

1. Disassembly

Disassembly of the MK2 printer and upgrading to the MK2S using the upgrade kit.

Written By: Jakub Dolezal



F TOOLS:	PARTS:
 All tools are included (1) 	 Original Prusa i3 MK2 to MK2S upgrade kit (1)

Step 1 — Preparing the printer



- Ensure the printer is **turned off and not plugged in!!!** Also check the **filament is unloaded** from the Extruder!
- Prepare tools included in the MK2 kit or get similar from nearest hardware shop.
- Prepare MK2S upgrade kit received from Prusa Research.
- Before you start printer disassembly, be sure you have printed all the new parts! Download them here: Printable parts
- (i) We strongly recommend getting a box or bowl for nuts and screws. You will need some of them later during assembly.

Step 2 — Y-axis: Heatbed disassembly (Part 1)



- Ensure again the printer is not connected to the power outlet, otherwise there is a risk of damage to the electronics!
- Turn left part of the printer with the Rambo cover towards you. Release the M3x40 screw using a 2.5mm Allen key.
- Using pliers, cut the zip tie holding the cables from heatbed. Proceed carefully, you can break the cables.
- Unwrap at least two turns of the spiral wrap and follow the cables inside Rambo cover, locate the connectors and unplug them. Unplug the connector, **DO NOT PULL** the cable!

Step 3 — Y-axis: Heatbed disassembly (Part 2)



- Lay the printer on the PSU side and move the heatbed all the way to the back for better stability.
- Locate the Y-belt-holder and undo both screws using a 2.5mm Allen key.
- Move the Y-belt-holder away from the Y-carriage. You can leave the belt inside the holder.

Step 4 — Y-axis: Heatbed disassembly (Part 3)



- Using a 2mm Allen key, release all 4 screws. When releasing the last screw hold the heatbed, otherwise it will fall off!
- After the heatbed is released, place it in a safe location. You will use it during the printer's reassembly.
- (i) Get your box for spare parts, you will reuse several components from now on.

Step 5 — Y-axis: Release Y-carriage



- Move the Y-carriage to the front and using pliers, cut off the zip ties on all 3 bearings. While cutting the last zip tie hold the Y-carriage, it will fall off.
- Rotate the printer "back on it's feet" and using pliers cut the 4 zip ties holding the smooth rods.
 Best way is to use tip of the pliers and twist them around until the zip tie breaks.
- After removing all zip ties, use your hand to remove the smooth rods. Wrap 4 four fingers around the rod and press your thumb against the M8 nut on the side of the Y-Corners. Do not use excessive force.
- (i) You will need the Y-carriage later, so place it next to the heatbed from the previous step. Smooth rods and bearings will be replaced by new ones from our upgrade kit.

Step 6 — Extruder removal (Part 1)



- Using pliers, cut the zip tie holding cables from the extruder. Proceed carefully, you can break the cables.
- Using pliers, cut the zip ties on the spiral wrap behind extruder. Again proceed carefully, you can break the cables. Unwrap the spiral wrap all the way to the Rambo cover.
- Follow the cables inside Rambo cover, locate the connectors and unplug them. Unplug the connector, **DO NOT PULL** the cable!



Step 7 — Extruder removal (Part 2)

Using a 2.5mm Allen key, release all screws holding the Extruder body.
 While releasing the last screw hold the Extruder, it will fall off!

Step 8 — Extruder disassembly (Part 1)



- Using a 2.5mm Allen key, release the 2 screws on the Front print fan. Don't try to remove the fan completely yet, you will need to release P.I.N.D.A. probe first.
- Using a 2.5mm Allen key release the 4 screws on the Left hotend fan. You can remove this fan completely, however you will reuse it later.
- Use pliers to release the nut holding P.I.N.D.A. sensor. Proceed carefully since this nut is glued!
- Using a 2.5mm Allen key, remove the screws holding the Extruder idler.
- Using a 2.5mm Allen key, remove screws holding Extruder motor.

Step 9 — Extruder disassembly (Part 2)



- Using a 2.5mm Allen key remove the screws and remove this part of extruder.
- Carefully remove the hot end, do not break the cables! Remove all nuts from this part of the extruder and keep them for later.

Step 10 — X-axis: Disconnect motor cables



- Move the Z axis up by rotating the trapezoid screws, when reaching 3/4 of the printer's height stop and turn the printer on the PSU side.
- Using a 2.5mm Allen key release the bottom screw from the Rambo cover and rotate the cover slightly upwards.
- Do not unwrap the spiral wrap, just follow the cables from X axis motor and unplug them from the Rambo board. Unplug the connector, **DO NOT PULL** the cable!

