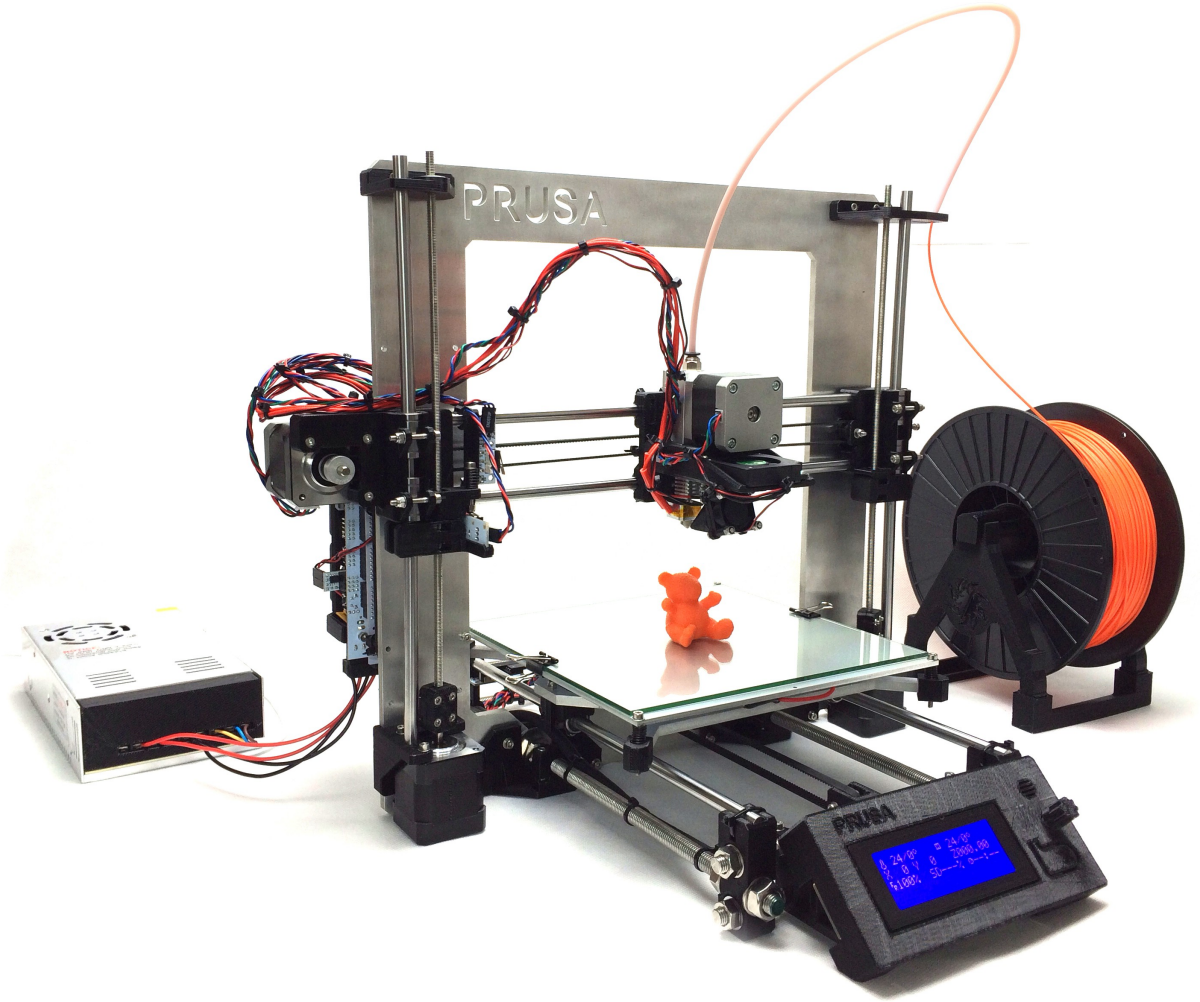
Prusa i3
Assembly Instructions



ooznest

Written By Ryan Lock

Overview

The Prusa i3 is the third iteration in the series of printers designed Josef Prusa, our kit uses his opensource design and adds many beneficial upgrades. Our Kit includes all the parts required to build a Prusa i3 plus many extras that will help you to get printing as quick as possible.

What we have done for you

In our kit all plastic parts have been preprepared and checked for fitting. For plastic parts that require nuts to be inset this has been done, but please check the plastic parts box for any that may have fallen out during shipping, Instruction Steps marked with a "*" means some of this step has already been done.

All wires that need terminal connectors have been pre-crimped and terminals attached, we have not cut wires to a certain length so you can do the cable management the way you prefer. Z-Axis motor wires have been inserted through the holes in the frame

The MK2A Aluminium heated bed has 1metre power wires pre-soldered and the thermistor is pre-attached.

The Hexagon hot end has been assembled with cartridge heater and thermistor attached, it has been pre-heated and tightened at 220°C. The Hexagon hot end has also been pre-attached to the Bulldog Lite Extruder.

Arduino Mega2560, RAMPS 1.4 & Stepper Drivers (Heat sinks still need to be attached) are pre-assembled and flashed with pre-configured firmware, the output current on the stepper drivers have also been set.

Tools Required

- Allen Keys (Supplied with kit)
- 5.5/7.0mm Spanners (M3/M4 Nuts)
- 2 x 13/17mm Spanners **or** 2 x Adjustable Spanners (M8/M10 Nuts)
- Pliers (Preferably Long Nose)
- Mallet or Hammer
- Large & Small Philips Screw Driver
- Ceramic Screw Driver (Supplied with kit)
- Tweezers
- Scissors
- Ruler

Notes on assembly

Using Appendix A check that all parts have been supplied and no parts have been damaged during shipping, if there is any problems contact us and we will rectify the issue as quick as possible.

It is recommended to read through instructions thoroughly before starting assembly.

Insure you have a clear, firm and level table to assemble the printer on and you are using tools safely, also take extreme caution when wiring electronics.

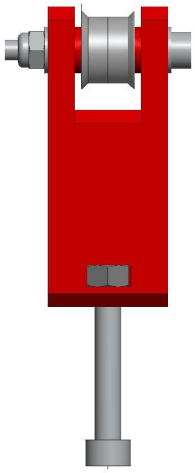
Most washers have a flat side and a rounded side, it is recommended to put the flat side against the plastic part. Take care to not over tighten the Nuts & Bolts that are in contact with plastics parts because they may crack.

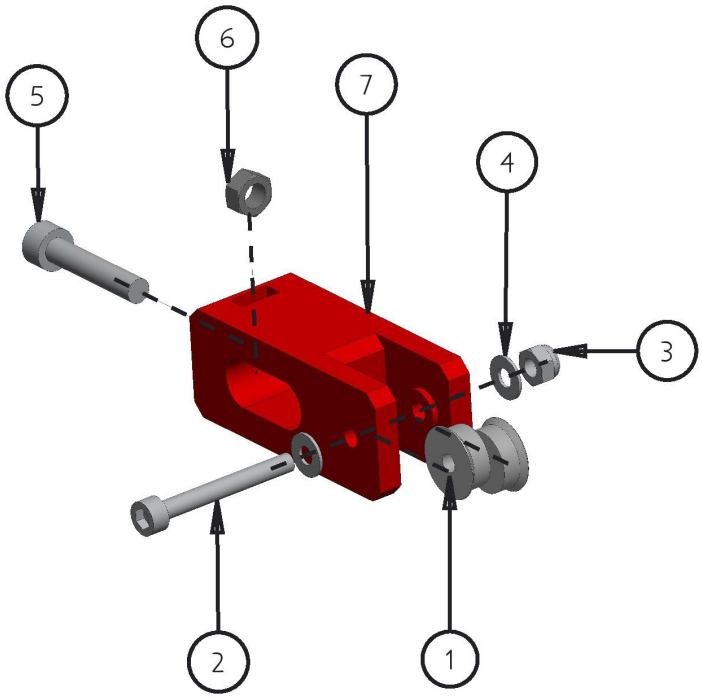
Any problems contact us (Details on our website) and we will help to resolve the problem.

Most importantly take your time and have fun!

Y-Axis Idler Assembly

ITEM NO	DESCRIPTION	QTY
1	623ZZ-FLANGED-BEARING	2
2	M3-25MM-BOLT	1
3	M3-NYLOC-NUT	1
4	M3-WASHER	2
5	M4-20MM-BOLT	1
6	M4-HEX-NUT	1
7	Y-AXIS-IDLER	1





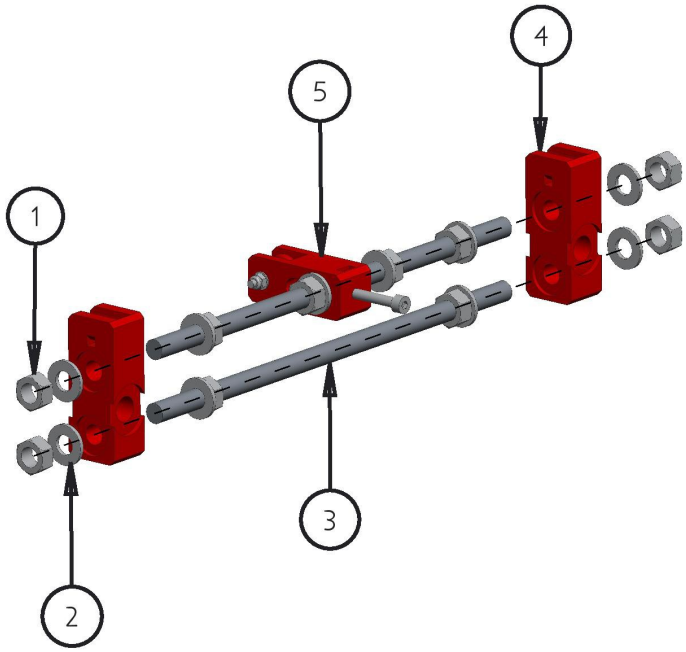
Instructions

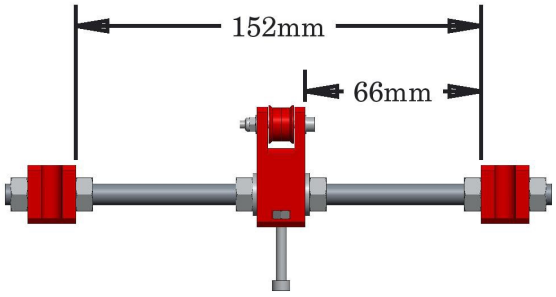
A)* Insert a M4-Hex-Nut into the inset provided on the backside of the Y-Axis-Idler, screw a M4-20mm-Bolt through the M4-Hex-Nut Nut until it is just about to come through the other side of the M4-Hex-Nut.

B) Screw a M3-25mm-Bolt through 2 x 623zz-Flanged Bearings, as in the diagram, insuring that two M3-Washers are included. Attach a M3-Nyloc-Nut and tighten the M3-25mm-Bolt, once tight insure the bearing assembly rotates freely.

Y-Axis Front Assembly

ITEM NO	DESCRIPTION	QTY
1	M8-HEX-NUT	10
2	M8-WASHER	10
3	THREADED-ROD-8MM	2
4	Y-AXIS-CORNER	2
5	Y-AXIS-IDLER	1





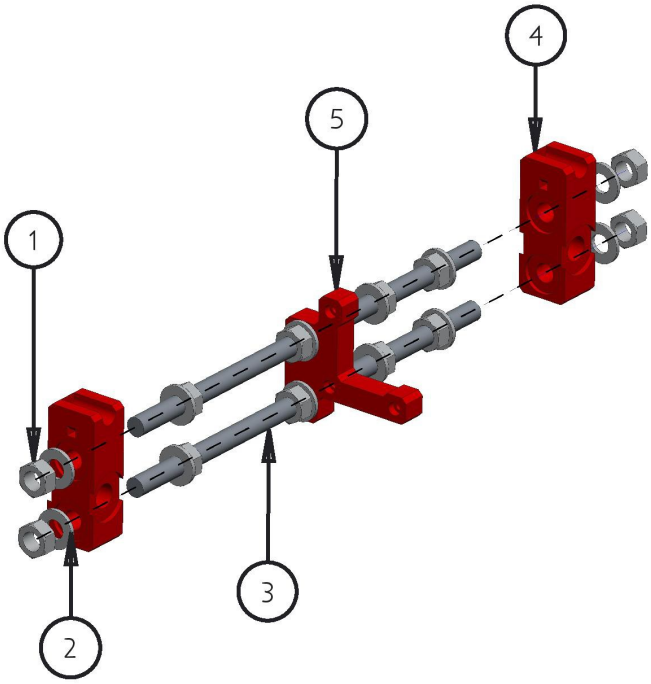
Instructions

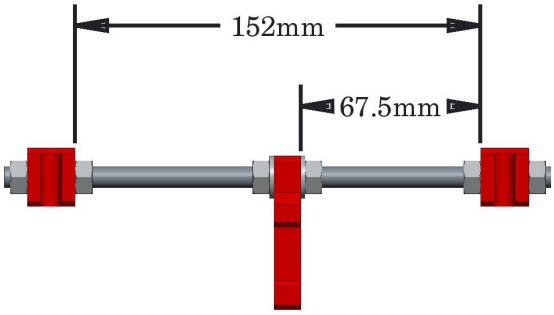
A) Thread M8-Hex-Nuts, M8-Washers, Y-Axis-Idler & Y-Axis-Corner's along the 2 x Threaded-Rod-8mm in the order as shown in the diagram.

B) Finger tighten the M8-Hex-Nuts so the Y-Axis-Idler and Y-Axis-Corners are as shown in the left hand image. Make sure the 8mm-Threaded-Rod is touching the backside of elongated hole on the Y-Axis-Idler when tightening the nuts either side of it. All Nuts will be fully tightened at a later stage.

Y-Axis Back Assembly

ITEM NO	DESCRIPTION	QTY
1	M8-HEX-NUT	12
2	M8-WASHER	12
3	THREADED-ROD-8MM	2
4	Y-AXIS-CORNER	2
5	Y-AXIS-MOTOR	1





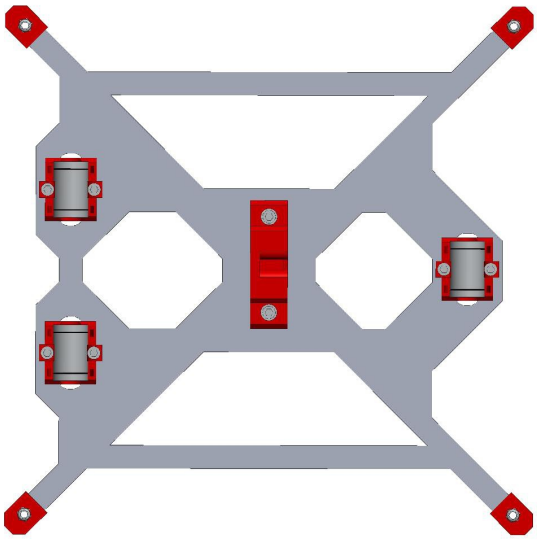
Instructions

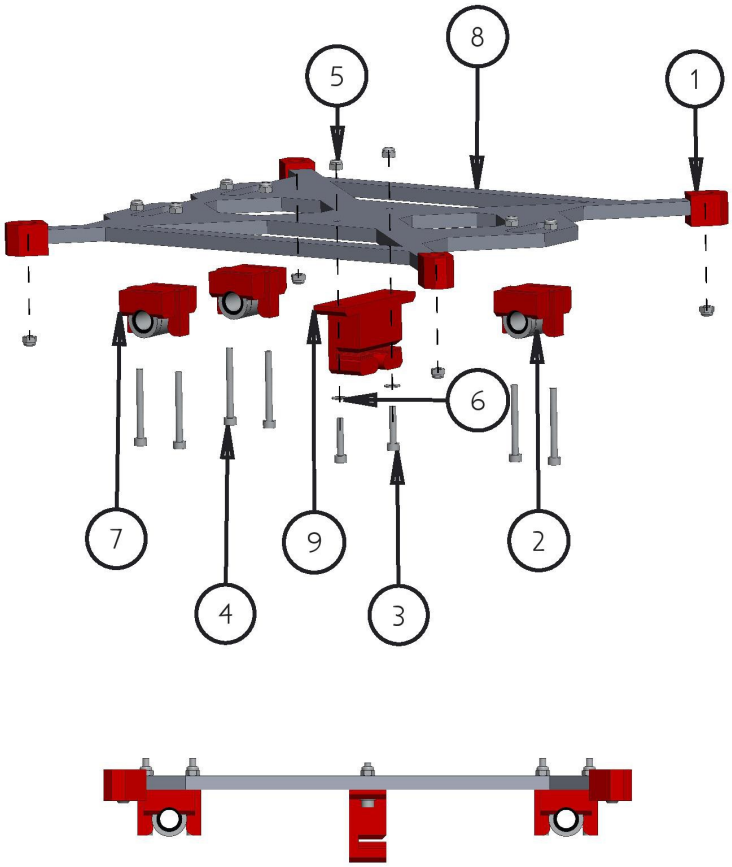
A) Thread M8-Hex-Nuts, M8-Washers, Y-Axis-Motor & Y-Axis-Corner's along the 2 x Threaded-Rod-8mm in the order as shown in the diagram.

B) Finger tighten the M8-Hex-Nuts so the Y-Axis-Idler and Y-Axis-Corners are as shown in the left hand image. Make sure the Y-Axis-Motor is perpendicular to both Threaded-Rod-8mm when tightening the nuts either side. All Nuts will be fully tightened at a later stage.

Y-Axis Bed Assembly

ITEM NO	DESCRIPTION	QTY
1	HEATED-BED-SPRING-TRAP	4
2	LM8UU-BEARING	3
3	M3-16MM-BOLT	2
4	M3-30MM-BOLT	6
5	M3-NYLOC-NUT	12
6	M3-WASHER	2
7	Y-AXIS-BEARING-HOLDER	3
8	Y-AXIS-BED-PLATE	1
9	Y-AXIS-BELT-HOLDER	1





Instructions

A)* Insert M3-Nyloc-Nuts into each of the Hex insets on the 4 Heated-Bed-Spring-Traps.

B) Attach the Y-Axis-Belt-Holder to the Y-Axis-Bed-Plate using 2 x M3-16mm-Bolts & 2 x M3-Nyloc-Nuts, insure you place a M3-Washer in-between each M3-16mm-Bolt head and the Y-Axis-Belt-Holder, make sure the Y-Axis-Belt-Holder is straight before fully tightening the bolts.

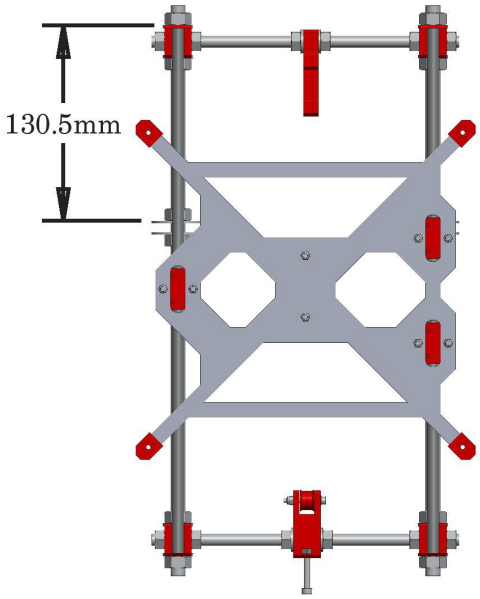
C) On each Y-Axis-Bearing-Holder insert a cable tie through each of the 2 provided slots so it goes in on the side the bearing will sit then the whole way under the bearing holder and comes back out on the same side, do not tie them up.

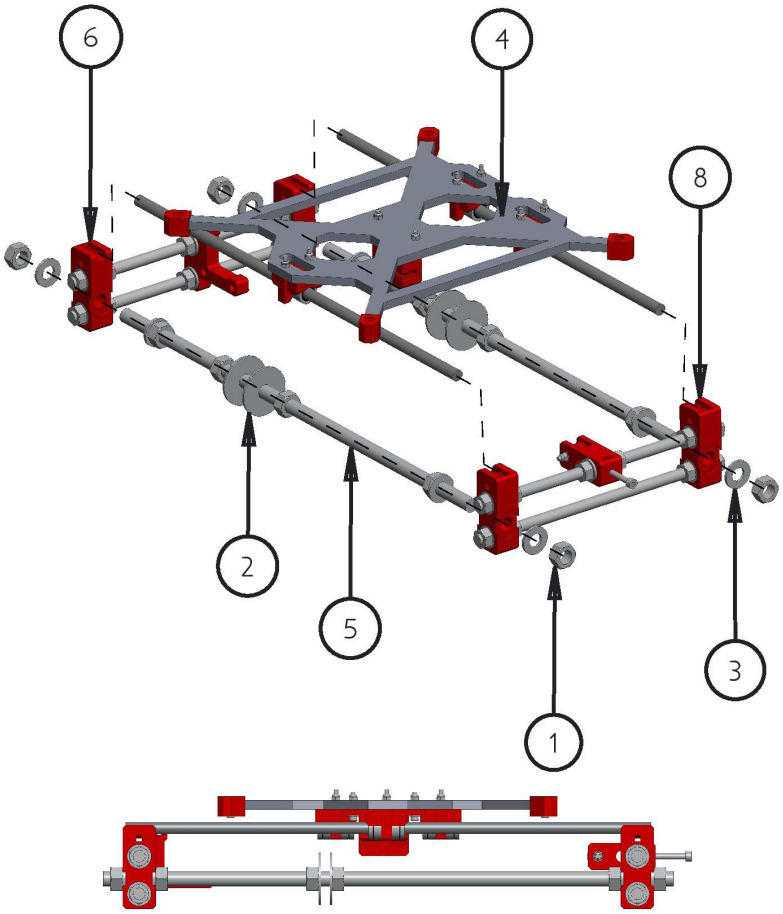
D) Insert a LM8UU-Bearing into each Y-Axis-Bearing-Holder, attach each Y-Axis-Bearing-Holder to the Y-Axis-Bed-Plate using 2 x M3-30mm-Bolts & 2 x M3-Nyloc-Nuts, make sure they are straight before fully tightening the bolts. For the 2 x Y-Axis-Bearing-Holders on the left hand side it is recommended to temporarily insert any one of the 8mm-Smooth-Rods through the two LM8UU-Bearings while tightening the bolts to insure the LM8UU-Bearings are centred on each other.

E) The cable ties previously inserted can now be used to securely attach the LM8UU-Bearings to the Y-Axis-Bearing-Holders, if available use pliers to firmly pull the cable ties. The 8mm-Smooth-Rod can now be removed.

Y-Axis Assembly

ITEM NO	DESCRIPTION	QTY
1	M10-HEX-NUT	12
2	M10-PENNY-WASHER	4
3	M10-WASHER	8
4	SMOOTH-ROD-350MM	2
5	THREADED-ROD-10MM	2
6	Y-AXIS-BACK	1
7	Y-AXIS-BED	1
8	Y-AXIS-FRONT	1





Instructions

A) Thread M10-Hex-Nuts, M10-Washers, M10-Penny-Washers, Y-Axis-Front & Y-Axis-Back on to the Threaded-Rod-10mm in the order as shown in the diagram.

B) Insert 2 x Smooth-Rod-350mm through the LM8UU-Bearings of the previously assembled Y-Axis-Bed, then insert the ends of the Smooth-Rod-350mm into the insets on the Y-Axis-Corners, make sure the side on the Y-Axis-Bed with one LM8UU-Bearing is on the left hand side of the assembly. Insure the ends of the Smooth-Rod-350mm are touching the ends of all 4 insets on the Y-Axis-Corners.

C) Tighten the whole assembly including the M8-Hex-Nuts on the Front and Back Side's (Except from M8-Hex-Nuts either side of the Y-Axis-Idler). All 4 Y-Axis-Corner's should be touching the ground, if not to diagnose individually check all 4 Y-Axis-Corner's after tightening each bolt and recheck distances between the Y-Axis-Corners on the Front & Back Sides. Make sure both Smooth-Rod-350mm cannot move forward or backwards, but can still be lifted out of the insets.

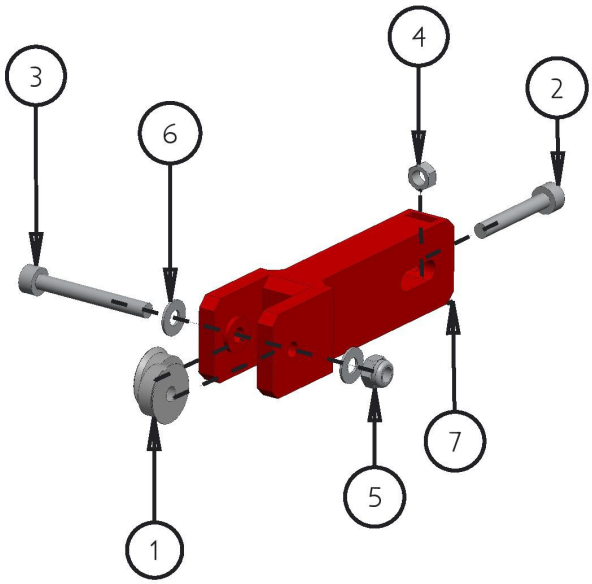
D) Check that the motion of the Y-Axis-Bed is smooth, if not recheck the distances between the Y-Axis Corners on the Front & Back Sides.

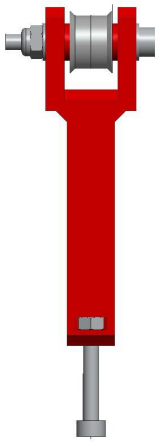
E) The M10-Penny-Washers should be roughly 130.5mm from the back side as shown in the right hand picture, these will be tightened against the Z-Axis-Frame Later.

F) At this point do **not** zip tie down the Smooth Rods.

