



Steps for assembly of a Bukito.

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Table of contents

Table of contents	1
Definitions and conventions.....	2
Tools you will need, not included in kit.....	3
Other items included in kit	3
General observations	3
Power switch assembly.	4
Z motor mount.....	7
Z axis kit.....	8
Y axis kit.....	9
Z motor.....	12
Extruder filament drive mechanism.....	12
X axis assembly	16
Z Screw	21
Y platform	22
Attaching the platform.....	25
Handle	27
Filament tube.....	27
Aligning (tramming) the platform.....	28
Applying blue tape	29
Add-on PLA cooling fan.....	29
Plug in the power supply.	30

Definitions and conventions.

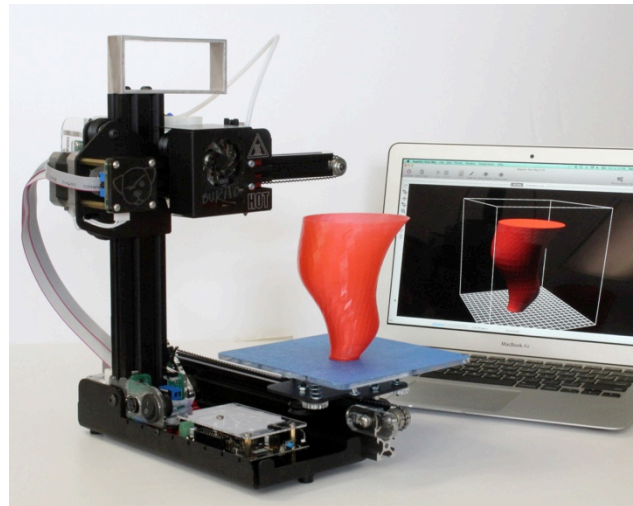
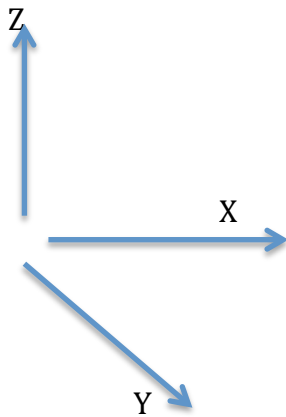
The parts are collected into **kits** (labeled plastic bags.) Where possible, we will walk you through all the parts in a kit and highlight the **kit name** (which should be written on the bag) in yellow. In some cases we will have you use a few parts from different kits- we will point out where you open a kit for the first time.

The **X axis** runs along the horizontal bar that runs from right to left in this photo. The extruder is carried on the X carriage..

The **Y axis** is the bar that runs underneath the platform (Y direction movement is done by the platform). Or, toward and away from you in this photo.

The **Z axis** is the vertical axis.

The “**front**” of the Bukobot is defined here as the end of of the Y axis closest from the Azteeg board mount. (Or to put it another way, the Azteeg and other electronics will be in the front, and the power switch will be on the left (See image below of assembled Bukitos– refer back to this if you get lost.) When we say “**left**” or right we mean from the point of view of an observer looking at the machine from the front.



Tools you will need, not included in kit

A tool to strip ends of wires and one to crimp a connector on the end of a wire.

Phillips-head screwdriver (00 size)

A roll of 3M blue painter's tape ("ScotchBlue") for the platform, if you will be printing in PLA.

Other items included in kit

Metric allen wrench set

We include a piece of nylon filament for cleanout if the nozzle clogs (see www.bukobot.com).

We include a test piece of PLA filament.

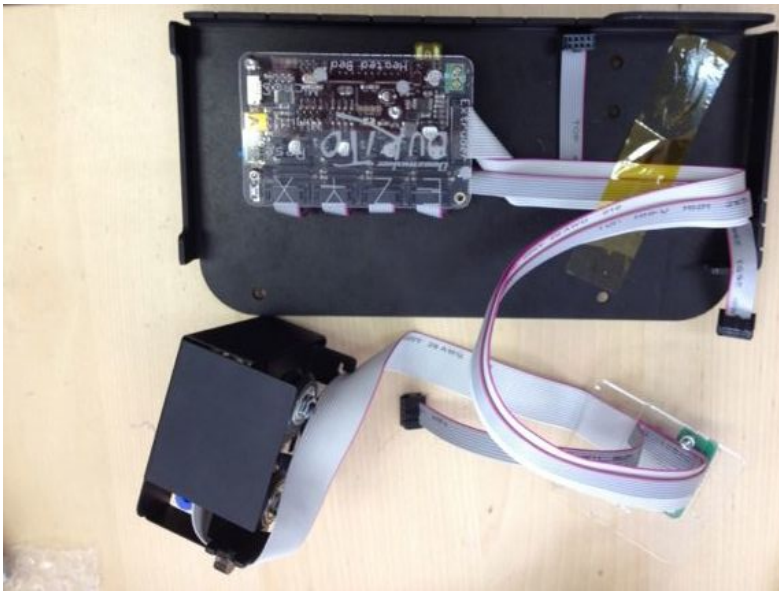
General observations

If you are an experienced assembler of electronics, you may find the following obvious. If not, some notes about assembly in general:

- Many pieces have rectangular and slide nuts. These nuts are designed to lock in the slots in the sides of the aluminum bars. You just need to get them started and they will self-align.
- By and large, it's a bad idea to cinch down nuts on the first pass. We will discuss this as we go.
- Each end stop gets a ribbon cable connection. The other end of these connectors are labeled on the board and also cut to a length that should make them tight connections when allocated correctly. If a ribbon cable has significant slack, it probably isn't the right one! Look at these carefully before beginning.

Power switch assembly.

Open the Power switch assembly kit.

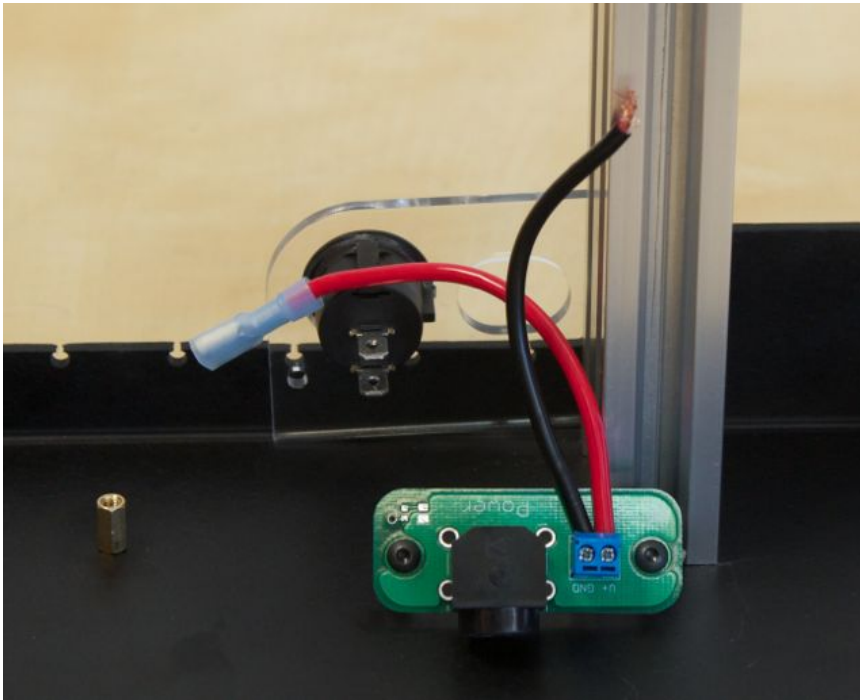


Gather up the main assembly(baseplate, control board and extruder, with cables) and the two aluminum 11 inch extruded rods.



Attach the acrylic piece with the power switch to the baseplate assembly using the screw and square nut and shortest of the screws in this kit.

Strip off the ends of the wires about 5 mm from the end. Crimp one end of each of the red wires with the connectors supplied.

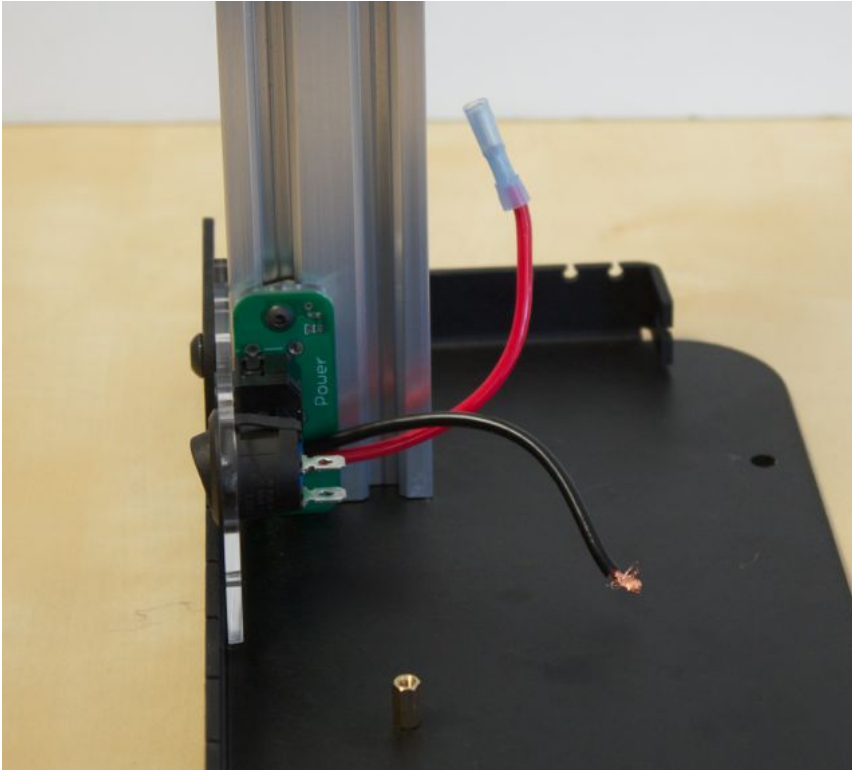


Attach the small acrylic piece to the back of the power connector board (small oval green circuit board) with the two slide nuts. Align it so that the cutouts are over the protruding connections on the board. Slide the nuts into the wider side of the aluminum bar. Slide it to near the bottom.

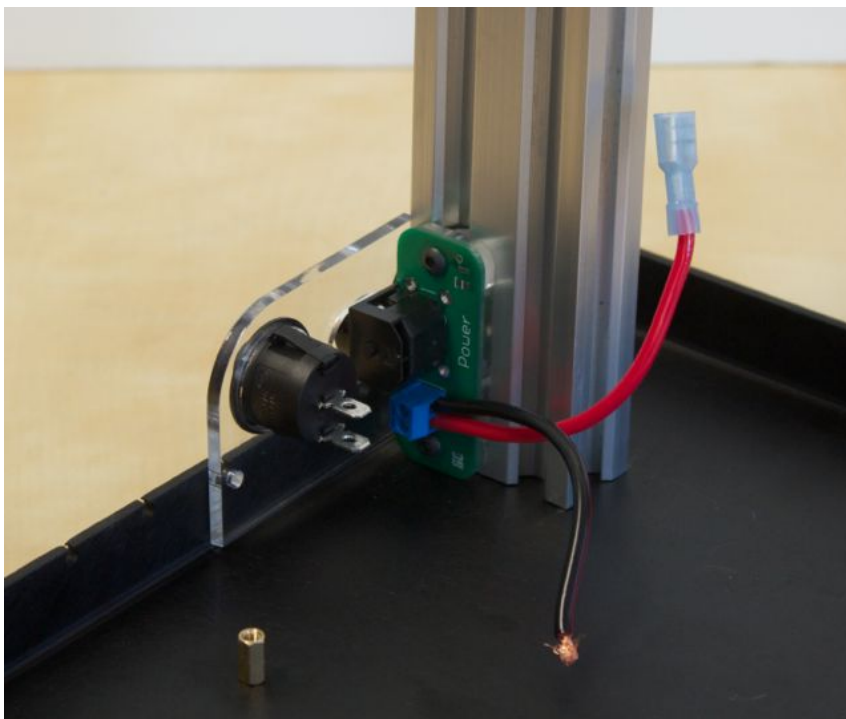
Put the rectangular nut on the side of the baseplate into the narrow side of the aluminum bar. Carefully slide down the bar and attach it to the baseplate. Tighten down all sliding nuts.