Step 11 — X-axis: Preparing Z axis



- Using a 2.5mm Allen key release the screws on Z-axis-top-left and Z-axis-top-right 3D printed parts. Then remove them from the frame.
- Remove the smooth rods on both sides. If you can't pull them easily. Try to rotate them first.
 Proceed carefully you can break the printed part in the bottom of Z axis.
- Rotate the trapezoid screws and move the X axis all the way up. When reaching the top hold the X axis by one hand, it will fall off once leaving the threads!

Step 12 — X-axis: disassembly (Part 1)



- Release marked screws on the motor holder with a 2.5mm Allen key and rotate the motor slightly to release tension in the belt.
- Using pliers, take the belt out from the pins. **Don't throw the belt away**, you will need it later.
- Using gentle force, slide out both ends of X axis. The smooth rod might get stuck in either of printed parts. Release it by rotating the rod and pulling at the same time.
- (i) Smooth rods and linear bearings will be replaced by new from the upgrade kit.

Step 13 — X-axis: disassembly (Part 2)



- Using a 2.5mm Allen key, release the screws securing the trapezoid leadscrew nuts and remove them.
- Insert a screwdriver carefully in the 3D printed part and push the bearings out.
- A Only press the screwdriver against the metal sleeve of the bearing!
- (i) Bearings will be replaced by newer ones, keep remaining parts for reassembly.
- Proceed to the next chapter <u>1. Y-carriage drilling</u>



2. Y-carriage drilling

Increase openings in the Y-carriage to fit new u-shaped bolts for MK2S.

Written By: Jakub Dolezal



Step 1 — Assembling P-drill (Part 1)



- 3.1 mm drill bit
- P-drill
- M3x12 screws
- M3nS square nuts
- (i) All parts of the P-drill, including the printed part are part of the upgrade kit.

Step 2 — Assembling P-drill (Part 2)



Insert M3nS square nuts into the nut traps in the P-drill printed part.

Step 3 — Assembling P-drill (Part 3)



• Insert the 3.1 mm drill bit all the way into the P-drill printed part.

Step 4 — Assembling P-drill (Part 4)



- Insert M3x12 screws into the P-drill printed part.
- Using 2.5mm Allen key tighten the screws as much as possible.

Step 5 — Drilling Y-carriage (Part 1)



 Highlighted holes are going to be drilled in next steps.

Step 6 — Drilling Y-carriage (Part 2)



- Using the assembled P-drill, drill the highlighted holes from previous step (increase the diameter of the original holes used for zip ties to secure bearings).
- Rotate with the P-drill assembly clockwise as shown in the picture.
- Apply force downward through the Y-carriage.
- It's similar to opening a wine bottle, but don't apply that much force or the drill bit will get stuck. If it gets stuck, just rotate the opposite direction and repeat with less force.
- F If the drill bit is slipping in the printed part, just tighten the M3x12 screws a little more.
- Don't drill the Y-carriage directly on the table, you can damage the surface. Use cardboard or empty filament spool as an underlay
- Ensure the P-drill drills few millimeters through the Y-carriage.
- Proceed to the next chapter <u>2. XYZ-axis reassembly</u>



3. XYZ-axis reassembly

Written By: Jakub Dolezal



Step 1 — Placing Y-motor-distance: part 1



- Before you proceed, let's make a fast disassembly and instal Y-motor-distance.
- Take a 1.5mm Allen key and release both screws on Y-axis endstop.
- Take a 2.5 mm Allen key and release both screws on Y-axis motor.
- Keep in mind both endstop and motor are tied to the frame, proceed with caution or might break the cables.

Step 2 — Placing Y-motor-distance: part 2



- Use the motor to set proper distance for the Y-motor-distance. Place the motor next to the Y-motor printed part.
- Place the Y-motor-distance part at the other edge of the motor.
- The cut out part for the wiring must be upwards, see the picture.
- That's it! Now place the motor and the endstop back and tighten it. When ready, proceed to the next step.

Step 3 — Y-axis: marker identification



The marker (used in the next steps) is made as a countersunk hole, see the picture.

Step 4 — Y-axis: correct bearing orientation



- When placing bearings onto the Ycarriage, make sure that they are oriented as shown in the picture.
 One of the tracks has to be in line with the cutout for the bearing!
- This orientation has to be followed in all 3 bearings on the Y-carriage!
- Marker on the Y-carriage must be facing the table (not visible)!