X-Axis Tensioner Assembly

ITEM NO	DESCRIPTION	QTY
1	623ZZ-FLANGED-BEARING	2
2	M3-20MM-BOLT	1
3	M3-25MM-BOLT	1
4	M3-HEX-NUT	1
5	M3-NYLOC-NUT	1
6	M3-WASHER	2
7	X-AXIS-TENSIONER	1





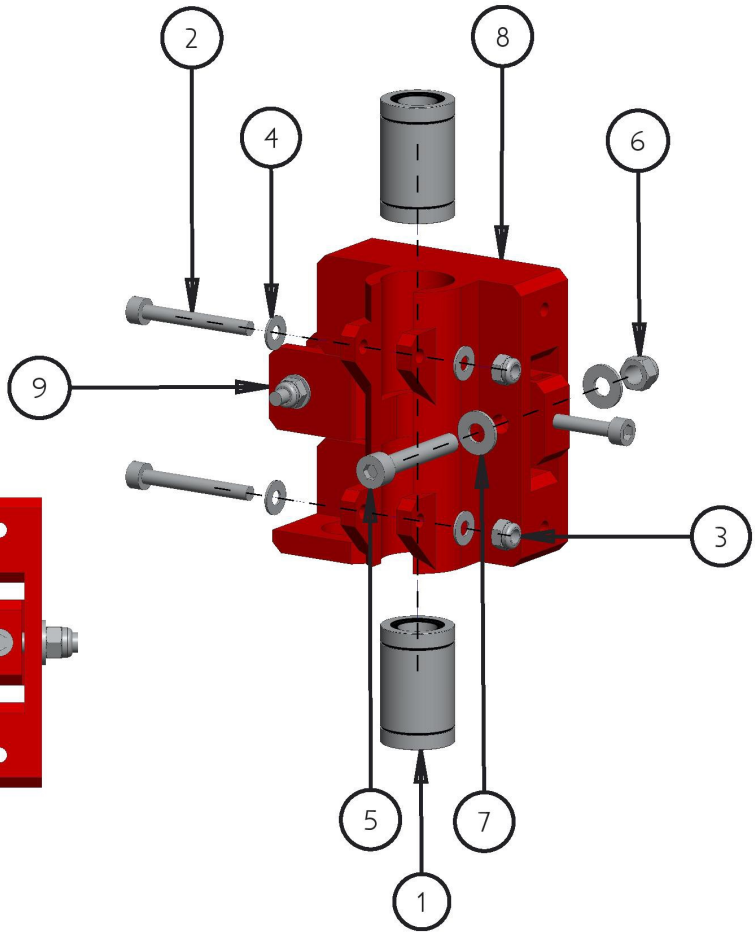
Instructions

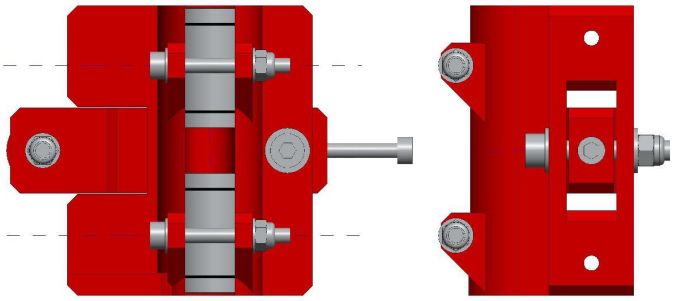
A) Insert A M3-Hex-Nut into the inset provided on the backside of the X-Axis-Tensioner, screw a M3-20mm-Bolt through the M3-Hex-Nut until it is just about to come through the other side of the M3-Hex-Nut.

B) Screw a M3-25mm-Bolt through 2 x 623zz-Flanged Bearings, as in the diagram, insuring that two M3-Washers are included. Attach a M3-Nyloc-Nut and tighten the M3-25mm-Bolt, once tight insure the bearing assembly rotates freely.

X-Axis Idler Assembly

ITEM NO	DESCRIPTION	QTY
1	LM8UU-BEARING	2
2	M3-25MM-BOLT	2
3	M3-NYLOC-NUT	2
4	M3-WASHER	4
5	M4-25MM-BOLT	1
6	M4-NYLOC-NUT	1
7	M4-WASHER	2
8	X-AXIS-IDLER	1
9	X-AXIS-TENSIONER	1





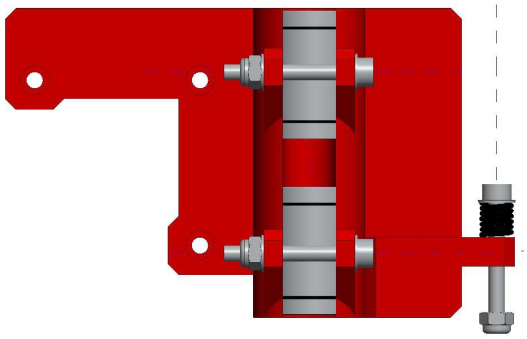
Instructions

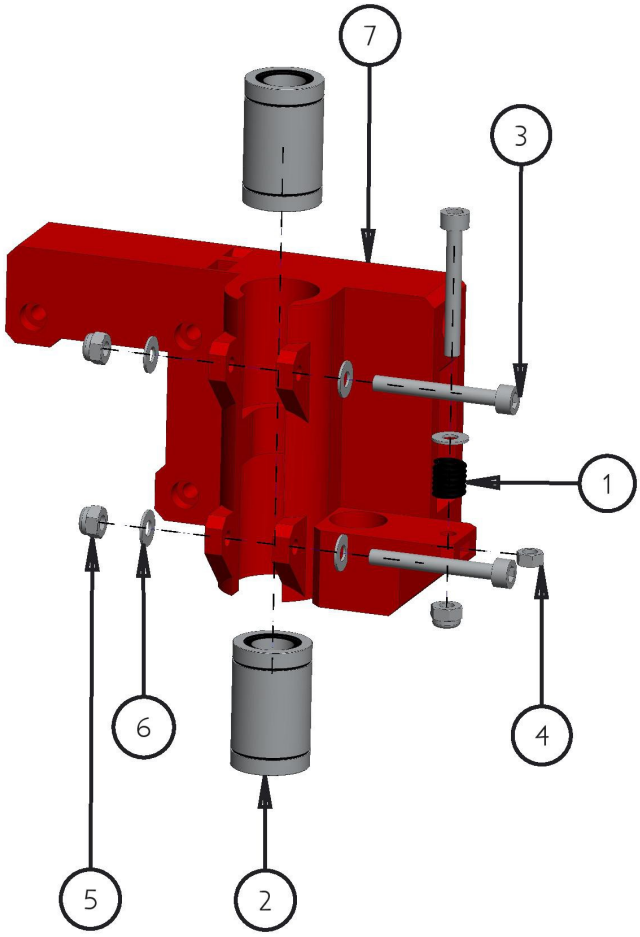
A) Insert the X-Axis-Tensioner through the horizontal slot in the X-Axis-Idler as shown above. Screw a M4-25mm-Bolt through the X-Axis-Idler & X-Axis-Tensioner remembering to include the M4-Washers, then attach a M4-Nyloc-Nut and finger tighten, this will be fully tightened later on once the GT2-Belt has been connected.

B) Push a LM8UU-Bearing into the top & bottom slots of the X-Axis-Idler, clamp each LM8UU-Bearing in position using a M3-25mm-Bolt, 2 x M3-Washers & M3-Nyloc-Nut. Before tightening the M3-25mm-Bolt's insert a 8mm-Smooth-Rod through both LM8UU-Bearings to insure they are centred on each other, make sure the bearings are flush with the top & bottom surfaces on the X-Axis-Idler. Only slightly tighten the M3-25mm-Bolt's otherwise the 8mm-Smooth-Rod will no longer ride smoothly through the LM8UU-Bearings. The 8mm-Smooth-Rod can now be removed.

X-Axis Motor Assembly

ITEM NO	DESCRIPTION	QTY
1	COMPRESSION-SPRING	1
2	LM8UU-BEARING	2
3	M3-25MM-BOLT	3
4	M3-HEX-NUT	1
5	M3-NYLOC-NUT	3
6	M3-WASHER	5
7	X-AXIS-MOTOR	1





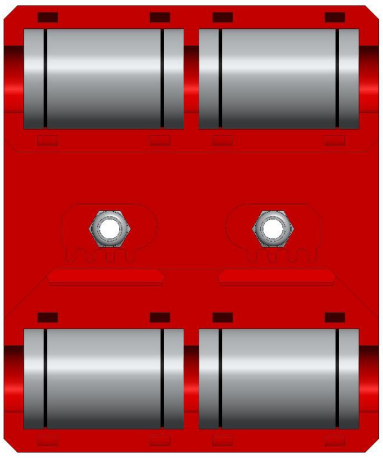
Instructions

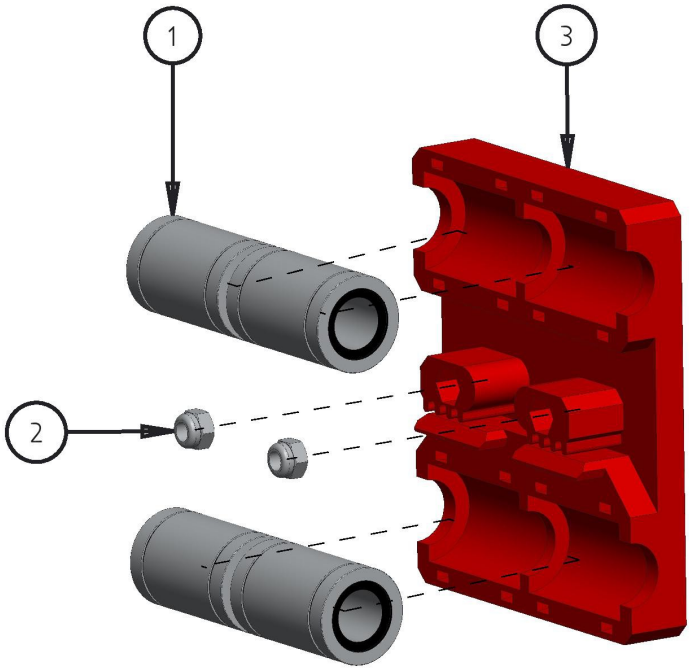
A)* Insert a M3-Hex-Nut into the slot provided on the right hand side of the X-Axis-Motor. Screw a M3-25mm-Bolt through a M3-Washer & Compression Spring, once through the other side attach a M3-Nyloc-Nut to the end. While holding the M3-Nyloc-Nut with a spanner screw the M3-25mm-Bolt until it is flush with the bottom of the M3-Nyloc-Nut. The M3-20mm-Bolt will be adjusted later to trigger the Mechanical-Endstop.

B) Push a LM8UU-Bearing into the top & bottom slots of the X-Axis-Motor, clamp each LM8UU-Bearing in position using a M3-25mm-Bolt, 2 x M3-Washers & M3-Nyloc-Nut. Before tightening the M3-25mm-Bolt's insert a 8mm-Smooth-Rod through both LM8UU-Bearings to insure they are centred on each other, make sure the bearings are flush with the top & bottom surfaces on the X-Axis-Motor. Only slightly tighten the M3-25mm-Bolt's otherwise the 8mm-Smooth-Rod will no longer ride smoothly through the LM8UU-Bearings. The 8mm-Smooth-Rod can now be removed.

X-Axis Carriage Assembly

ITEM NO	DESCRIPTION	QTY
1	LM8UU-BEARING	4
2	M3-NYLOC-NUT	2
3	X-AXIS-CARRIAGE	1





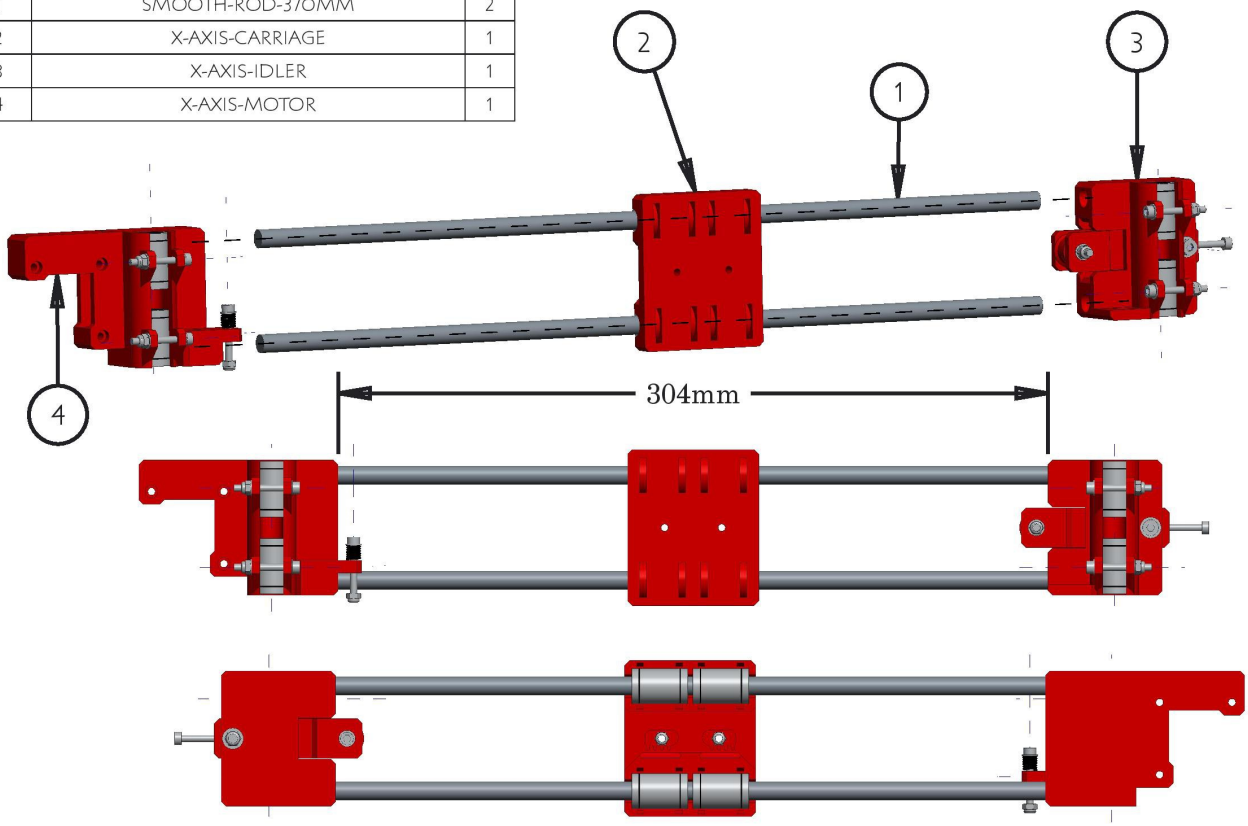
Instructions

A) Insert 4 x LM8UU-Bearings into the bearing holders on the X-Axis-Carriage. Insert a 8mm-Smooth-Rod through each pair of LM8UU-Bearings and securely attach each LM8UU-Bearing too the X-Axis-Carriage using cable ties through the provided slots, the 8mm-Smooth-Rods can now be removed.

B)* Push 2 x M3-Nyloc-Nuts into the insets provided.

X-Axis Assembly

ITEM NO	DESCRIPTION	QTY
1	SMOOTH-ROD-370MM	2
2	X-AXIS-CARRIAGE	1
3	X-AXIS-IDLER	1
4	X-AXIS-MOTOR	1



Instructions

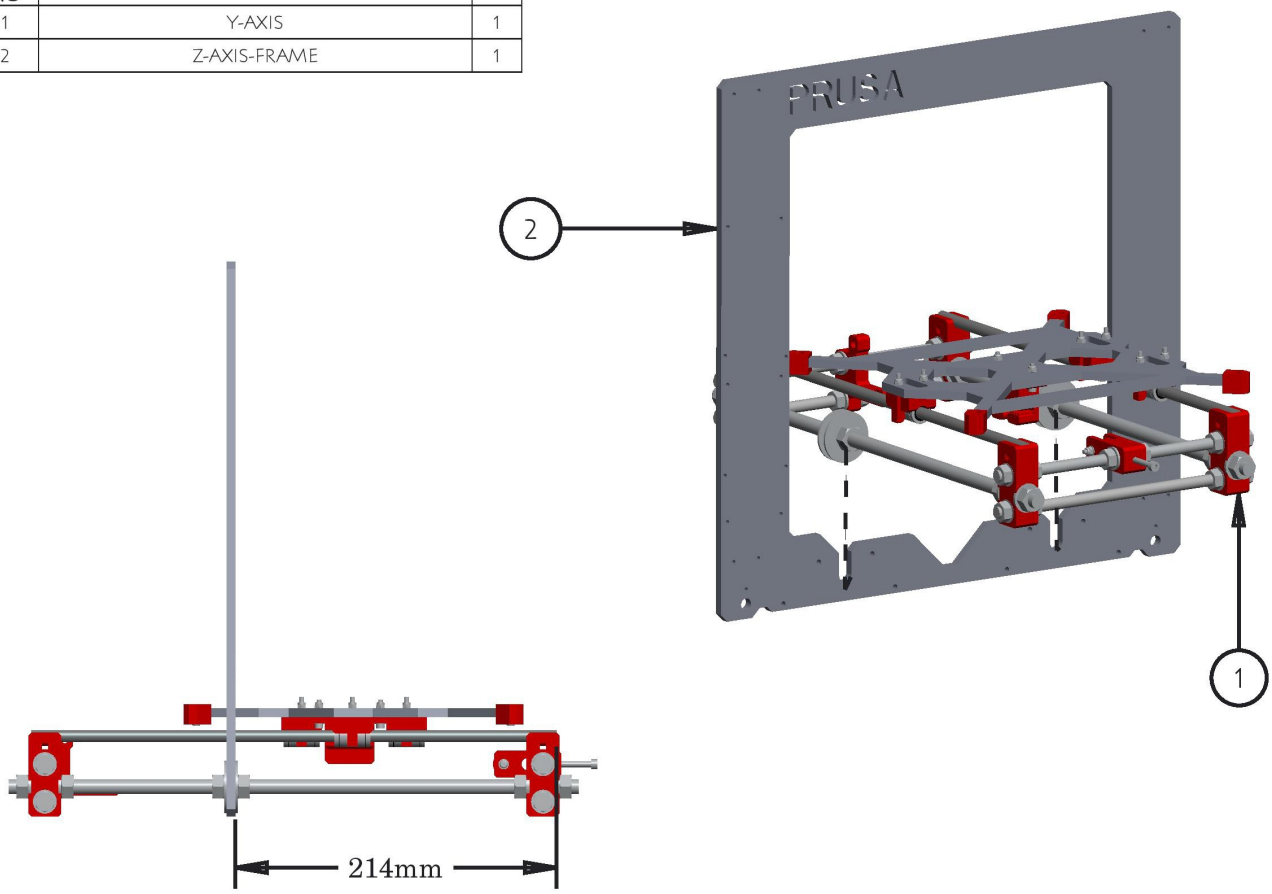
A) Push a Smooth-Rod-370mm into each hole on the X-Axis-Motor, insure they are fully seated, lightly tap with a hammer if needed.

B) Slide the X-Axis-Carriage onto the 2 x Smooth-Rod-370mm, it should be oriented so the teeth on the back of the X-Axis-Carriage are pointing downwards.

C) Push the X-Axis-Idler onto the 2 x Smooth-Rod-370mm, once fully seated the distance between the X-Axis-Idler and X-Axis-Motor should be 304mm.

Attaching Z-Axis Frame

ITEM NO	DESCRIPTION	QTY
1	Y-AXIS	1
2	Z-AXIS-FRAME	1



Instructions

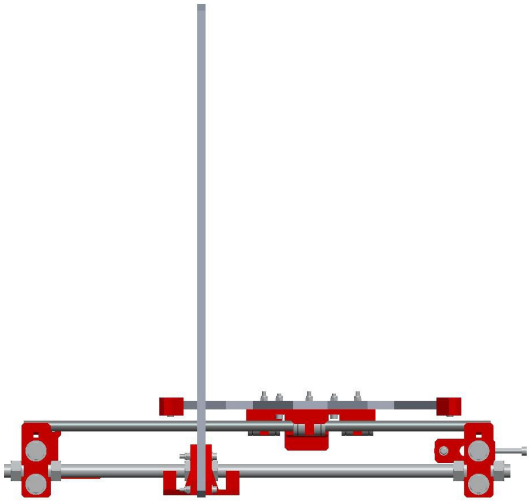
A) Insert the Z-Axis-Frame Between the M10-Penny-Washers on the Y-Axis.

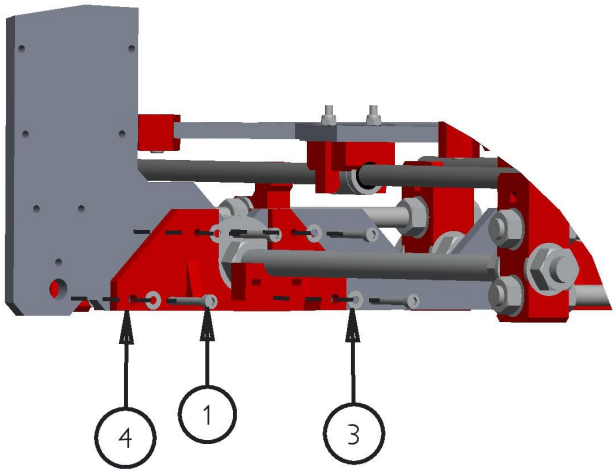
B) Adjust the Z-Axis-Frame so the distance between the front side of the Z-Axis-Frame and the end of the Smooth-Rod-350mm is 214mm on both sides.

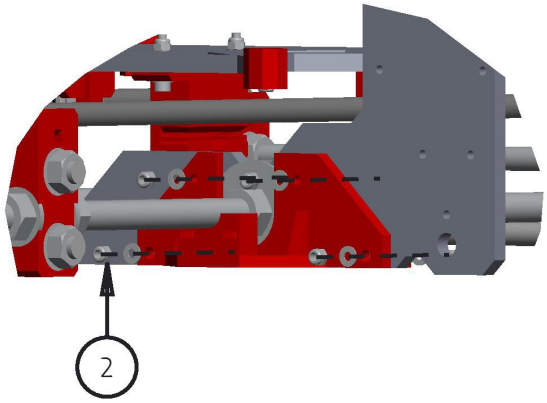
C) Strongly tighten the 4 x M10-Hex-Nuts that are holding the Z-Axis-Frame. Access to these nuts can be improved by removing the Y-Axis-Bed, this can be done by lifting the M8-350mm-Smooth-Rods out of their insets on the Y-Axis-Corner's.

Z-Axis Frame Brace Assembly Part 1

ITEM NO	DESCRIPTION	QTY
1	M3-25MM-BOLT	8
2	M3-NYLOC-NUT	8
3	M3-WASHER	16
4	Z-AXIS-FRAMEBRACE	4







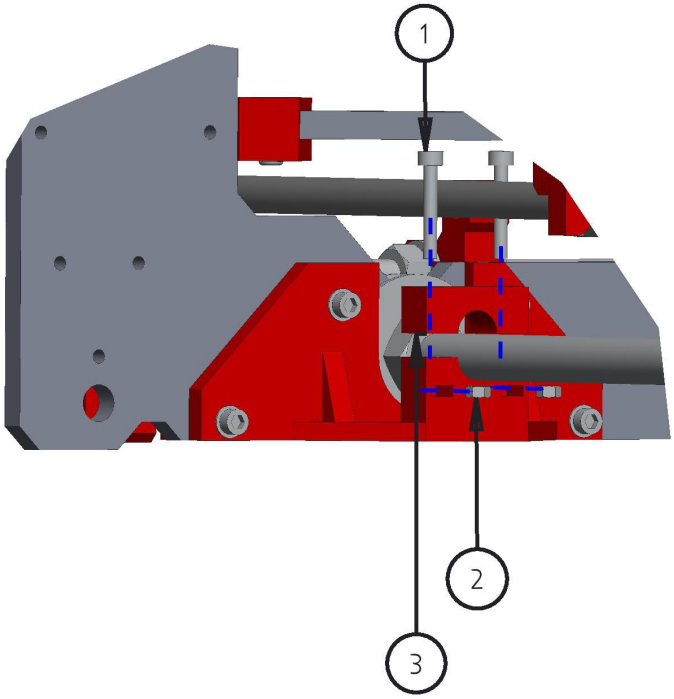
Instructions

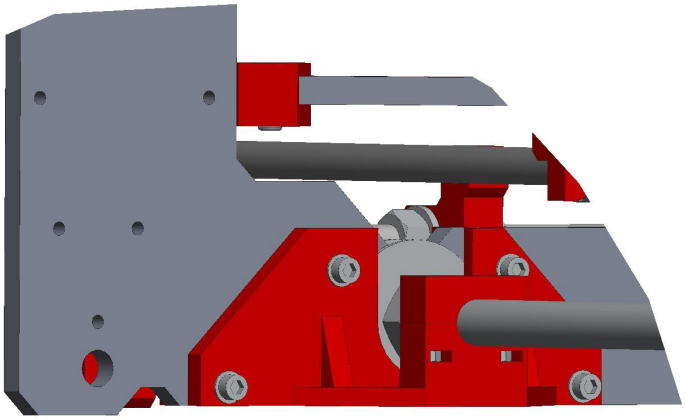
A) Attach a Z-Axis-Framebrace either side of the Z-Axis-Frame on top of the left hand M10-Penny-Washers. This is done using 4 x M3-25mm-Bolts, 8 x M3-Washers & 4 x M3-Nylocs. The M3-25mm-Bolts go through both Z-Axis-Framebrace's with the M3-Nylocs being attached on the backside.

B) Follow the same procedure to attach the 2 x Z-Axis-Framebrace's over the right hand M10-Penny-Washers.

Z-Axis Frame Brace Assembly Part 2

ITEM NO	DESCRIPTION	QTY
1	M3-20MM-BOLT	8
2	M3-HEX-NUT	8
3	Z-AXIS-FRAMEBRACE-TOP	4





Instructions

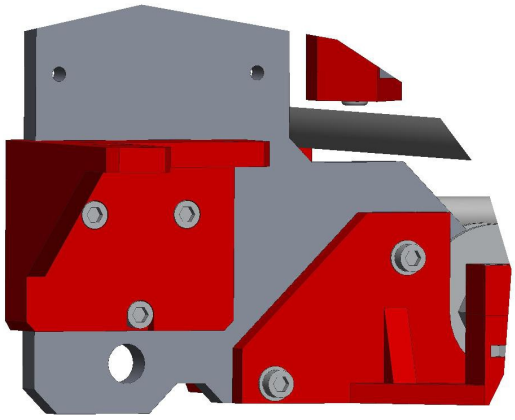
A)* Insert a M3-Hex-Nut into each of the 2 slots provided on the Z-Axis-Framebrace.

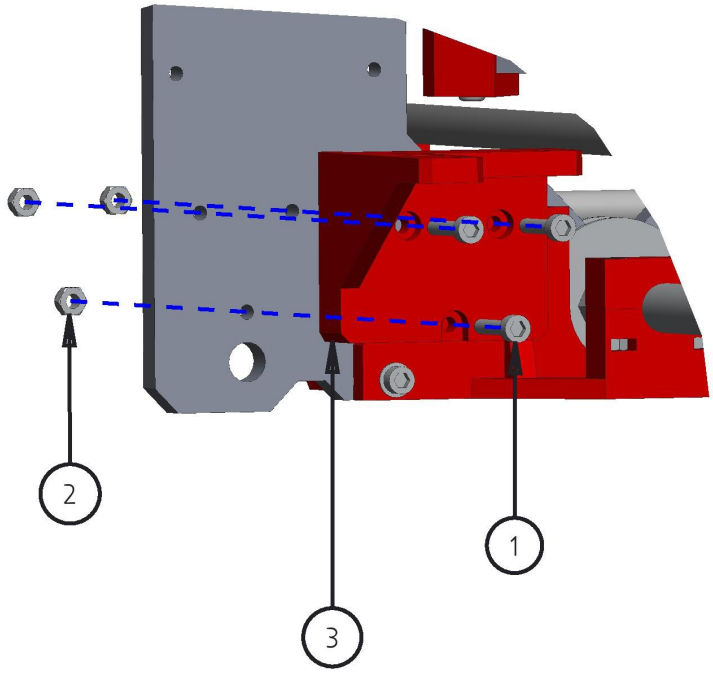
B) Place the Z-Axis-Framebrace-Top over the Threaded-Rod-10mm and tighten down into the inserted M3-Hex-Nut using 2 x M3-20mm-Bolt.

C) Repeat the process on the other three Z-Axis-Framebrace's.