Pick up the aluminum bar that has threaded holes at both ends which should now have the power connector board loosely attached

Take the power connector and loosen the small screws in the blue connector box on the green power board with a Phillips head screwdriver just enough so that you can insert the stripped wire ends into the holes at 90 degrees to the small screws. Connect the red and black wires into the holes at 90 degrees to the small screws. Tighten the small Phillips screws. Be sure there are no stray strands hanging out as this can cause shorts. Twisting the ends a bit before inserting them may help.



Red wire goes into the +5 slot and black wire to GND. Note that in this picture the acrylic cover is behind the green board, and the nuts are on the far side slotted into the aluminum bar. It can be a little tricky to handle all the pieces (here, the assembled main electronics board which you will have on your system at delivery is not shown.) Slide it as shown between the aluminum bar and the power switch.

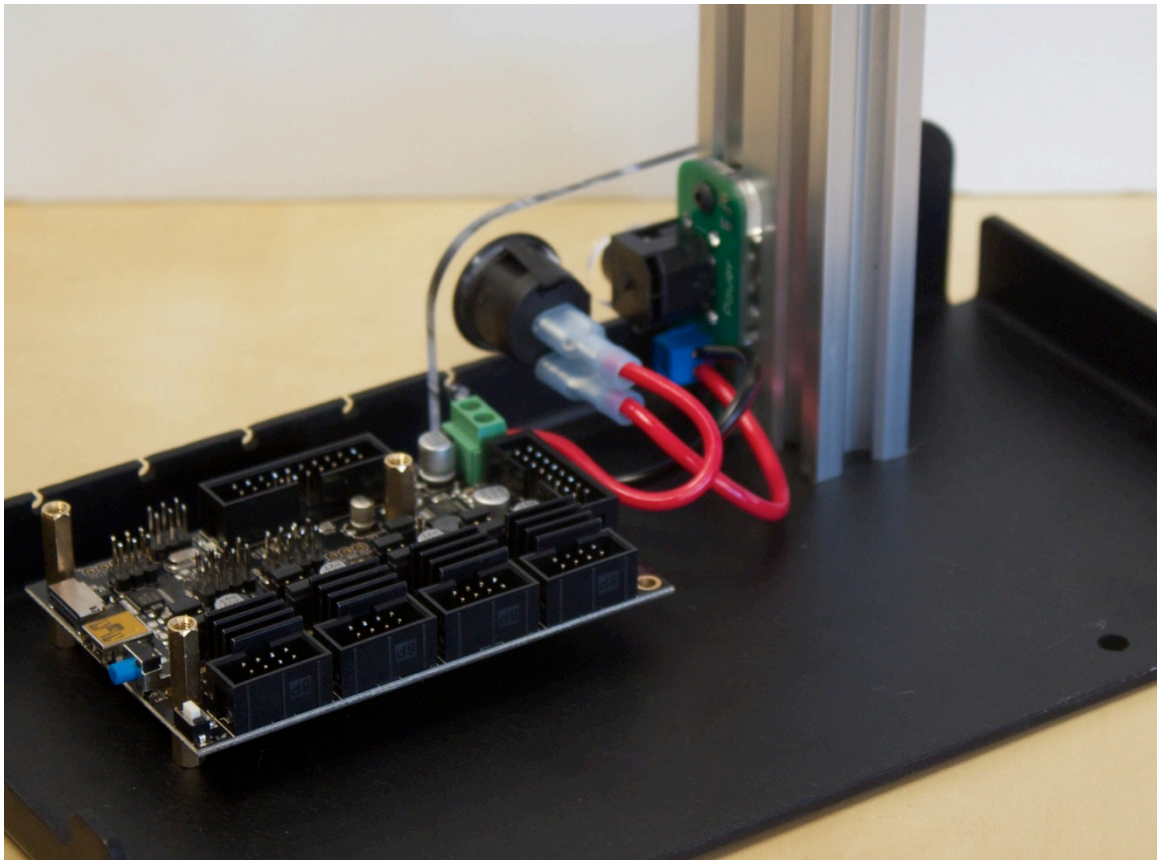


Take the other **red wire** (not currently attached to anything) and insert it into the **+** **terminal** of the main electronics board (you will need to take off the acrylic cover to do this, which involves taking off three screws with an allen wrench.)

Tighten down the small Phillips screws. Take the **black wire** from the power plug connector board and attach it to the **- terminal** on the main board.

Attach the wire from the board into the top of the switch.

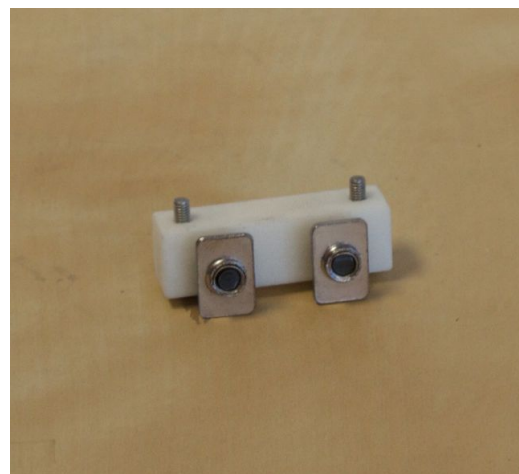
Attach the red wire from the power plug board into the bottom of the switch.



Z motor mount.

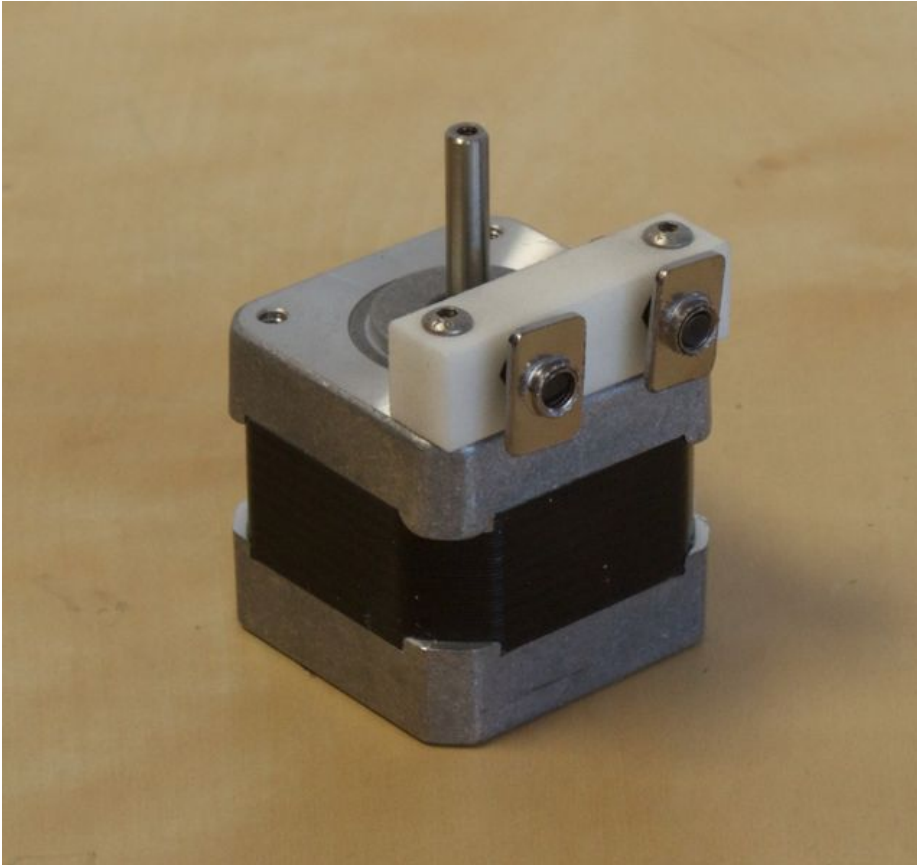
Open the Z motor mount kit.

Put in screws from each side into the white block such that the screw tips are closest to the black mark. Put the big black screws in and out a few times to loosen up the holes a bit. Put the thinner screws in so they are just



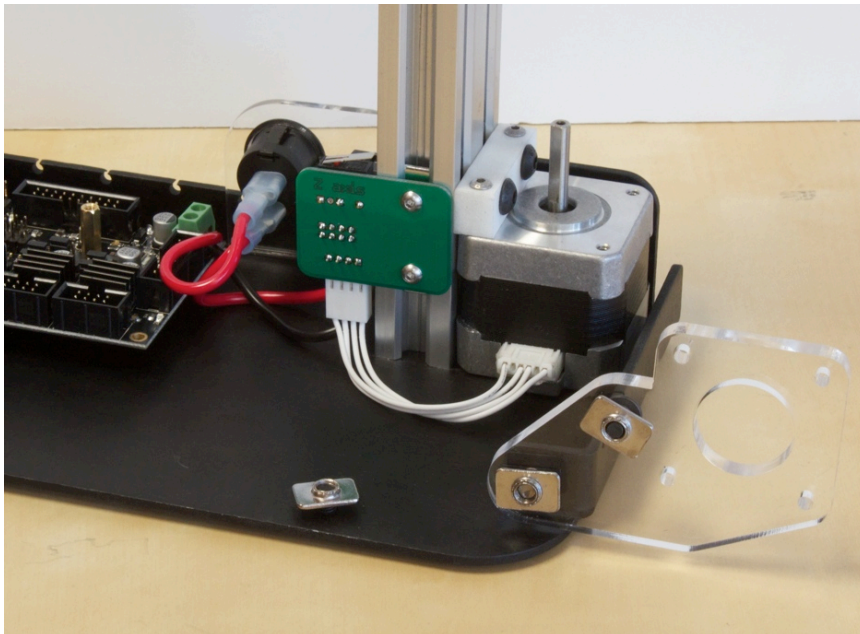
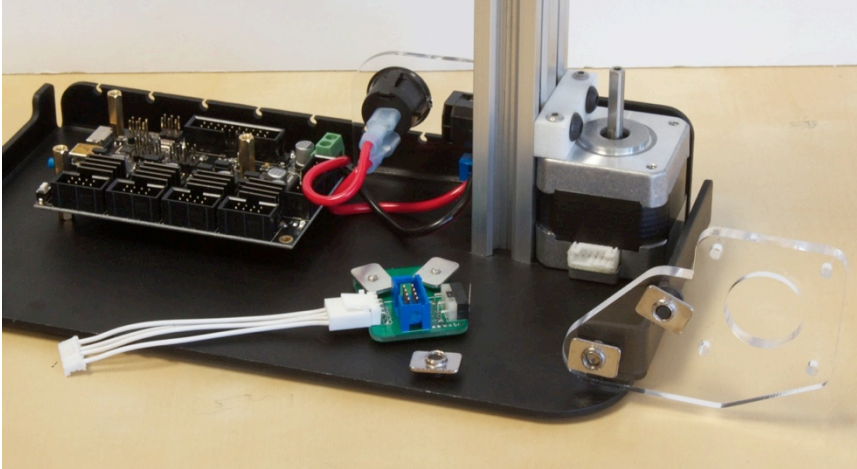
flush with the surface of the white block. This picture was taken before we added the black marks- the black mark would be on the top and front of this piece.

Put the piece on top of one motor such that if the motor connector is toward you, the white piece is on the left with the black line facing out (the black screw tips should face toward the motor center). The black line will then disappear when it is attached to the aluminum bar. The nuts should be loose.



Z axis kit.