Step 5 — Y-axis: assemble the Y-carriage



- A Begin by locating the marker, at this step the marker should be facing the table (not visible) and only then you can add the bearings. If you place bearings to the same side as marker, you will have issues later!
- Insert a 3x20x16 u-shaped bolt into the Y-carriage as shown on the picture.
- Place the linear bearings in cutouts.
- On the side with two bearings, slide the bearings to the center, towards each other as close as possible.

Step 6 — Y axis: tighten Y-carriage u-shaped bolts



- (i) Use pliers to tighten the u-shaped bolts.
- Step 1: place the nuts on the u-shaped bolt and insert a bearing.
- Step 2: using pliers tighten the nuts until you reach the surface of the Y-carriage, then stop tightening!
- Step 3: use pliers again and rotate with the nuts **only 1/4 of circle** to finish the tightening.
- A Don't tighten the nuts more than is described above, or you will deform the bearings!

Step 7 — Y-axis: assemble the Y-carriage rods



- Use the mid-sized smooth rods (330 mm)
- Insert the 8mm smooth rods into the linear bearings on the Y-carriage.
- Be very careful! Insert the rod straight into the bearings, do not apply too much force and do not tilt the rod!

Step 8 — Y-axis: assemble the Y-axis stage



- Insert the assembled Y-carriage into the Y-axis stage.
- A Ensure the correct orientation of parts, single bearing on the side of the Y-axis motor.
- Note the location of the Y-carriage orientation marker it's important the Y-carriage is oriented as in the picture!
- Insert zip ties into the holes in Y-corners and tighten them using pliers.
- Ensure the correct orientation of zipties (head of the ziptie should be facing out from the Y-axis stage).

A Press smooth rods (330 mm) all the way in the Y-corners holders. Don't use excessive force.

Step 9 — Y axis: tighten Y-belt-holder



- Rotate the printer onto the PSU side.
- Move the Y-belt-holder below the Ycarriage and locate the holes. Insert screws from the holder through the carriage.
- (i) To hold screws temporarily in place, you can use M3n nuts. We will remind you to remove them just before the heatbed assembly.

Step 10 — X-axis: prepare the NEW rods



- Don't mix old and new smooth rods and bearings. For the printer's best performance you need to use those in the upgrade kit.
- LM8UU linear bearings (new)
- 8mm longest smooth rods (new)
- Carefully slide linear bearings on rods.

Step 11 — X-axis: prepare printed parts



- Insert new LM8UU linear bearings into the printed parts (X-end-motor and X-end-idler) as shown in the pictures.
- The bearings should be in line with the X-ends as highlighted in the picture.
- (i) You can press on the flat surface for easier insertion.
- Place two bearings in a way that the inner balls of the second bearing are rotated 45° compared to the first. This way you will achieve greater contact with the smooth rod. See third picture for more details.
- (i) Note these pictures are illustrative to highlight proper assembly of the bearings. You might have motor and endstop already attached.

Step 12 — X-axis: prepare the X-carriage



A Don't use X-carriage from your disassembled printer, use the new version you've printed.

- Insert zip ties into the X-carriage as shown in the picture.
- \bigwedge Ensure the correct orientation of zip ties.
- (i) Note your printed part might look slightly different, but the procedure is the same.

Step 13 — X-axis: assemble axis base



- Insert new rods with new bearings fully into the printed parts.
- Ensure the correct orientation of the parts and rods (rod with 2 bearings must be on the side with the nut trap).
- \bigwedge Insert the rods very carefully. Do not tilt the rods too much.
- (i) Note these pictures are illustrative to highlight proper assembly of the rods. You might have motor and endstop already attached.

Step 14 — X-axis: placing the X-carriage



- Place the X-carriage on the X-axis base as shown in the picture.
- Ensure the correct orientation of the X-carriage.

Step 15 — X-axis: tighten the X-carriage



- Use pliers to tighten the zip ties.
- Make sure that bearings are in the position as shown in the picture (a bearing should be fully seated and bottomed out in the carriage).
 - Use pliers to cut off any excess zip tie.
- Move the zip tie head to the position as shown in the last picture.

Step 16 — Z-axis: placing trapezoid motor nuts



Insert M3 nuts (4 pcs total) in the printed parts as shown in the picture.

Step 17 — Z-axis: tighten trapezoid motor nuts



- Use M3x12 screws (4 pcs) to tighten nuts in place.
- Use 2.5mm Allen key to tighten the screws.

(i) Make sure the nut is oriented just like the picture!