Z-Axis Motor Mount Attachment

ITEM NO	DESCRIPTION	QTY
1	M3-16MM-BOLT	6
2	M3-NYLOC-NUT	6
3	Z-AXIS-MOTOR-LEFT	1
4	Z-AXIS-MOTOR-RIGHT	1





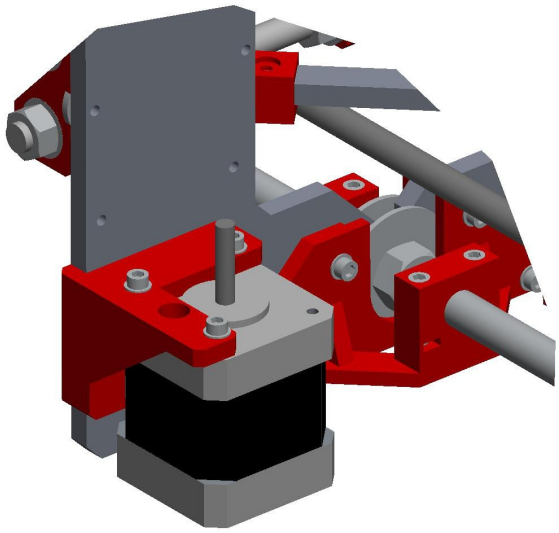
Instructions

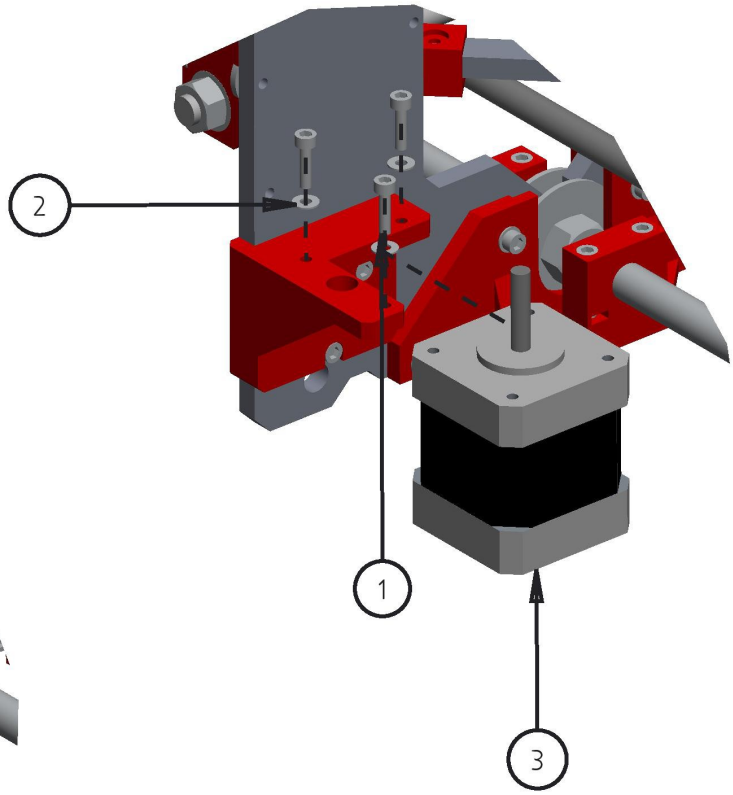
A) Attach the Z-Axis-Motor-Left using 3 x M3-16mm-Bolts and 3 x M3-Nyloc-Nut.

B) Repeat the process for Z-Axis-Motor-Right.

Z-Axis Motor Attachment

ITEM NO	DESCRIPTION	QTY
1	M3-12MM-BOLT	6
2	M3-WASHER	6
3	NEMA17-STEPPER-MOTOR	2





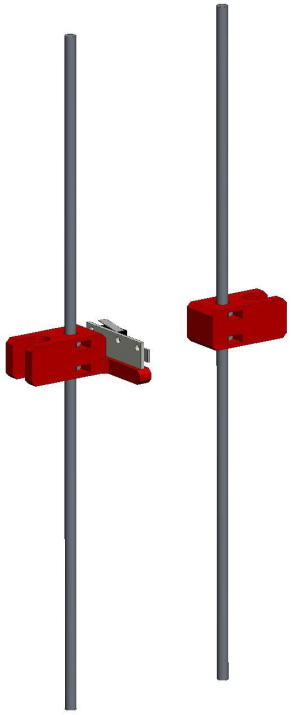
Instructions

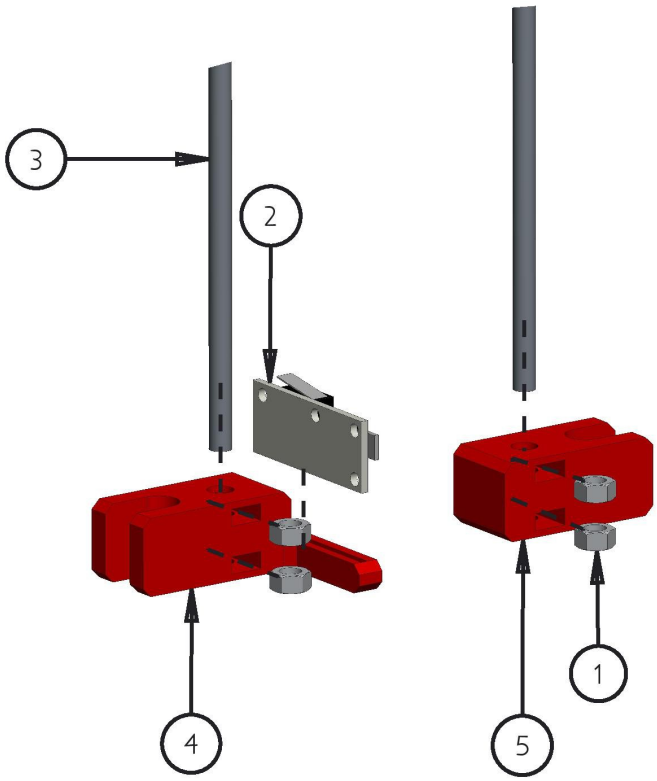
A) Attach a NEMA17-Stepper-Motor to the Z-Axis-Motor-Left using 3 x M3-12mm-Bolts and 3 x M3-Washers. Make sure that the connection terminal on the NEMA17-Stepper-Motor goes against the frame, and connect the wire that has been pre-inserted through the hole to this terminal.

B) Repeat the process to attach the NEMA17-Stepper-Motor to the Z-Axis-Motor-Right.

Z-Axis Nut Traps Assembly

ITEM NO	DESCRIPTION	QTY
1	M5-HEX-NUT	4
2	MECHANICAL-ENDSTOP	1
3	THREADED-ROD-5MM	2
4	Z-AXIS-NUTTRAP-LEFT	1
5	Z-AXIS-NUTTRAP-RIGHT	1





Instructions

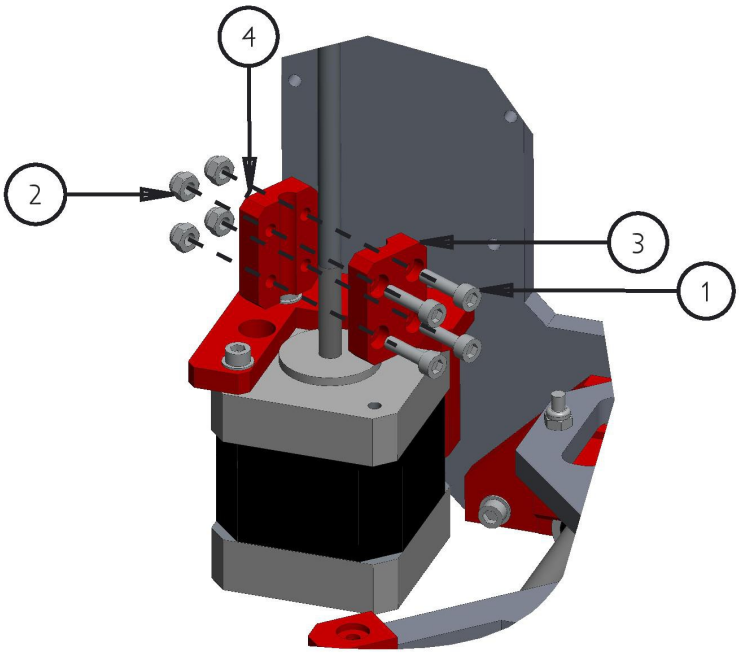
A)* Insert a Brass M5-Hex-Nut in both of the 2 slots on each Z-Axis-Nuttrap, the 2 x M5-Hex-Nuts need to be in sync for the Threaded-Rod-5mm to go through, this has already been done by us, however the procedure to get the 2 x M5-Hex-Nuts in sync is detailed in Appendix B.

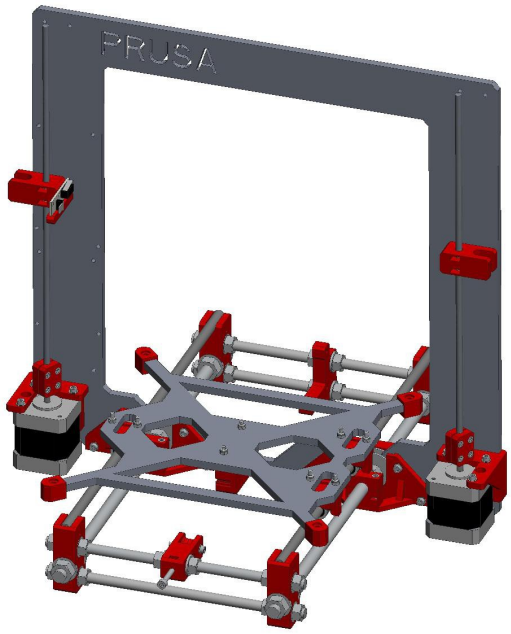
B) Push a Mechanical-Endstop in the slot provided on the Z-Axis-Nuttrap-Left in the orientation shown in the diagram, it should go down as far as possible.

C) Thread an assembled Z-Axis-Nuttrap onto each Threaded-Rod-5mm until approximately half way up.

Attaching Threaded Rod to Motor Shaft

ITEM NO	DESCRIPTION	QTY
1	M3-12MM-BOLT	8
2	M3-NYLOC-NUT	8
3	Z-AXIS-COUPLING-BOLT-SIDE	2
4	Z-AXIS-COUPLING-NUT-SIDE	2





Instructions

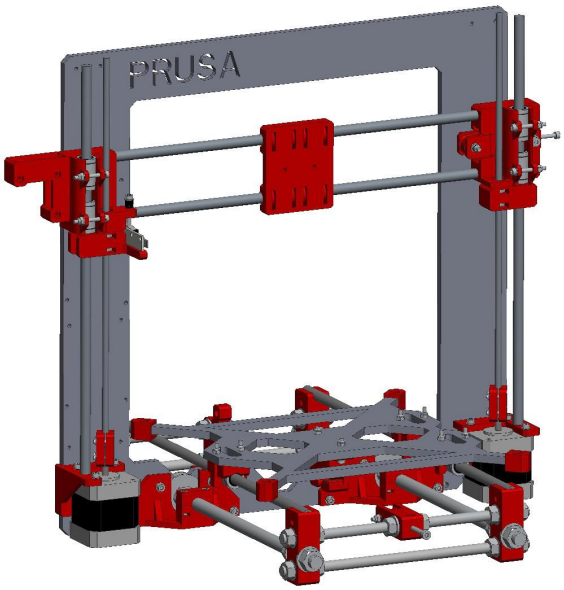
A)* Insert a Nyloc into each of the 4 inserts on the Z-Axis-Coupling-Nut-Side.

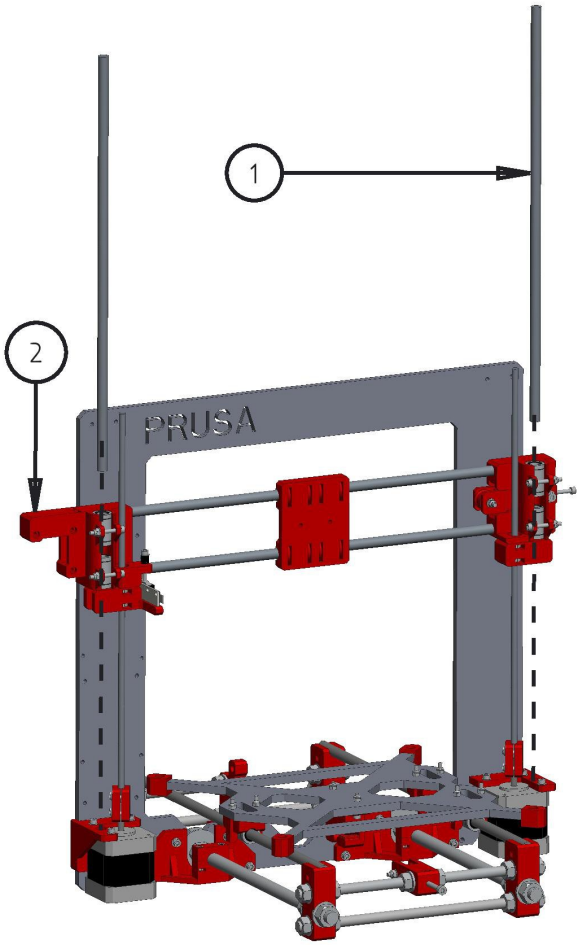
B) With the previously assembled Threaded-Rod-5mm & Z-Axis-Nuttrap-Left get it inline with & touching the top of the left hand side NEMA17-Stepper-Motor Shaft. Bring the Z-Axis-Coupling-Nut-Side & Z-Axis-Coupling-Bolt-Side together around the Threaded-Rod-5mm & NEMA17-Stepper-Motor Shaft. Use 4 x M3-12mm-Bolts to tighten the Z-Axis-Coupling around the Threaded-Rod-5mm & NEMA17-Stepper-Motor Shaft. The M3-12mm-Bolts should be as tight as possible.

C) Repeat the same procedure to attach the Threaded-Rod-5mm & Z-Axis-Nuttrap-Right to the right hand side NEMA17-Stepper-Motor Shaft.

Attaching X-Axis to Z-Axis

ITEM NO	DESCRIPTION	QTY
1	SMOOTH-ROD-320MM	2
2	XAXIS	1





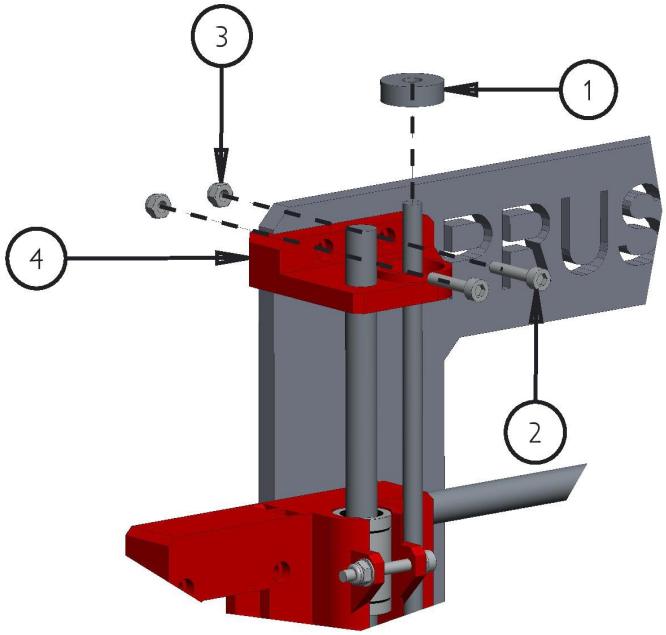
Instructions

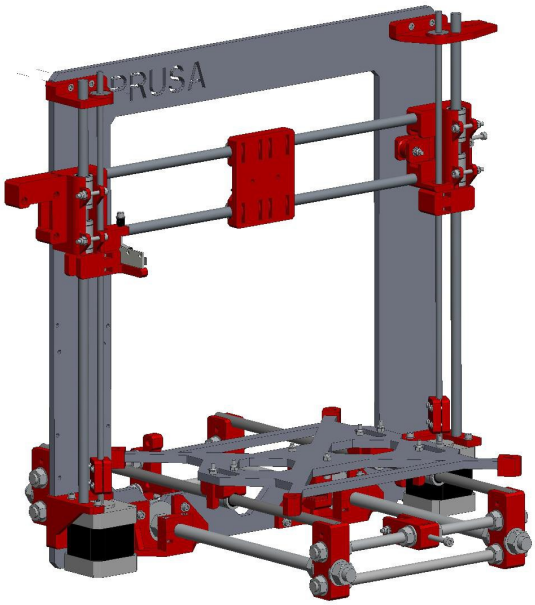
A) Slide the previously assembled X-Axis over the 2 x Threaded-Rod-5mm so it sits on top of both Z-Axis-Nuttraps, rotate the Z-Axis-Couplings if necessary to move the respective Z-Axis-Nuttrap up or down.

B) Slide down a Smooth-Rod-320mm through both LM8UU-Bearings on the Left & Right side of the X-Axis until it goes into the 8mm hole on the Z-Axis-Motor-Left & Right and touches the NEMA17-Stepper-Motor, this may require a tap with a hammer. Be sure to go through straight when pushing the Smooth-Rod-320mm through the 2 x LM8UU-Bearings others Ball Bearings may fall out.

Z-Axis Top Assembly

ITEM NO	DESCRIPTION	QTY
1	625ZZ-BEARING	2
2	M3-16MM-BOLT	4
3	M3-NYLOC-NUT	4
4	Z-AXIS-TOP-LEFT	1
5	Z-AXIS-TOP-RIGHT	1





Instructions

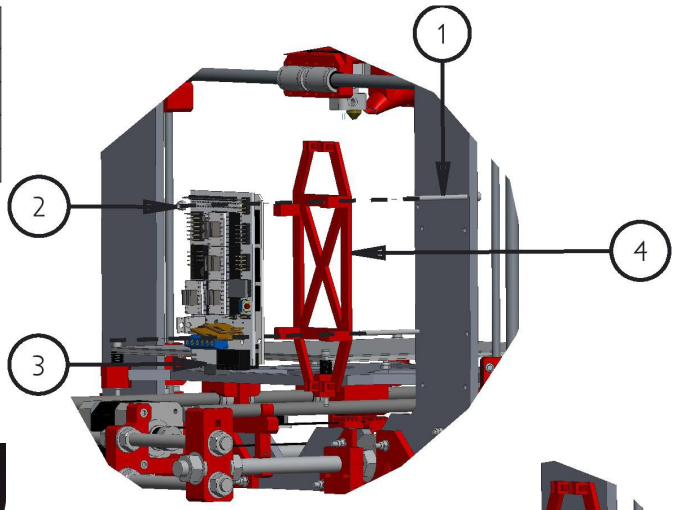
A) Insert a 625zz-Bearing into the inset on the Z-Axis-Top-left until it is flush with the top, this may require a tap with a hammer.

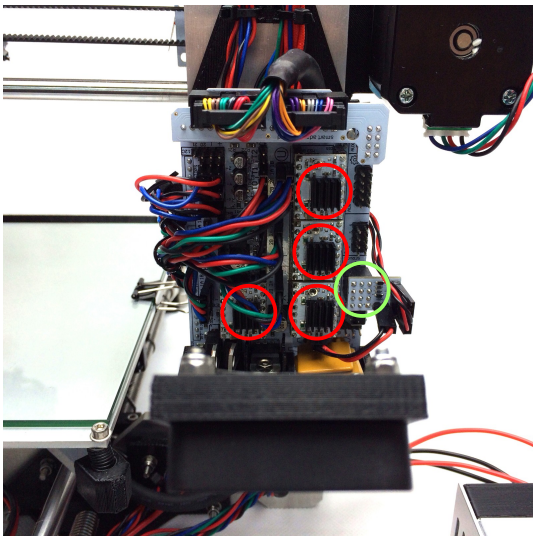
B) Attach the Z-Axis-Top-Left to the Z-Axis-Frame using 2 x M3-16mm-Bolt & 2 x M3-Nyloc-Nut, before tightening repeat the same procedure with the Z-Axis-Top-Right, then tighten them both fully.

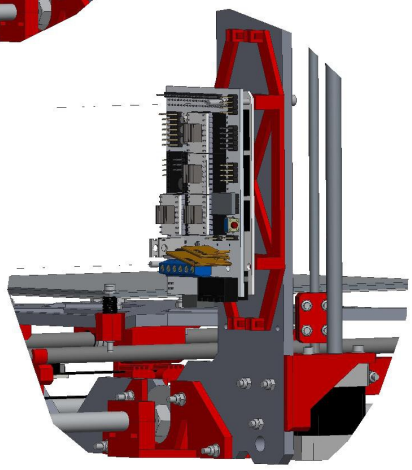
C) Lift the Z-Axis up and release to check that Z-Axis falls freely under gravity.

Attaching RAMPS 1.4

ITEM NO	DESCRIPTION	QTY
1	M3-50MM-BOLT	2
2	M3-NYLOC-NUT	1
3	RAMPS-14	1
4	RAMPS-HOLDER	1







Instructions

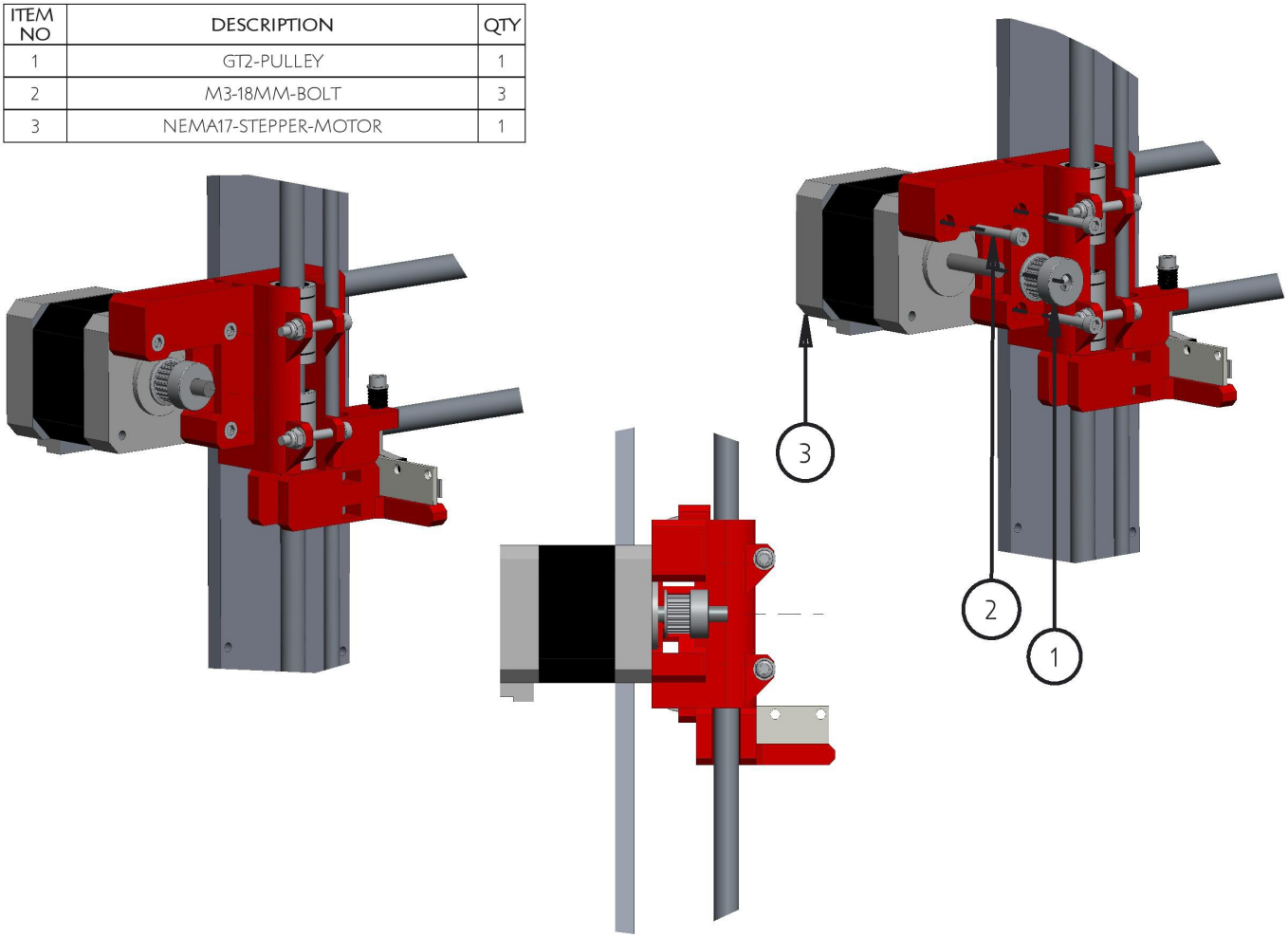
A) Attach a Black Heatsink to each of the 4 x Stepper Drivers on the RAMPS-1.4 Board (Red Circles), this is done by using a square of the provided Double Sided Aluminium Conductive Sticker in between the Heatsink and the Stepper Driver.

B) Attach the RAMPS-1.4 Fan Extender to the RAMPS-1.4 Board by pushing it onto the Header Pins at the position shown by the Green Circle Above

C) Attach the RAMPS-Holder & RAMPS-1.4 Board to the Z-Axis-Frame by using 2 x M3-50mm-Bolts which go through the Top Right & Bottom Left of the RAMPS-Holder & RAMPS-1.4 Board, the two stand off's on the RAMPS-Holder which are level horizontally should be at the bottom (You will have to temporalily slide the left hand Smooth-Rod-320mm upwards to get access to these holes). Attach a M3-Nyloc-Nut only to the Top Right M3-50mm-Bolt, the bottom left M3-50mm-Bolt will be used to attach the RAMPS-Fans-Bracket later.

Attaching X-Axis Motor

ITEM NO	DESCRIPTION	QTY
1	GT2-PULLEY	1
2	M3-18MM-BOLT	3
3	NEMA17-STEPPER-MOTOR	1



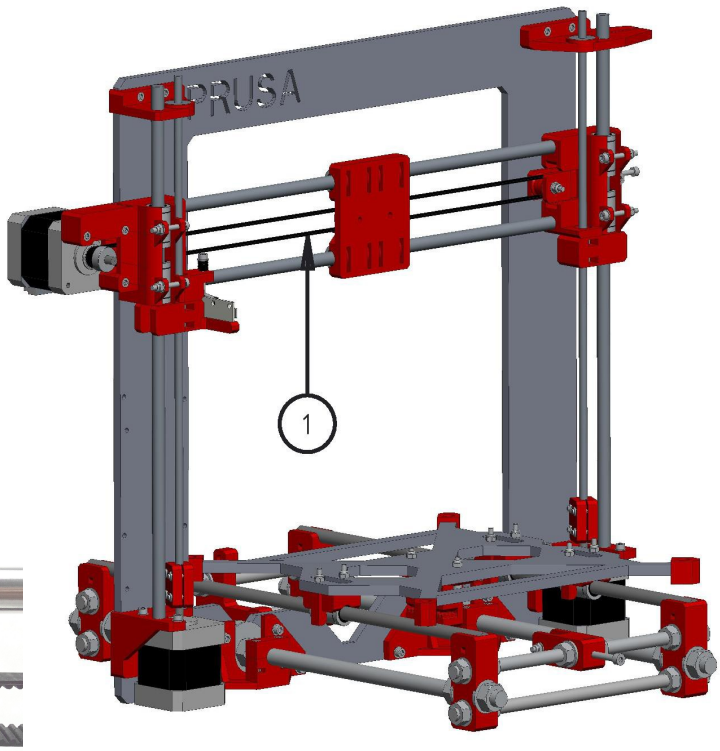
Instructions

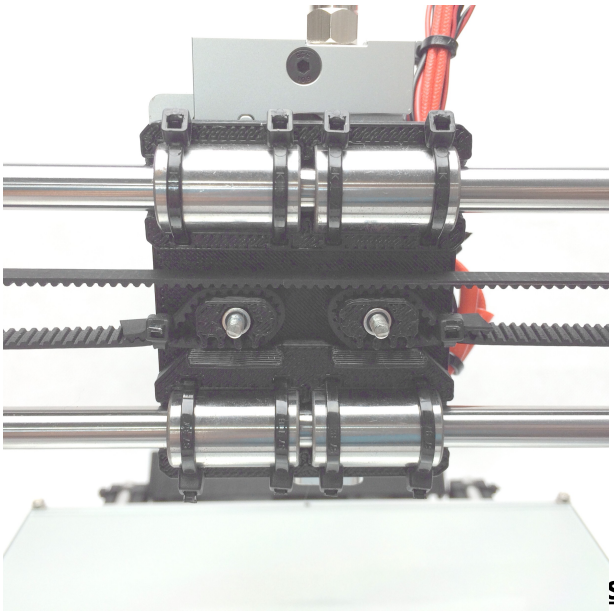
A) Attach a NEMA17-Stepper-Motor to the X-Axis-Motor using 3 x M3-18mm-Bolts, insure the connection terminal on the NEMA17-Stepper-Motor is pointing downwards.

