

MakerGear

Dual Extruder Assembly

Disconnect your M2 from its power supply prior to starting!

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Tools Needed

Snips (to cut plastic ties)
1.5 mm hex wrench (M2)
2 mm hex wrench (M2.5)
2.5 mm hex wrench (M3)
3 mm hex wrench (M4)
Phillips Head Screwdriver
3/32" hex wrench

Removal of Single Extruder

Remove Fan Assembly

- Cut the zip tie on the right side of the Filament Drive to free the Fan wires. Disconnect the Fan wires from the harness.
- Remove the M3x40 screw from the Extruder Fan to remove the Fan assembly.
- You will not need this assembly for the dual extruder setup.



Remove Filament Drive

- Disconnect the Thermistor and Heater wires from the Extruder Harness.
- Remove the (2) M3x25 screws holding the Filament Drive in place.
- You will not need this filament drive for the dual extruder setup.



Remove Motor and Wiring Harness

- Cut the (3) zip ties on the top of the Extruder Motor Mount and remove that piece. You will not need this for the dual extruder setup.
- Loosen the (2) M4x35 screws so that the Motor can be slid out from the back.
- Remove the Motor along with the Extruder Harness and *set them aside to reuse later.*

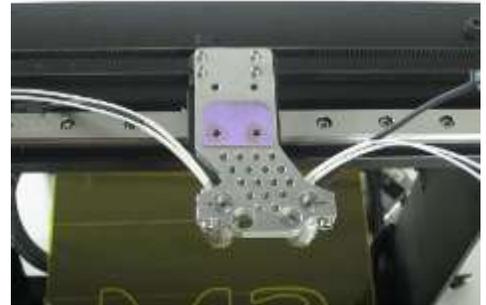


Remove Motor Mount, Mounting Plate, and Belt Clamp

- Remove the (4) M3x12 screws from the Extruder Motor Mount.
- Remove the (4) M2x16 screws from the Motor Mounting Plate freeing it from the Belt Clamp.
- Slide the Belt Clamp off of the X Belt.
- You will not need the motor mount, mounting plate, or belt clamp with the dual extruder setup.

Mounting Plate Assembly

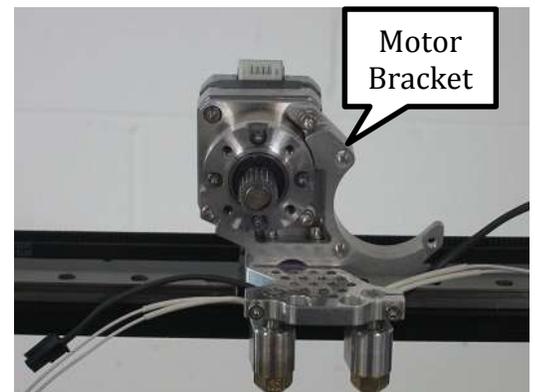
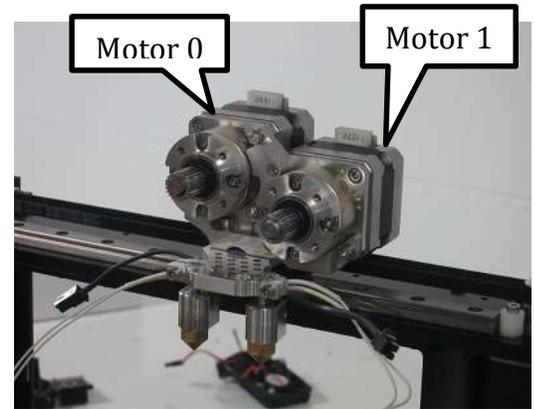
- (1) Mounting Plate (Assembled)
 - (2) M3x8 screws, washers
 - (1) Belt Clamp
 - (4) M2x16 screws, washers
- Place the belt clamp on the belt span nearest to the carriage with the fin under the back span. The belt clamp does not need to be in the same spot along the belt where the previous clamp was located.
 - Place the extruder mounting plate on top of the belt clamp and X rail carriage. Insert (4) M2x16 screws with washers through the back four holes of the extruder mounting plate to secure the belt clamp. Tighten.
 - Push the plate back to press the small ledge on its underside against the front of the carriage; this helps to ensure that the two hot ends line up correctly in the Y direction.
 - Insert (2) M3x8 screws with washers through the back two holes of the X carriage that are not covered by the paper. Tighten.



