# Printrbot Simple (Model 1403) Rev F Printrboard

Printrbot Simple is currently shipping with the Rev F Printrboard. Check which rev Printrboard your Simple kit includes and use the corresponding instructions.
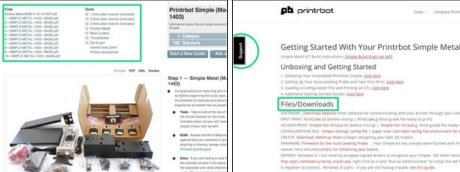
Written By: Printrbot Support

## 🔧 TOOLS:

- 1.5mm allen wrench (included) (1)
- 2.5mm allen wrench (included) (1)
- 3.5mm allen wrench (included) (1)
- Rubber Mallet (1)
- Micro Cutters (1)
- Threadlocker (1)
- Zip tie gun (1)
- Needle nosed pliers (1)
- Screwdriver (1)

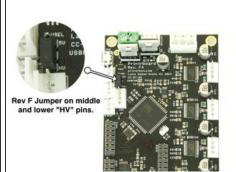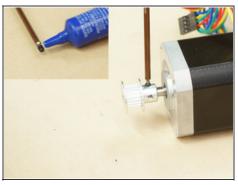## Step 1 — Assembling the Printrbot Simple (Model 1403) Rev F Printrboard



- Congratulations on receiving your new Simple Metal kit! Before beginning the build, take a quick look over the checklist of materials and tools to make the experience as hassle free as possible.

- **Tools** - Take a look at the top of this guide for a list of tools needed for the build. We have included some, but you will need to supply a couple of your own as well.

- **BOM** - Review the Bill of Materials and check it against what you received in your package. If anything is missing, please contact us at Printrbot.com/Support

- **Docs** - If you are having a hard time with any of the example photos in the steps, you may prefer the exploded view docs attached to the top of this guide. There are also some great files/downloads/videos at Printrbot.com/simple

- **Vids** - If you would prefer to follow a build video, click here for a user created guide.

- **HEATED BED USERS:** A guide for the Simple Metal Kit w Heated Bed is under construction. In the meantime, you will have to refer to the Heated Bed Upgrade instructions throughout the build. Click here for the Simple Metal with Heated Bed BOM.
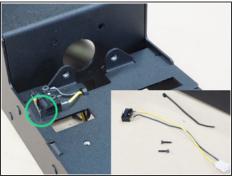
## Step 2



Rev F Jumper on middle and lower "HV" pins.

- Before beginning the build, take a look at your Printrboard.

- If your Printrboard is labeled "**Rev D**", click here for the Rev D Simple Metal build instructions.

- If your Printrboard is labeled "**Rev F**", continue with this guide.

- Also note, rev F boards should have a jumper connecting the "HV" voltage selector pins.
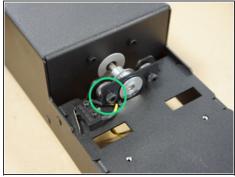
**Step 3**



- Add a GT2 pulley to the motor. Be sure that one of the set screws is threaded down on to the flat side of the motor shaft. Using Threadlocker will help to keep the set screws in place. You will find all M3 set screws for this kit in the universal bag.

- NOTE: Do not tighten the set screws untill you install motor in the next steps of the build.

- Attach the 6" end stop to the top left side of the base with M2 10MM screws (x2). Note that the end stop is open to the front of the base (green circle on picture).

- Insert the zip tie so the cable will be locked in the slot nearest to the switch. The wire does not pass through the zip tie, but the zip tie traps the wires. Make sure the black wire is pulled away from the bearing, and the head of the zip tie is under the base.

- Stack M4 12MM, 624 bearing, and #6 washer (x2 each) and attach to the vertical tabs on the base.

- NOTE: Do not tighten the M4 screws until the belt guid has been added in the following steps of the build.

## Step 4



- Attach the motor (with GT2 pulley) to the base of the bot with M3 6MM screws (x4).

  (i) This will be your X axis motor. It is a good idea to mark the motor plug with a "X" for future reference when wiring the electronics.

- Add the delrin belt guide to the GT2 pulley and M4 12MM screws, it sits between the washer and the head of the screw (bearing stacks from previous step).

- Tighten the GT2 set screws once you have the delrin belt guide installed. The delrin belt guide should be right up against the front flange of the GT2 pulley without binding.