Step 18 — Z-axis: identifying rod length



Step 19 — Z-axis: prepare the Z-rods



A Ensure again you are using the new smooth rods!

• Insert Z-rods (the shortest ones) inside the Z-axis-bottom parts.

(i) Note this step is illustrative, the motor cables should be already tied to the frame.

Step 20 — Z-axis: assembling the X-axis



• Carefully slide the X-axis on rods and trapezoid screws. By rotating both screws simultaneously let the X-axis to slide until both trapezoid screws are exposed as in the picture.

Insert the X-axis very carefully, perfectly in axis with the bearings and with a minimal force.

Step 21 — Z-axis: Placing top parts



- Place parts on the frame as in the picture.
- Use 2.5mm Allen key to tighten the parts to the frame.
- Check both leadscrews in the upper part of printer, they shouldn't touch the edges of the printed part. If so, release the motor holder at the bottom and slightly move it.
- \blacksquare All screws in this step are M3x10 (4 pcs).

Step 22 — X-axis: assembling the belt (Part 1)



- Insert the flat part of the X-GT2 belt (longer one) into the X-carriage as in the picture.
- (i) A reference video is included at step 28 covering steps 20-27.

Step 23 — X-axis: assembling the belt (Part 2)



- Guide the belt around the pin as shown in the picture.
- Insert the belt all the way into the belt holder as shown in the picture.
- Note that there is no belt going out of the X-carriage, it's IMPORTANT.

Step 24 — X-axis: belt idler guide



• Guide the X-axis belt through the X-end-idler, around the 623h bearing with the housing and back.

Step 25 — X-axis: belt carriage guide



• Guide the X-axis belt through the X-carriage.

Step 26 — X-axis: belt motor guide



• Guide the X-axis belt through the X-end-motor, around the GT2-16 pulley and back.

Step 27 — X-axis: tightening the belt (Part 1)



- Use pliers to tighten up the X-axis belt.
- Insert the flat part of belt as shown in the picture.

Step 28 — X-axis: tightening the belt (Part 2)



- Guide the belt around the pin as shown in the picture.
- Push the belt all the way into the X-carriage.

↑ The belt shouldn't be tight at the moment.
Step 29 — X-axis: tensioning the belt



- Rotate the motor back
- Screw in the removed M3x18 screws.
- If you have to apply too much force and are experiencing troubles, rotate the motor back, repeat previous step while making the belt more loose.
- (i) The belt should be quite tight (see the video at step 28).
- *i* This step is illustrative, you don't need to remove the frame.

Step 30 — X-axis: VIDEO for steps 20-27



- Insert the flat part of X-GT2 belt (longer one) into the X-carriage, around the pin. Guide the X-axis belt through X-end-idler, around the 623h bearing with the housing and back. Guide the X-axis belt through the X-carriage. Guide the X-axis belt through the X-end-motor, around GT2-16 pulley and back.
- Remove the two M3x18 screws.
 Rotate the motor counter-clockwise.
- Insert the flat part of the belt around the pin.
- Rotate the motor back. Screw in the removed M3x18 screws.
- *i* Video is available in an online (digital) version only.
- All done! You can continue to the next chapter - <u>3. Extruder Assembly</u>



4. Extruder Assembly

Guide for the assembly of the Extruder.

Written By: Josef Prusa



Step 1 — Get the necessary tools



- 2.5 and 1.5 mm Allen key
- Needle-nose pliers

Step 2 — 3D printed parts



- Extruder cover
- Extruder body
- Extruder idler
- Fan nozzle (can be in black color, dimensions are the same).
- Cable holder

Step 3 — [TIP] Top nut insertion



(i) If you're experiencing troubles with getting nut into the top hole, just follow these simple steps.

- Screw a M3 nut a bit on a long screw (M3x40 works best).
- Push the screw with the nut into the hole where it is supposed to be.
- Grab the screw with pliers and gently hammer the nut in place using a wrench.

Step 4 — Placing the nuts



- Place the M3 nuts (2 pcs) into the traps on the left side of the extruder body.
- Slide the M3nS square nuts (4 pcs) into the traps on the right side of the extruder body.

A Place the nuts as deep as possible.

Step 5 — Preparing the extruder body



- Slide the extruder body on the nozzle as shown in the picture.
- Push the nozzle all the way down and make sure that cables are on the side as shown in the picture.

Step 6 — Preparing the extruder cover



• Place the M3 nuts (2 pcs) into the traps of the extruder cover.