Motor Bracket Assembly

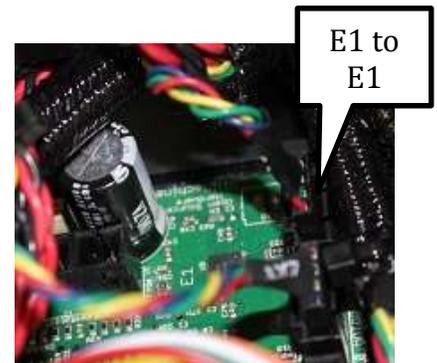
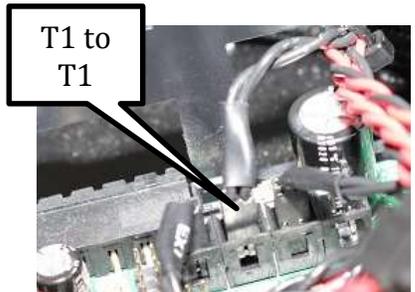
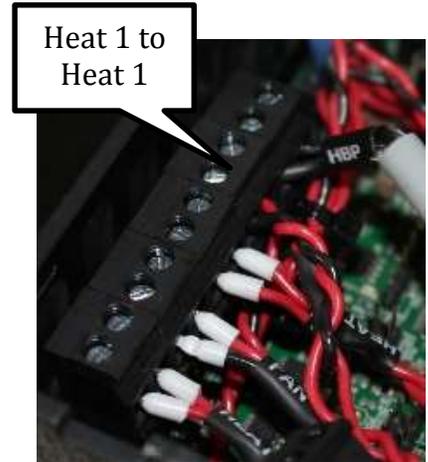
- (1) Motor Bracket
- (6) M3x14 screws, (4) washers
- (2) M3x18 screws, washers, lock washers
- (2) Extruder Motors—
 - Motor 0 (original) and Motor 1 (new)

- Place lock washers followed by flat washers on M3x18 screws. With the flat part of the motor bracket to the rear, place it on top of the paper spacer, and use the screws to loosely secure it to the Mounting Plate and X Carriage. Use the plastic alignment piece to ensure that the bracket is parallel to the X rail (minor misalignment is ok—if excessive, the filament will not feed properly into the extruders). Remove the plastic piece and tighten the M3x18's.
- With connector facing up, remove (3) M3x6 screws from the top right, bottom right, and bottom left of one motor (this will be named "Motor 0"). You will not need these M3x6's for the dual extruder setup.
- With connector facing up, remove (3) M3x6 screws from the top left, bottom left, and bottom right of the other motor (this will be named "Motor 1"). You will not need these M3x6's for the dual extruder setup.
- Slide Motor 0 into the left opening of the Motor Bracket with the connector facing up. Insert (3) M3x14 screws with washers to secure Motor 0 to the Motor Bracket. Tighten.
- Slide Motor 1 into the right opening of the Motor Bracket with the connector facing up. Insert an M3x14 screw with a washer into the bottom right hole and (2) M3x14 screws into the left holes to secure the Motor to the Motor Bracket. Tighten.



Wiring

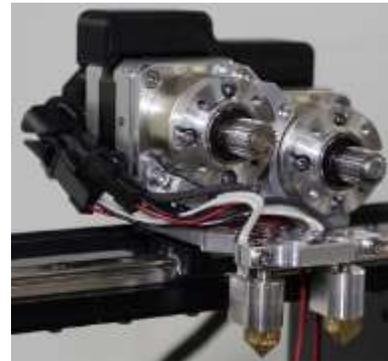
- (1) Wiring Bracket
 - (2) Wiring Harnesses – Harness 0 (original) and Harness 1 (new)
 - (2) M3x40 screws
 - (5) Small Zip Ties
 - (1) Fan Assembly
- Open the electronics case, and run the new wiring harness—Harness 1—through the back opening of the case. Look at the wiring harness that originally connected to the extruder motor—Harness 0—for reference. The wiring for Harness 0 should not change from the single extruder assembly.
 - Plug the large 2-pin connector labeled Heat 1 from Harness 1 into the header labeled H1 on the RAMBo; it should be the only open header on the left side of the board.
 - Plug the small 2-pin connector labeled T1 on Harness 1 into the T1 header on the RAMBo (in the rear of the board, in between the T0 and Bed Thermistor connectors). This connector has no polarity.
 - Plug the 4-pin connector labeled E1 from Harness 1 into the E1 motor header at the rear right side of the board behind the 4-pin connector labeled EXT from Harness 0. The red wire should go to the front.



- Slide the free end of Harness 0 through the large hole in the back of the wiring bracket.
- **M2's before November 2015:** Twist the harness into a loop shape to make it easier to press into its channel. Run the Thermistor, Heater, and Fan wires of Harness 0 through the smaller hole in the wiring bracket. (The motor connector wire should not be included in the loop as it will go in the hollowed out area at the top.) Once the wires are pushed through the hole (the end of the fan connectors should be about 4" from the small hole), press the harness into the channel and pull the rest of the harness back out of the large hole.
- **M2's since November 2015:** Pass the four black connectors through the smaller hole in the wiring bracket, but not the white motor connector. Position such that the plastic sheathing around the cable bundle terminates at the exit hole (for appearance) and press the portion of the bundle into the short channel between the two holes. Make sure the motor wire has room to be gathered into the adjacent cavity that will end up being at the top of the assembly.
- Slide the free end of Harness 1 through the large hole in the back of the wiring bracket. Run Harness 1 through the second channel in the Wiring Bracket until the Thermistor and Heater wires are free (the end of the connectors should be about 3.25" from the end of the channel). The motor connector will go in the hollowed out area at the top.
- Put the fan wires from Harness 0 in the top two slots on the left side of the bracket. The Heat and EXT wires from Harness 0 go into the middle two slots, and the Heat 1 and Therm 1 wires from Harness 1 go in the bottom slots. Use a zip tie to hold all the wires in their slots.