Open the Z axis kit and assemble the screws and acrylic cover such that the acrylic cover cutouts are over the protruding parts of the circuit board. Add the white connector. Slide the nuts into the Z (vertical) axis aluminum bar such that the white connector is down. Attach the Z axis insulation displacement connector (black connector) into the blue connection on the back. Then press the part until the bottom of the acrylic touches the bottom plate and tighten the screws



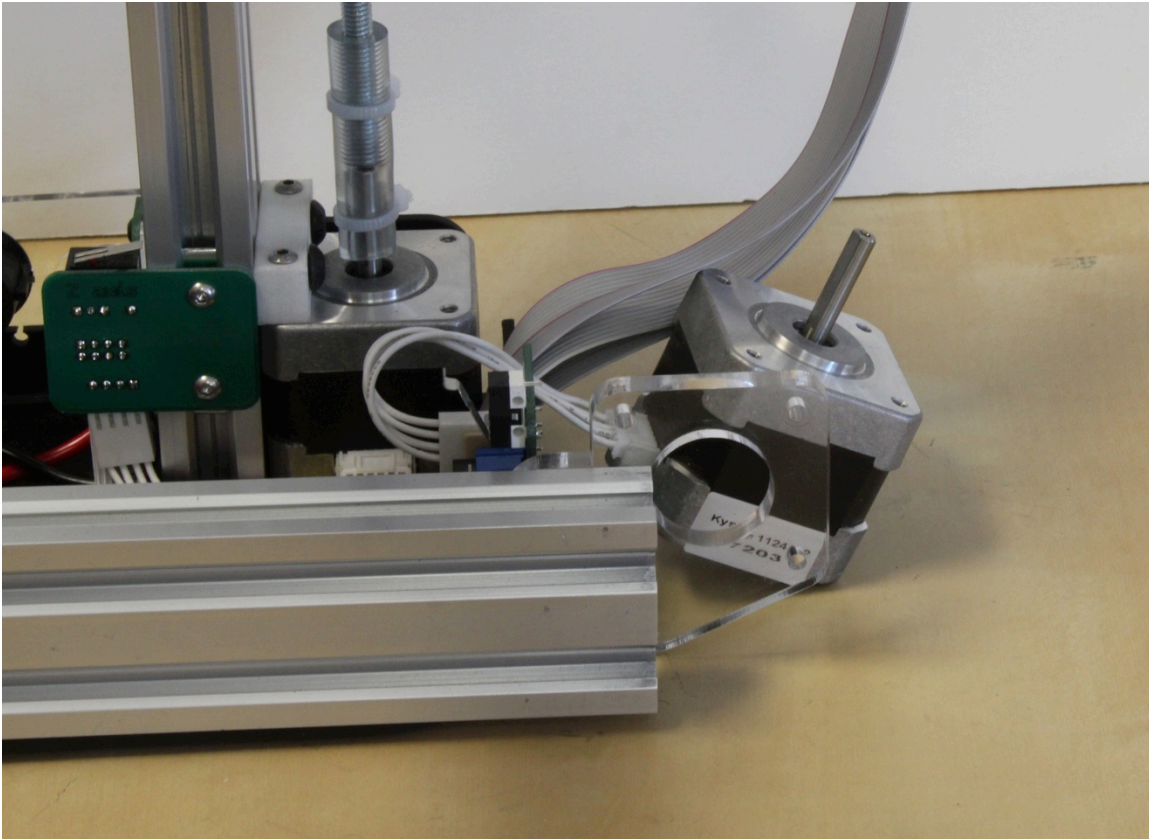
Y axis kit.

Open the **Y axis kit** and attach the acrylic piece to the board using the two longest big screws and two nuts..

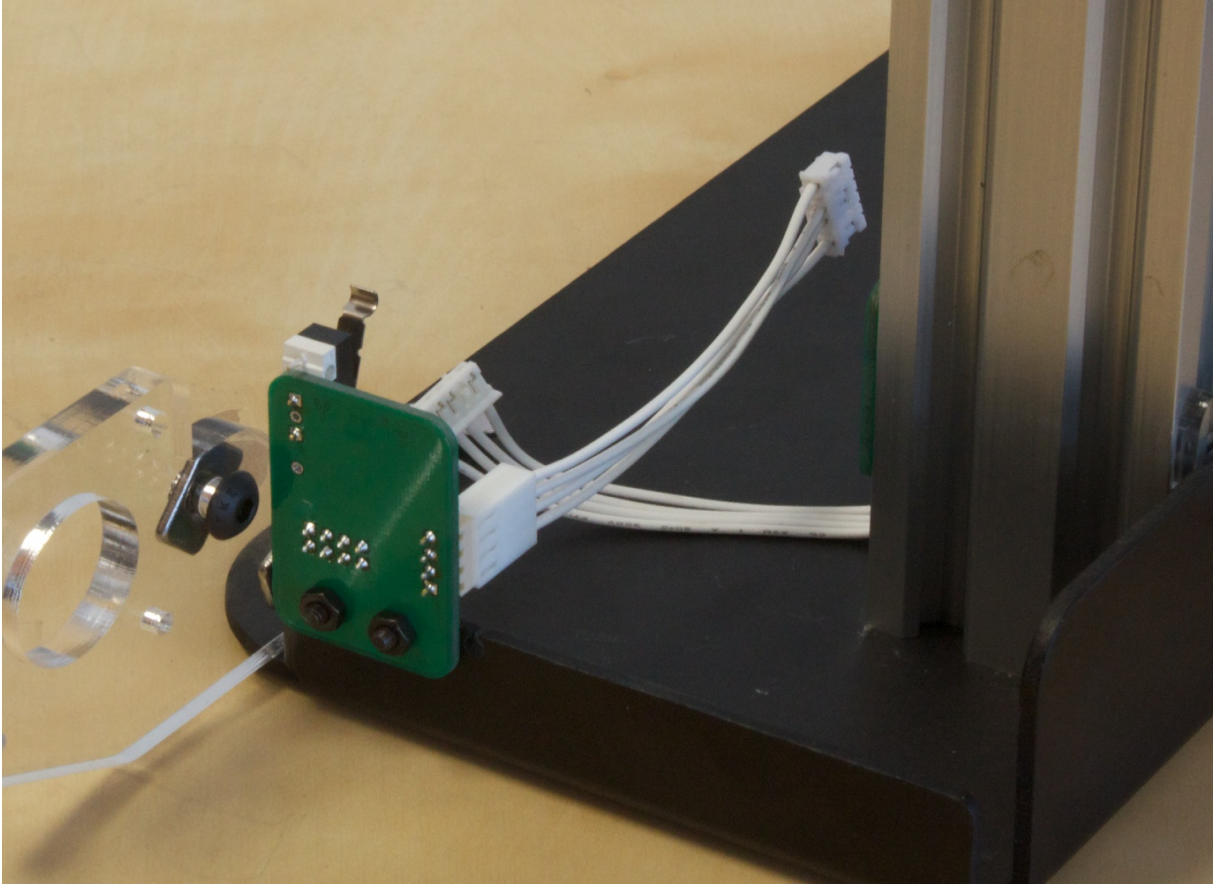
Put the two shorter screws through the holes in the Bukito baseplate and put a rectangular nut loosely on each.

Take the other large aluminum bar and place it over the nuts; slide until it is just level with the big circular hole on the acrylic piece . Tighten down. Attach the white

cable from the y motor power board to the y motor. (Note: in this image the z motor was already there, but we are now recommending that the z motor be attached later on in the build).

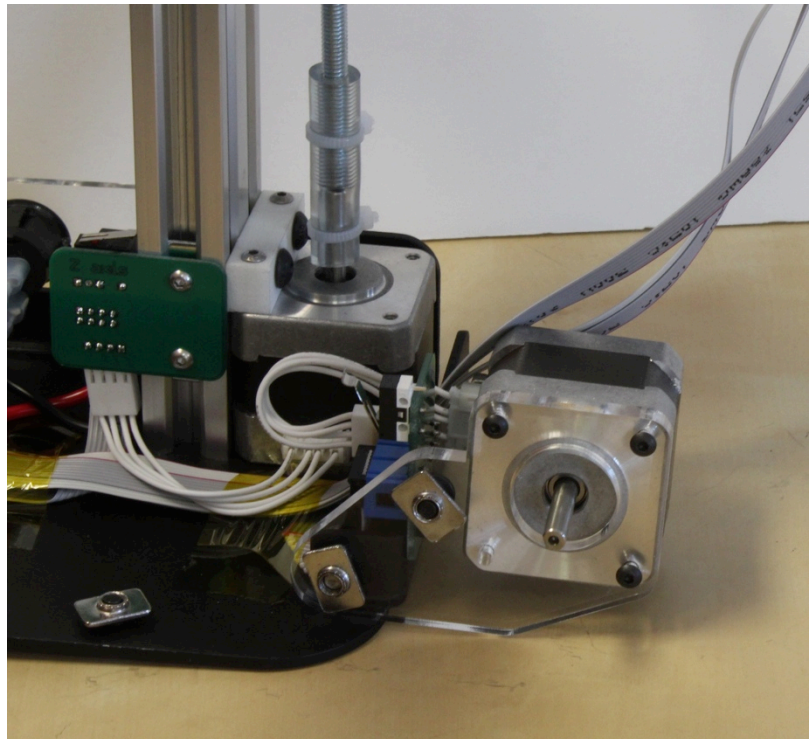


Take the y end stop and attach the white cable. Attach it on the outside of the base plate next the acrylic piece. Use the two closest holes to the acrylic piece. Attach the ribbon cable and connector (trace back to the “y” on the main electronics board) to the y end stop.



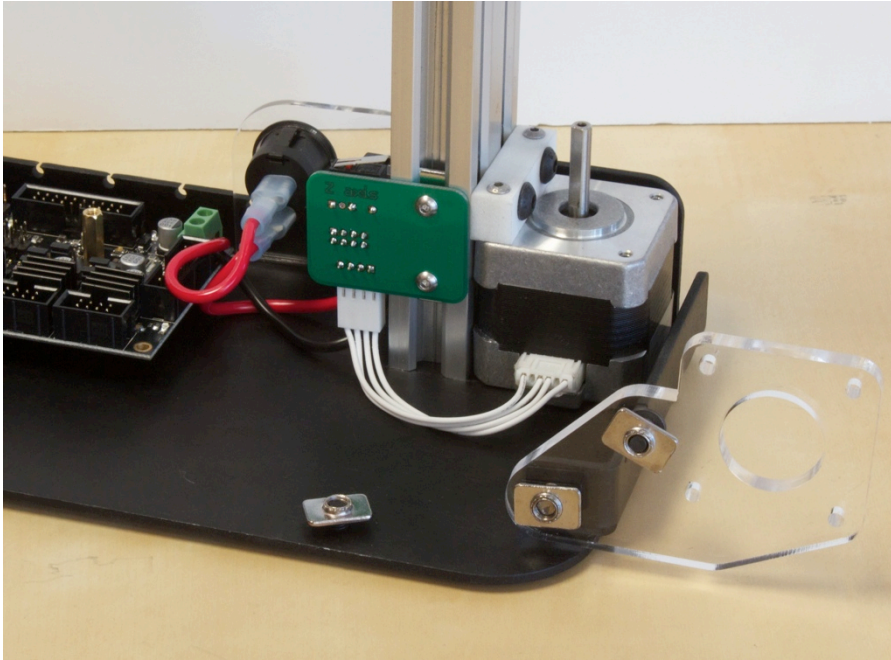
The y axis acrylic should be parallel to the y axis aluminum bar. Bottom of the acrylic should be flush with the aluminum bar.

Take a motor and attach the white connector to the board you just attached, and attach the motor with the three screws provided. We are talking about the motor with the shaft pointed toward us in this picture. (Note: in this image the z motor was already there, but we are now recommending that the z motor be attached later on in the build).

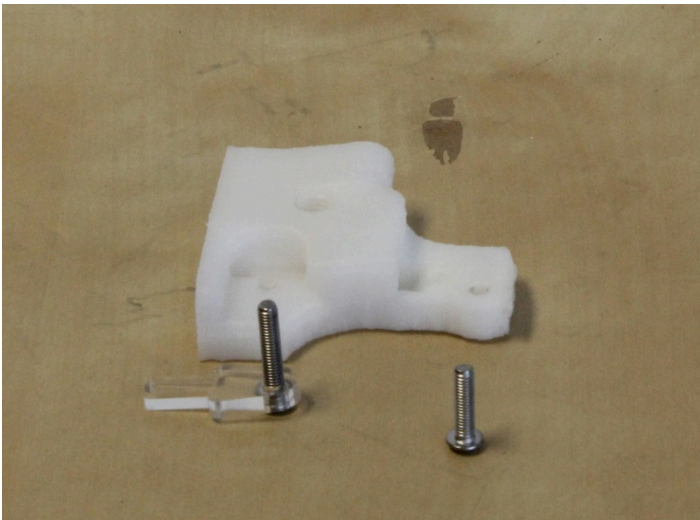


Z motor

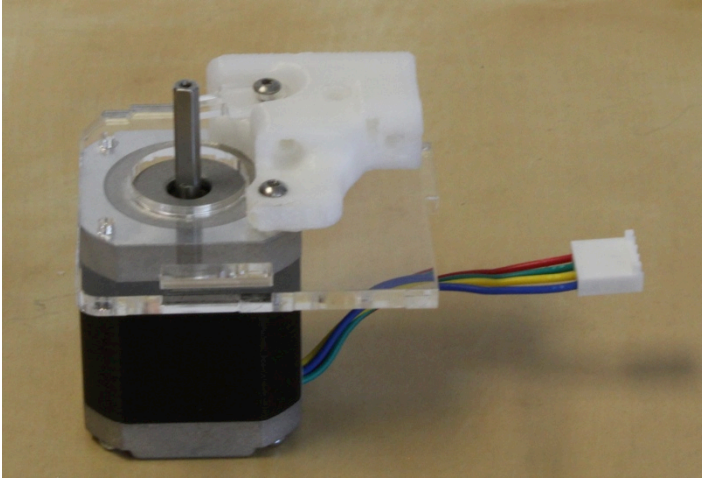
Now attach the z motor by sliding it down the z axis. Attach the connector from the z motor board and tighten the motor down.



