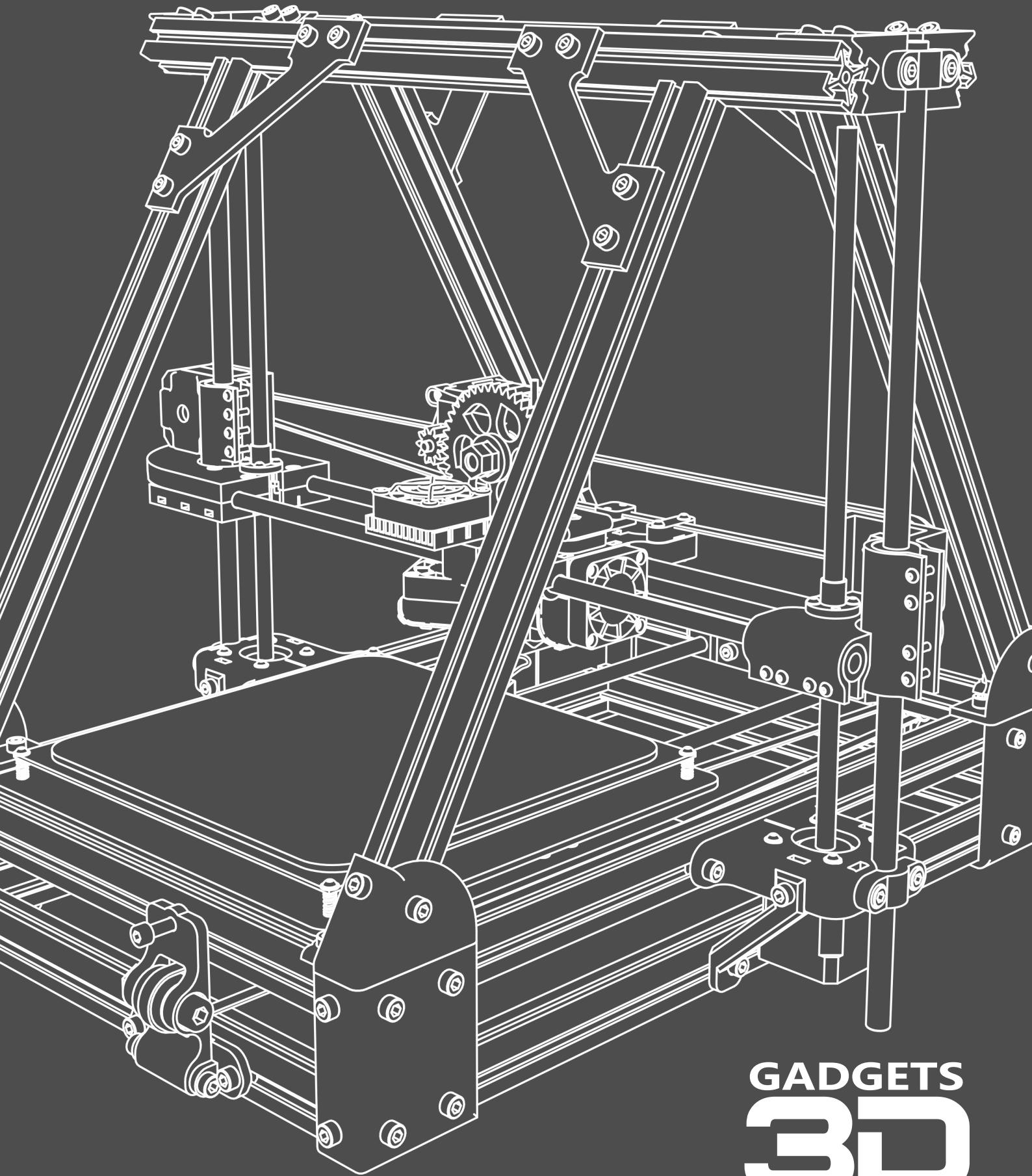


RepRap Mendel Max 1.5

Build Manual G3D v1.2



GADGETS
3D

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PLASTIC PARTS SET 1



2x Belts Closing

1



1x Endstop Alu 20x20 Holder

2



1x Endstop Holder - 8mm

3



1x Endstop Holder - 10mm

4



2x Lower Vertex Left Lower

5



2x Lower Vertex Left Upper

6



2x Lower Vertex Right Lower

7



2x Lower Vertex Right Upper

8



1x PSU Holder

9



4x Top Vertex

10



1x Wires Holder - Large

11



1x Wires Holder - Medium

12



1x Wires Holder - Small

13



1x X Carriage Linear Bearing - 8mm Rod

14



1x Y Idler Mount

15



1x Y Idler Tensioner

16



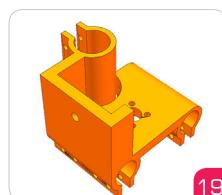
1x Y Motor Mount

17



1x Y Rod Holder

18



1x Z Belt Holder

19

2x Z Lower Motor mount
- 10mm

20

2x Z Lower Motor Mount
Support Left

21

2x Z Lower Motor Mount
Support Right

22



1x Z Motor Holder Upper

23



1x Z Motor Holder Lower

24



4x Z Rod Clasp - 10mm

25



2x Z Top Vertex - 10mm

26



1x Duct*

27



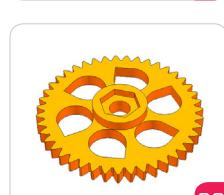
1x Extruder Part 1*

28



1x Extruder Part 2*

29



1x Gear 1*

30



1x Gear 2*

31

*PARTS OF EXTRUDER

TOP FRAME



1

1.1 Take:

- 1x 340mm aluminum profile,
- 4x T-slot nut,
- 4x M5x10 SHCS,
- 5x M5 washer,
- 1x M5x10 FHS,
- 1x lower vertex upper printed part;



2

1.2 Assemble the screws to printed part like on picture above;



3

1.3 Now take the aluminum profile and screw it to printed part using last M5x10 SHC screw and M5 washer;



4

1.4 When the first end of aluminum profile is done, take last M5x10 FHS and screw it to the second end of aluminum profile;



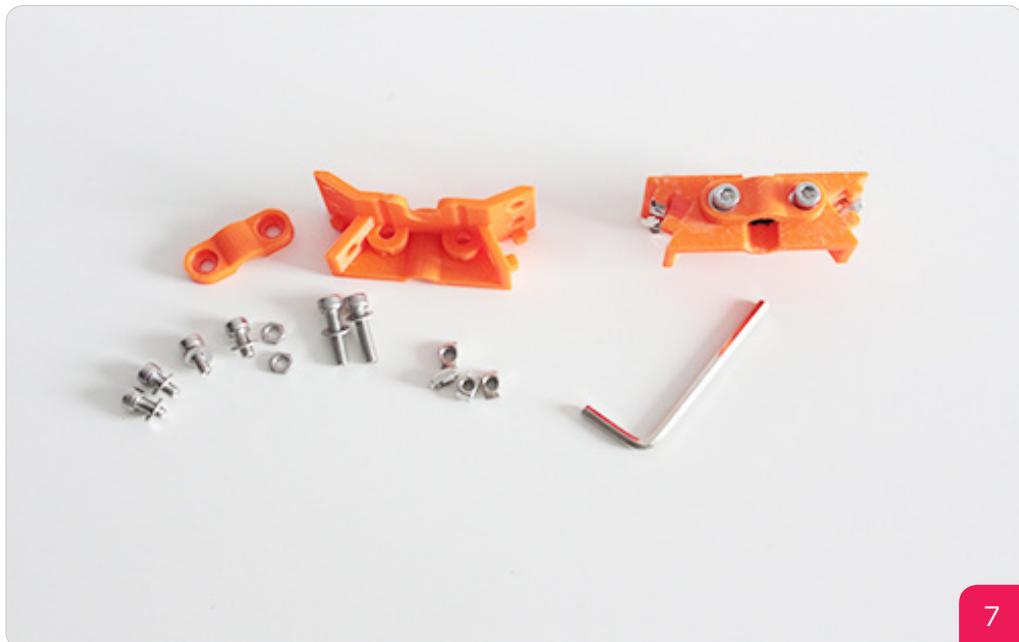
5

1.5 It should look like this;



6

1.6 Repeat this for another 3 aluminum profiles;



7

1.7 Take:

- 2x Z rod clasp 10mm printed part,
- 2x Z top vertex 10mm printed part,
- 12x M5x10 SHCS,
- 4x M5x20 SHCS,
- 16x M5 washer,
- 12x T-slot nut,
- 4x M5 nut;



8

1.8 Assemble them like on picture above;



9

1.9 Now take 2x 420mm aluminum profile and assembly it using printed part, remember to turn aluminum profile so you get holes in order (holes from inside should be on top of the profile);



10

1.10 Do the same thing with the other end of aluminum profile - it should look like on picture above;



11

1.11 Tighten a little the printed part into aluminum profiles so it just don't move, don't tight too much;



1.12 Collect previously assembled parts and assemble them to top frame like on picture above;



1.13 Assembled parts should look like on picture above;



14



15

1.14 If everything is assembled right, you should have holes used for later tightening;



16

1.15 Using setaquare or other tool, make the profiles be 90° angle - like on picture above;



17

1.16 Prepare:

- top vertex printed part,
- 4x M5x10 SHCS,
- 4x T-slot nut,
- 4x M5 washer;



18

1.17 Assemble it like on picture above, do the same thing with other 2 parts;



19

1.18 When you get the right angle (90°) use top vertex printed parts to tighten the frame;



20

1.19 Assembled top frame should look like on picture above.

BOTTOM FRAME

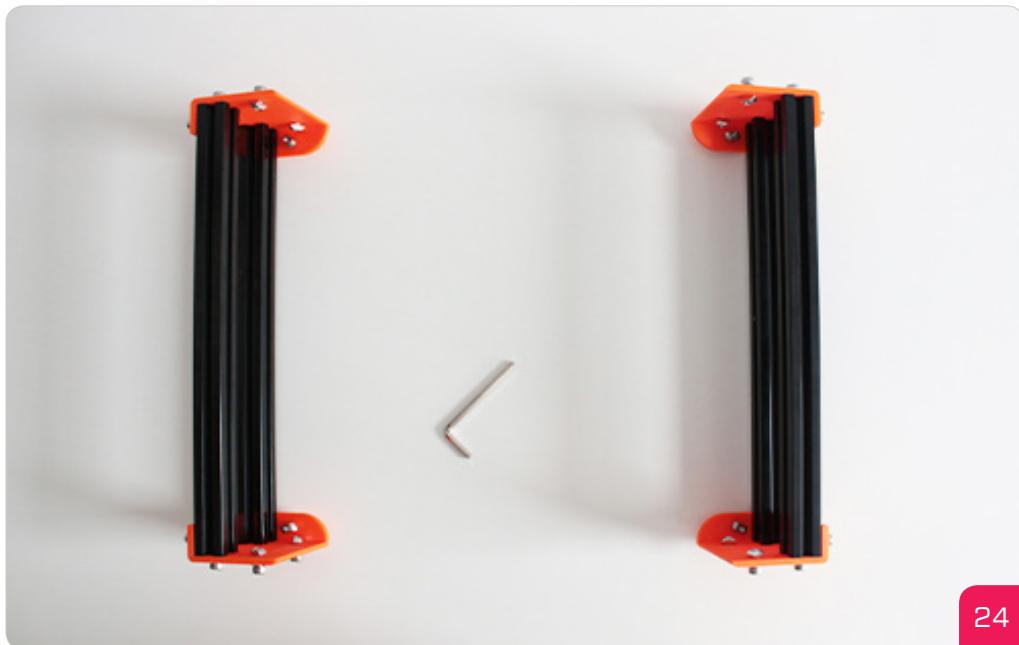


2.1 Prepare:

- 4x 420mm aluminum profile,
- 4x 300mm aluminum profile,
- 4x lower vertex lower printed parts,
- 28x M5x10 SHCS,
- 28x M5 washer,
- 20x T-slot nut;



2.2 Screw down 5x M5x10 SHCS with T-slot nuts into printed part, last two SHCS will not need T-slot nut, screw them to the aluminum profile;



2.3 Repeat this for other 300mm aluminum profiles;

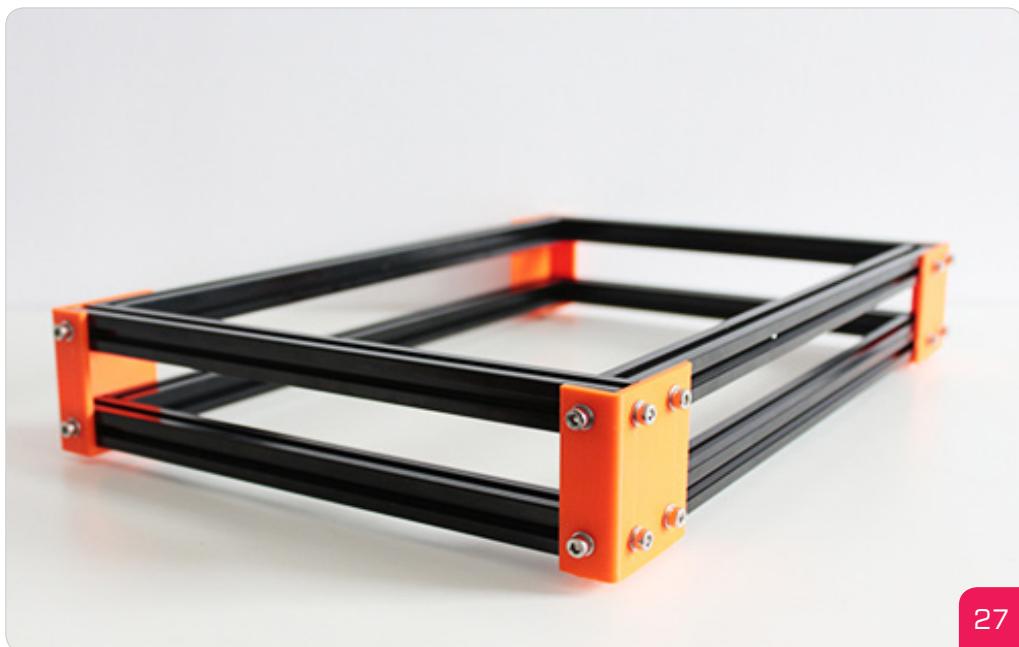


25



26

2.4 Take 4x 420mm aluminum profiles and screw them into already assembled parts, remember to turn aluminum profile so the holes in it should be from left and right side of the frame (it's needed for PSU);



27

2.5 Assembled bottom frame should look like on picture above;



28

2.6 Take:

- one of the bottom frame,
- bottom 420mm aluminum profile
- 2x M5x10 SHCS,
- 2x M5 washer,
- 2x T-slot nut,
- 2x M4x10 FHS,

you can do it before assembling bottom frame or later;



29



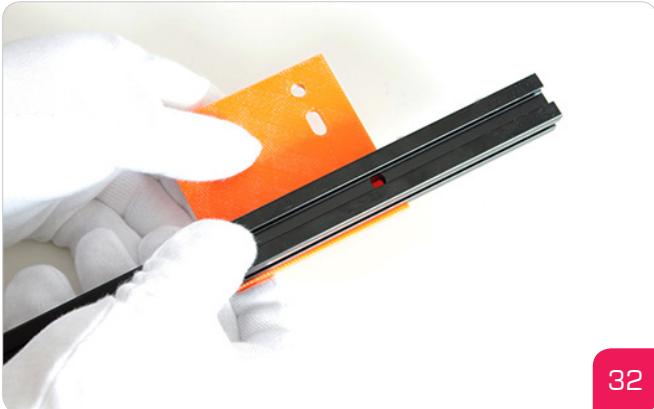
30

2.7 Take 2x M4x10 FHS and place them into aluminum profile (like you would use T-slot nut) also remember to turn aluminum profile in right position so you can screw FHS later through the holes;



31

2.8 Place the PSU holder on one of the M4x10 FHS;

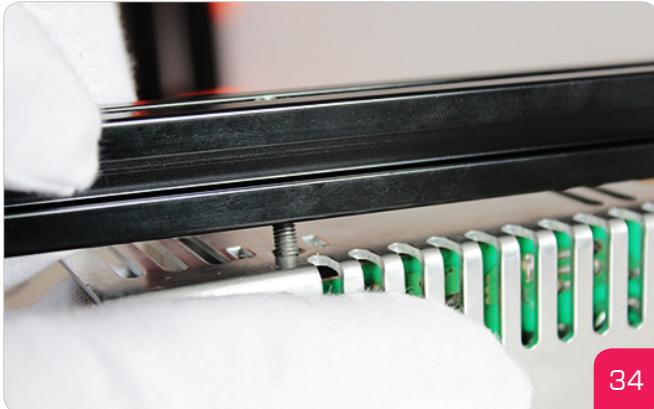


32



33

2.9 Turn it on other side and place on PSU, through the hole you can screw it a little but remember that PSU should be moveable for now;



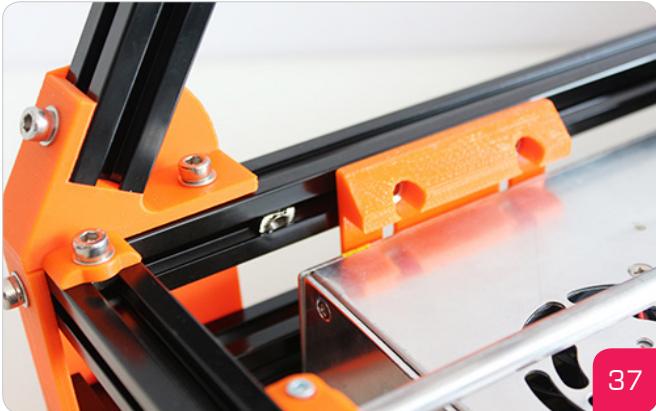
2.10 Screw the PSU to aluminum profile through the hole in it but still remember it should be moveable for now;



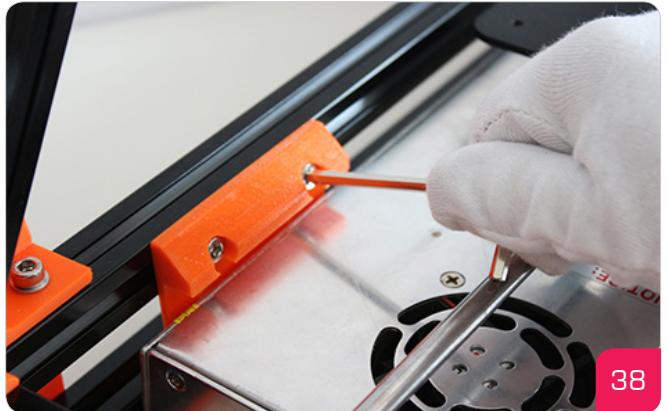
2.11 Move the aluminum profile in desired destination (hole 1 or hole 2) and tighten one of the screws;



2.12 Put the aluminum profile into bottom frame and screw it tight;



37



38

2.13 Using T-slot nut and M5x10 SHCS, screw the PSU holder into top aluminum profile, try to shake a little with bottom frame and make sure that PSU is solid placed;

Y AXIS



39

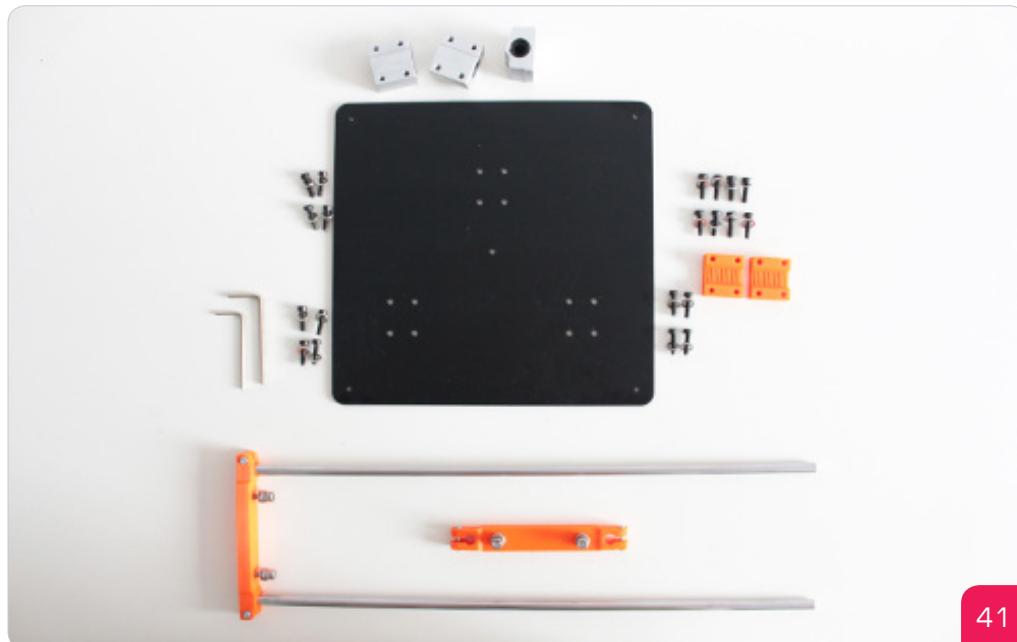
3.1 Prepare:

