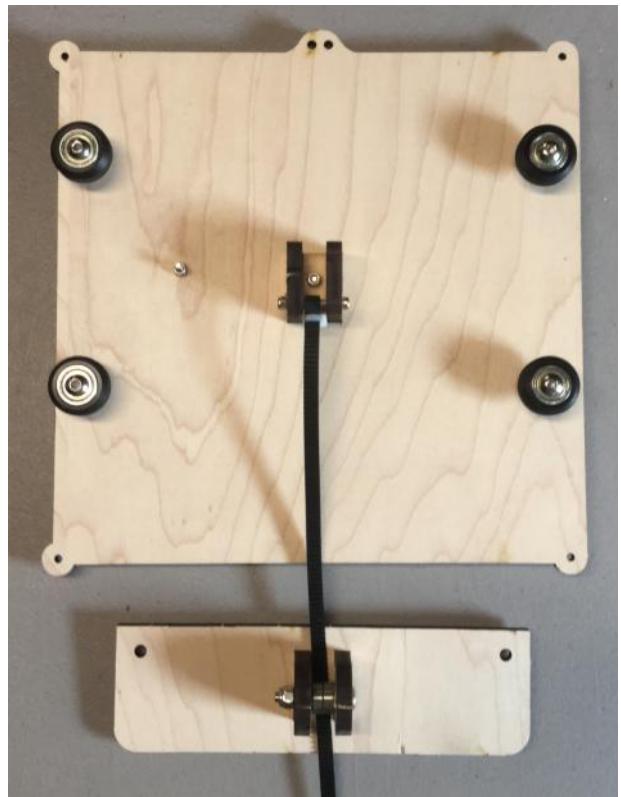


Next get the Heat Bed Mount and belt, loop the ends of the belt and use a zip tie to secure the loop on each end of the belt. Once you have looped both ends the belt will be 26 1/8" (664mm). Then using an M3x25mm Bolt and Nylon Lock nut install the belt onto the bottom of the Heat Bed Mount as shown in the picture below. The

Flat side of the belt will be closest to the heat bed mount and the belt's teeth will be facing you.



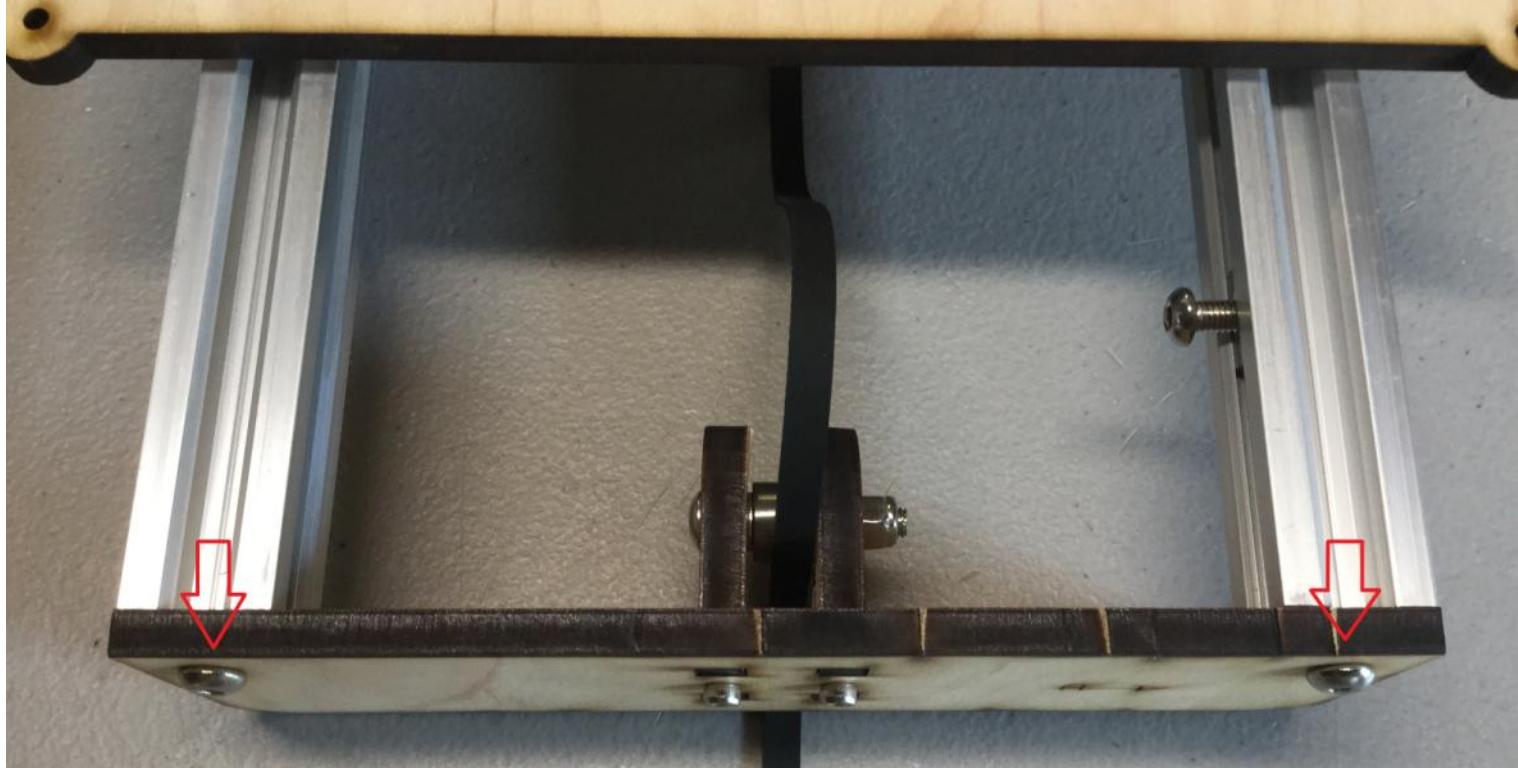
Next place your Y idler bracket as shown in the picture on the right, run the belt under the bearings and out the other side.



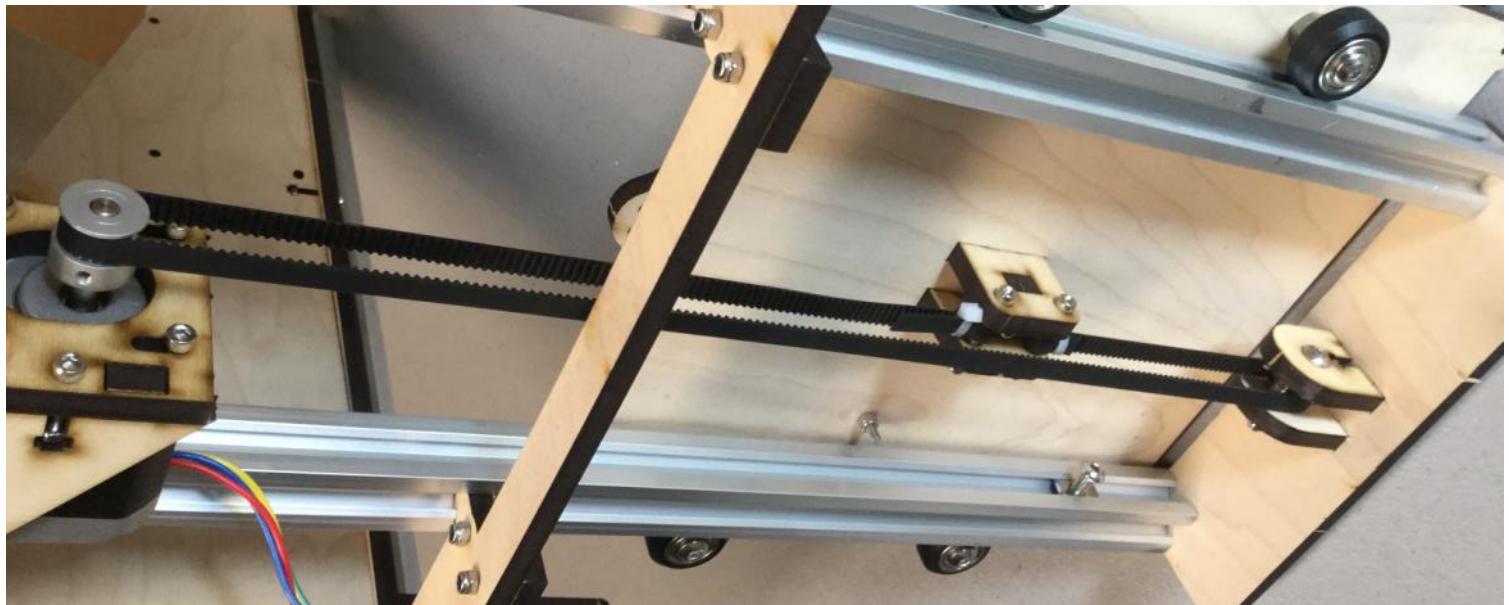
Now get the Printer and flip the Y idler bracket and heat bed mount over and slide the heat bed mount onto the Aluminum Extrusion as shown on the left making sure the delrin idlers are properly aligned on the Extrusion.

Then install a M5x12mm Bolt and T-Slot Nut onto the right Aluminum Extrusion as shown in the picture on the left

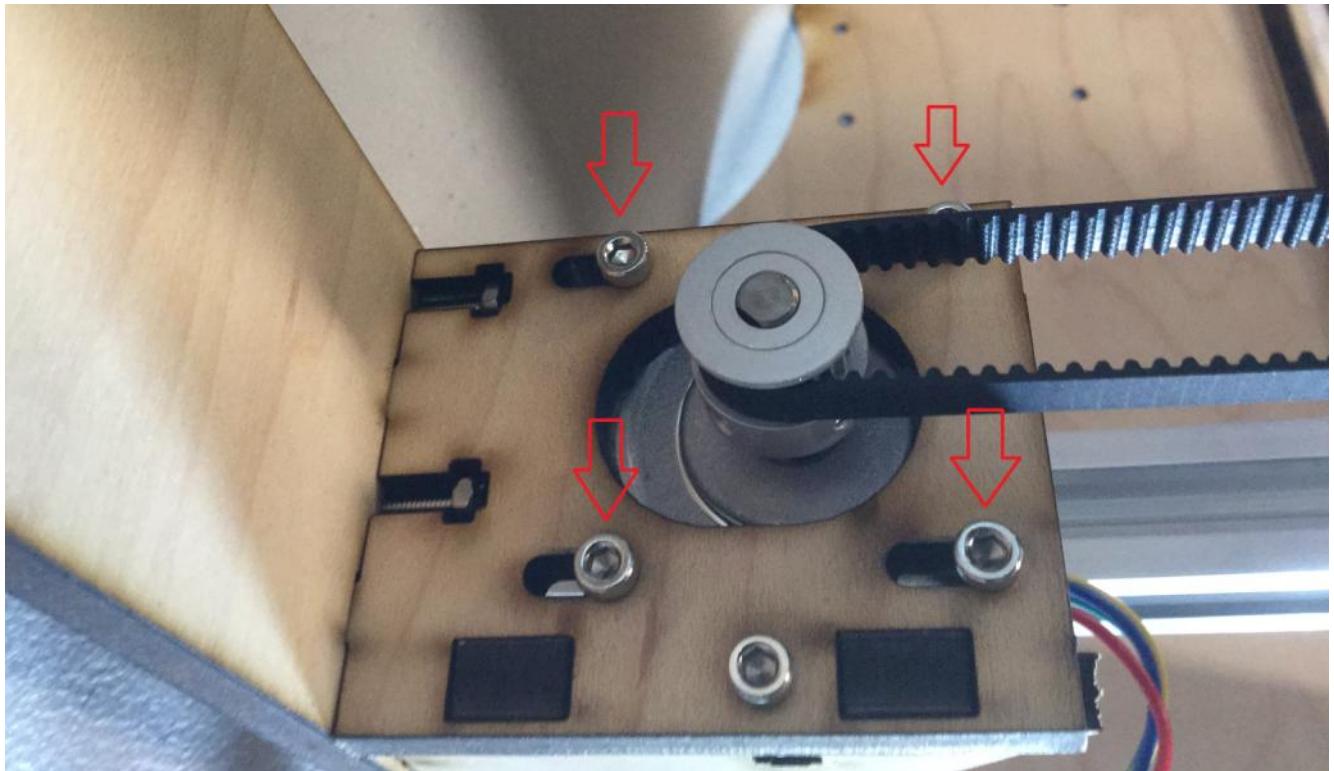
Install an M5x12mm nut through the Y idler and into the two Aluminum Extrusions, Push both the Aluminum Extrusions apart from each other while tightening these bolts along with the M5x12mm bolts in back holding the Aluminum Extrusion to the Y Motor Bracket



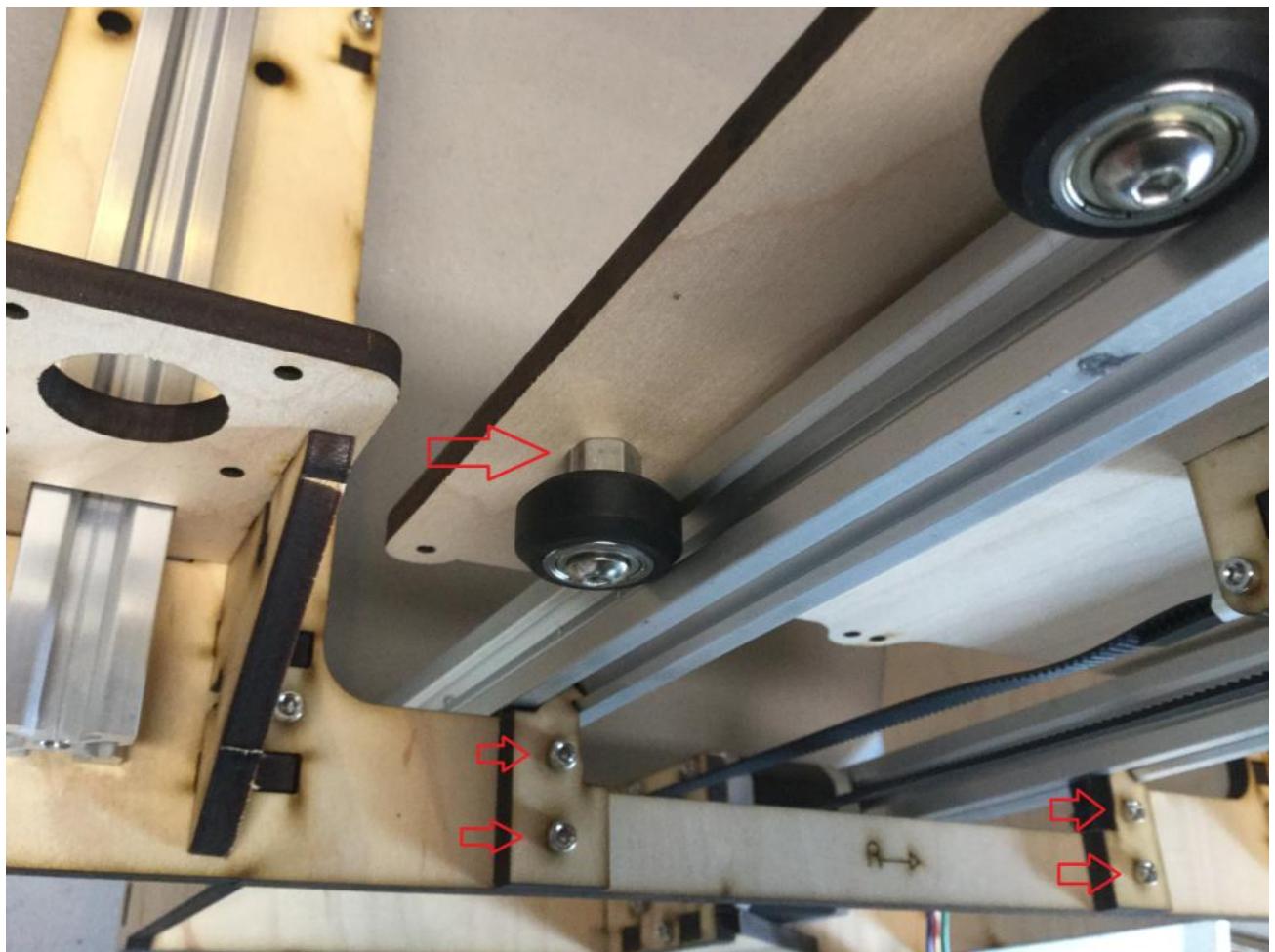
Now run the belt back from the Y idler around the motor and back to the bottom of the Heat bed plate, use another M3x25mm bolt and Nylon Lock Nut to secure the belt in place.

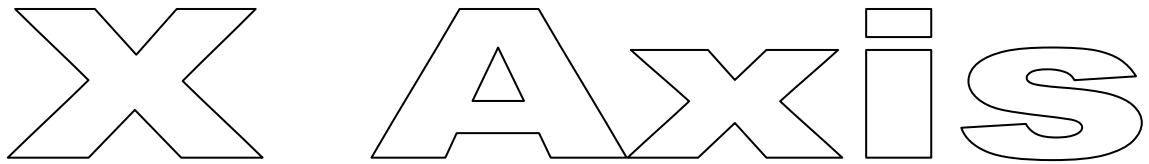


Now pull the motor to the back of the printer and tighten down the 4 bolts securing it to the Y Motor Mount



Now tighten the bolts and nuts shown with the Red Arrows in the picture blow and Adjust the Eccentric Spacers if needed so they completely contact the Aluminum Extrusion





X Axis Assembly

Gather the following parts before watching the X Axis Assembly Video

Assembled X Idler, X Motor, X Carriage and Z Nut Traps (See Picture below)

2 x Aluminum Extrusion

4 x M5x12mm Bolt

4 x T-Slot Nuts

4 x M3x10mm Bolts

1 x Motor

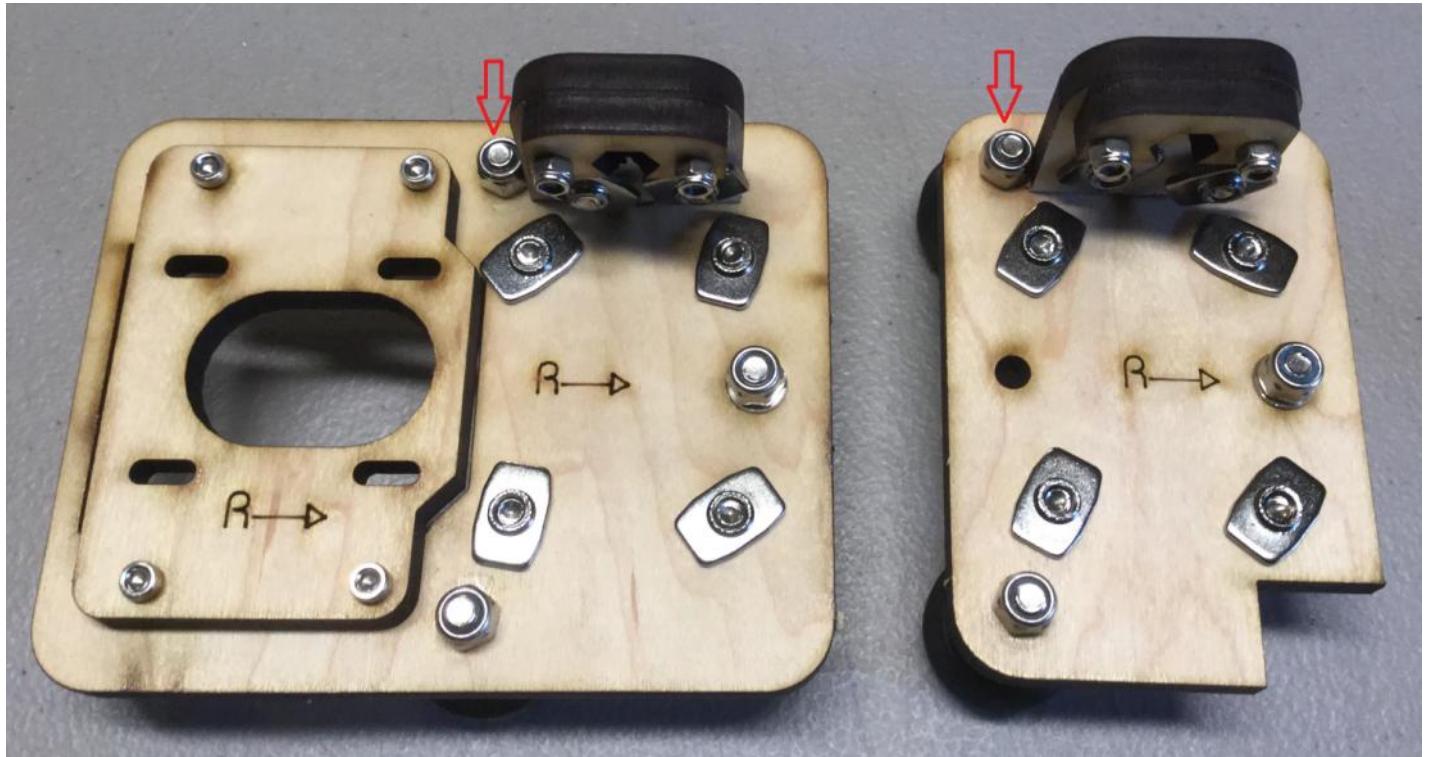
1 x GT2 Gear

1 x Set Screw (for the gear M3x5mm grub)

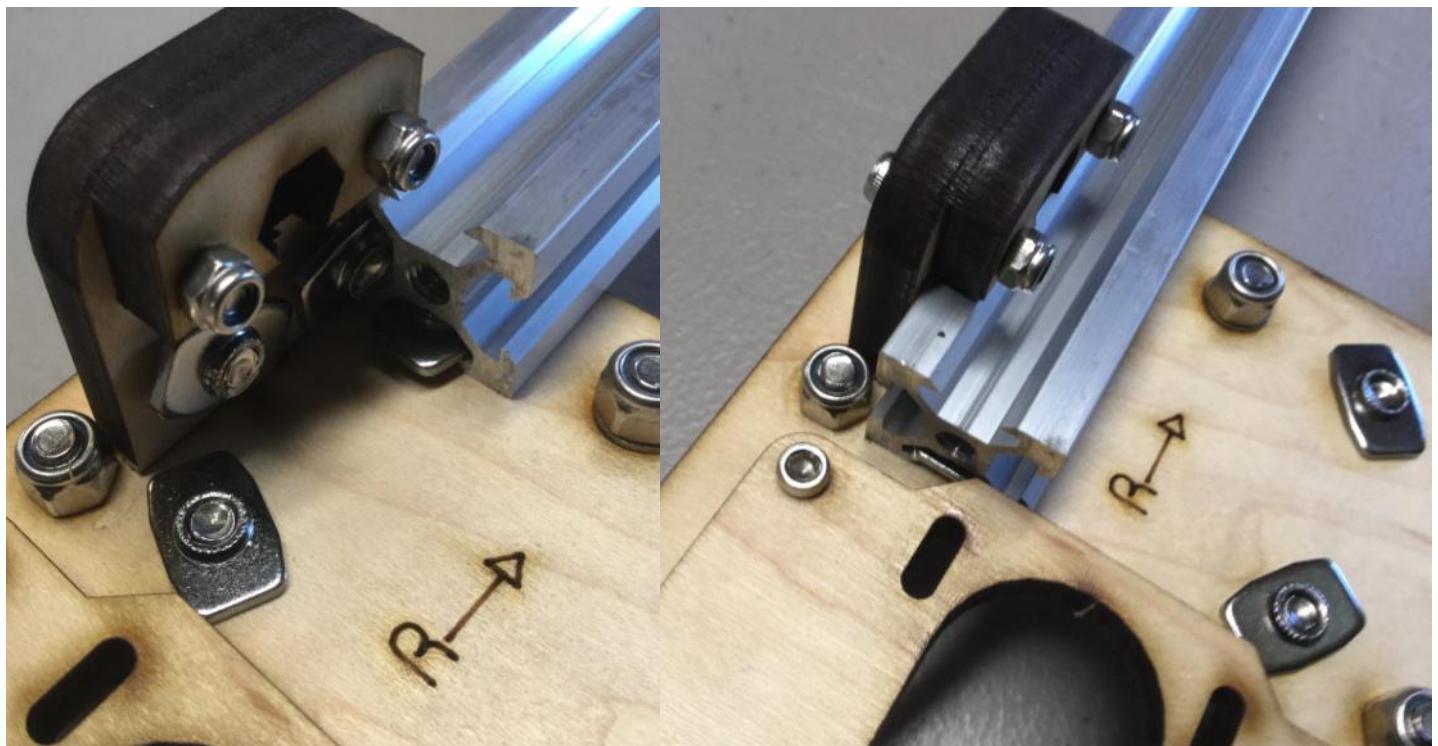
1 x GT2 Belt cut to 30"



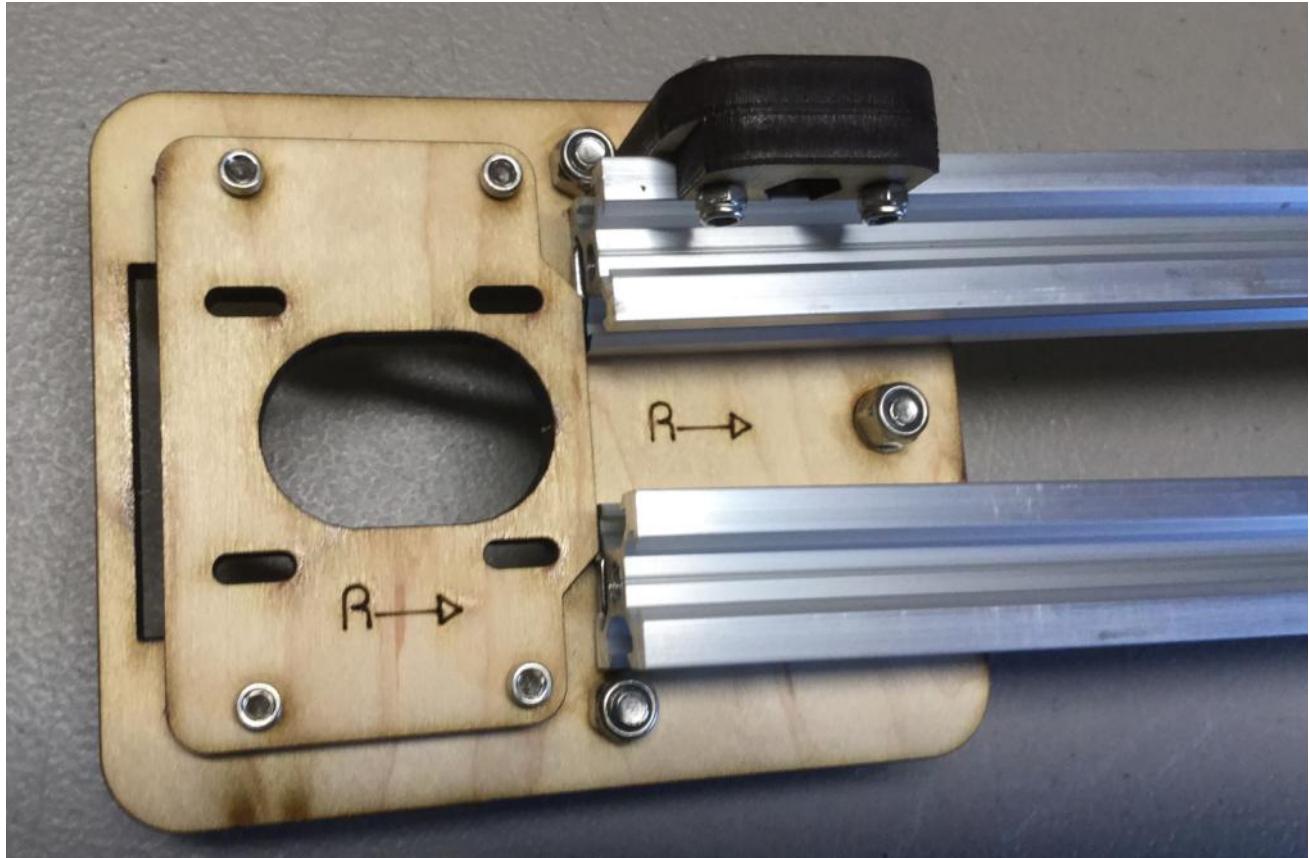
Insert the Z nut traps into the X motor and X idler pieces, you may need to rotate the M5 nut shown below with the red arrow to get the Z nut traps to seat properly.



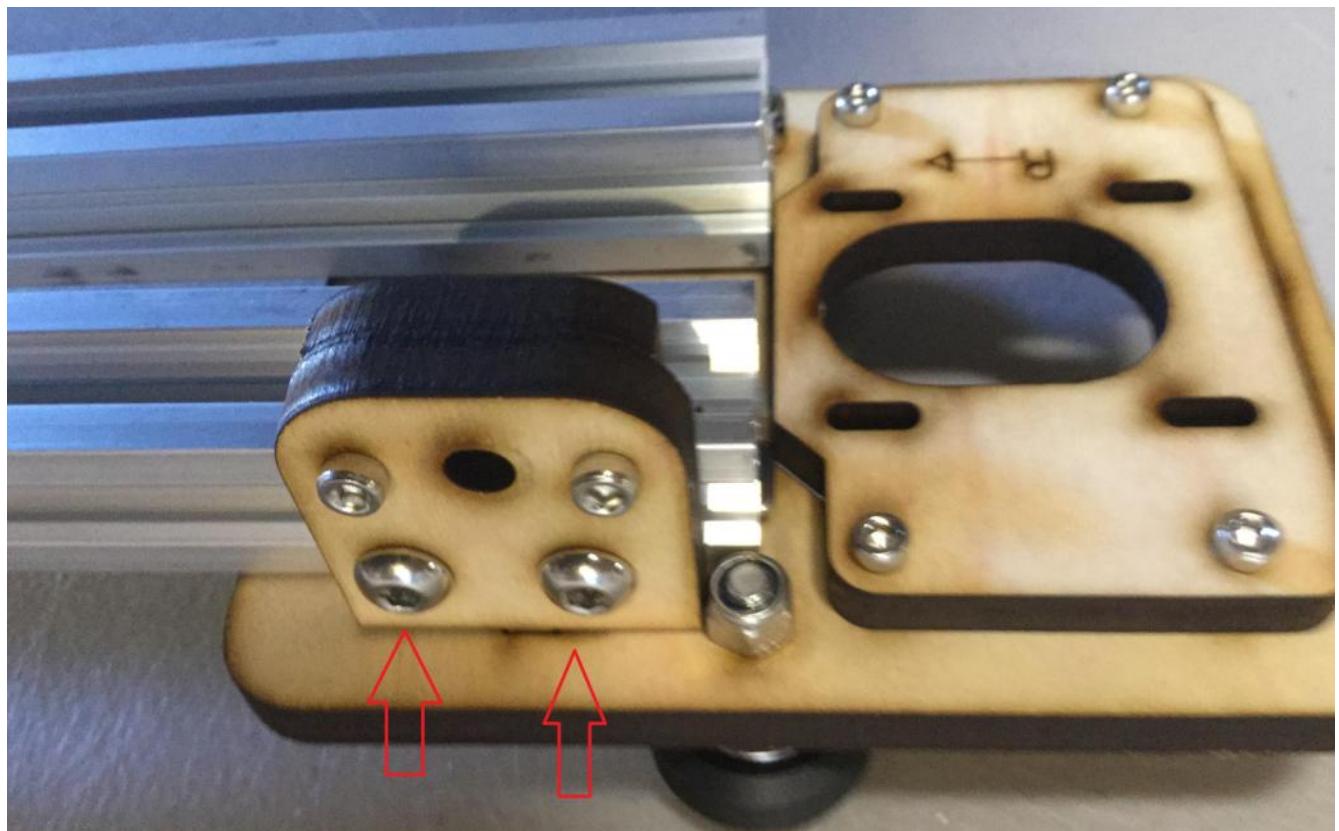
Next get one of the Aluminum Extrusions, align the 2 T-Slot nuts on the Z nut trap and 2 T-Slot nuts on the X motor bracket with the Aluminum Extrusion, push the aluminum extrusion till the hits the X motor wood piece.