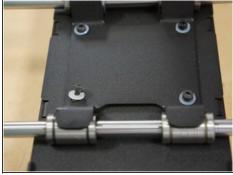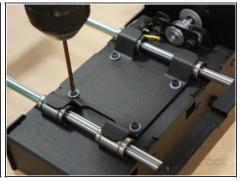- Note the direction of the wire for cable management.

## Step 5



- Add the Red/Black Power Adapter to the bottom of the base. Face the barrel connector to the outside.

- Thread the nut on the barrel connector of the power adapter up against the wall of the base.

- Please check your Power Adapter before you try to install it. A batch of improperly wired adapters made their way into production (see photo #3). You want the black wiring on the same side as the clip. If you have the incorrect adapter click here to get the correct adapter.
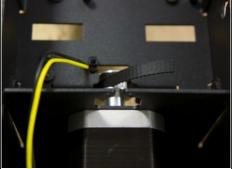
## Step 6



- Place two LM8UU bearings on each 8mm rod. Align the bearings with the notches in the base.

- Add the X axis rod ends to the rods (8mm x 250mm). You may want to gently use a rubber mallet or hammer to insert the rods. This is a good time to check the alignment between the holes on the blocks and the holes on the bed.

- Secure the bearings/rods with the Bearing Clamp, using M3 6MM screws and nylon washers (x4 each).

⚠ BE SURE TO INCLUDE THE NYLON WASHERS when attaching the Bearing Clamp. Without the washers, the M3 6MM screws may make contact with the Printrboard once it is installed. This can cause problems communicating with your Printrboard.
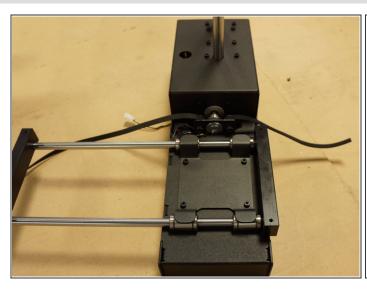
## Step 7



- Run a GT2 belt over the 624 bearing, under the GT2 pulley, and back up over the other 624 bearing. The teeth of the belt should be facing up and aligned with the grooves of the GT2 pulley.
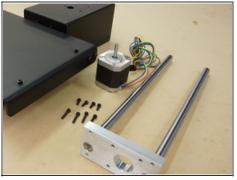
## Step 8



- Attach the bed to the rod ends with M3 10MM screws (x4).

- NOTE: The holes between the rod end blocks and the bed may not line up. You may need to tap the blocks or shift them manually so they are aligned for installation.

**Step 9**



- The right side of the bed has a folded edge with two screw holes in it. This is for the belt tensioning system. Loop the GT2 belt through the tensioning clip and secure it in place with a zip tie.

- Thread M3 16MM screws (x2) through the folded edge of the bed, and into the belt tensioning clip. Only thread a little of the M3 into the tensioner so that you can tension the belt in the future.

- Loop the other end of the belt through the slots in the folded edge of the left side of the bed.

- Once the belt is tight, secure it with a zip tie. You may want to make this as tight as you can by hand or with needle nose pliers! NOTE: Make sure that all zip ties on belts are flat on the smooth surfaces. Never tighten zip tie on the edge of the tensioner, it will only smash the belt and allow for slipping.

  (i) *Now the tension of the belt can be adjusted by the M3 16MM screws on the right side of the bed. Remember, tight belts make good prints!*

- NOTE: The pictures in this step show the undercarriage of the bot. You will need to turn it upside down to match this orientation.

## Step 10



- Direct he Z rod/block up through the undercarriage of the base. The dimple on the top of the block indicates that end of the block should face the front of the bot.
- Attach the rod/block to the base with M3 10MM screws (x4).
- Attach the motor to the rod/block with M3 16MM screws (x4) - green circles. Note that the motor wiring is positioned to the left.

  ⓘ *This will be your Z axis motor. It is a good idea to mark the motor plug with a "Z" for future reference when wiring the electronics.*
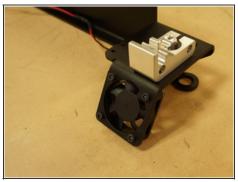
## Step 11



- Attach the Printrboard to the bottom of the base with M3 6MM screws (x4). Note that the SD card port slot and micro-USB port are facing out, aligned with the holes in the base.

**Step 12**



- Add the Z coupler to the Z motor shaft.

- Insert the Acme Threaded Rod into the top of the Z coupler.

- Tighten the set screws down on to the flat side of the motor shaft and the threaded rod. Using thread locker will help prevent any slipping in the future through loosening set screws.