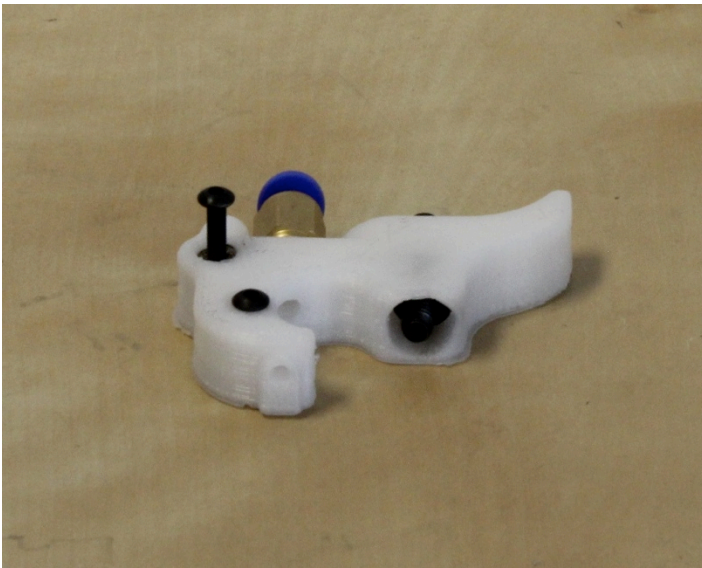
Extruder filament drive mechanism



Open the **extruder drive mechanism kit**. Be sure not to lose the small piece -the spring (a few steps down) hooks over the narrow part of this small acrylic piece.

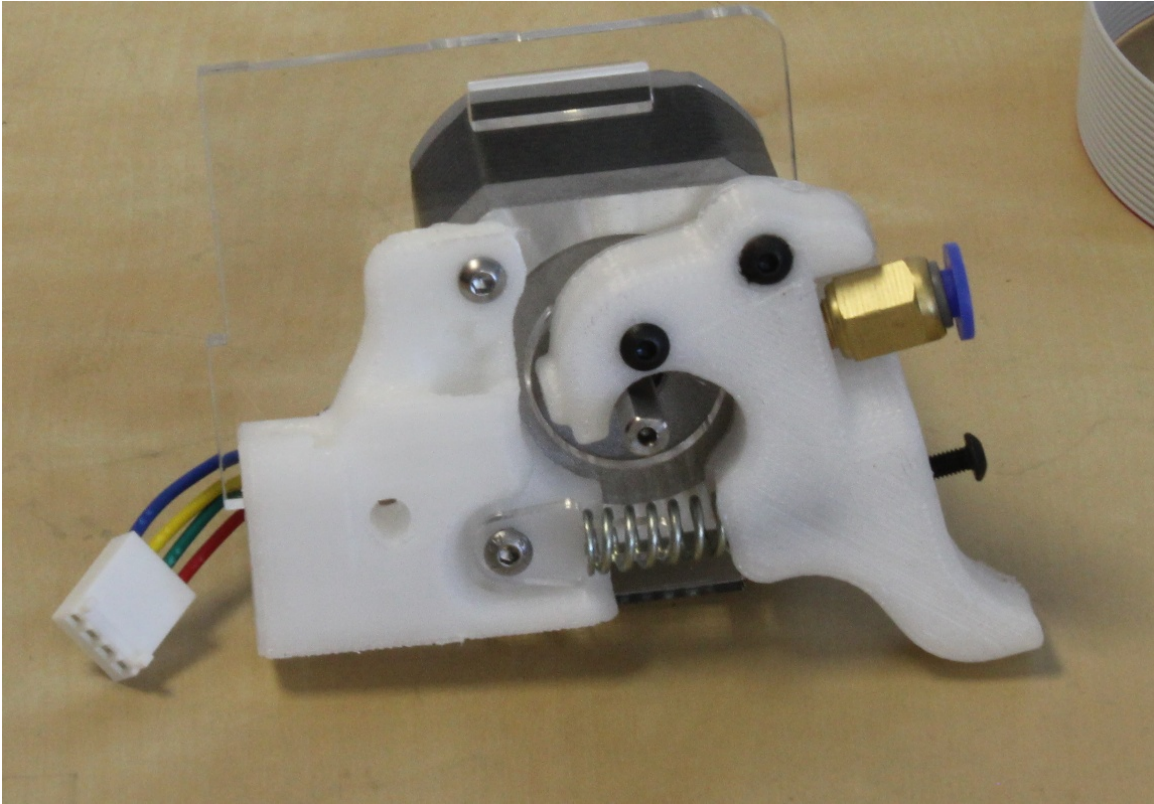


Take one motor and lay acrylic on top with wider end away from connector.

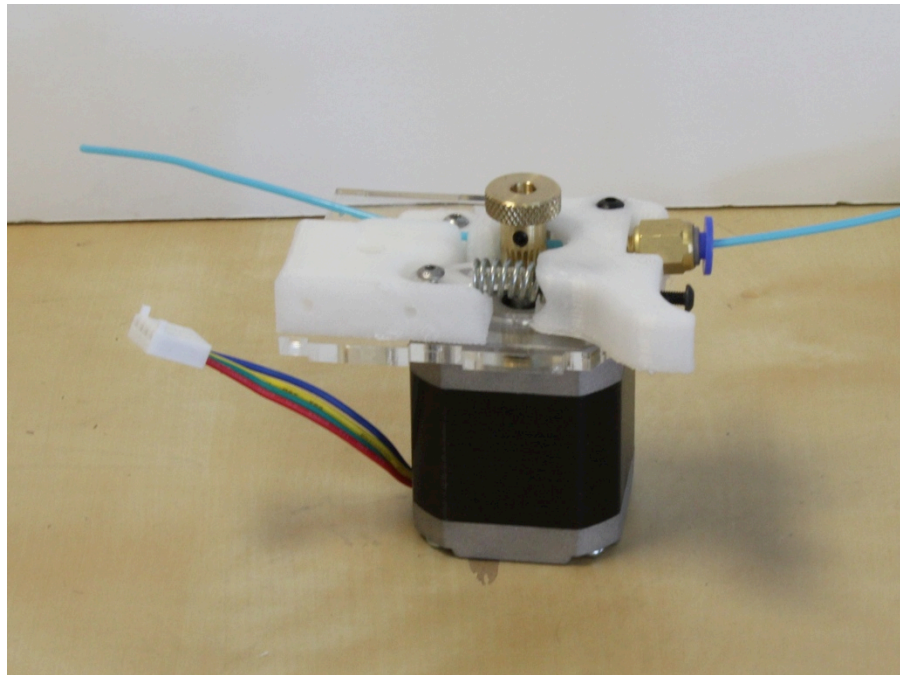


Drop screw and spring into the hole in the part with the blue flange. (Hole is in front of you - screw point is facing out.)

Assemble as shown below.



Put filament in to check drive gear alignment. Motor connector should be on same side as blue flange.



Now straighten out wires and arrange things so that you can get at the wire clamp panel (acrylic piece and board on a ribbon cable, already attached to the main electronics board.)



Attach that panel to the extruder drive mechanism.



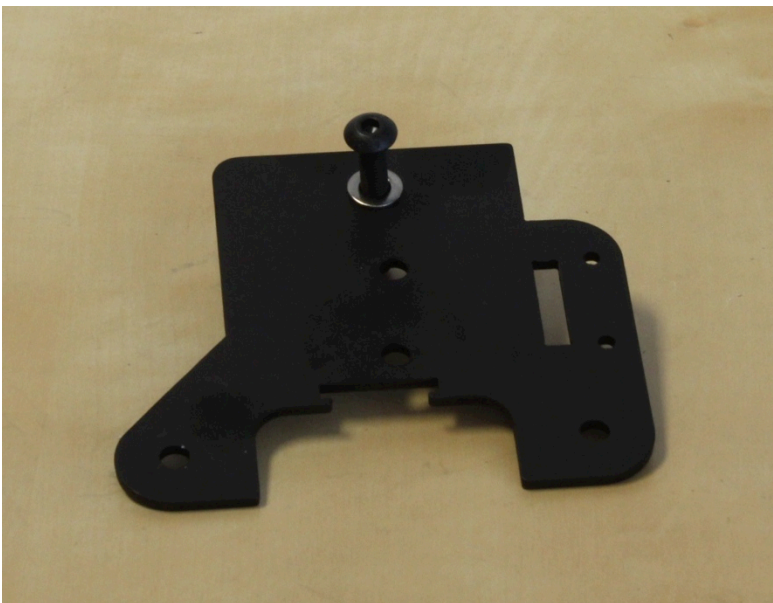
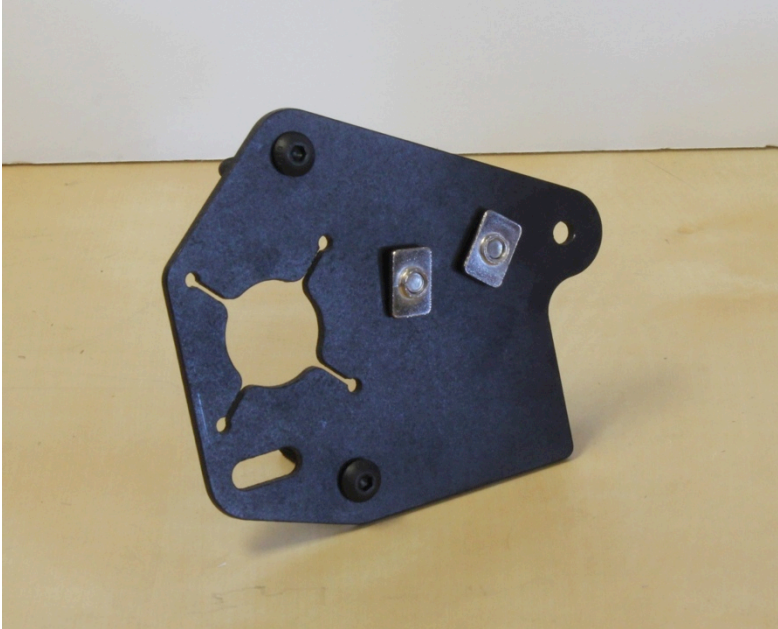
Plug motor into circuit board on assembly.