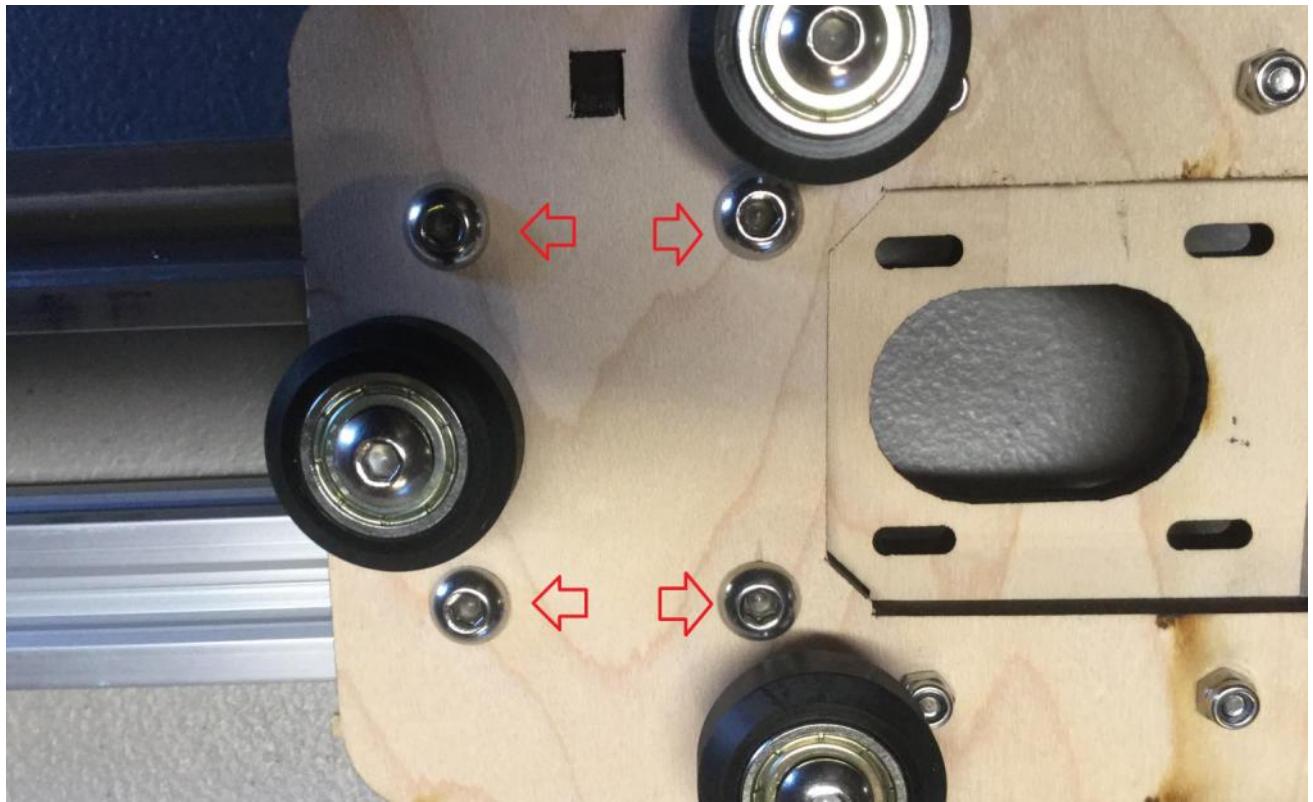
Next get the other Aluminum Extrusion, align the 2 T-Slot nuts on the X motor bracket with the Aluminum Extrusion, push the aluminum extrusion till the hits the X motor wood piece.



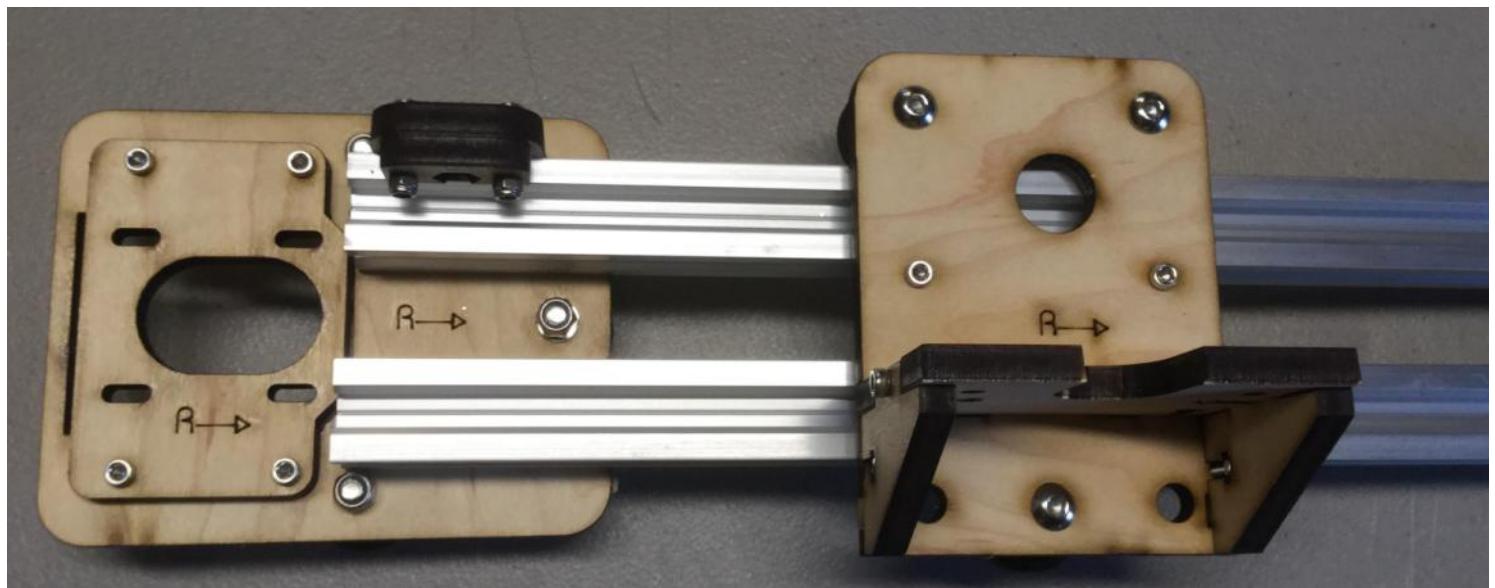
Now while pushing the two aluminum extrusion apart from each other so they are parallel tighten the two M5x12mm nuts in the Z nut trap (See red arrows below)



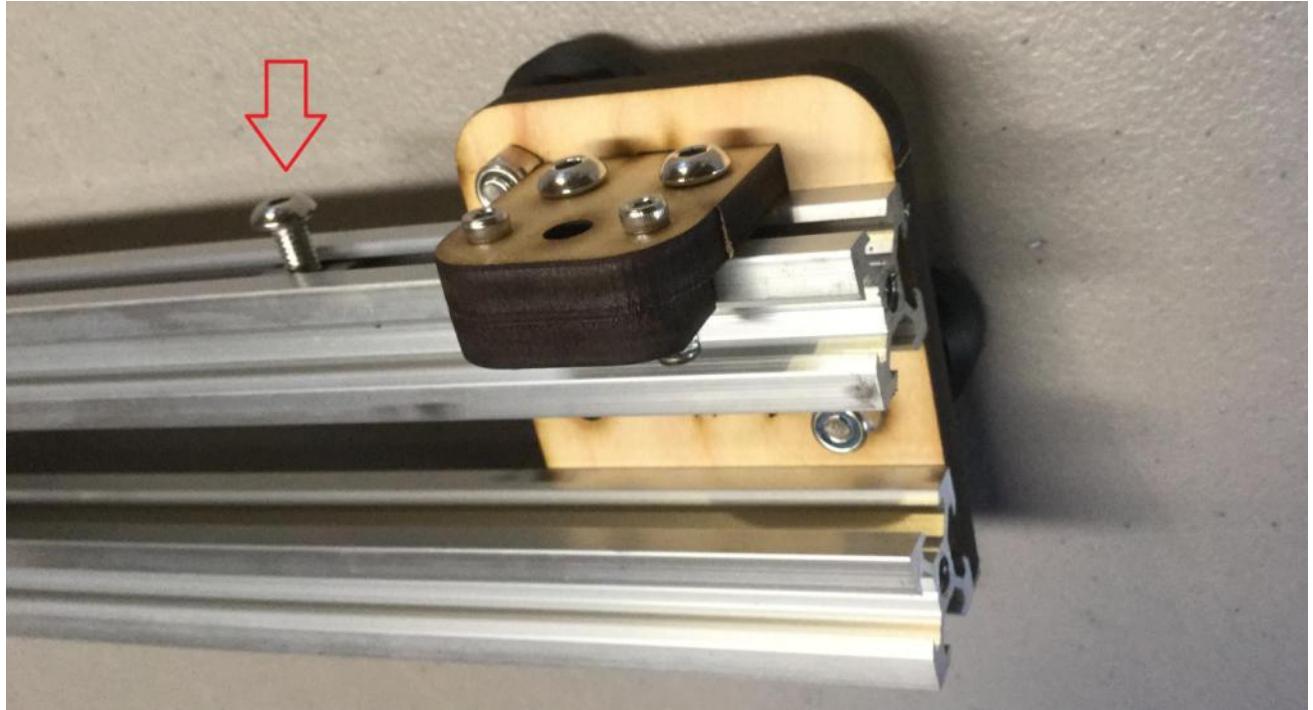
Now tighten the 4 M5x12mm bolts on the underside of the X motor bracket that will secure the Aluminum Extrusion to the X motor bracket



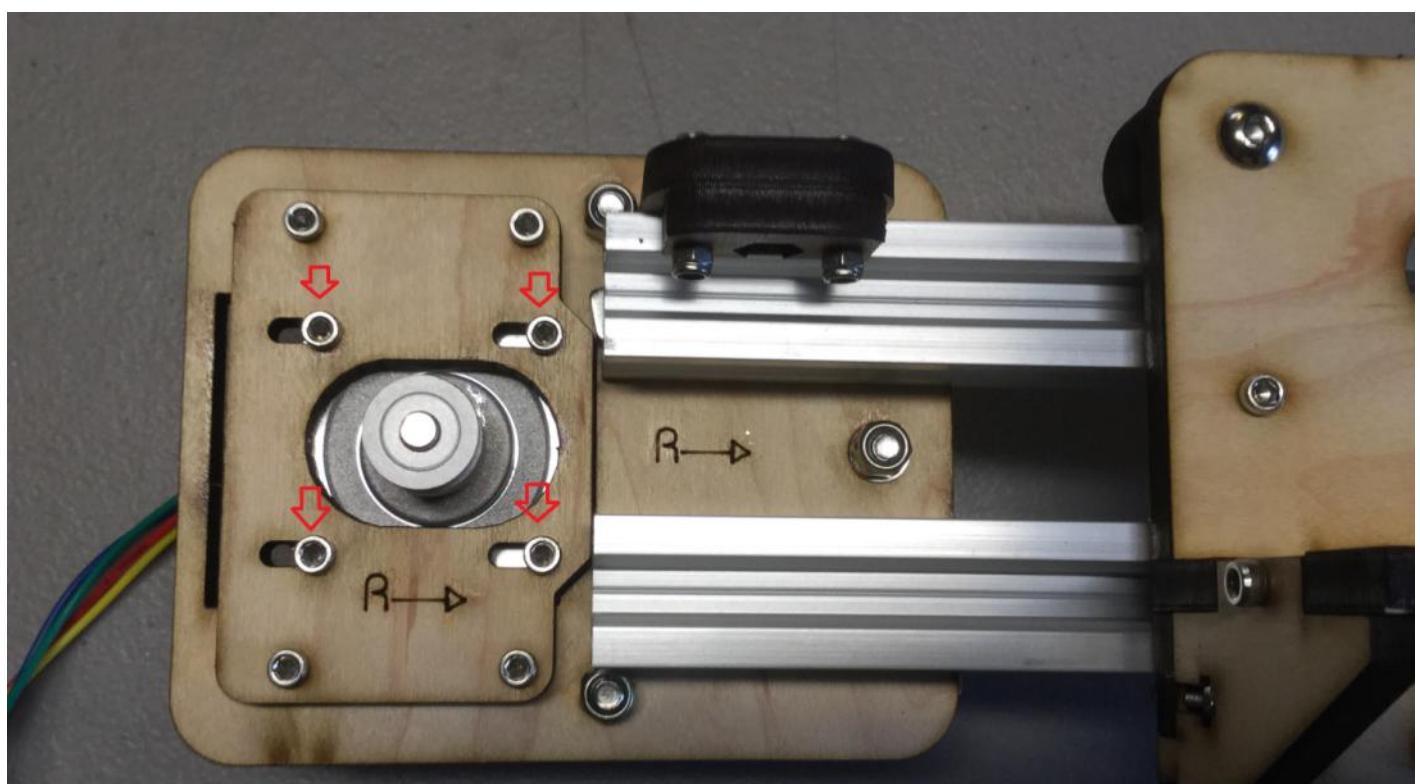
Now slide the X carriage onto the extrusion, make sure that all the R→ Point the same direction.



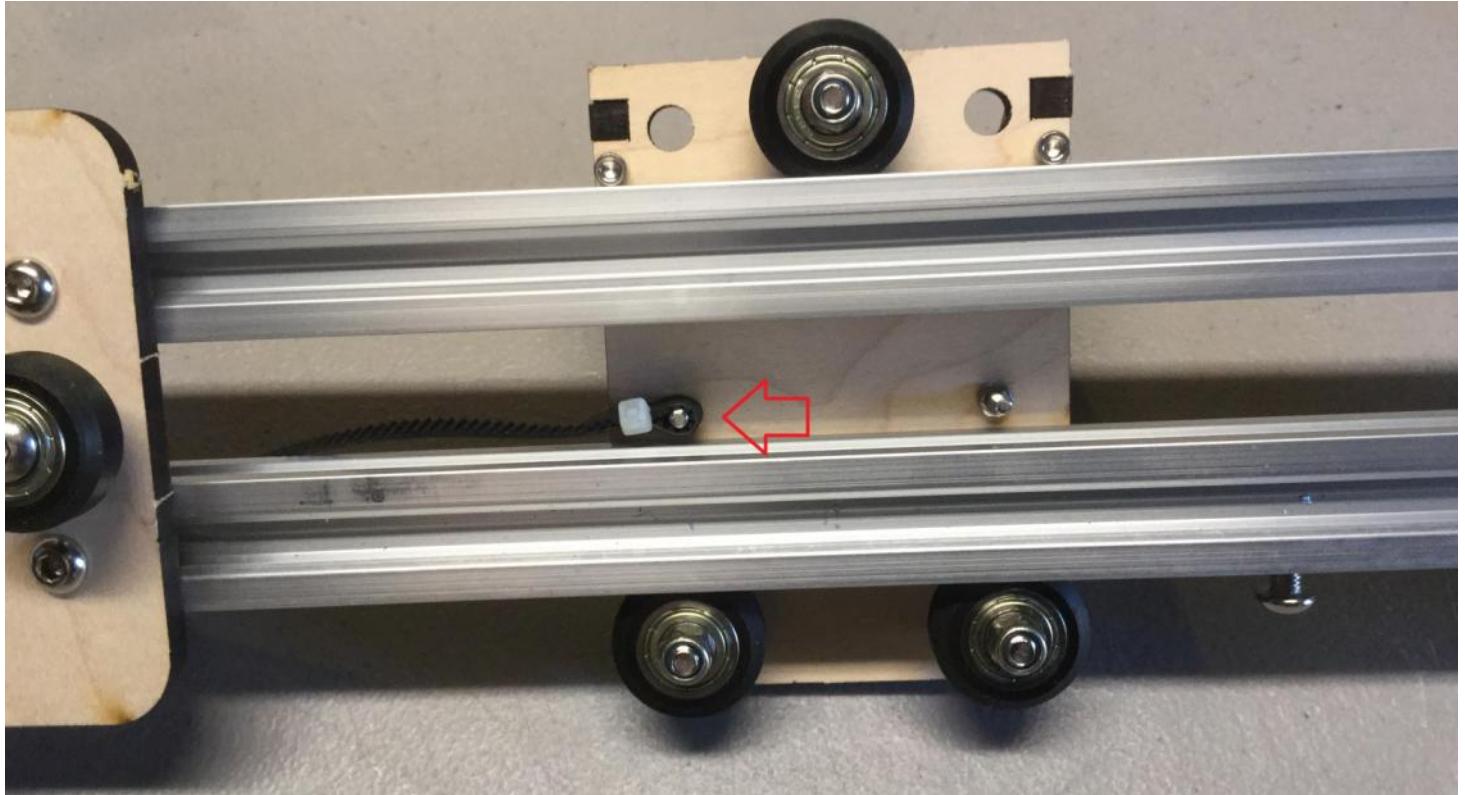
Next install an M5x12mm bolt and T-slot nut in to the top slot in the top Aluminum Extrusion, this will be used later for our X endstop. Then Align the nut traps and install X idler and Z nut trap onto the Aluminum extrusion, but keep these bolts loose.



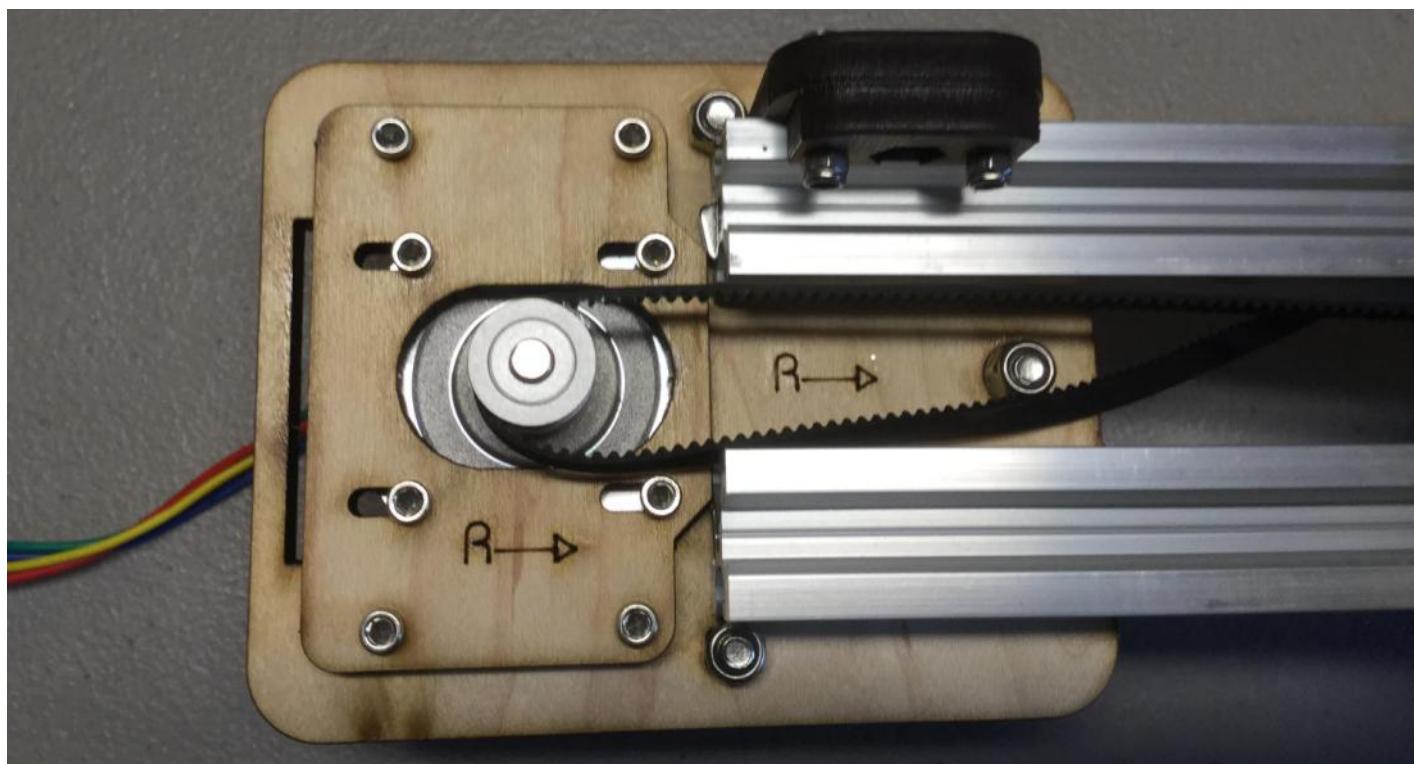
Next get the Nema 17 motor and GT2 gear, install the gear onto the motor, the motor shaft will stick up about 3mm from the top of the gear. Tighten the set screw down on the flat spot of the motor shaft then install 4 M3x10mm bolts to hold the motor onto the X motor bracket, leave these 4 bolts loose.



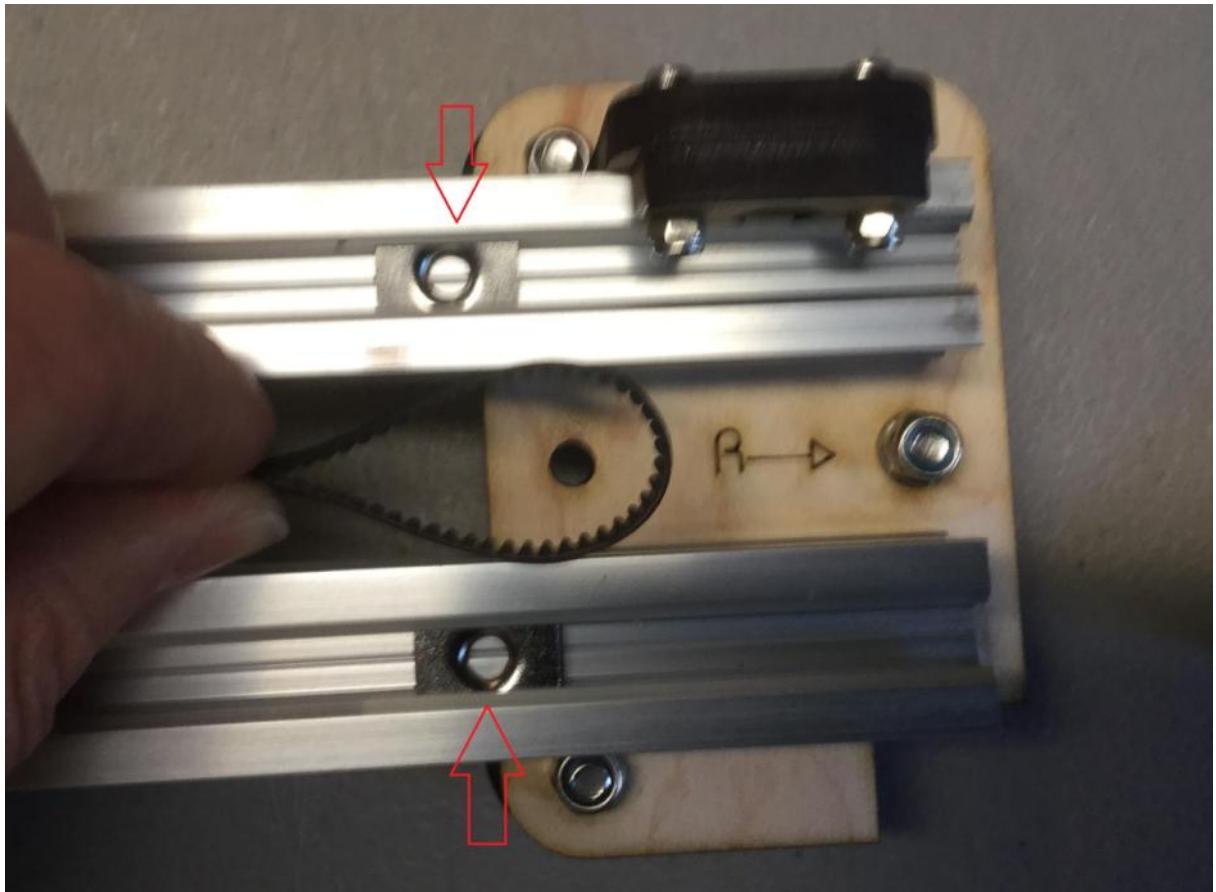
Next get your 30" GT2 belt, loop the ends of the belt and zip time them like we did on the Y belt, when both ends have been looped you will want this belt to be 28" in length. Flip the X axis over so we can look at the back of the X carriage and install one belt on to the X carriage as shown below.



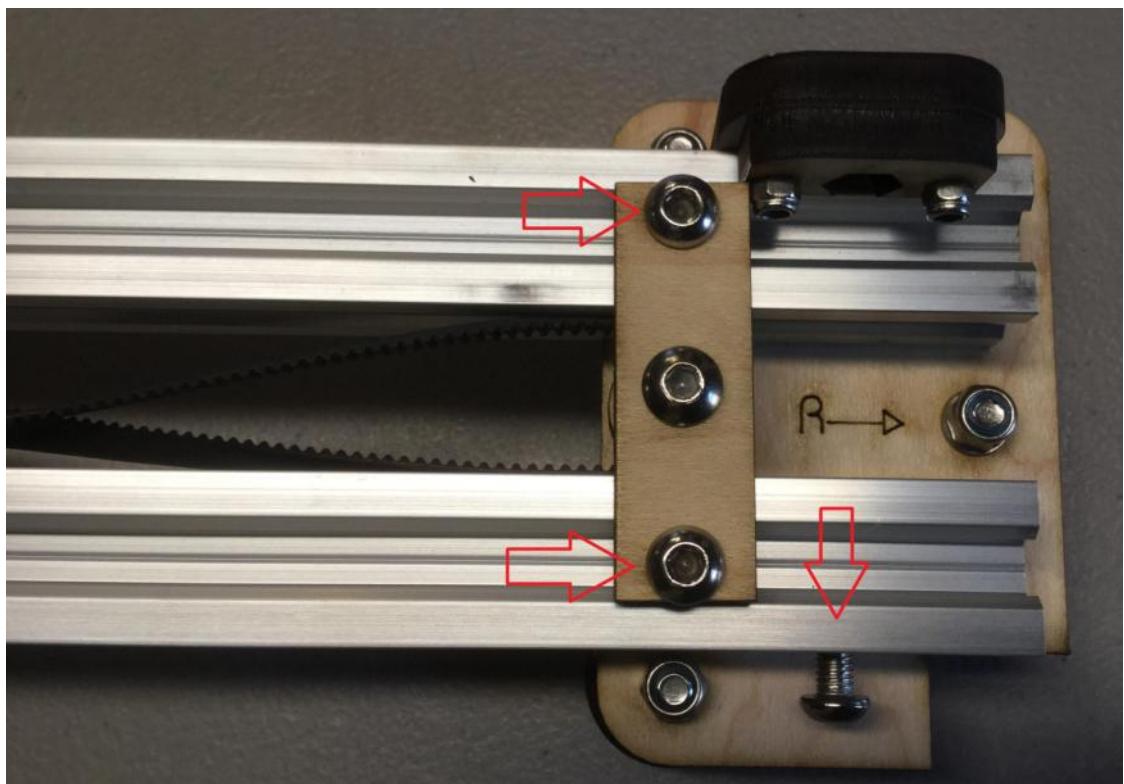
Now route the belt around the GT2 gear on the Motor and then back past the X carriage to the X Idler.



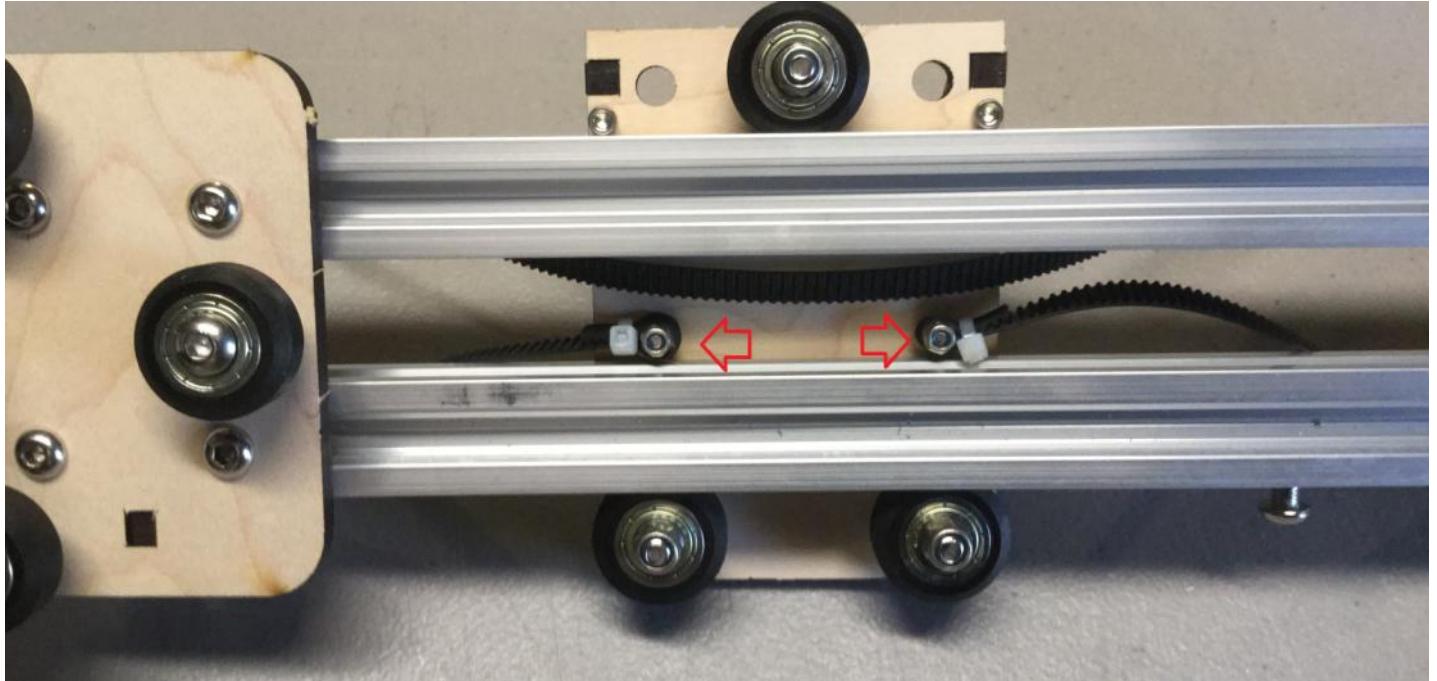
Install 2 T-Slot nuts into the extrusion on the X Idler side and loop the belt as shown below.



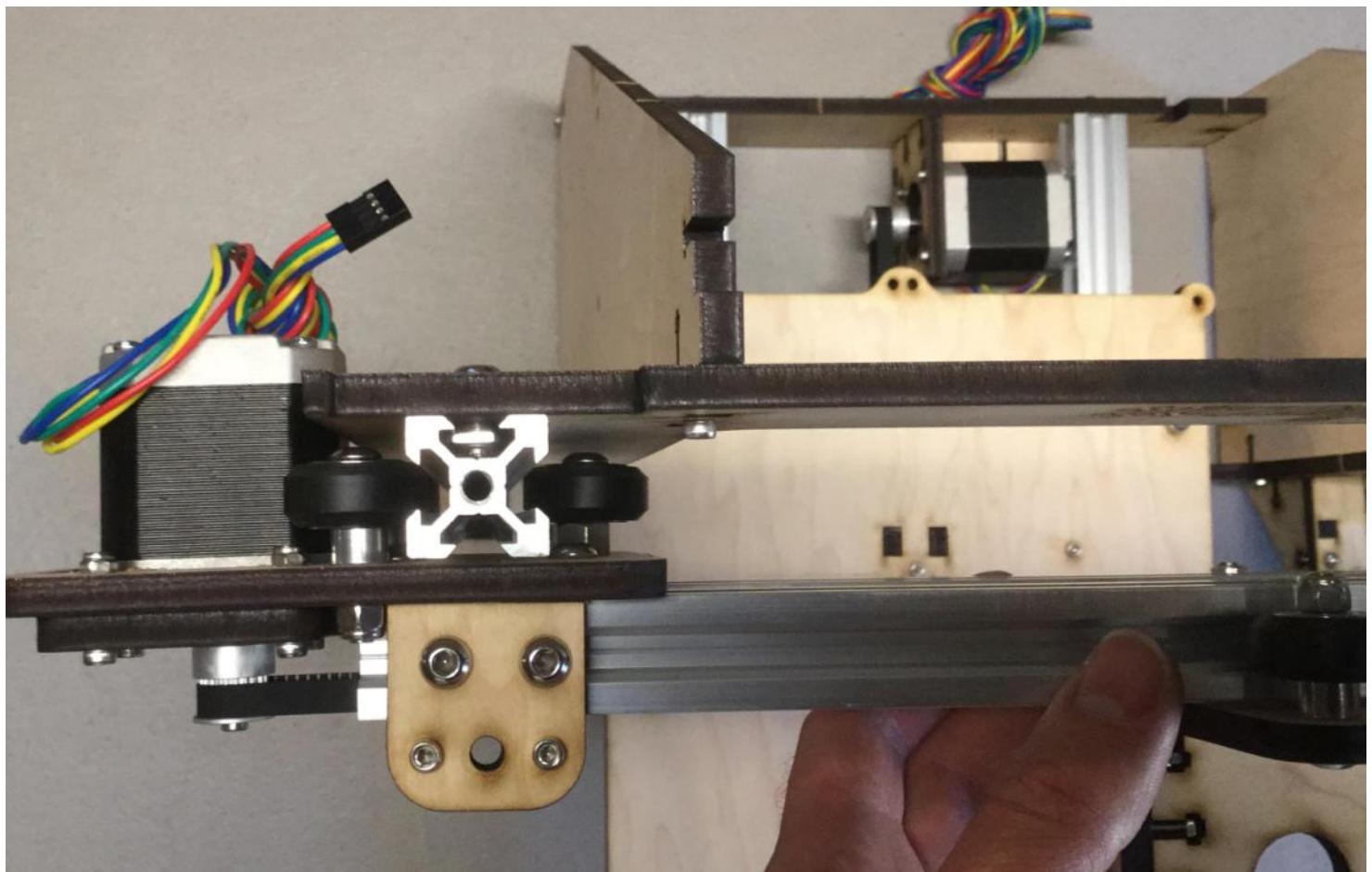
Install the Idler piece into the top then secure with 2 M5x12mm Bolts with the 2 T-Slot nuts you just installed, but keep the bolts loose. Last install a M5x12mm bolt and T-Slot nut into the bottom of the lower Extrusion.