B) Push a GT2-Pulley onto the NEMA17-Stepper-Motor Shaft, position it so the grooved section is in the middle of the horizontal gap which goes through the X-Axis-Motor. Use 2 x Grub Screws to hold it in position, make sure one of the grub screws is in contact with the flat section of the NEMA17-Stepper-Motor Shaft.

Attaching X-Axis GT2 Belt

ITEM NO	DESCRIPTION	QTY
1	GT2-BELT	1





Instructions

A) Loop 1metre of GT2-Belt around the GT2-Pulley on the X-Axis-Motor, then over to X-Axis-Idler and loop it around the 623zz-Flanged-Bearings on the X-Axis Tensioner, adjust the lengths so the two free ends of the GT2-Belt meet at the bottom of the X-Axis-Carriage.

B) Loop one free end of the GT2-Belt around one the grooved belt holder's on the X-Axis-Carriage so it comes back on to it's self with the teeth facing each other, insure the GT2-Belt is pushed fully into the grooves on the X-Axis-Carriage so it touches the backside, use a small screw driver to help push it in. Use a Cable tie to secure this free end against the GT2-Belt, before fully tightening use pliers to pull out any excess which may be around the Belt Holder, also get the Cable tie as close as possible to the Belt Holder when fully tightening, use pliers to pull the cable tie tight.

C) Repeat Step B for the other free end of GT2-Belt, but this time before fully tightening the Cable Tie, use pliers to pull any excess out of the the whole length of GT2-Belt.

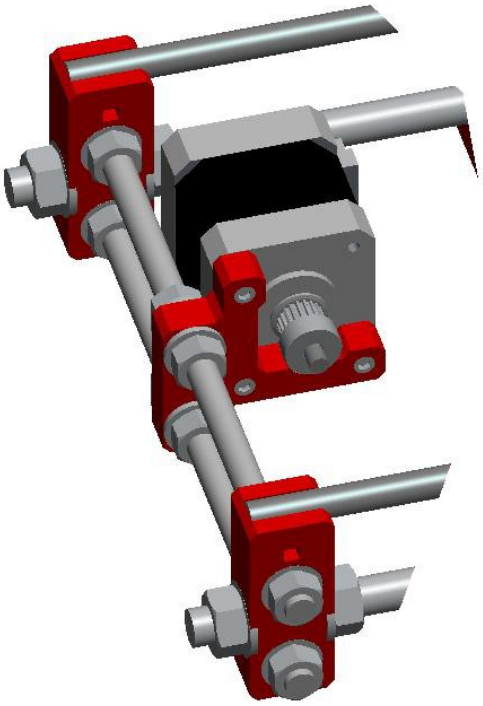
D) If needed adjust the GT2-Pulley on the X-Axis-Motor so it is centred with the belt, also when the X-Axis-Carriage moves left and right the GT2-Belt shouldn't move along the pulley.

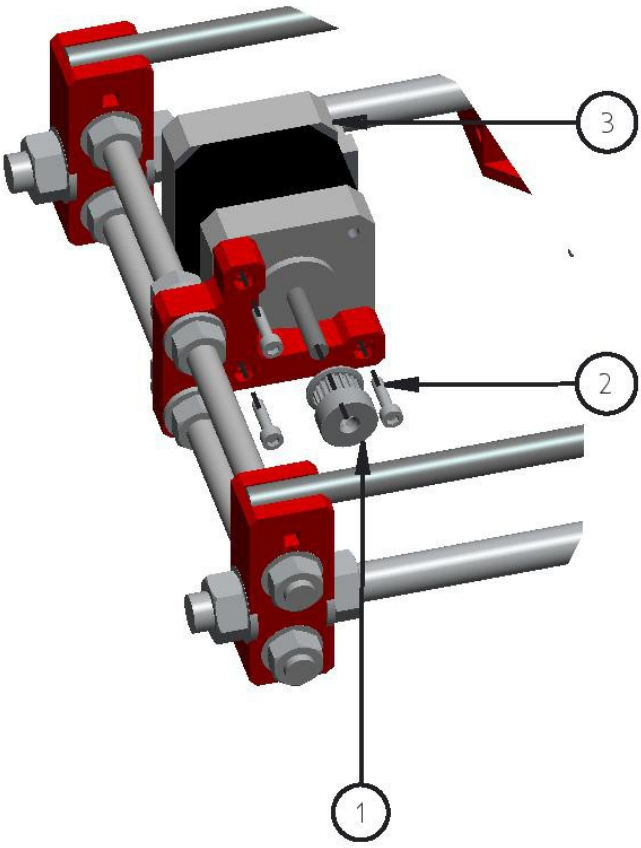
E) Turn the M3-20mm-Bolt on the back of the X-Axis-Tensioner clockwise to tension the GT2-Belt, it should be tensioned enough so that the GT2-Belt is pluckable. Once happy secure the X-Axis-Tensioner by tightening M4-25mm-Bolt on the X-Axis-Idler which goes through the X-Axis-Tensioner.

F) To further secure the belt add an extra cable next to each of the ones used above. Use Scissors to cut any excess off the GT2-Belt.

Attaching Y-Axis Motor

ITEM NO	DESCRIPTION	QTY
1	GT2-PULLEY	1
2	M3-12MM-BOLT	3
3	NEMA17-STEPPER-MOTOR	1





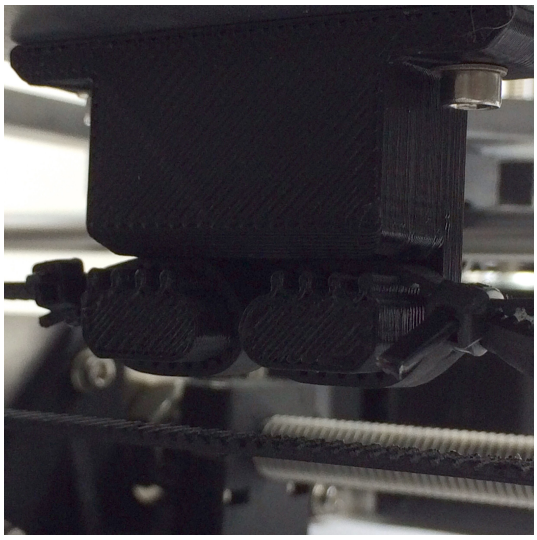
Instructions

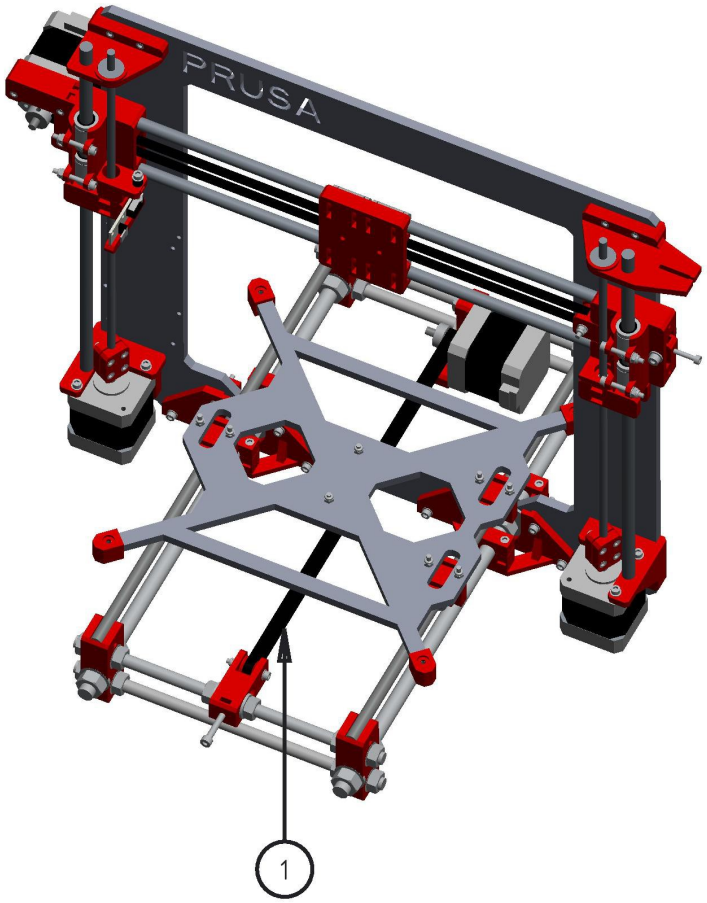
A) Attach a NEMA17-Stepper-Motor to the Y-Axis-Motor using 3 x M3-12mm-Bolts, insure the connection terminal on the NEMA17-Stepper-Motor is pointing towards the Z-Axis-Frame.

B) Push a GT2-Pulley onto the NEMA17-Stepper-Motor Shaft, position it so it is roughly 1.0mm from the motor casing, this will be adjusted later if needed. Use 2 x Grub Screws to hold it in position, make sure one of the grub screws is in contact with the flat section of the NEMA17-Stepper-Motor Shaft.

Attaching Y-Axis GT2 Belt

ITEM NO	DESCRIPTION	QTY
1	GT2-BELT	1





Instructions

A) Loop 1metre of GT2-Belt around the GT2-Pulley on the Y-Axis-Motor, then over to Y-Axis-Idler and loop it around the 623zz-Flanged-Bearings on the Y-Axis-Idler, adjust the lengths so the two free ends of the GT2-Belt meet at the top of the Y-Axis-Belt-Holder.

B) Loop one free end of the GT2-Belt around one the grooved belt holder's on the Y-Axis-Belt-Holder so it comes back on to it's self with the teeth facing each other, insure the GT2-Belt is pushed fully into the grooves on the Y-Axis-Belt-Holder so it touches the backside, use a small screw driver to help push it in. Use a Cable tie to secure this free end against the GT2-Belt, before fully tightening use pliers to pull out any excess which may be around the Belt Holder, also get the Cable tie as close as possible to the Belt Holder when fully tightening, use pliers to pull the cable tie tight.

C) Repeat Step B for the other free end of GT2-Belt, but this time before fully tightening the Cable Tie, use pliers to pull any excess out of the the whole length of GT2-Belt.

D) If needed adjust the GT2-Pulley on the Y-Axis-Motor so it is centred with the belt, also when the Y-Axis moves back and forward the GT2-Belt shouldn't move along the pulley.

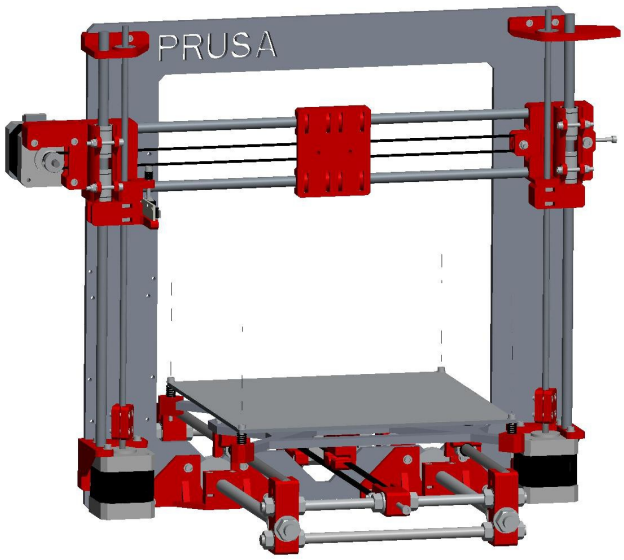
E) If needed adjust the Y-Axis Idler by turning the M8-Hex-Nuts either side so it is centred with the belt, also when the Y-Axis moves back and forward the GT2-Belt shouldn't move along the 623zz-Flanged-Bearings on the Y-Axis Idler.

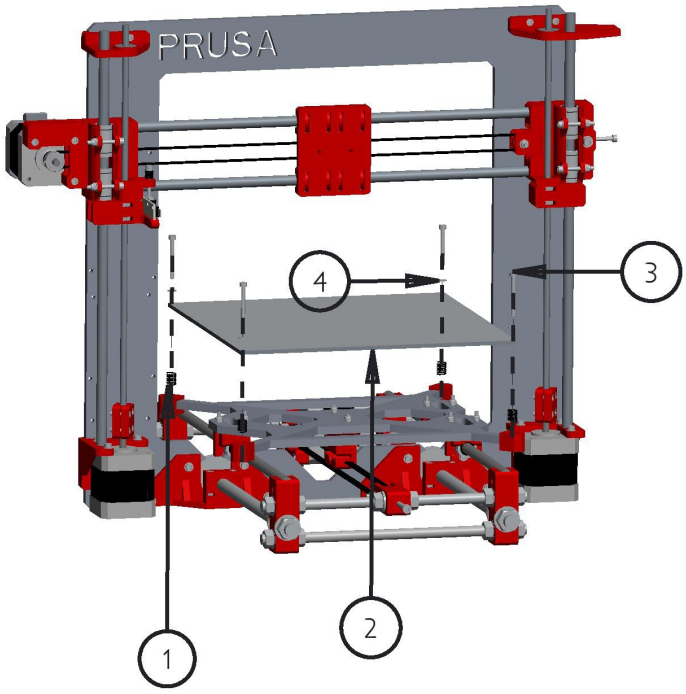
F) Turn the M4-20mm-Bolt on the back of the Y-Axis Idler clockwise to tension the GT2-Belt, it should be tensioned enough so that the GT2-Belt is pluckable. Once happy secure the Y-Axis Idler by tightening M8-Hex-Nuts either side.

G) To further secure the belt add an extra cable next to each of the ones used above. Use Scissors to cut any excess off the GT2-Belt.

Attaching Heated Bed

ITEM NO	DESCRIPTION	QTY
1	COMPRESSION-SPRING	4
2	HEATED-BED	1
3	M3-30MM-BOLT	4
4	M3-WASHER	4





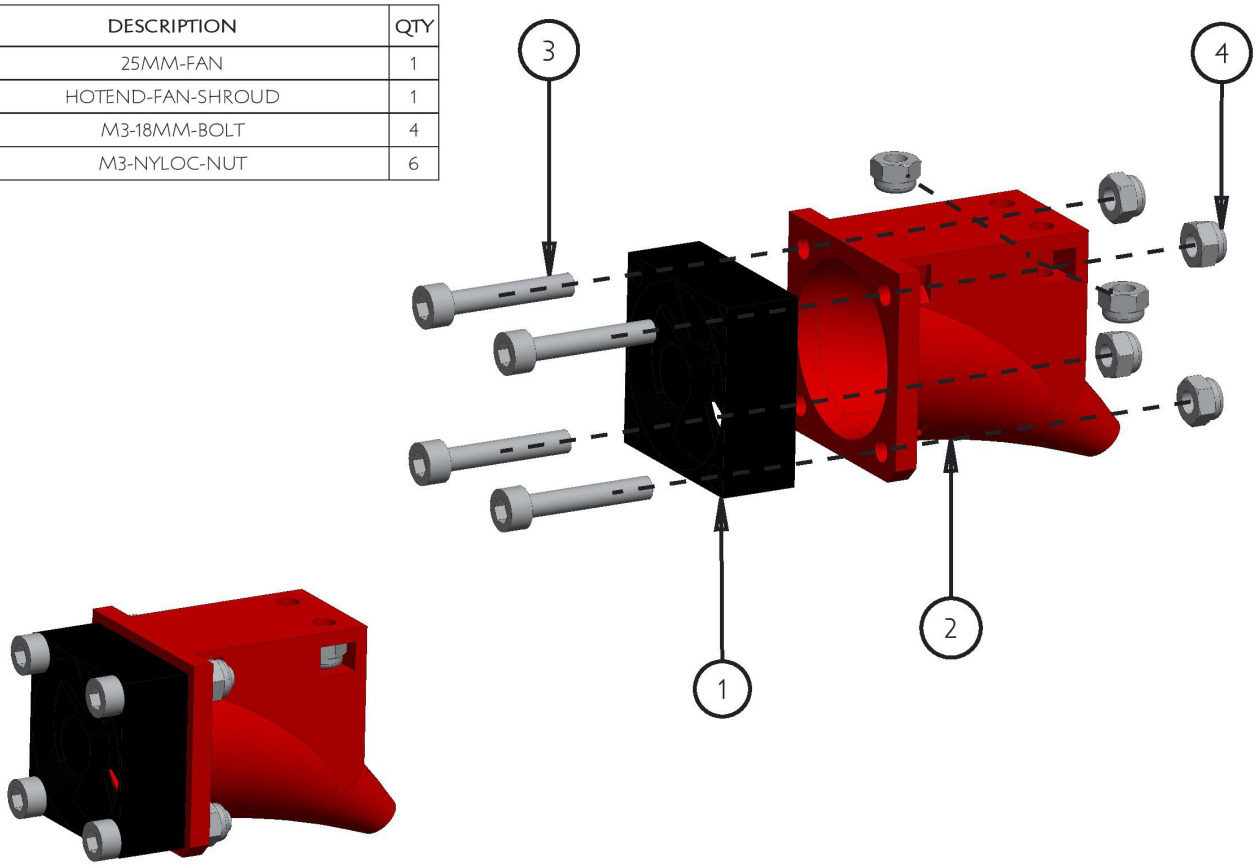
Instructions

A) Both Smooth-Rod-350mm can now be secured using a Cable Tie through the slot provided on each Y-Axis-Corner.

B) To attach the Heated-Bed to the Y-Axis-Bed, in each corner use a M3-30mm-Bolt, M3-Washer, & a Compression-Spring. The Heated-Bed should be orientated so the plain aluminium side is facing upwards with the power wire connections at the front. The easiest way to attach the Heated-Bed, is to first have the Heated-Bed resting on the Y-Axis-Bed with the Compressions-Springs in-between, and the M3-30mm-Bolt & M3-Washer through the whole each corner. Then starting at one corner compress the Heated-Bed against the spring, and screw the M3-30mm-Bolt into the M3-Nyloc-Nut, which is on the underside of the Heated-Bed-Spring-Trap, until it begins to come through the other side. Do the same for the opposite diagonal, and then do the other remaining 2. Once all M3-30mm-Bolts are sufficiently in the M3-Nyloc-Nut's tighten each M3-30mm-Bolt in turn until the Compression-Spring is fully compressed. Now make sure each corner of the Heated-Bed is the same distance away from the Y-Axis-Bed.

Hotend Fan Assembly

ITEM NO	DESCRIPTION	QTY
1	25MM-FAN	1
2	HOTEND-FAN-SHROUD	1
3	M3-18MM-BOLT	4
4	M3-NYLOC-NUT	6



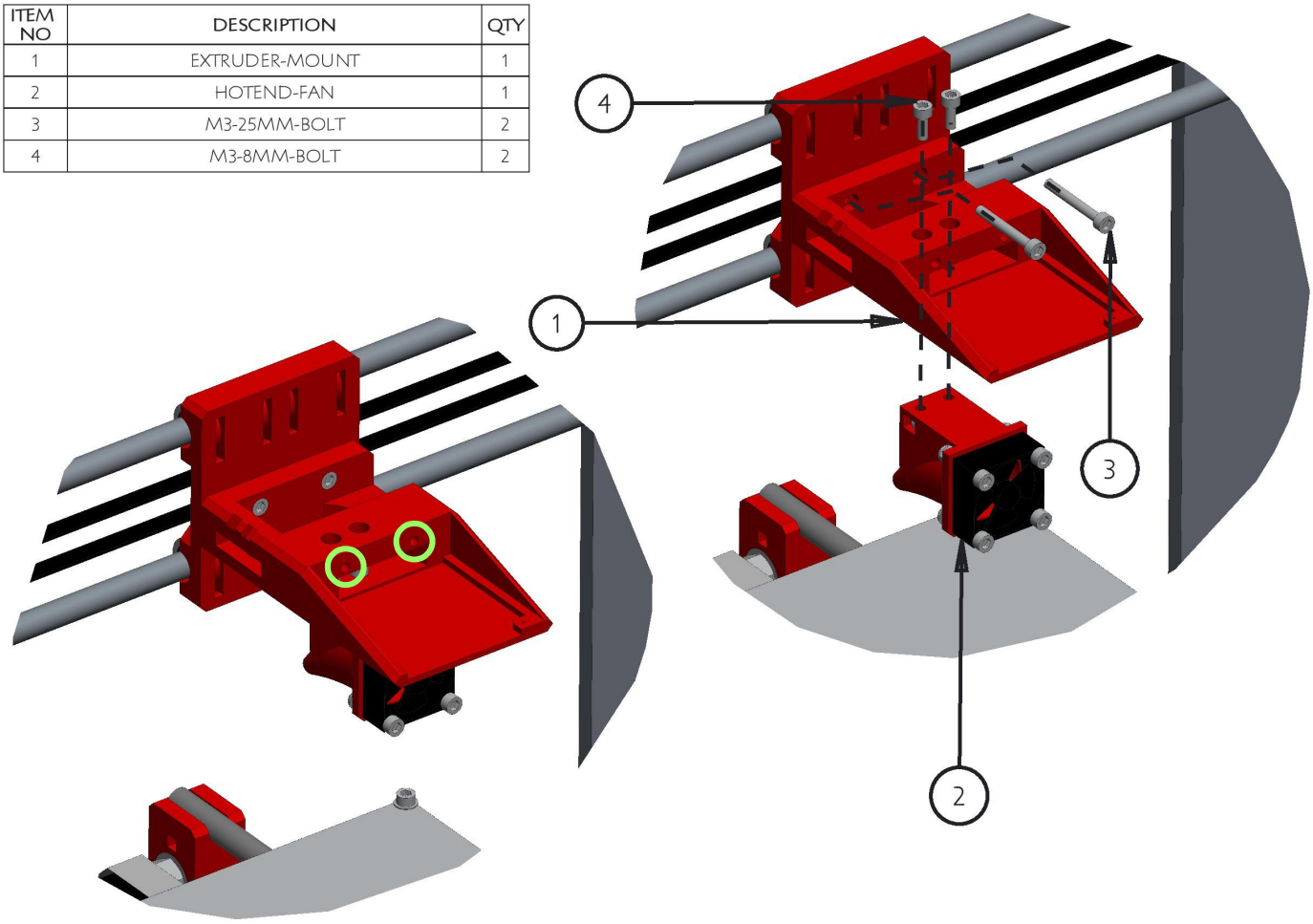
Instructions

A)* Insert a M3-Nyloc-Nut into each slot provided on the left & right side of the Hotend-Fan-Shroud.

B) Attach the 25mm-Fan to the Hotend-Fan-Shroud using 4 x M3-18mm-Bolts & 4 x M3-Nyloc-Nuts, the fan should be orientated so the arrow on the side is pointing towards the Hotend-Fan-Shroud with the wire connection at the top.

Attaching Extruder Mount

ITEM NO	DESCRIPTION	QTY
1	EXTRUDER-MOUNT	1
2	HOTEND-FAN	1
3	M3-25MM-BOLT	2
4	M3-8MM-BOLT	2



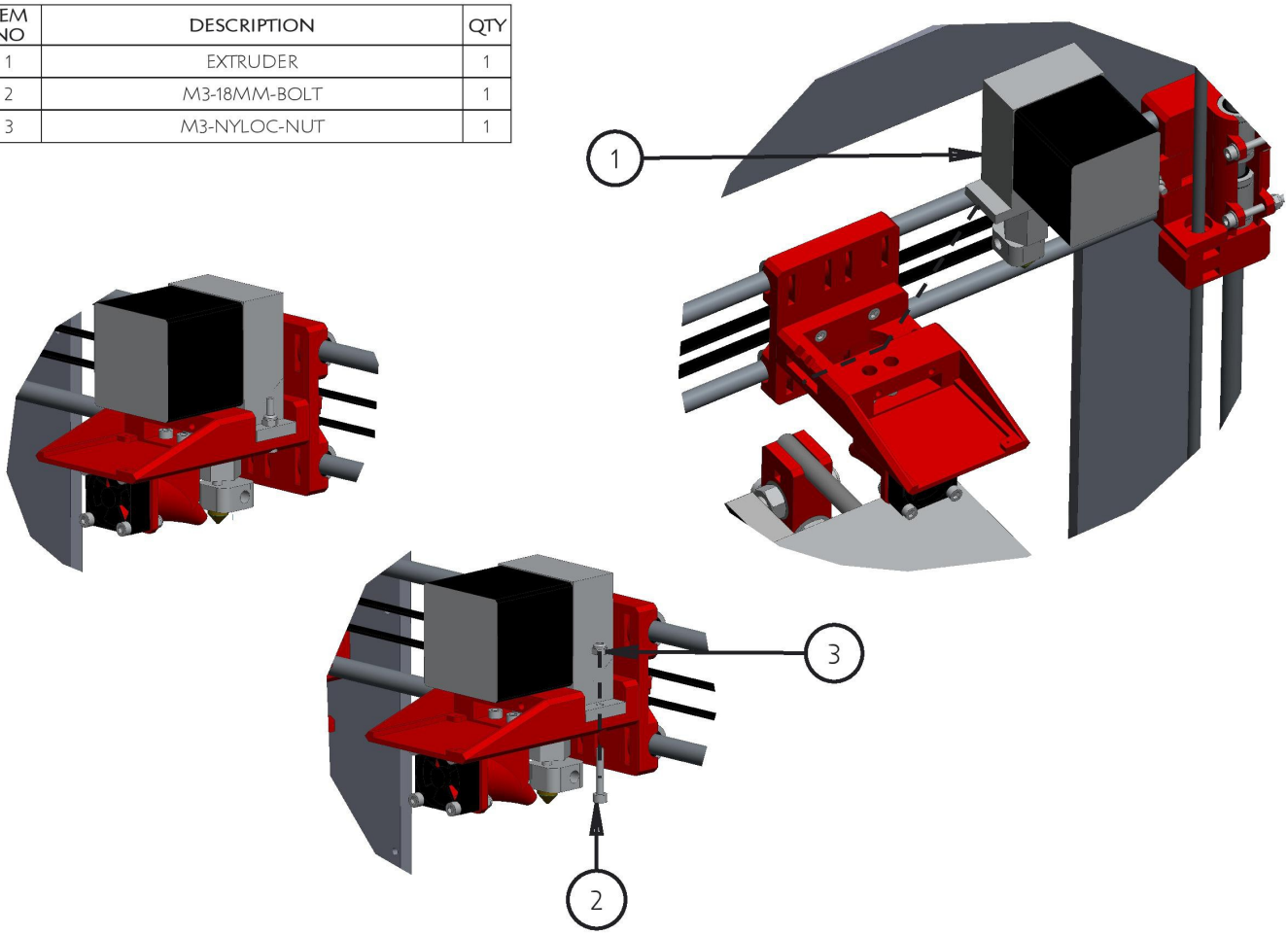
Instructions

A) Attach the Extruder-Mount to the X-Axis-Carriage using 2 x M3-25mm-Bolt's which screw into 2 x M3-Nyloc-Nuts which are on the back side of the X-Axis-Carriage. You will have to start off screwing the 2 x M3-25mm-Bolt's in at an angle, once there is sufficient clearance to straighten them they can then be screwed through with the long side of an Allen key going through the access holes in extruder body directly opposite (Circled in green above). Make sure the M3-25mm-Bolt's are inline with or below the plastic surface once tight.