- NOTE: With the springy coupler you should make sure the threaded rod is compressed to the motor shaft. After securing the bottom set screws, lift the top of the coupler while tightening the set screws into the Acme Rod.
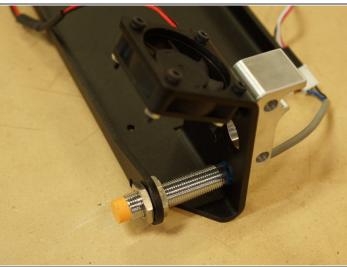
## Step 13



- Attach the Extruder Base to the Y Arm with M3 8MM screws (x3)

- Attach the fan to the Y Arm with M3 20MM screws and M3 hex nuts (x4 each). Again, note the direction of the fan wiring, towards the back of the arm.

  ⓘ *M3 20MM screws may seem excessive for holding the fan to the Y Arm, but the length of the screws will really come in handy after you have printed your fan shroud.*

  - **Note:** Do not over tighten the screws holding the fan to the assembly. This can cause the fan blades to be trapped agains the Y arm asembly and not spin up.

  - **Note:** Make sure the fan is wired correctly to the Printrboard. It may spin backwards or not at all if the wires are crossed.

## Step 14



- Insert the Auto-Leveling Probe into the probe mount holes in the Y Arm.

- Secure the position of the probe by sandwiching the mount between the nuts on the Auto-Leveling Probe.

  (i) *Don't spend too much time dialing in the position of the Auto-Leveling probe just yet. That will take place during the calibration process.*   Link
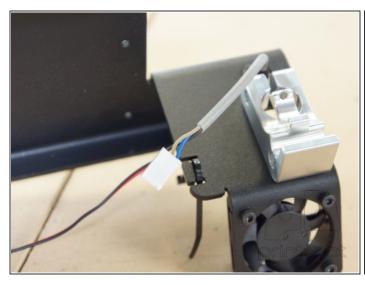
## Step 15



- Add a 6-32 1-1/2" screw, spring and 6-32 hex nut to the arm of the extruder.

- Place a 625 bearing in the hinge of the arm.

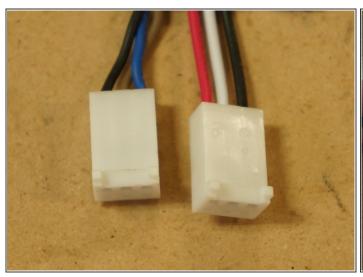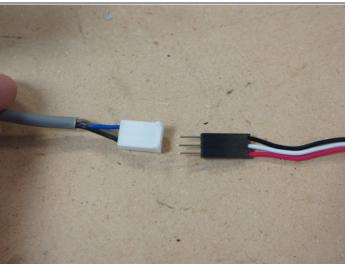- Hold the bearing in place with M5 16MM screw.

## Step 16



- Insert the black post into the bottom of the extruder arm.

- Insert M3 20MM screw and #6 washer into the top of the black post.

- Use the M3 20MM to attach the extruder arm assembly to the motor. The motor wires will be at the bottom of the motor when installed.

- Add the Direct Drive Gear to the motor by tightening the set screw down on to the flat side of the motor shaft. You will find all M3 set screws for this kit in the universal bag.

- Align the drive gear teeth with the 624 bearing - green square.

  ⓘ *Use Threadlocker after you are sure that the drive gear is aligned with the 624 bearing. Keeping these aligned will help to ensure better extrusion when printing.*
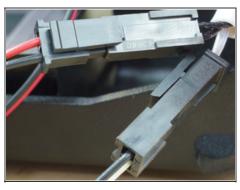
**Step 17**



- Place a zip tie in the notches. DO NOT fasten the zip tie. Leave it open for wire management later in the build.

- Attach the extruder motor assembly to the base of the extruder on the Y Arm with and M3 20MM screw on the left (under the 6-32 1 1/2" screw). Insert the hot end into the base of the extruder.

- With the hot end all the way up the base assembly, attach the right side M3 20MM screw and tighten so that the hot end has no movement! - green circles.

- NOTE: The wire for the Auto-Leveling Probe is running between the side wall of the motor and the vertical wall of the Y Arm.

## Step 18



- Attach the Probe extension cable to the probe.

  ⓘ *Your kit may have been packaged with the probe extension already connected to the probe.*

- If you have the Red/White/Black extension cable, you will want to plug it in the direction of picture 1. (Blue to Black/ Brown to White/ Black to Red).

- **ALWAYS** match the wires from the plug end of the cables (as if the probe were being plugged straight into the board) before plugging them together.  The objective is to match the plugs, NOT the colors.