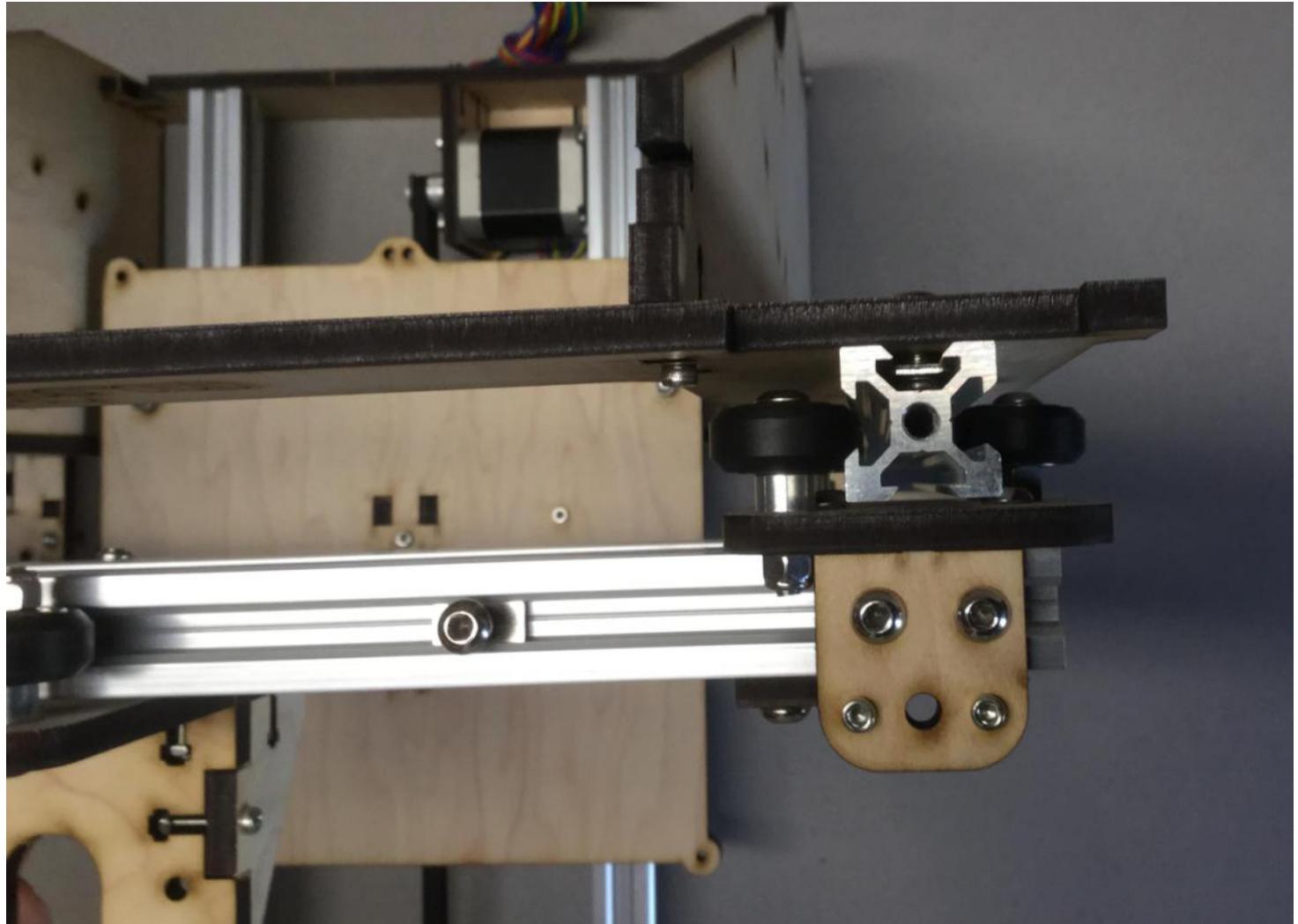
Now bring the belt back to the X carriage and install it onto the other bolt, then install an M3 Nylon Lock nut onto the two bolts to secure the belt in place.



Next we will install the X axis onto the printer frame, Align the X motor side of the X axis with the Extrusion on the left side of the frame so the extrusion goes inbetween the delrin idlers on the X motor bracket.

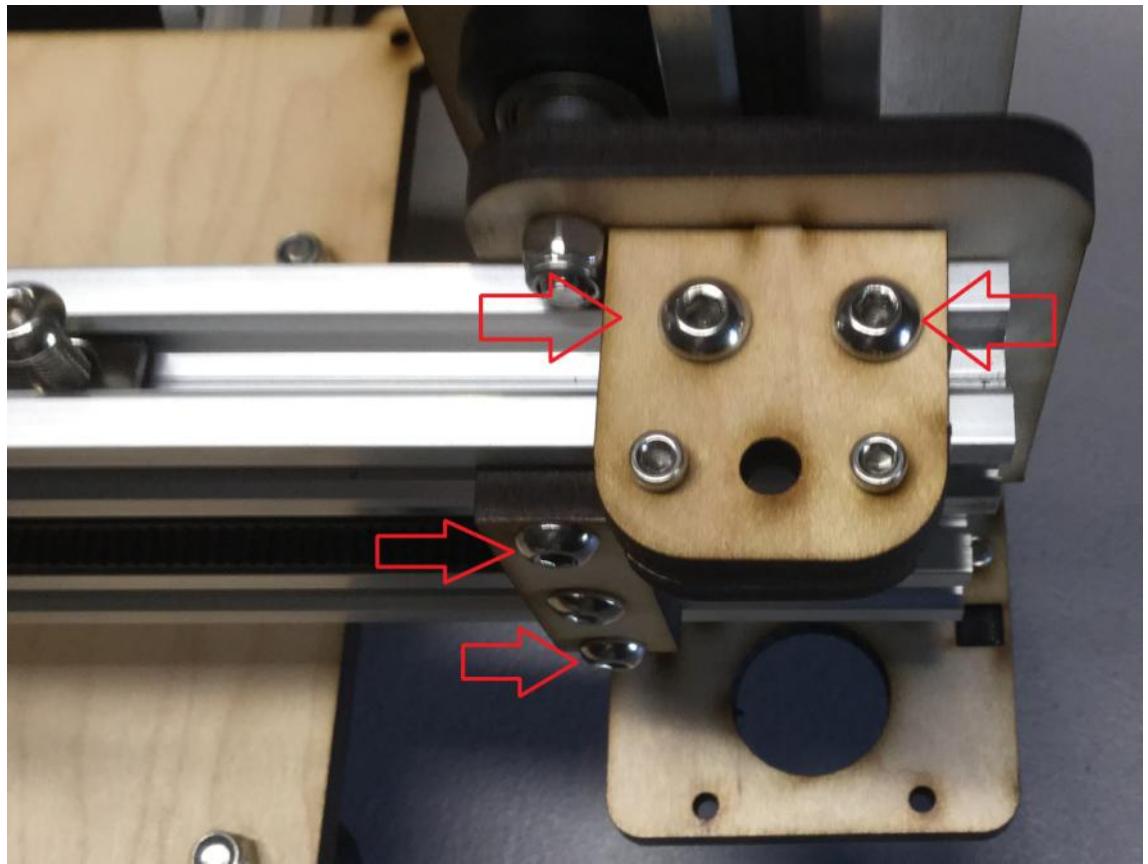


Now move the X idler until it aligns with the extrusion on the right side of the machine (The bolts on the x idler should still be loose so we can move it right and left on the X extrusion.



Now check the delrin idlers on the X motor and X idler brackets, if all delrins are not contacting the vertical aluminum extrusion adjust the eccentric spacers now.

Next tighten the 2 M5 bolts securing the Z nut trap on the X Idler and the 2 M5 bolts holding the Idler to the X idler bracket and extrusion.



Last lift the X axis up so the holes in the back of the frame align with the 4 holes in the back of the X idler then tighten the 4 bolts holding the X idler to the horizontal X axis aluminum extrusion.



LCD installation

LCD

Gather the following parts

1 x Wood Parts shown below

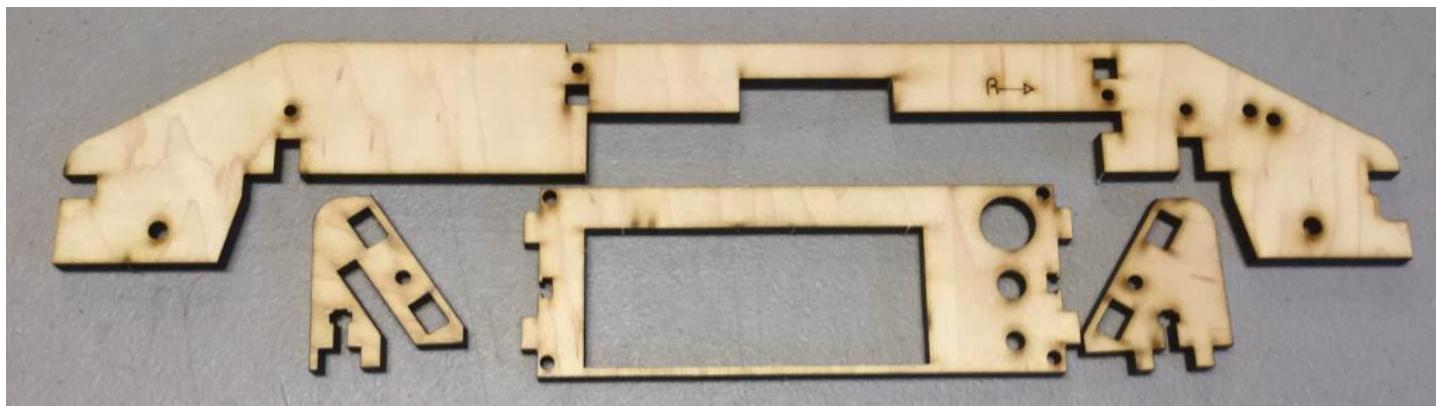
8 x M3x16mm Bolt

2 x M3x10mm Bolt

6 x M3 nuts

4 x M3 Lock nuts

1 x LCD Interface



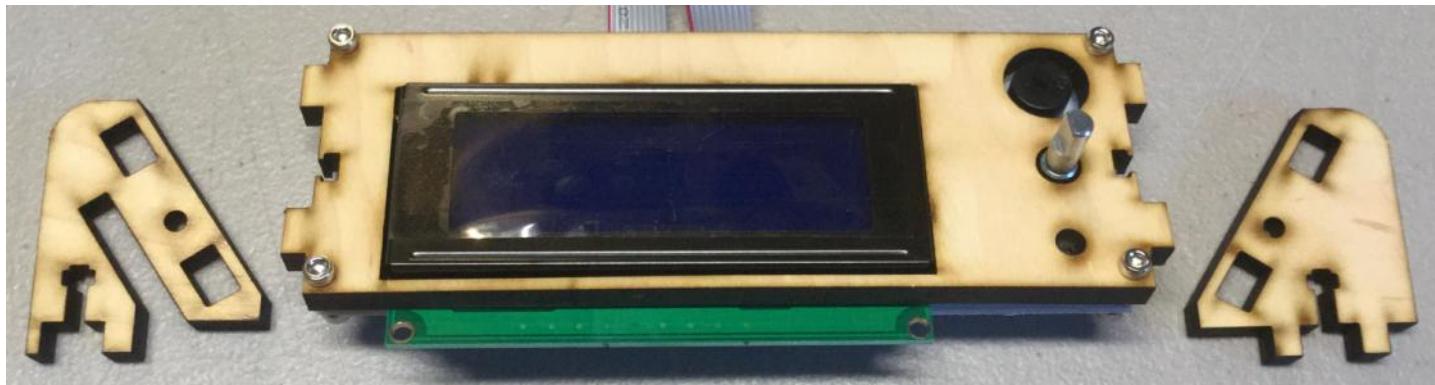
Put the wood piece on top of the LCD then install a M3x16mm bolt into each corner



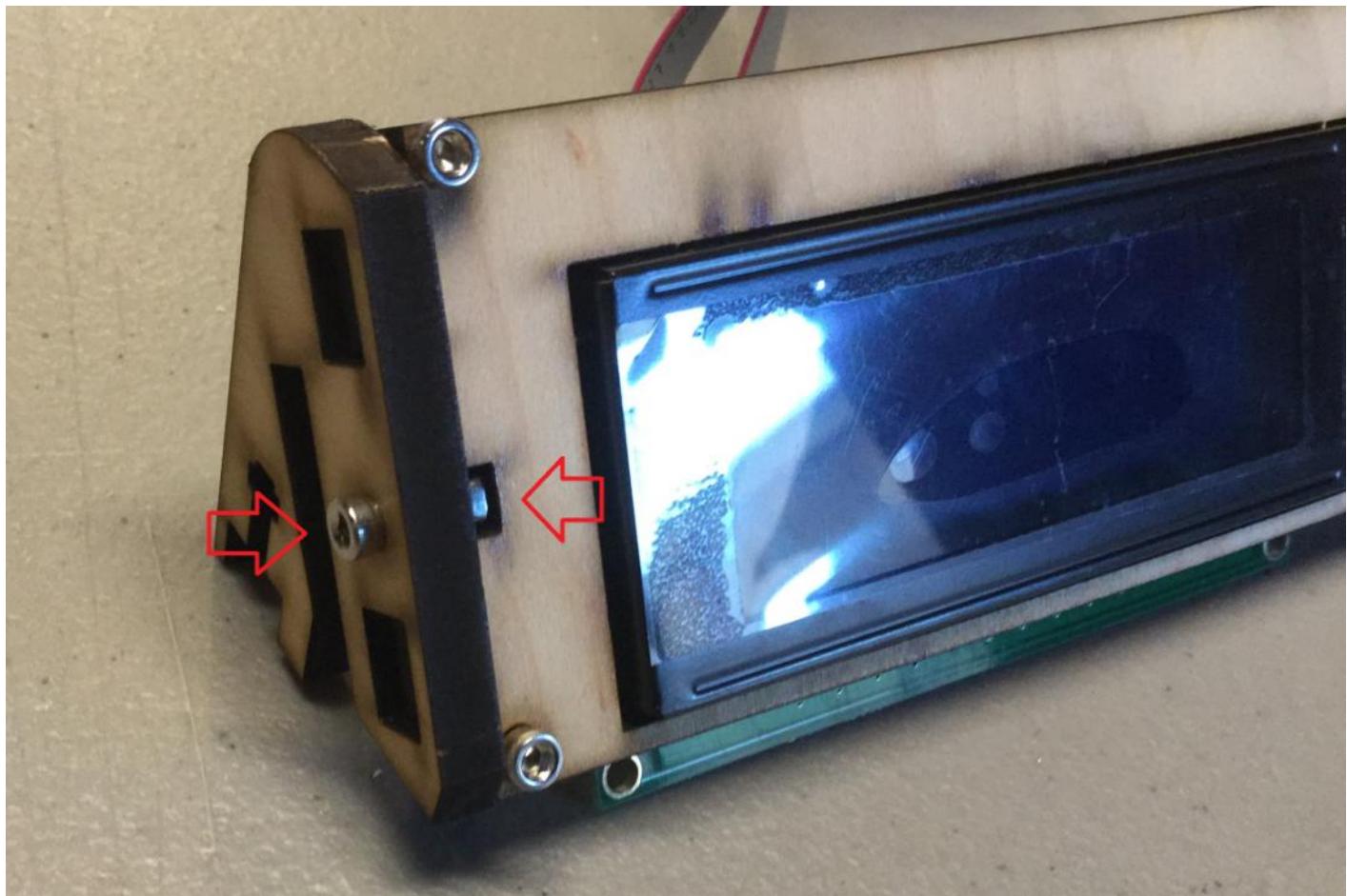
Flip the LCD over and install an M3 Nylon Lock Nut on each of the M3x16mm bolts. Tighten them down, but do not tighten them so much that the electronic board bends.



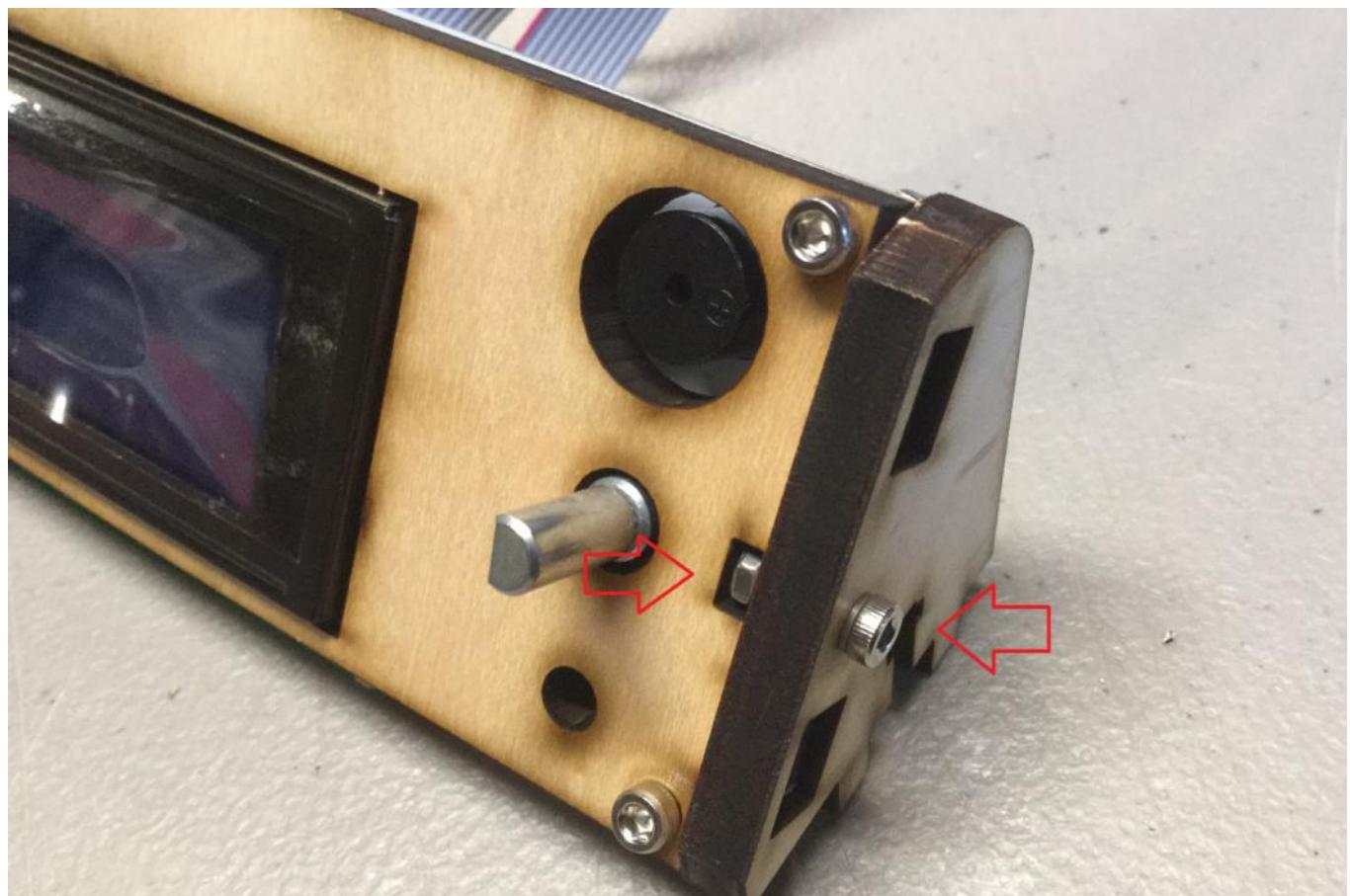
Get the side pieces for the LCD, they will be installed as shown below.



Install an M3x10mm bolt and regular M3 nut to secure the side piece.



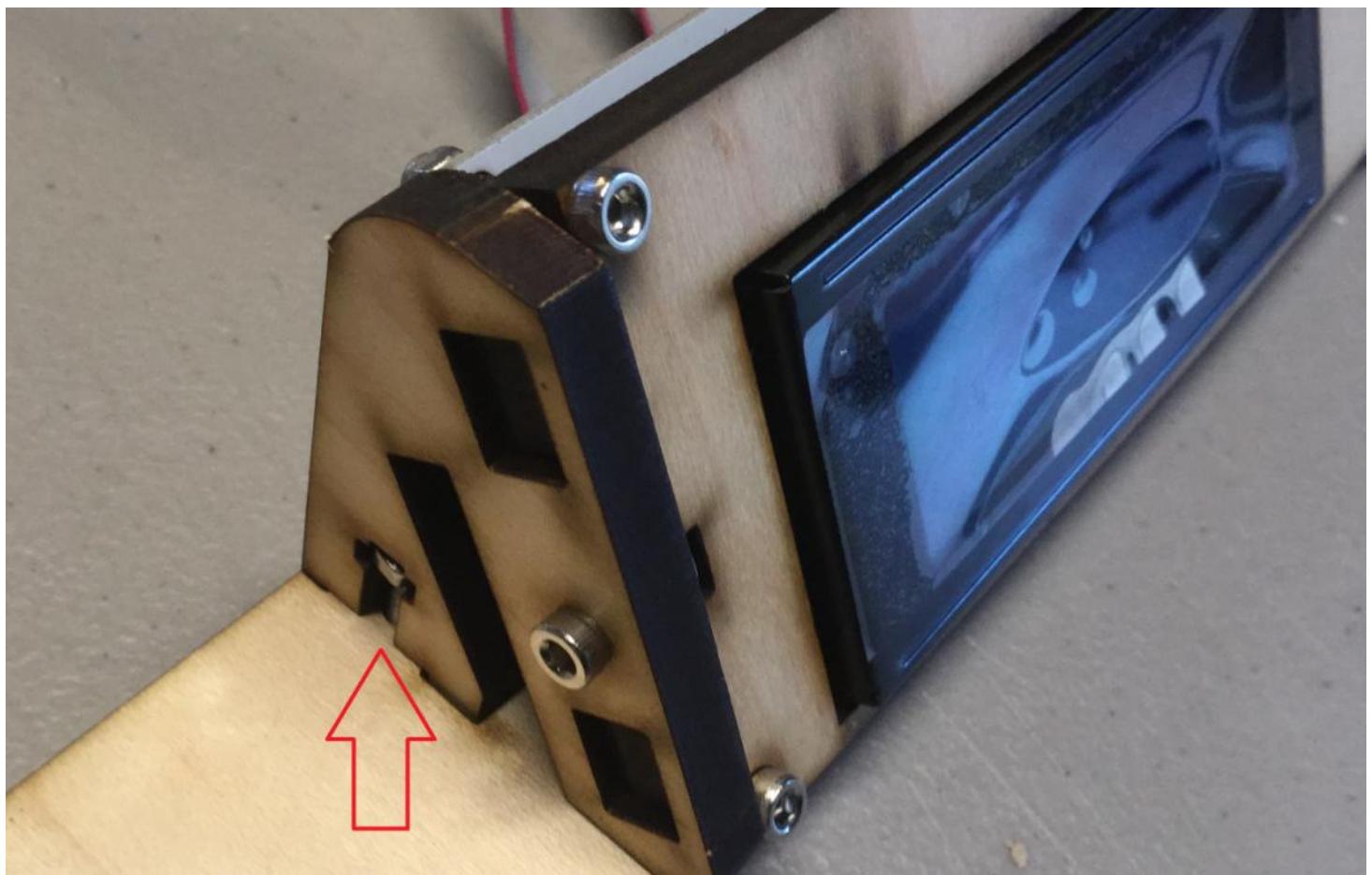
Do the same for the other side with an M3x10mm bolt and regular M3 Nut



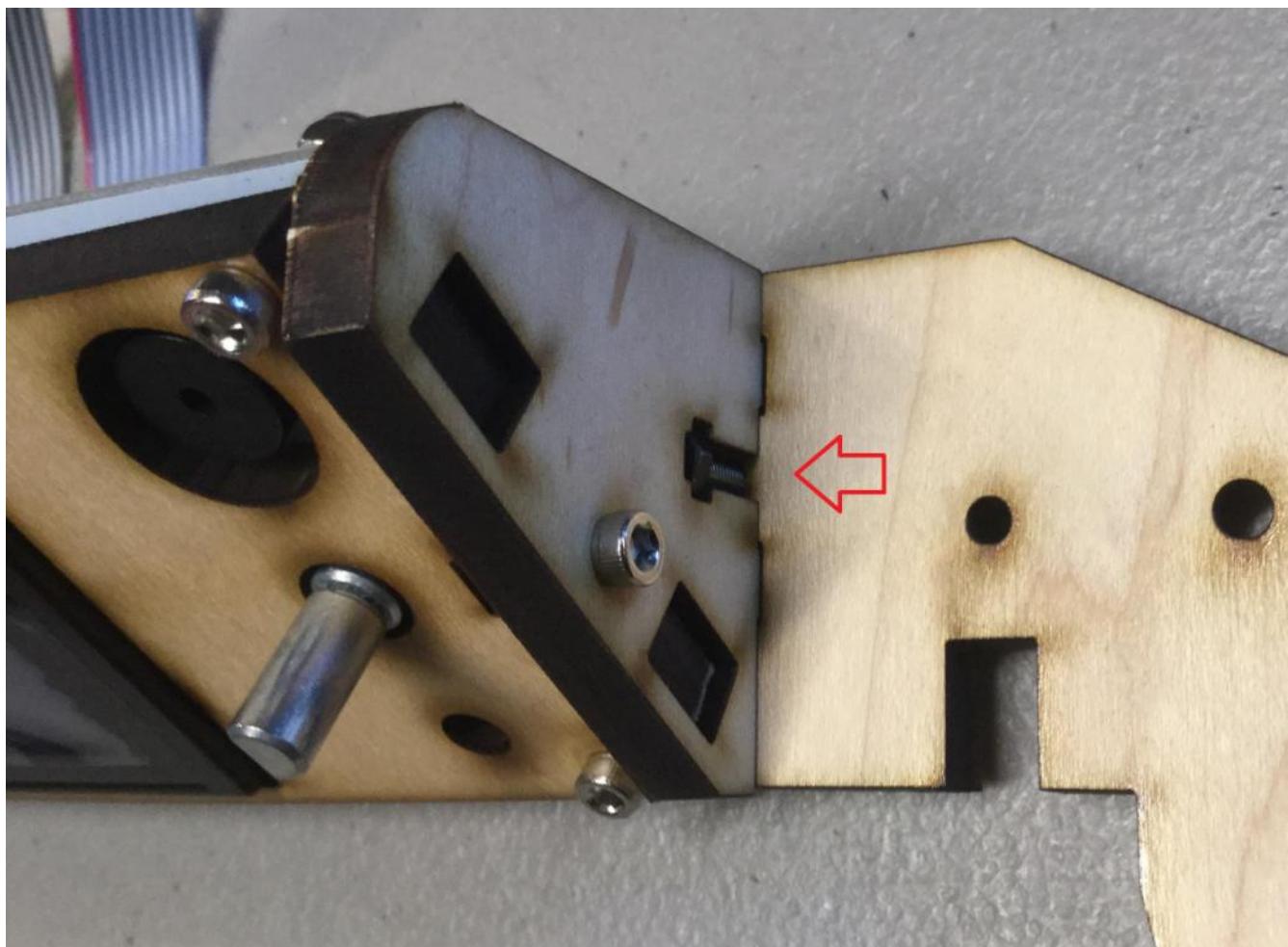
Install the LCD onto the wooden top piece



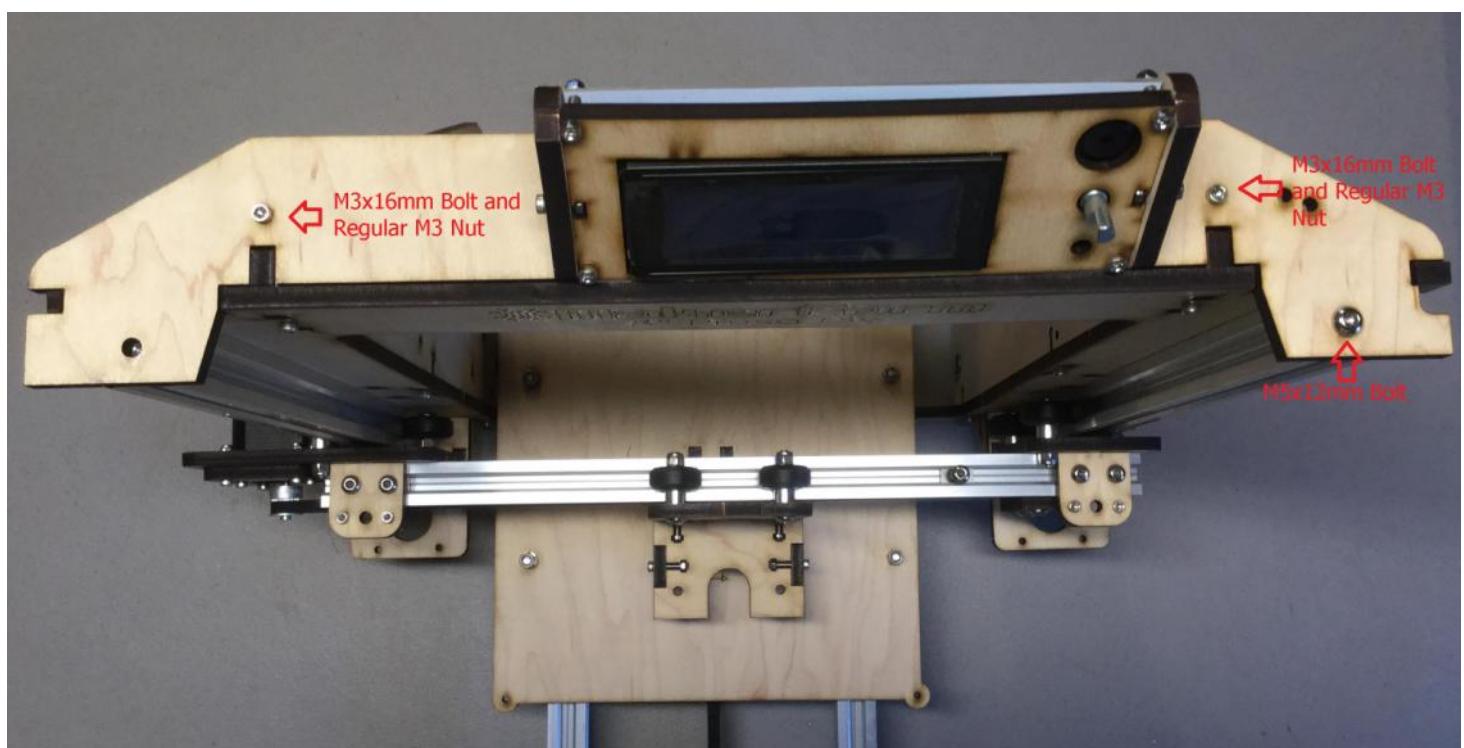
Install an M3x16mm Bolt and Regular M3 nut to secure the LCD to the top wooden piece.



Install an M3x16mm bolt and regular nut into the right side of the LCD mount



Last bolt the Assembly to the top of the printer using 2 M3x16mm bolts, 2 Regular M3 nuts and one M5x12mm bolt as shown below.