- 2x 415mm 8mm diameter smooth rod,
- 4x M5x16 SHCS,
- 4x M5 washer,
- 4x M3x16 screw,
- 4x M3 nut,
- 2x Y rod holder printed part;



40

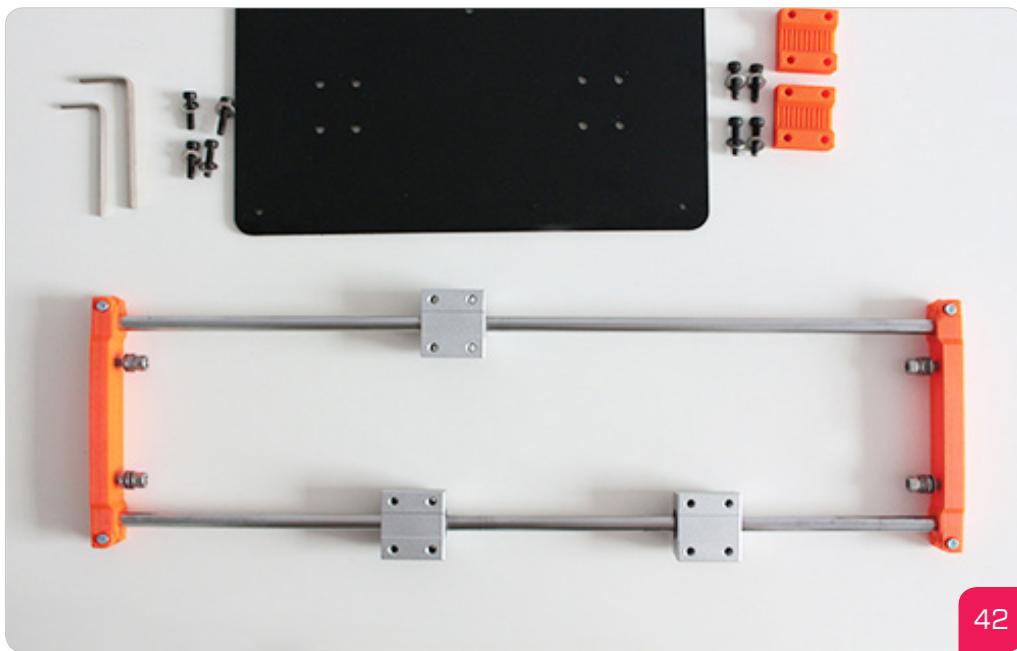
3.2 Assemble Y rod holders like on picture above, don't tight anything now;



41

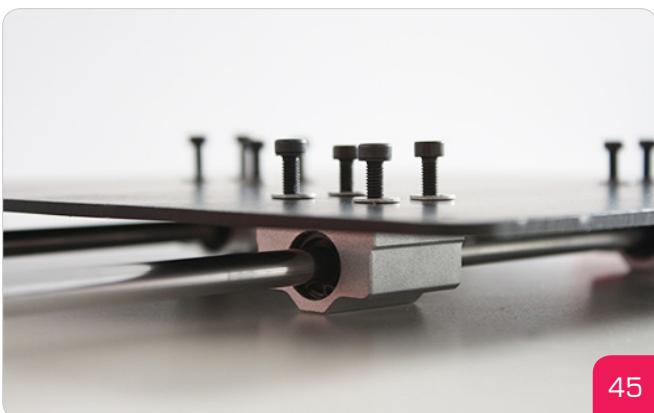
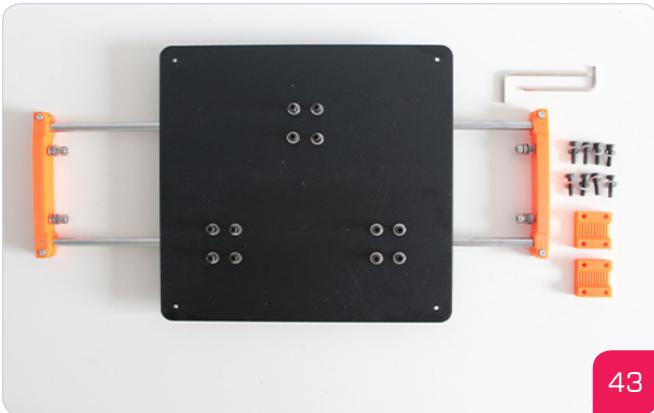
3.3 Prepare:

- 12x M4x10 SHCS,
- 8x M4x16 SHCS,
- 20x M4 washer,
- 2x belt closing printed part,
- 3x LM8UU bearing with housing,
- 1x heatbed mount,
- pre-assembled Y axis rods;

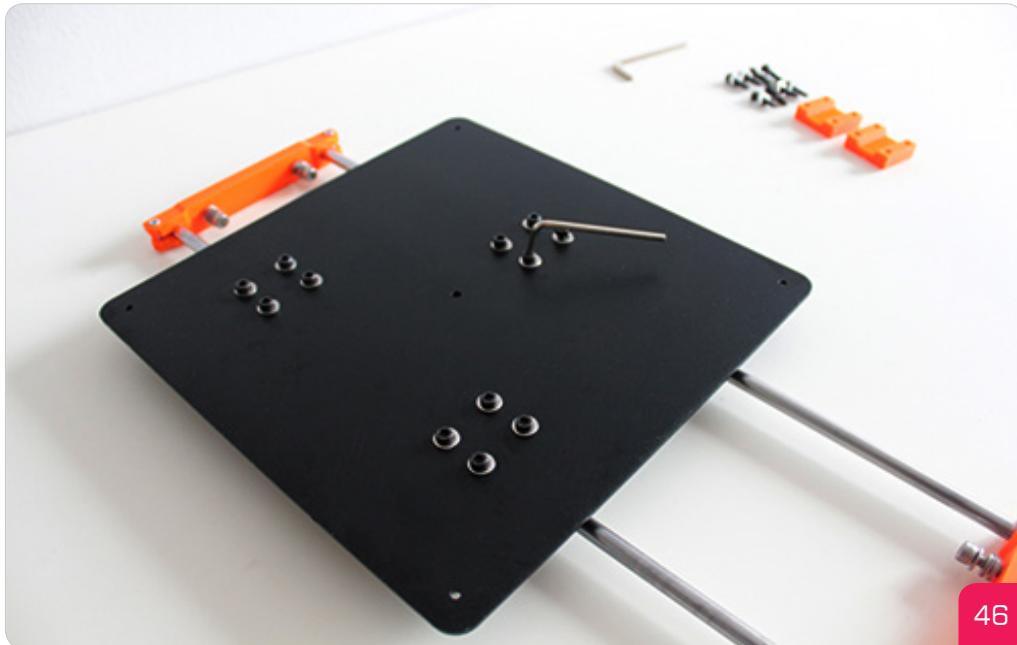


42

3.4 Insert smooth rods into LM8UU bearings like on picture above;



3.5 Attach heatbed mount to bearing housing flat surfce using 12x M4x10 SHCS and 12x M4 washer;



46

3.6 Tighten heatbed mount to bearing housing;



47

3.7 Turn elements upside down like on picture above and attach belt closing printed parts using last eight M4x20 SHCS and eight M4 washers, don't tight printed parts to housing, later it will be needed to insert belt between housing and closing;

Y AXIS DRIVE



4.1 Prepare:

- M8x30 SHCS,
- 3x M8 washer,
- 1x M8 nut,
- 2x T-slot nut,
- 2x M5x10 SHCS,
- 2x M5x12 SHCS,
- 1x M5x20 SHCS,
- 4x M5 washer,
- 3x M5 nut,
- GT2 timing belt,
- 2x 608 bearing,
- Y idler mount,
- Y idler tensioner printed parts;



49

4.2 Assemble Y idler tensioner, in order insert M8x30 SHCS, M8 washer, 2x 608 bearing, M8 washer then insert M8 nut into tensioner socket and tight it, remember to not overtight it, bearings should rotate easily without friction;

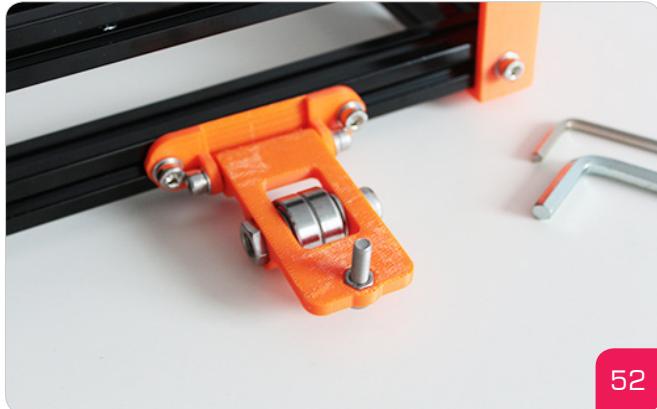


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51

4.3 Now use M5x10 SHCS with washer and T-slot nuts for assemble the Y idler mount next insert M5 nuts into Y idler tensioner slots and use M5x12 SHCS to connect printed parts into one piece like on picture above, last M5x20 SHCS and M5 nut goes on the top of the tensioner, with this screw you can tense the belt later;



52



53

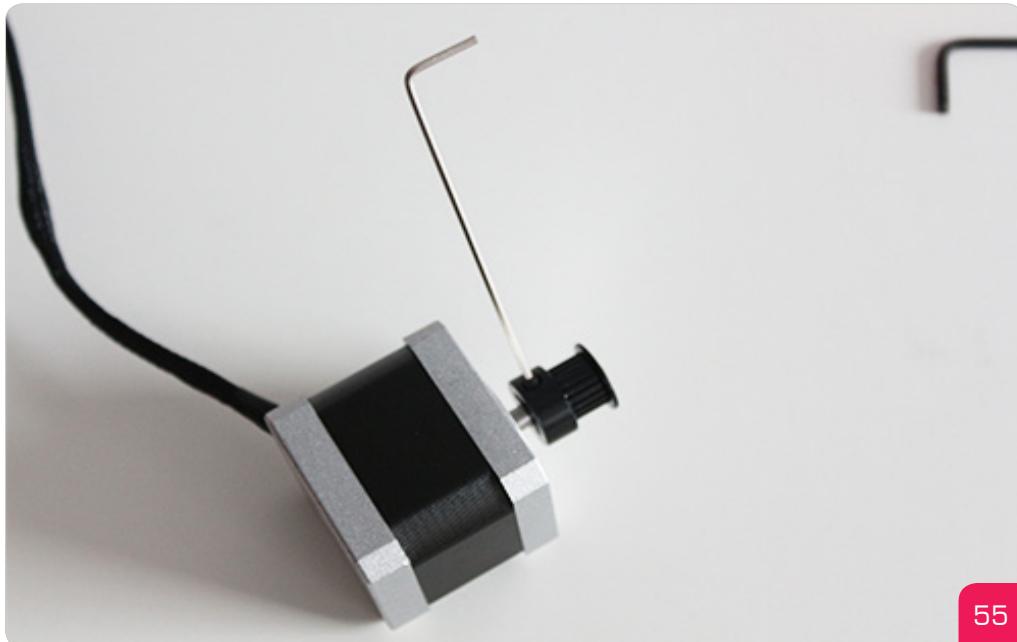
4.4 Now attach earlier assembled part to bottom frame on its shorter side;



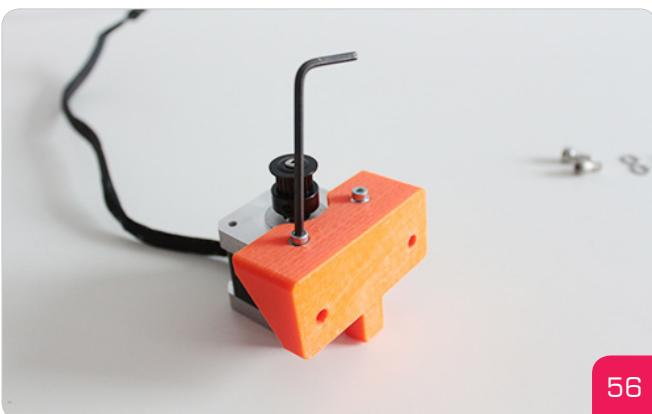
54

4.5 Prepare:

- Y motor mount printed part,
- 2x M3x10 SHCS,
- 2x M5x10 SHCS,
- 2x M3 washer,
- 2x M5 washer,
- 2x T-slot nut,
- 1x GT2 pulley,
- 2x M3x5 headless screw,
- 1x Nema 17 stepper motor;



4.6 Insert GT2 pulley onto Nema 17 stepper motor shaft and tight it using M3x5 headless screws;



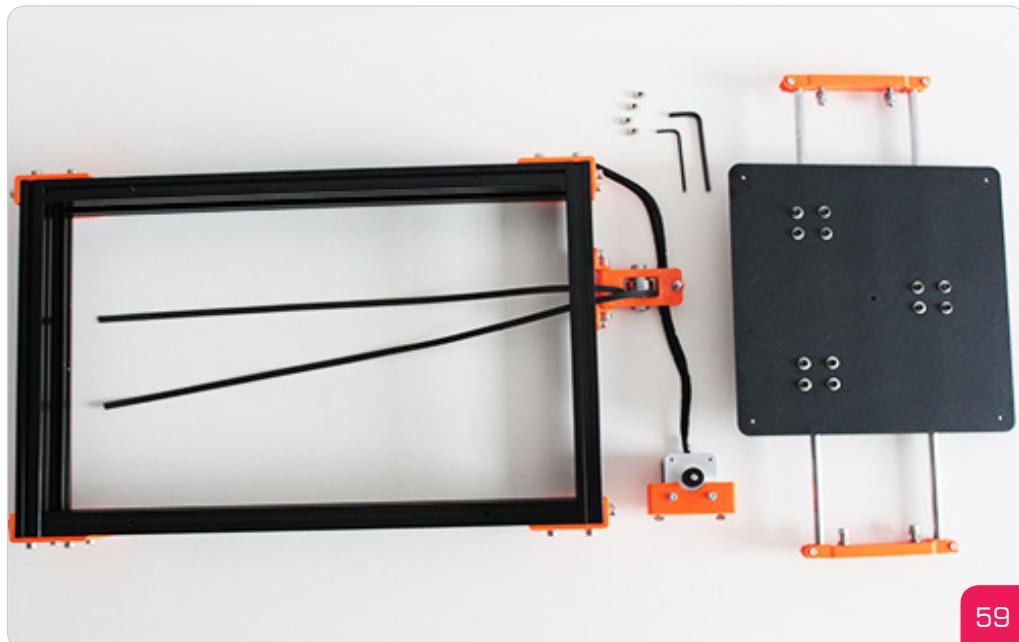
4.7 Attach printed part onto Nema 17 stepper motor using M3x10 SHCS and M3 washers;





58

4.8 Use last T-slot nuts and M5x10 SHCS, this will connect the part with aluminum profile;

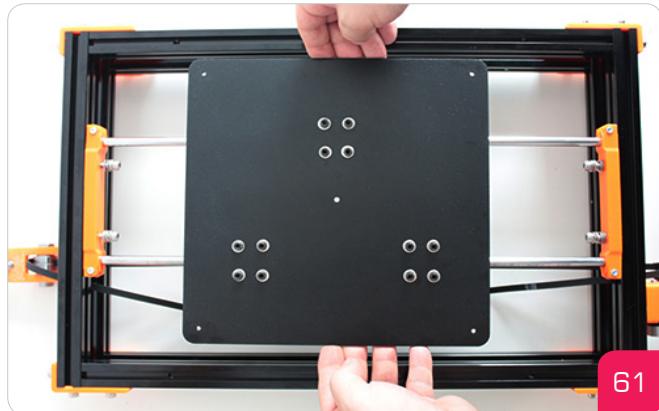


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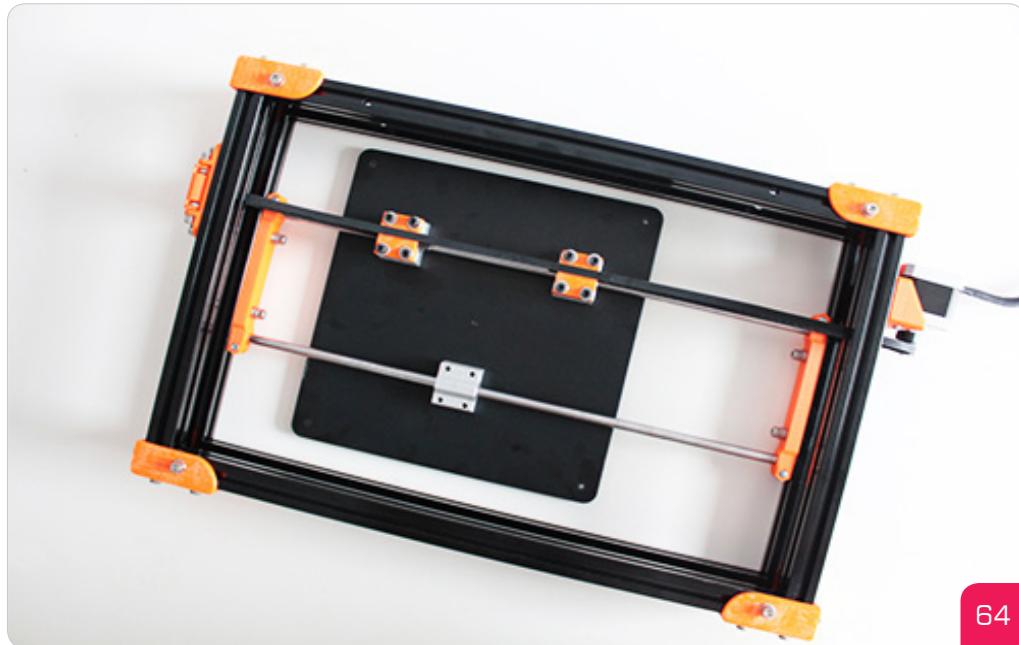
4.9 Take previously assembled parts shown on the picture above;



4.10 Now attach the Y motor mount to bottom frame but make it still moveable;



4.11 Take earlier assembled part and attach it to the upper aluminum profile;

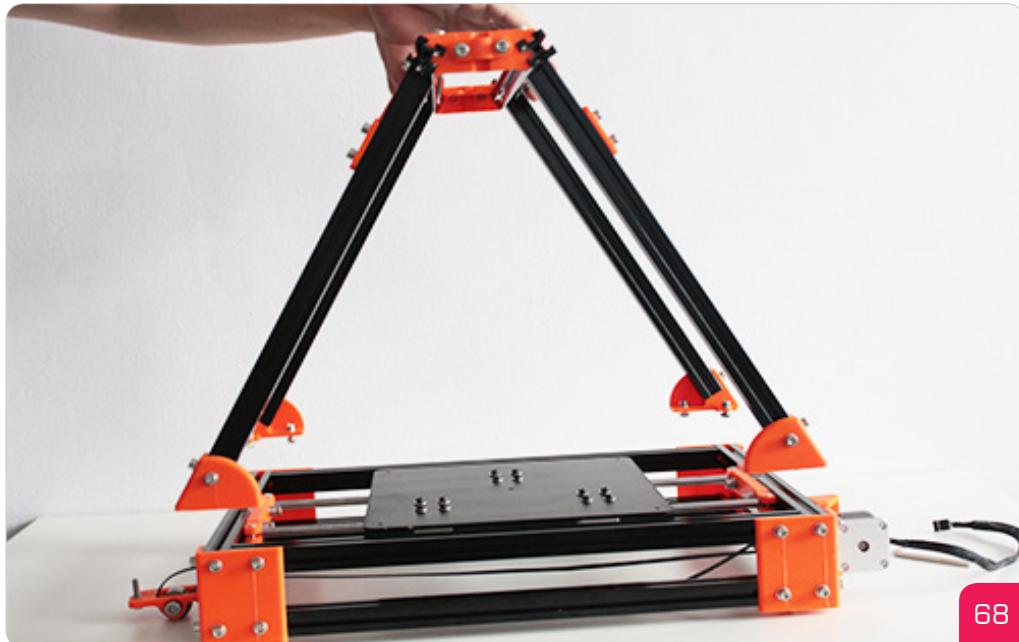


64

4.12 Turn whole part upside down to get an access to belt closing parts;



4.13 Try to calculate how much belt you need then screw belt closings so it won't move;



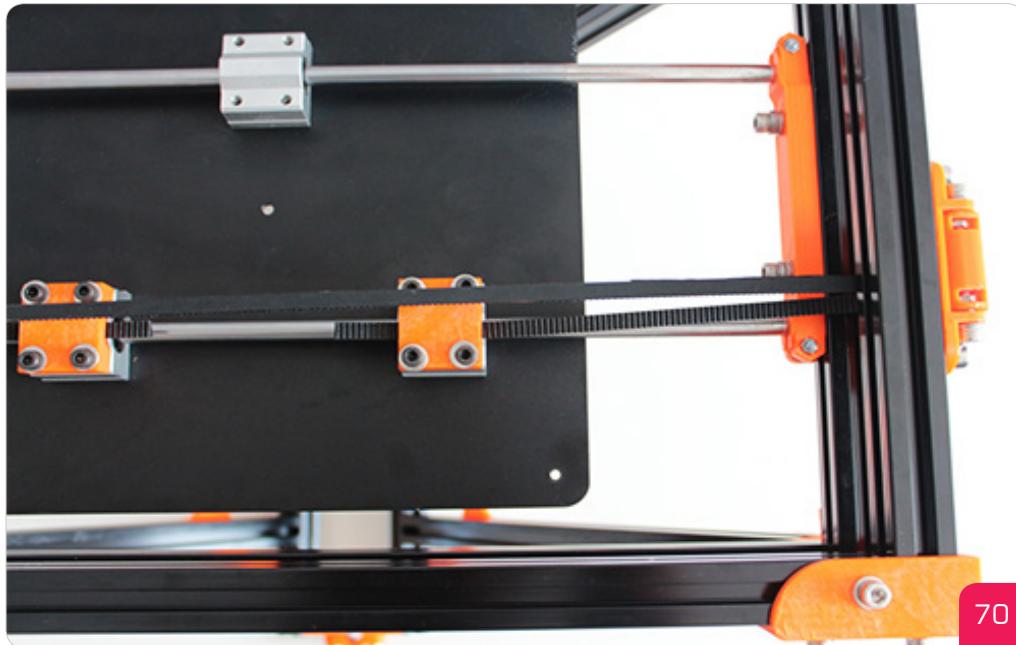
68

4.14 Attach assembled top frame to bottom frame;



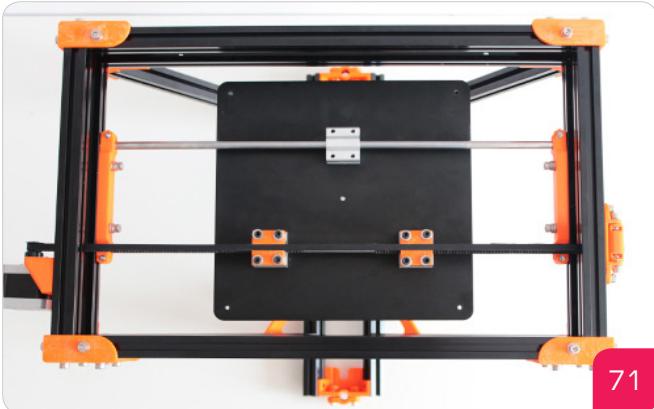
69

4.15 After attaching top frame to the bottom frame which is almost ready the heatbed mount should be calibrated like on picture above, from 2 sides it should stop in the center of top vertex;