B) Use 2 x M3-8mm-Bolts to attach the Hotend-Fan to the Extruder-Mount through the access holes on top.

Attaching Extruder

ITEM NO	DESCRIPTION	QTY
1	EXTRUDER	1
2	M3-18MM-BOLT	1
3	M3-NYLOC-NUT	1



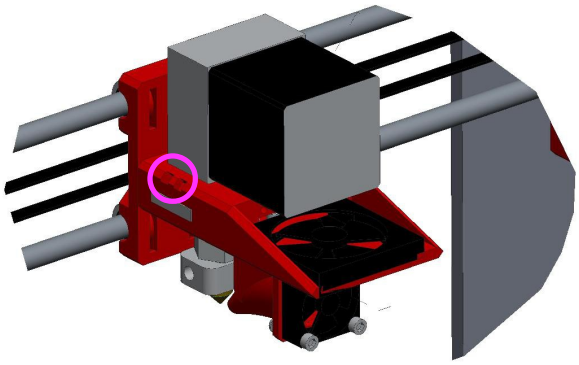
Instructions

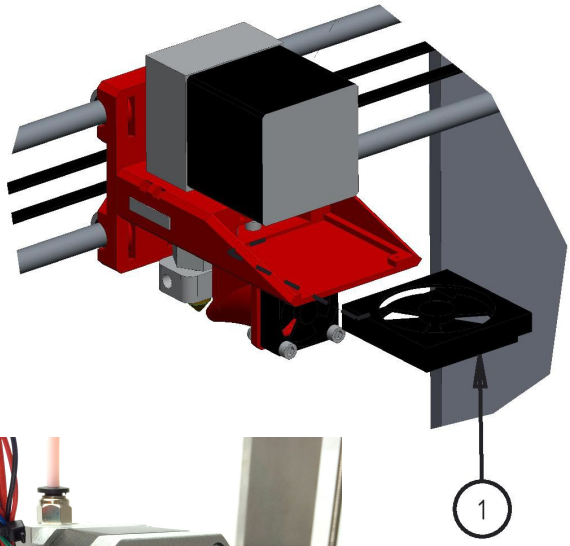
A) Attach the Extruder to the Extruder-Mount by first feeding the Thermistor & Cartridge Heater wires through the hole in the Extruder-Mount where the Hotend will sit. Next bring the Hotend downwards through the same hole so the extruder is sitting flat on the plastic, then push the side ways so it goes fully into the slot on the left side of the Extruder-Mount.

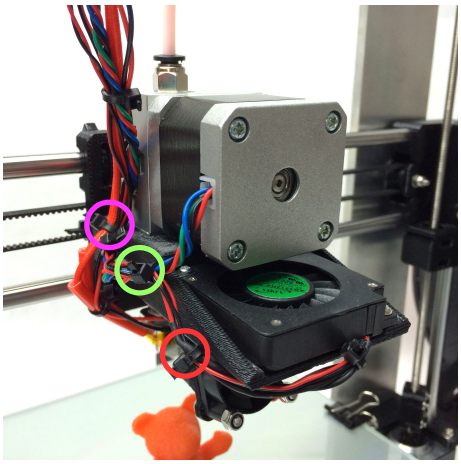
B) Secure the Extruder to the Extruder-Mount by using a M3-18mm-Bolt & M3-Nyloc-Nut.

Attaching Extruder Fan & Extruder Wiring

ITEM NO	DESCRIPTION	QTY
1	EXTRUDER-FAN	1







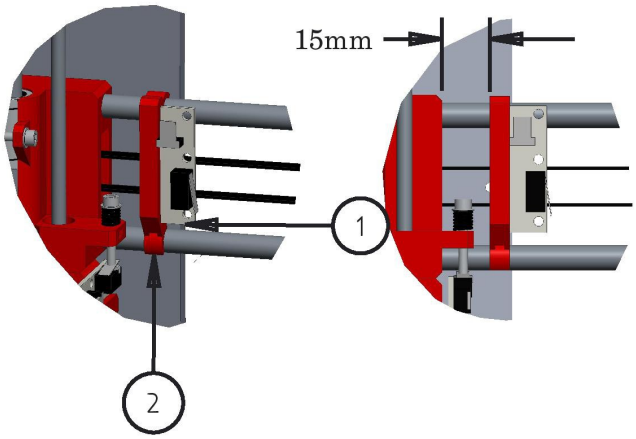
Instructions

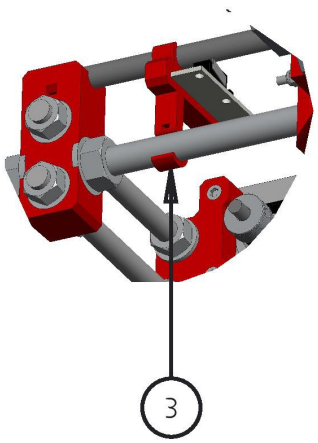
A) Attach the Extruder-Fan the to Extruder mount so the air flow opening on the Extruder-Fan is pointing towards the gap through the Extruder-Mount which looks on to the Hotend. Secure it with the supplied Philip Screws, the longer of the two goes in the back left hole and the smaller in the front right.

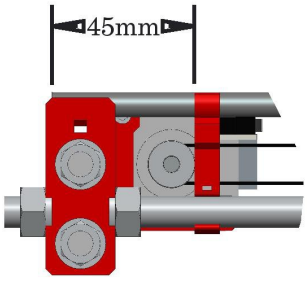
B) First Cable tie the two wires coming from the two fans together, this is indicated by the Red Circle, then cable tie the two fan wires to the Extruder Motor Wire (Green Circle). Finally join these 3 wires with the Thermistor & Cartridge Heater wires with a cable tie going through the anchor point slot on the left side of the Extruder-Mount indicated by the Purple Circles

X & Y-Axis Endstop Holders

ITEM NO	DESCRIPTION	QTY
1	MECHANICAL-ENDSTOP	2
2	X-AXIS-ENDSTOP-HOLDER	1
3	Y-AXIS-ENDSTOP-HOLDER	1







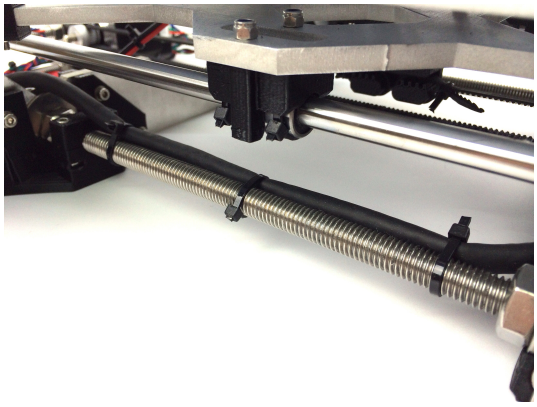
Instructions

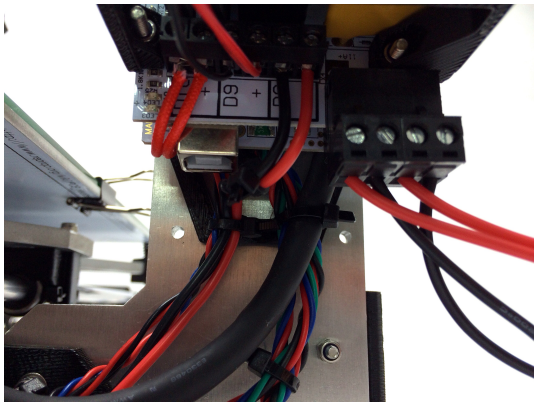
A) Insert a Mechanical-Endstop into the X-Axis-Endstop-Holder and attach it to the two Smooth-Rods-370mm on the X-Axis. Use a cable tie going around the bottom Smooth-Rod-370mm and through the slot on X-Axis-Endstop-Holder to secure it roughly 15mm away from the X-Axis-Motor (This may need adjusting later). If the Mechanical-Endstop is loose inside X-Axis-Endstop-Holder secure it using a cable tie going around both the Mechanical-Endstop and X-Axis-Endstop-Holder.

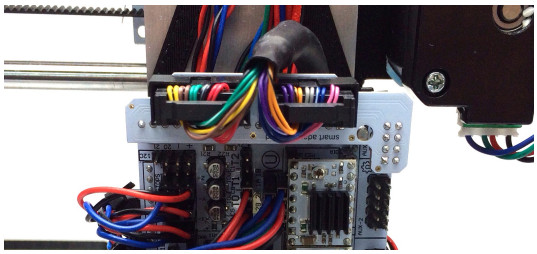
B) Insert a Mechanical-Endstop into the Y-Axis-Endstop-Holder and attach it to the Smooth-Rod-350mm & Threaded-Rod-10mm on the Y-Axis. Use a cable tie going around the bottom Threaded-Rod-10mm and through the slot on Y-Axis-Endstop-Holder to secure it roughly 45mm away from the the end of the Smooth-Rod-350mm (This may need adjusting later). If the Mechanical-Endstop is loose inside Y-Axis-Endstop-Holder secure it using a cable tie going around both the Mechanical-Endstop and Y-Axis-Endstop-Holder.

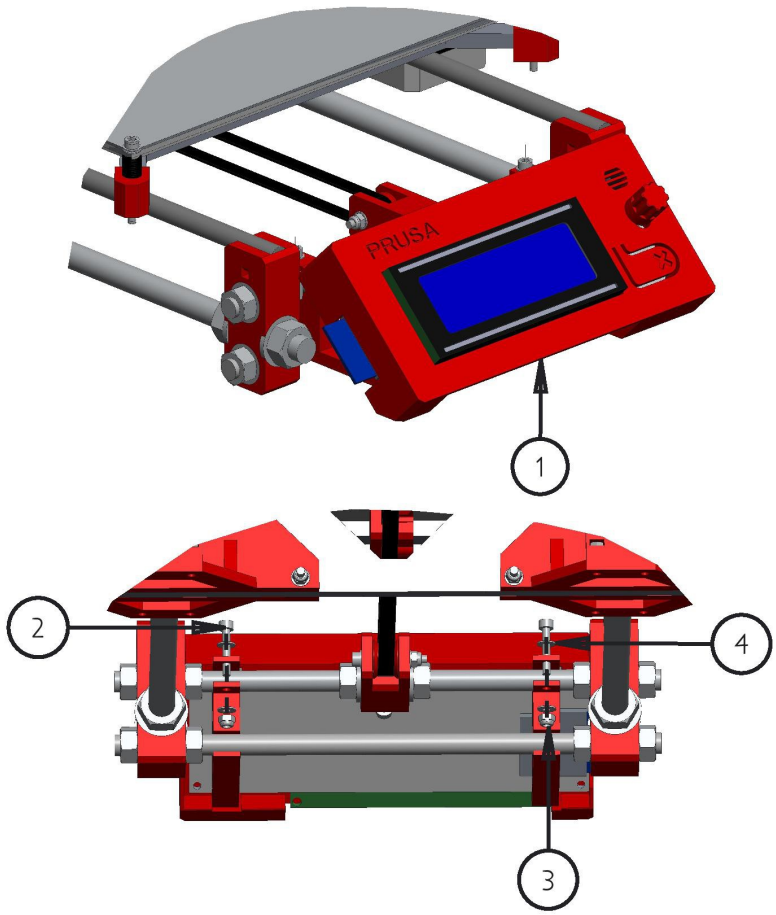
Attaching LCD Controller

ITEM NO	DESCRIPTION	QTY
1	LCD-CONTROLLER	1
2	M3-18MM-BOLT	2
3	M3-NYLOC-NUT	2
4	M3-WASHER	4

1. 

2. 

3. 



Instructions

A) Attach the LCD-Controller to the 2 x Threaded-Rod-8mm on the front of the Y-Axis.

B) Use 2 x M3-18mm-Bolt's, 4 x M3-Washers & 2 x M3-Nylocs to secure it to the top Threaded-Rod-8mm. It is a good idea to leave this step until you a full happy with the machine so you can easily get access to the Y-Axis-Idler if needed.

C) The LCD-Controller Wire can be cabled tied along the Threaded-Rod-10mm and over the Z-Axis-Framebrace (Image 1). The LCD-Controller Wire should then be routed up and under the RAMPS-1.4 Board until it comes back out the top (Image 2). The Smart Adaptor which is attach to the end on the LCD-Controller Wire should then be plugged into the RAMP-1.4 Board at the position shown in Image 3.

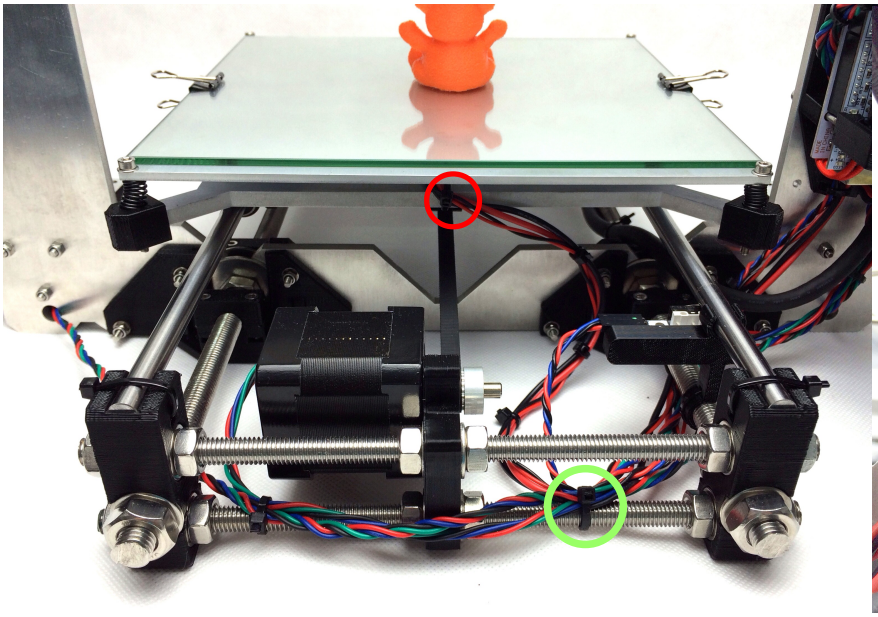
Notes On Wiring

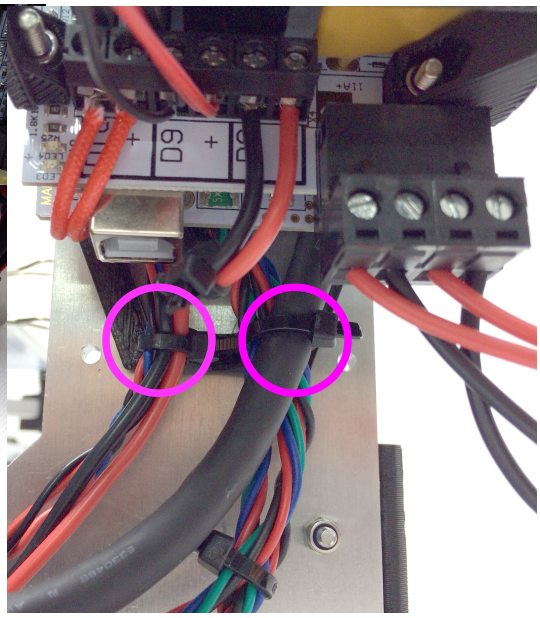
Appendix C is a RAMPS 1.4 Wiring Diagram which shows where every wire should be plugged into, the wires in the diagram are coloured the same as the wires supplied so take care which colour goes where so you get the correct orientation of each wire. It is best where possible to bring the wires up on to the RAMPS 1.4 Board from the left hand side so they do not obstruct the air flow to the Heatsinks on the Stepper Drivers

Any extra lengths of wire can either be bundled and hidden under the Electronics or Cable tied somewhere out the way.

The instructions below are a general guide on how to route the wires but they do not have to be followed strictly.

Wiring Part 1





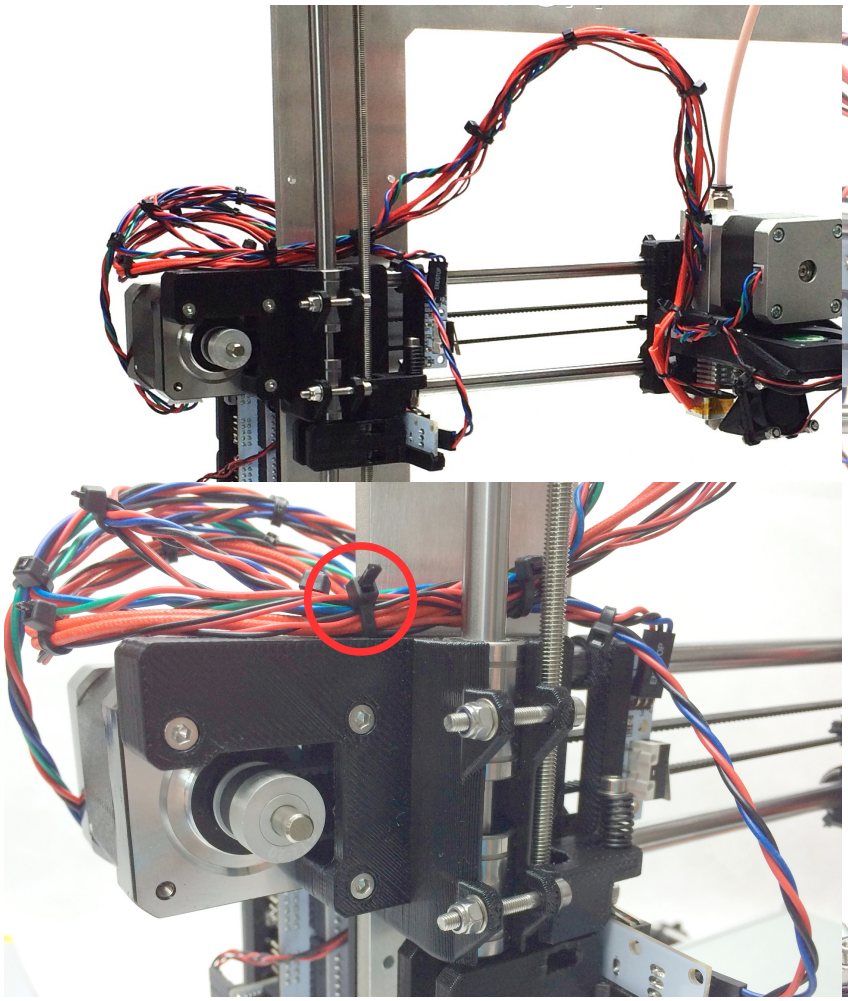
Instructions

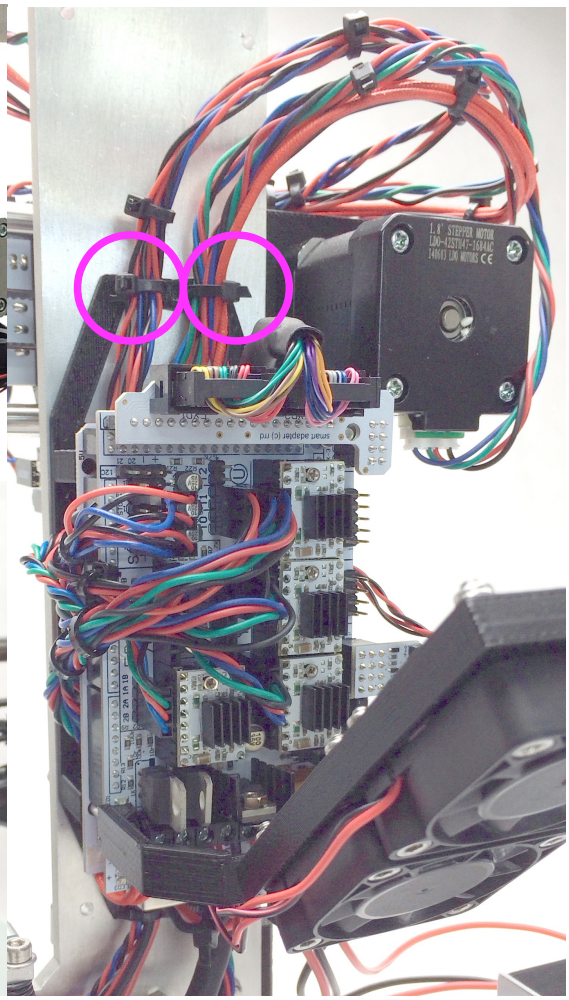
A) Cable tie the Heated-Bed Power & Thermistor Wires to the back of the Y-Axis-Bed (Red Circle)

B) Bring the two NEMA17-Stepper-Motor Wires around the back to the Threaded-8mm and Cable Tie them along with the Mechanical-Endstop & Heated-Bed Power & Thermistor Wires to the Threaded-8mm (Green Circle). Make sure there is enough slack on the Heated-Bed Power & Thermistor Wires for the forward and back motion of the Y-Axis.

C) Route all the wires mentioned in Step **B** under the Threaded-10mm and up to the bottom of the RAMPS-1.4. The Heated-Bed Power Wires can then be screwed into the D8 Terminals, the rest of the wires can be routed under the RAMPS-1.4 and brought back out on the left hand side and plugged into the positions indicated on the RAMPS 1.4 Wiring Diagram. Use Cable ties through the 2 anchor points on the bottom of the RAMPS-Holder to keep the wires in place (Purple Circles).

Wiring Part 2





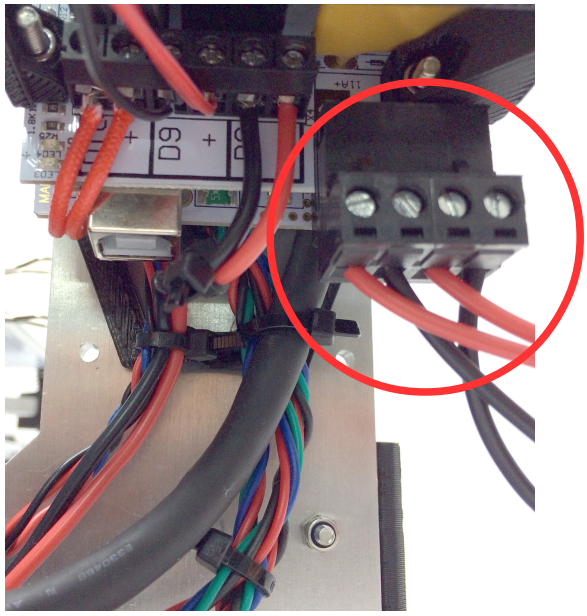
Instructions

A) Route the wires from the X-Carriage behind the Threaded & Smooth Rod on the left hand side so they meet with the X & Z endstop wires and sit on top of the X-Axis-Motor. All these wires can now be Cable Tied to the Anchor Point on the X-Axis-Motor (Red Circle), insuring there is enough slack for the left and right motion of the X-Carriage and for the Z-Axis Mechanical Endstop to move down roughly a centimetre. The wires going from the X-Axis-Carriage to the X-Axis-Motor can now be Cable Tied together to form a single loom.

B) The Wires in Step **A** & the X-Axis NEMA17-Stepper-Motor Wire can now be routed down and under RAMPS-1.4. The Heater Cartridge Wire's for the Hotend should be routed straight down so it comes out at the bottom and then screwed into the D10 terminals. The Extruder Fan & Hotend Fan Wires should be brought back out on the right hand side and plugged into the RAMPS Fan extender at the positions indicated on the RAMPS 1.4 Wiring Diagram. The rest should be should be brought back out on the left hand side and plugged into the positions indicated on the RAMPS 1.4 Wiring Diagram.

C) Use Cable ties through the 2 anchor points on the top of the RAMPS-Holder to keep the wires in place (Purple Circles), insure there is enough slack for the up and down motion of the Z-Axis.

Wiring Part 3

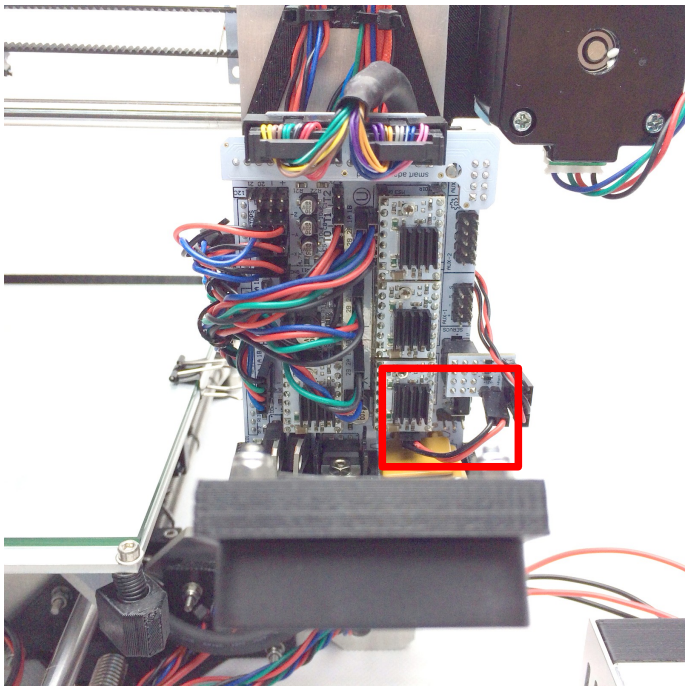


Instructions

A) Wire a Plug to the Power Supply as in the RAMPS 1.4 Wiring Diagram, use the provided Mains Cable. Route the wires through the Power Supply Cover before attaching them to the power supply.