Z Motors

Z Motor

Gather the following parts

1 x Partially Assembled Printer

2 x Motors

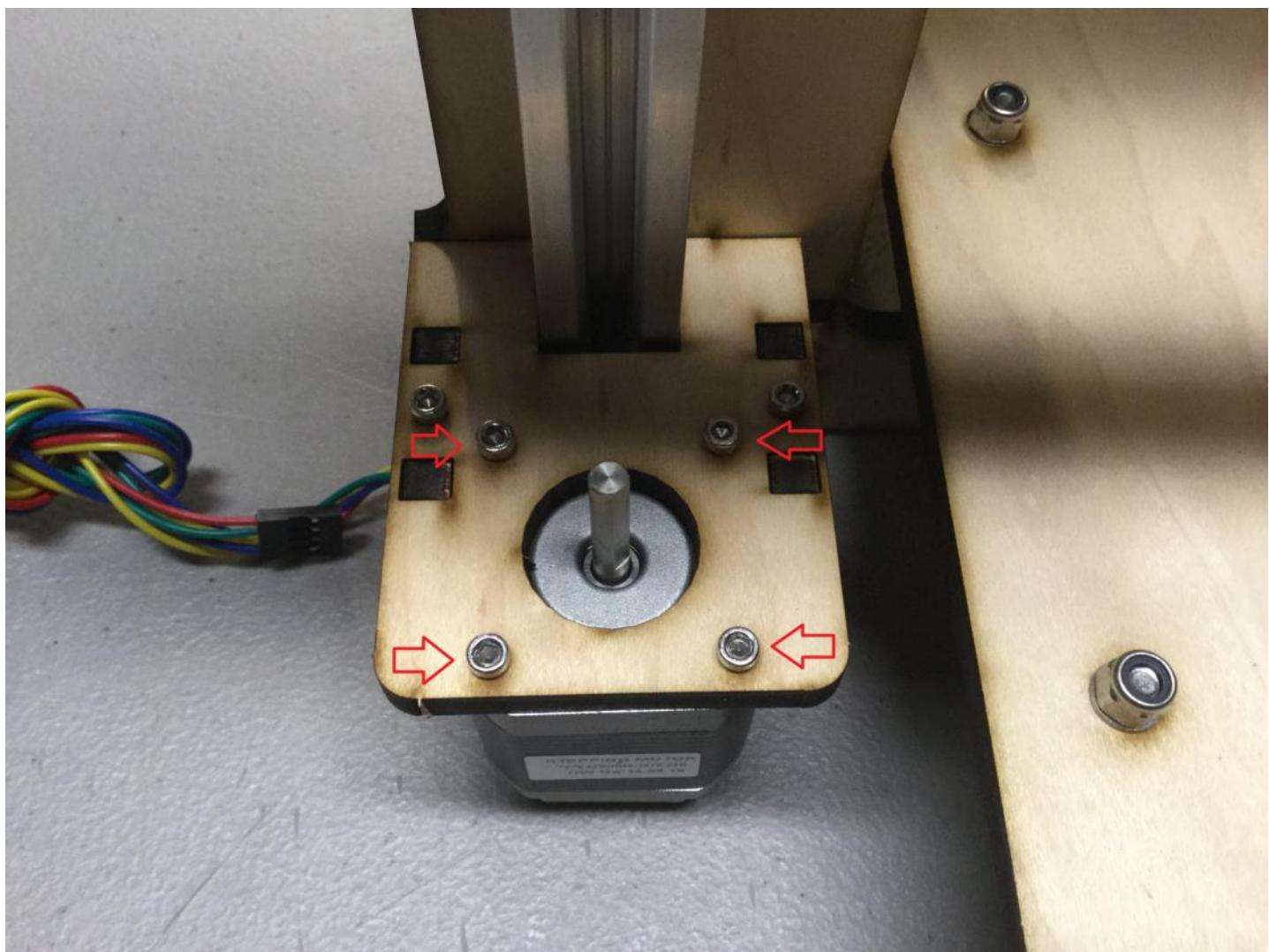
8 x M3x10mm Bolt

2 x Clear Tubing

2 x M5 Threaded Rods

2 x M5 Nut

Install a Z motor into each Z motor bracket using 4 M3x10mm bolts as shown below



Next Prop up the X axis with something so you can work on the motor.

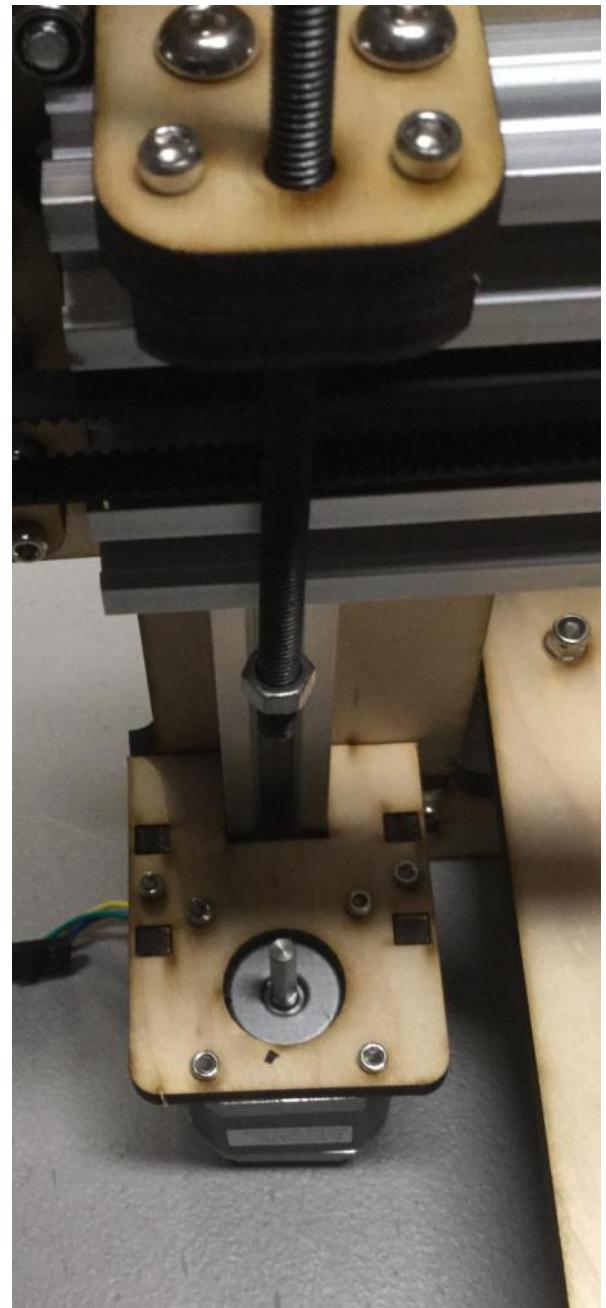
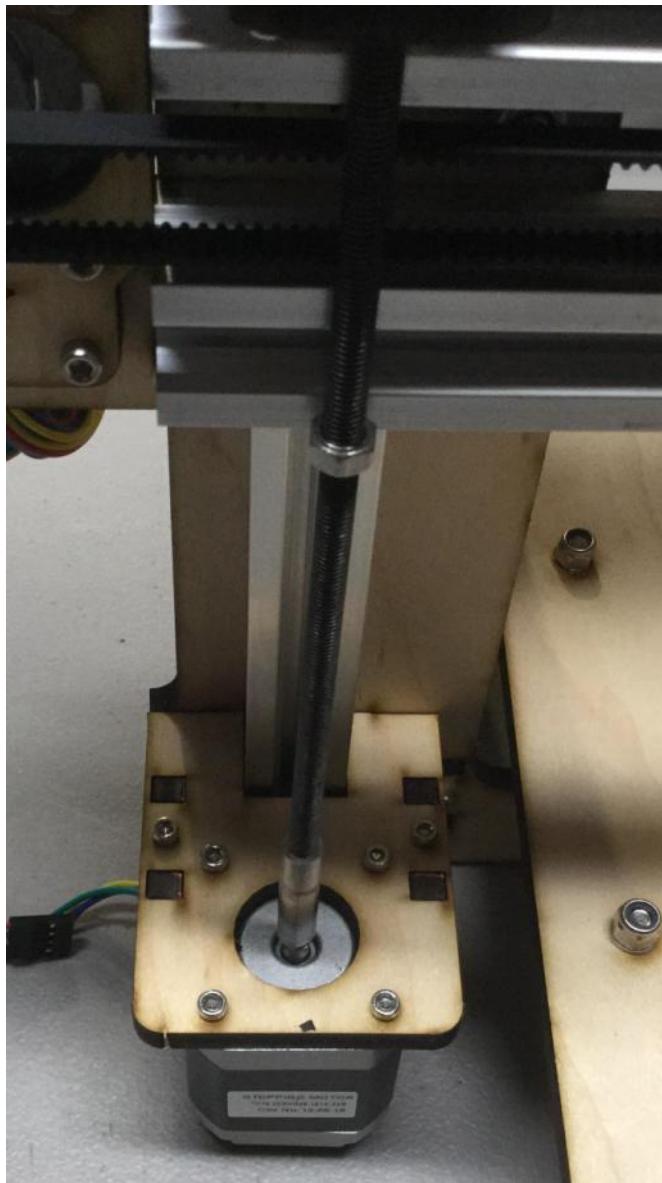
Thread a threaded rod through the Z nut trap and install an M5 nut until the threaded rod reaches the Motor shaft and the Nut is about 4" above the motor shaft. Repeat for the other Z motor.

Next Push the clear tubing half the way onto the motor shaft and spin the threaded rod into the clear tubing until the threaded rod contacts the motor shaft.

Last lower the X axis onto the threaded rods, align the M5 nuts so the sit into the Z Nut traps.

At this point the Aluminum extrusion on the x axis should be parallel to the Y axis heat bed mount,

you can measure from the bottom of the aluminum extrusion to the top of the Y axis heat bed mount on the right and left sides.



If needed hold onto both threaded rods and turn one until they are the same distance. If one side of the X axis pops up off the nut trap you will want to raise the X axis so it aligns with the holes in the frame, loosen the bolts holding the X motor bracket and X idler bracket to the aluminum extrusion and loosen the Z nut traps, then sit the X axis on the Z nuts make sure everything is parallel then tighten them back down.

Heat Bed Installation

Heat Bed installation

Gather the following parts

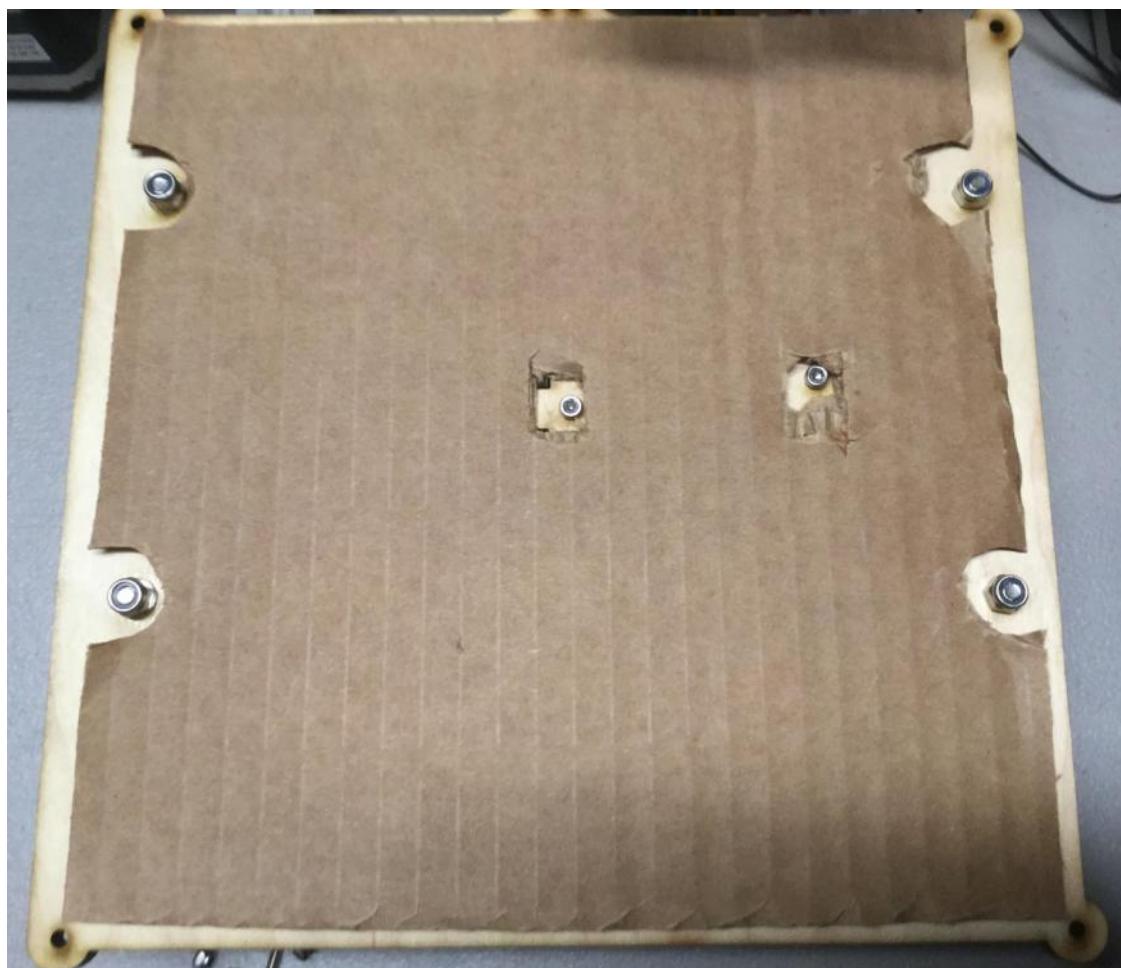
- 1 x Partially Assembled Printer
- 1 x Assembled Thermistor
- 1 x Kapton Tape
- 1 x Heat Bed
- 4 x Bed Springs
- 4 x M3x25mm Bolt
- 4 x M3 Nylon Locknut
- 1 x Glass (See Page 4 of Build Guide)
- 4 x Binder Clips



Tape the thermistor to the center of the back side of the heat bed using the kapton tape.

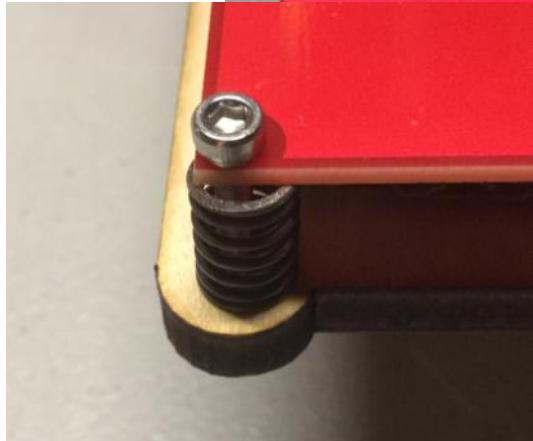


Install any fire resistant insulation on top of the Y heat bed mount that can withstand 125c, make sure to cutout where the bolts are so the insulation does not push up into the heat bed.

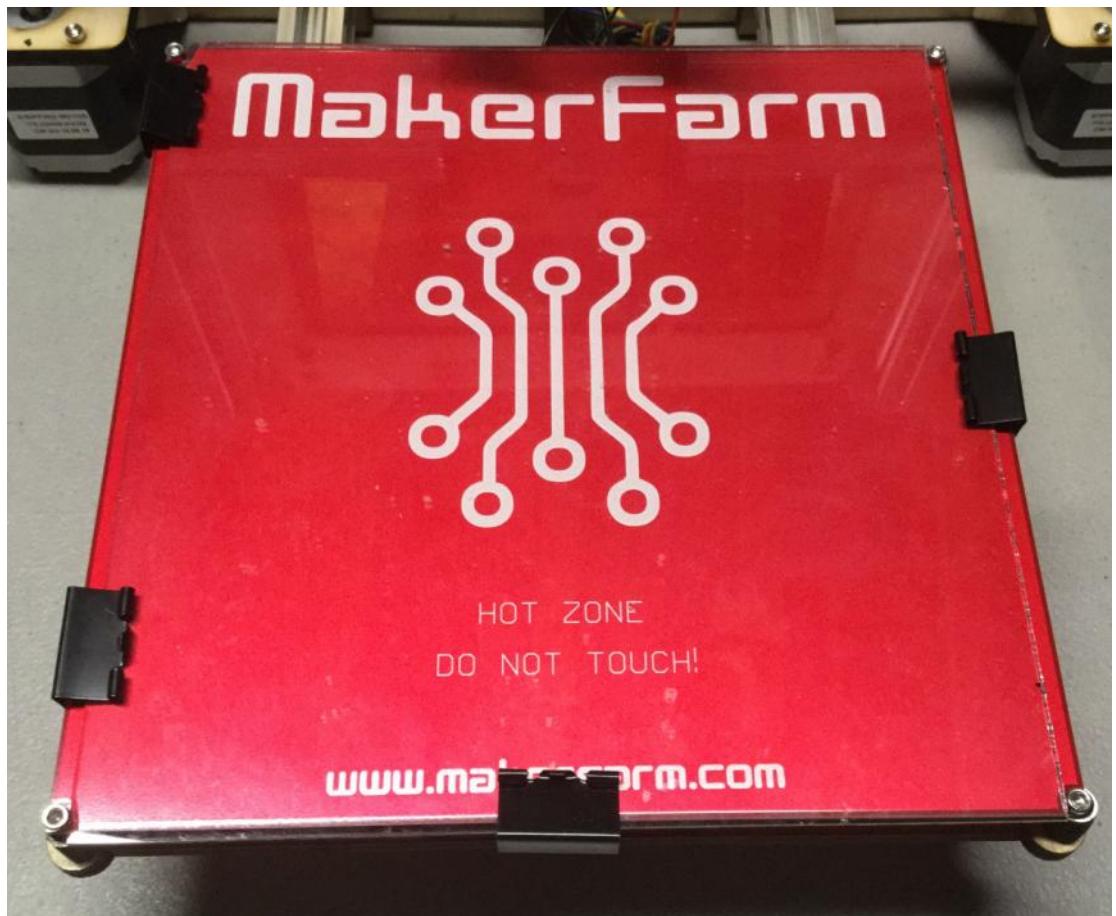


(Cardboard is not recommended as it could be a potential fire hazard)

Put a spring in each corner of the Y heat bed mount then put the heat bed on top and install an M3x25mm bolt and M3 Nylon lock nut in each corner and tighten the bolts till the come about 2mm out of the bottom of the Nylon Lock nut.



Last put the glass on top of the heat bed, if the glass sits on top of the bolt heads break the corner of the glass off with pliers then install the binder clips and remove the levers from the clips.



Extruder

Greg's Accessible Extruder

Gather the following parts

1 x Extruder Printed Parts

1 x Extruder Hardware Box

Extruder Build Guide



Extruder Printed Parts Downloads

[Small Gear.stl \(Server 1\)](#)

[Large Gear.stl \(Server 1\)](#)

[Extruder Block.stl \(Server 1\)](#)

[Guidler.stl \(Server 1\)](#)

[Small Gear.stl \(Server 2\)](#)

[Large Gear.stl \(Server 2\)](#)

[Extruder Block.stl \(Server 2\)](#)

[Guidler.stl \(Server 2\)](#)

Set your springs so they are Compressed to be 11mm long when the filament is installed in your extruder.

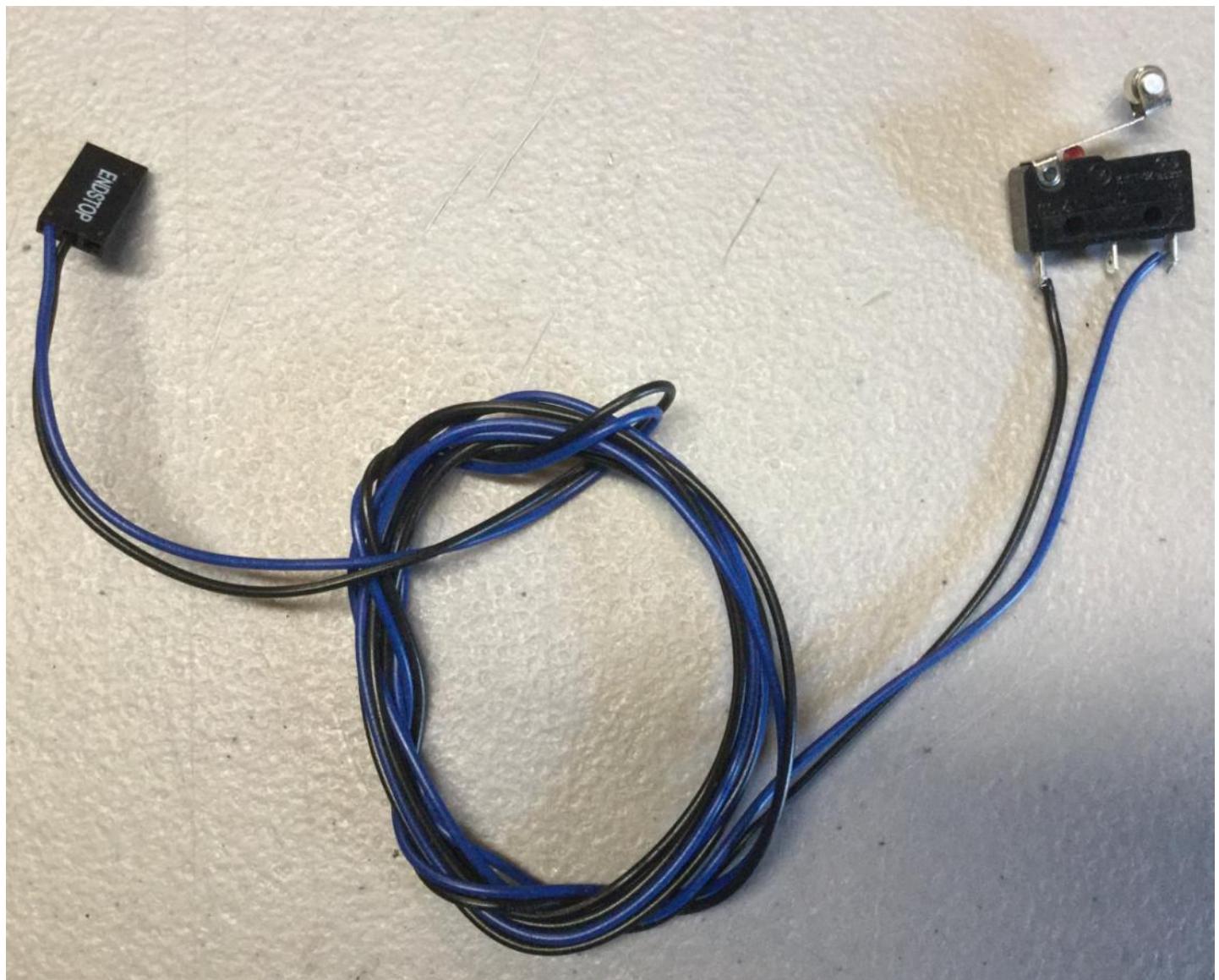
Endstops

Endstop installation

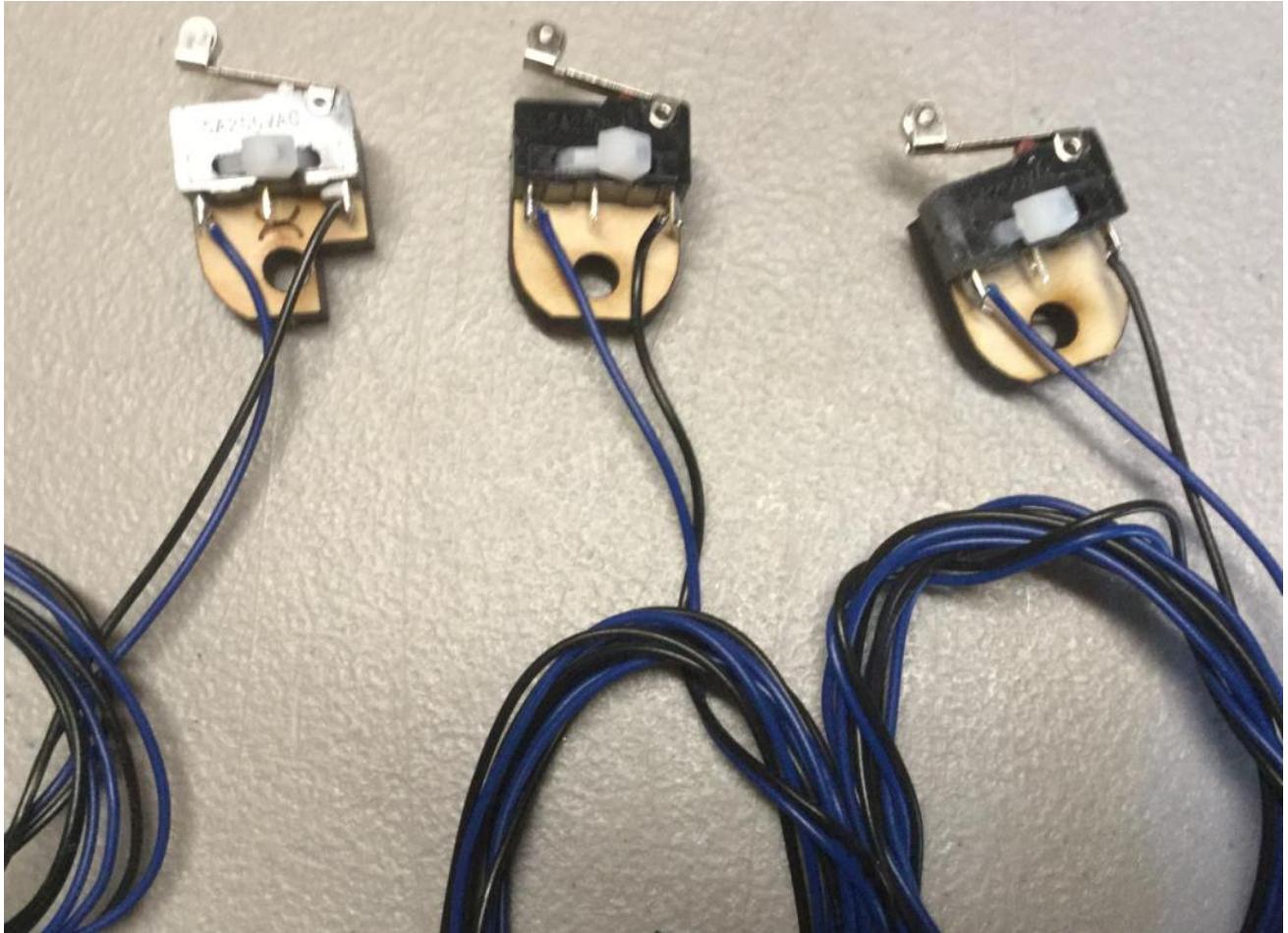
Gather the following parts

- 1 x Soldering iron and Solder**
- 3 x Mechanical Switches**
- 3 x Endstop Wires (Remove the red wire)**
- 3 x Zip Tie**
- 3 x Wood Endsop Mounts**
- 1 x M5x12mm Bolt**
- 1 x T-Slot Nut**
- 1 x M3x16mm Bolt**
- 2 x M3 Nylon Lock Nuts**

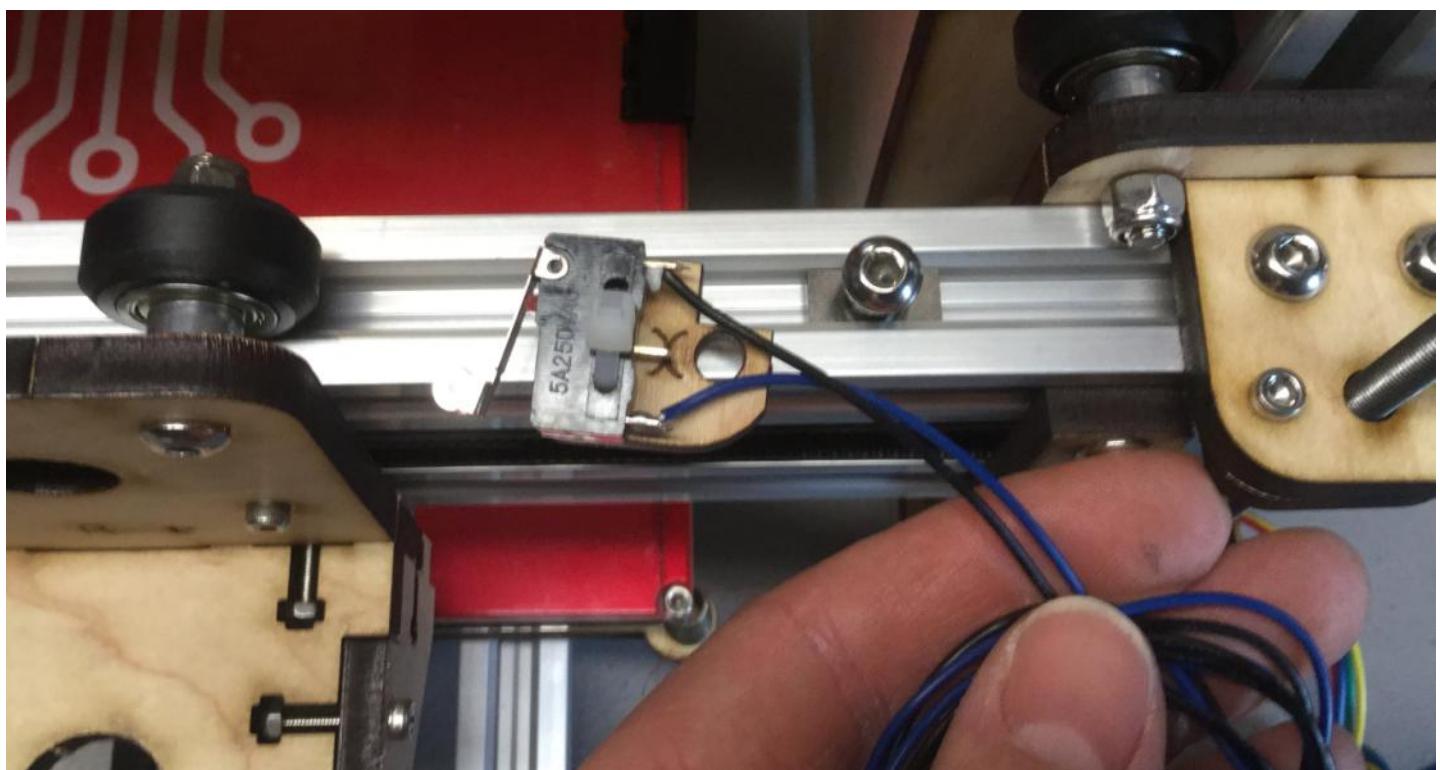
Solder the Black and Blue wires to the endstop as shown below for all 3 endstops.



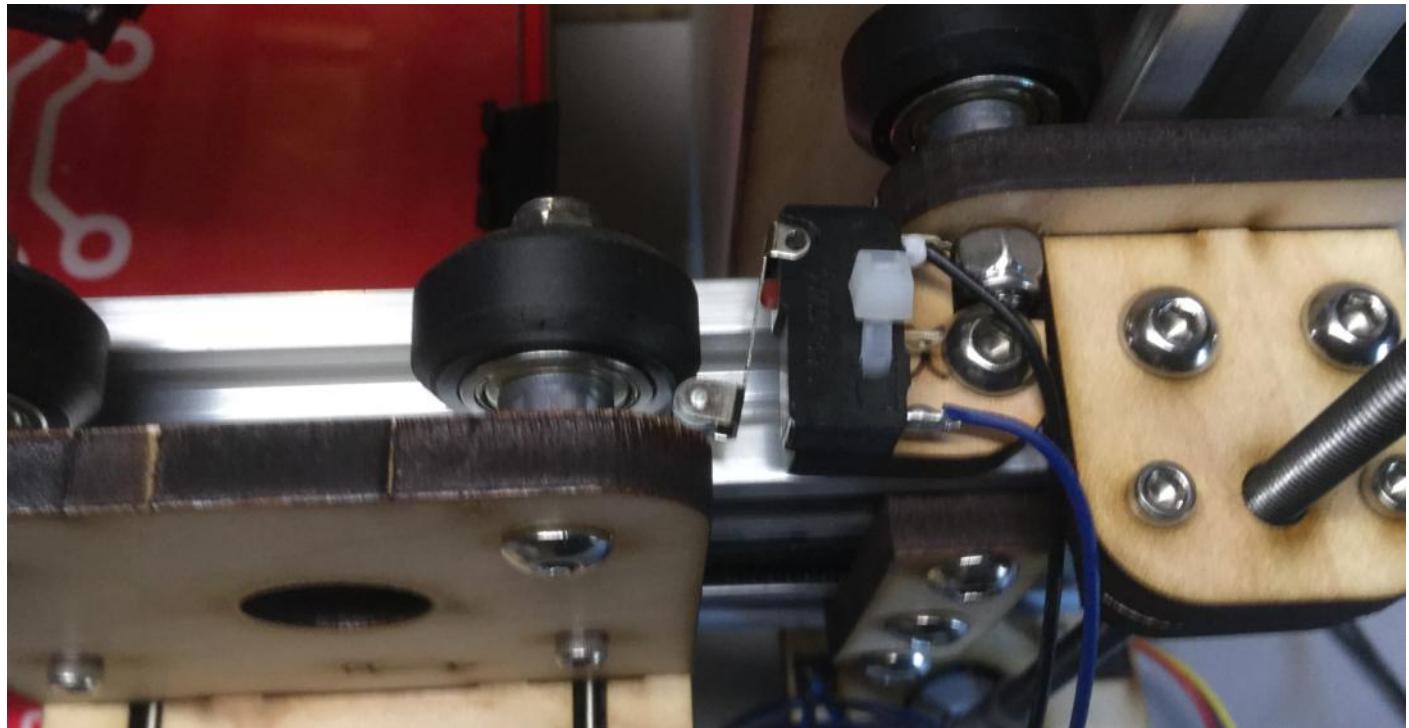
Connect the 3 endstops to the wood endstop mounts as shown below using a zip tie.