70

4.16 Turn assembled frame upside down again, in the picture belt is not calibrated yet because Y idler mount and Y motor mount are still moveable;



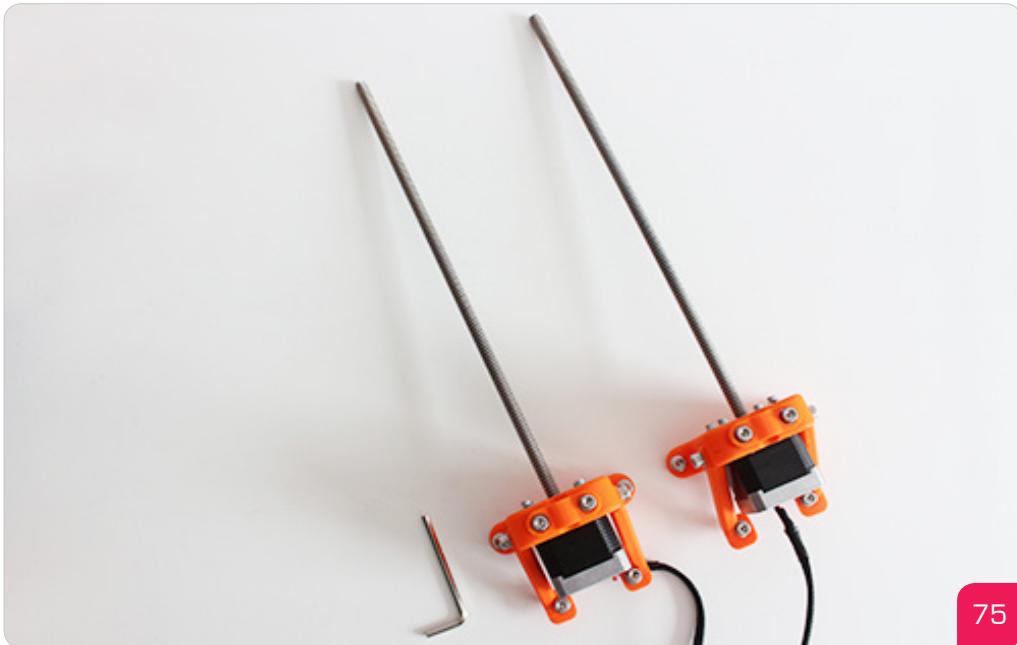
4.17 Right arrangement is when top belt covers the bottom one, then you can tighten the screws of Y ilder mount and Y motor mount. This operation needs some time, make everything very carefully to receive better precision later;

Z AXIS



5.1 Prepare:

- 8x M3x10 SHCS,
- 16x M5x10 SHCS,
- 16x M5 washer,
- 8x T-slot nut,
- 8x M5 nut,
- 2x Z Stepper motor with ballscrews,
- 2x Z lower motor mount support left and right,
- 2x 10mm rod clasp,
- 2x Z lower motor mount,
- 8x M3 washer



75

5.2 Assembled parts should look like picture above;



76

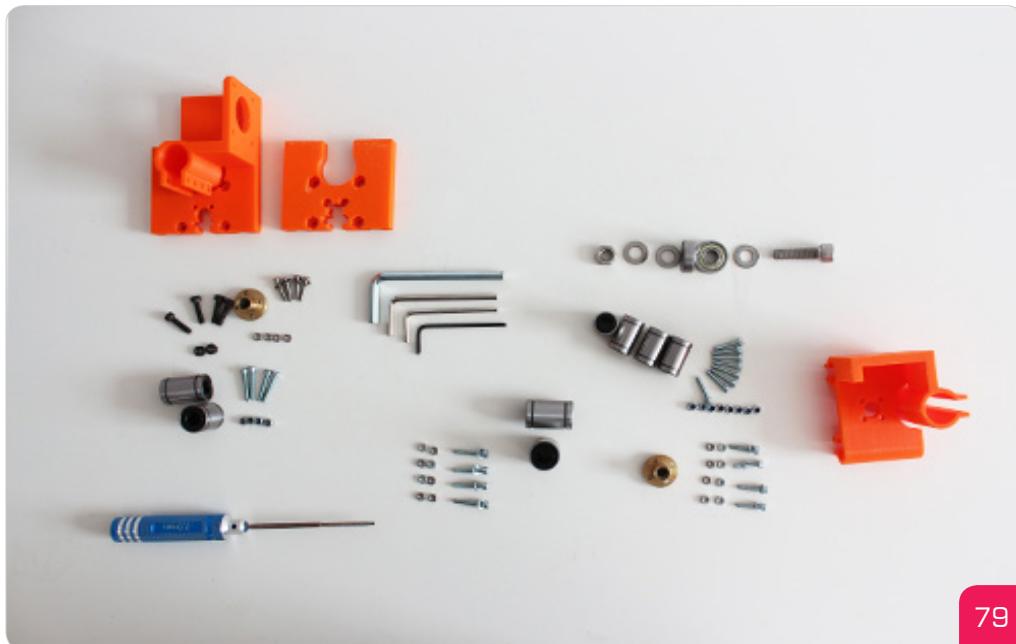


77



78

5.3 Attach assembled parts to the bottom frame but don't tighten them yet;



79

5.4 Now prepare axis mounts, prepare:

- 1x M8x30 SHCS,
- 2x 608 bearing,
- 3x M8 washer,
- 1x M8 nut,
- 2x ball screw mount,
- 4x M4x20 SHCS,
- 24x M3x20 SHCS,
- 24x M3 nut,
- 24x M3 washer,
- 4x LM10UU bearing,
- 4x LM8UU bearing,
- Z belt holder,
- Z motor mount;



80



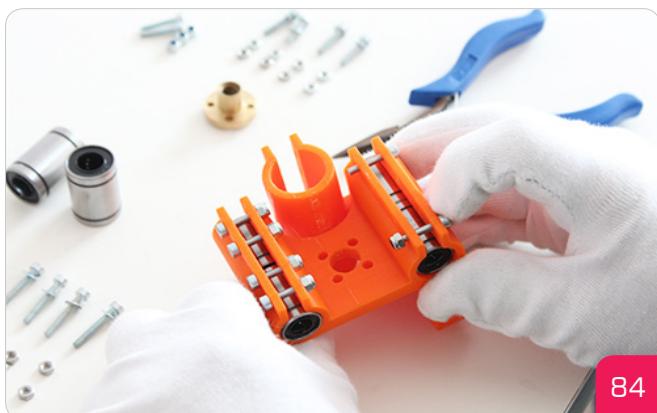
81



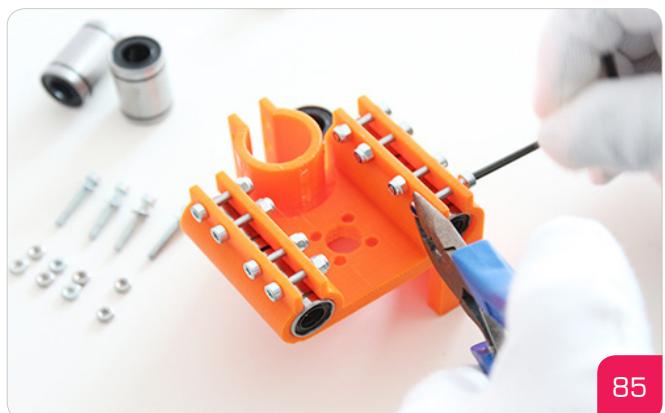
82



83

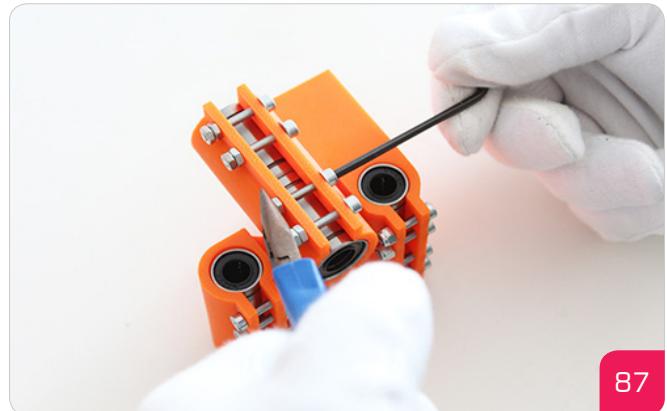


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5.5 Insert LM8UU bearings into Z belt holder printed part and use M3x20 screws with washers and nuts to lock the bearings;



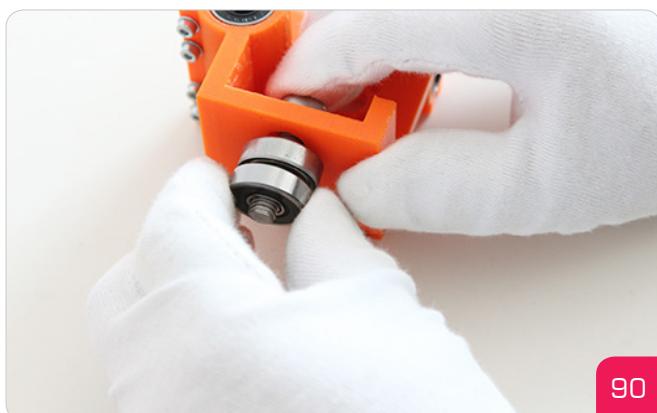
5.6 Insert LM10UU bearings into Z belt holder printed part and use again M3x20 screws with washers and nuts to lock the bearings;



88



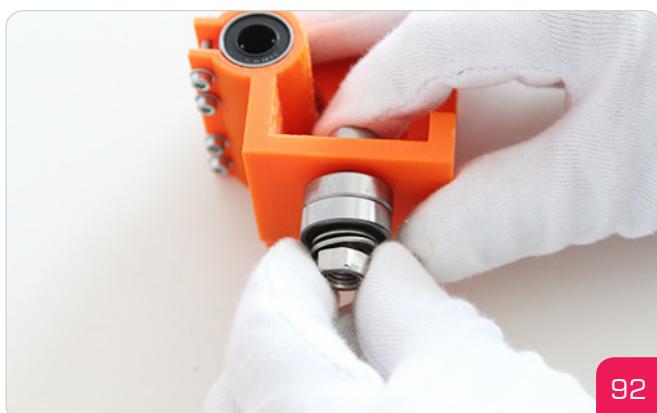
89



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94

5.7 Now insert M8x30 SHCS into hole, put washer, 2x 608 bearing, 2x washer and tighten the M8 nut, but still remember that bearings should move easily without friction;



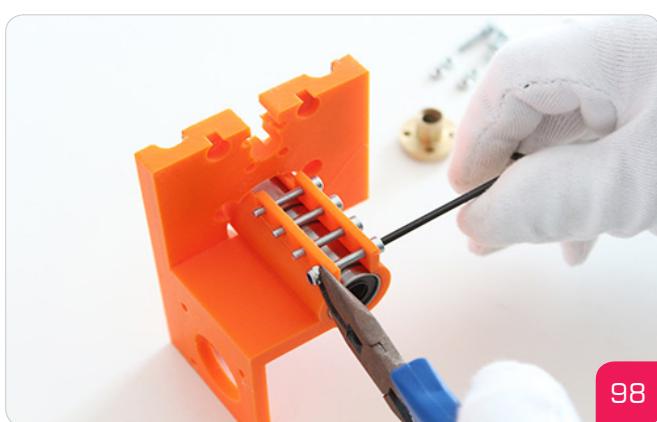
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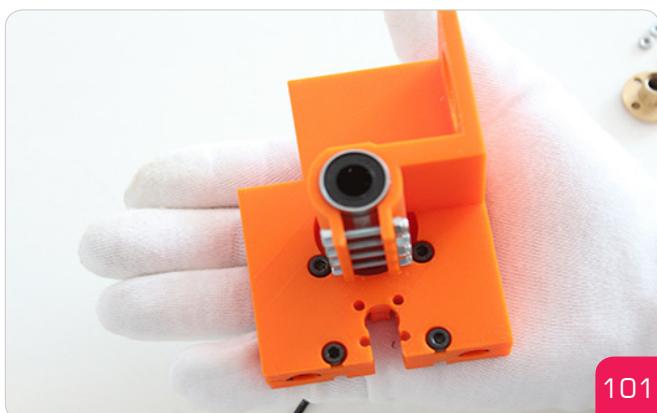
5.8 Take Z motor mount and do the same thing, insert LM10UU and lock it using the M3x20 SHCS;



99



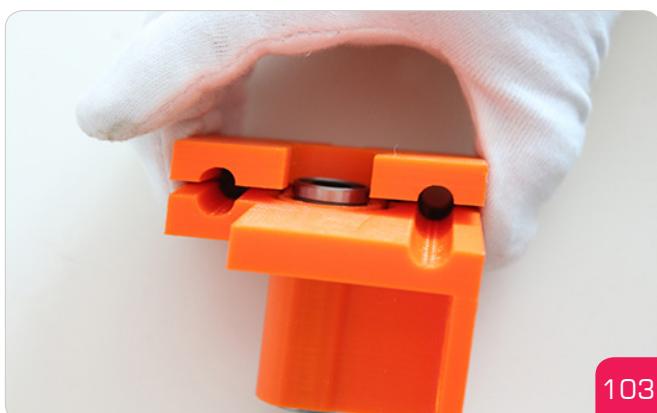
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103

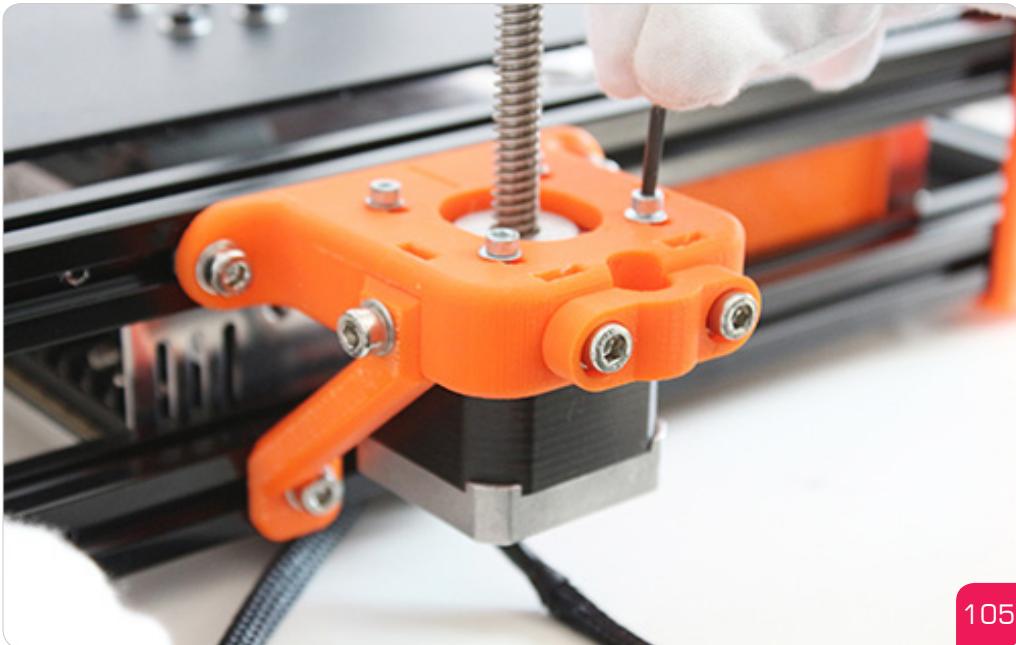
5.9 Take bottom part of Z motor mount and assembly it like on picture above using M4x20 SHCS, dont tight the bottom part yet, later it will be needed;



104

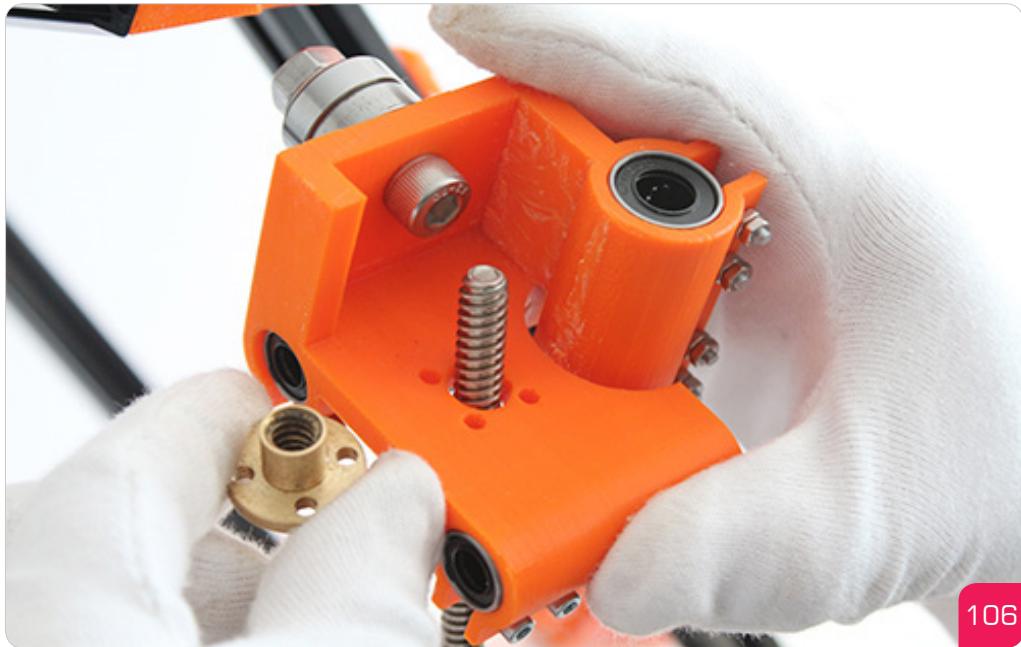
5.10 Prepare:

- 2x ball screw mount,
- 8x M3x20 SHCS,
- 8x M3 nut,
- 8x M3 washer;