- Remove the (2) screws in the back of Motor 0 that are closest to Motor 1.
- Connect Motor 0 and Motor 1 with the Motor wires on the Harnesses and then secure the Wiring Bracket to the top and back of the two Extruder Motors using (2) M3x40 screws. Tighten
- Connect the Heater and Thermistor wires of Harness 1 to the Heater and Thermistor for Motor 1. These wires should run under and to the side of Motor 0.
- Connect wires from the Fan Assembly to Harness 0. The **12V fan** should be connected to the Fan 1 plug, and the **24V fan** should be connected to Fan 0.
- The fan wires should be routed along the left side of Motor 0 along with the heater and thermistor wires, then across the mounting plate under Motor 1, and the Fan Assembly should be left to dangle behind Hot End 1.
- Connect the Heater and Thermistor wires of Harness 0 to the Heater and Thermistor for Motor 0. These wires should run to the side of Motor 0.
- **Secure the wires at the front left of Motor 0 to each other with a zip tie.**
- Remove the (4) zip ties that secure the Harness 0 to the frame vertically on the right side. Reattach both harnesses into the same position using (4) new zip ties.

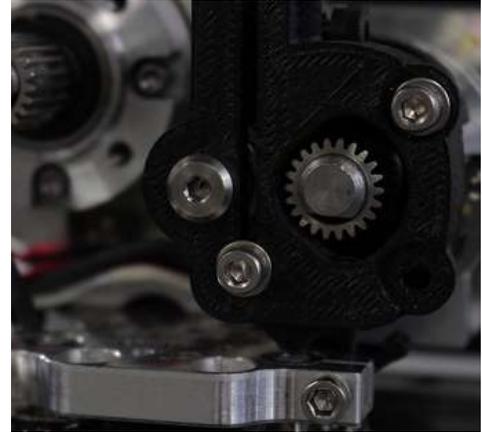


Filament Drive Assembly

Connect Filament Drive 1 (Right Side)

- (1) Motor 1 Filament Drive
- (2) M3 x 25, washers

- Slide the Motor 1 Filament Drive onto the Motor 1 drive gear. Rotate the filament drive until the hole for the filament at the bottom lines up with the hole on top of Hot End 1. Insert (2) M3x25 screws with washers through the top right and bottom left holes of the filament drive to secure it to the motor. Make sure when tightening the screws that no wires are pinched between the filament drive and motor.



Connect Filament Drive 0 (Left Side)

- (1) Motor 0 Filament Drive
- (2) M3 x 25, washers

- Before attaching Filament Drive 0 to the motor, place the pair of white wires and the black wire from the thermistor and heater of Hot End 0 into the hook at the bottom of the filament drive.
- Slide the filament drive onto the Motor 0 drive gear. Rotate the filament drive to line the filament hole up with the hole on top of Hot End 0. Insert (2) M3x25 screws with washers through holes in the top left and bottom right positions to secure it to the motor. When tightening the screws that no wires are pinched between the two parts.



Fan Duct Assembly

(2) M3 x 30, washers

- Using an Allen wrench, pry the wires up between the two filament drives to move them out of the way.
- Slide the nose of the Fan Duct between the filament drives. Insert (2) M3x30 screws with washers through the two holes on the sides of the assembly securing it to the filament drives and motors.
- Rout the fan wires through the hooks on the printed fan duct between the two fans to the hook in Filament Drive 1.



Replace the Z Knob

(1) Short Z Knob

- Loosen the set screw using a 3/32" hex key, and remove the original Z Knob from the printer.
- Place the new Z Knob onto the lead screw and tighten the set screw, leaving 1-2mm gap between the knob and top clamp. A snippet of 1.75mm filament makes a handy spacer.



Replace the Z Endstop

- (1) Z Endstop Clamp
- (1) Red LED and sensor
- (1) M3x25

- Loosen the (2) M3x12 screws to remove the clamp from the 10mm rod.
- Remove the (2) M2.5x14 screws, sensor, and Red LED from the original clamp assembly. Put the LED and sensor aside to reuse.
- Attach the sensor and Red LED into the new clamp body.
 - Position the sensor switch so that its lever faces the opposite side from the flat surface of the clamp, and tighten it into position with (2) M2.5x14 screws.
 - Push the Red LED through the hole until the tip reaches the other end of the hole.
- Connect the clamp onto the 10mm rod with the sensor on the bottom.
- Push the assembly to the top of the shaft.
- Tighten the clamp into position with an M3x25 screw taking caution not to over-tighten.



Right Filament Guide

(1) Right Filament Guide

- Remove the M3x12 screw from the back right corner of the X Motor.
- Secure the Right Filament Guide into this position using the same screw and washer.



Right Spool Holder

(1) Spool Holder

(2) M4 x 16 screws, nylock nuts, black washers

- **Place the spool holder into position on the right side of the printer with the top corner (at the base of the longest side) by the middle hole.**
- **Place the M4x16 screw into the top corner of the spool holder and through the middle frame hole. Attach the black washer and nylock nut and tighten.**

