Makertech

Stage 06: Pre-Flight Checks and Arm Offset

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Step 1 — Sanity Checks



- (i) Double check everything is correctly plugged in.
- (i) Double check that heater cables are plugged in firmly and not loose.
- (*i*) Power up your printer.
- (i) Check that the two 30mm heatsink fans are spinning.

Step 2 — Sanity Check: Probe



(i) Hold a metal item under the probe, and check that the red LED at the top of the probe lights up.

- (i) Connect to your printer and send the below command. With a metal object held under the probe check whether the probe reports back triggered it should.
 - Marlin: M119
 - Klipper: QUERY_PROBE

Step 3 — Sanity Check - Part Cooling Fan



(i) Send an M106 command to turn on the fan. Send M107 to switch it off.

Step 4 — Sanity Check - Servo



- (i) MARLIN: Send M42 P<pin # of your relay switch> S1 or S255" to set it via an EXP Header Pin (0 = 0v, 255 = 3.3v) to power on the servo. First make sure #define DIRECT_PIN_CONTROL is enabled. Now run M280 P0 S90 to turn the servo to the 90-degree position. Power down the servo using M42 P<pin number of your relay switch> S0
 - P0 = servo index
 - Sxx = servo angle
- KLIPPER: Use the macro ARM_INSTALL to turn the servo to the 90-degree position. Send SERVO_OFF to power off the servo.

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Step 5 — Updated Servo Arm - 01/11/22



- (i) The servo arm design has been updated to incorporate the small arm included with the servo.
- If you don't already have it included in your kit, the 3D printed part of the arm can be found <u>here</u>, we recommend printing it in ABS.
 - If the injection moulded arm does not fit, there is a large version of the arm that can be found <u>here</u>.
- Drop the injection moulded arm that comes with the servo into the 3D printed arm.
- Attach it to the servo shaft as shown with an M2.5 x 6mm bolt.

Step 6 — Installing the Servo Arm



- (i) Before installing, make sure that the servo can move and is set to the vertical position. Set this by sending the commands outlined in the previous steps, if you've not already done so.
 - Secure the servo arm with an M2.5 x 6mm bolt and M2.5 shakeproof washer. (The updated arm should not use the washer)
 - Install the servo arm vertically like shown.
- Tighten firmly, doing your best to make sure that the servo's position is not changed.
 - Avoid using excessive force as this could break the servo's gears.
- In Klipper, when finished, send the SERVO_OFF command.
- In Marlin, when finished installing, power down the servo using M42 P<pin number of your relay switch> S0

Step 7 — Testing Switching



- Sending T0 will select the left hotend.
- Sending T1 will select the right hotend.
- The hotend should turn fairly easily. If it struggles first check that the M5 bolt is not on too tight.
 Next check that none of the cables are obstructing its motion.

Step 8 — Fine Tuning Switching



- (i) Send M280 P0 S175
 - The left hotend should now be active.
- (i) Send M280 P0 S10
 - The right hotend should be active.
- (i) Adjust the S value until switching results in the arm firmly holding the hotends position.
- **Updating Marlin:** The servo angles, if need updating from default, can be done with an M281 command. For example, setting the servo angle for the left hotend to 178 and the right hotend to 14 can be done with *M821 P0 L178 U14*. Follow this with *M500* to save.
- **Updating Klipper:** In Klipper, the angles can be adjusted in the variables.cfg file. Saving this file and restarting Klipper will make the new angles active.

If you find one of the hotend's can't be held firmly, redo step 5 - as it's likely the arm wasn't installed properly.

Step 9 — Installing the PTFE Tubes



- Fix two PC4-M6 couplings onto the heatsink of the switching hotend.
- Cut the PTFE tubing to the length you need and slide one end into the heatsink and push the other end into your extruder.
 - ▲ If you have a low temp side, make sure that the PTFE tube has been pushed all the way to the nozzle. If not, the hotend will get clogged! It should slide approximately 65mm from the top of the coupling.

Step 10 — Sanity Check - Heaters



- (i) Check the thermistor status, they should both be reading room temperature.
- (i) Turn on the heaters and monitor the temperature rise.

Step 11 — Hot Tightening



- (i) Heat the hotend up to it's max temps. That's 250C for the low temp configurations and 400C for the high temp configuration.
 - When up to temperature tighten the nozzles against the heatbreak.
 - Make sure that the two bolts on the side of the heatsink are also tightened and are holding the heatbreak securely.
- ▲ Take caution when doing this step as the hotend will be hot enough to cause severe burns. Use two pliers, one to hold the heater block and the other to tighten the nozzle.

Step 12 — Z-Alignment



(i) Use the bolts on the side of the heatsink to adjust the heights of the nozzle relative to the bed, with the goal to make both have the same distance from the print surface when selected.

Step 13 — Extruder Check



(i) Load filament into the switching hotend and send an extrude command to your printer.

(i) You should have a smoth flow of filament coming through both hotends.

Step 14 — Z-offset



(i) Set the z-offset for your printer as you normally would. Do this against the first hotend (left side).

We recommend doing this with the hotend and heated bed up to the temperature that you would be printing at.

Step 15 — Z-offset continued



- (i) With Hotend 1's nozzle brought down to your bed, use a piece of paper to judge the distance between the tip of the nozzle and print surface.
- (i) Send a T1 command to switch to the second hotend.
 - Check that the friction between the second nozzle and print surface is the same. If it's not, adjust the height of the second hotend by loosening the two M3 x 12mm bolts holding it in place.
- (i) Once satisfied both hotend's are aligned in the z-axis you will be ready for your first print.