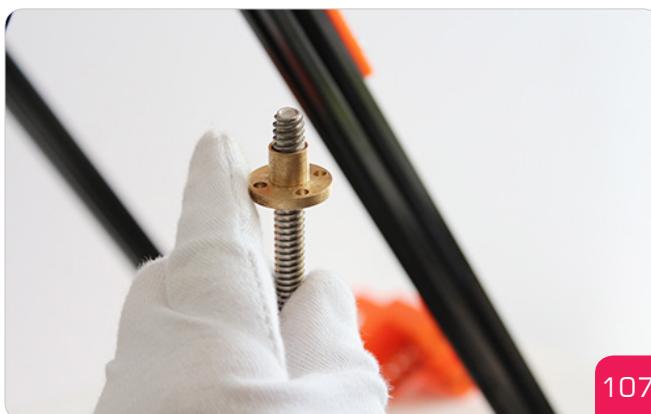


5.11 Now loose a bit Z motor from the printed mount to make it easier to assembly rest of the parts;

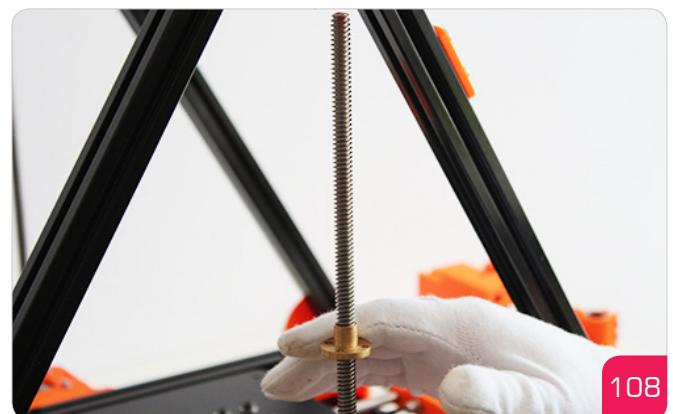
105



5.12 Insert earlier assembled Z belt holder printed part and ball screw mount on threaded shaft;

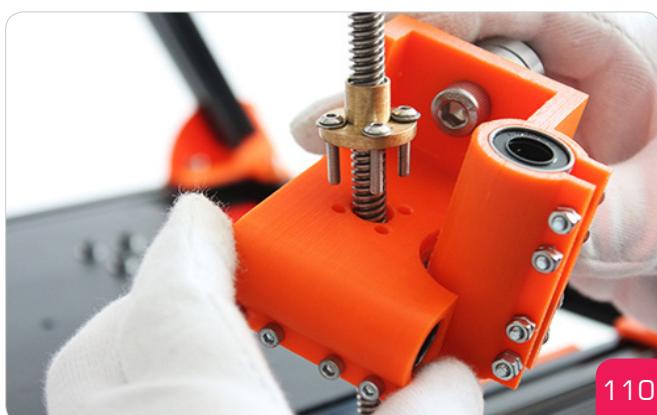


5.13 Screw the ball screw mount on Z motor threaded shaft to its half;





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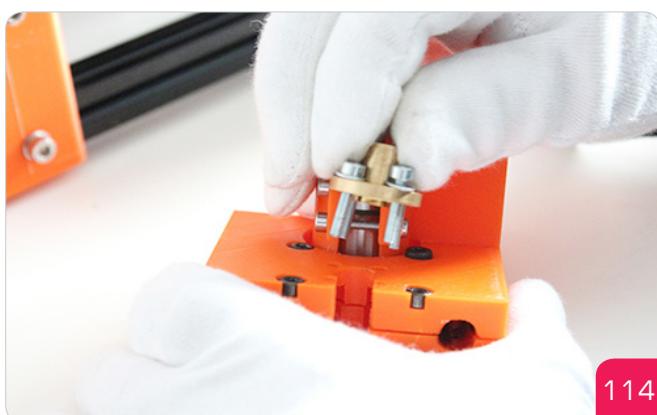


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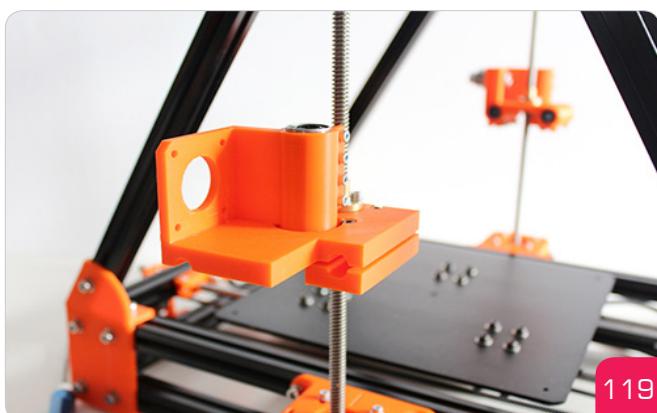
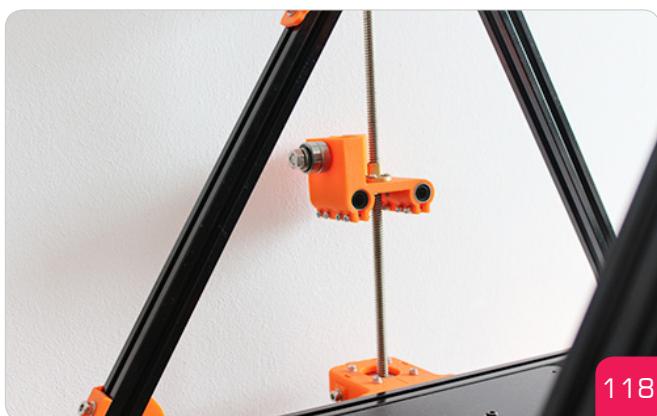
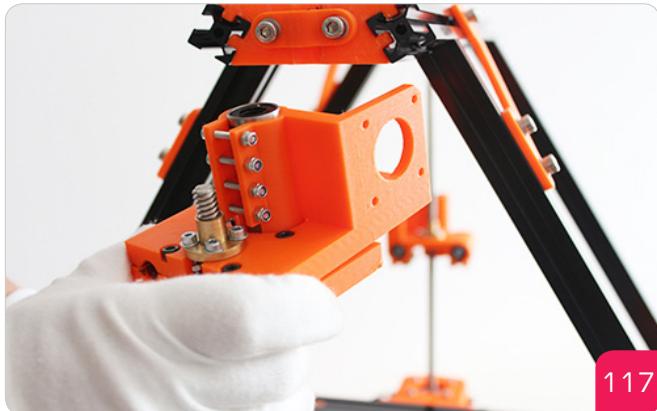


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5.14 Now adjust two parts and connect it using M3x20 SHCS, M3 washers and M3 nuts;



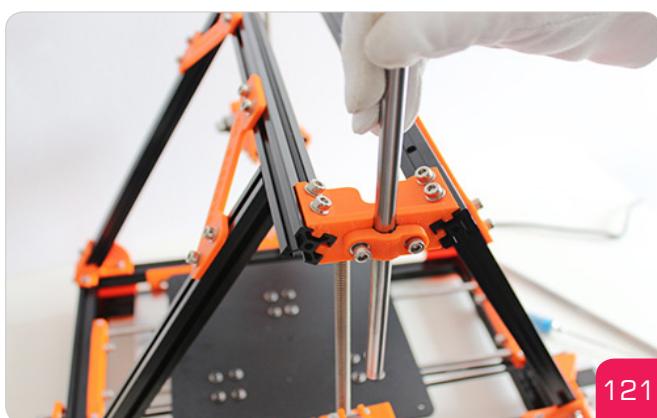
5.15 This step will be done in different, take last ball screw mount and insert in it M3x20 SHCS with M3 washers, then assembly it to Z motor mount like on pictures above;



5.16 Loose or unscrew Z lower motor mount and screw already assembled part on threaded Z motor shaft to its half;



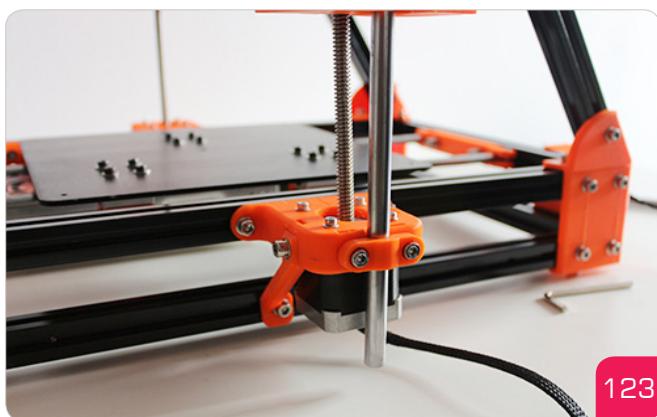
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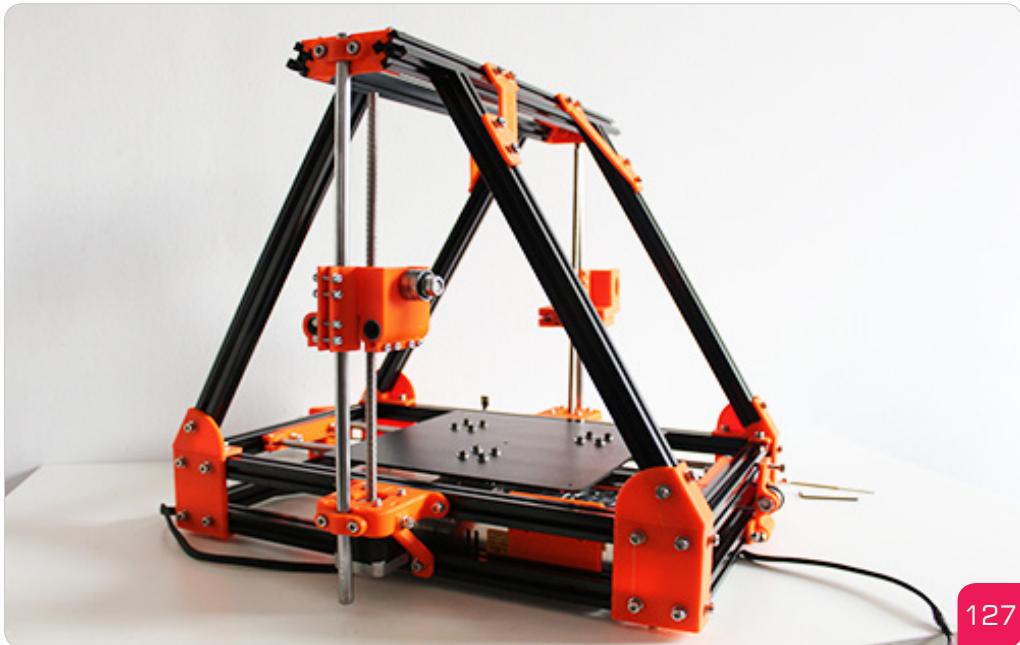


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5.17 Now prepare 2x 405mm 10mm diameter smooth rod and insert it through top frame 10mm rod clasp, Z motor mount and Z lower motor mount with 10mm rod clasp;

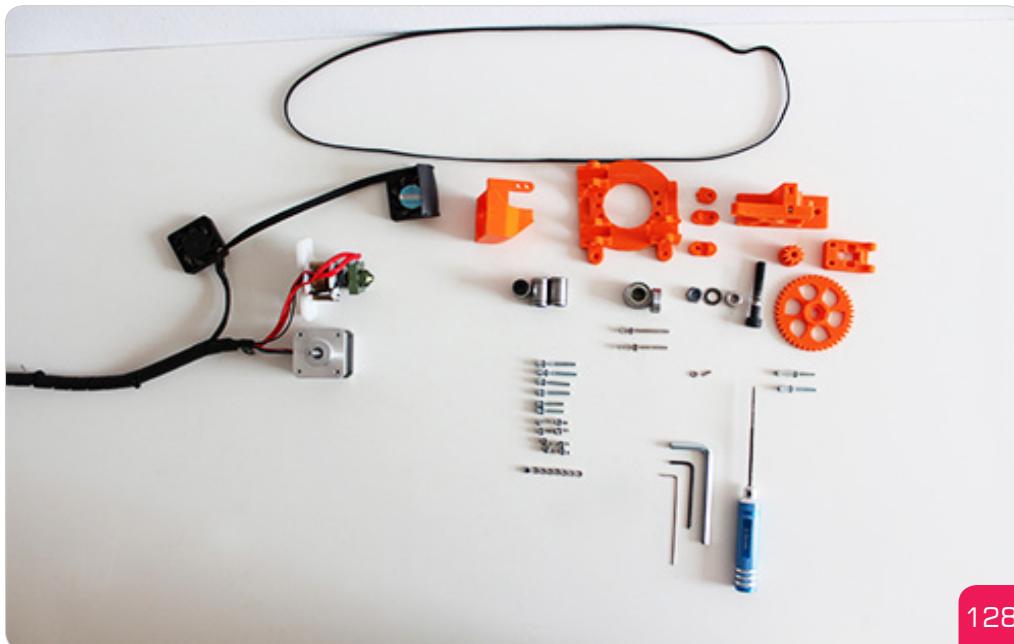


5.18 Tighten the 10mm clasp to lock smooth rod, it should look like on picture above, repeat this for the other side;



5.19 That's how it should look like.

EXTRUDER

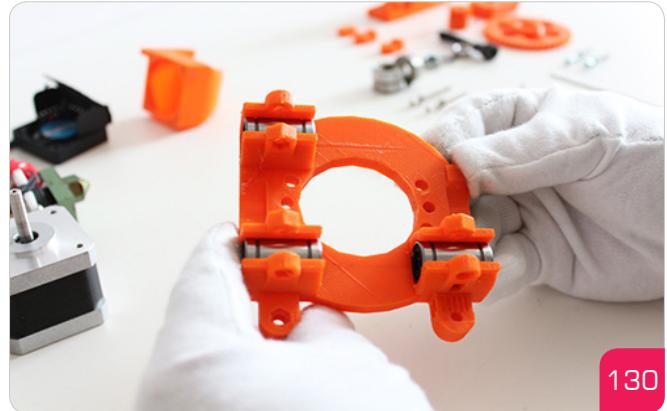


6.1 Prepare:

- GT2 timing belt,
- 8x M3x10 screw,
- 2x M3x20 screw,
- 2xM3x25 screw,
- 4x M3x30 screw,
- 2x M3x40 screw,
- 1x M3x8 headless screw,
- 18x M3 washer,
- 13x M3 nut,
- 2x M8 nut,
- 2x M8 washer,
- 3x LM8UU bearing,
- 2x 608 bearing,
- 1x M8 hobbed bolt,
- 1x Nema 17 stepper motor,
- 1x G3D hotend 1.2,
- 2x fan,
- printed parts: duct fan, X carriage, extruder 1, extruder 2, wheelgear 1, wheelgear 2;



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6.2 Take X carriage printed part and assembly it with LM8UU bearings;

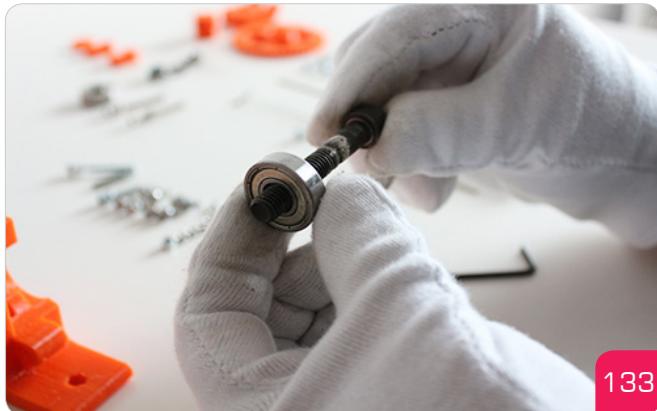


131



132

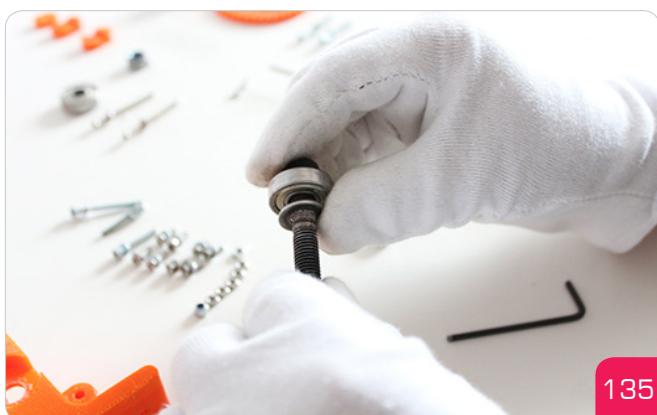
6.3 Tighten bearings using the M3x20 screws and M3 nut;



133



134



135

6.4 Put hobbed bolt into 608 bearing, then assembly it with printed part like on picture above, remember to use M8 washers so bearing will work without bigger friction;

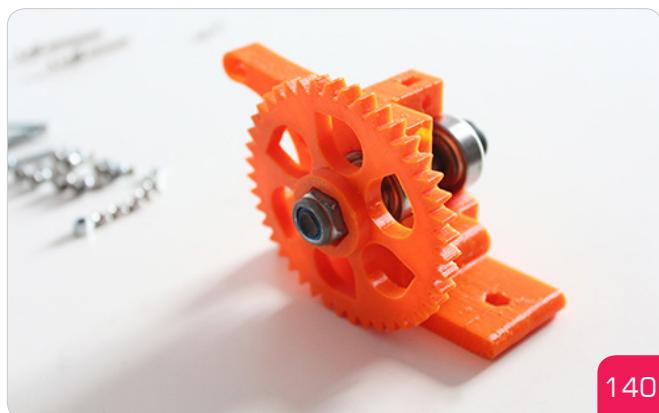


136



137

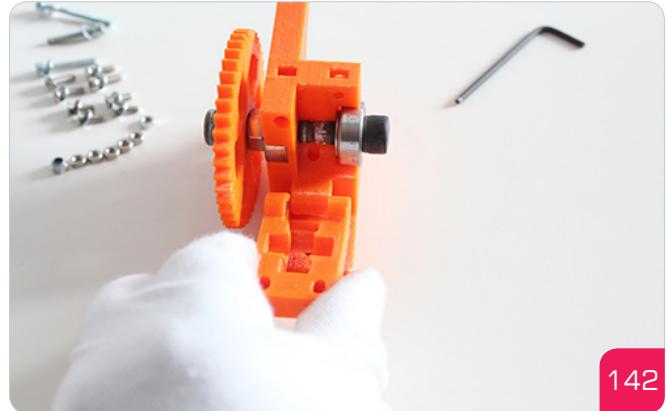
6.5 Put another 608 bearing, M8 washer and M8 nut to hobbed bolt (don't tighten too much, hobbed bolt should move easily without friction);



6.6 Take bigger printed gear and M8 nut and assembly it like on picture above, this operation is tricky so remember that 1st M8 nut should be a little loose so the hobbed bolt will move easily and 2nd M8 nut should tighten the printed wheelgear;

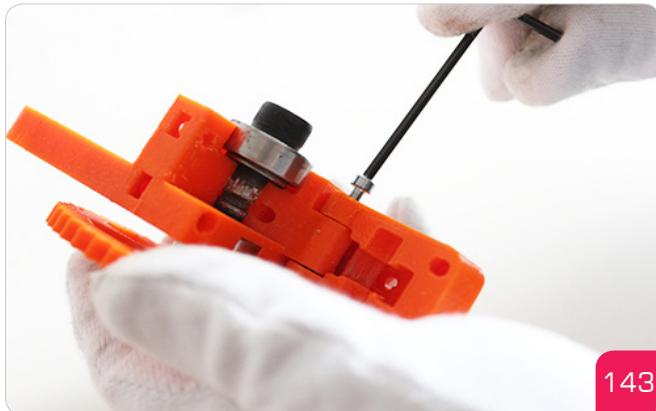


141

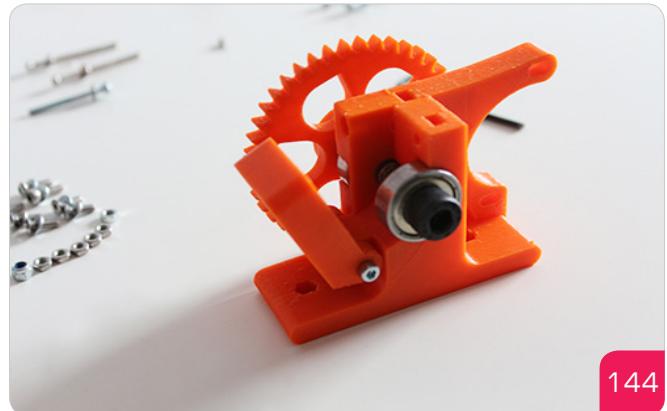


142

6.7 Take another extruder printed part and put M3 nut into the slot, and adjust it to already assembled part;

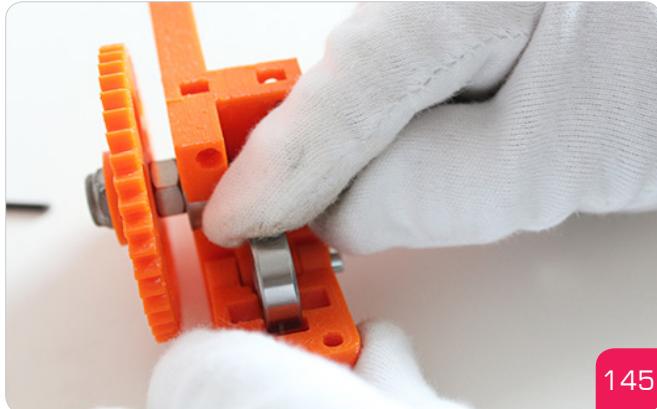


143



144

6.8 Screw the M3x25 screw into extruder, dont make it too tight, printed part should move easily, assembled part should look like on picture above;