⚠ If the probe and the probe extension are plugged in backwards, you WILL ruin your z probe!
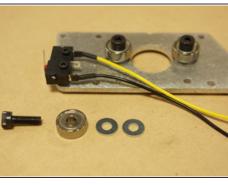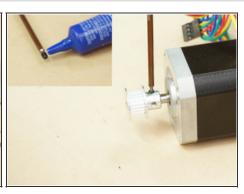
**Step 19**



- Connect the following:

  - Power extension cable to hot end power (red and black)

  - Thermistor cable for hot end to hot end thermistor (black and white)

  - Fan extension to fan. Click here if you are having trouble with the fan extension. Be sure to match the wire colors on the fan extension - black to black, red to red.

  - ⓘ *Your kit may have the correct length of wire and will not need an extension.*

- Use the zip tie previously left open to secure your wiring (hot end power/thermistor, Auto-Leveling Probe, fan, and extruder motor).
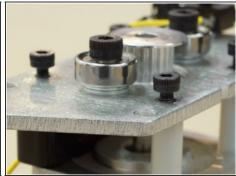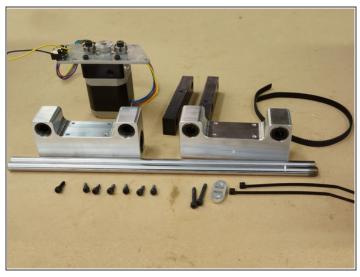
**Step 20**



● Stack M4 12MM screw, 624 bearing, and #6 washers (x2). Screw the stack into the plate next to the large hole in the middle. Repeat this process for a total of two "stacks" - green circles.

● Attach a 24" end stop to the metal plate with M2 10MM screws (x2). The opening of the switch should be pointed toward the inside of the plate.

● Add a GT2 Pulley to the motor shaft. Suggestion: Use Threadlocker on the set screw and tighten it down on the flat side of the motor shaft, after assembling the plate (next step).
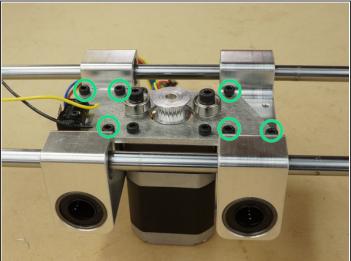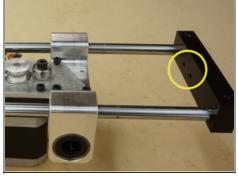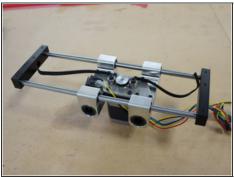
**Step 21**



- Place 16mm nylon spacers (x2) and the small black Z nut between the motor and metal plate. Note the orientation of the motor wiring, metal plate, and end stop.

- **NOTE: It is REALLY important to orient the black Z nut in the right direction. The threaded acme hole should sit closest to the motor and toward the back of the assembly. There is a also dimple on the z nut that goes towards the motor. To help with orientation.**

- Attach the motor to the bottom of the plate with M3 22MM screws (x4). Note the direction of the motor wiring.

  ⓘ *This will be your Y axis motor. It is a good idea to mark the motor plug with a "Y" for future reference when wiring the electronics.*

- Once the motor and spacers are in place, zip tie the end stop and motor wire together near the base of the motor. At this time you can tighten the set screws on the GT2 pulley. Align the bearings to the middle of the pulley (as seen in pictures).
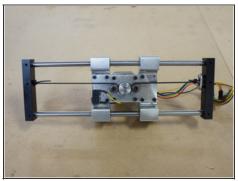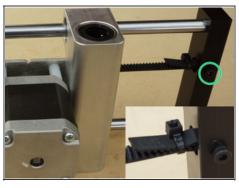
## Step 22



- Attach the Y-Z Bearing Blocks to the metal plate with M3 8MM screws (x6) - green circles.

  (i) *It may make things easier if you insert the 8mm smooth rods into the horizontal bearings before attaching the blocks to the plate. This will help keep everything aligned.*
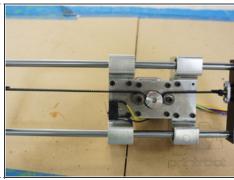
## Step 23



- Attach the Y axis rod ends to the rods (8mm x 268mm).
- NOTE: The "back" rod end has two holes facing inward for attaching the belt tensioning clip - yellow circle.
- Add a GT2 belt to the GT2 pulley, by running it over the 624 bearing, below the pulley and back over the other bearing. Again, be sure to align the teeth on the belt with the grooves on the pulley.
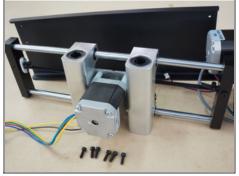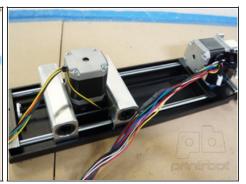
## Step 24



- Screw M3 10MM into the front bar end - green circle.