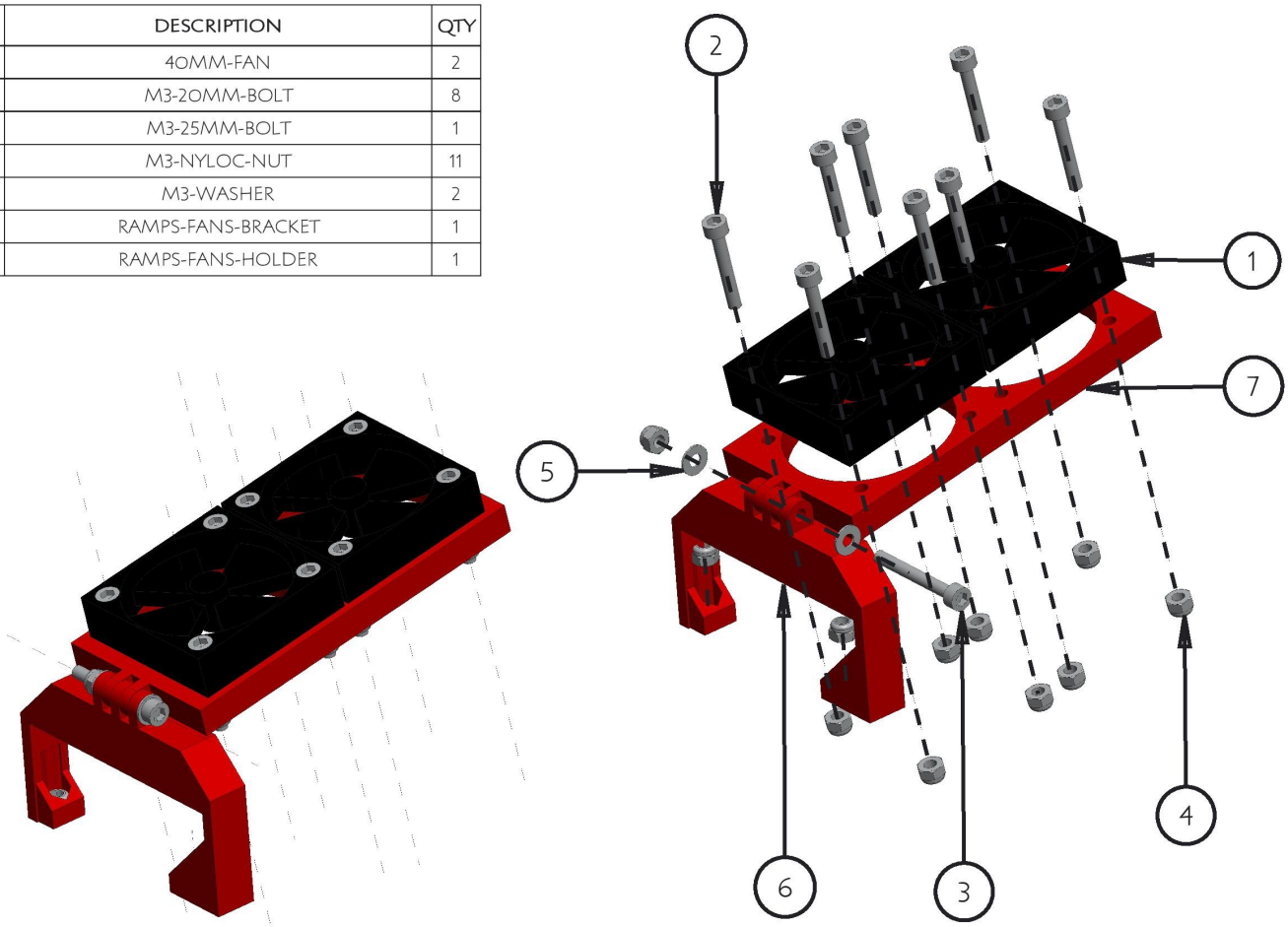
B) Connect the Power Supply to the RAMPS 1.4 (Red Circle) as in the RAMPS 1.4 Wiring Diagram. use the provided Red & Black Power Cable. Make sure to connect Positive To Positiv & Negative to Negative. Route the wires through the Power Supply Cover before attaching them to the power supply. Once complete the power supply cover can be clicked into place.

D) Use the small the 2 Pin wire which comes with the Fan Extender to connect 12V Power from the RAMPS 1.4 Board to the RAMPS Fan Extender as in the RAMPS 1.4 Wiring Diagram. See the Image Below



RAMPS Cooling Fans Assembly

ITEM NO	DESCRIPTION	QTY
1	40MM-FAN	2
2	M3-20MM-BOLT	8
3	M3-25MM-BOLT	1
4	M3-NYLOC-NUT	11
5	M3-WASHER	2
6	RAMPS-FANS-BRACKET	1
7	RAMPS-FANS-HOLDER	1



Instructions

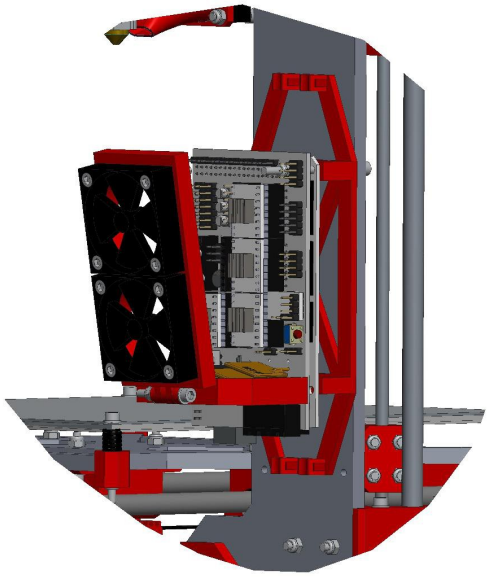
A) Attach 2 x 40mm-Fans (Fan Sticker Downwards) to the RAMPS-Fans-Holder using 8 x M3-20mm-Bolts & 8 x M3-Nyloc-Nuts. Insure the position where the leads attach to the 40mm-Fans is closest to the hinge.

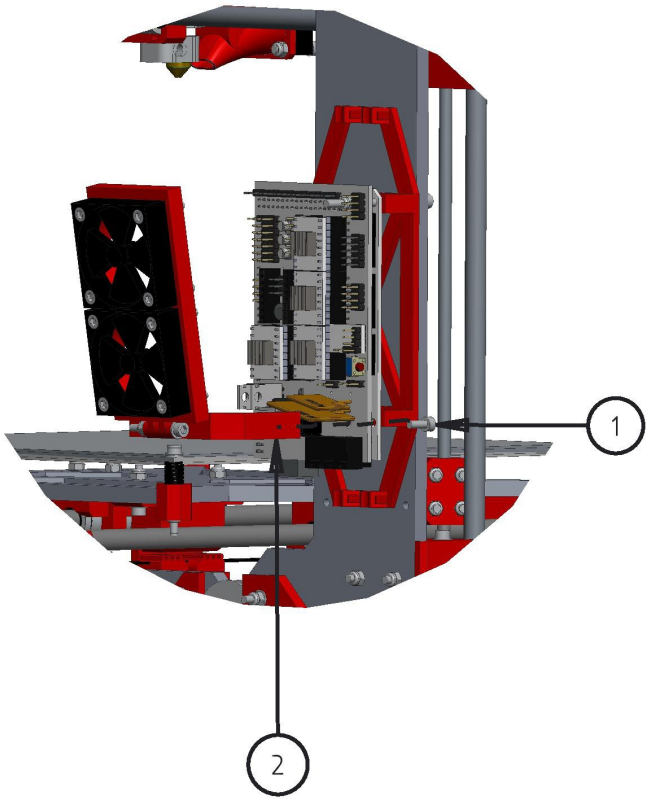
B)* Insert a M3-Nyloc into each of the two insets on the RAMPS-Fans-Bracket.

C) Mate the hinges on the RAMPS-Fans-Holder to the hinges on the RAMPS-Fans-Bracket, and secure them together using 1 x M3-25mm-Bolt, 1 x M3-Nyloc-Nut & 2 x M3-Washers.

RAMPS Cooling Fans Attachment

ITEM NO	DESCRIPTION	QTY
1	M3-8MM-BOLT	1
2	RAMPS-FANS	1





Instructions

A) Attach the left side of the RAMPS-Fans to the RAMPS-1.4 using the already inserted M3-50mm-Bolt in the bottom left corner of the RAMPS-1.4. Use a M3-8mm-Bolt through only the top board of the RAMPS-1.4 to secure the the right side of the RAMPS-Fans.

B) Before fully tightening these Bolts attach both 40mm-Fans to the D9 Terminals as in the RAMPS 1.4 Wiring Diagram.

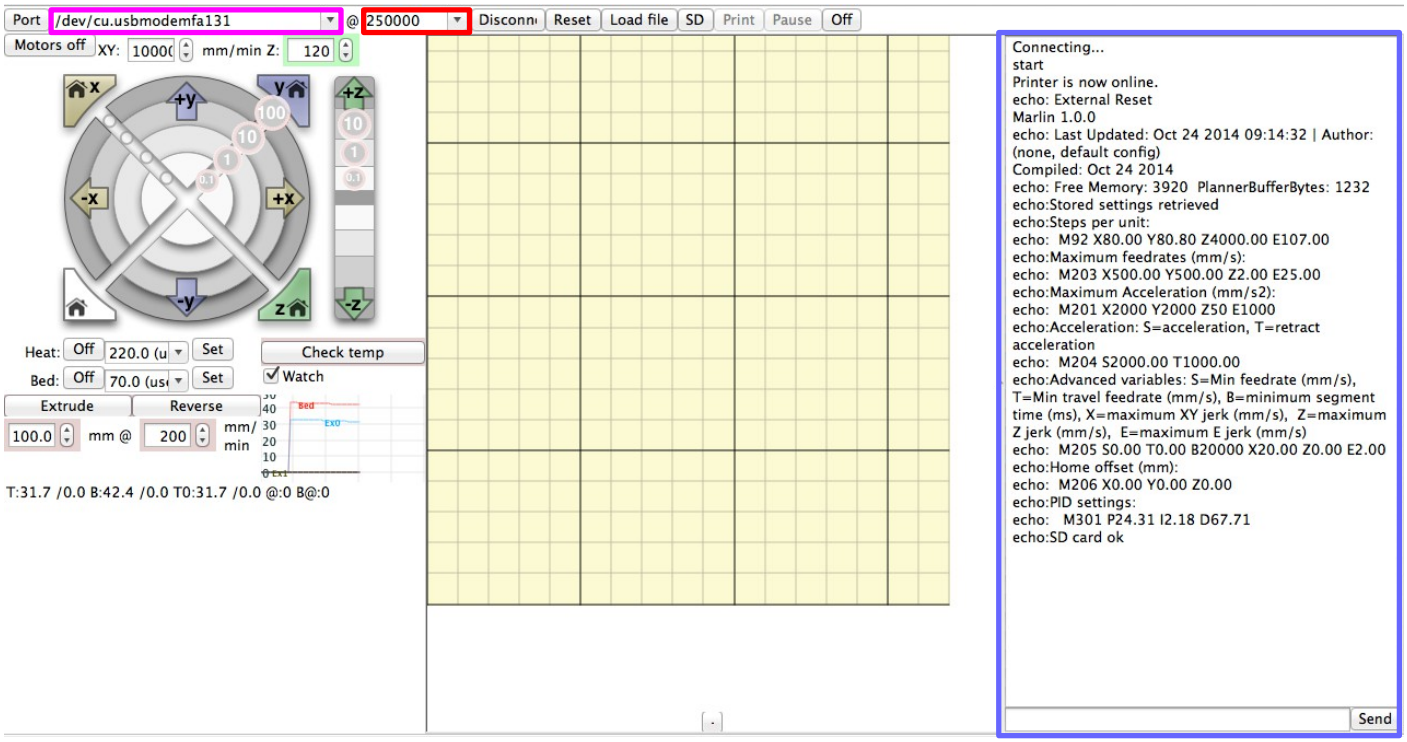
C) The M3-50mm-Bolt & M3-8mm-Bolt can now be tightened into the M3-Nyloc-Nuts on the RAMPS-Fans-Bracket.

Testing & Commissioning Part 1

When first testing your Prusa it is best to do so via a Computer or Laptop rather than the LCD Controller, the software used in the these instructions is PrintRun (Pronterface) which can be downloaded from:

http://koti.kapsi.fi/~kliment/printrun/

Once Extracted/Installed, launch PrintRun, it should look similar to the image below.



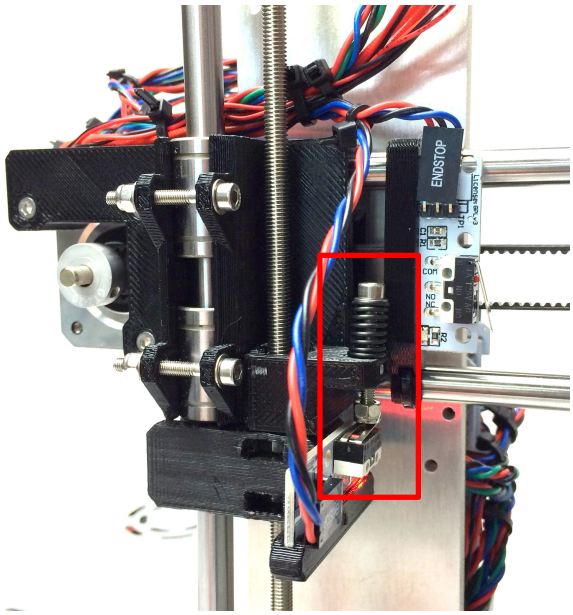
Now plug the printer into a power socket and power up, and connect the printer to your Computer/Laptop via USB.

At this point if you are using a windows computer download install the driver named “RRD RUMBA TAURINO DriverSetup.zip” from: http://reprap.org/wiki/Taurino

Next set the value in the Red Square above to 250000 from the drop down list.

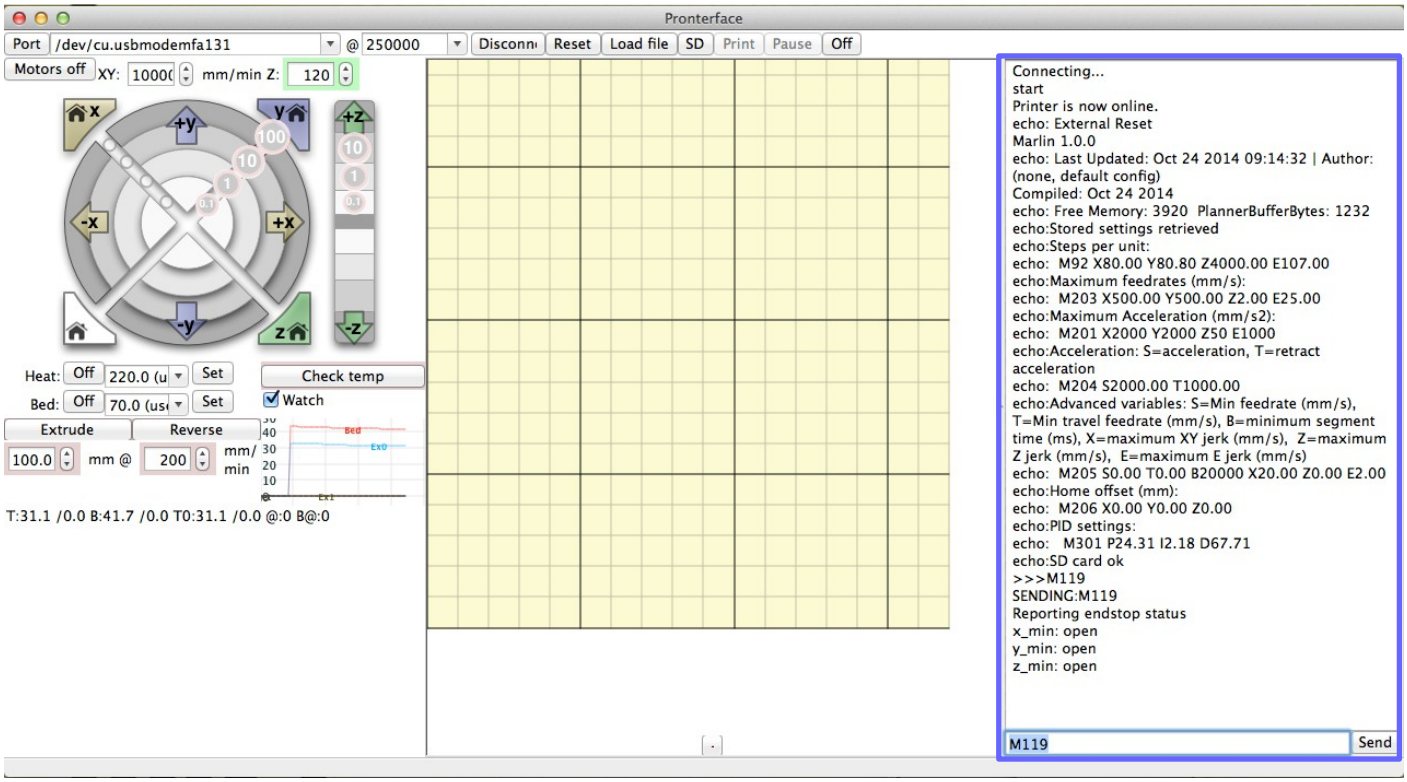
The drop down list in the Purple Square is where you select the USB Port which the Printer is connected to. Once you have selected the Port press “Connect”, if you have selected the correct port writing, similar to that in the Blue Square, should appear in the G-Code Viewer on the right hand sid. If you have selected the wrong port it will say “No Such File or Directory”, try connecting again but with a different port.

Testing & Commissioning Part 2



The Z-Axis Mechanical-Endstop works the opposite way round to the X & Y Mechanical- Endstops, when in normal motion the Red LED on the Mechanical-Endstop should be lit. When the Z-Axis travels down the Hotend will rest on the Print Bed preventing it from going down any further, however the Z-Axis-Nuttrap Left & Right will continue going down, this will then release the Z-Axis-Endstop and stop the printer.

Therefore Turn the M3-25mm-Bolt (Red Square) Clockwise to bring it down until the Red LED on the Mechanical-Endstop illuminates, once activated continue turning the M3-25mm-Bolt Clockwise until the Lever on Mechanical-Endstop is slightly angled off horizontal as in the picture to the left.



To test the Mechanical-Endstops are working correctly, in the G-Code Viewer (Green-Square) in PrintRun enter the Command M119, this command returns the X,Y & Z Mechanical-Endstop Status, in normal operation it should return x_min:open y_min:open z_min:open. Use your finger to trigger the X-Axis Mechanical-Endstop and re-enter M119, it should now read x_min:TRIGGERED y_min:open z_min:open.

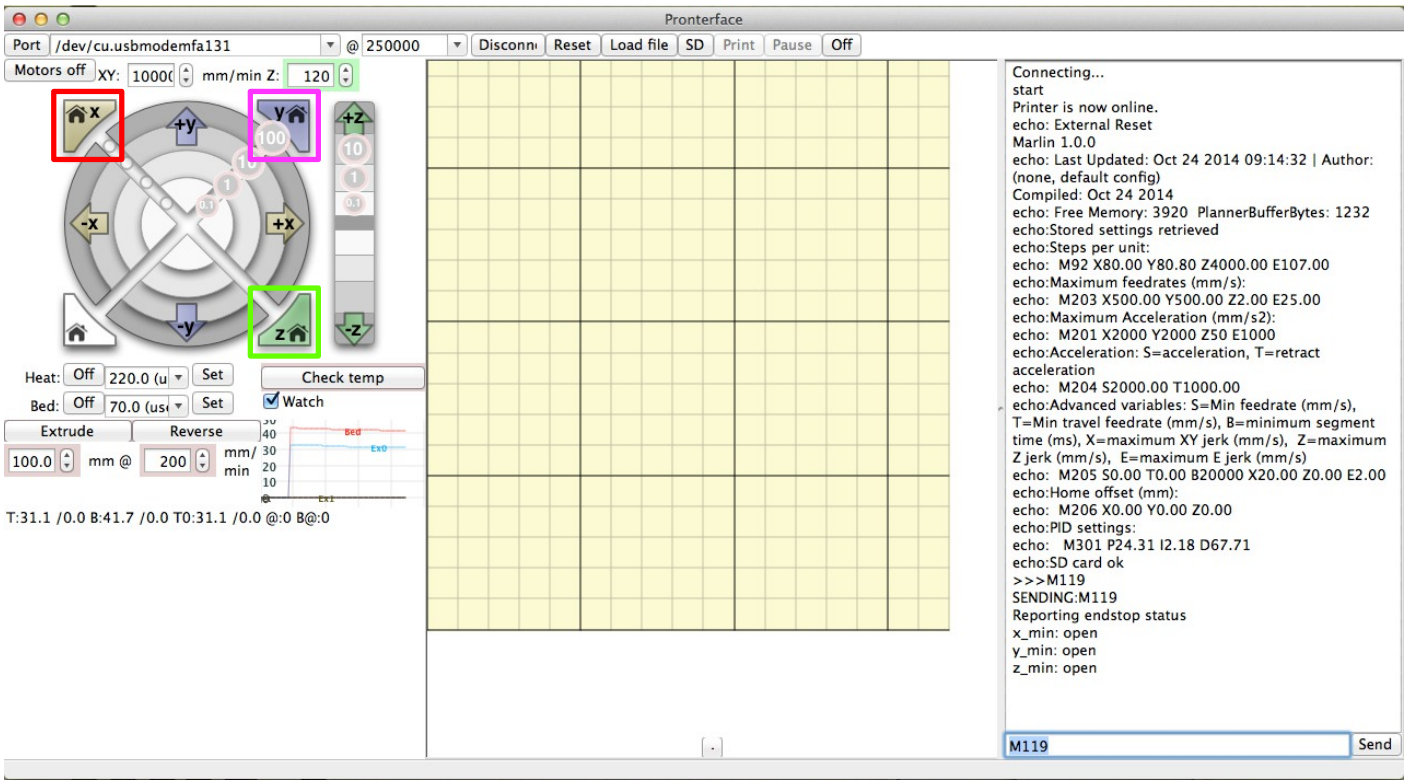
Release the X-Axis Mechanical-Endstop and do the same with the Y-Axis Mechanical-Endstop, it should now read x_min:open y_min:TRIGGERED z_min:open.

Release the Y-Axis Mechanical-Endstop and lift the Z-Axis by hand so the Red LED on the Z-Axis Mechanical-Endstop goes off, re-enter M119, it should now read x_min:open y_min:open z_min:TRIGGERED.

If M119 is returning something different to what is stated here check that Mechanical-Endstops are plugged into the correct positions as shown on the RAMPS 1.4 Wiring Diagram.

Testing & Commissioning Part 3

Before starting the next step attach the Borosilicate Glass Plate to the Heated-Bed using a bulldog clip down the left and right side. The Borosilicate Glass Plate should be orientated so the longest side is going from left to right and it should sit in-between the back and front bolt heads.



If the printer does anything other than what is described in the steps below be ready to press stop button (The X) on the front of LCD Screen Controller, if you do have to do this you will have to disconnect and re-connect the Printer in PrintRun. If any of the Motors are turning the wrong way, turn off the printer and flip the motor connection on the RAMPS 1.4 Board.

When the printer Home's it should move the Hotend Down to the Front-Left Corner of Borosilicate Glass Plate. To Home the X-Axis press the button in the Red Square above, the X-Carriage should move to the left and stop at the Mechanical Endstop.

Next home the Y-Axis by pressing the button in the Purple Square above, the Print Bed should move back and stop at the Mechanical Endstop.

Next home the Z-Axis by pressing the button in the Green Square above, the Z-Axis should now move downwards towards the Print Bed, The Nozzle on the Hotend should hit the front Left Corner of the Borosilicate Glass Plate, if it looks like it is going to miss the Borosilicate Glass Plate stop the printer and adjust the X & Y-Axis Endstops so it does.

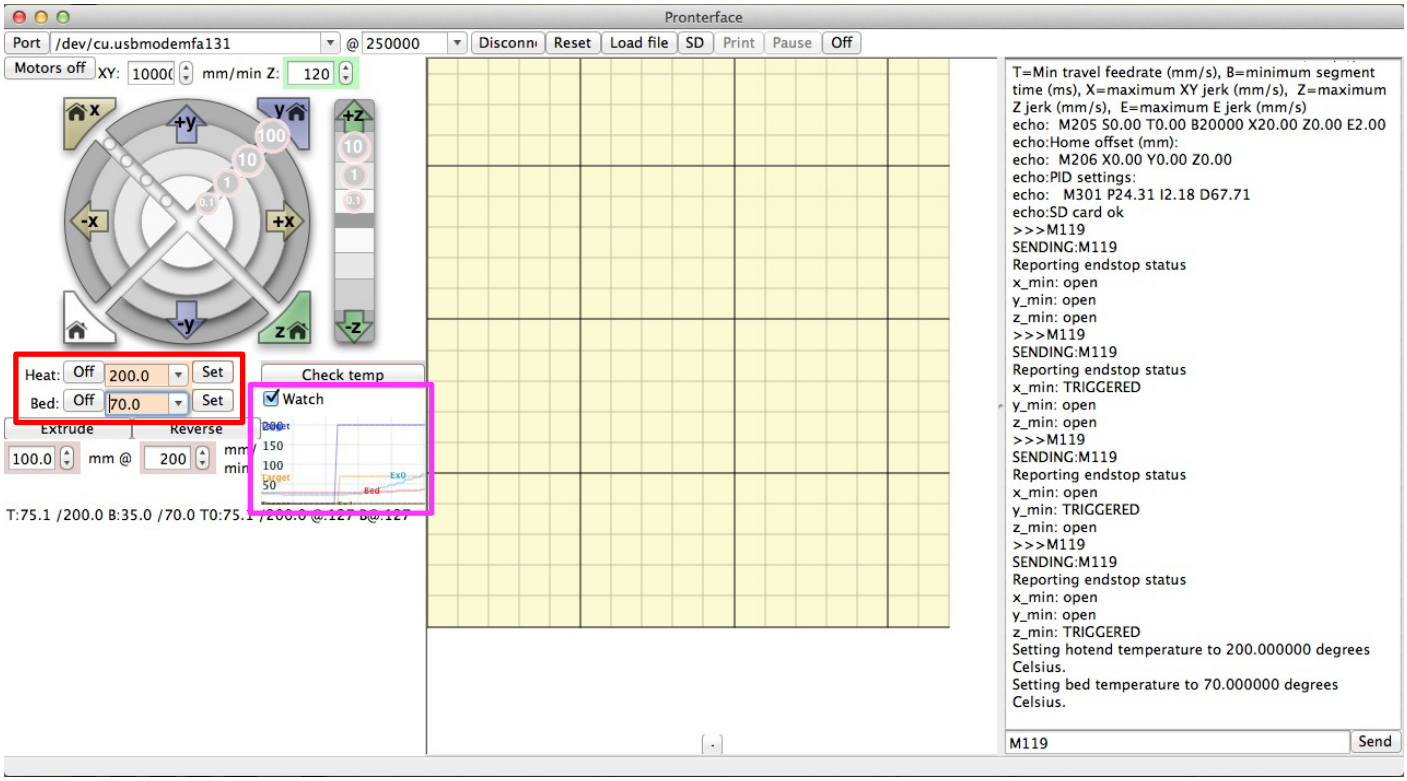
To check the Auto Bed Levelling works, Home the Printer and enter the Command G29 into the G-Code Viewer, the Printer will now take measurements of the Print Bed at 9 Positions to Auto Bed Level.

Testing & Commissioning Part 4

To check the 2 x RAMPS Fans work enter M106 S255 into the G-Code Viewer (S255 is the power of the Fan and should range from 0-255), the 2 x RAMPS Fans should now work with the air flowing towards the electronics, if they are blowing the wrong way they need to be turned around.

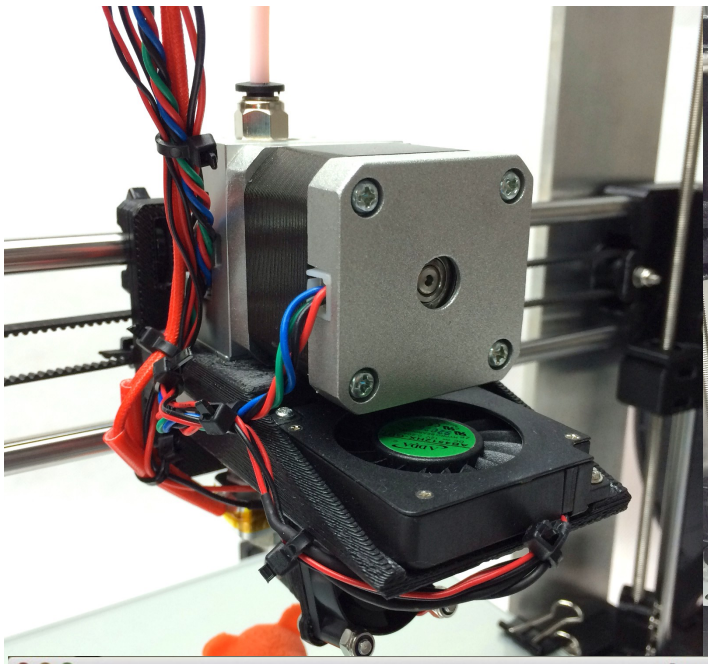
To check the Horizontal Extruder Fan works enter M42 P4 S255, the fan should now come on, if the 25mm Hotend Fan comes instead swap the connectors on the RAMPS Fan Extender.