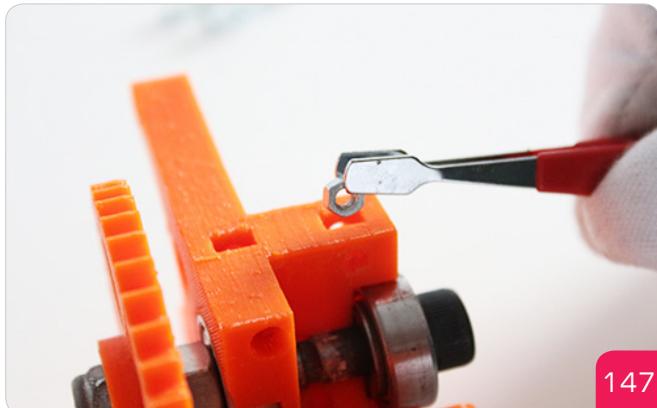


145



146

6.9 Take another 608 bearing and assembly it with extruder, it should make „click” sound, try to rotate the bearing to test if it fits;



147



148

6.10 Put M3 nuts into the top slots of extruder and assembly it with M3x40 screws;



149

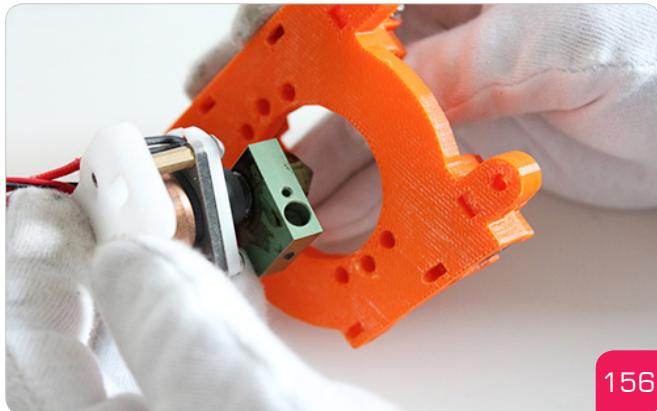
6.11 Assembled part should look like on picture above
(other solution - use springs for M3x40 screws to get
filament tightener);



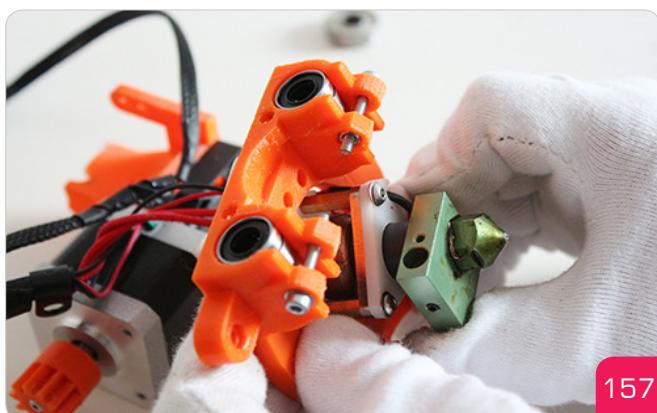
6.12 Take smaller wheelgear and put M3 nut into the slot then screw the headless screw into it, next step is to tighten wheelgear onto stepper motor shaft using the headless screw;



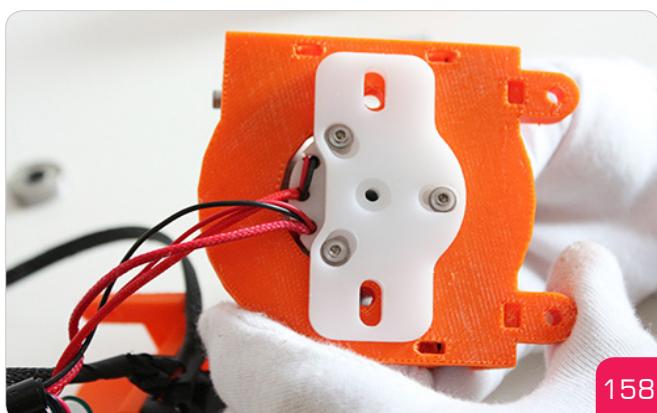
6.13 Take duct fan printed part and fan, screw the fan into printed part using the M3x10 screws;



156

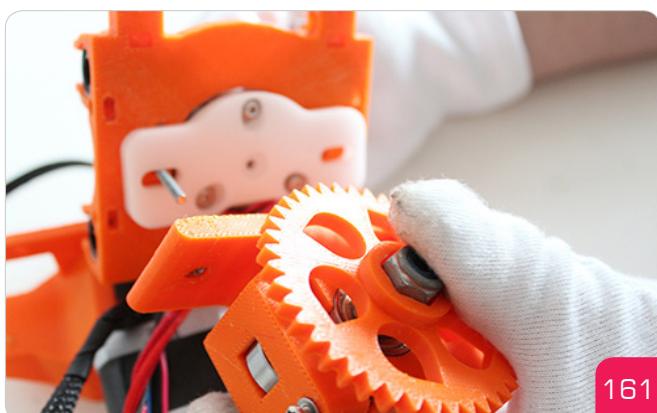
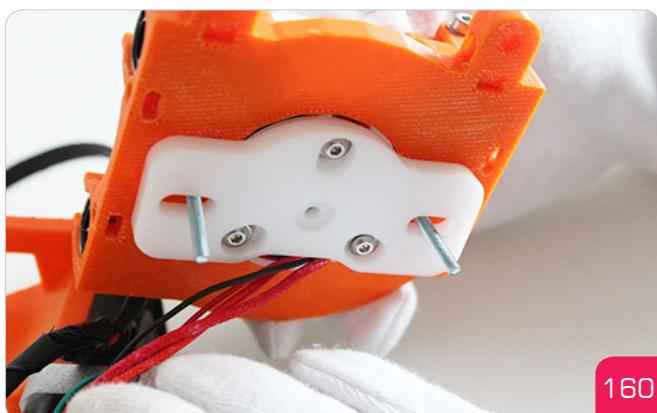
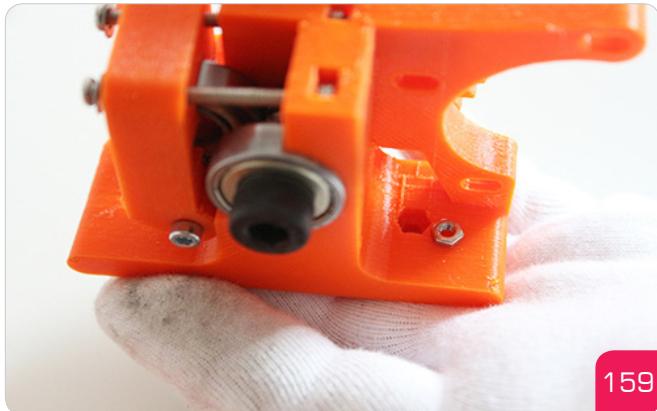


157



158

6.14 Going back to assembled components, take X carriage and assembly it with G3D Hotend 1.2, holes in printed part should fit with the G3D hotend 1.2 holes;



6.15 Now put two M3 nuts into the slots of assembled extruder, using two M3x30 screws assembly these parts;



162



163



164



165

6.16 Take already assembled Nema 17 stepper motor and adjust it with extruder assembled part, using the M3x10 screws tighten the stepper motor;



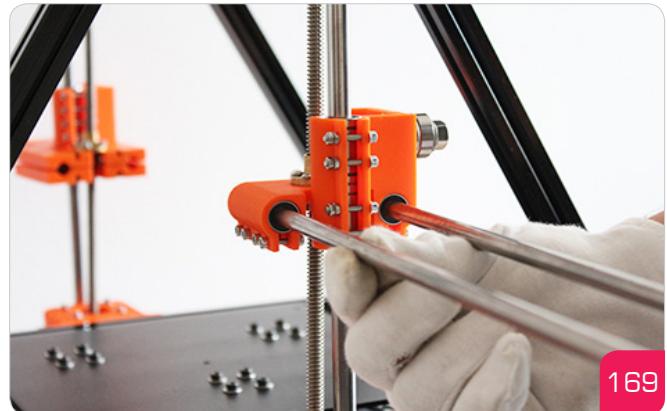
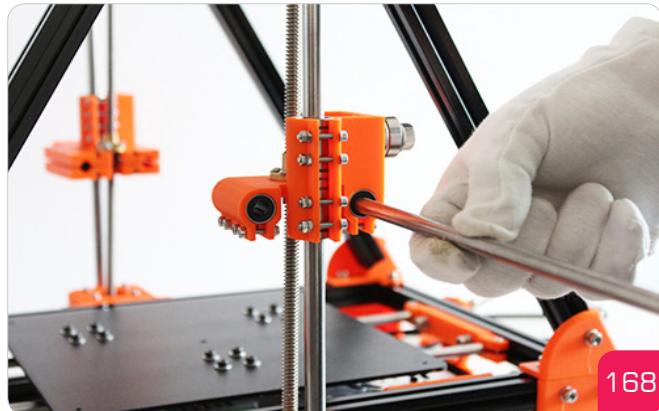
166



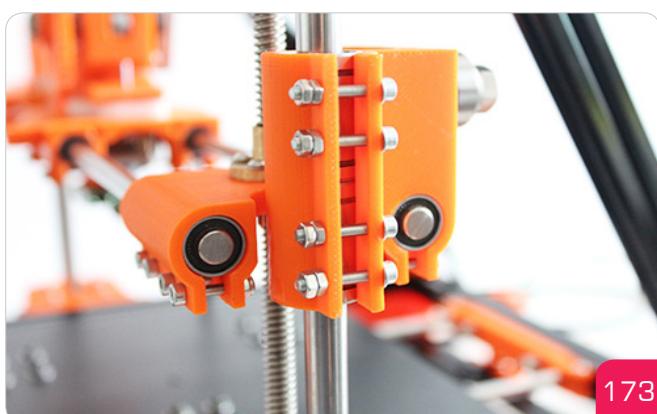
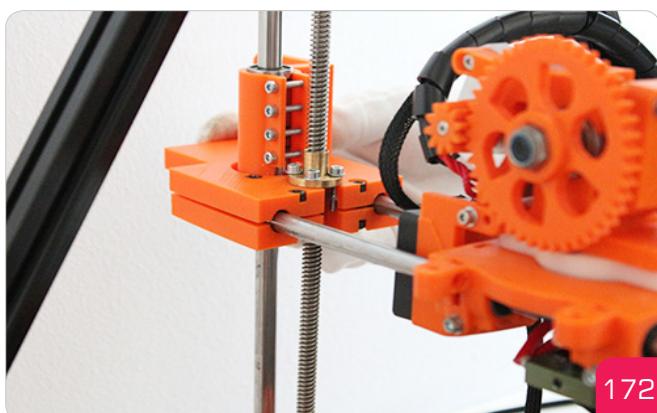
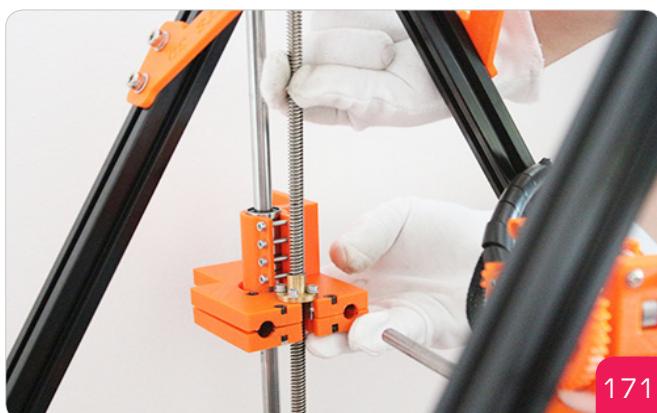
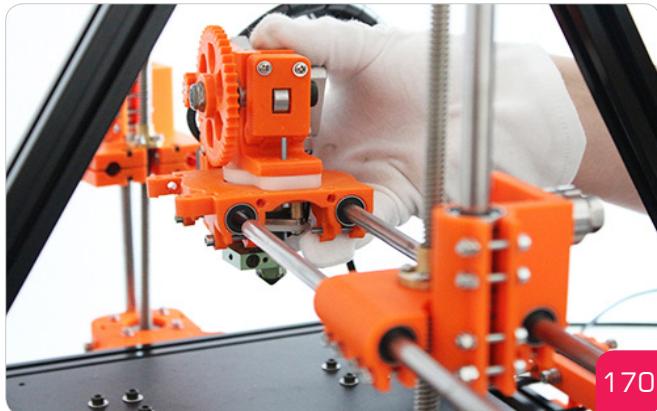
167

6.17 Take previously assembled duct fan part and use M3x10 screws to tighten it to extruder.

X AXIS



7.1 Take 2x 445mm 8mm diameter smooth rod and insert it through the bearings;

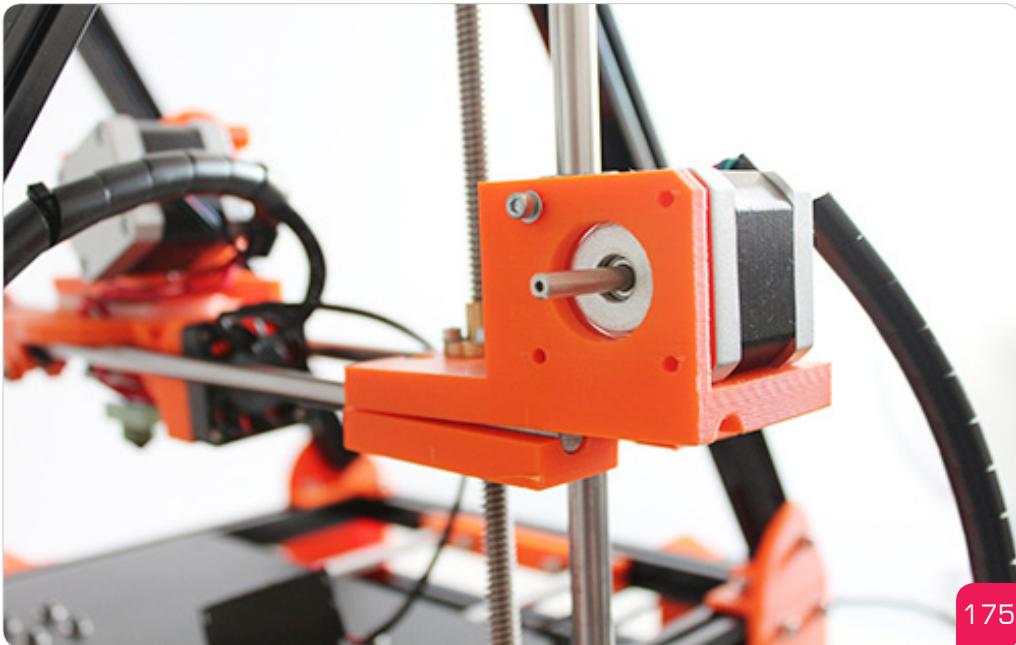


7.2 Take assembled extruder part and push smooth rods through it, after leveling the other Z rod mount (make the same high both of Z rod mounts), smooth rod should go through X carriage and Z motor holder - it's the closing of smooth rod and then it should be tightened so smooth rods won't move or rotate;

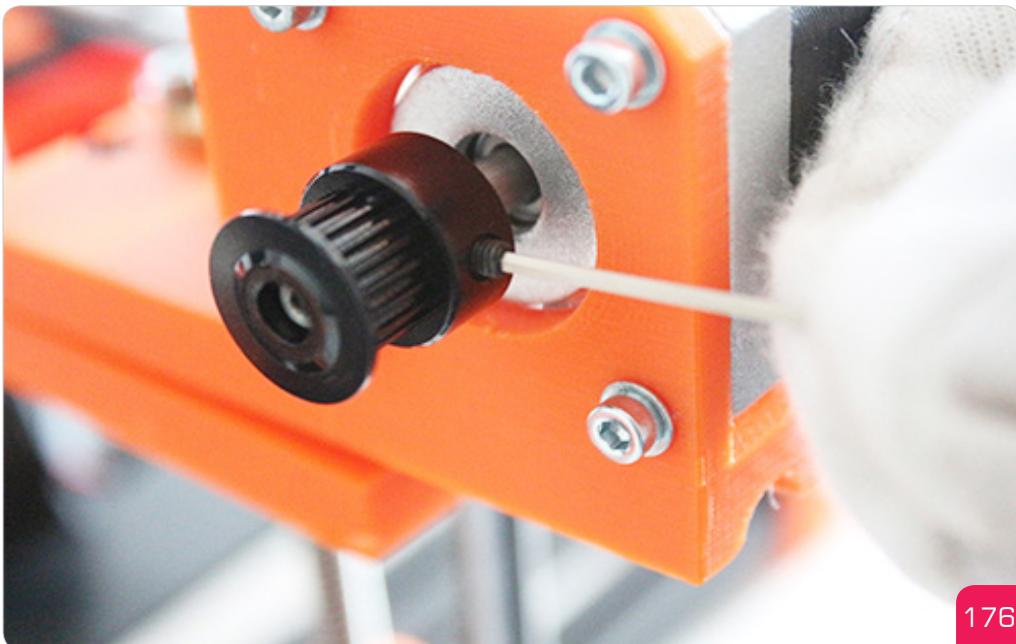


7.3 Prepare:

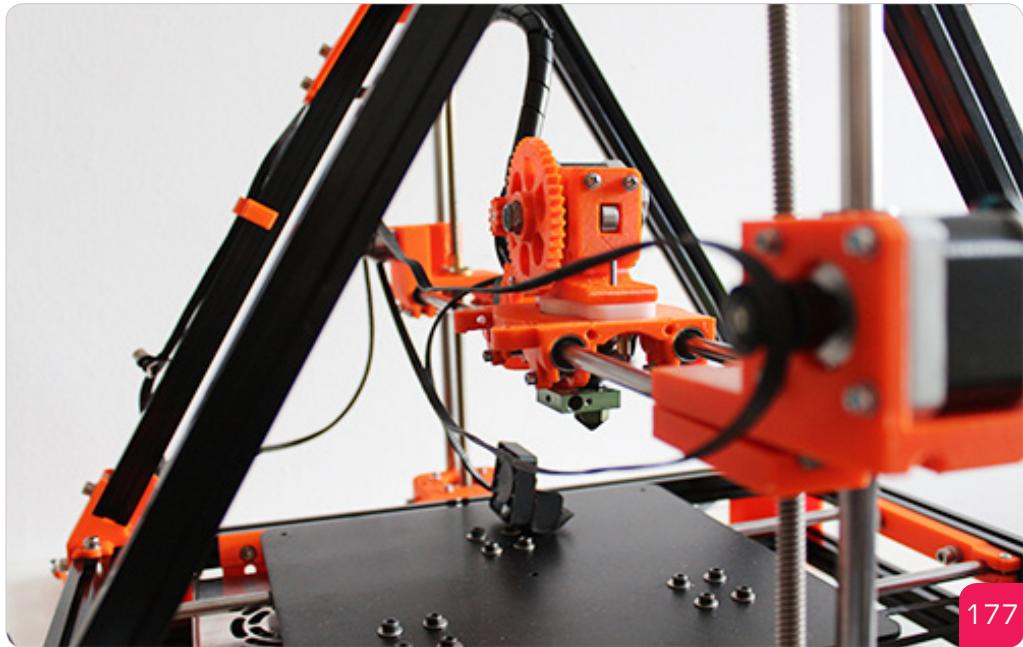
- Nema 17 stepper motor,
- 4x M3x10 SHCS,
- 4x M3 washer,
- 1x GT2 pulley,
- 2x M3x5 headless screws;



7.4 Mount the Nema 17 stepper motor onto Z rod mount like on picture above, then screw motor to Z mount using M3x10 screws and M3 washers;



7.5 Now insert GT2 pulley and tighten the headless screws from two sides;



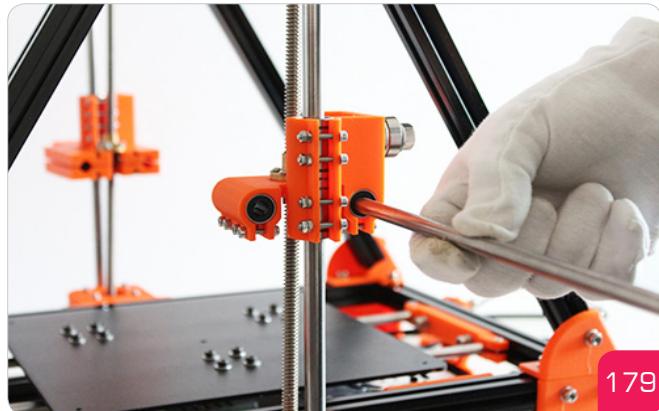
7.6 Now prepare GT2 timing belt, it's ready to be mounted;



