

Electrically Connecting the Tunell Filament Monitor to your printer

Tuesday, November 17, 2015 2:06 PM

Revision History

11/17/2015 Added details on UM2

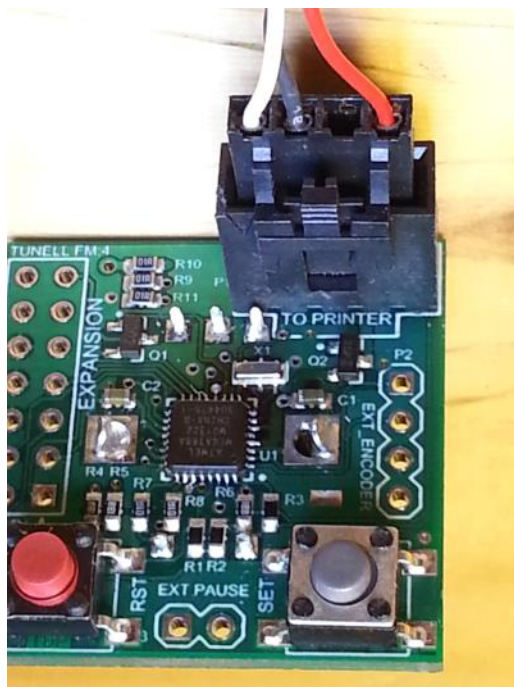
9/15/2015 Updated connection details on MakerBot/FlashForge/Wanhao/etc. and RAMPS board

About the Tunell Filament Monitor

The Tunell Filament Monitor detects filament feeding problems on your 3D printer by detecting filament motion with its rotary encoder. When a user-adjustable timeout period elapses without the filament feeding, the monitor sends a filament fault signal to the printer by actively pulling low the fault signal line.

Tunell Monitor Pinouts

Tunell Monitor Version 4 has been updated with a latching Molex G-grid SL connector. This connector is widely used as the MPC audio connector in the PC industry, and provides an easy-to-use secure cable connection.



Tunell Monitor Version 4, with Molex SL cable attached.

As pictured, the connector is wired as follows:

Pin	Location	Wire	Name	Description
Pin 1	Leftmost	White	Vin	Power input for Tunell Monitor. 5V typical.
Pin 2	2nd from left	Black	Ground (Gnd)	Power and signal ground.
Pin 3	3rd from left	Not connected		Reserved for future use.
Pin 4	Rightmost	Red	Filament Fault	Indicates filament fault detected by going low.

IMPORTANT NOTE: Please pay careful attention to the color assignment of the cables. When using standard MPC cables, Pin 1 (+5VDC) is white and pin 4 (fault signal) is red.

MakerBot Mightyboard Rev E and Equivalent

The original MakerBot Replicator, FlashForge Creator, Wanhao Duplicator, etc

The Tunell Monitor Version 4 was designed specifically to make it easy to connect to the original MakerBot Replicator and its clones like the FlashForge Creator and the Wanhao Duplicator.

The cable plugs straight into the Mightyboard's X-Min connector:



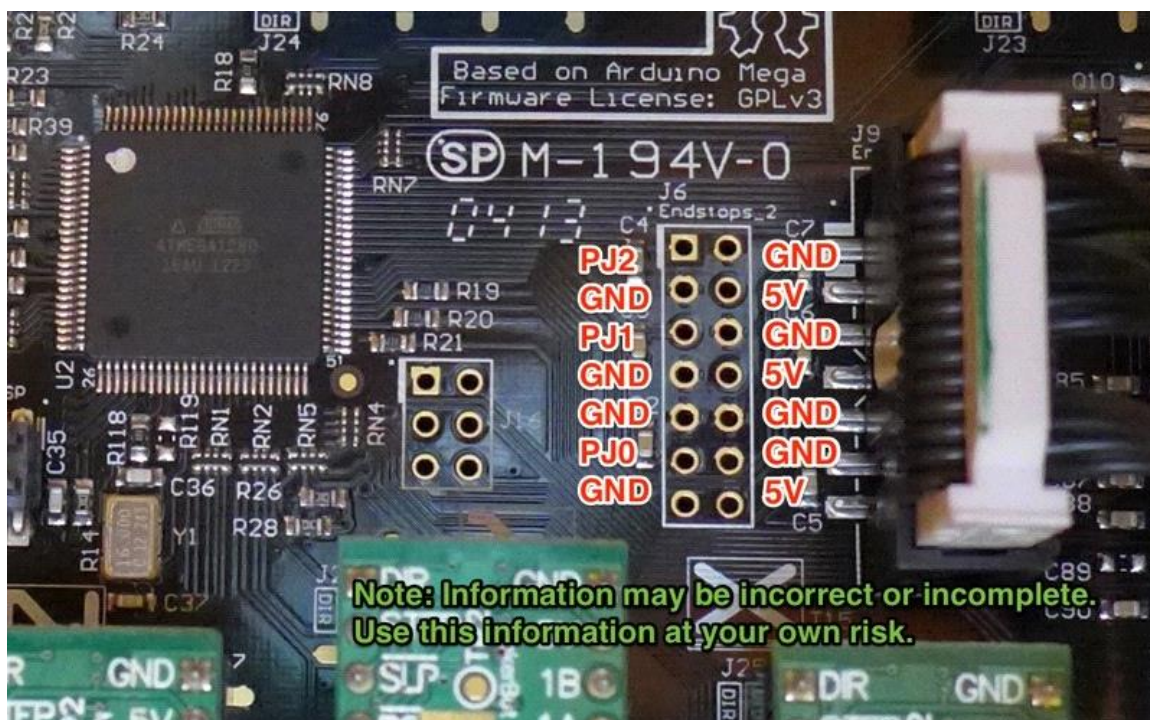
Mightyboard Rev G

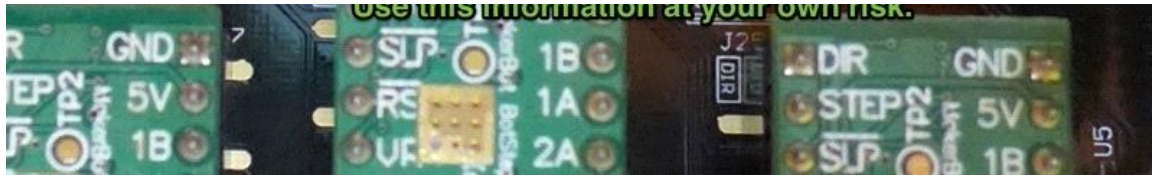
MakerBot Replicator 2 and Replicator 2X

NOTE: Some soldering required.

With the introduction of the Replicator 2 and the Replicator 2X, MakerBot redesigned the Mightboard to eliminate connectors for normally unused features.

However, with the Tunell monitor, we must send the X-min signal into the printer. On the Rev G board, X-min is located on connector J6, Pin 1. (The X-min pin is marked "PJ2" in the following image taken from Extrud3d.com - see <http://www.extrud3d.com/p-stop> for more details.)



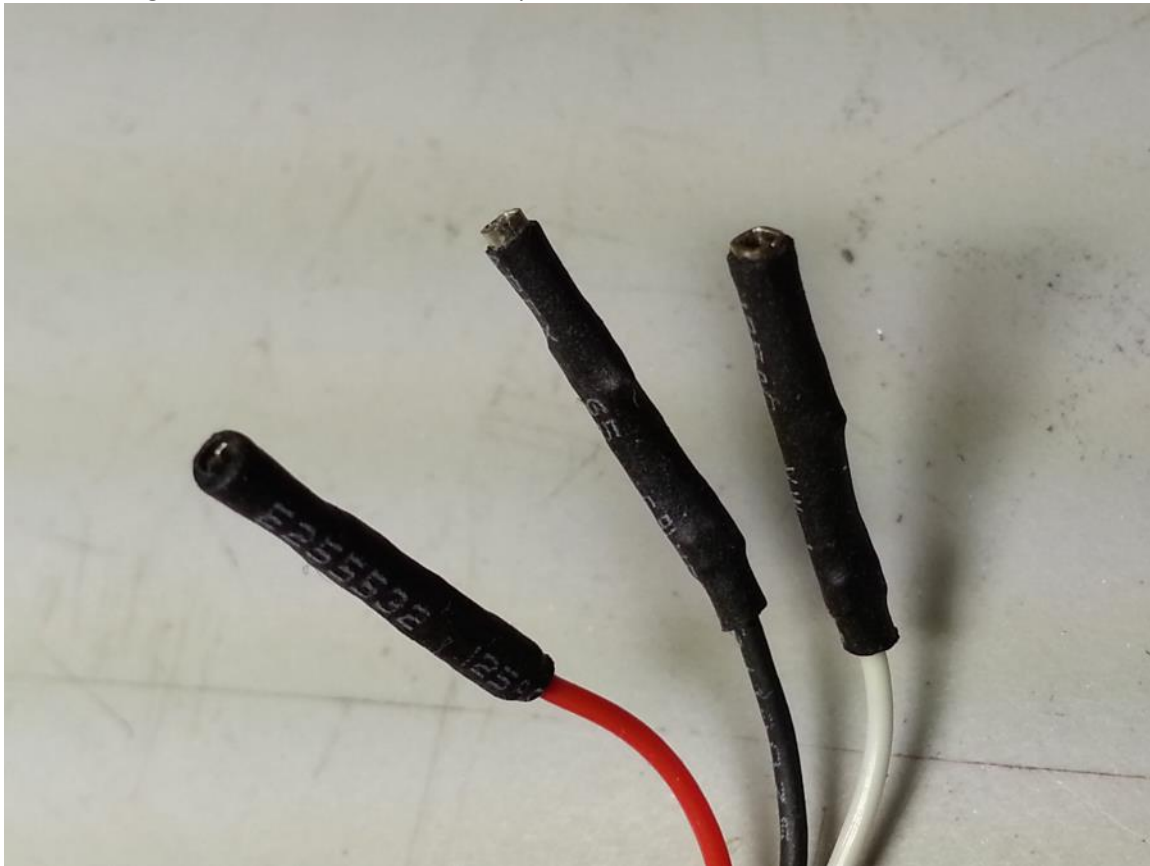


***** Be especially careful when doing this work.*** The Ground (GND) pin to the Rev G mainboard has a very good thermal connection to the internal ground plane, making the pin much slower to heat up, and much quicker to cool down while you are soldering the connection. Once the hole is filled with solder, it may be difficult to desolder the hole with a typical soldering iron, so make sure you avoid having to rework the connection after it is installed.**