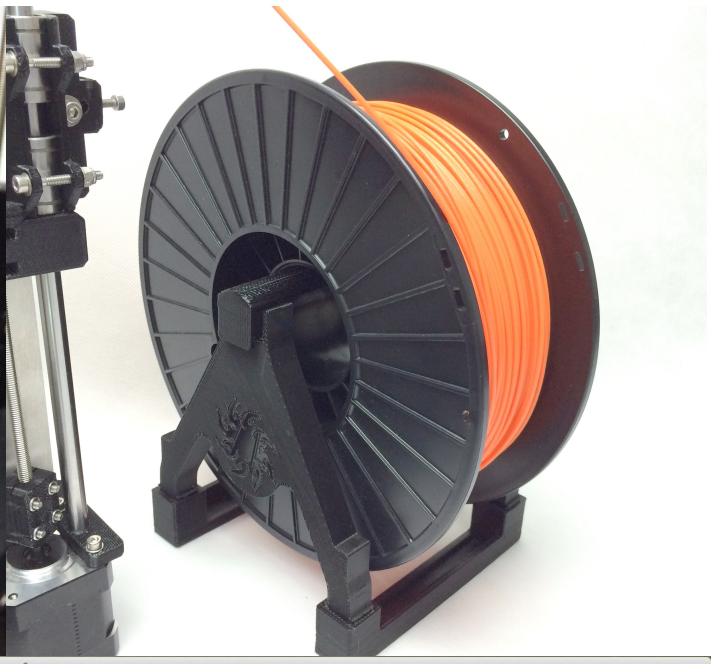
To check the Hotend Fan works enter M42 P5 S255, the fan should now come on.

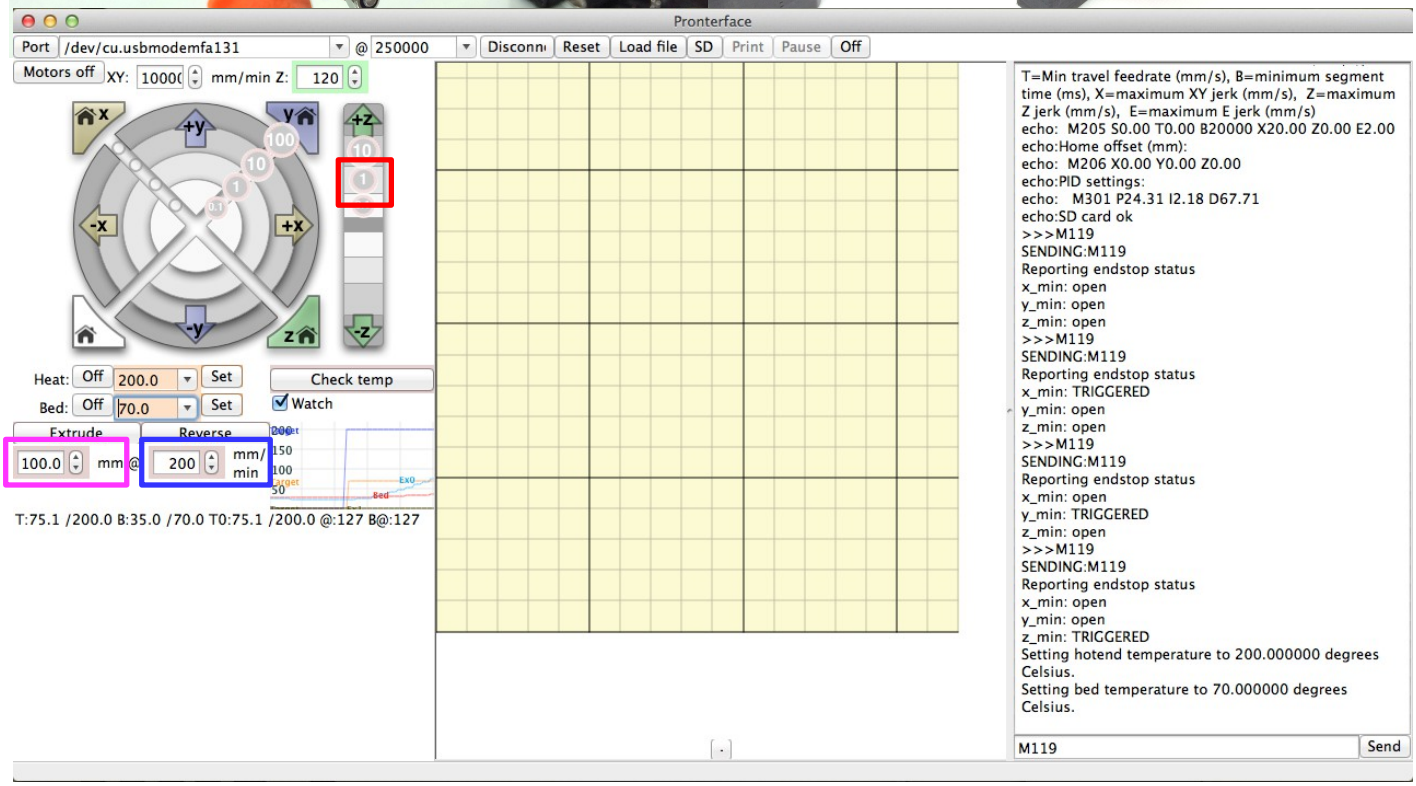


Check the Hotend and Heated Bed work by entering appropriate temperatures into value boxes shown by the Red Square above, then press “Set”. Make sure the Check Box “Watch” is ticked (Purple Square), the temperatures on the graph below should begin to rise.

Testing & Commissioning Part 5



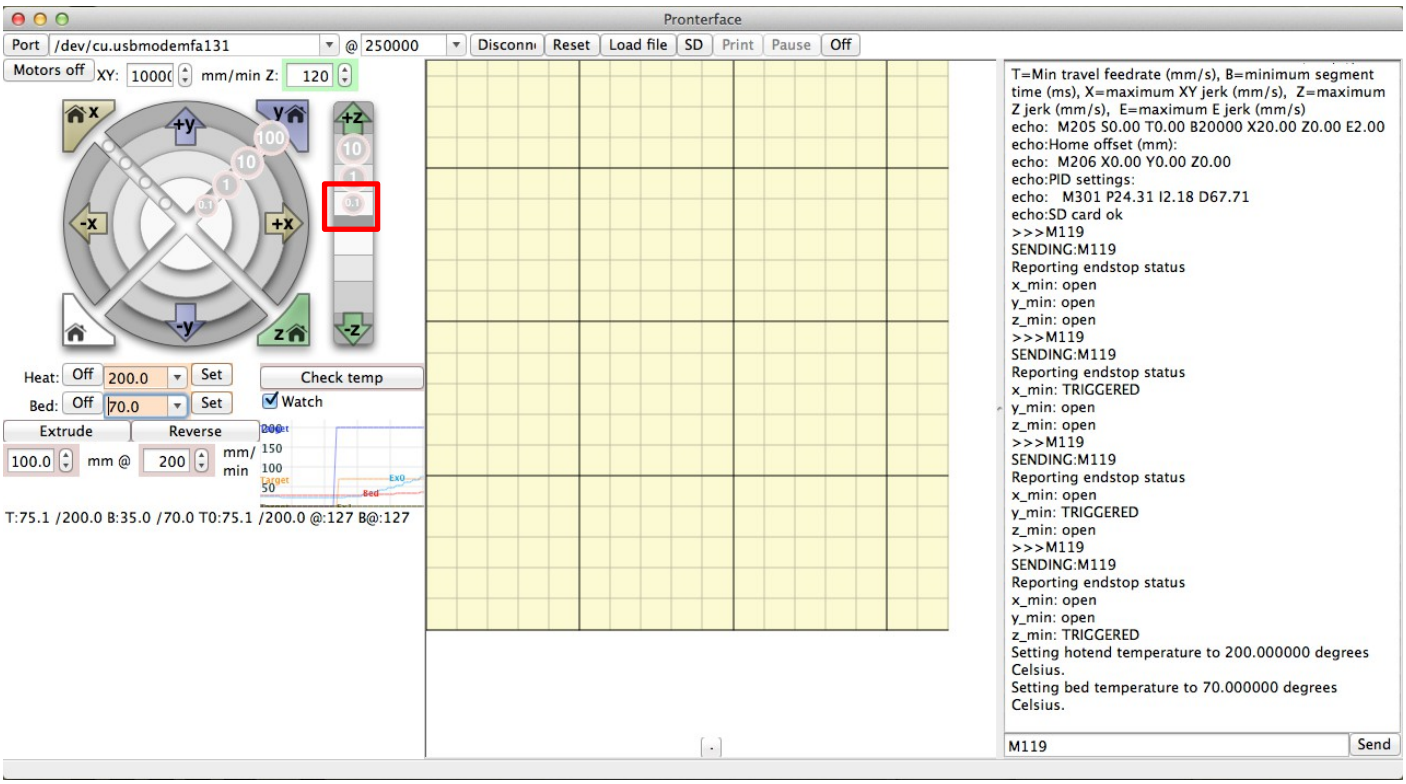




To extrude some ABS Filament set the Hotend Temperature to 230°C, the Heated Bed can now be turned off. Place the Filament on the Spool Holder as shown in the right hand image. Cut some 5cm lengths of filament off the spool, these will be used later to make ABS Juice. Insert the PTFE Tubing into the Pneumatic Coupling and feed the filament through the PTFE Tubing until it comes through Pneumatic Coupling on the other end. The extruder tension can be set with the two horizontal screws on the right hand Side of the extruder, these should be set so they are both flush with the metal tensioner.

Use PrintRun to move the Hotend up so it is at least 5cm off the Print Bed (Red Square) and turn all fans on, set the Extrusion Length to 200mm (Purple Square) & Feed Rate to 200mm/min (Blue Square). Once the Hotend has reached 230°C press the “Extrude” Button and feed the end of filament into the centre of the hobbed pulley inside the extruder. As this is a new Hotend it may take a while for the filament to begin coming out of the nozzle, once it is coming out of the nozzle screw the Pneumatic Coupling into the extruder. If the extruder starts clicking this means filament has missed the hole to the Hotend, stop the printer and push in the extruder tensioner on the right side to release the filament and pull it out, retry the extrusion again. If the extruder is turning the wrong way turn off the printer and flip the extruder wire on the RAMPS 1.4 Board.

Setting Extruder/Hotend Offset



When the printer homes the Z-Axis it release the lever on the Mechanical Endstop, however when it release this lever the Nozzle has already been touching the Build Plate for some distance, therefore a firmware offset is needed to compensate for this distance.

To Calculate this Offest insure the nozzle is clear of any plastic and Home all Axes on the printer. With a piece of paper at hand raise the Z-Axis in 0.1mm steps (Red Square) until a piece of paper can fit in between the nozzle and glass plate, the nozzle should just be touching the paper so it grabs it slightly if you try to pull it out, lower the Z-Axis if needed. Keep track of how many 0.1mm steps were needed, and write this number down (if you had to lower the Z-Axis at all this removes a 0.1mm Step).

To navigate the LCD Controller use the Rotary Encoder which is to the right hand of the screen, twist to navigate up and down the menus and click to select menus. When on the Info Screen press the Rotary Encoder to get to the main menu.

Navigate to Main Menu > Control > Motion > Z Offset

Change this value from 0 to the value found above, for instance if it took 20 x 0.1mm steps, 2.0 should be entered, press the Rotary encoder once to save this value and return to the Motion Menu.

To go back to the Control menu scroll to the top of the motion menu and click “Control”, now go down to and click “Store Memory”, this will save the Z Offest to the printer so it will not be lost when the printer is switched off.

Most of the printer settings can be changed under the control section of the LCD Controller, always Store the settings to memory if you don't want to lose them when turning the printer off.

A full Menu Tree for the LCD Controller can be found in Appendix E, not all the options on this tree will be shown, for instance “Pause Print” will only show if the printer is printing.

Printing - Part 1

To Print a model it first needs to be in .stl file format, then it is sliced and converted into G-Code which can then be put on to the SD Card and printed from the LCD Controller.

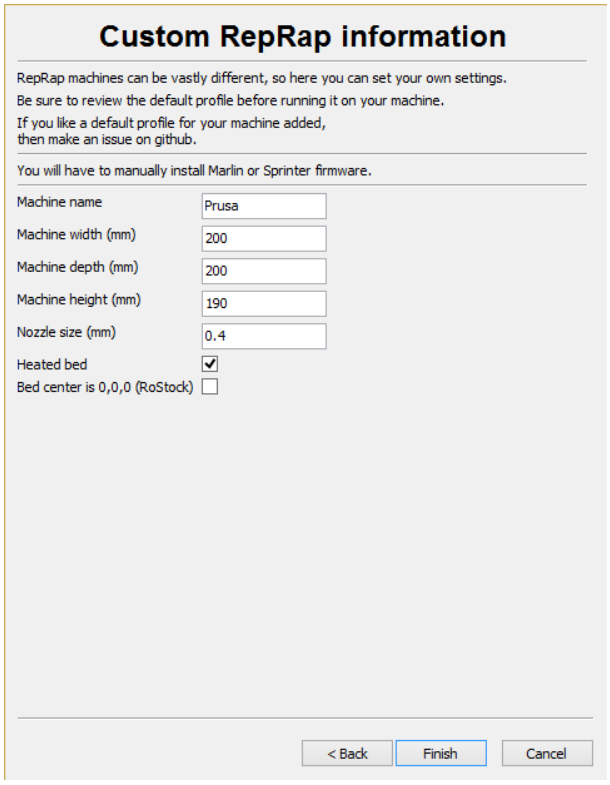
For a Slicer we recommended using Cura from Ultimaker, Cura can be downloaded from:

http://software.ultimaker.com/

Our instruction manual will cover the basic use of Cura in conjunction with our Printer, however it is recommended that you read the Cura instruction manual which can be downloaded from:

https://www.ultimaker.com/pages/support/manuals

Once installed. open Cura, the “First time run wizard” will show, select your language and click next. On the next screen select “Other (Ex: RepRap, Makerbot, Witbox)” and click next. On the next screen select “Custom”



On the next screen enter the information shown to the left and click finish. Cura will load with a model already on the print area, we recommend to delete this model and load something more simple to start off with. The model can be deleted by clicking on it with the mouse pointer and pressing the delete key on the keyboard.

A good example of a simple model to start off with is:

http://www.thingiverse.com/thing:27053

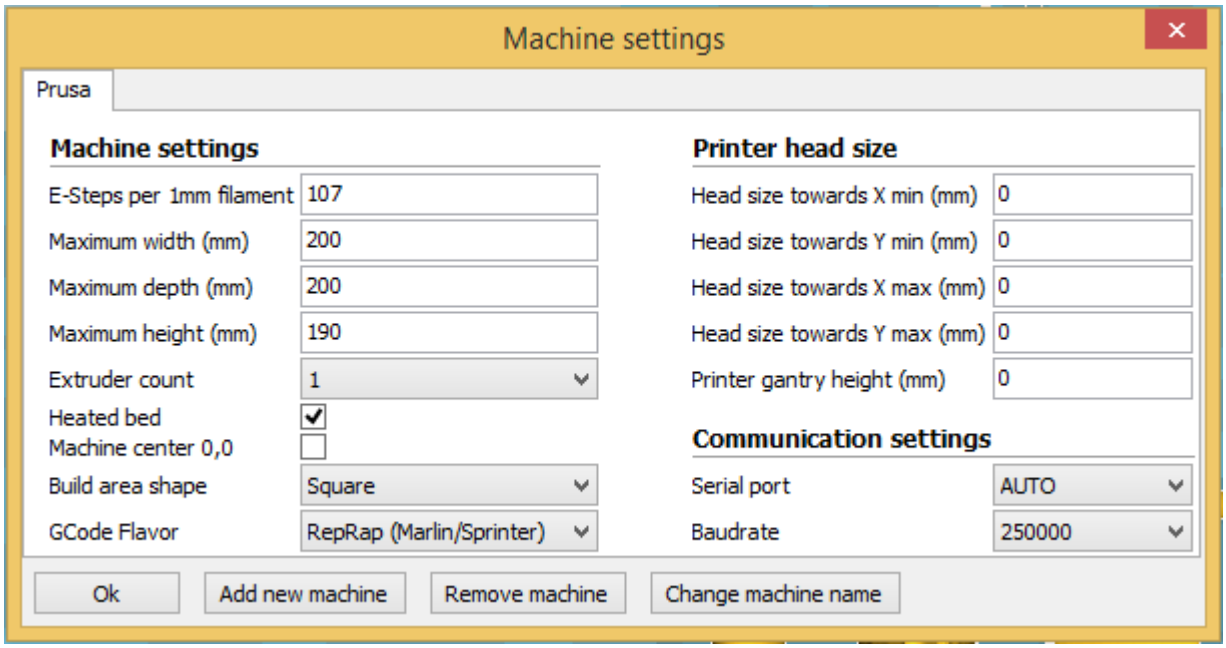
Once you have downloaded this model or another of your choice, in Cura press the button:

And navigate to where the model is saved and press open. The model should now been seen in the centre of the print area.

The model can be manipulated by using the buttons:

Initially this model will take a long time to print, scale it down by half by pressing the middle button and entering 0.5 next to “Scale X”

Printing - Part 2



In Cura navigate to Machine > Machine Settings and enter the values above (Some will have already been set from the first time run wizard).

We have created a pre-configured profile for Cura which can be downloaded from the bottom of our product page:

http://ooznest.co.uk/3D-Printer-Kits/Prusa-i3-Kit

Load this Profile into Cura by going to File > Open Profile and select our profile you just downloaded. All the settings in Cura will now have been set to values which will work with our Printer and the ABS Filament supplied.

Cura has a lot of settings which can be altered so this instruction manual will only go over the main ones.

Basic

Layer Height: The recommended range for this is 0.1-0.3mm.

Shell thickness: Should always be a multiple of the nozzle orifice size which is 0.4mm.

Bottom/Top Thickness: Should always be a multiple of the Layer Height.

Print Speed: To begin with start off slow and gradually build up the speed as you gain experience, 45mm/s is Considered Slow, 65mm/s Normal, & 85mm/s Fast, increasing the speed will decrease quality. Cura will provide suitable Max Speed warnings if you try to go to fast.

Bed Temperature: For ABS always keep this at 100°C, if the print bed is taking to long to reach this temperature cut a piece of cardboard to the same size and place this over the print bed when heating to speed up the process, remove it when the printer starts operating.

Support Type: This decides when support will be built to hold up over hangs

Platform Adhesion Type: For ABS always have either Brim or Raft.

Diameter: This is the diameter of the filament if you have a micro meter you can accurately measure the diameter and enter it here, otherwise leave it at 1.75.

Printing - Part 3

Advanced

Nozzle Orifice: Should always be kept at 0.4mm.

Bottom Layer Speed: Keep this really slow to increase adhesion to the print bed.

Outer Shell Speed: Reducing this will increase the exterior quality of the prints.

Start/End-GCode

The main thing to note here is the lines:

;M42 P5 S255 ;Disable For ABS
M42 P4 S255

These two lines control the Hotend Fan (Top Line) and Horizontal Extruder Fan (Bottom Line). Always have the extruder fan activated, however when printing with ABS Disable the Hotend fan by adding a ";" at the beginning, this is disabled because when ABS Cools it shrinks therefore while printing we do not want to cool it. However when printing with PLA this fan should be enabled.

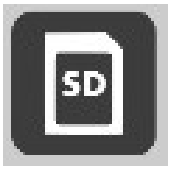
Under Expert > Open Expert Settings, there is a lot more settings which change various aspects, a couple to note are:

Line Spacing: When print a raft with ABS this should be set the same as Base Line Width to increase adhesion.

Base Thickness: The lower this value the better adhesion to the bed, 0.1 is recommended.

Airgap: Increasing this value will help with the removal of the raft

For the first print keep the settings at our profile values, once happy plug the SD Card into your computer. Cura will recognise the SD Card and show the button:



Press this button to export the G-Code to the SD Card. For a G-Code file to be read by the LCD Controller It's file name has to be a maximum of 8 Characters with the file extension as .gco . For example if you have the Octopus as your first model it will be saved onto the SD Card as CutoOcto.gcode therefore navigate to the SD Card on your computer and rename it to CuteOcto.gco. A sample CuteOcto.gco file can be downloaded from the product page on our website

The SD Card can now be plugged into the SD Card Reader on the left hand side of the LCD Controller.

Before printing, the Glass Print Bed needs preparing, for all materials it is recommended to put a layer of Kapton Tape on the Glass, make sure to pop and flatten any air bubbles under the tape. With ABS this still may not be enough to stop the part from warping, what works extremely well is spreading ABS Juice on top of the Kapton Tape. To make ABS Juice use the lengths of ABS cut off earlier and put them inside the Acetone bottle and let them dissolve. Once dissolved use a paper towel to spread some of the ABS Juice onto the Kapton Tape.

Printing - Part 4

With the Print Bed prepared you are now ready to start your first print. Before starting the print it is good practise to reset the printer, this is done by pressing the button below the Fan Extender on the right hand side of the RAMPS 1.4 Board (It is the Blue/Red button in the lower right corner of the RAMPS Board on the RAMPS 1.4 Wiring Diagram). Once reset, on the LCD Controller navigate to Main Menu > Print From SD and select the G-Code file previously saved on there. The Printer will now begin to heat the Hotend and the Print Bed, once heated the printer will first Home and then Auto Bed level before beginning the print. While the printer is Homing and Auto Bed Levelling you should keep the nozzle clear of plastic which has oozed out because this will effect the readings.

It is a good idea to always watch the first layer to insure the print is adhering to the Print Bed, if the print is not adhering you should stop and restart the print, but reduce the calculated Z Offest in steps of 0.1mm until it adheres. If the extruder makes a clicking sound during the first layer this is because the nozzle is to close to the Print Bed, therefore you should increase the Z Offset.

Once the print has completed let the Print Bed cool and use a thin scraper to peel it off the Print Bed.

The instructions for the construction and operation of the printer are now complete, we wish you happy printing!

Maintenance & Other Notes

Over time Nut's & Bolts on the printer will come loose due to vibrations, therefore it is recommended that you regularly re-tighten everything.

Printing with PLA using an All Metal Hotend is more tricky than using ABS, when printing with PLA have all the fans on, start off slow and reduce retractions. Furthermore the PLA Filament you need to use has to have a smooth outside surface to reduce friction, the PLA Filament we sell has a slightly rough outer surface which makes it harder to get working correctly. Some good sources of PLA Filament:

http://www.faberdashery.co.uk/
http://colorfabb.com/

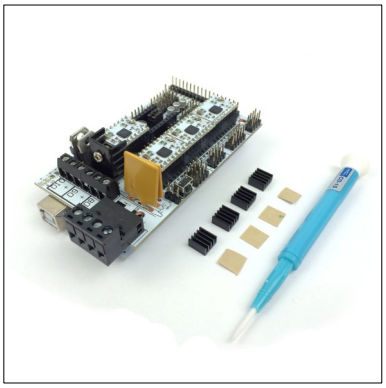
Some useful sources for information about 3D Printing:

RepRap Forum: http://forums.reprap.org/
RepRap Wiki: http://reprap.org/
RepRap IRC: http://reprap.org/wiki/IRC
3D Print Board: http://3dprintboard.com/

Appendix A – Parts List

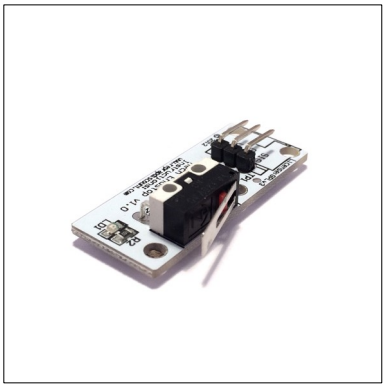
Electronic Parts

1 x Taurino Classic (Bottom)
1 x RAMPS Shield (Top)
4 x A4988 Stepper Drivers
4 x Black Heatsinks
4 x Aluminium Stickers
1 x Ceramic Screw Driver



1 x RAMPS Fan Extender
2 x 12V DC 40mm Fans
1 x 12V 2Pin Wire

3 x Mechanical Endstop's



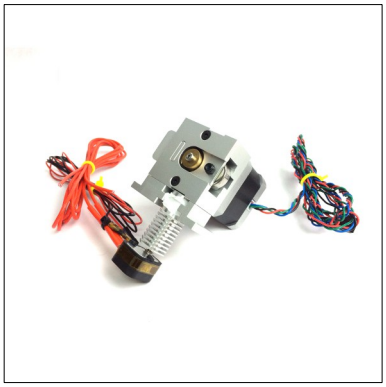
4 x NEMA17
Stepper Motors

1 x 12V 360W Power Supply

1 x Assembled LCD
Controller with wires.
1 x SD Card

1 x MK3A Heated Bed with
Power wires & Thermistor
Attached.

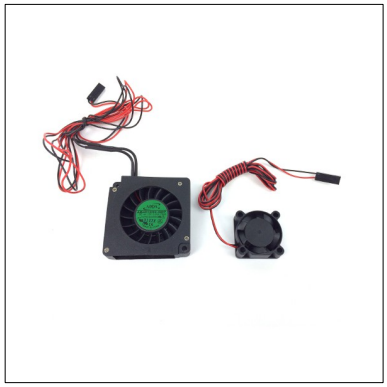
1 x Bulldog Lite with
Hexagon hotend.