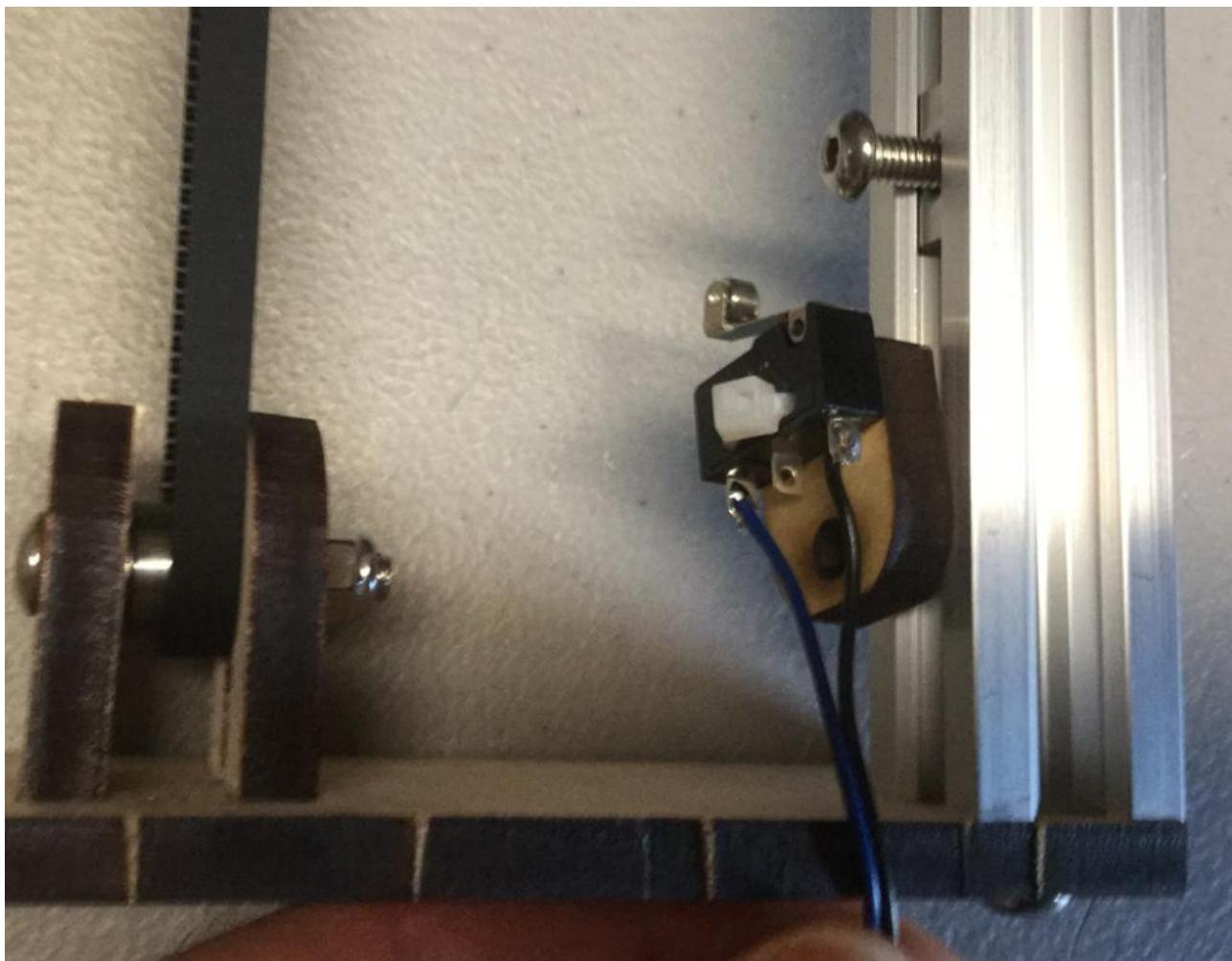
Next get the endstop and mount with the X on it, this will be mounted to the M5x12mm bolt and T-Slot nut we installed earlier on the X axis by the X Idler.



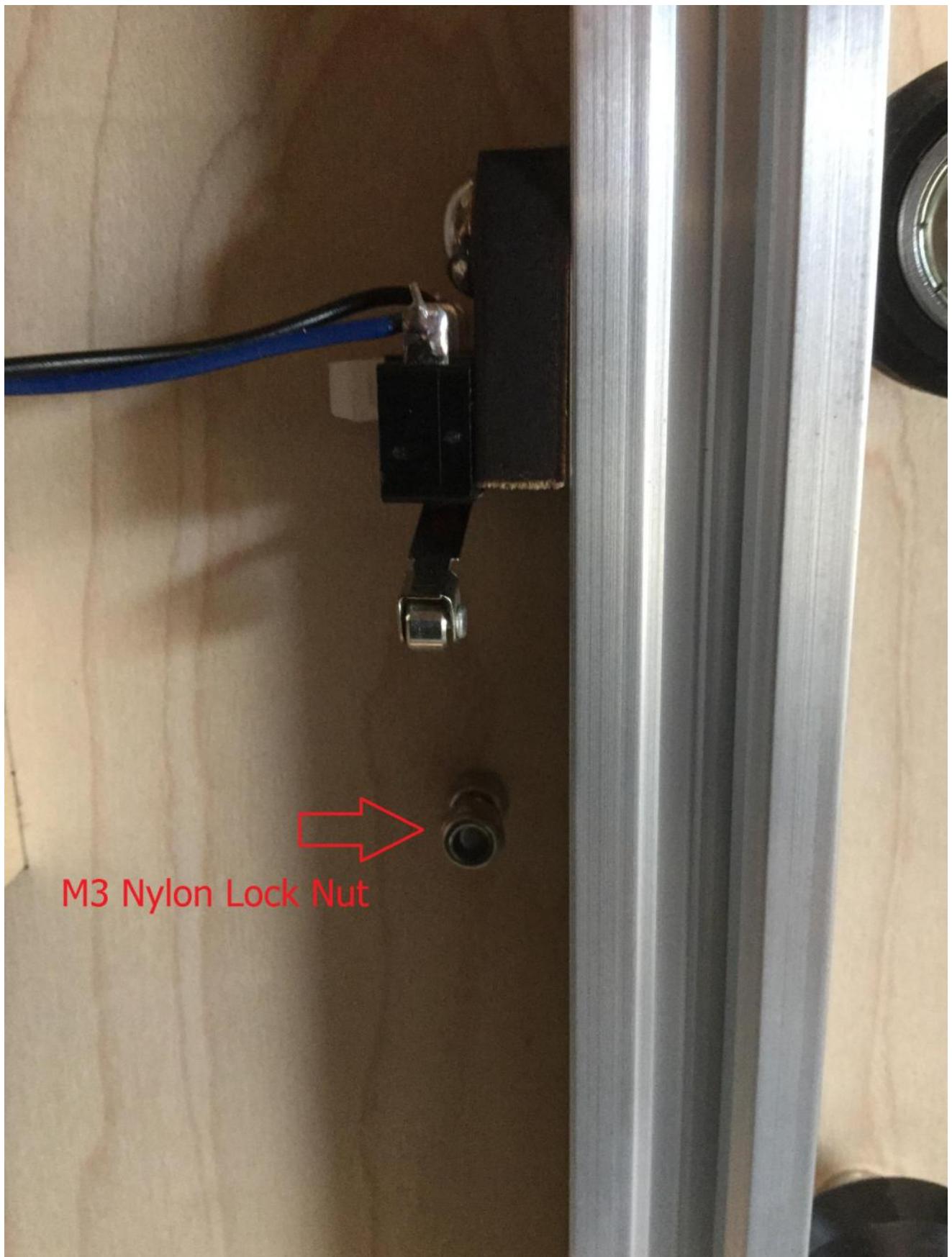
Now that the X endstop is mounted move the X Carriage to confirm that the delrin idler engages the endstop



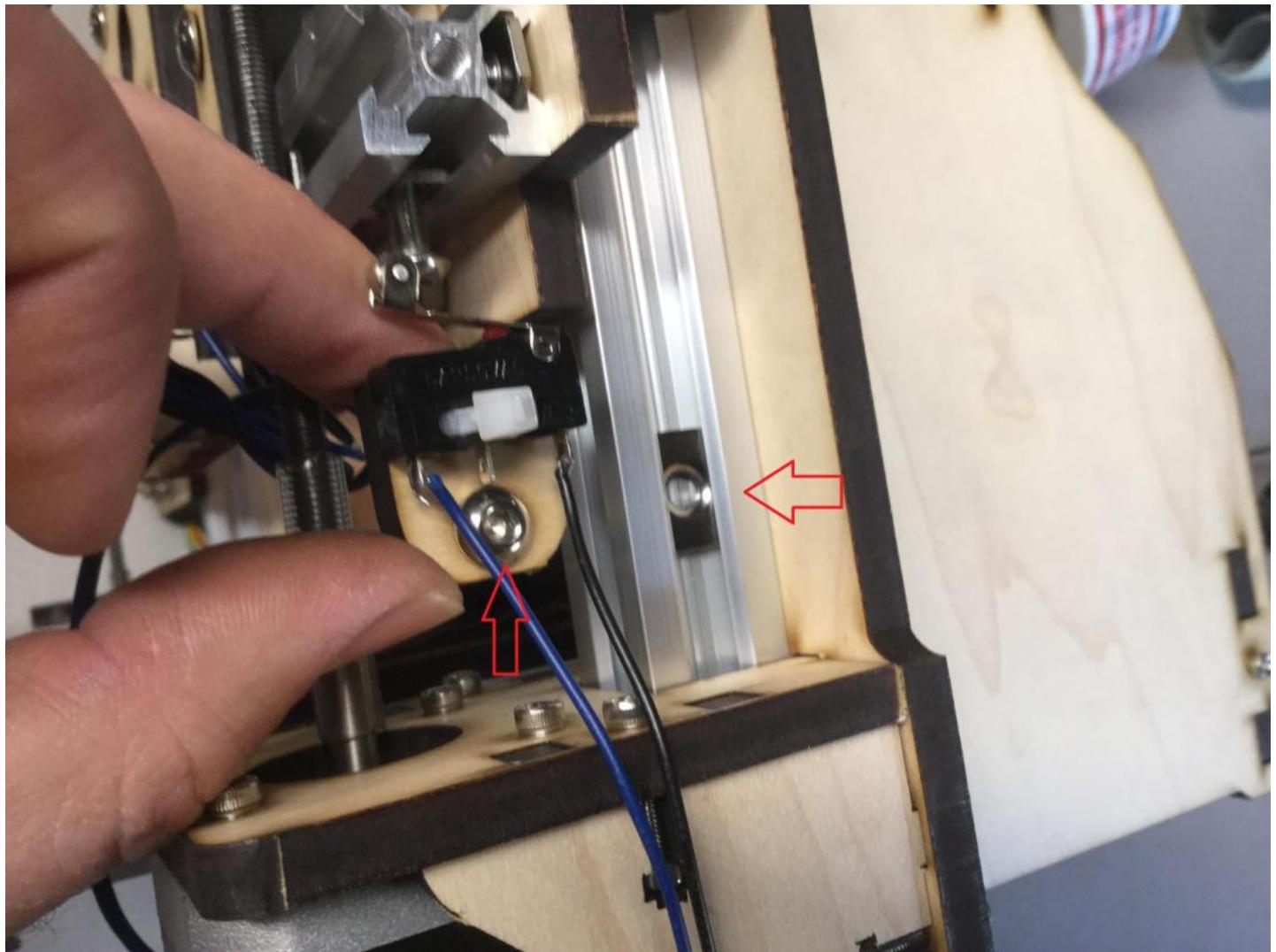
Next we will mount the Y endstop onto the M5x12mm bolt and T-Slot nut we installed earlier on the right Aluminum extrusion under the heat bed.



Now flip the printer over and look at the underside of the Y bed, as you move the heat bed closer to the front of the machine you will see the M3x16mm Bolt we installed earlier, install an M3 Nylon Lock nut on the bottom so it hits the endstop.



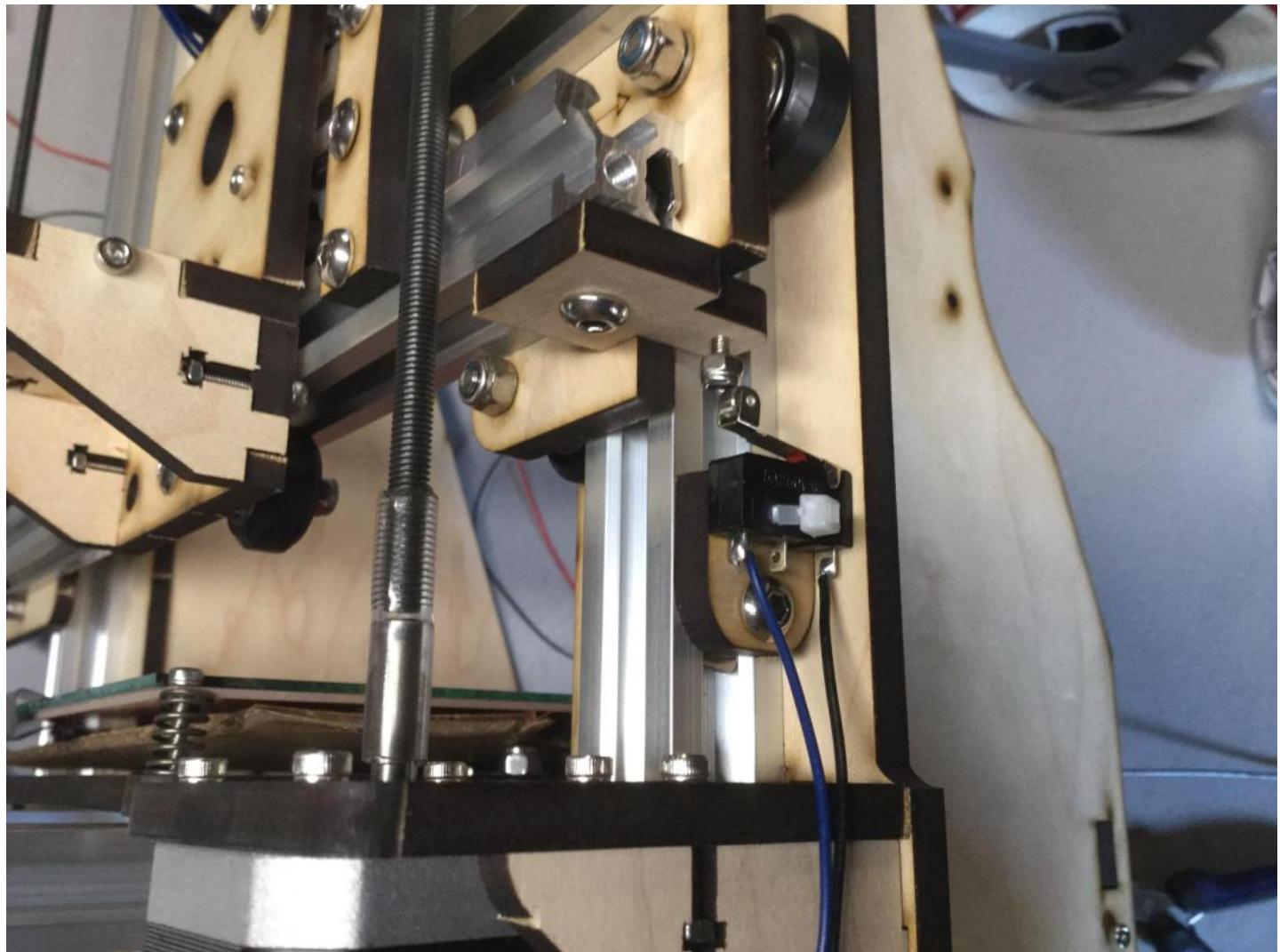
Next we will install the Z endstop, slide a T-Slot nut into the Aluminum Extrusion as shown in the picture, then install the endstop using an m5x12mm bolt.



Next get the Z endstop adjuster and install an M3x16mm bolt half way through the wood then install an M3 Nylon Lock nut onto the end of the bolt.



Now install the Z endstop adjuster to the bottom of the Extrusion on the M5x12mm Bolt and T-Slot nut we installed earlier. When the X axis lowers the M3 Nylon lock nut should hit the Endstop switch.



Spool Holder

Spool Holder

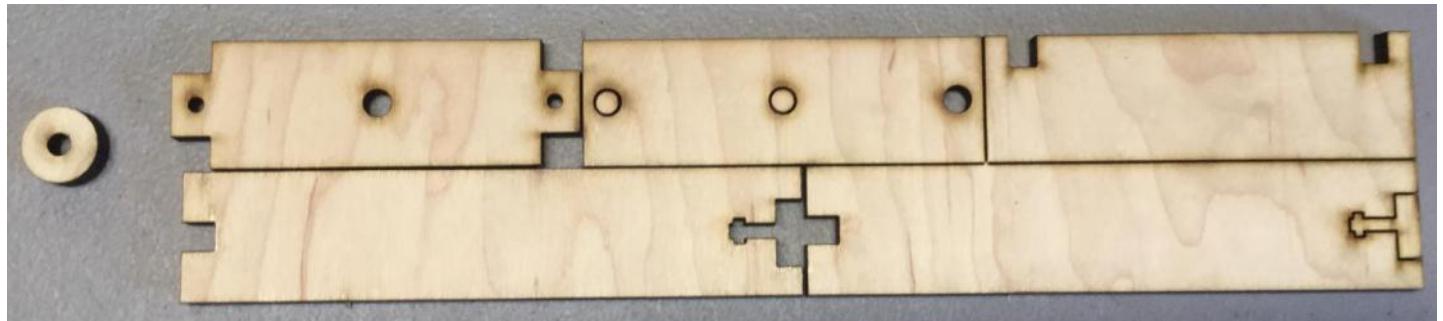
Gather the following parts

Set of Wood parts (Pictured Below)

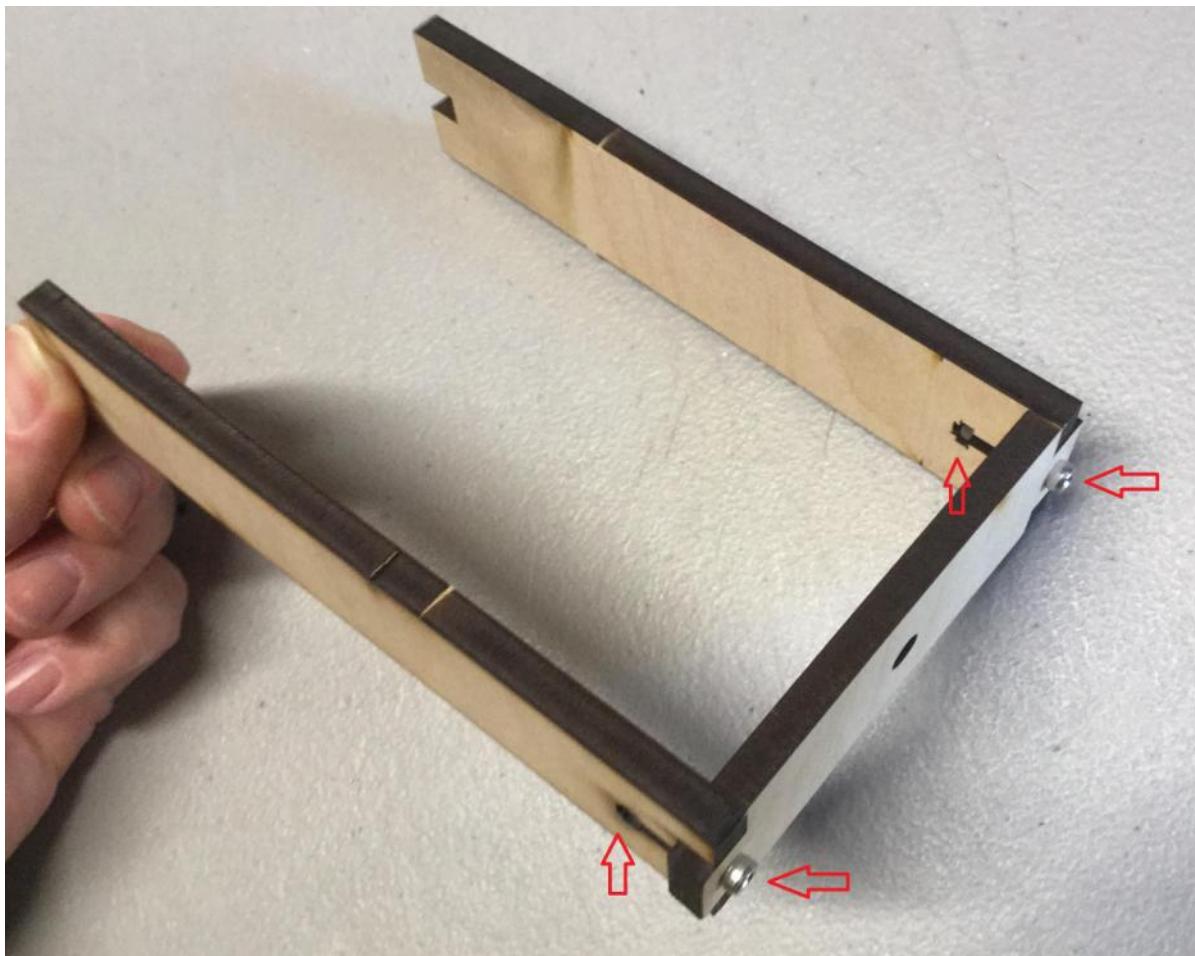
2 x M3 Nuts

2 x M3x16mm Bolt

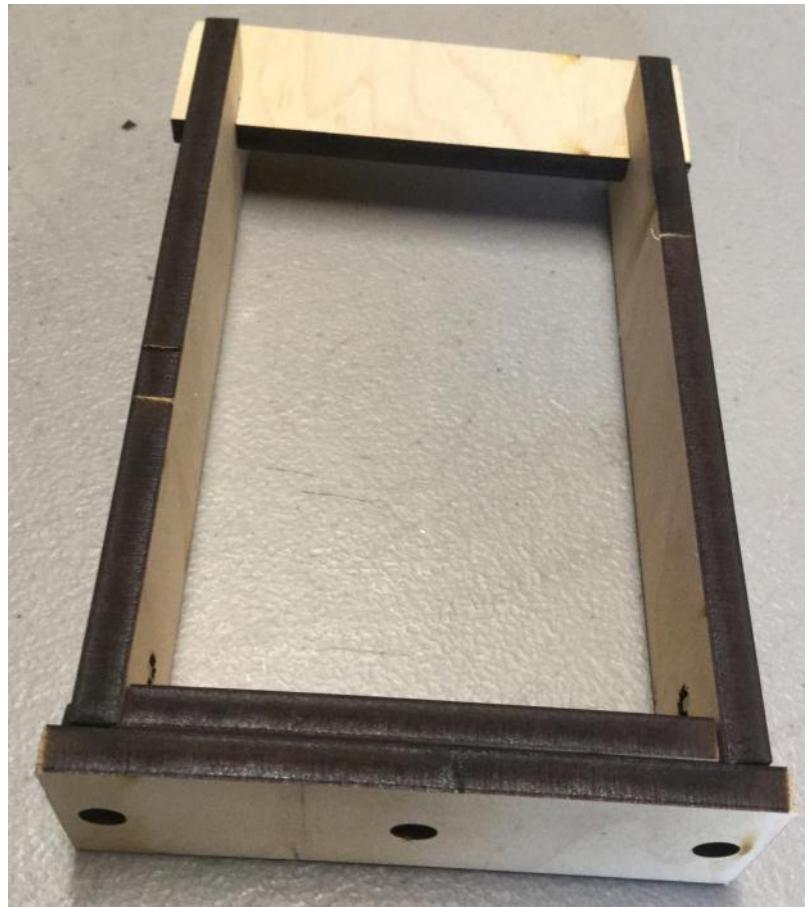
1 x M5x30mm Bolt



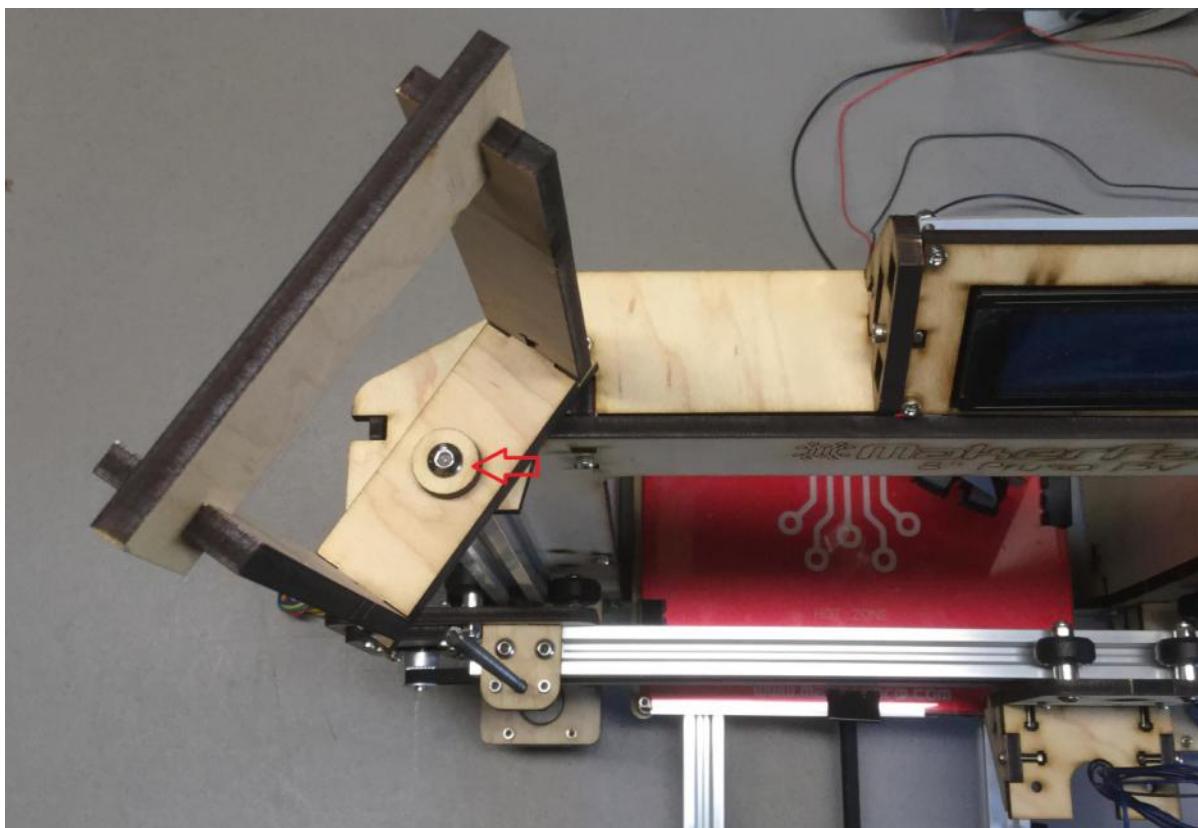
Secure the two sides to the bottom piece using an M3x16mm bolt and regular M3 nut on each side as shown below



Slide the top piece into the sides and put the bottom piece on the bottom, the M3 bolt heads will go inside the two outer holes in this bottom piece.



Last using the an M5x30mm bolt and the wooden washer install the spool holder onto the left side of the printer screwing the M5 bolt into the Aluminum Extrusion.



Ramps Install

To install Ramps you can follow the Wiring diagram below, the Video or the next few pages.

RAMPS Install

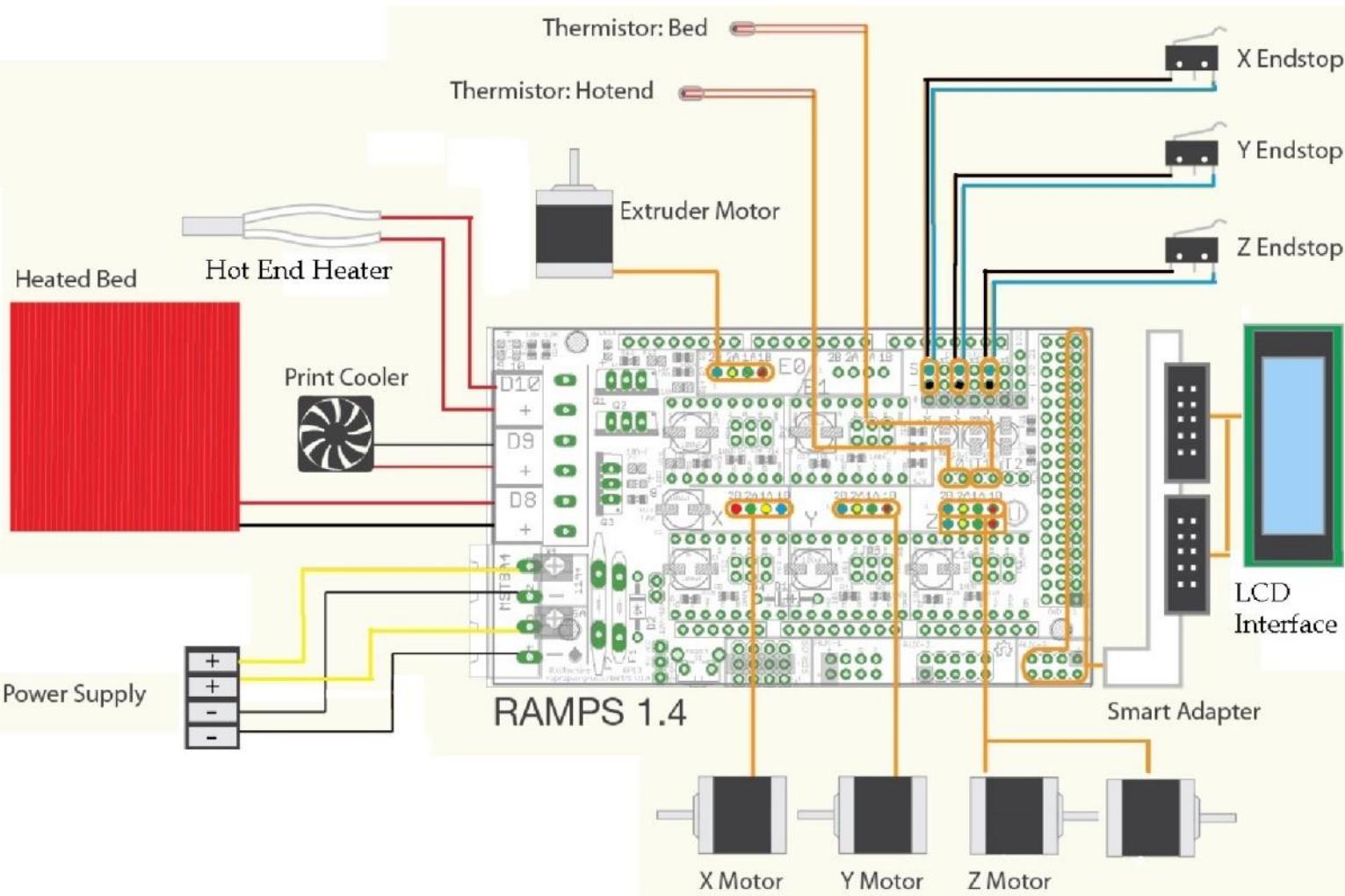
Gather the all your electronic parts

1 x Ramps Kit

1 x Partially Assembled Printer

3 x M3x25mm Bolts

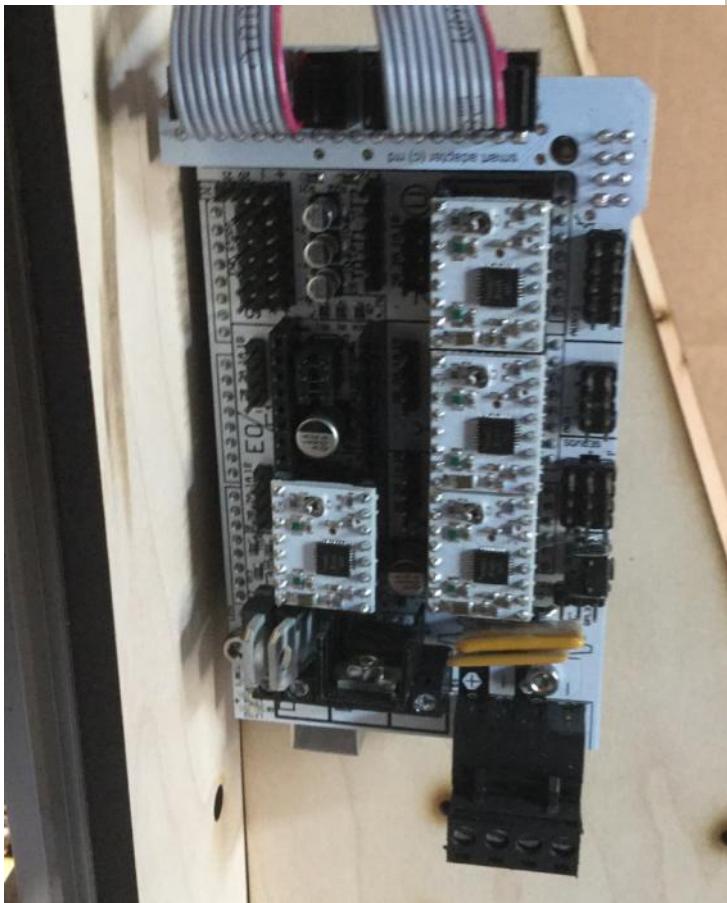
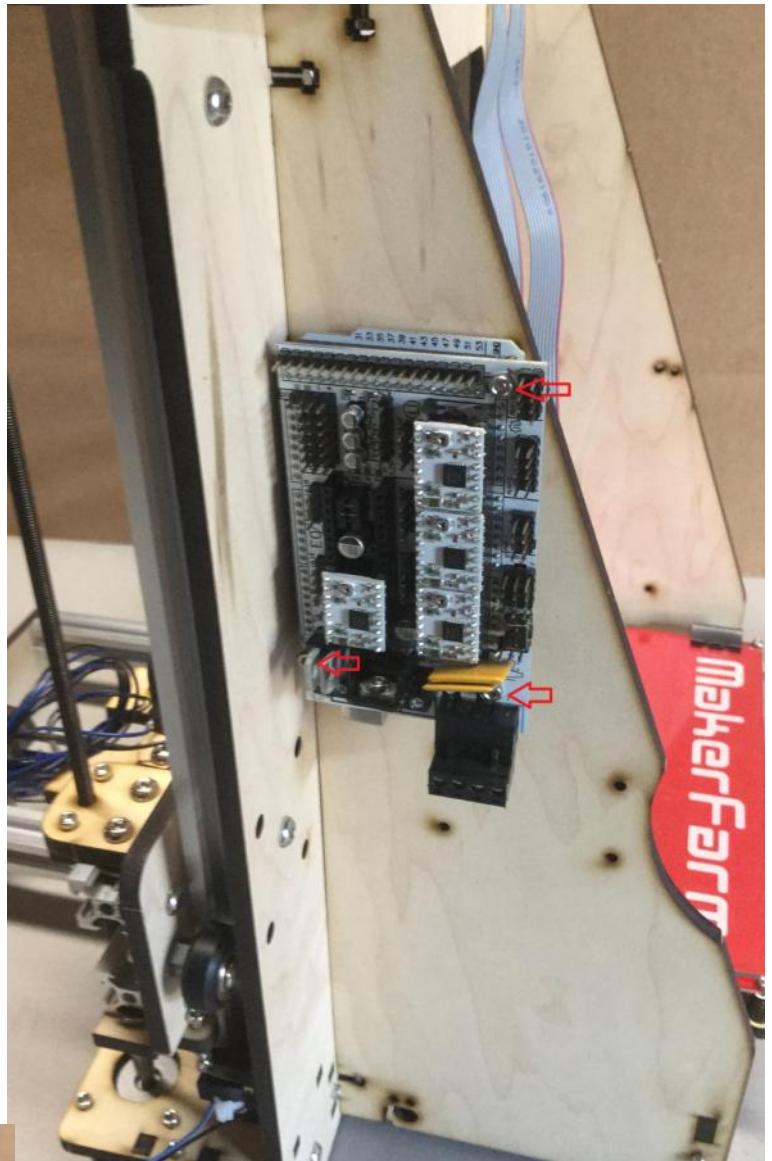
3 x M3 Nylon Lock Nuts



The Hexagon and Magma fan will be connected to the Power supply, Not D9 as the fan needs to run all the time.