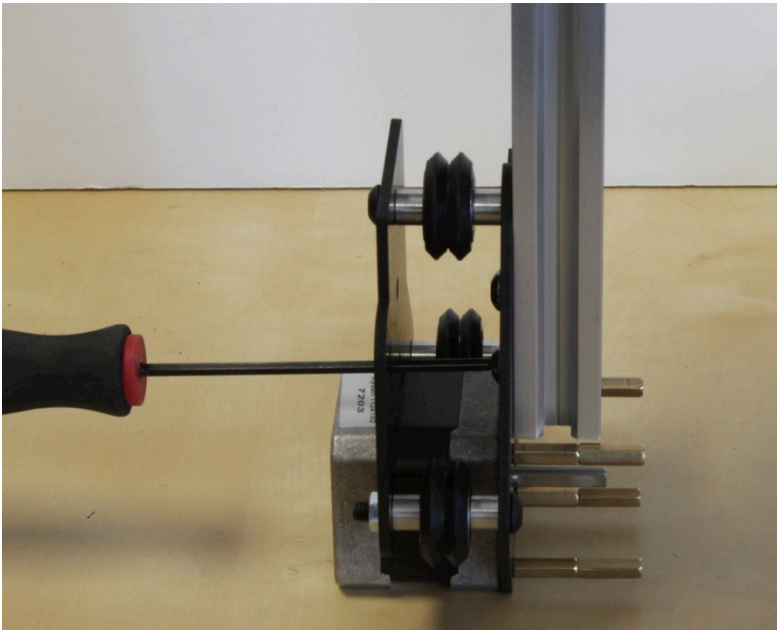
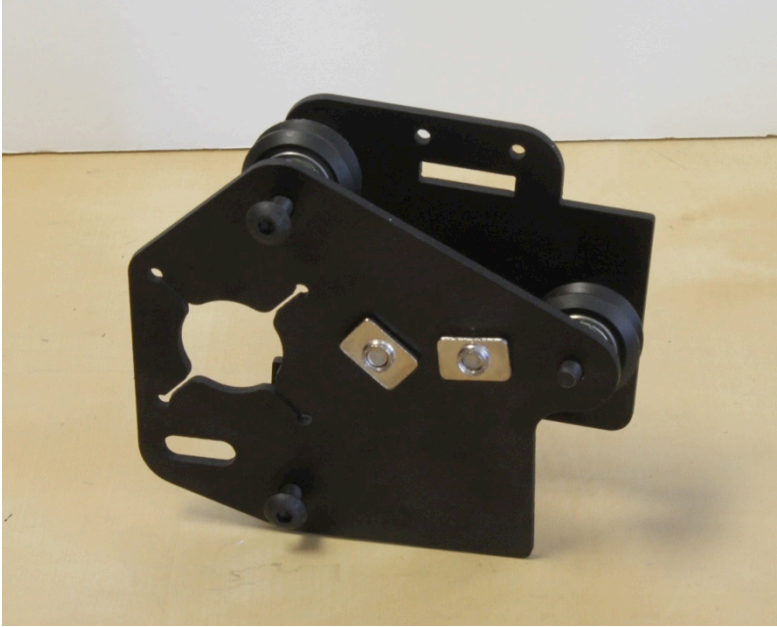
Add the fan – attach acrylic piece and press fit into place (far end first)

X axis assembly

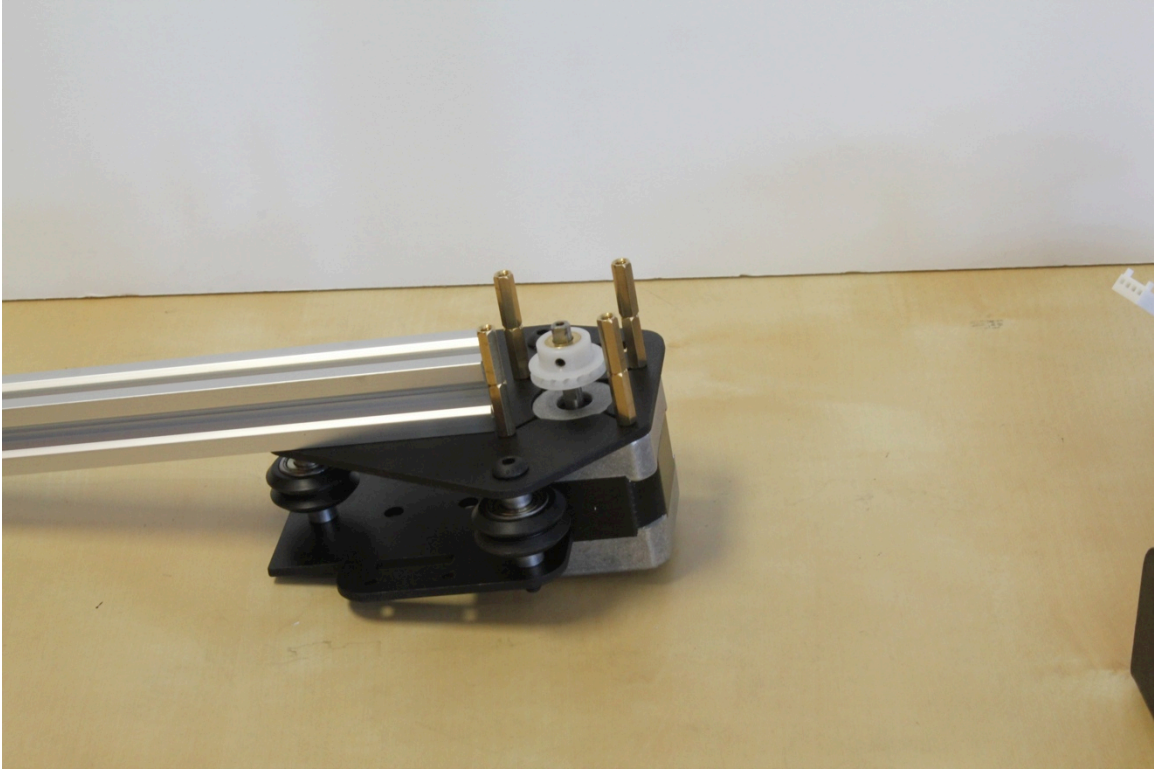
Open **the x axis kit**

Mount the x motor using the standoffs in the kit; be sure the connector faces down (away from the drive assembly).

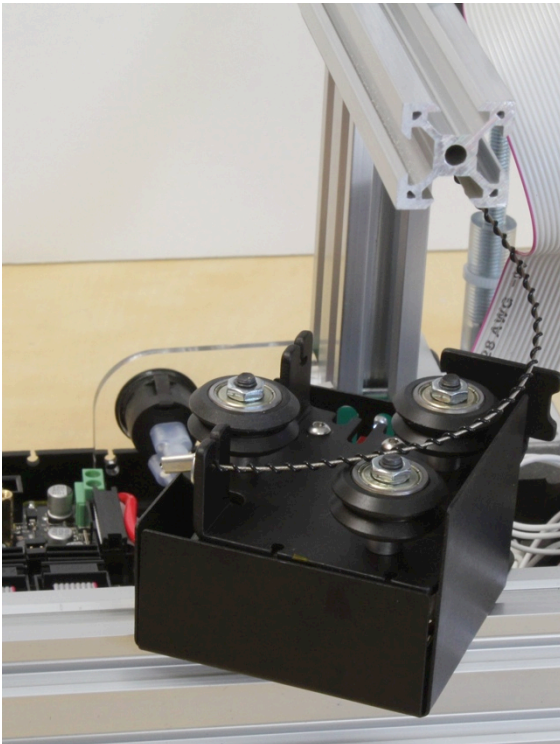




Align syncromesh pulley (white plastic part) with valley of the extruded aluminum rod. Once it is aligned, rotate it so that the small screw on the side (dark spot on side in image below) is on the flat part of the motor shaft so that it can be tightened down.

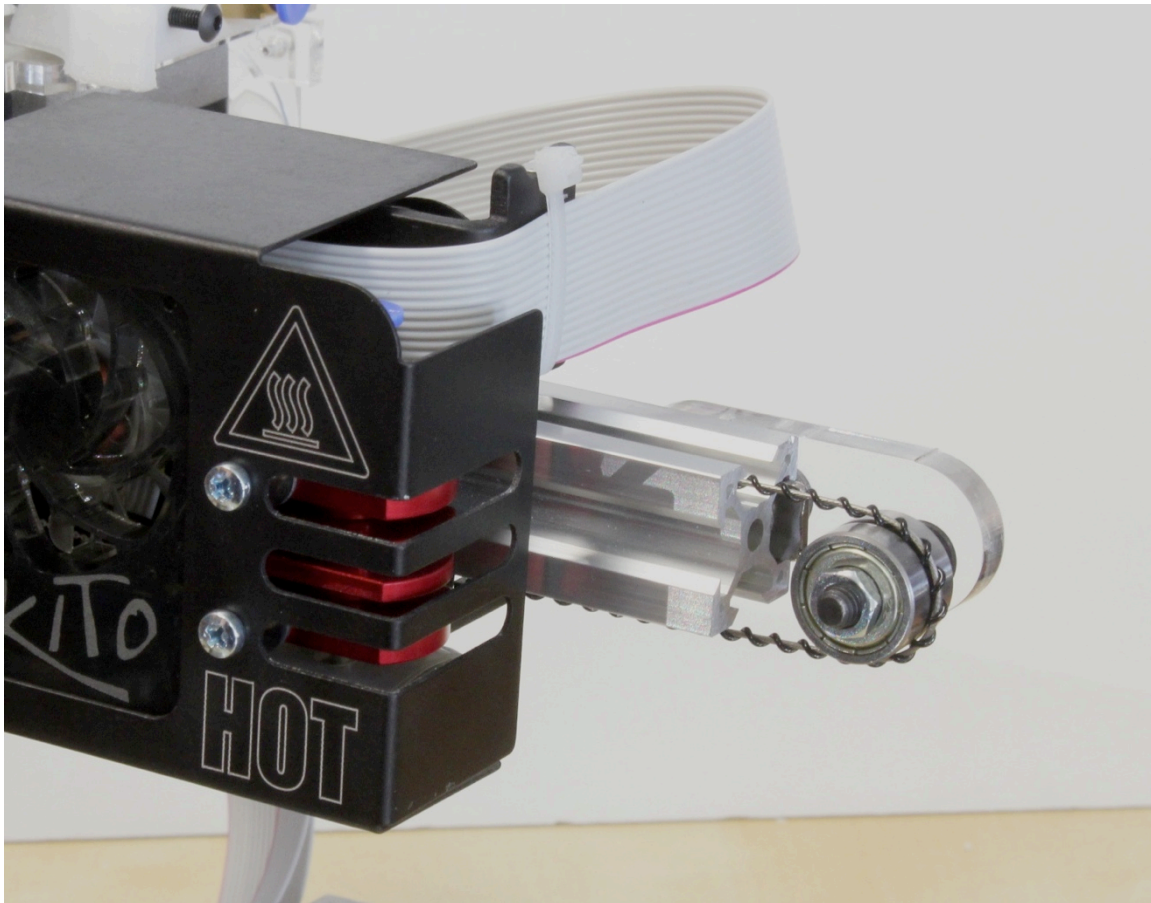


Take shorter of the two pieces of synchro mesh and be sure there is a washer on either end. Put the mesh in the valley of the top of the x carriage aluminum bar.

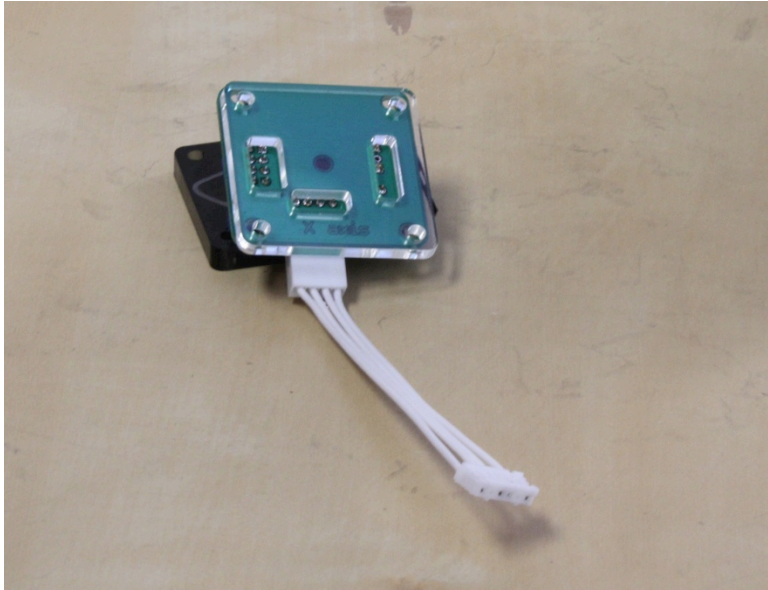


Take the extruder carriage and slide it onto the x axis, being careful to place the wheels over the synchro mesh. Then hook the synchro mesh into the tabs on the bottom of the X carriage.

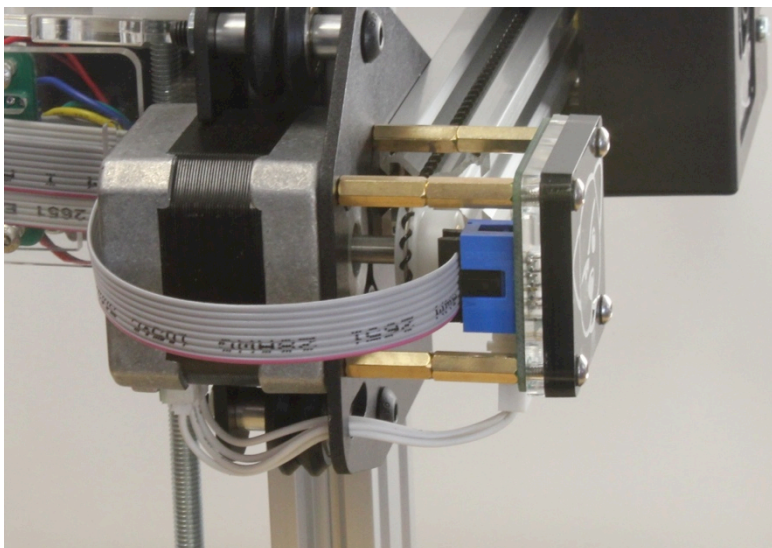
Next take the synchro mesh idler (piece of acrylic with a roller) and attach it to the end of the x axis. Adjust the tension of the synchro mesh by pulling the idler away from the end of the x axis. Adjust the synchro mesh to be tight enough so that it takes some force to tighten down the idler into position. Be sure the synchro mesh isn't binding or dragging anywhere. It should be tight enough that it does not lift off the idler or pulley on the other end – about the same tension as a steel-string guitar string.