Top nut needs to be pushed all the way down! (the nut trap has 2 diameters, only last 3 mm have correct diameter for the nut trap).

Step 7 — Placing the extruder cover



- M3x18 (1 pc)
- M3x25 (1 pc)
- Mind the correct orientation of cables leading from the extruder heater.
- Using the 2.5mm Allen key tighten both screws to mount the extruder cover on the extruder body.
- Make sure to use the proper length of screws when mounting the extruder cover. Check all nuts are in their places.
- Tighten until the nozzle stops moving in the extruder, if there's still a gap between the cover and the body it's alright.

Step 8 — Preparing the extruder motor



- Press the pulley on the motor.
- (i) If you're experiencing trouble, loosen the grub screw a bit.
- Note the correct orientation (the screw has to be closer to the motor).
- A Don't tighten the pulley at the moment, we have still time for that.

Step 9 — Mounting the motor and the idler



- M3x30 screws (2 pcs)
- Don't forget to have the idler in place (the screw has to go through it).
- Mount the motor on the the extruder body as shown in the picture, double check proper orientation of the motor cables.
- Mind the correct orientation of motor cables.



Step 10 — Tighten the motor screws gently.

Tighten the motor screws gently.

Step 11 — Tightening the pulley



- Using the 1.5mm Allen key tighten the pulley.
- Make sure that the part with smaller diameter is perfectly aligned with the nozzle entrance.
- Make sure the pulley can rotate freely.
- (i) Use a piece of 1,75 mm filament (from the spool) to align the pulley with the openings for the filament (see the picture).

Step 12 — VIDEO for step 11



- Using the 1.5mm Allen key tighten the pulley. Make sure that the part with smaller diameter is perfectly aligned with the nozzle entrance. Use a piece of filament to align the pulley with the openings for the filament.
- Video is available in an online (digital) version only.

Step 13 — Prepare the Extruder idler



• Place the M3nS square nuts (2 pcs) into the traps of the extruder body.

Step 14 — Preparing shaft with bearing



- 5x16sh shaft
- M5w washer (2 pcs)
- 625 bearing (1 pc)
- Place the washers and bearing on the shaft as shown in the picture.
- Place the shaft with bearing into the idler.
- ↑ Check the shaft is pressed all the way in!

Step 15 — Prepare the Extruder idler screws



- M3x40 screw (2 pcs)
- M3w washer (4 pcs)
- Extruder spring (2 pcs)
- Assemble the screws as shown in the picture.

Step 16 — Placing the screws



- Screw the extruder screws into the extruder body using the 2.5 mm Allen key as shown in the picture.
- (i) Length of the springs should be circa 13 mm when tightened.
- *i* It is alright to tighten the screws with higher force, we need to induce pressure on the idler.

Step 17 — Preparing the Front print fan



- 5015 print fan
- M3x20 screws (2 pcs)
- Screw the fan on to the extruder using the 2.5mm Allen key as shown in the picture.

A Do not tight fully at this moment, fan should just be secured in place.

(i) Front print fan is in the box 2.3.4.5.SUP

Step 18 — Preparing the fan nozzle



- Fan nozzle
- M3x20 screw (1 pc)
- Tighten the fan nozzle using the 2.5 mm Allen key. Gently tighten screws holding up the fan in place.

Nouble check that the fan can rotate freely.

Step 19 — P.I.N.D.A. probe preparation



 Prepare the P.I.N.D.A. probe (autocalibration) by removing both of the nuts (if included in delivery)

Step 20 — P.I.N.D.A probe and print fan cables preparation



- Pass the P.I.N.D.A. probe through the mount.
- Guide both cables through a cable clip on the extruder body as shown in the picture.
- (i) Exact position of the P.I.N.D.A. probe will be adjusted later (in Chapter 9, Preflight check), so there is no need to adjust or tighten fully at this point.
- The best position for mounting at this point is to align the last thread of the probe with the end of the mount
- Note the loop on the cable from the probe, it's necessary to do it like that!

Step 21 — The P.I.N.D.A. probe tighting



• Secure the P.I.N.D.A. probe with M3x10 screws

Note the loop on the cable from the probe, it's necessary to do it like that!