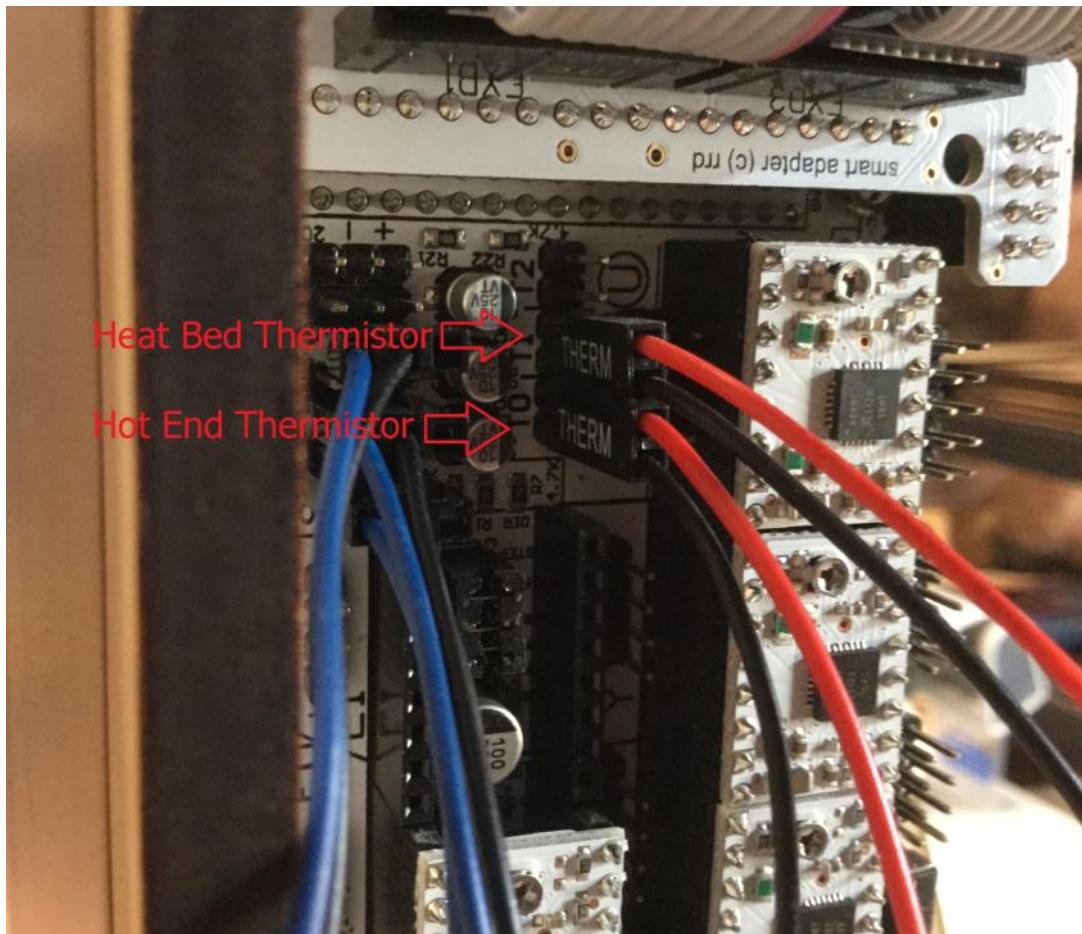
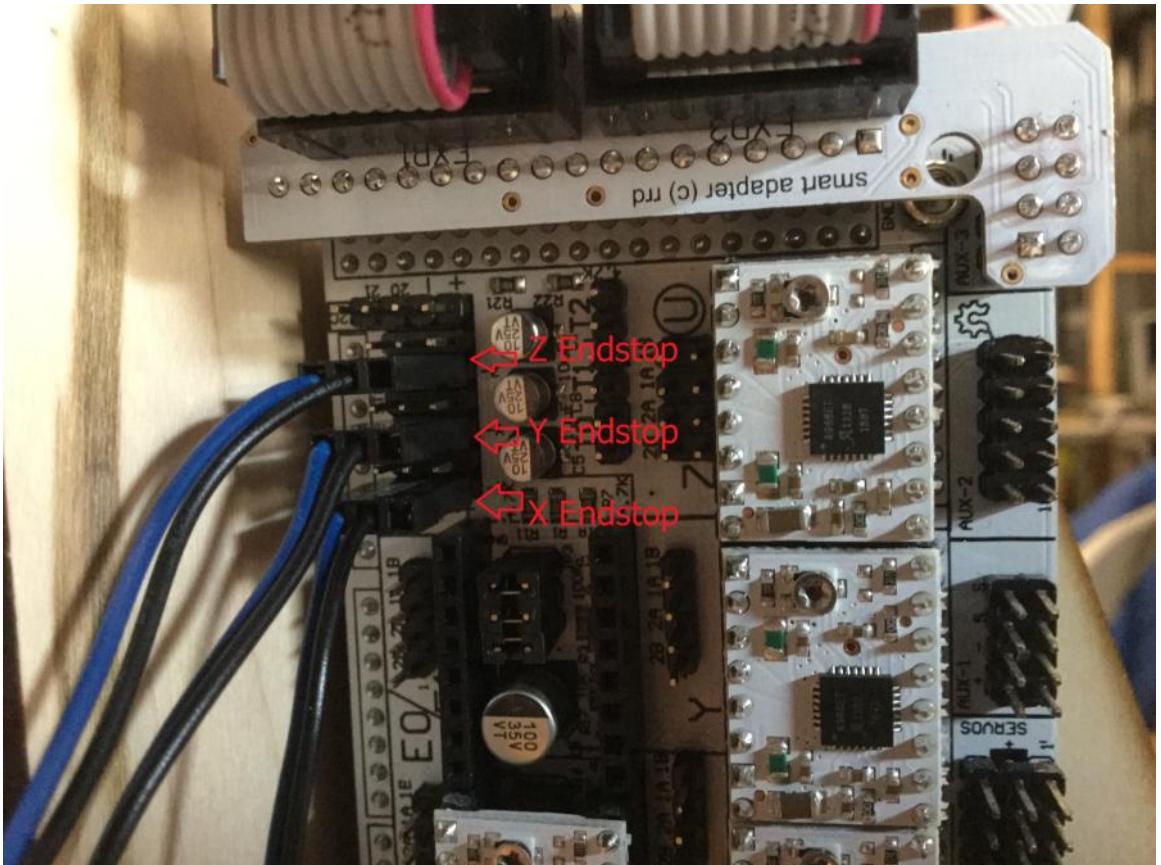
RAMPS Install Video

Use 3 M3x25mm Bolts and Nylon Lock nuts (See red arrows in the picture on the right) to secure the ramps electronics to the right side of the printer, tighten the M3 bolts but do not overtighten them which would cause the ramps board to flex.



Connect the LCD to the ramps board by plugging in the Smart Adapter to the top of the ramps as shown in the picture on the left

Next plug in the
Endstops

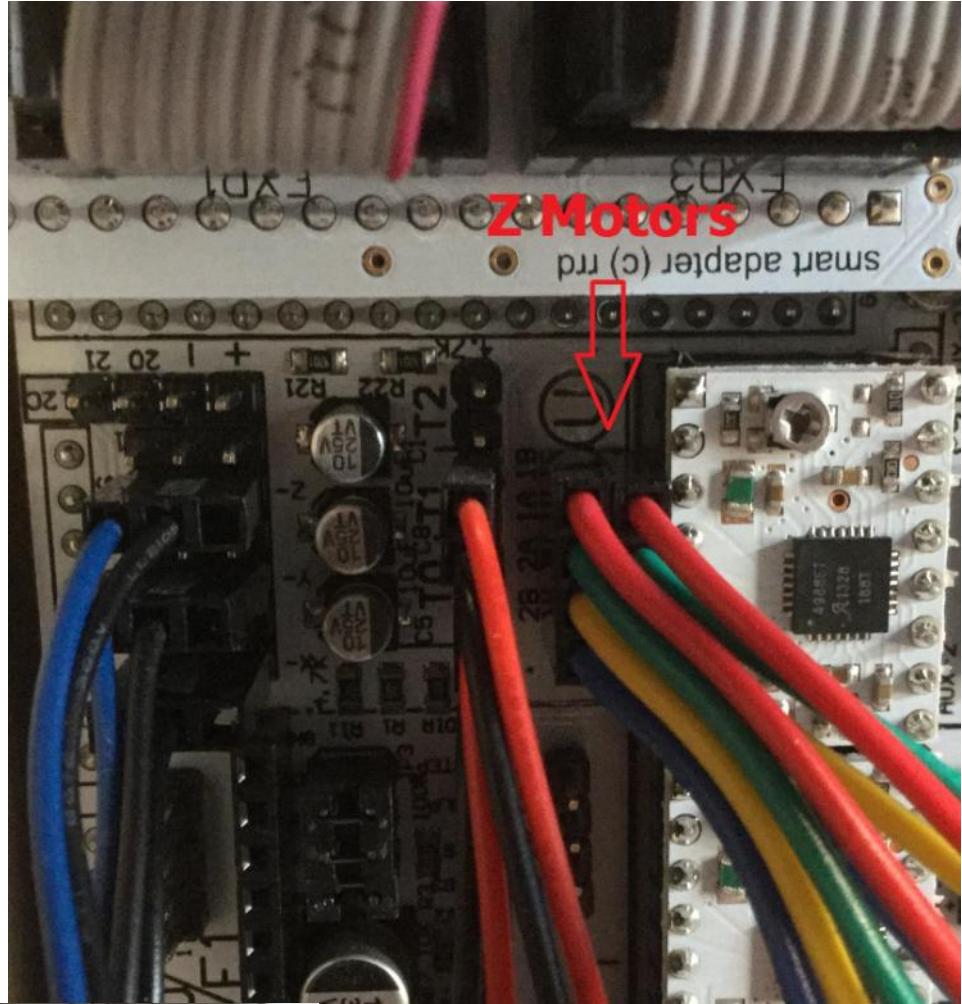


Now plug in the Hot
end and heat bed
thermistors.

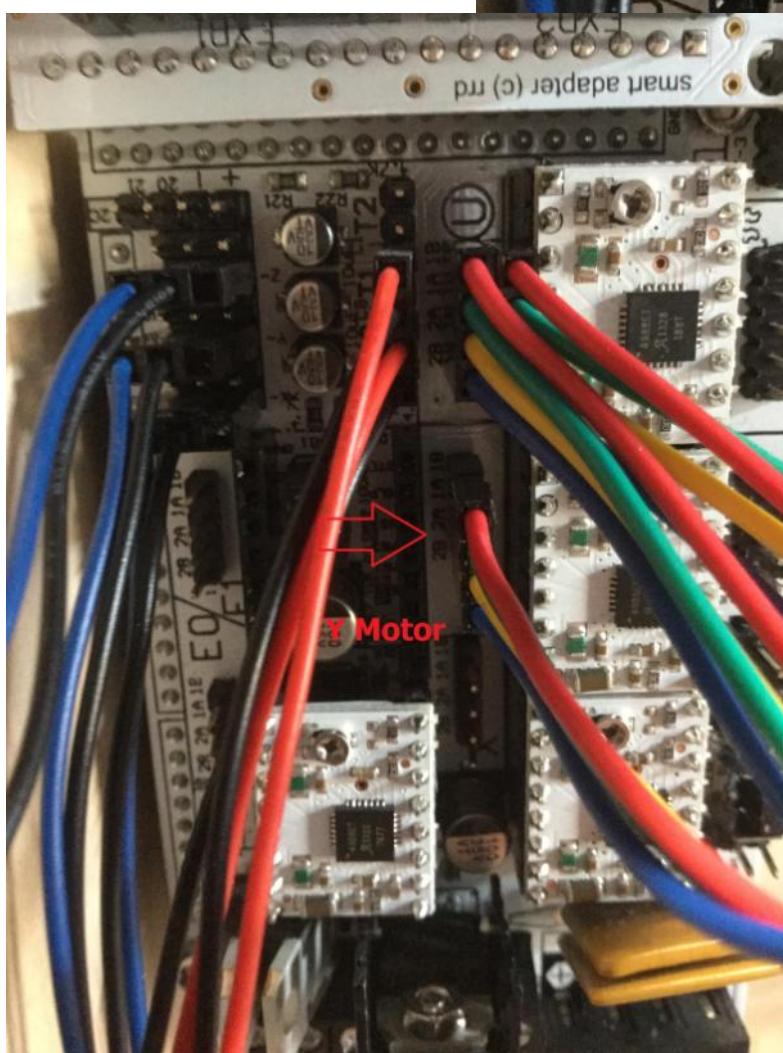
Hot End Thermistor
plugs into T0

Heat Bed
Thermistor plugs
into T1

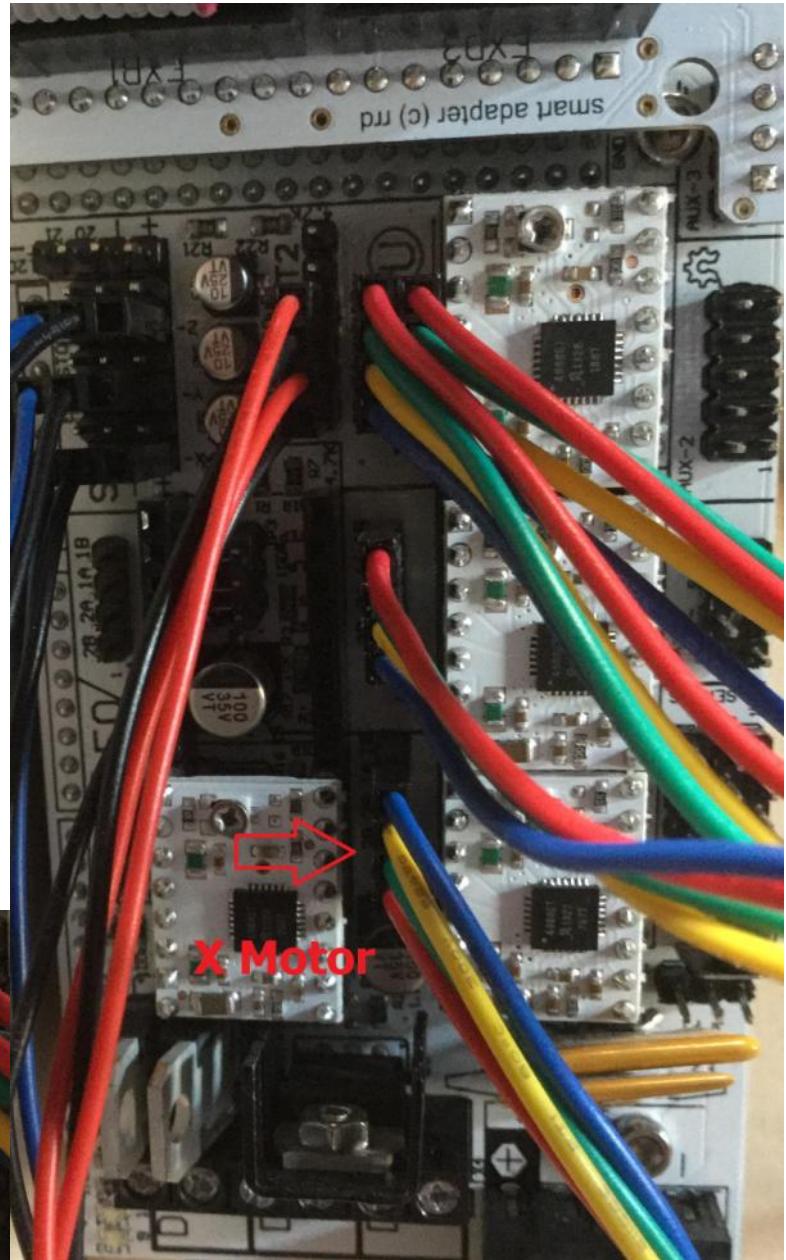
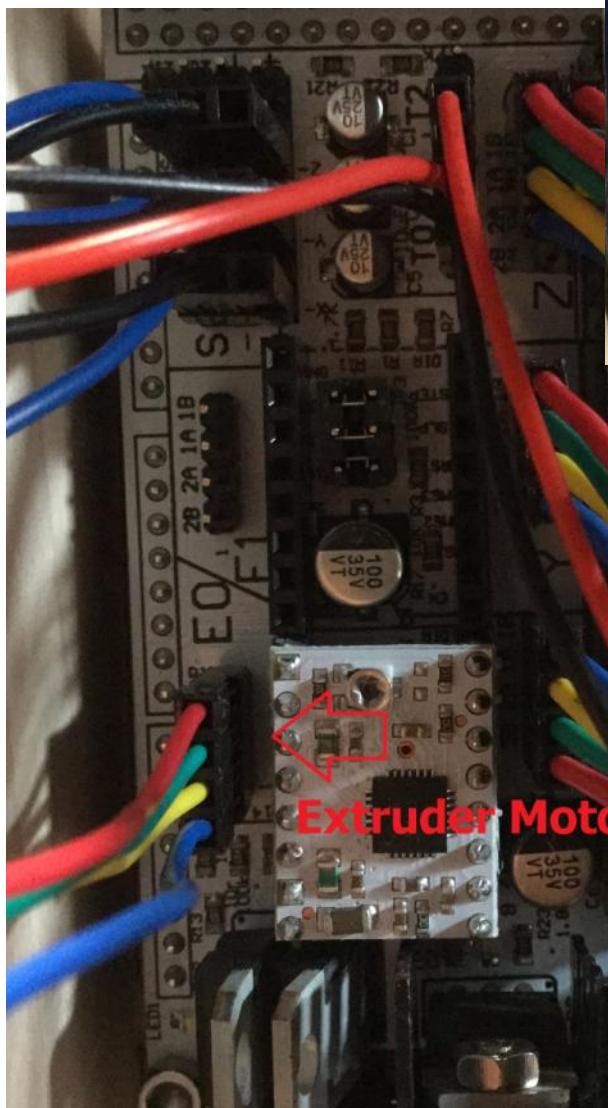
Next plug in the Z Motors



Now plug in the Y Motor

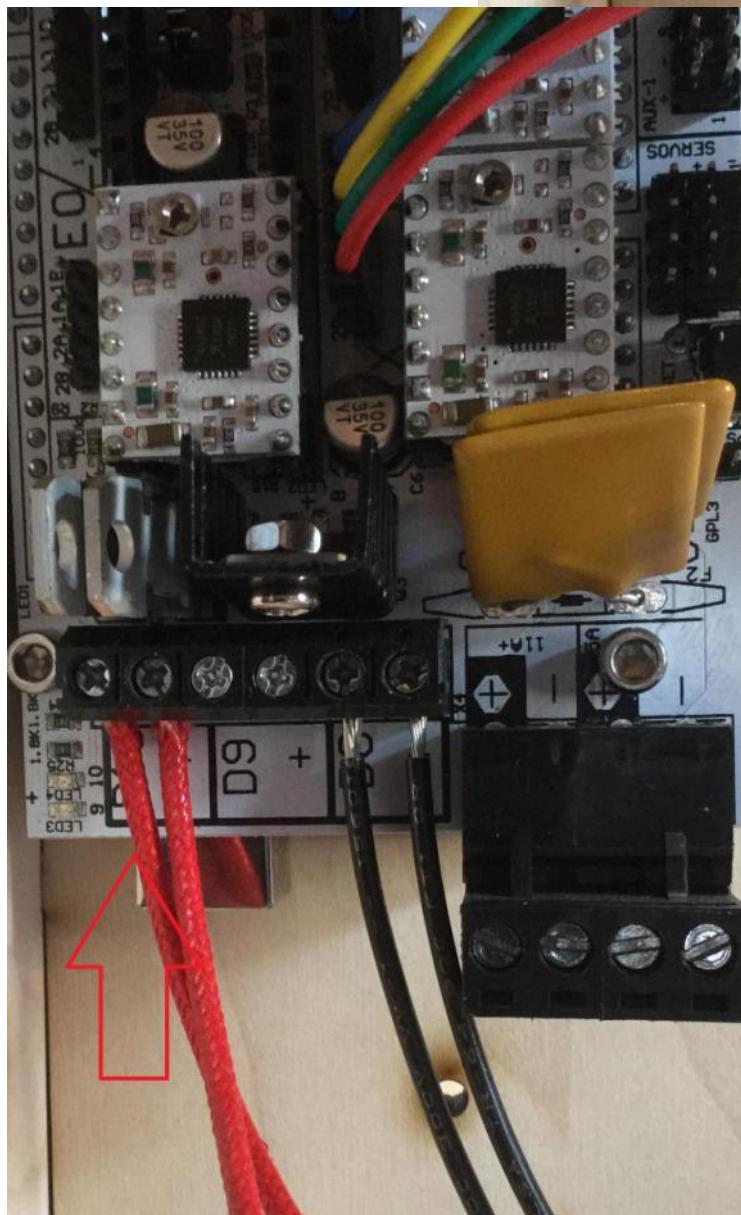
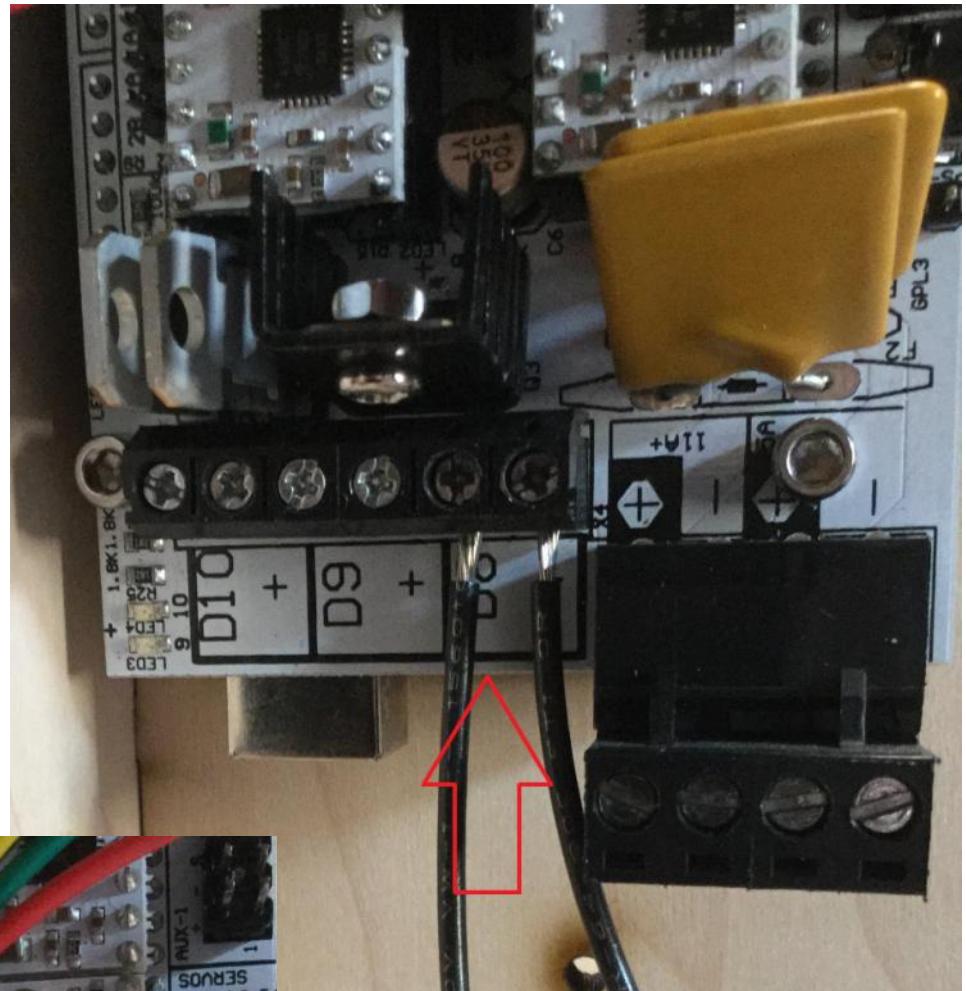


Next plug in the Xmotor, Note that the Blue wire is closest to the top of the machine opposite of all the other motor



Now plug in the Extruder Motor

Now connect the heat bed wires to the D8 Screw terminals



Last connect your hot end heater to D10

Wiring your 12v Power Supply to your RAMPS



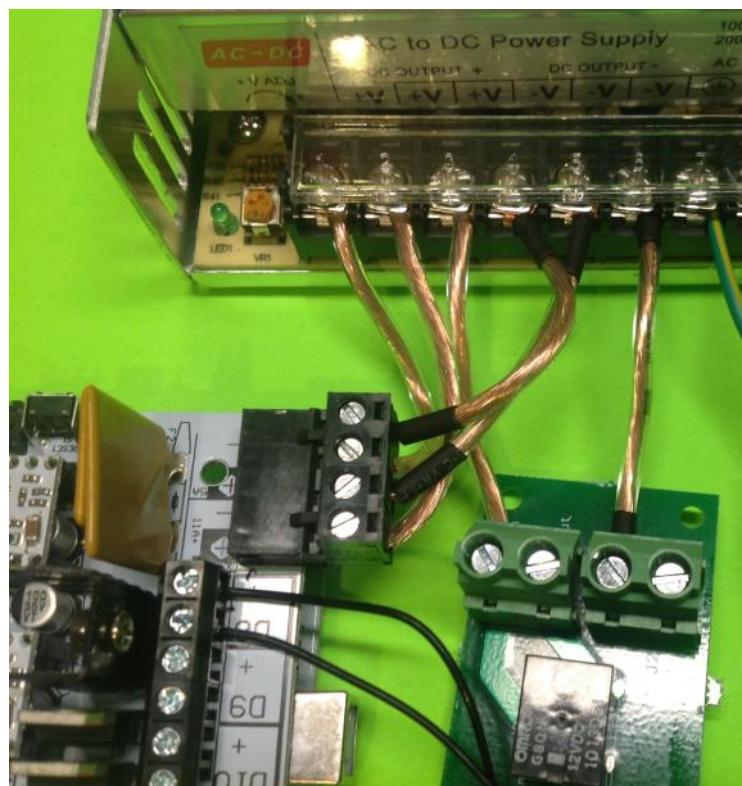
Gather the follow items, your Power Supply, the wiring kit you ordered with your power supply, the RAMPS Electronics and Heat Bed Relay (Heat Bed Relay is Optional on the 8" i3v).

The wires have been shortened in this picture to better show how to wire them, you will wire your power supply and electronics after they are both installed on your printer to make sure they are the correct lengths.

The Power supply will have 6 Power outputs, 3 of them labeled -V and 3 labeled +V. In the picture all the -V wires have black on the ends.

Connect the 3 -V wires from the power supply to the following, One to -on the 5amp RAMPS connection, One to -on the 11amps RAMPS connection and one to J2 on the heat bed relay.

Connect the 3 +V wires from the power supply to the following, One to +on the 5amp RAMPS connection, One to +on the 11amps RAMPS connection and one to J1 on the heat bed relay.



To see how to mount the power supply to your printer check out this guide:
[Power Supply Mounting Guide](#)

.40mm Magma Hot End

Gather the following parts before watching the Hot End Video

- 1 x Magma Hot End Kit**
- 1 x Magma Accessory Bag**
- 2 x M3x10mm bolts**



Magma Hot End Video

.35mm or .50mm J-Head Hot End

Gather the following parts before watching the Hot End Video

1 x Hot End Kit



Newer versions of the Jhead include a Ceramic Heater, Watch the Magma video on Page 85 to see how to install the Ceramic Heater.

Hot End Video



E3d-V6 Hot End

Gather the following parts

1 x Hot End Kit



3mm and
1.75mm E3D
-V6
Assembly

With the E3D-V6 you will also need to modify your firmware to do this when you get to the firmware upload stage of the build guide select the configuration.h page then we will change the Hot End Temp sensor from 6 to 5 (See below)

#define TEMP_SENSOR_0 6

Change to : #define TEMP_SENSOR_0 5

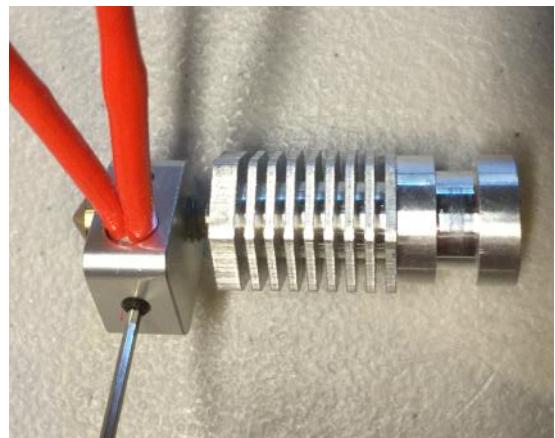
Hexagon Hot End

Gather the following parts

- 1 x Hexagon Hot End Kit**
- 1 x Assembled Extruder**
- 1 x Adjustable wrench (Not included)**



1. Install heater cartridge and set screw into heater block.

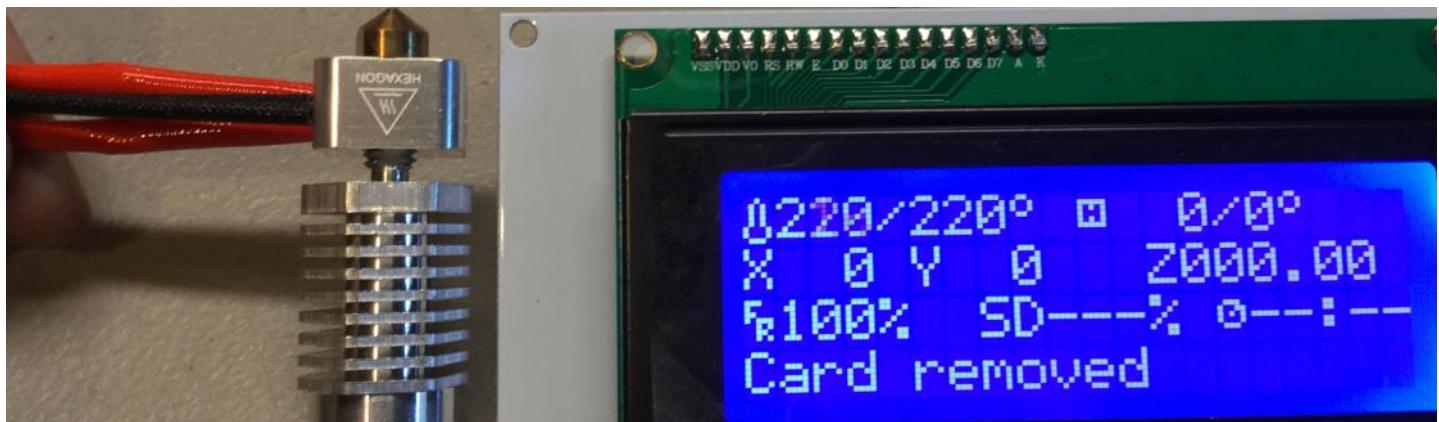


2. Install Thermistor into the smaller hole in the heater block (For now the thermistor will be unsecured)



Hexagon Hot End (Continued)

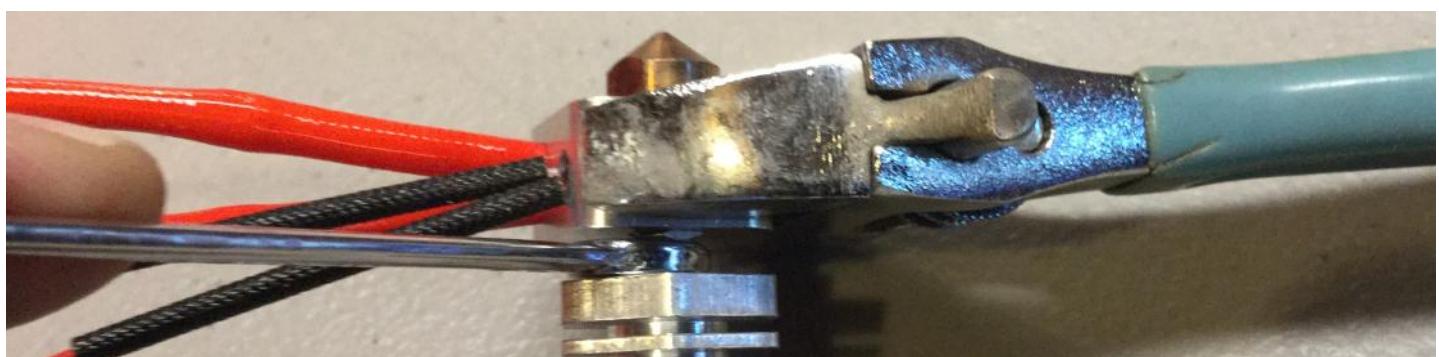
3. Connect your Hot End heater and thermistor to the electronics (See page 78) then power up the printer, and using the LCD menu push the knob, select Control, then Temperature, then Nozzle and change the nozzle temperature to 220c, when set return to the main menu and the hot will start heating till it reaches 220c. While heating make sure the thermistor stays in the heater block.