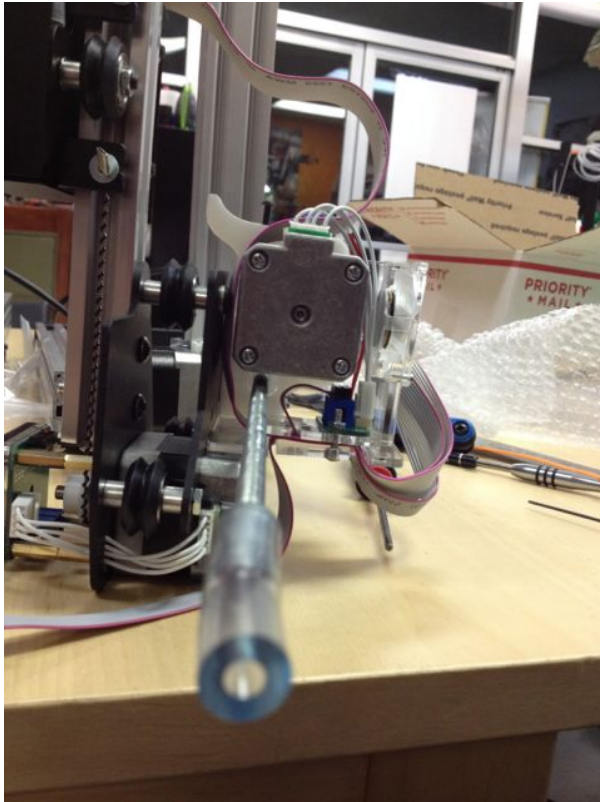
Take the x end stop kit and put the acrylic cover over the circuit board, aligning so that the protruding parts of the board are in the cutouts.



Plug in end stop ribbon cable (should trace to “x” on main board); the white cable goes through oblong hole in black metal plate (near center of image below)
Plug in motor cable (ribbon cable) into blue connector.

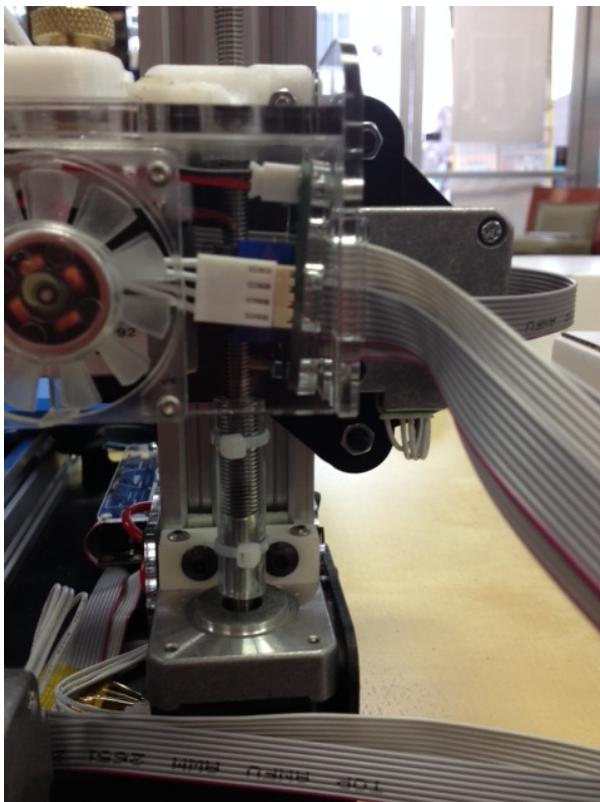


Z Screw



Put z screw into white plastic of extruder screw assembly. (You are looking up from what will be the bottom of the screw.)

Slide x carriage on z axis and be sure that all wheels and z screw align.

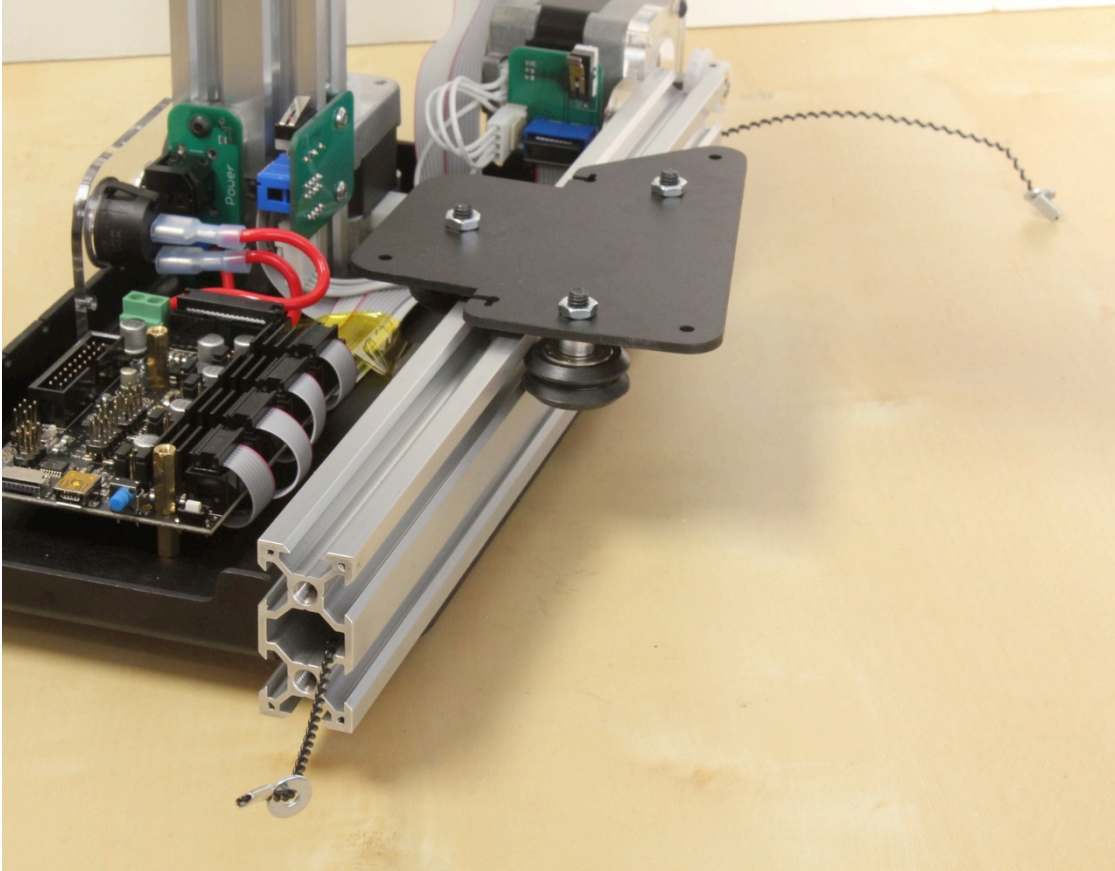


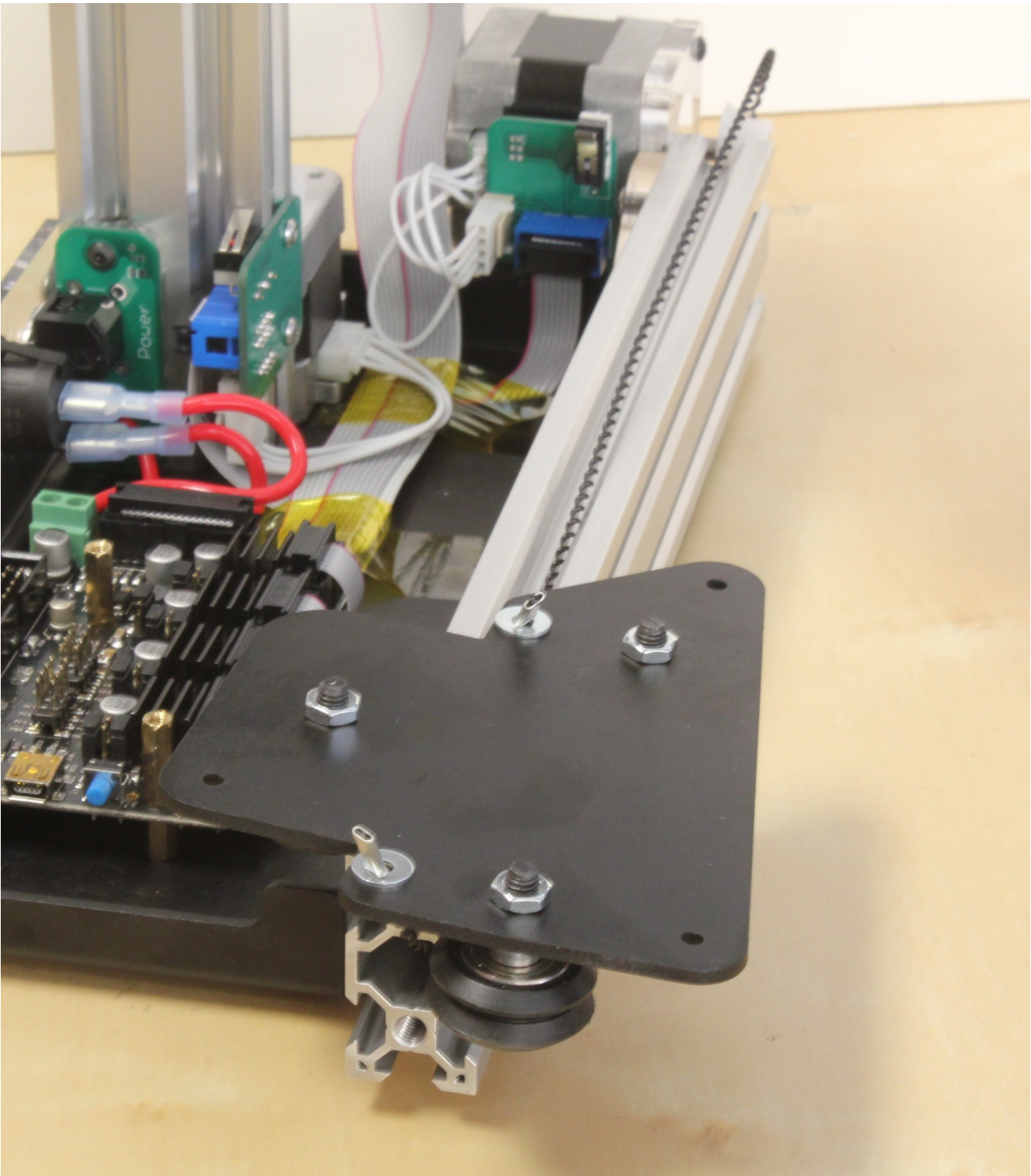
Squeeze plastic tube onto z axis and push down. Squeeze while pushing down so that tube will widen a bit while being forced along.

Put a cable tie on the plastic tube just above the z motor mount white piece and another near the top of the screw cover.