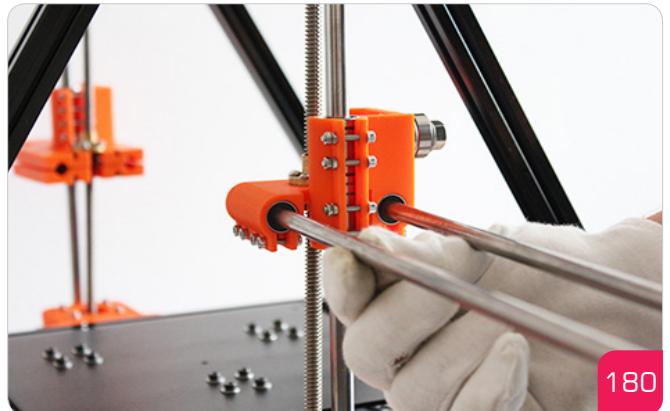
178

7.7 Prepare:

- 2x M3x30 SHCS,
- 2x M3 washer,
- 3x M3 nut,
- X carriage printed parts;

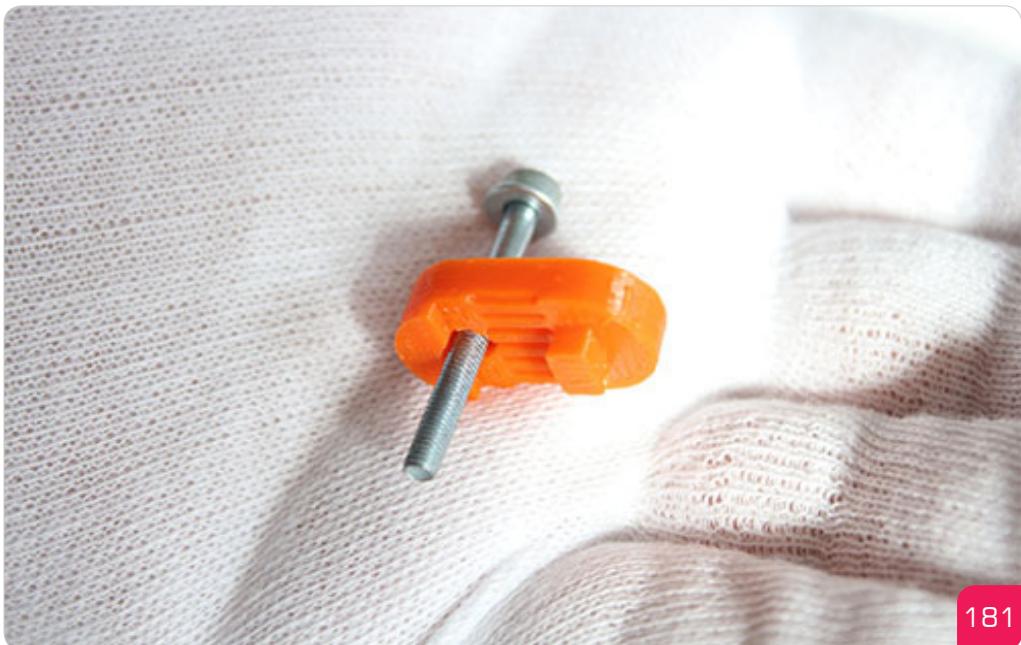


179



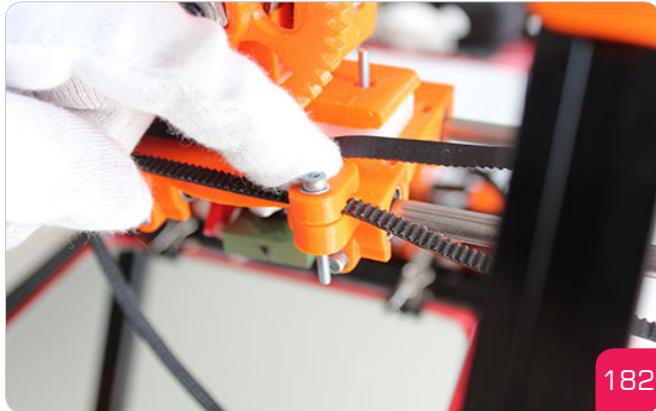
180

7.8 Place GT2 belt like on picture;

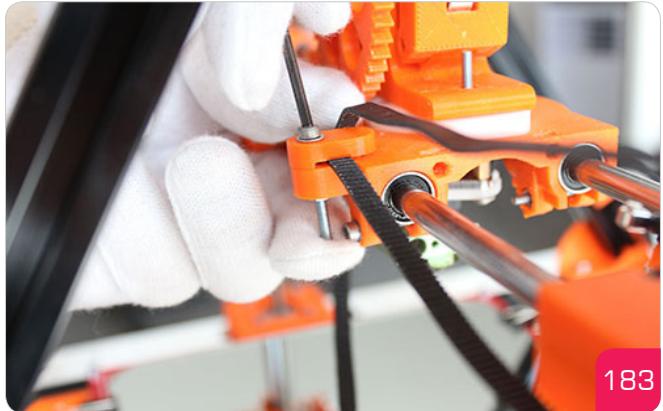


181

7.9 Take one of X carriage printed part, insert M3x30 SHCS with washer into hole;



182



183

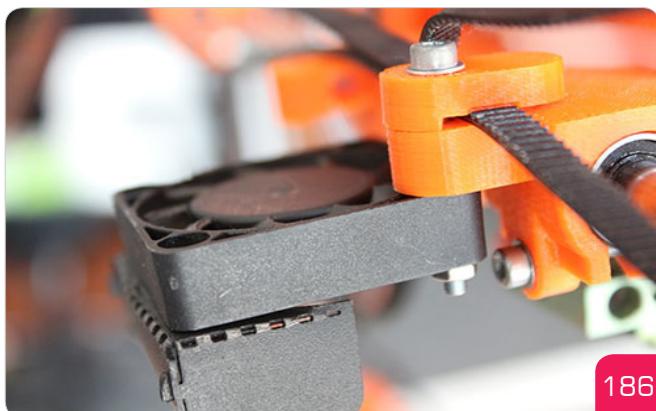
7.10 Now insert bottom GT2 belt (teeth facing upward) and tighten the screw using M3 nut (M3 nut should hide in a hole);



184

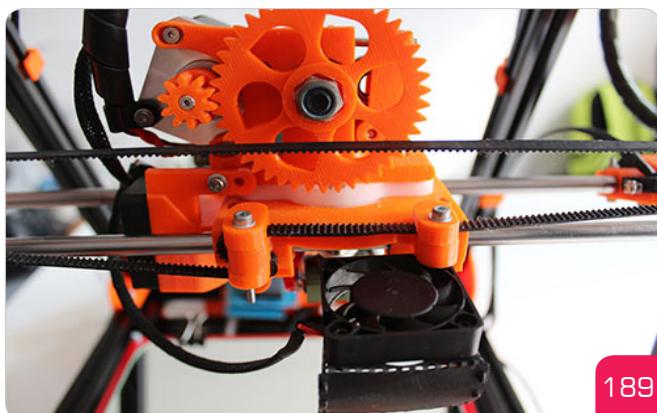


185



186

7.11 Now take last unattached fan, assemble it with screw and nut;



7.12 Take last X carriage parts and M3x30 SHCS with washer, tighten the belt a little and assembly these parts (last M3 nut should hide in a hole);



190

7.13 Correct assembly should look like this, top part of belt should cover the bottom part from top view;

HEATBED



191

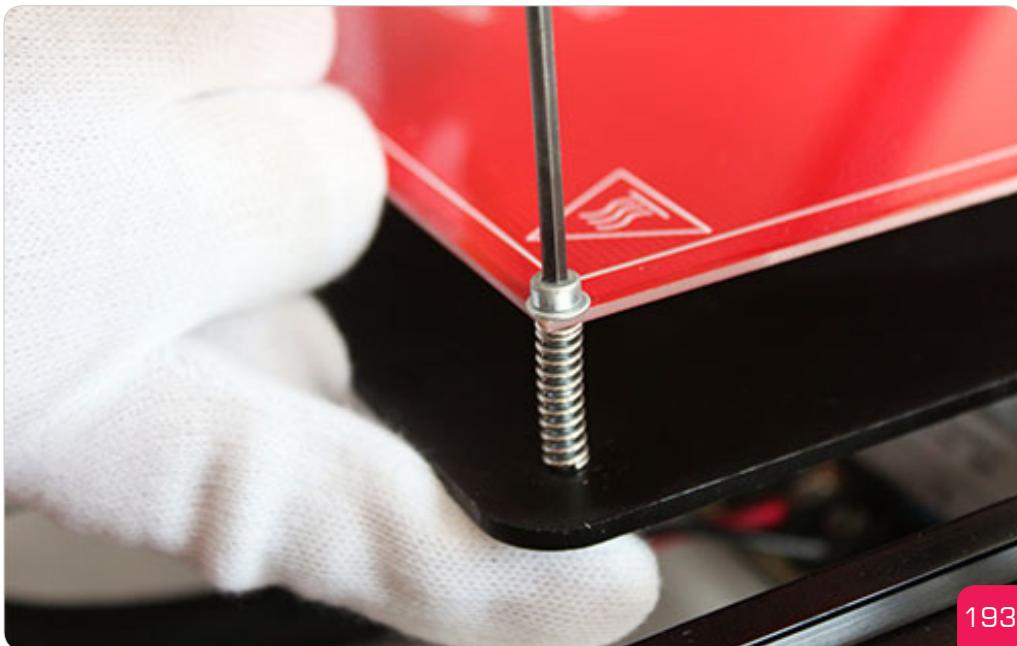
8.1 Prepare:

- heatbed,
- mirror plate,
- 4x 3x20 spring,
- 4x M3x30 SHCS,
- 8x M3 washer,
- 4x M3 nut,
- 4x Clips;



192

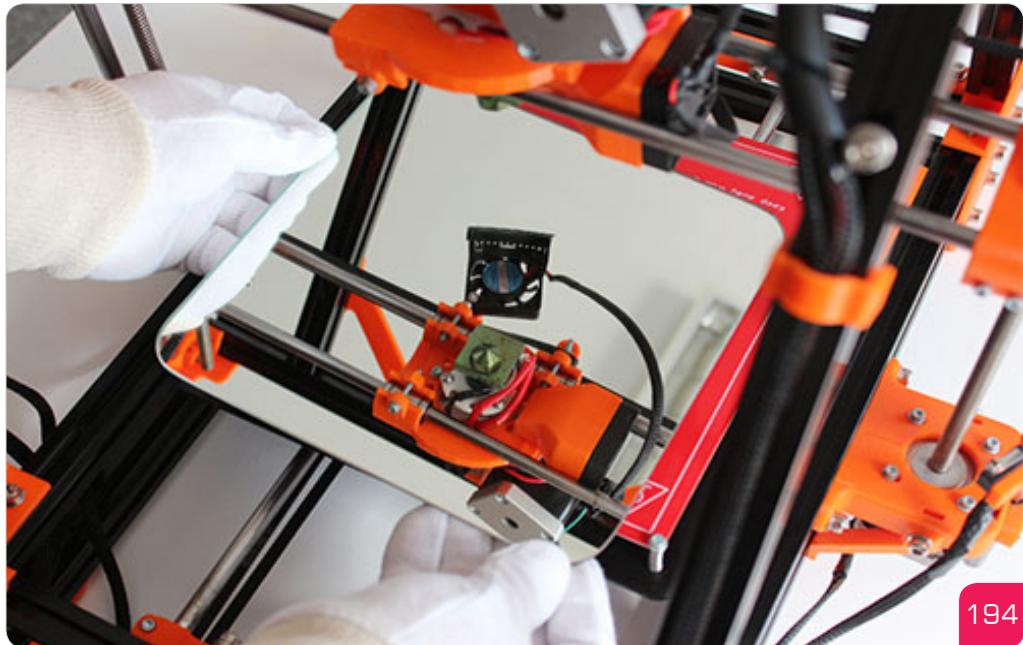
8.2 Take heatbed and in order insert M3x30 SHCS with washer then insert the spring, aluminum plate*, washer and M3 nut, repeat this operation for another holes;



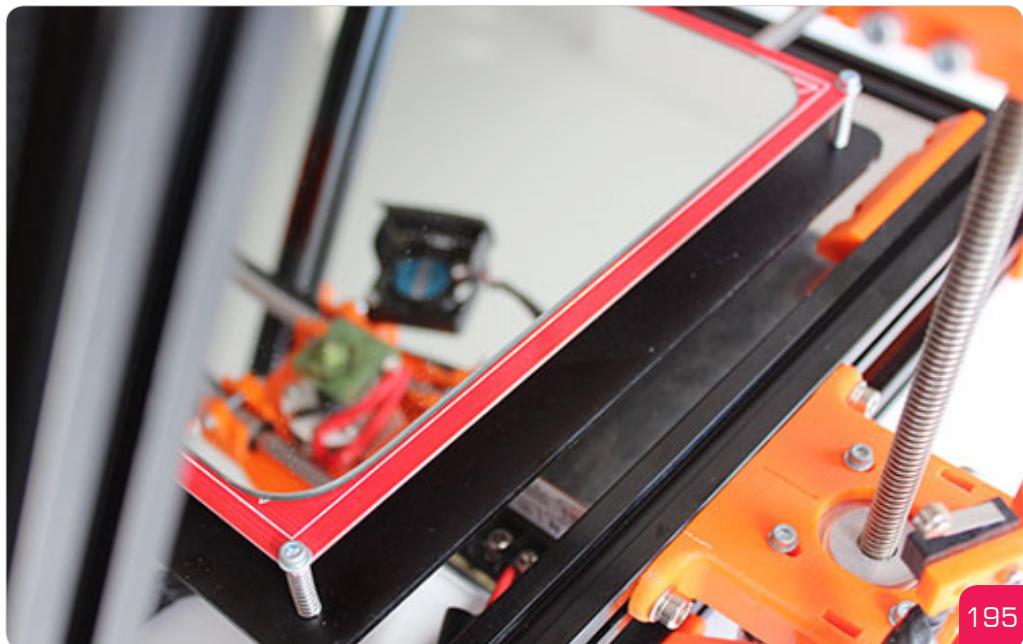
193

8.3 Now attach heatbed onto aluminum plate, this is tricky operation so be patient (Remember: M3x30 SHCS, washer, heatbed, spring, aluminum plate, washer, M3 nut);

* aluminum plate is already mounted

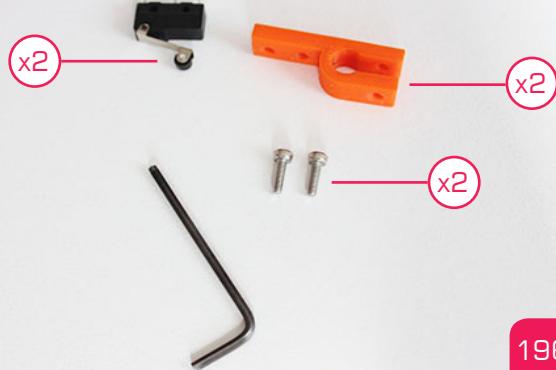


8.4 Now place the mirror plate onto heatbed;

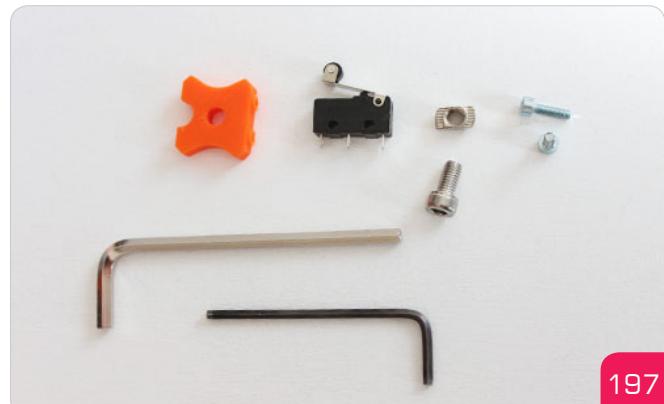


8.5 Adjust mirror plate with heatbed lines;

ENDSTOP



196



197

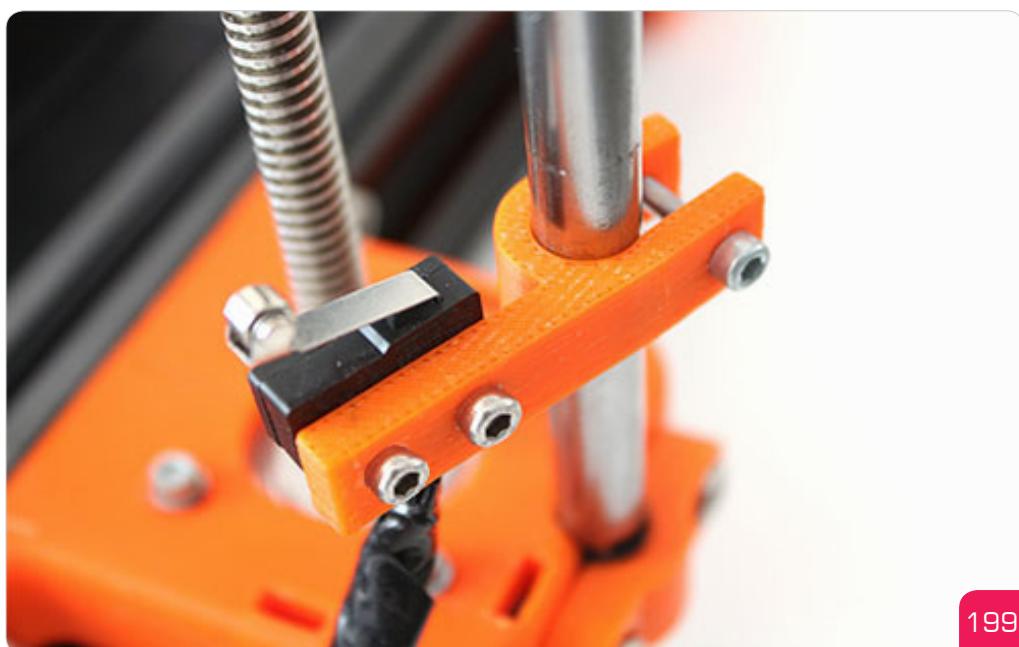
9.1 Prepare:

- 3x endstop,
- 6x M3x10mm SHCS,
- 1x M5x10mm SHCS,
- 1x T-slot nut,
- 1x endstop holder 8mm,
- 1x endstop holder 10mm,
- 1x endstop alu printed part;



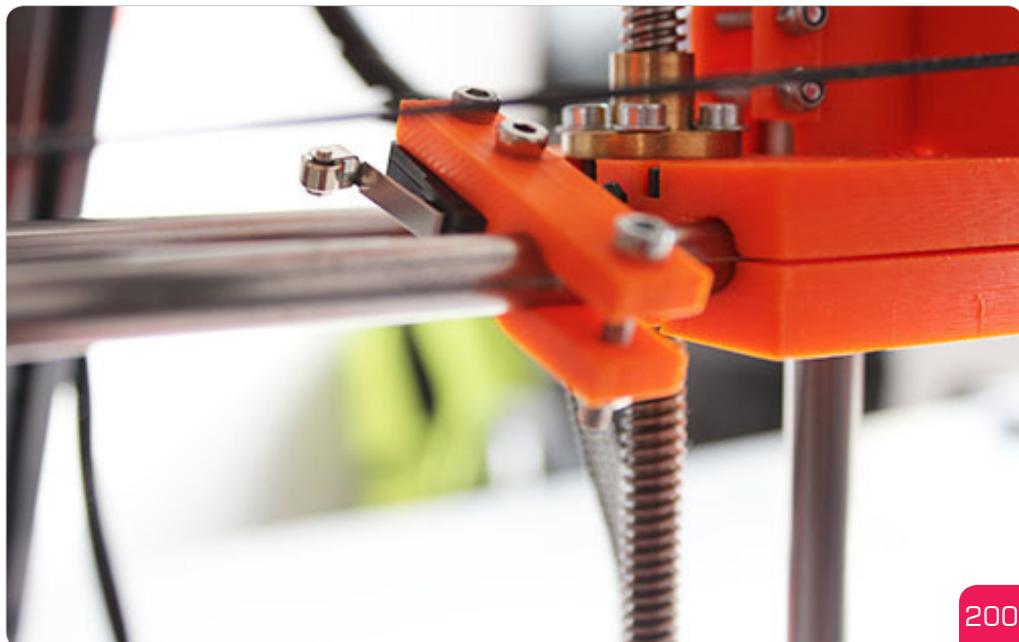
198

9.2 Now attach endstops to plastic parts using the M3x10mm screws;



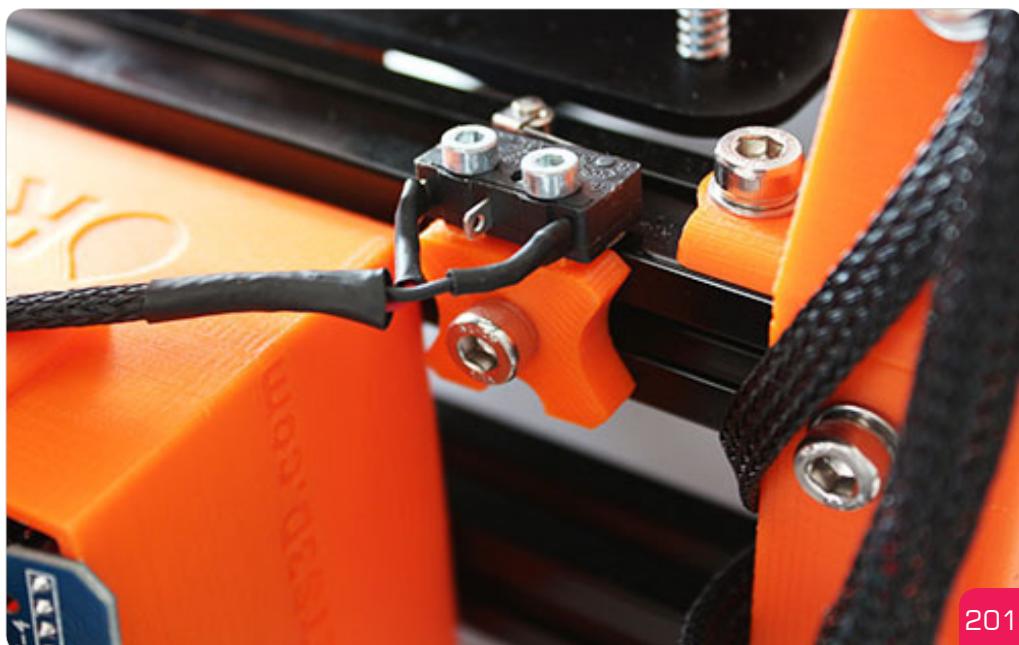
199

9.3 Take endstop holder 10mm printed part with endstop on it and slide it onto Z smooth rod (endstop should aim at Z holder printed part);