- Wrap the GT2 belt around the M3 10MM screw and zip tie the belt.

  (i) *You may find it easier to loop the belt first, then insert the M3 10MM screw into the bar end and through the loop.*

- Loop the other end of the belt through the belt tensioning clip.

- Attach the belt and clip with M3 20MM screws (x2). Pull the belt tight with needle nose pliers then lock it in place with a zip tie.

  (i) *Get the belt tight before tensioning. You want there to be plenty of thread on the M3 20MM screws to adjust belt tension in the future.*

⚠ The zip tie heads should be oriented away from the Y plate assembly (as seen in picture 1). It will hit the Y plate and affect the function of your printer if it's not correct. Also make sure that all zip ties on belts are flat on the smooth surfaces. Never tighten zip tie on the edge, it will only smash the belt and allow for slipping.
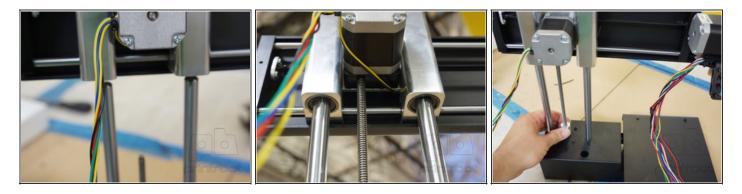
## Step 25



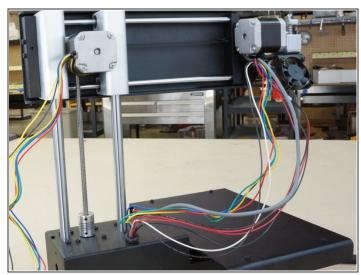- Attach the Y motor assembly to the Y Arm with M3 10MM screws (x6).

## Step 26



- Add the Y Arm to the base by inserting the smooth rods on the base into the vertical bearings of the Y Arm.

- Thread the Acme rod into the Small Black Z Nut.

## Step 27



- Carefully insert the wiring through a rubber grommet and down through the wiring holes in the base.

- Plug the grommets into the wiring holes.

## Step 28



● Add wire wrap to the cables. Not only will it make the bot look cleaner, but it will also improve functionality by keeping the cables from tangling in the other components.

## Step 29



- Tuck the wiring inside of the base. Use a zip tie to secure all of the wiring that will connect to the Printrboard.

- Wait until all of the wiring is connected before finishing off your wire management with zip ties.

- Connect the following cables to the corresponding ports on the Printrboard.

- NOTE: Be sure to check your wiring against the picture to verify that nothing is plugged in incorrectly. You will see that the Y and E motors are plugged in differently than the X and Z motors.

- X axis motor - "X-MOT" (blue, yellow, green, red)

- Y axis motor - "Y-MOT" (red, green, yellow, blue)

- Z axis motor - "Z-MOT" (blue, yellow, green, red)

- Extruder motor - "E-MOT" (red, green, yellow, blue)

**Step 30**



- Printrboard wiring cont'd

  - X End Stop - "X-STOP"

  - Y End Stop - "Y-STOP"

  - Auto-Leveling Probe - "Z-STOP"

  - Hot End Power ext - "HOTEND"

  - Hot End Thermistor ext - "T-EXT"

  - Fan ext - "FAN"

  - Red/Black Power Adapter - "PWR"

## Step 31



- Great job! Simple build finished. You're not quite done though. There are a couple more steps on your journey to 3D printing glory.
- **Step 1**: [Click here](#) to download free software, Cura to use your computer to communicate with your Printrbot.
- **Step 2**: [Click here](#) to follow the guide on getting started with Cura.
- **Step 3**: [Click here](#) to follow the guide on calibrating your Auto-Leveling Probe.
- ⚠️ **IMPORTANT**: WITHOUT GOING THROUGH THIS CALIBRATION PROCESS, YOUR PRINTRBOT WILL NOT FUNCTION PROPERLY
- Go to http://printrbot.com/project/simple-meta... for more on drivers, software and getting started with your new 3D printer.

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