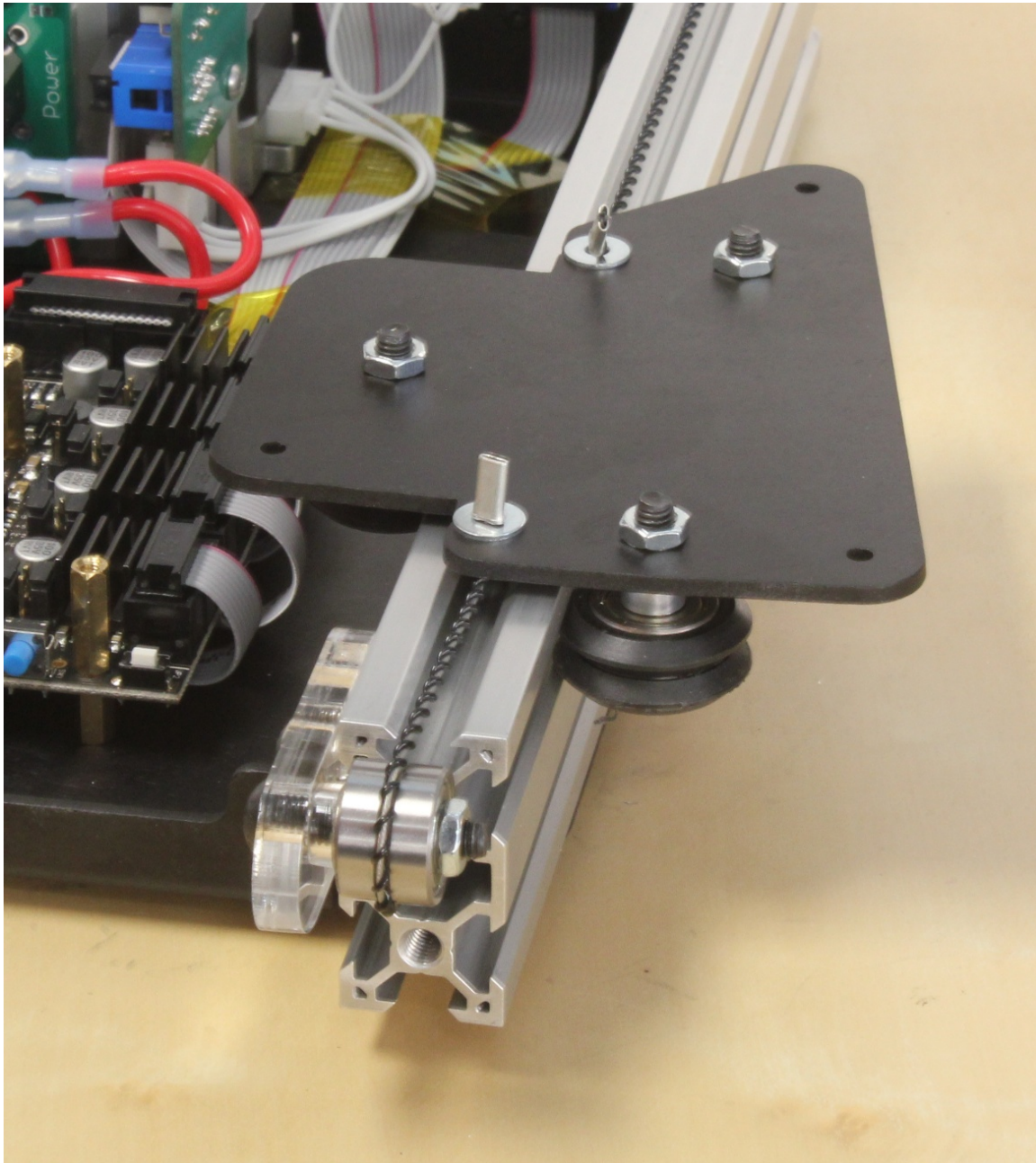
Y platform

Attach the y platform to its metal rail and run the remaining piece of synchro mesh through the channel in the MIDDLE of the aluminum rail. Be sure that you have a washer on either end.





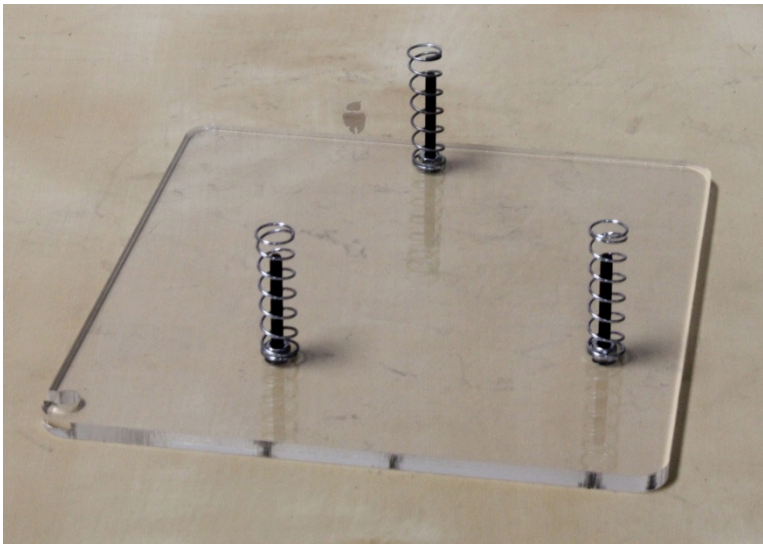
Attach ends of syncmesh to bottom of platform and put on and adjust idler as you did on the x carriage. Tighten similarly.



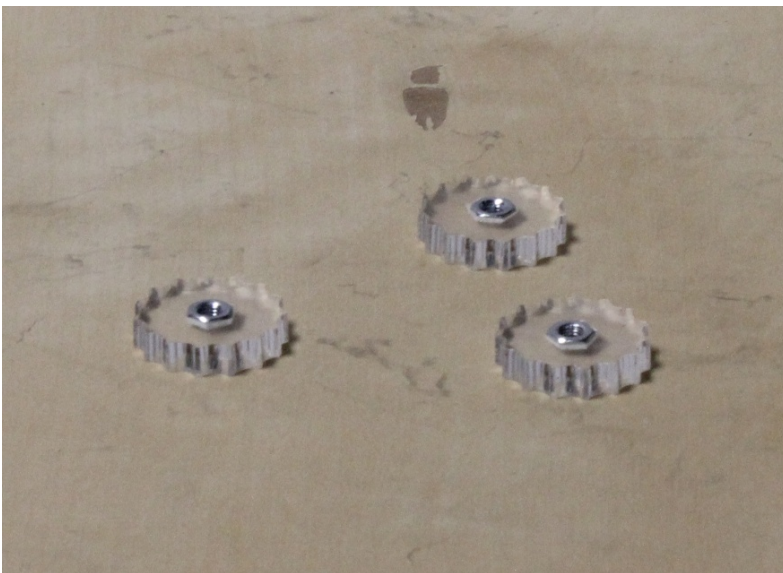
Attaching the platform

Open the **platform attachment kit**

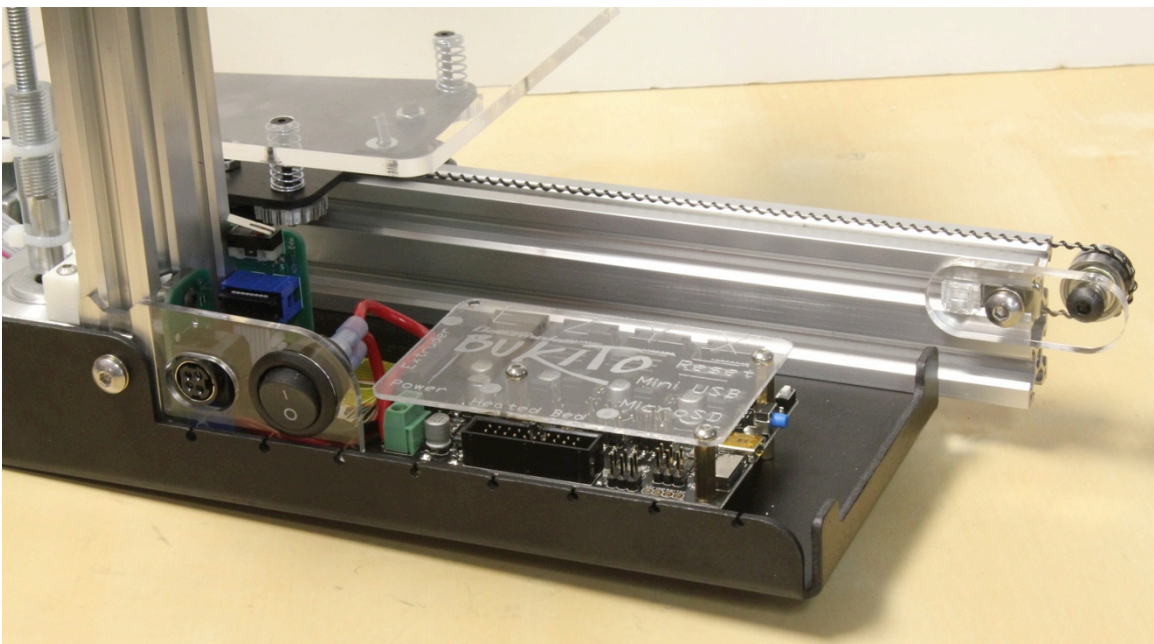
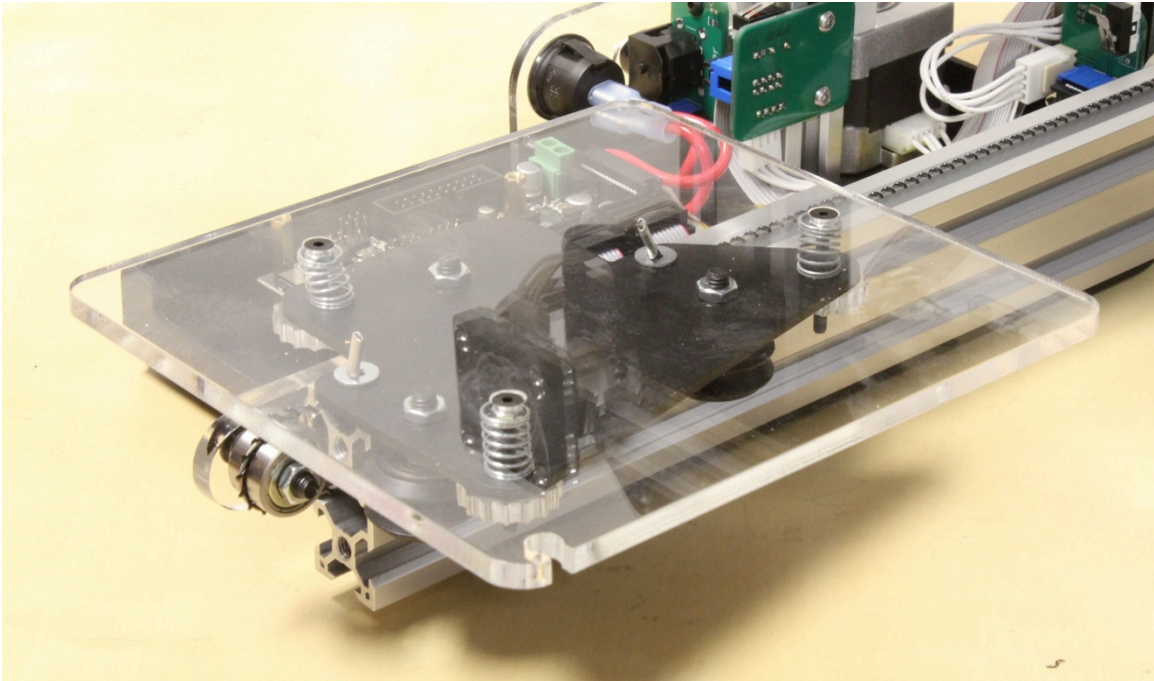
Take the platform (shown here as clear acrylic, but production kits will be made of garolite-LE, a tan linen-phenolic mix.) Put the four long screws and springs on as shown.



Take the flower-shaped gears and small washers and drop a washer into the indentation in each gear.

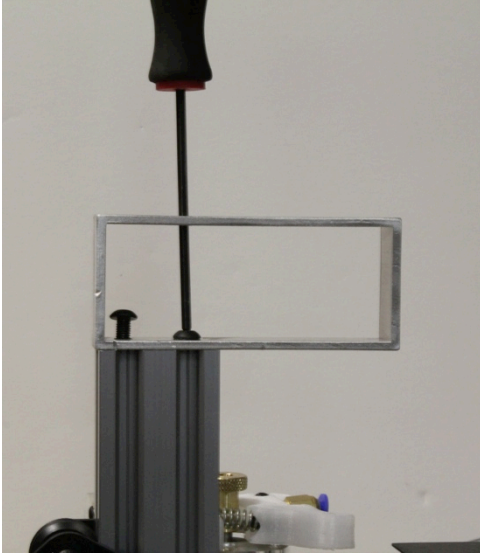


Take the platform and connect it to the carriage as shown. Hold the platform down with one hand and tighten the screws (using the “flowers”) as much as you can. You will back it off later to adjust it.