Step 22 — Mounting the Left hotend fan



- M3x18 screws (4 pcs)
- Note the correct orientation of the fan. The sticker has to face towards the nozzle!
- Guide cables from the extruder motor via slot in the extruder body, put the fan in place.
- Using M3x18 screws mount the fan to the extruder body using the 2.5mm allen key as shown in the picture.
- Tighten fan screws gently using the 2.5 mm Allen key.
- (i) The Left hotend fan is in the box 2.3.4.5.SUP

Step 23 — Preparation for step 24



Step 24 — Preparing for extruder mounting on the X-axis



- M3x40 screws (1 pcs)
- M3x30 screw (1 pcs)
- M3x18 screw (1 pcs)
- M3x40 (1 pcs) with M3n nut (1 pcs)

 \bigwedge Pay attention to use proper screws as indicated in the picture.

• Place the M3n nut (1 pcs) into the trap

Step 25 — Extruder cables preparation



- Guide cables from the extruder as in the picture.
- Cables from the P.I.N.D.A. probe, the extruder motor and both fans must pass the X-axis between the lower smooth rod and the X-axis belt.

Step 26 — Arranging extruder cables



- Arrange cables from the extruder upper part neatly in extruder cable holders.
- Make sure the cables from the extruder motor are guided as shown in the picture

Step 27 — Securing extruder in place



- Screw in all 4 screws.
- Tighten the extruder in place.

Step 28 — Cable management



- Guide the cables as shown in the picture.
- Make sure that the wires from the thermistor are going above the heater wires.
- Running them below will cause issues later, don't do that!

Step 29 — Cable management - right side



• Insert a ziptie (longer one in package) in the right side of the X-carriage so that cables from the extruder motor and the fan are below the ziptie and held in place.

↑ Double check the orientation of the ziptie.

- Once all cables are neatly arranged, finalize it by tightening the ziptie and cutting off the excessive piece.
- (i) Use pliers to cut off any excess ziptie.

Step 30 — Attachment of the cable holder



- Cable holder
- Make sure the cable holder is oriented upwards.
- Place the two halfs of the cable stiffener on the M3x40 screw.

Step 31 — Tighten the cable holder



- Use two zipties for fastening.
- (i) Use pliers to cut off any excess ziptie.

Step 32 — Preparing the filament



- Take the piece of filament that came with the parts (NYLON Ø 3 mm, about 50 cm long).
- Push it all the way down. If you experience difficulties when inserting the filament use pliers to make a sharp tip on the filament.
- The filament is for the support of the whole harness. Don't cut it, it'll go all the way with the wires to the electronics.
- Note the correct orientation of nylon filament, it needs to point up as shown in the picture!

Step 33 — Spiral wrap ziptie



- Wrap the spiral wrap (the largest and the longest one) around the cables.
- Start with cables from the upper part, after 1 turn add cables from the hot end.
- Double check by moving the extruder fully to the left or right that spiral wrap does not interfere with the printer frame.
- Use zipties and tighten the wrapped cables and spiral wrap. Tight the spriral wrap to the cable stiffener.
- Use one piece at the beginning of the spiral wrap.

Tighten zip ties carefully, too much pressure can damage cables inside!

Step 34 — Finalizing the extruder



- Check for free movement of the Xcarriage and inspect cables in the full left and right positions.
- Once you are satisfied with organisation of the extruder cables finalize spiral wrap to the full length.
- Separate the filament at the last whirl of the spiral wrap.

Step 35 — All done!



- Congratulations! You've just assembled the extruder.
- You can continue by assembling the remaining parts in the next chapter -<u>4. Heatbed and Electronics</u>



5. Heatbed and Electronics

Written By: Jakub Dolezal



Step 1 — Y-axis: Preparing the heatbed



- Locate the heatbed disassembled in previous chapter.
- M3x8r screws (4 pcs)
- Heatbed comes with the print surface (yellowish foil) already stuck on so DO NOT REMOVE IT and take extra care to prevent any damage to the surface.
- If you used M3n nuts to hold the M3x12 screws inside Y-belt-holder, it is now time to remove the nuts.

Step 2 — Y-axis: Assembling the heatbed



• Using 2mm allen key, tighten the heatbed to the Y-carriage.

Tighten the screws with care. The threads inside the heatbed can be easily broken!

The screws should fit directly to the threads, if not, you could have turned the Y-carriage upside down.

Step 3 — Y-axis: Finalizing the heatbed



- Tighten the Y-belt holder to the heatbed using the supplied 2.5 mm Allen key.
- Make sure that the screws are screwed into the heatbed and no space is left between the nut on the heatbed and the Y-carriage.

Tighten the screws with care. The threads inside the heatbed can be easily broken!

• If you have the Y-belt-holder with a slot, make sure that the screws are in the middle as shown in the picture.