4. Now that the hot end is at 220c use a couple wrenches to tighten the brass nozzle onto the Heater Block.



5. Now use the supplied wrench and an Adjustable wrench to tighten the Top section of the Hexagon to the Heater Block.



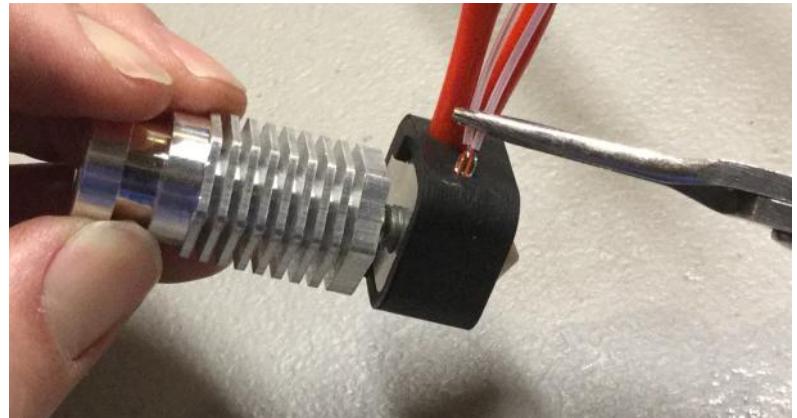
Hexagon Hot End (Continued)

6. Now let the Hexagon cool back down to room temperature, when its cool you can remove the thermistor and the Ceramic Heater.

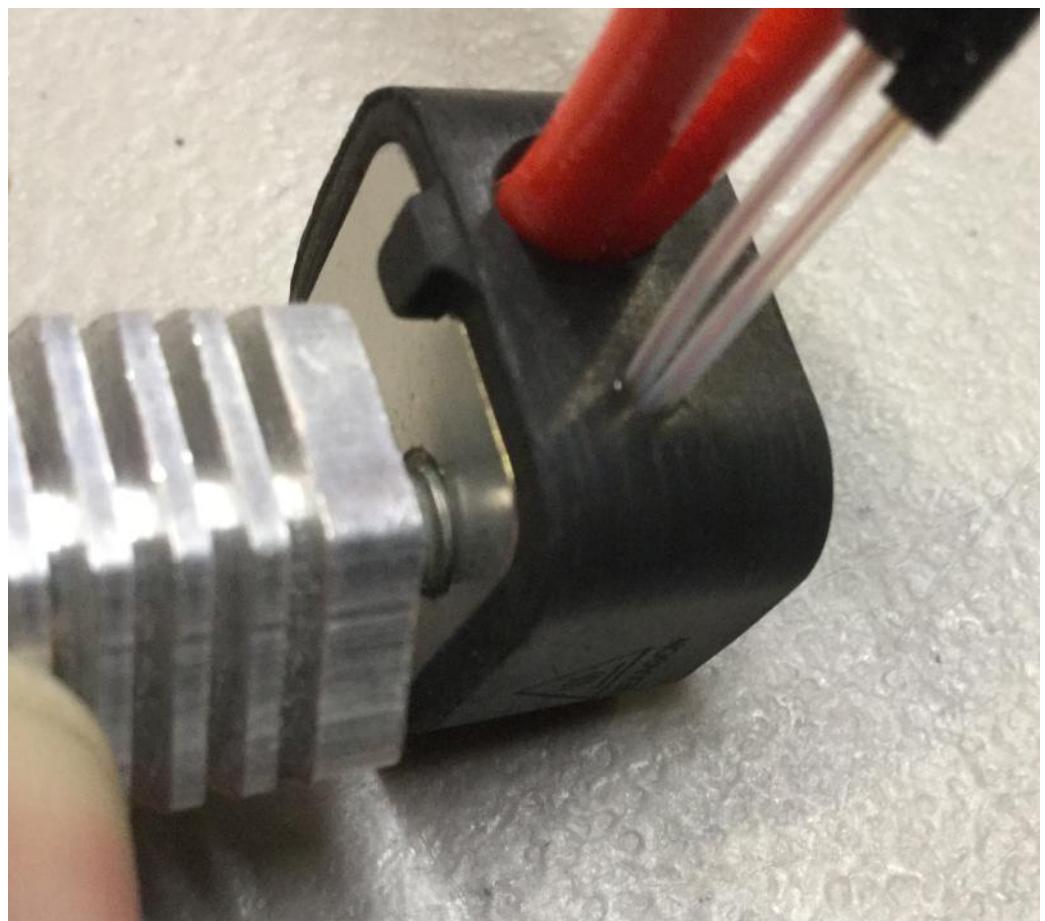
7. Now Install the Silicone Boot over the heater block, make sure the thermistor and Ceramic Heater holes are aligned.



8. ReInstall the Ceramic heater and gently tighten the set screw to hold it in place, then push the thermistors glass bead into the heater block past the Silicone Rubber Boot.



**Make sure the
glass bead
goes into the
heater block
and is not still
stuck in the
Silicone Boot.**



Hexagon Hot End (Continued)

9. Using a Zip Tie secure the Heater and Termistor wires together.



10. Install the Aluminum Mounting Plate:



11. Align the
Mounting Plate
with the Extruder:



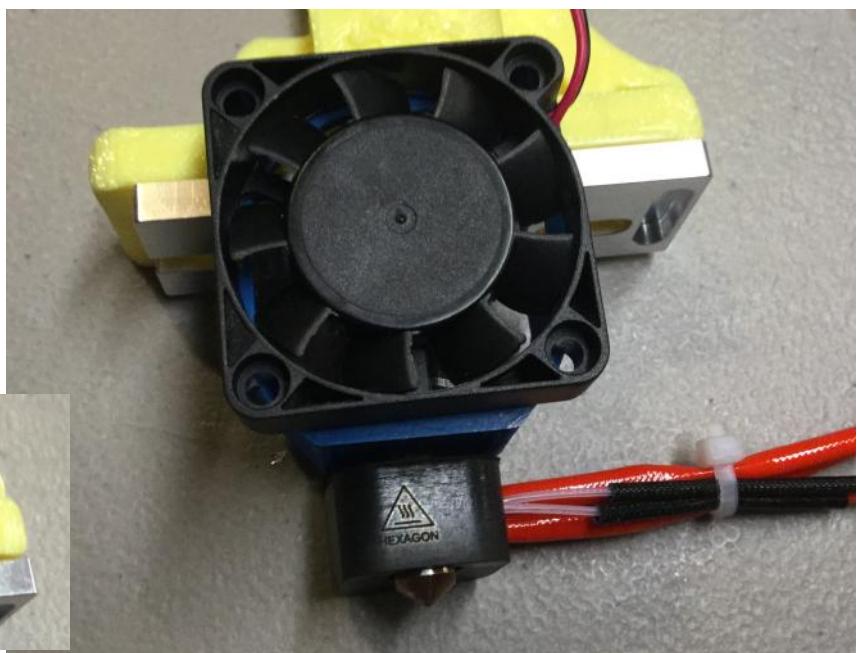
Hexagon Hot End (Continued)

12. Align the Fan Shroud with the bolt holes in the Extruder Block



13. Place the Fan on top of the Fan Shroud and use two M3x16mm Bolts to secure the Fan and Fan Shroud to the Extruder Block.

***** YOUR FAN WILL CONNECT DIRECTLY TO THE POWER SUPPLY AND NOT YOUR ELECTRONICS*****



See page 106 to Season the hot end, Seasoning will help prevent jamming in the hot end and can be performed any time it is needed.

Printed Fan Shroud Download
[Hexagon Fan Shroud \(Server 1\)](#)
[Hexagon Fan Shroud \(Server 2\)](#)

Extruder & Hot End Install

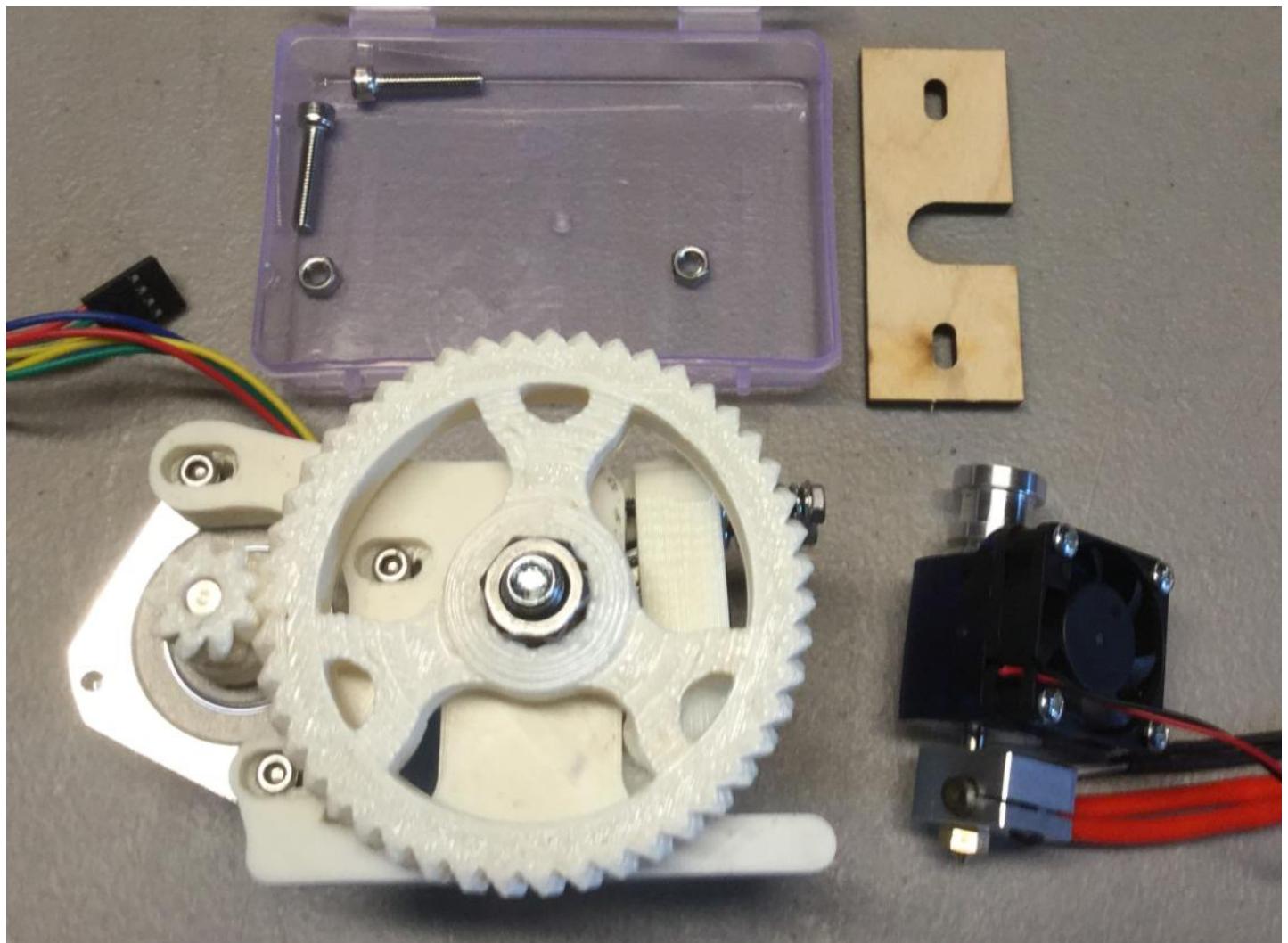
Extruder & Hot End Install

Gather the following parts

- 1 x Partially Assembled Printer
- 1 x Assembled Extruder & Hot End
- 2 x M4x20mm Bolts
- 2 x M4 Nuts
- Zip Ties

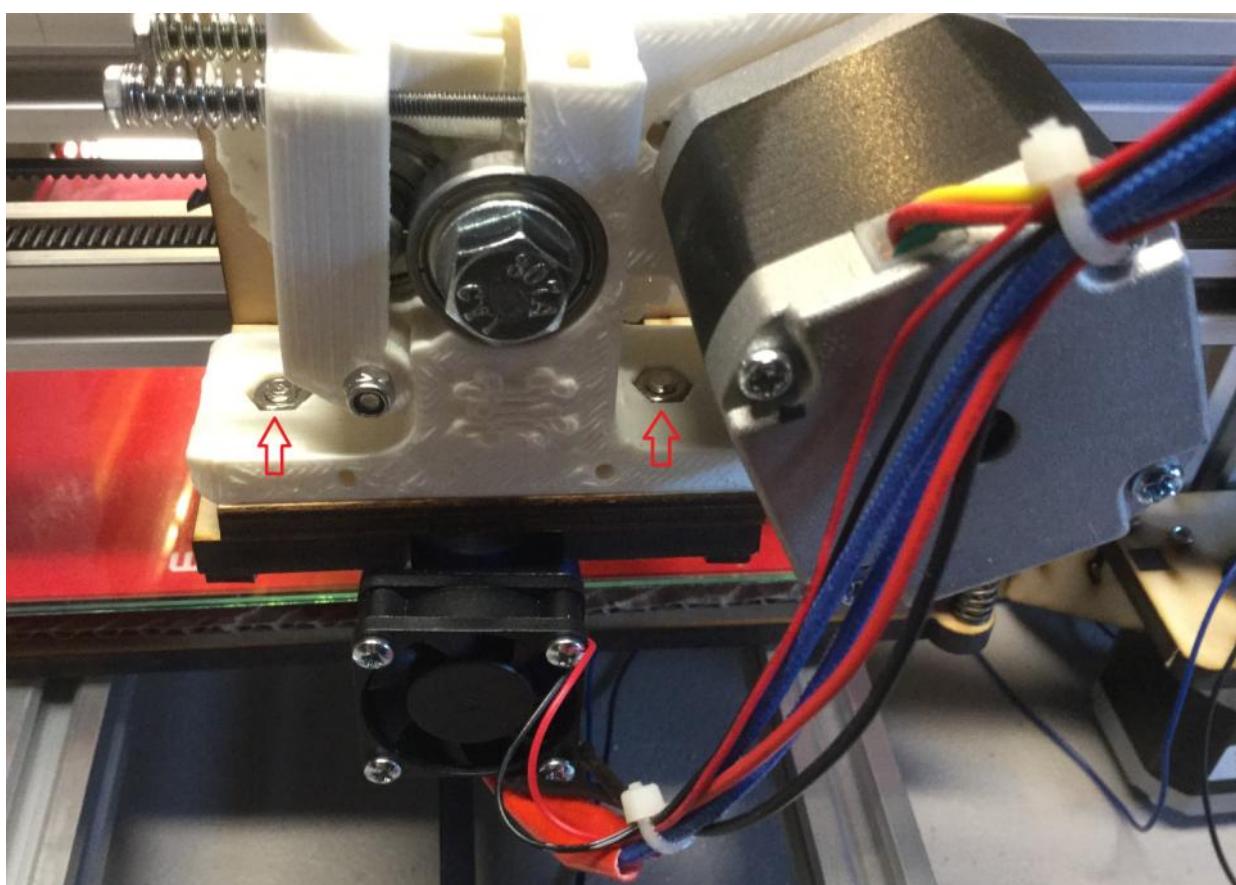
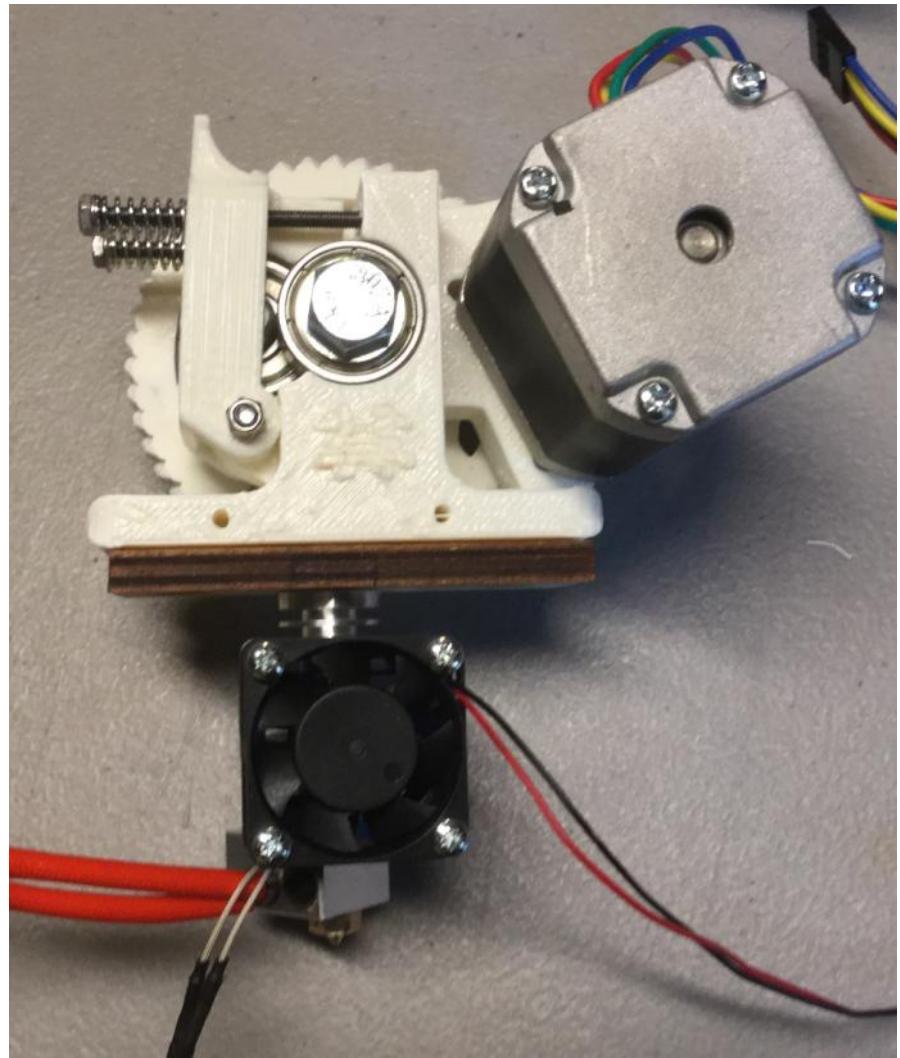
If you have the bulldog see the bulldog guide: [Bulldog i3v guide](#)

If you have the 1.75mm Version of the E3D-V6 Hot End read this page before installing the extruder and Hot End: [1.75mm E3D-V6 Installation](#)



Install the mounting plate into the groove at the top of the hot end then align with the bottom of the extruder (Some hotends will use an Aluminum Mounting plate instead of the wooden one shown)

Place the Extruder/Hot end assembly onto the X Carriage, place the M4 nuts into the Extruder blocks nut traps as shown below and install the M4x20mm bolts from underneath until tight. Notice the wires leaving the hot end in the front, this helps put tension on the hot end to constantly tighten the heater block



Downloads

-Test Gcode [Server 1](#) [Server 2](#) (Load on SD Card before watching the initial tests video)

Your RAMPS electronics for your i3v will come pre-loaded with the correct firmware for an i3v with a Magma, Jhead or Hexagon Hot end, if you have and e3d or if you would like to make changes to the firmware you can watch the [**RAMPS Firmware Video**](#) -

-I3v Firmware Download: [Server 1](#) [Server 2](#)

-I3v Firmware Download for E3D: [Server1](#)

-Windows 8, 7 & XP Driver: [Server 1](#) [Server 2](#)

-How to install an Unsigned driver in Win 8
[Server 1](#) [Server 2](#)

-[MAC OS X driver \(Download Arduino 1.0.5\)](#)

-[Pronterface Download](#)

-[Slic3r \(Includes Slic3r Configs\)](#) [Server 1](#) [Server 2](#)

-[24mm Calibration Cube stl](#) [Server 1](#) [Server 2](#)

Initial Tests Video (This will show you how to configure the endstops and level your bed)

Slic3r -

Slic3r Video

Now that we have the printer moving and calibrated we can slice some 3d objects so they can be printed. Open slic3r then click File and Load Config and browse to find the Config file you downloaded earlier that matches your nozzle size. Next click File, Quick Slice and select Hollow_Cube.stl .

Your Slic3r will now slice the stl into Gcode which we can copy onto an SD Card and print directly from the LCD interface or we can load the Gcode into Pronterface and print simply by Opening Pronterface, connecting to the printer clicking Load File then Print.

Your printer will then start heating up and once the hot end and heat bed have reached the correct temperatures setup in the Slic3r Config file it will start printing.

Note: if you upgrade your slic3r version to something other than 0.9.9 and if you don't use the slic3r configs on page 95 of this guide you will have print problems.

i3V First Print Video

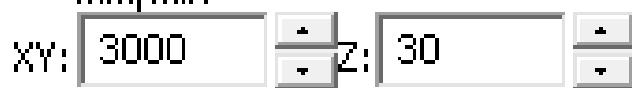
Using Pronterface (Optional)

Now that you have everything installed we will open pronterface select the com port that your printer installed to and set the speed to 250000 then click connect.

Next set your Speeds:

mm/min

XY: 3000 Z: 30



Now we are going to test our endstops and make sure the motors are plugged in correctly. First click the  button, your heat

bed should move forward and the  bottom wood piece holding the Linear Bearing should hit the switch causing the heat bed to stop.

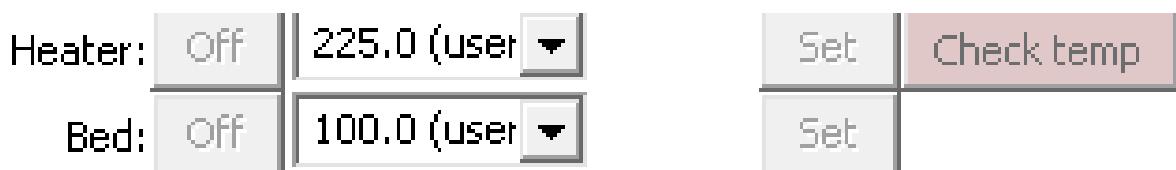
If your heat bed moves to the back of the printer instead you can turn the power supply off, unplug your usb cable and flip the connector around 180 degrees for the Y motor.

Once the Bed moves the correct direction you can adjust the Y endstop until the nozzle is on the back edge of the Glass. For the X and Z endstops there will be #6 bolts that will contact the switch, you can turn the bolt clockwise and counter clockwise until the correct home position has been reached.

Then repeat for the other axis using the   buttons.

For the Z axis we want the nozzle to be about the thickness of a sheet of paper away from the glass on both the right and left of the heat bed, if the side opposite the switch is higher or lower you can adjust the height by holding both the m5 threaded rods and turning one.

Next heat up your hot end to about 225c by typing in 225 and click set in the Heater Row, then to check your temperature click the Check temp occasionally:



Once your hot end has reached 225c set your Extruder speed to 30 and click extrude.



If your filament gets pulled out of the hot end instead of pushing it in then power off the printer and rotate the motor connector for the Extruder Motor.

You should now be able to move your printer in all directions, but your endstops will only be used when you click one of the home buttons so don't keep telling your printer to go past that point.

Any questions please e-mail
elderfarrer@gmail.com or you can chat via
google chat (elderfarrer@gmail.com)

Thanks,

Maker Farm Inc



Adjusting the Stepper Drivers

Before attempting to adjust the Stepper Drivers be aware that it is very easy short or damage the stepper drivers, if you accidentally touch the metal Multimeter Leads to the wrong spots on the Stepper Driver.

The A4988 Stepper Drivers have already been assembled, calibrated and mounted to your RAMPS Board. But it may be necessary to adjust them slightly if you are experiencing certain issues, such as missing steps (when the print staggers in an Axial direction) or if you are experiencing extrusion consistency issues). Either way the following is for your reference to help you understand how the stepper drivers affect the printer.

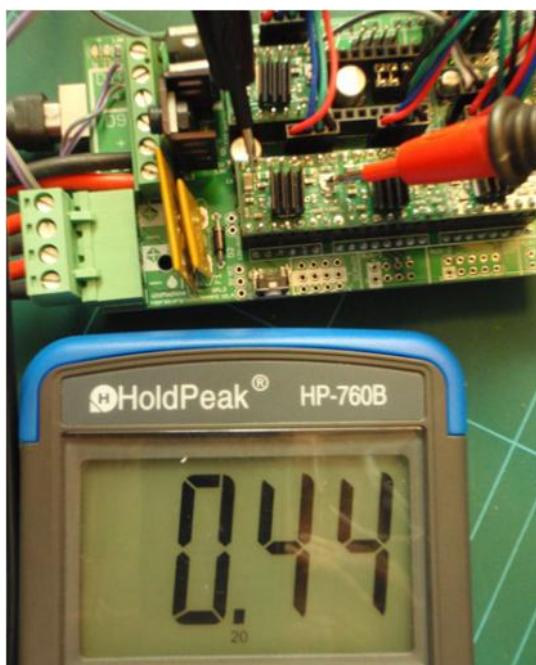
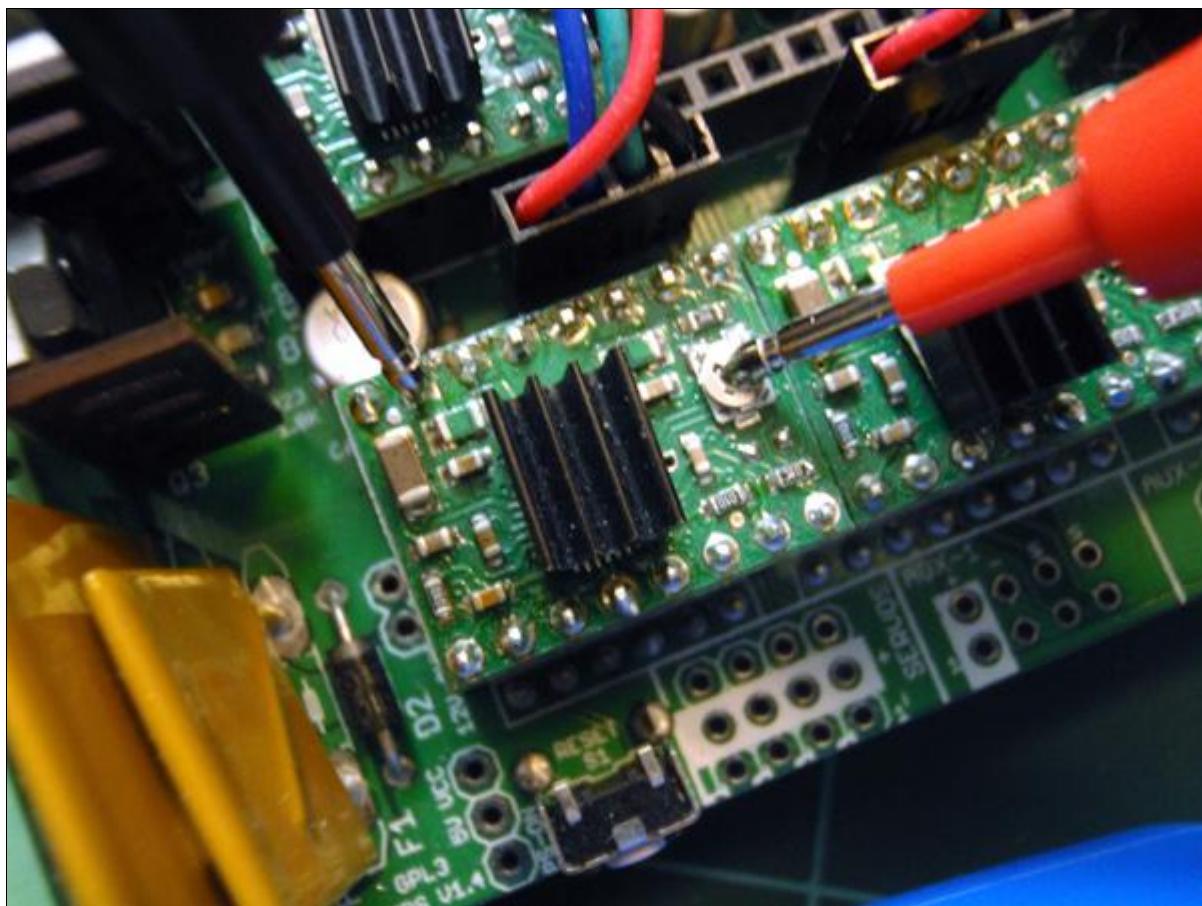
There is a very fine line between too much current and too little current in relation to the accurate operation of the stepper motor itself. We are going to set our stepper drivers to .39v, though you may need to set the voltage to a lower value for the extruder to prevent it from getting to hot and warping the printed parts.

So now select DC Voltage on your Multimeter to two decimal places.



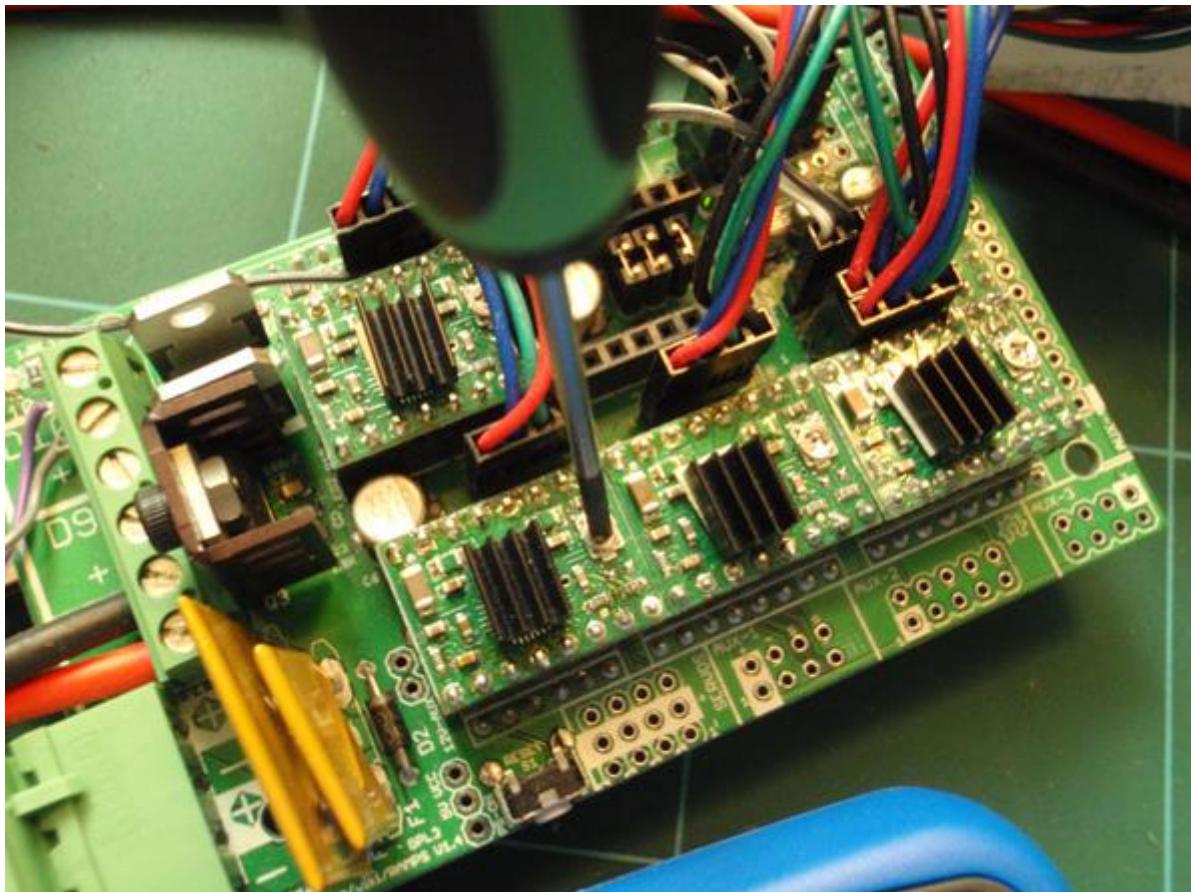
Step 2

With power connected and on and the stepper motors connected, locate the Vref Adjustment Pot and looking at the stepper driver in the following orientation the 2nd pin in from the left along the top row and measure the current by putting the ground probe on the 2nd pin from the left on the top row and the positive probe on the adjustment pot, poke the probe into the pot until you get a reading on your multimeter. Make sure you don't slip and touch any of the other pins as this could damage the stepper driver.