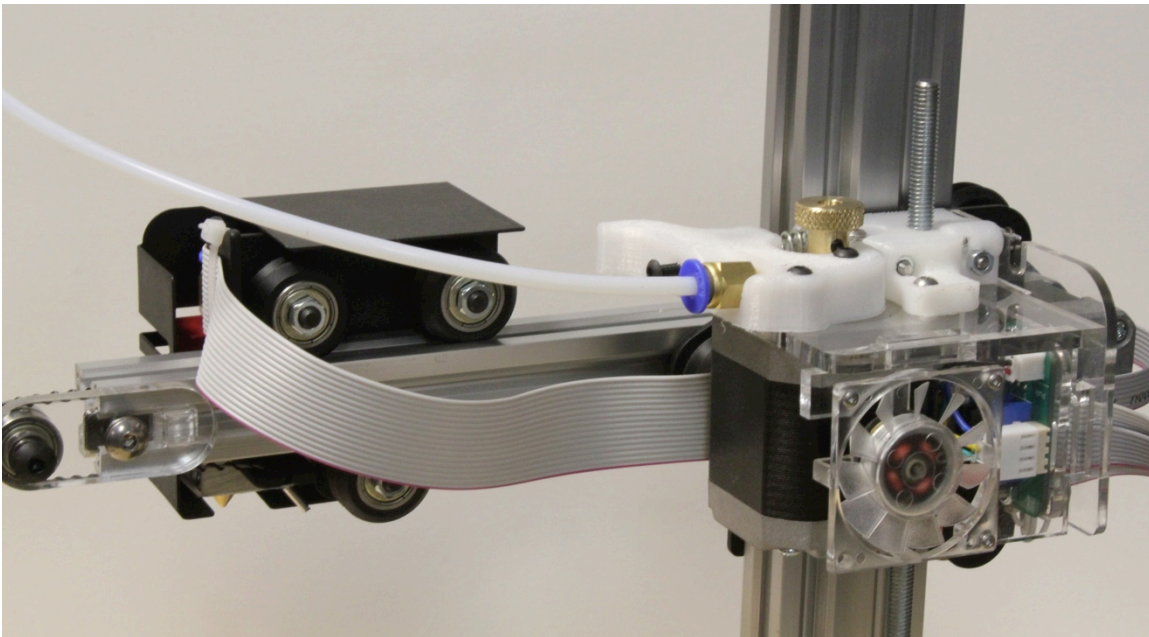
Handle

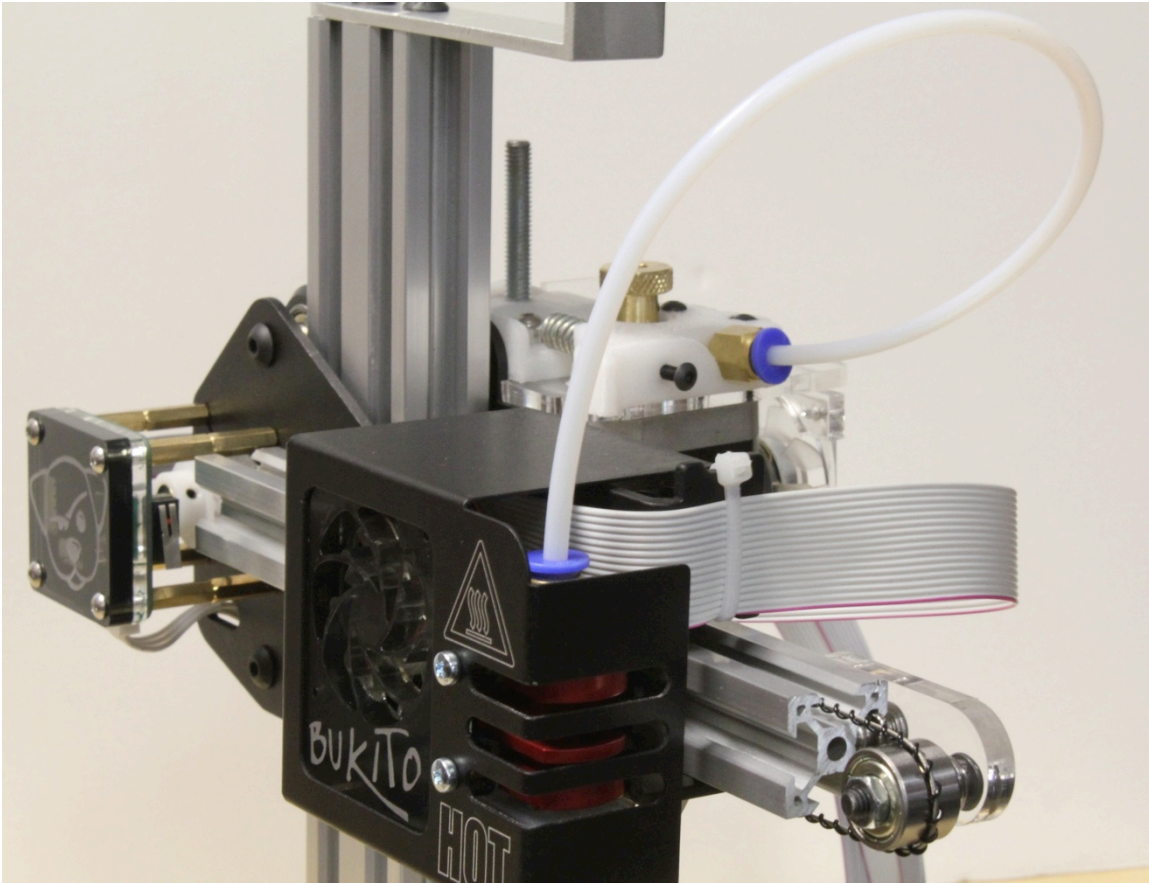
Put on the handle, using the two screws provided. The top holes are meant for clearance for the screwdriver and also for you to add your own 3D printed handle additions if you like.



Filament tube

Attach the filament tube to the blue flanges on the extruder drive assembly and on the extruder block.





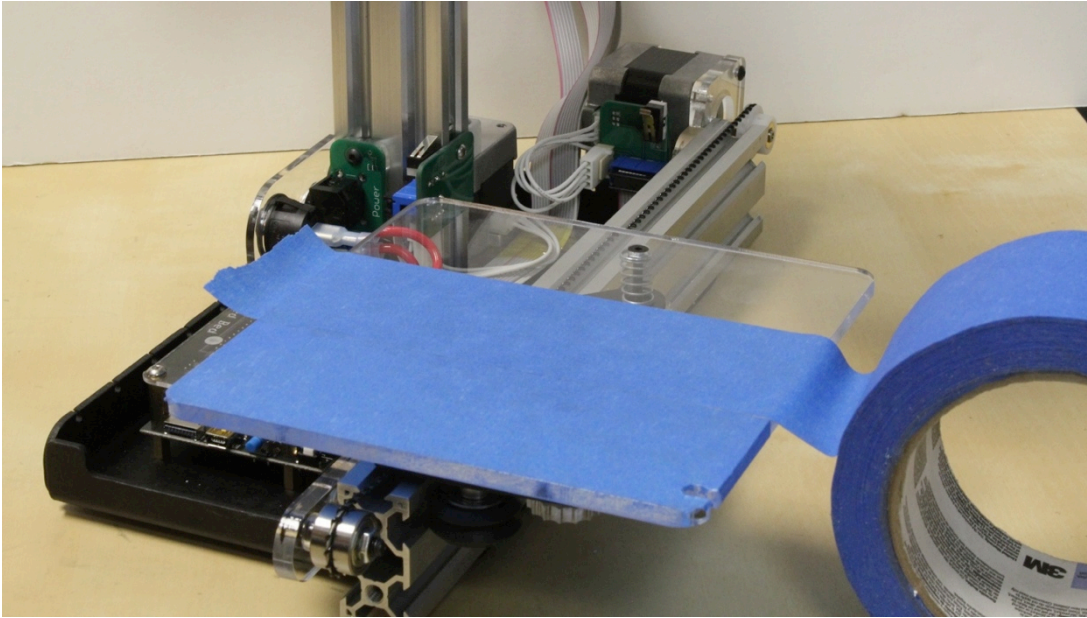
Aligning (tramming) the platform

3D prints are critically dependent on a good first layer, which means the platform and the carriages must all be aligned correctly (“trammed”) with respect to each other. Note: do not level the machine to any absolute level (e.g. with a bubble level) because you may have your Bukito on a surface that is not level which doesn’t matter. The critical thing is that the platform and the frame are aligned relative to each other.

Tighten your three platform mounting adjustment nuts (flower shaped) until the springs are fully compressed. Move the extruder and platform by hand until the nozzle is over the glass nearest one of the adjustment screws, and loosen that nut until the nozzle just touches. To check the height, slip a piece of paper under the nozzle to use as a feeler gauge (post-it notes work particularly well for this if you put the sticky side up and stick your fingers to it). The nozzle should just barely press the paper against the platform and resist when you try to move the paper around, but should not grip it firmly. Move the extruder and platform to one of the other screws and repeat this procedure until all three have been adjusted. See “first print” for the next iteration of this once you have turned on your machine.

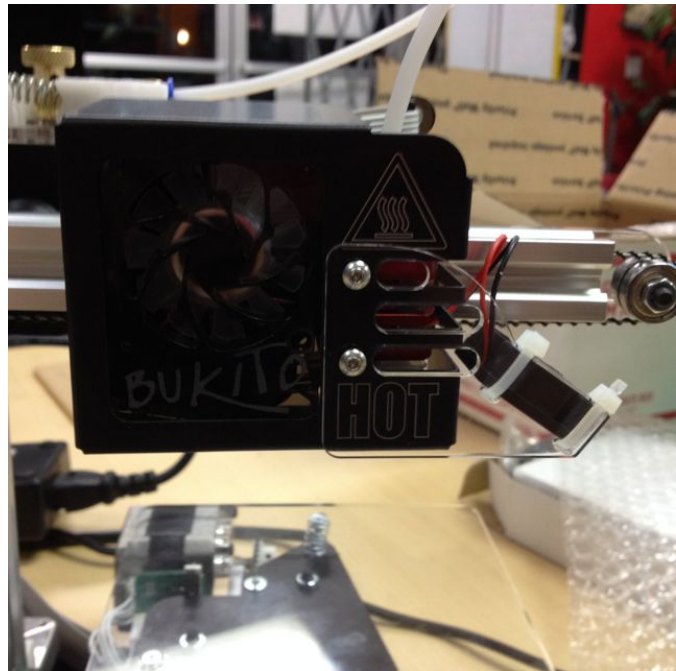
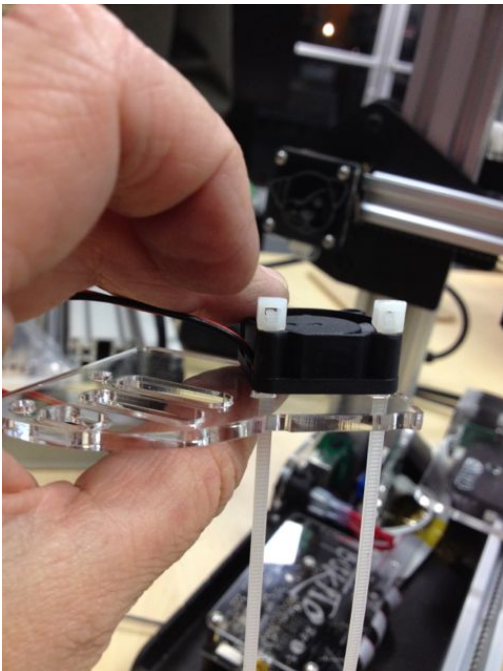
Applying blue tape

If you are going to print in PLA, now put on blue tape. (Garolite as-is works for nylon.) Purchase a roll of 3M “ScotchBlue” painter’s tape. (Other brands do not seem to work as well.) This tape is used so that the PLA will stick to the platform. Cover the platform carefully (one layer thick, preferably without lapping or bubbles.) Be sure to punch a little hole for the extruder well.



Add-on PLA cooling fan

Take the **PLA cooling fan kit** and attach the small fan at 90 degrees to the end of the acrylic piece with two cable ties. Trim the cable ties. Remove the screws holding on the extruder head cover, add the fan holder acrylic, and replace the screws



Plug in the power supply.

Congratulations- you are done! Read the "first print" directions .