Step 4 — Check if everything is correct



- Take a look on the printer from the top side and make sure that lines on heatbed are perfectly parallel with the X axis rods as shown in the picture.
- If they are not in parallel position, use 17 mm wrench to adjust the M10 nuts to get it correct. Use nuts only on the side close to left Z axis motor.
- This is extremely important, if the things are not in parallel, you'll have huge troubles calibrating later on!
- A If you'll adjust the nuts, make sure that the M10 threaded rod is all the way down in the slot.

Step 5 — Electronics: X-axis (Part 1)



- Slide X-axis cables through the Rambo cover while rotating the Rambo cover back to the frame.
- The spiral wrap must run into the Rambo cover so it is held in place when tightened up.
- Tighten the Rambo cover base to the frame using supplied 2.5 mm Allen key.

Step 6 — Electronics: X-axis (Part 2)



- X-axis motor
- X-axis endstop
- (i) All motor cables have their markings for easier assembly.

Step 7 — Electronics: Heatbed (Part 1)



- Guide the cables from the heatbed through the side hole of the Rambo cover base.
- Push the filament all the way down through the filament holder hole in the Rambo cover base.
- Heatbed thermistor
- Heatbed heater
- (i) Note the white cable from heatbed can be also in black version, however their function is the same.

Step 8 — Electronics: Heatbed (Part 2)



Using a ziptie, tie the cables from the heatbed to the Rambo cover base at the end of the spiral wrap.

(i) Double check the zip tie is tied firmly.

Step 9 — Electronics: Extruder Var. A (Part 1)



- Depending on the version of your Rambo cover your hole for extruder cables is either from the top (Var. A) or side of the cover (Var. B step 11). The principle for connecting is the same.
- Guide the cables from the extruder through the top hole of the Rambo cover base.
- Push the filament all the way down through the filament holder hole in the Rambo cover base.
- Force the last spin of the spiral wrap into the hole of the Rambo.

Step 10 — Electronics: Extruder Var. A (Part 2)



 Using a zip tie, tie the cables from the extruder to the Rambo cover base at the end of the spiral wrap.

Step 11 — Electronics: Extruder Var. B (Part 1)



- Guide the cables from the extruder through the upper hole on the side of the Rambo cover base.
- Push the filament all the way down through the filament holder hole in the Rambo cover base.

Step 12 — Electronics: Extruder Var. B (Part 2)



Using a zip tie, tie the cables from the extruder to the Rambo cover base at the end of the spiral wrap.

Step 13 — Electronics: Extruder (Part 3)



- P.I.N.D.A. probe
- Extruder motor
- Extruder heater
- Extruder thermistor (cable going from the extruder labeled with Yellow/Green heat shrink)
 [Orientation does not matter]
- Print fan (cable going from the extruder labeled with Red heat shrink)[make sure that the red wire is closer to the thermistor]
- Extruder fan (cable going from the extruder labeled with Blue heat shrink)
- DOUBLE CHECK the connection! It is so important to ensure the correct connections.
Step 14 — Electronics: Verify connections



Check again all cables are connected to the right socket on the board and connectors are plugged all the way in. Incorrect setup can cause irreversible damage!!!

Step 15 — Finalizing Rambo cover



- (i) Depending on the version of Rambo cover the pictures might slightly differ, however the principle used in this step is the same for both.
- M3x40 screw (1 pcs)
- Close the Rambo-cover doors
- Make sure that no wire is pinched!
- Tighten M3x40 screw.

Step 16 — Hooray!



- Congratulations, you've just disassembled Original Prusa i3 MK2 and upgraded it to Original Prusa i3 MK2S!
- Before the first print, visit our last chapter - <u>5. Preflight check</u> to properly setup the P.I.N.D.A. sensor.



6. Preflight check

The last things you should check before the first print

Written By: Josef Prusa



Step 1 — P.I.N.D.A. adjustment, phase 1



- A Ensure the printer is turned off and not plugged in.
- Move the extruder manually all the way to the left.
- By rotating BOTH threaded rods at the same time on the Z-axis move the nozzle until you reach the heatbed. Try rotating both the rods equally!
- Check again from a different angle the nozzle is touching slightly the heatbed. Don't bend the heatbed!

Step 2 — P.I.N.D.A. adjustment, phase 2



- Move the extruder carefully all the way to the right.
- Make sure that the nozzle is not scratching the print surface during the movement! If it does, rise the right side of the X axis by rotating the right Z motor slightly clockwise.
- If an adjustment is needed, you can lower the nozzle height by rotating the right Z motor counterclockwise.