Step 3

Now we have a reading of the Vref voltage, it should be between 0.39 and 0.50v, if we wish to adjust it we need to turn the pot slightly, if we turn it clockwise we'll increase the current drawn and anti clockwise we'll reduce it. Use an insulated small slotted screwdriver to turn the pot slightly.



Step 4

Now you have adjusted the pot slightly re-read the Vref voltage as in step 2 and you should see the change in the Vref from the adjustment you made, now you should have a feel for the amount of change in Vref in relation to the degree change of the pot.

You should notice a physical change in the behaviour of the stepper motor as the Vref is manipulated, when it is too low the stepper motor will make a noise and vibrate as if it were moving but it will fail to move or move inaccurately, if the Vref and hence current is too high the stepper motor will move in jerky overly highly torquey manner (it will seem unnecessarily powerful for the printer) and after a certain point the motor won't move again and will vibrate and get very hot.

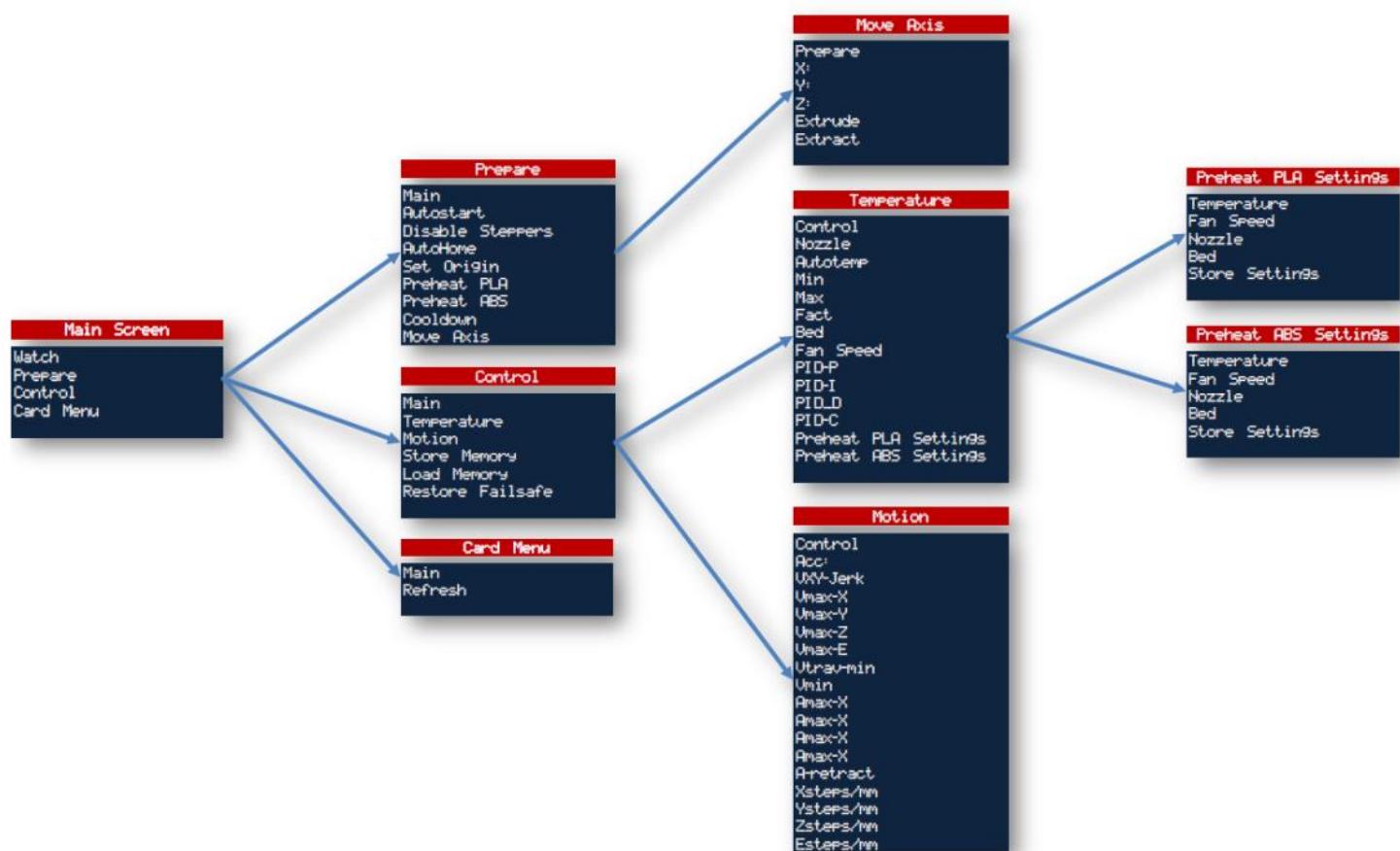
Depending upon which motors are being used more heavily when printing will depict how warm/hot they get along with their respective heat sinks on the stepper drivers, so for example the Extruder stepper may well be considerably hotter than the z axis stepper motor as it is doing considerably more work

Using the LCD interface

The LCD interface will have a Rotary Knob, if you turn the knob at the main screen you can change the feed rate or speed at which the printer prints. If you push the rotary knob you can enter menus and select options.

See Menu Structure Below:

Marlin LCD Menu Tree (v1)



Troubleshooting:

My Prints are shifting during the printing process.

Typically when you print shifts to one side it due to one of a few different things.

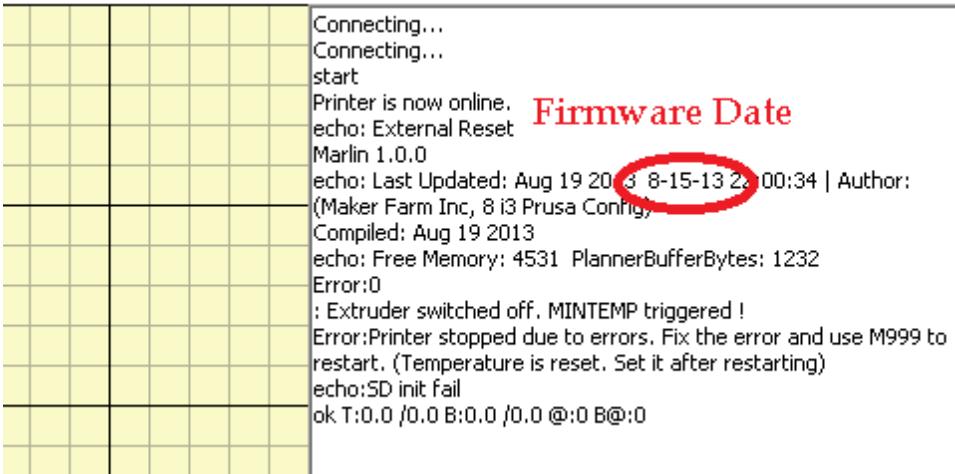
Lose belts or belts that are too tight.

Mechanical binding, if your print head hits something during a print it can shift, or if your rods need to be cleaned and oiled there may be to much friction and your print can shift (you should wipe down and re-oil your smooth rods at least once a month).

Not enough Current. Each axis has a potentiometer on the electronics, if you turn it clockwise 1/8th a turn it will give your more current and more power to prevent shifting prints.

Too much current, If your motors get to much current they can get very hot which can cause the motors to skip, you can turn your potentiometer for that axis counter clockwise 1/8th a turn to test.

Make sure you have the latest firmware: to check your firmware connect your printer to pronterface, in the box on the right of the pronterface screen you will see the firmware date, currently the latest is 8-15-13 which can be downloaded from the link in the i3 guide.



```
Connecting...
Connecting...
start
Printer is now online. Firmware Date
echo: External Reset
Marlin 1.0.0
echo: Last Updated: Aug 19 2013 8-15-13 22:00:34 | Author:
(Maker Farm Inc, 8 i3 Prusa Config)
Compiled: Aug 19 2013
echo: Free Memory: 4531 PlannerBufferBytes: 1232
Error:0
: Extruder switched off. MINTEMP triggered !
Error:Printer stopped due to errors. Fix the error and use M999 to
restart. (Temperature is reset. Set it after restarting)
echo:SD init fail
ok T:0.0 /0.0 B:0.0 /0.0 @:0 B@:0
```

Last is Speed, if your printer is going to fast or your slic3r settings have fast acceleration it can cause your print to shift, to test you can lower all your speeds in slic3r.



Troubleshooting:

My hobbed bolt is chewing up the filament

First is we want to check out speeds for prонterface and for Slic3r, for prонterface make sure the extruder speed is set to 30mm/min (to the right of the Reverse button) for Slic3r make sure you use the Slic3r config file from page 95 of this guide and make sure you have slic3r version 0.9.9, if you upgrade past 0.9.9 you will have print issues.

Next look at your extruder, we want to make sure the idler bearing turns freely when not in contact with the filament or hobbed bolt. If the idler bearing does not turn freely check to make sure it isn't rubbing on the hinge part of the extruder block, also make sure the bearing isn't hitting plastic inside the extruder idler.

Next is Temperature, for Jhead hot ends ABS use 225c, for PLA use around 205c. For the Hexagon ABS use 250c and PLA use 225c. If you are using PLA you may also need a fan to blow on the black peek plastic part of the jhead hot end to prevent heat from building up causing jams, for the Magma PLA is not supported.

Next is the print material used, ABS is the easiest material to print with, I would recommend everyone start out with ABS to get you printing, after that you can experiment with other materials that take more effort to get printing. Also make sure you have good quality filament from a good source, there are many places that sell sub par filament that won't work and just cause problems. I would recommend using Makerfarm, Ultimachine or Makerbot filament as they are all known good sources, you can measure your filament and make sure its 3mm, if its above 3mm it can cause issues and jams, cheap filament also usually has debris in the filament which will cause jams and other issues.

Next if your X axis isn't level this can cause your nozzle to have to much back pressure. If you tell your printer to home the nozzle should end up in the back right corner of the heat bed glass. If you now move the nozzle to the left side of the printer check to see if the nozzle moves farther away from the glass or if it moves closer to the glass, if either happens then you will want to hold both of the 5mm threaded rods attached to the Z motors and turn the left one until the nozzle is the same height away from the glass on the left side as it was on the right side. If you upgrade your slic3r or are not using the slic3r config on page 95 of this guide your Z Motor can easily get out of calibrate causing this issue.

Next check your spring tension, if the springs are to loose there won't be enough grip on the filament, if the springs are to tight the filament will be squished causing it to be oval instead of cylindrical which will cause it to jam also. You should be able to pull back on the Extruder Idler with your thumb to pull out or put in new filament, if you can't pull out the filament your springs are to tight.

Last if there is something physically blocking the nozzle it can cause the same problem, if you have a .50mm or .40mm nozzle you can straighten out part of a pen spring, then when the hot end is at temp for your filament you can push the spring up into the tip of the nozzle, then set your prонterface speed to 10mm/min and extrude to see if that unclogged the nozzle. If that doesn't work you will want to separate your hot end from the extruder, then when the hot end is at temp push in a allen wrench or screw driver that is 3mm into the hot end while holding onto the hot end mounting plate, this should force out any filament in the hot end clearing out any debris.



Troubleshooting:

My hobbed bolt is chewing up the filament (Continued)

When printing with ABS or PLA with Hexagon or Magma hot end may benefit from you “Seasoning” the hot end from time to time.

Seasoning - the internal surfaces of the hot end with cooking oil. This might sound crazy but, it works first hand with the Hexagon and Magma hot end. PLA is a sugar and molten sugars stick to bare metal like stainless steel, in the kitchen you prevent this by creating an oily patina on the metal surface by baking a thin layer of oil onto the surface. There's some science to this but we won't go into it here. Simply dip the end of a piece of PLA (10mm or so) in canola oil or something similar, heat the hot end to about 180 degrees and insert the oily PLA into the hot end, press it through with your fingers until it exits the nozzle then extract the oily PLA, then push 50mm of un-oiled PLA through. Repeat this as many times as you like, I had success just doing it once. The hot end will fizz and pop while you are doing this as you are effectively frying the PLA, for me it smelt strongly of cooking donuts. This is why you need to push an unoiled piece through to purge any excess oil.

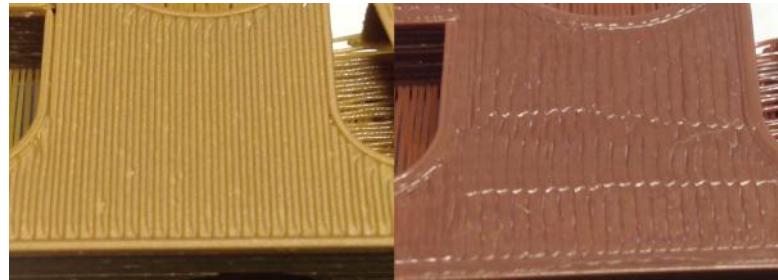


Troubleshooting:

My ABS prints warp or come off the glass before finished printing.

Warping is caused because the edges of your print cool faster than the center of the print which causes them to shrink. There are a few things that can be done to help minimize or prevent this warping.

1. Make sure your first layer print is squished to the glass, if you look at the bottom of your print (side in contact with the glass) you should not easily be able to see the lines of filament, if it looks like the left picture try lowering your nozzle a little till your print looks the right photo.



2. Make sure your heat bed is at the proper temperature, For RAMPS electronics and ABS you will want your heat bed as close to 110c as possible, the high temperature helps keep the ABS stuck to the bed. If you have a hard time getting your heat bed up to 110c you may want to add a [Heat Bed Relay](#)

3. Next we need to make sure we have a good printing surface, on top of your heat bed you should have a piece of glass, for ABS and PLA it is recommended to spray your glass with this hairspray: walmart.com/ip/Fructis-Style-Extreme-Hold-Extreme-Control-Anti-Humidity-Aerosol-Hairspray-8.25-oz/19200744, this is the one we use in our botfarm and not all hairspray's are created equal, if you can get the Garnier Fructis Extreme #5 the make sure you use it. When you apply the hair spray to the glass it should take you about 3 or 4 seconds to spray the whole bed. If your prints stop sticking you can spray it again on top of the last layer. After a few layers you will want to wash your glass off under some hot water before applying a fresh layer. You can also cover your glass with Kapton tape, you will want to get as wide of a roll of kapton tape as possible, if your print is on top of any seam of two pieces of kapton tape meeting the print will not stick, also you will want to clean your kapton tape with acetone to prevent oils from the kapton tape to help the print to stick. You may also want to research ABS glue.

4. Environment - if you are in a cold room or a room with moving air that can make your print warp also. Sometime people will have an enclosure to keep their printer in a hot environment though most of the time this isn't needed.

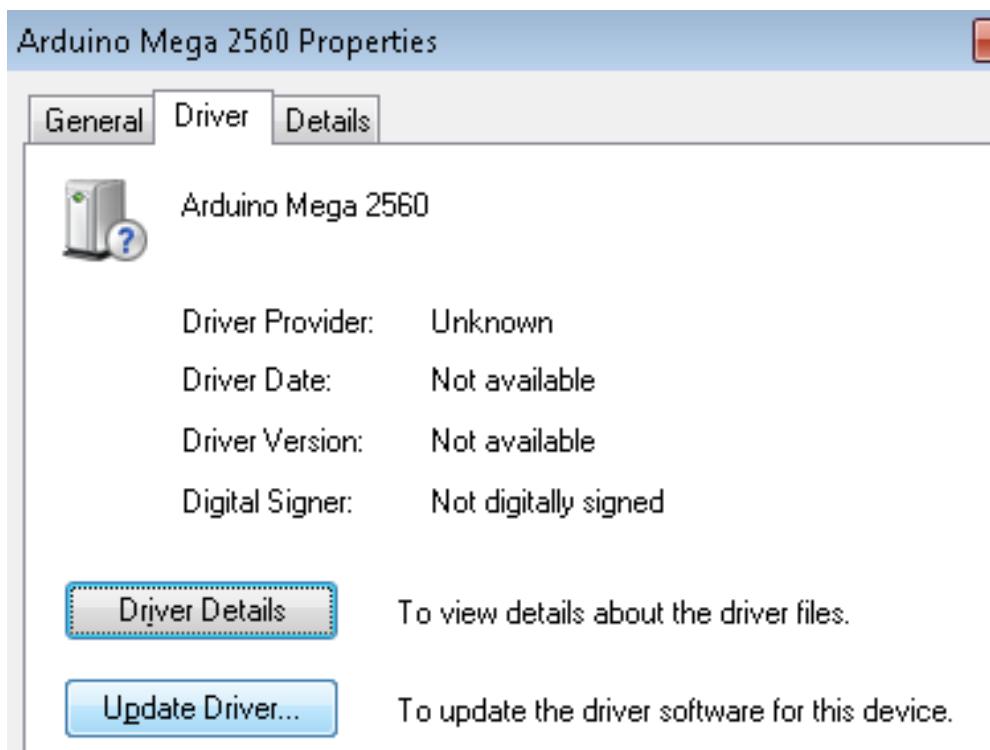
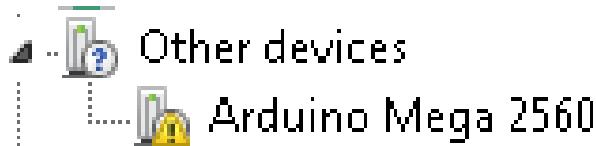
5. Adding mouse ears or a raft to your print can help with warping: <http://www.makerbot.com/blog/2011/02/25/mouse-ears-defeat-corner-curling-monster/>, raft settings are in slic3r Print settings tab under Support Material. You may also want to play with the skirt function and add multiple layers as a wall to keep the heat in.



Troubleshooting:

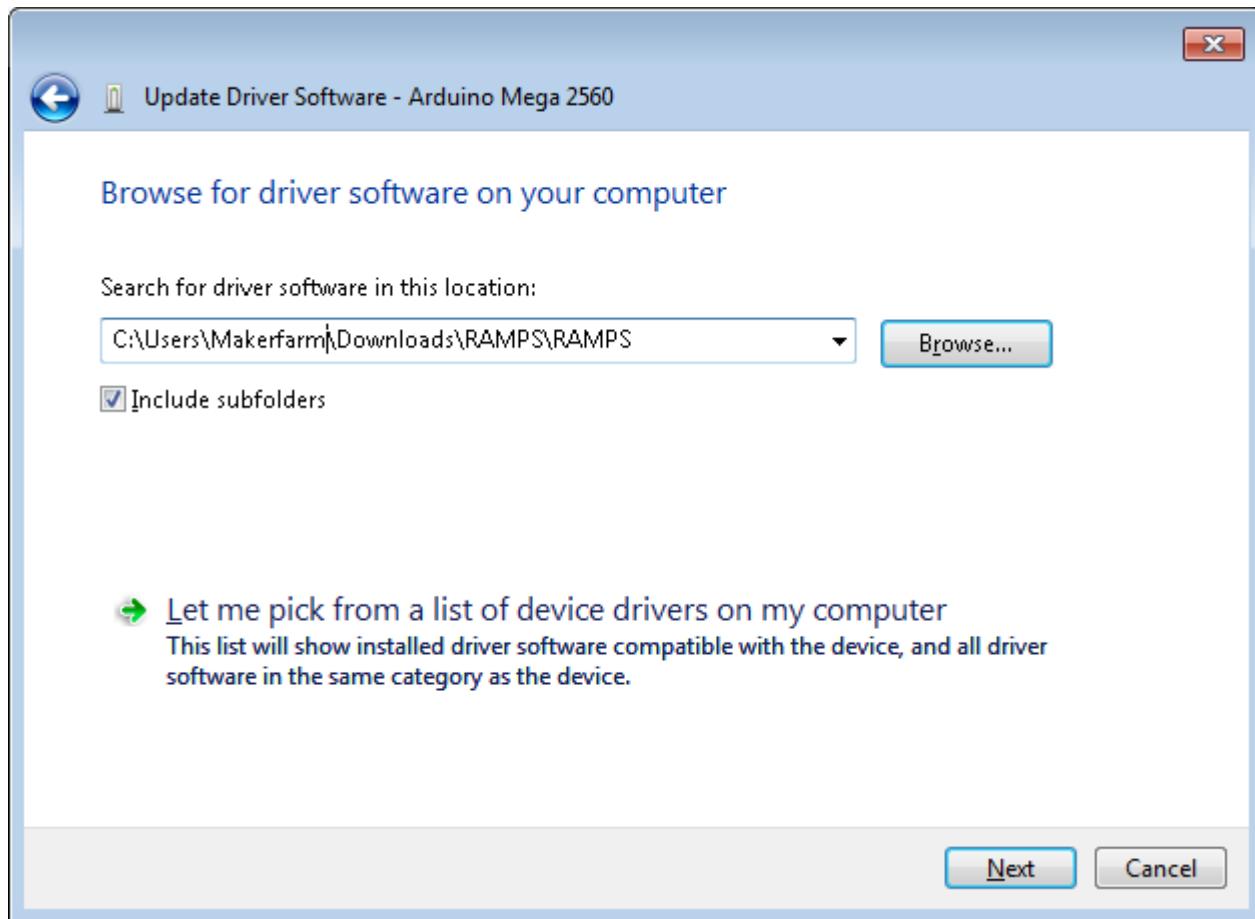
My computer didn't install the printer on a com port.

If windows doesn't setup your printer on a com port most likely the driver hasn't been installed yet. For windows xp and windows 7 you will first want to download the Driver for your electronics on page 95 of this guide, After you have downloaded that you will unzip the zip you downloaded and you should have a firmware called RAMPS with a few sub folders, in the ramps folder there will be a file called "Arduino MEGA 2560.inf" that will be the driver for your ramps board. To install it you will plug in your ramps, if it comes up and asks for the driver you will point it to the file called "Arduino MEGA 2560.inf", if it doesn't ask for the driver open your control panel and device manager, you should see a device with an ! by it that says something like "Taurino Mega" or "Arduino Mega 2560",

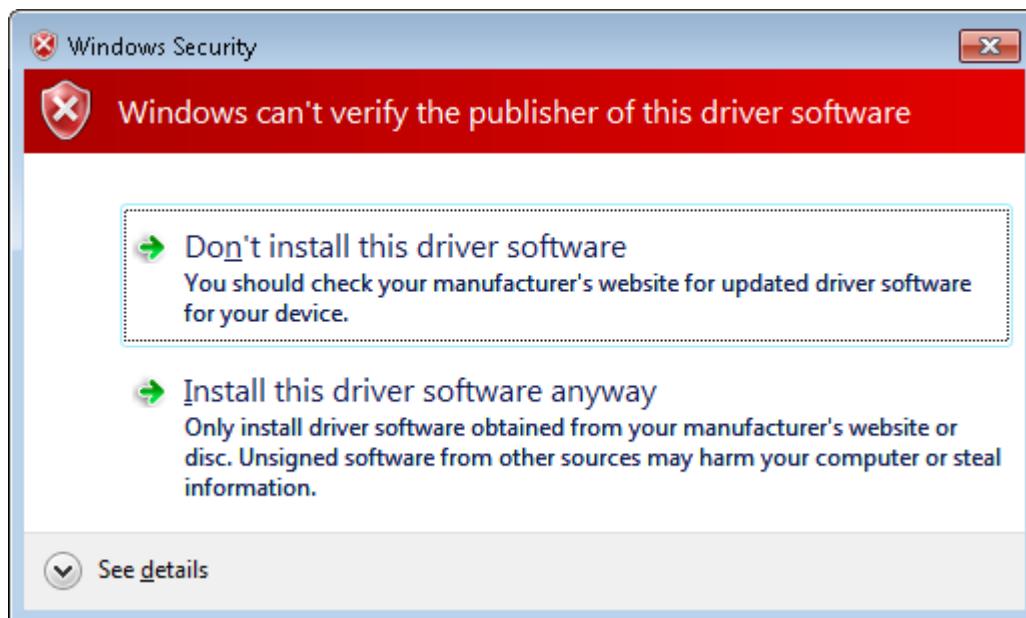


if you double click on that device and goto the driver tab, you can click on update driver,

Troubleshooting:



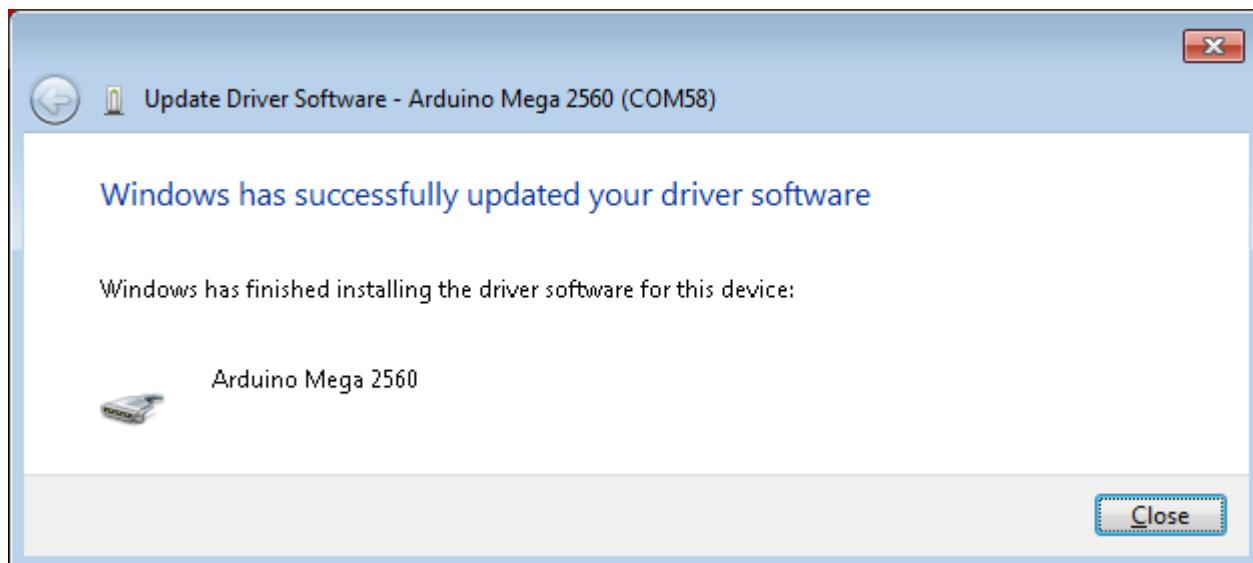
at that point you will click “Browse my computer for driver software” point to the folder that contains the file called "Arduino MEGA 2560.inf, and click next.



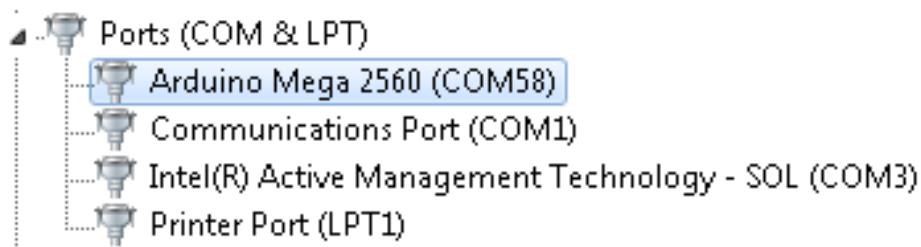
If you get this message just click “Install this driver software anyway”



Troubleshooting:



it should install the driver, now you can click close.



After that it will show up under your ports in the device manager.

If that doesn't work you may try to carefully remove the Arduino Mega from the RAMPS (the Arduino Mega has the USB plug and is the back board)



Troubleshooting:

My Magma is taking a long time to reach 225c to print ABS.

The Magma requires a fan to run all the time, this can also cause problems getting your hot end up to correct temperature. Here are a few things that can help.

1. Wrap your brass nozzle with a few layers of kapton tape to insulate the thermistor.
2. Print a fan Shroud: <http://www.thingiverse.com/thing:147033>
3. Flip your fan around so it pulls air instead of blowing, you may need longer bolts to do this.

My Magma gets a MAXTEMP error when I go above 235c.

By default the firmware's Max temp is set to 235c, if you have a jhead and go over that temperature the hot end will melt down. For the magma though we can increase the max temp, all you need to do is download the Magma Firmware: [MAGMA FIRMWARE DOWNLOAD](#) Then follow the firmware video on page 95.

My Heat Bed is taking a long time to reach 110c to print ABS.

The Heat bed can sometime be difficult to get up to correct temperature. Here are a few things that can help.

1. Install Insulation under the heat bed, Any high temperature and flame proof insulation will work, I have heard of reports of people using a few sheets of Cardboard, if you do use Cardboard use it at your own risk and be careful as it is flammable.
2. Make sure your heat bed is getting enough current, your power supply will need to output a minimum of 11amps on the 12v rail. If you are not using an ATX power supply your power supply may not be able to output what it is actually rated at.
3. If you are in a cold room or a room with moving air that can cause your heat bed to cool faster then it can heat.
4. If you have a hard time getting your heat bed up to 110c you may want to add a [Heat Bed Relay](#)

My Motors are getting hot

It is normal for your motors to get hot enough that you won't want to touch them. They will run fine at this temperature, but if the extruder motor gets to hot it can soften the printed pieces, if you feel your extruder motor is getting to hot you can turn the potentiometer on the extruder stepper driver counter clockwise 1/16th or 1/32nd of a turn.

My Extruder motor isn't turning

The firmware is setup to prevent the extruder motor from turning if the hot end temperature is below 175c, this protects the hot end and extruder from damage.

Troubleshooting:

My X, Y or Z motor is moving the wrong direction when I press home.

If this happens the motor that moves the wrong direction is plugged in backwards, all you need to do is unplug the power and usb cables (to prevent damaging the stepper drivers) then unplug the stepper motor and flip the connector around.

D9 on my RAMPS isn't working when I turn the fan on

D9 can be used if you wish to have a fan blowing on your printed part to help PLA cool faster. D9 should not be used to cool the hot end if you have a Magma, Hexagon or Jhead hot end. To use D9 you will need to change your firmware, in the configuration.h page change the motherboard to 33.

My Extruder Motor isn't turning

The firmware will prevent your extruder motor from turning if the hot end temperature is below 180c.

Troubleshooting:

My endstops aren't working properly

The first thing we need to do is make sure the endstops are wired correctly and plugged into the electronics in the correct place, see page 78 for the wiring diagram. NOTE: the Blue wires should all be connected to the S Row, the Black wires connected to the - Row and the + Row will not be connected to a wire. NC on the switch should be connected to the Blue wire, C should be connected to the Black wire and NO will not be used.

Next we will check to see if they are working, to do this start pronterface and connect to your printer, in the bottom right corner of the screen you will see a text box and send button. Make sure none of your Endstops are triggered then type M119 in the Text box and Click the Send button, in your box above the send button you should see something like picture P1.

Next move your heat bed all the way to the front so it triggers the Y endstop, type M119 in the box and click send, you should see something like P2. If it doesn't look like P2 double check the wiring of your Y endstop on page 78.

Next move your Hot end all the way to the right so the X endstop is triggered, type M119 in the box and click send, you should now see somthing like P3. If it doesn't look like P3 double check the wiring of your X endstop on page 78.

Next we will check to see if your Z endstop works, you can either manually press your Z endstop switch or turn your Z motors until they hit the Z endstop. Type M119 in the box and click send, you should now see somehting like P4. If it doesn't look like P4 double check the wiring of your Z endstop on page 78.

If any of your endstops went from Open to triggered in the Z_Max, Y_Max or X_Max make sure you have that endstop plugged into the correct spot on the RAMPS. If you had one endstop not do anything you can plug it into another spot then run the M119 command again to see if it works, if it still doesn't plug a known working endstop into the original port that wasn't working, if the known good endstop works we know we have a problem with the endstop or its wiring, if the known good endstop doesn't work please contact Maker Farm for more instructions.

Also the endstops will only work when you press the Home button for all Axis or for each individual axis, if you press the + or - the firmware is set to not use the endstops.

x_min: open
x_max: open
y_min: open
y_max: open
z_min: open
z_max: open
P1

x_min: open
x_max: open
y_min: TRIGGERED
y_max: open
z_min: open
z_max: open
P2

x_min: TRIGGERED
x_max: open
y_min: TRIGGERED
y_max: open
z_min: open
z_max: open
P3

x_min: TRIGGERED
x_max: open
y_min: TRIGGERED
y_max: open
z_min: TRIGGERED
z_max: open
P4