Appendix A – Parts List

2 x 4 Pin Motor Wires
3 x 3 Pin End stop Wires
2 x 0.5m Black Power Wire
2 x 0.5m Red Power Wire

1 x Extruder Fan
1 x Hotend Fan

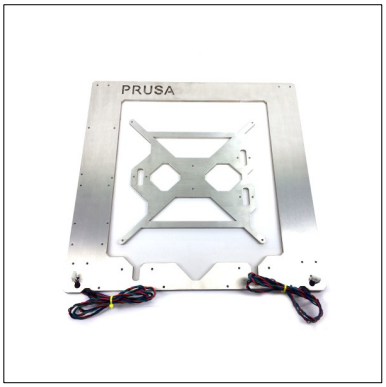


1 x USB Cable

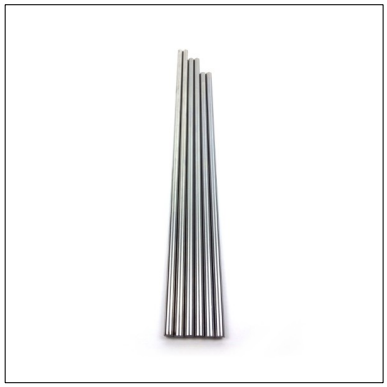
1 x 3A Plug
1 x 2m Mains Cable

Mechanical Parts

1 x Z-Axis-Frame with
2 x Motor wires
1 x Y-Axis-Bed-Plate



2 x Smooth-Rod-320mm
2 x Smooth-Rod-350mm
2 x Smooth-Rod-370mm



2 x Threaded-Rod-5mm (300mm)
4 x Threaded-Rod-8mm (205mm)
2 x Threaded-Rod-10mm (380mm)

2 x GT2-Pulley with Grub Screws

Appendix A – Parts List

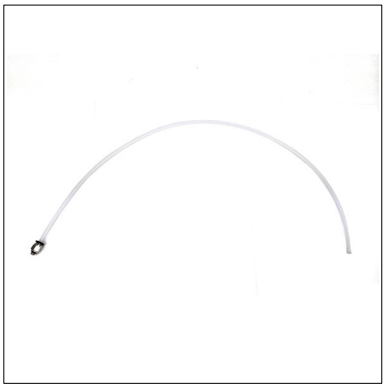
2 x 1m GT2-Belt

12 x LM8UU-Bearings
(4 Labelled Z-Axis-LM8UU)

4 x 623zz-Flanged-Bearings
2 x 625zz-Bearings

5 x Compression-Spring

1 x PTFE Tubing
1 x Pneumatic Coupling



Nuts & Bolts

15 x M3-Hex-Nut
1 x M4-Hex-Nut
22 x M8-Hex-Nut
12x M10-Hex-Nut

60 x M3-Washer
2 x M4-Washer
22 x M8-Washer
8 x M10-Washer
4 x M10-Penny-Washer

Appendix A – Parts List

75 x M3-Nyloc-Nut
1 x M4-Nyloc-Nut

3 x M3-8mm-Bolt
20 x M3-12mm-Bolt
15 x M3-16mm-Bolt
15 x M3-18mm-Bolt
20 x M3-20mm-Bolt
20 x M3-25mm-Bolt
15 x M3-30mm-Bolt
2 x M3-50mm-Bolt
1 x M4-20mm-Bolt
1 x M4-25mm-Bolt

Extras

1 x Borosilicate Build Plate

1 x 10mm Kapton Tape
1 x 50mm Kapton Tape

2 x Bulldog Clips

50 x Cable Ties

1 x Allen Key Set

1 x ABS 1.75mm Filament
Of Chosen Colour.

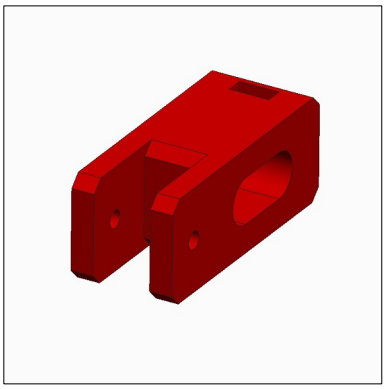
Appendix A – Parts List

1 x 250ml Acetone

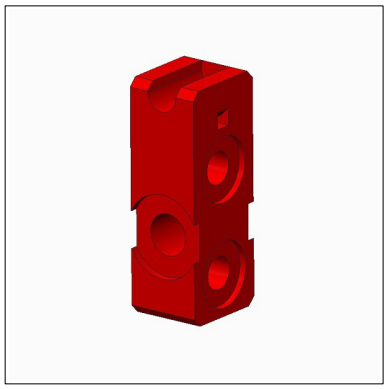
1 x Extruder Cleaning Kit

Plastic Parts (In Order of Use)

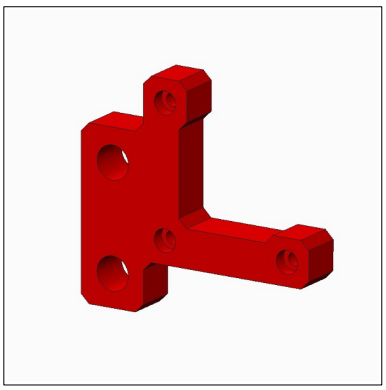
1 x Y-Axis-Idler
1 x Inserted M4-Hex-Nut



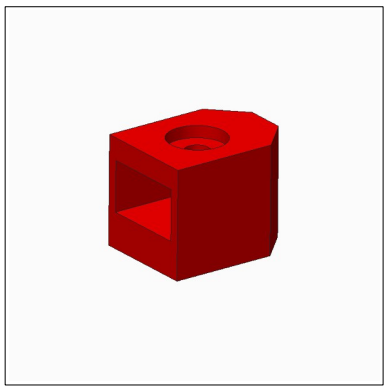
4 x Y-Axis-Corner



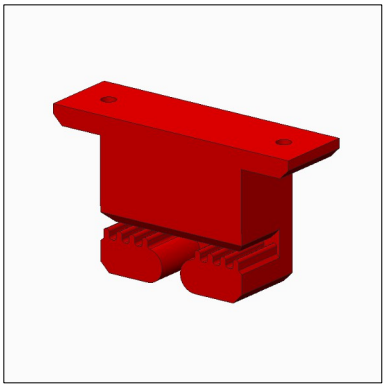
1 x Y-Axis-Motor



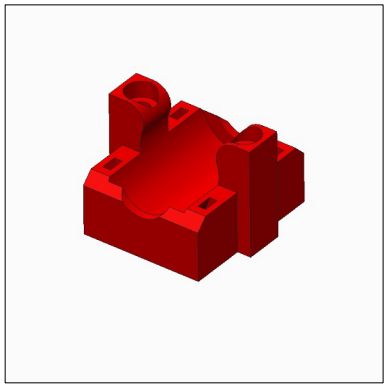
4 x Heated-Bed-Spring-Trap
4 x Inserted M3-Nyloc-Nut



1 x Y-Axis-Belt-Holder

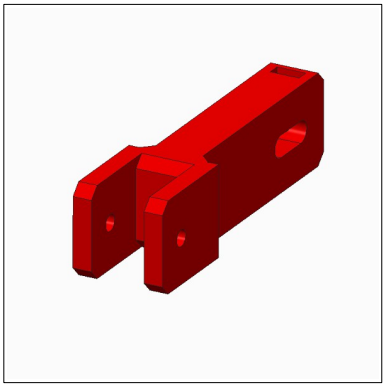


3 x Y-Axis-Bearing-Holder

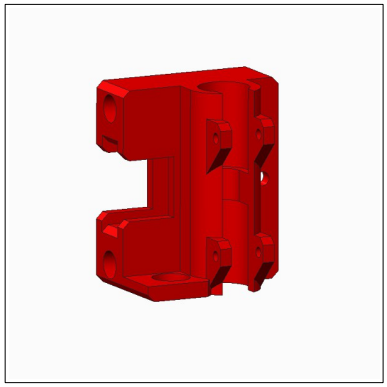


Appendix A – Parts List

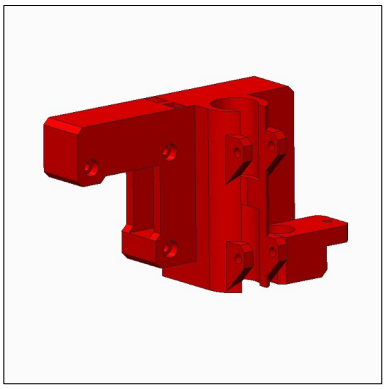
1 x X-Axis-Tensioner
1 x Inserted M3-Hex-Nut



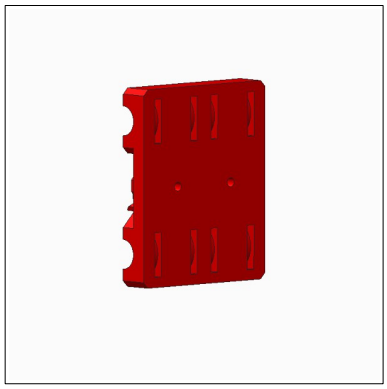
1 x X-Axis-Idler



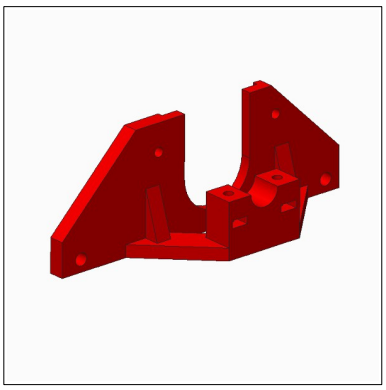
1 x X-Axis-Motor
1 x Inserted M3-Hex-Nut



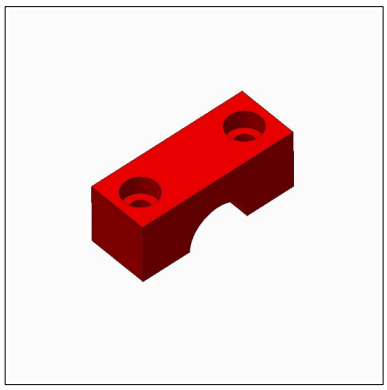
1 x X-Axis-Carriage
2 x Inserted M3-Nyloc-Nut



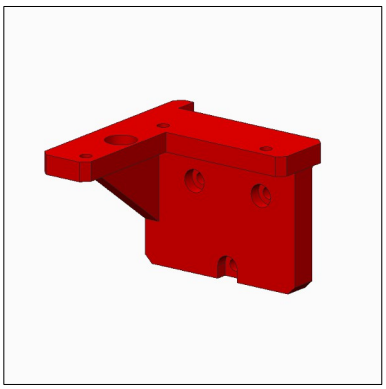
4 x Z-Axis-Framebrace
8 x Inserted M3-Hex-Nut



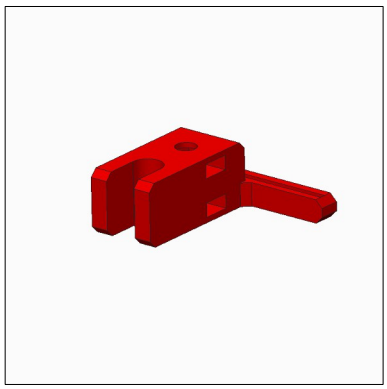
4 x Z-Axis-Framebrace-Top



1 x Z-Axis-Motor-Left
1 x Z-Axis-Motor-Right

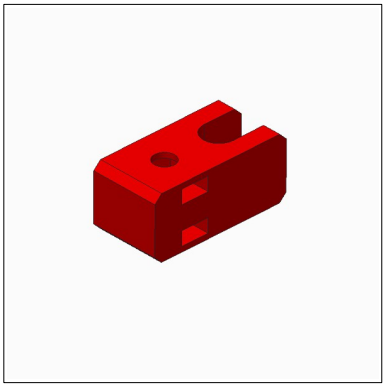


1 x Z-Axis-Nuttrap-Left
2 x Inserted Brass
M3-Hex-Nut

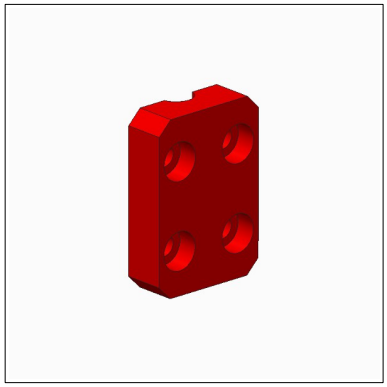


Appendix A – Parts List

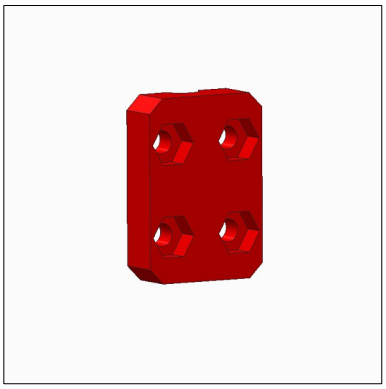
1 x Z-Axis-Nuttrap-Right
2 x Inserted Brass M3-Hex-Nut



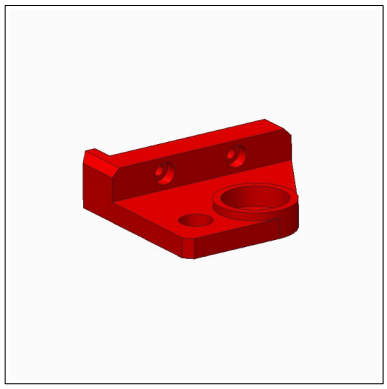
2 x Z-Axis-Coupling-Bolt-Side



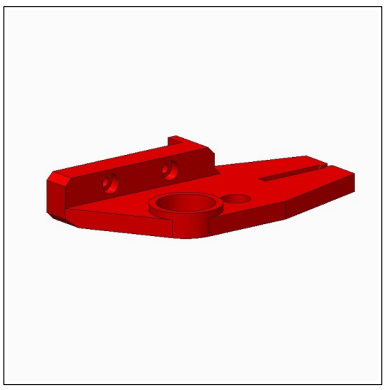
2 x Z-Axis-Coupling-Bolt-Side
8 x Inserted M3-Nyloc-Nut



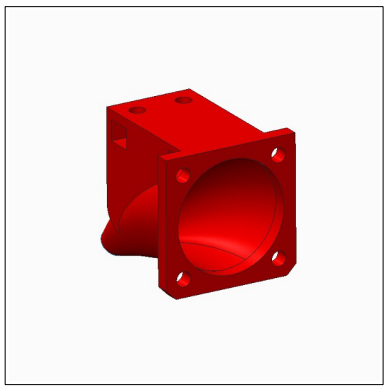
1 x Z-Axis-Top-Left



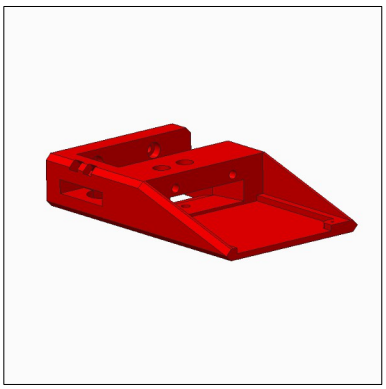
1 x Z-Axis-Top-Right



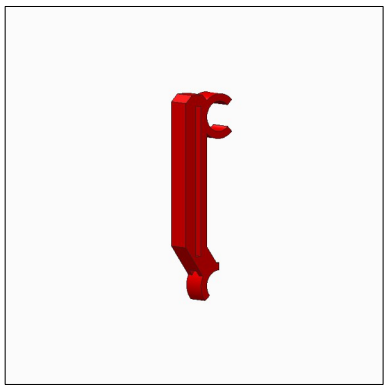
1 x Hotend-Fan-Shroud
2 x Inserted M3-Nyloc-Nut



1 x Extruder-Mount

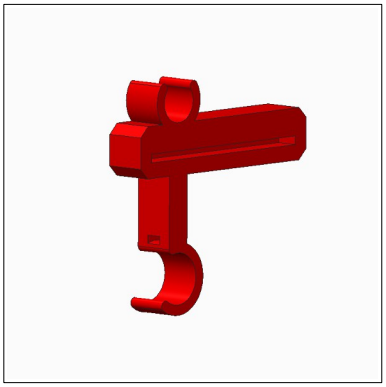


1 x X-Axis-Endstop-Holder

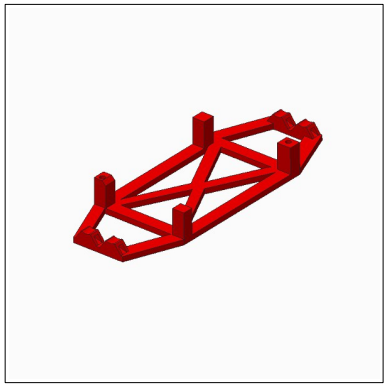


Appendix A – Parts List

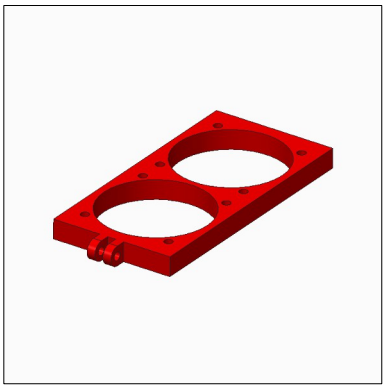
1 x Y-Axis-Endstop-Holder



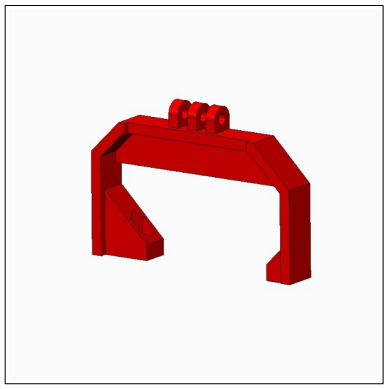
1 x RAMPS-Holder



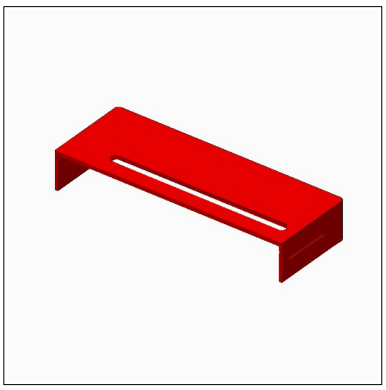
1 x RAMPS-Fans-Holder



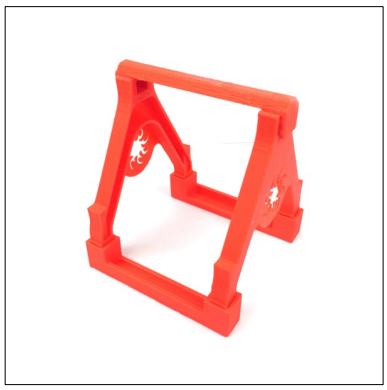
1 x RAMPS-Fans-Bracket
2 x Inserted M3-Nyloc-Nut



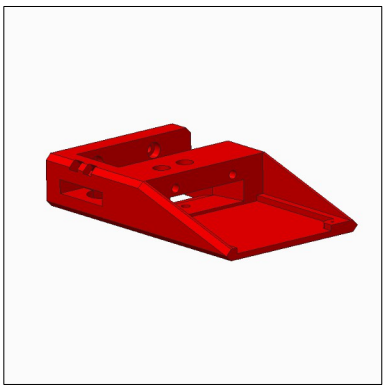
1 x Power-Supply-Cover



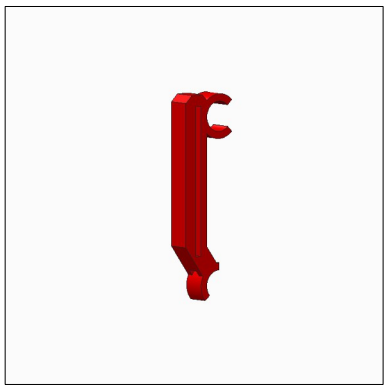
1 x Spool Holder



1 x Extruder-Mount



1 x X-Axis-Endstop-Holder

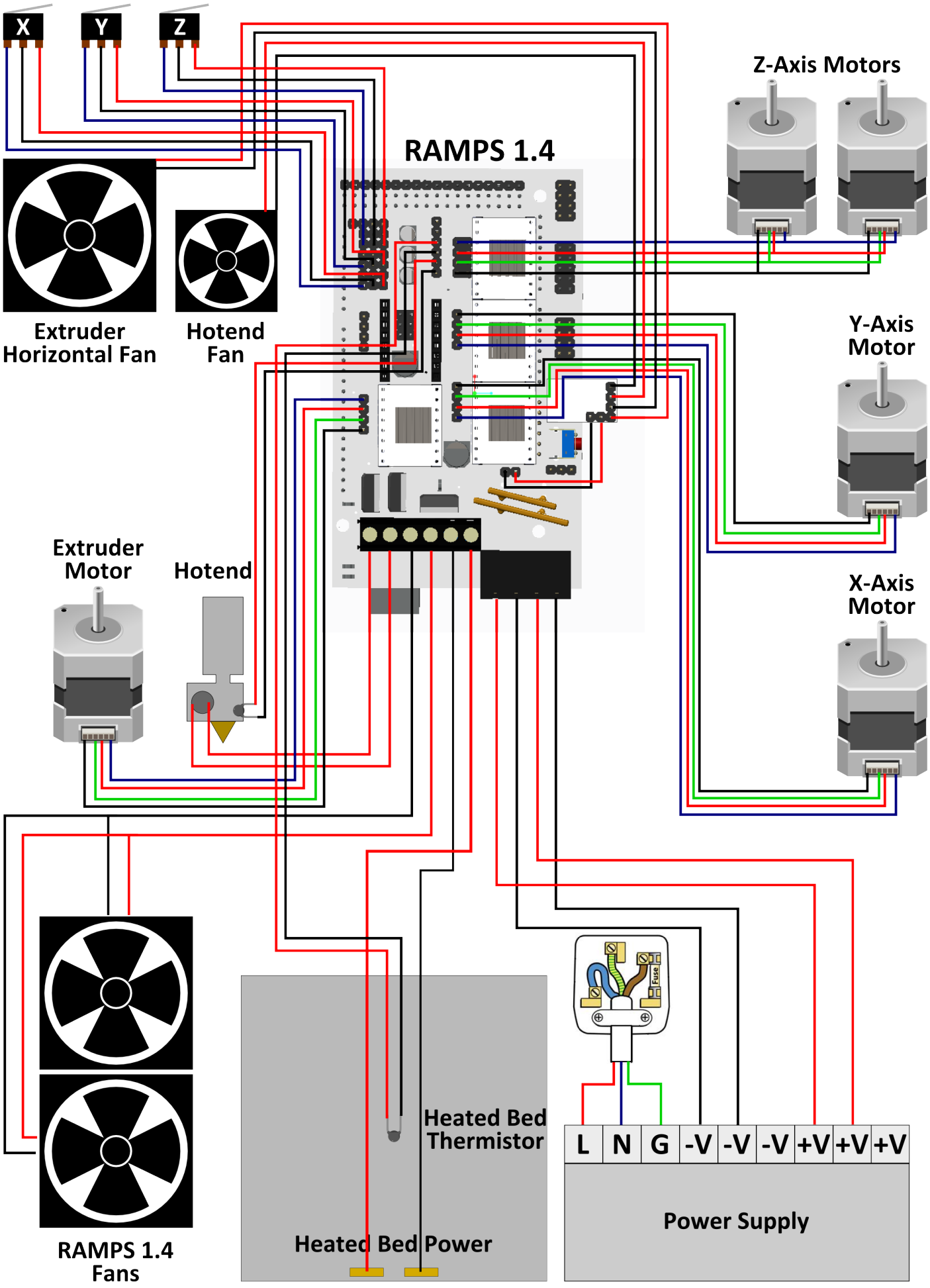


Appendix B – Z-Axis Nuttraps

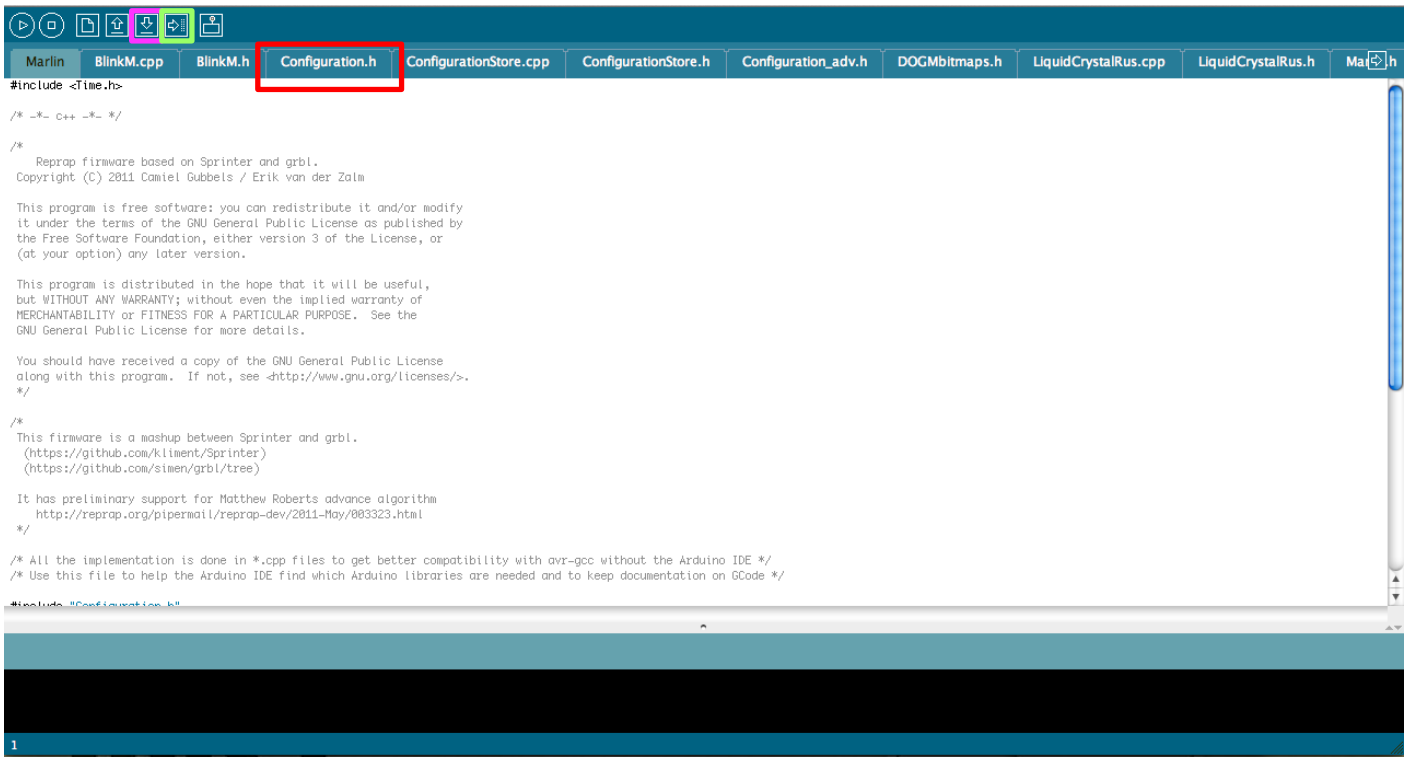
On the Z-Axis-Nuttraps the two Brass M5-Hex-Nuts have to be in sync, otherwise the Threaded-Rod-5mm will not go through both of them.

The method to achieve this is trial and error, first insert a M5-Hex-Nut into one of the slots, this will be the fixed nut. Next Insert the second M5-Hex-Nut but mark with a felt-tip which corner is going in first. Once both are in, try and thread the Threaded-Rod-5mm through both of them, if it will not go through take out the marked M5-Hex-Nut and turn it clockwise so the next corner is going in first, continue this until the Threaded-Rod-5mm will go through both of them. Once the Threaded-Rod-5mm will go through both of them jiggle the Threaded-Rod-5mm about to shift the M5-Hex-Nut into better alignment, the Threaded-Rod-5mm should now go through smoothly.

Appendix C - RAMPS 1.4 Wiring Diagram



Appendix D – Uploading Firmware



To upload the firmware download and install Arduino Software Version 0023 from:

http://arduino.cc/en/Main/OldSoftwareReleases

Do **NOT** update the software when prompted.

Also download and extract the Firmware from the downloads section at the bottom of our product page:

http://ooznest.co.uk/3D-Printer-Kits/Prusa-i3-Kit

With the printer plugged in via USB, Disconnected in PrintRun and switched off at the power socket open up the Arduino Software.

Select Tools > Board > Arduino Mega 2560
Select Tools > Serial Port > Select the same one used in PrintRun

Select File > Open and navigate to where you extracted the firmware and open the file Marlin.pde, the Arduino Environment should now look similar to that above.. The tab Configuration.h (Red Square) is where most the printer settings are located.

Press Save (Purple Square), then upload (Green Square), once the upload is complete it will say “Done Uploading”

Appendix E – LCD Controller Menu Tree