Step 3 — P.IN.D.A. adjustment, phase 3



- Move the extruder to the center of the X-axis.
- Locate the spare parts package, take the longest zip tie and place it under the P.I.N.D.A. sensor.
- Release two screws holding the P.I.N.D.A. sensor and gently press it against the zip tie.
- Tighten screws on the P.I.N.D.A. holder again.
- A correct height of the P.I.N.D.A. sensor compared to the nozzle should be similar to the last picture.

Step 4 — Check your Prusa i3 before printing



- Please watch our video with the most common build problems and their solutions before printing. <u>http://www.prusa3d.com/buildvideoM</u> <u>K2S</u>
- Note the video includes previous version of the MK2 with a slightly different look, however the principles of the calibration and printing are the same.

Step 5 — Quick guide for your first prints



(i) See our free **3D Printing Handbook** - <u>http://www.prusa3d.com/3dhandbookMK2S</u>

- Read the chapters 3.2 Disclaimer and 3.3 Safety instructions
- Read the chapter 6.3 Setup before printing.
- Download and install the drivers chapter 8 Printer drivers. Don't forget we have ready to print settings for Slic3r, Cura, Simplify3D and KISSlicer.
- Calibrate the printer by following the chapter 6.3.1 Calibration flow. Please follow the steps exactly, otherwise you can permanently damage the print surface!

Step 6 — Printable 3D models

PRUSA RESEARCH	OUR E-SHOP	PRUSA 13 3D PRINTER	PRUSA 13 KIT	ABOUT US	CONTACT	SUPPORT	a	π
PRINTABLE 3D MODELS	pared some printat	ile object for you to print. T	hey are ideal for the	first prints on yo	ur new printer. S	TL and GCODE f	īles are ava	ilable after
nstalling the drivers package in "3D Objects" ABS and it's compatible with 1.75mm Origina	folder on your Deskt Prusa i3.	op or in the Start menu an	d you just have to co	opy them onto you	ur SD card. Each	object has differ	rent G-code	for PLA or
	ADALINDA	and the Louisia Plant and	This phone of					
	Amazing model of	a dragon which we even us	e on our promotion	nal photos 😄				
and the second s	Print takes roughly	r 6 hours at 200 µm layer h	eight.					
	TREEFROG							
100	Author: Morena Pro	tti (Model on Thingiverse)						
	Great showpiece of prepared the file a	r gift for your friends. Tree t 50 microns layer height t	rog is commonly us o show you what yo	ed as a 3D printin ur printer is capal	ig benchmark. W	/e		
	Print takes roughly	3 hours at 50 µm layer he	ght for PLA.					
	License: CC BY-NC	ND 3.0						

- (i) Read the chapter 7 Printing of 3D Printing Handbook.
 - Congratulations! You should be ready to print by now ;-)
- You can start by printing some of our test objects bundled on the included SD card - you can check them out here <u>www.prusa3d.com/printable-3d-</u> <u>models</u>

Step 7 — Prusa knowledge base

	RUSA	HOME	SUPPORT
	Q Start typing your question here		
S	upport Home > Original Prusa (3 MK2 > MK2 Electronics > MAXTEMP error		
Ν	/AXTEMP error		
M	IAXTEMP means, that maximal temperature threshold was reached. 260°C with V6 Lite hotend and 310°C with V6 otend. Printer will shut down the heaters to prevent damage.	Full	
In	dication: MAXTEMP shown on the screen and one of the temperature readouts shows unusually high temperature	h.	
Р	ossible causes:		
	 Thermistor leads are shorted (connected together) against the heaterblock. Hotend temperature readout is constantly showing temperature over 300C. This can happen during printer assembly rarely. First step is to car unscrew the thermistor securing screw, then check if the fiberglass sleeving is covering the whole length of the thermistor leads. Sleeving is stretchy, so make adjustment to cover the whole length and secure the thermistor in place. Occasional glitch. Sometimes the heater can be tricked to overcompensate, possibly by a blast of colder air, when suddenly removed can cause the heater to spike over the temperature. Restart the printer and monitor if problem occurs again. Printer heats up uncontrollably when first powered after assembly triggering the MAXTEMP. Quickly power 	refully r back which i the off the	

 If you encounter any problems at all, don't forget you can always check out our knowledge base at

http://help.prusa3d.com. We're adding new topics every day!

Step 8 — Prusa3D forum



- If you need help with the build, check out our forum with great community :-)
- Account is shared with <u>http://shop.prusa3d.com/</u>
- Support forum is available at <u>http://forum.prusa3d.com</u>