200

9.4 Take endstop holder 8mm printed part with endstop on it and slide it onto X smooth rod, endstop should be between smooth rods (endstop should aim for X carriage);



201

9.5 Last endstop should be placed in bottom frame, on top aluminum profile (endstop should aim for Y aluminum plate);

SPOOL HOLDER



202

10.1 Prepare:

- 100mm aluminum profile,
- aluminum extrusion holder,
- 2x M5x10 SHCS,
- 2x T-slot nut;

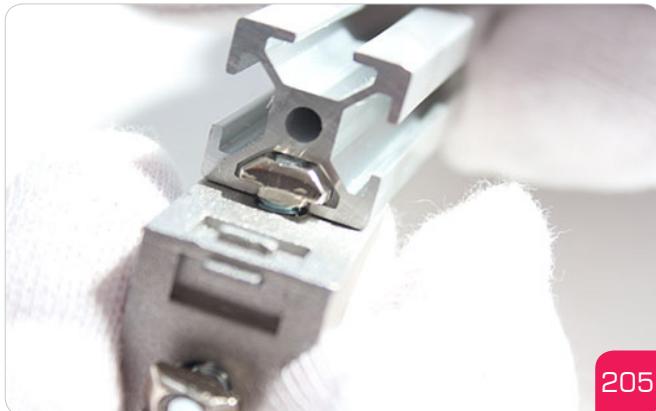


203



204

10.2 Take aluminum extrusion holder and assemble 2x M5x10 SHCS with T-nuts;



205



206



207

10.3 Now insert 100mm aluminum profile onto aluminum extrusion holder and tighten the screw;



10.4 Attach assembled part on top corner;

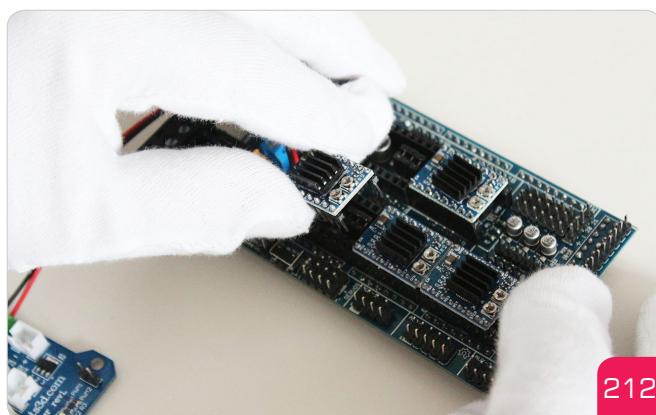
RAMPS



210

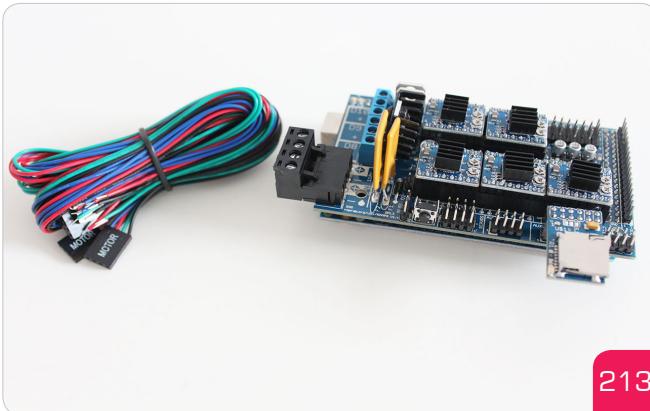


211



212

11.1 Unpack RAMPS box
(RAMPS 1.4 + arduino + sd shield);



213



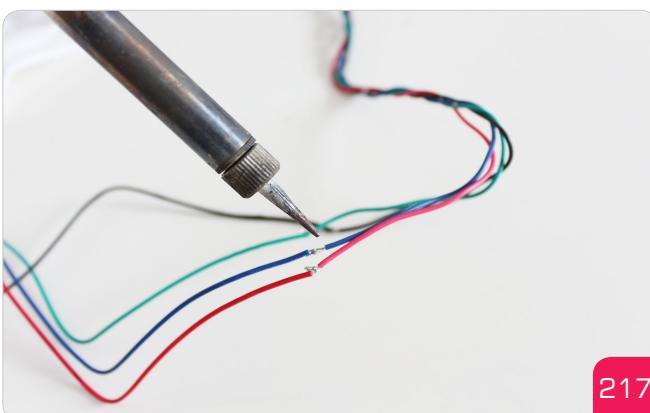
214



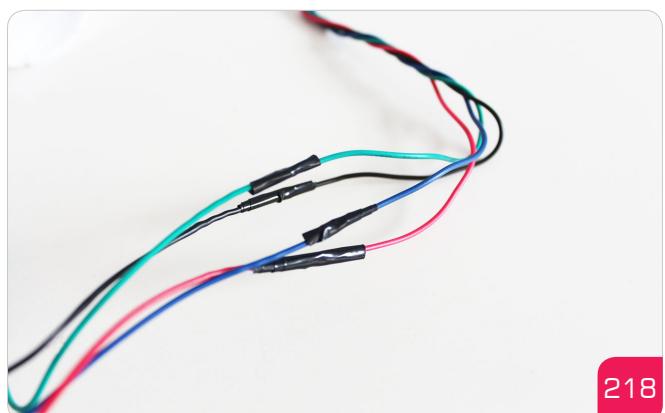
215



216



217



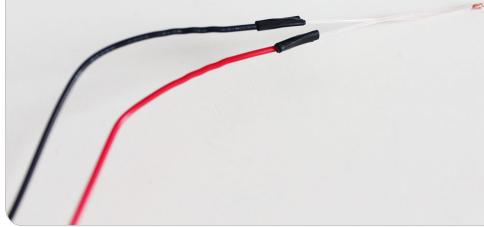
218

11.2 Take motor wires and solder the same colors from wires with connector and use tape to protect the connection, this will apply to X, Y and E motors;

connector wires	motor wires
black	yellow
green	blue
red	red
blue	green

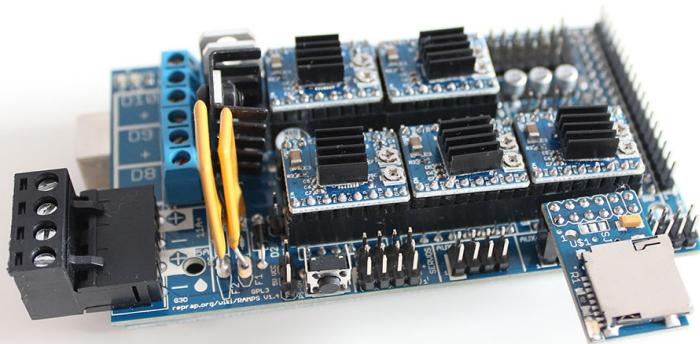


219



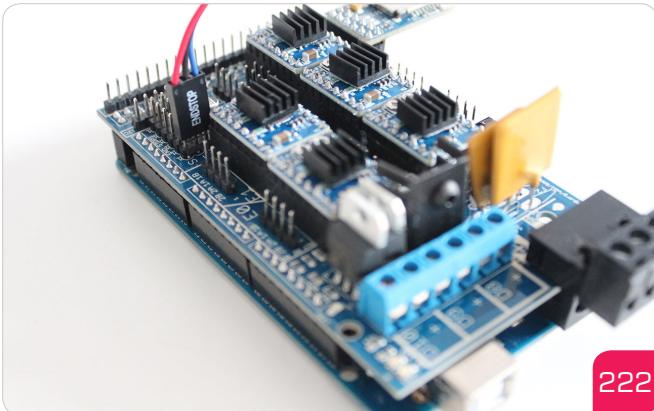
220

11.3 Take thermistor wires with connector and thermistor (heatbed, hotend), solder it like before, and use tape to protect the connection;

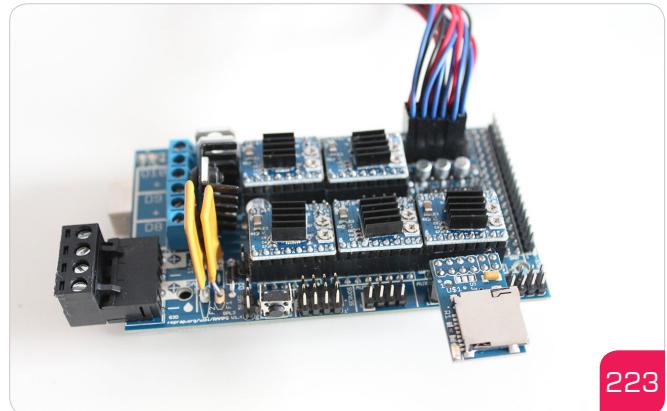


221

11.4 After soldering motors, endstops, thermistors you can connect them into RAMPS board;

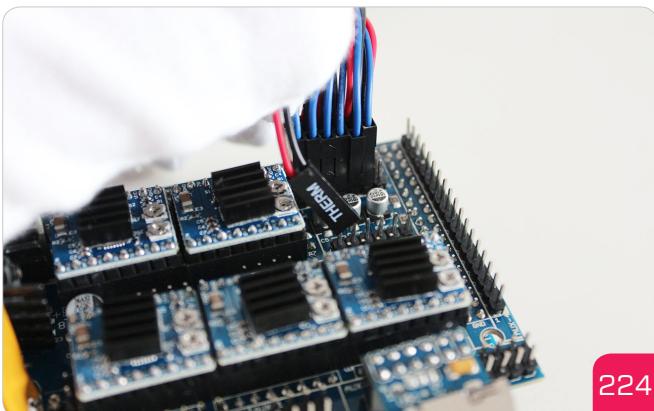


222

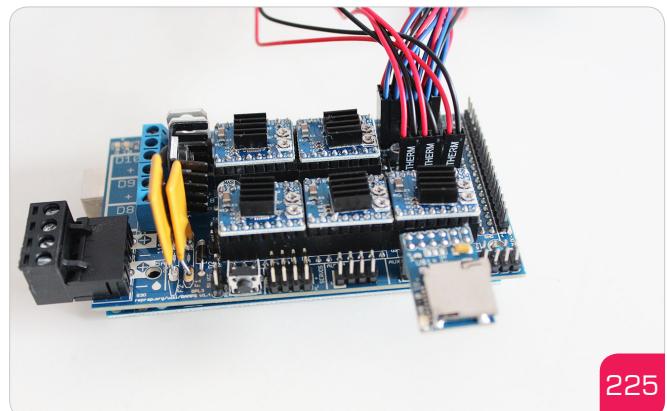


223

11.5 Take endstop connector and place it;

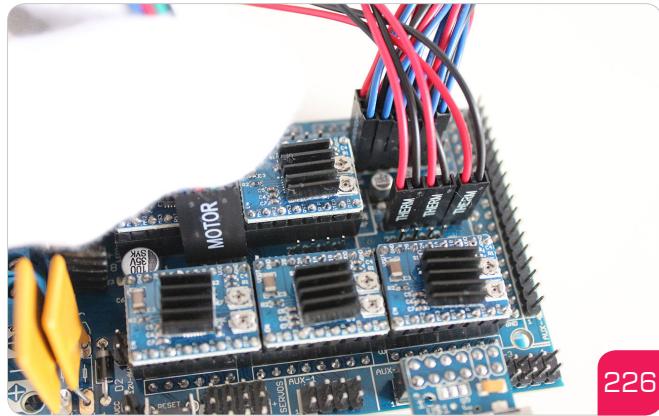


224

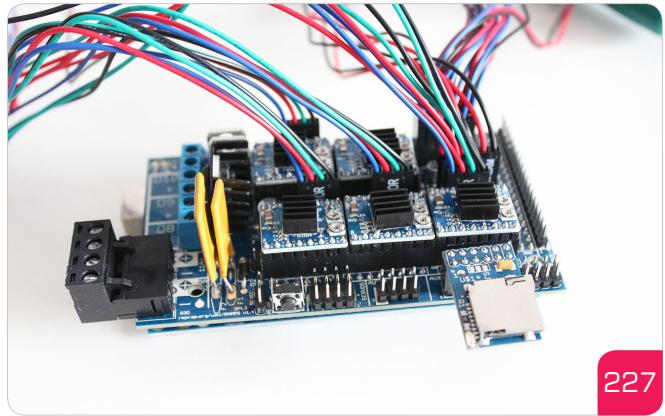


225

11.6 Thermistor connectors should go near endstop pins;

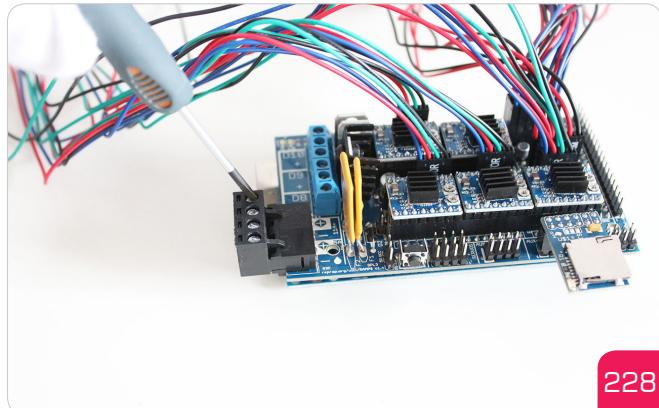


226

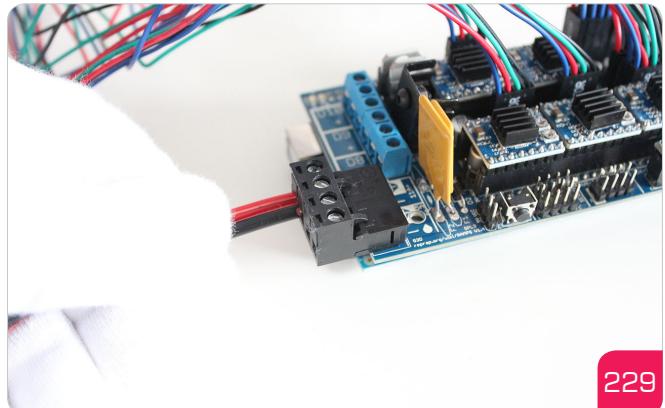


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11.7 Take motor connector and connect it near drivers;

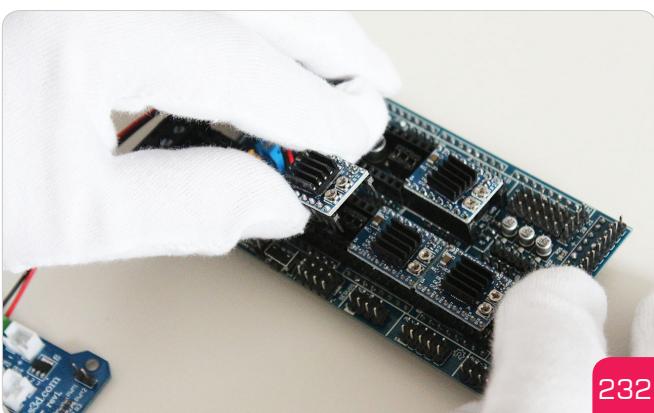


228

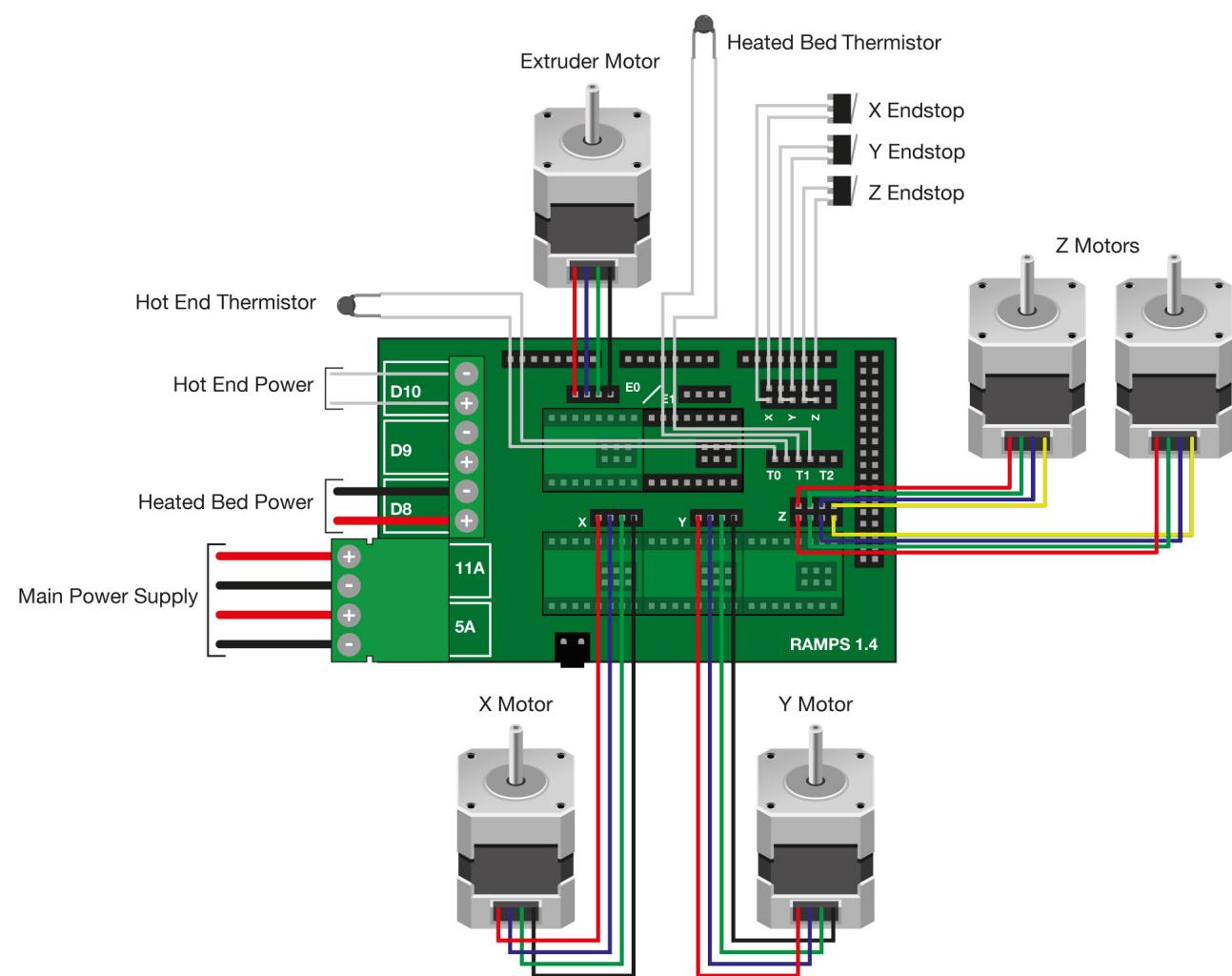


229

11.8 Take flat screwdriver to loose power connector then connect power wires;



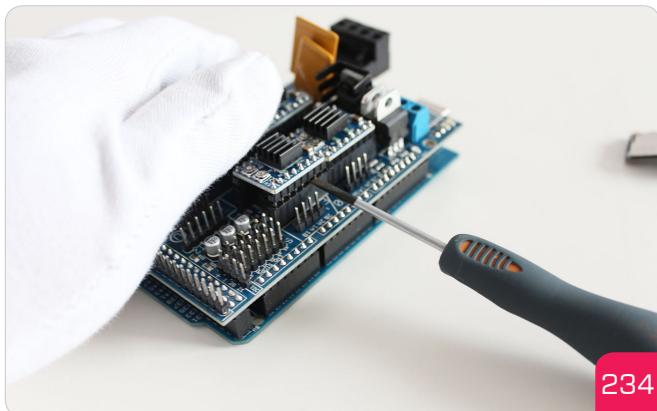
11.9 With the same screwdriver loose hotend connector then connect wires, after this operation tighten the screws;



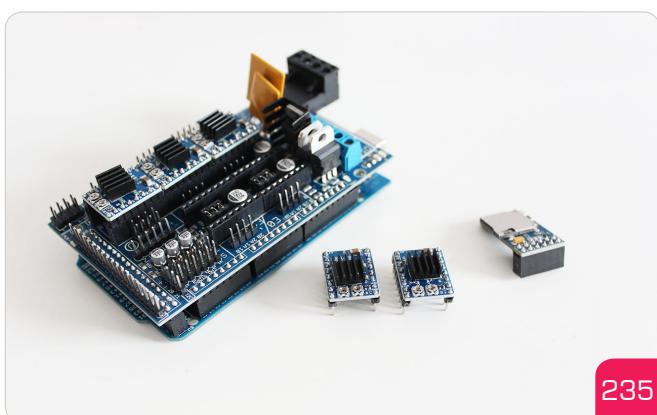
233

11.10 RAMPS 1.4 wiring schematic;

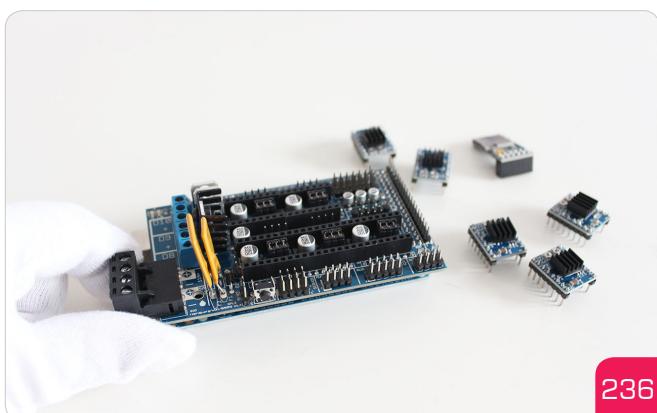
*ADDITIONAL RAMPS DISASSEMBLY



234

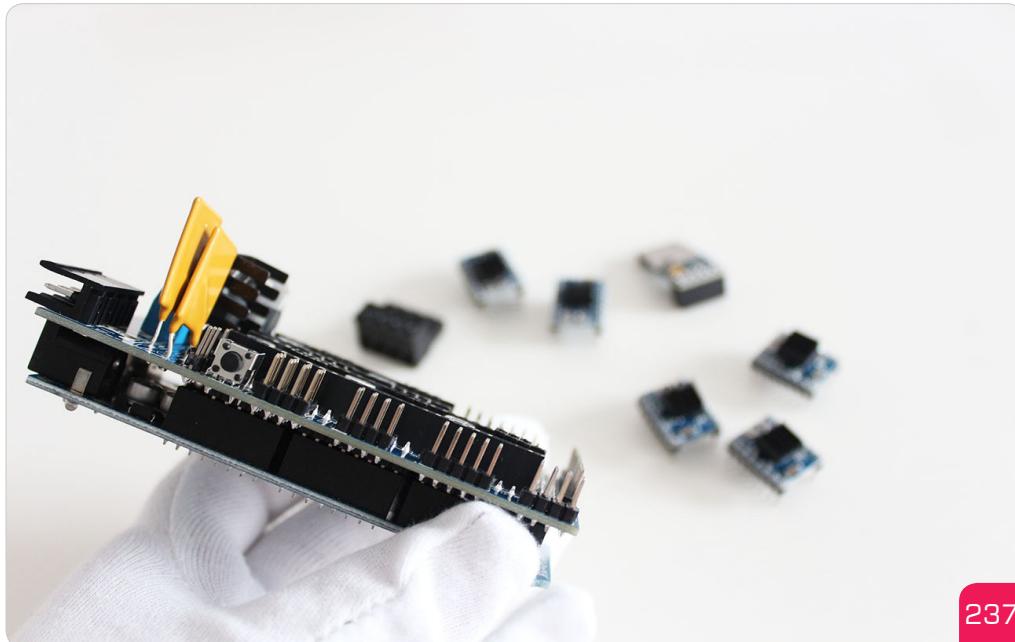


235



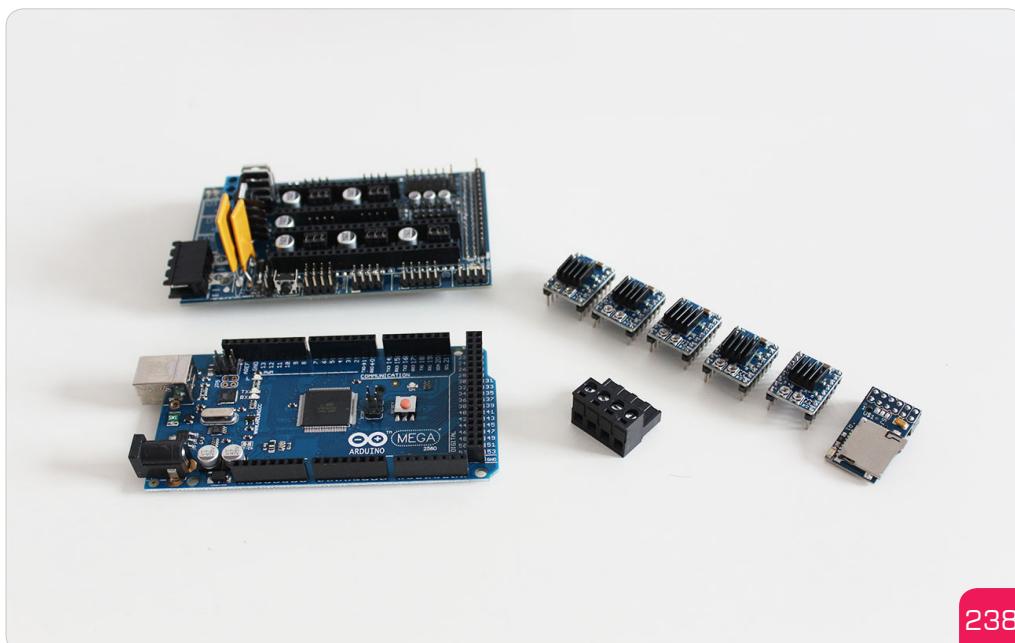
236

11.11 Use flat screwdriver to undermine the A4988 step motor drivers,



237

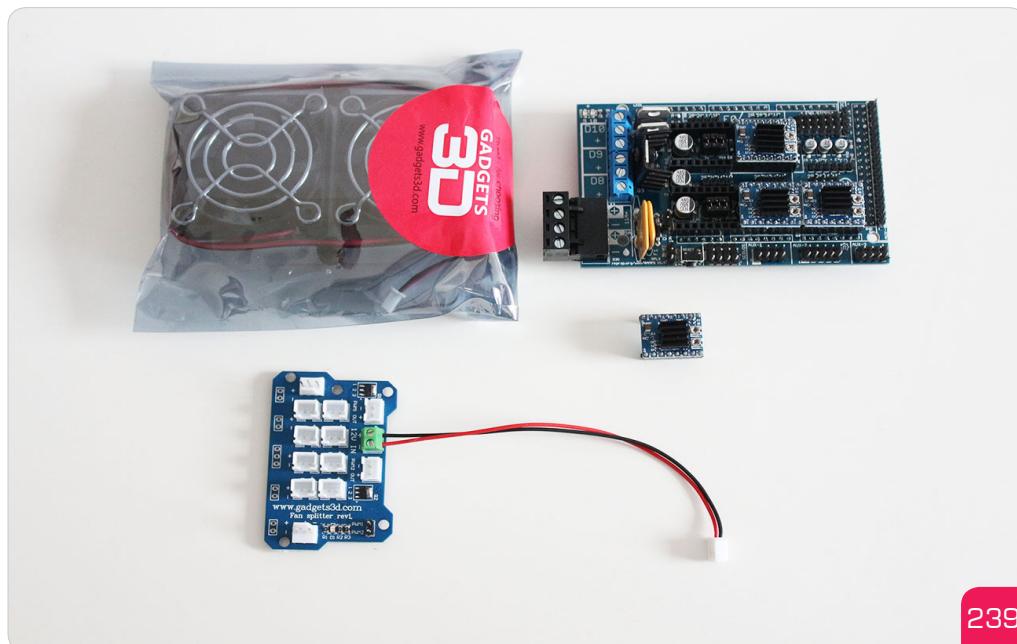
11.12 Use the same tool to deattach arduino module from RAMPS, after this unplug power socket;



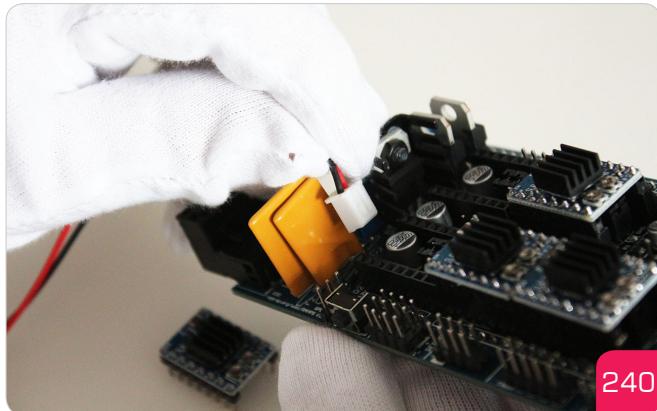
238

11.13 Now your RAMPS is fully disassembled.

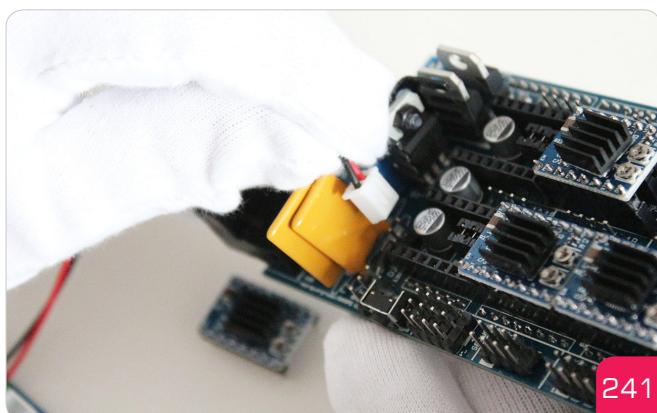
FAN SPLITTER & COOLING PLATE



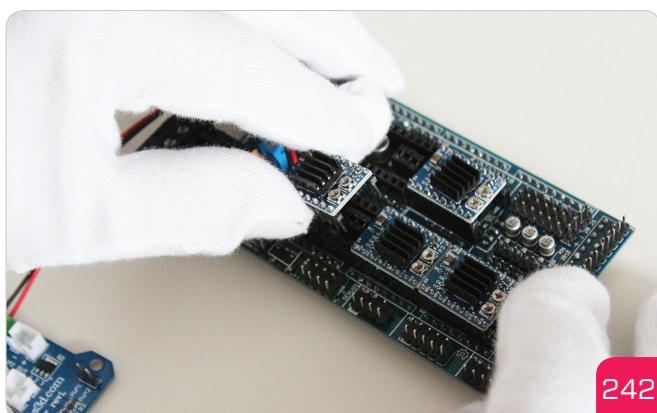
12.1 Collect parts needed for assembly;



240



241



242

12.2 Plug-in fan splitter power wire into RAMPS socket (or any other source of 12V);



243

12.3 Unpack fansplitter parts with plastic spacers,
4x M3x10 SHCS, 5x M3 plastic nut;



244



245



246

12.4 Unscrew two screws from plastic frame;



247



248



249



250

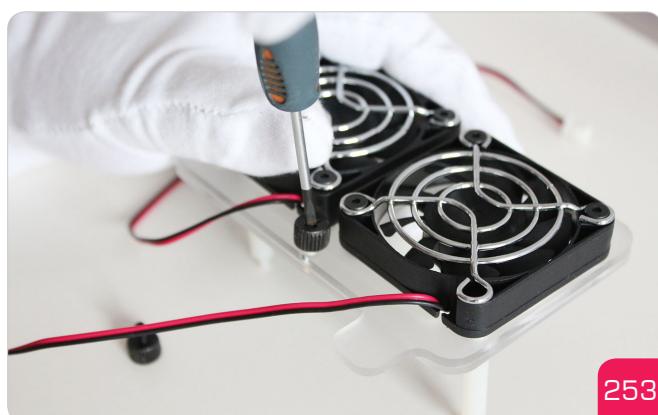


251

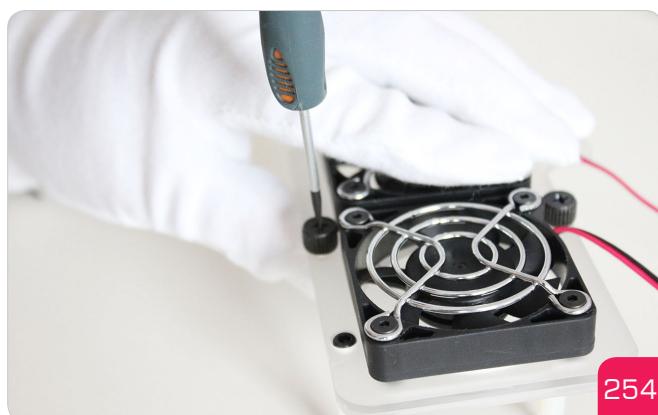
12.5 Take already disassembled part and 3x M3x10 SHCS, 3x Plastic spacer and assemble like on picture above;



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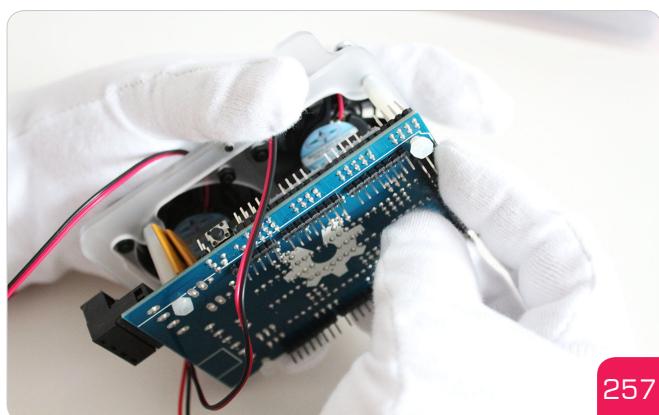
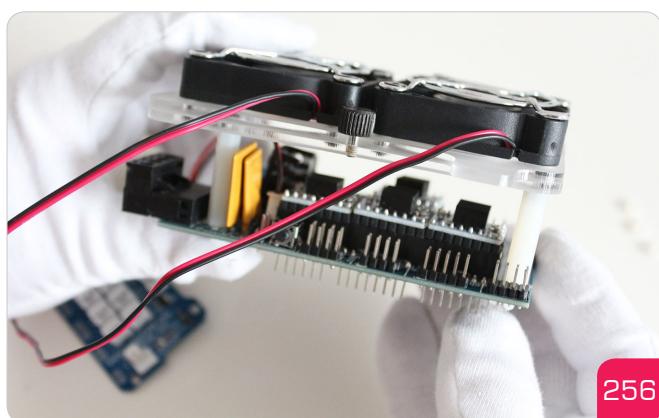
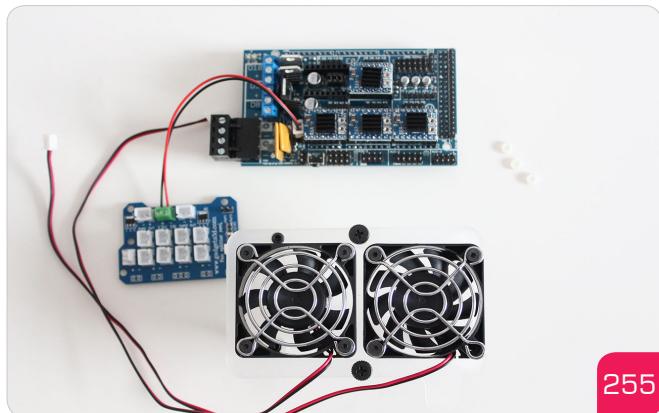


253

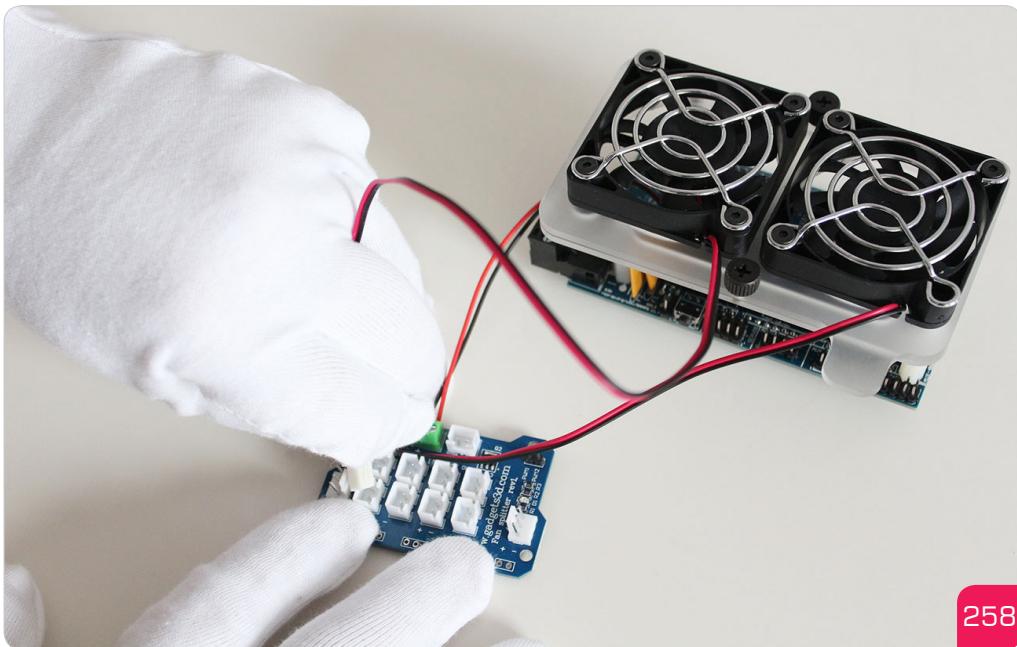


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12.6 Now attach top part with fans on your already assembled part with spacers and connect them using two screws;

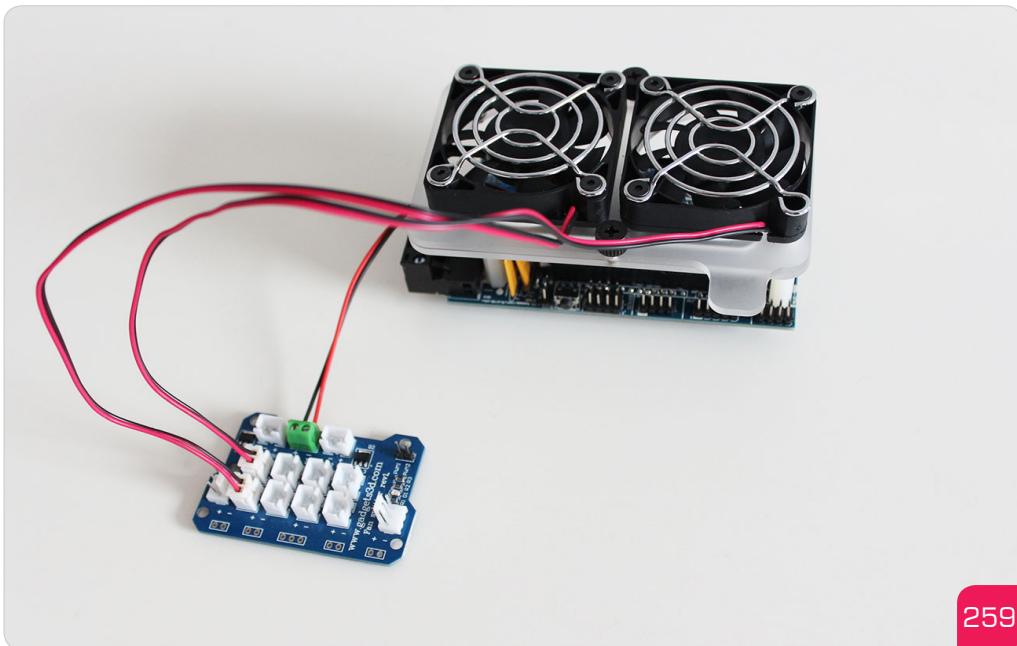


12.7 Now take RAMPS with already connected fansplitter board and assemble fans onto it. Use plastic M3 nuts to tighten part;



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12.8 Now connect fans into fan splitter sockets;



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12.9 Fan splitter board is successfully connected.