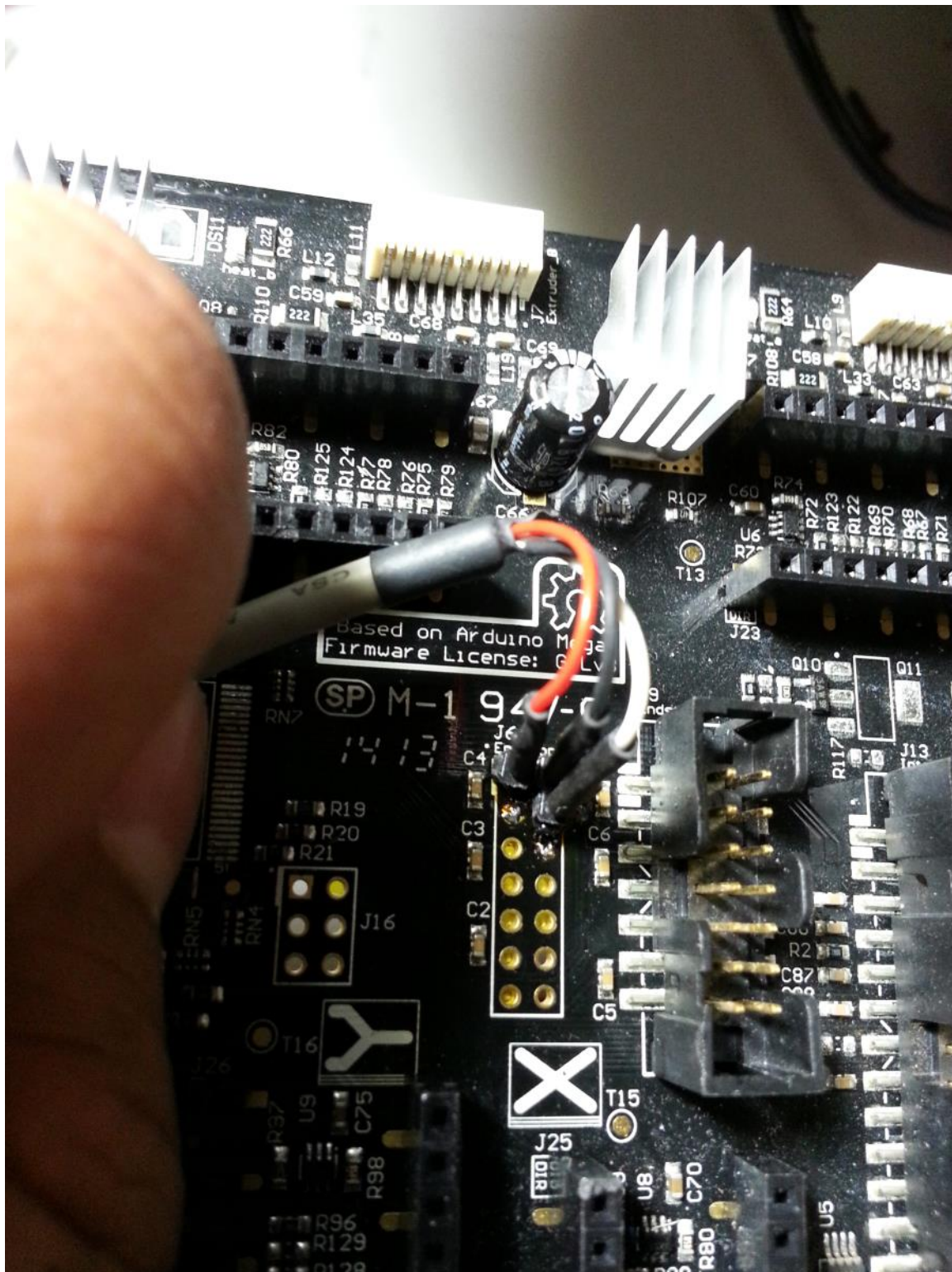
The white (+5VDC/Vin) line goes to the 5V pin, the black (Ground/GND) line goes to GND, and the red (filament fault signal) cable goes to Pin J6-1 (PJ2).

[Install Method 1 - individual header pins on Mightyboard](#)

For this method, carefully remove the crimped terminal pins from the Molex SL housing. Apply heat shrink tubing over each of the terminals as pictured below.

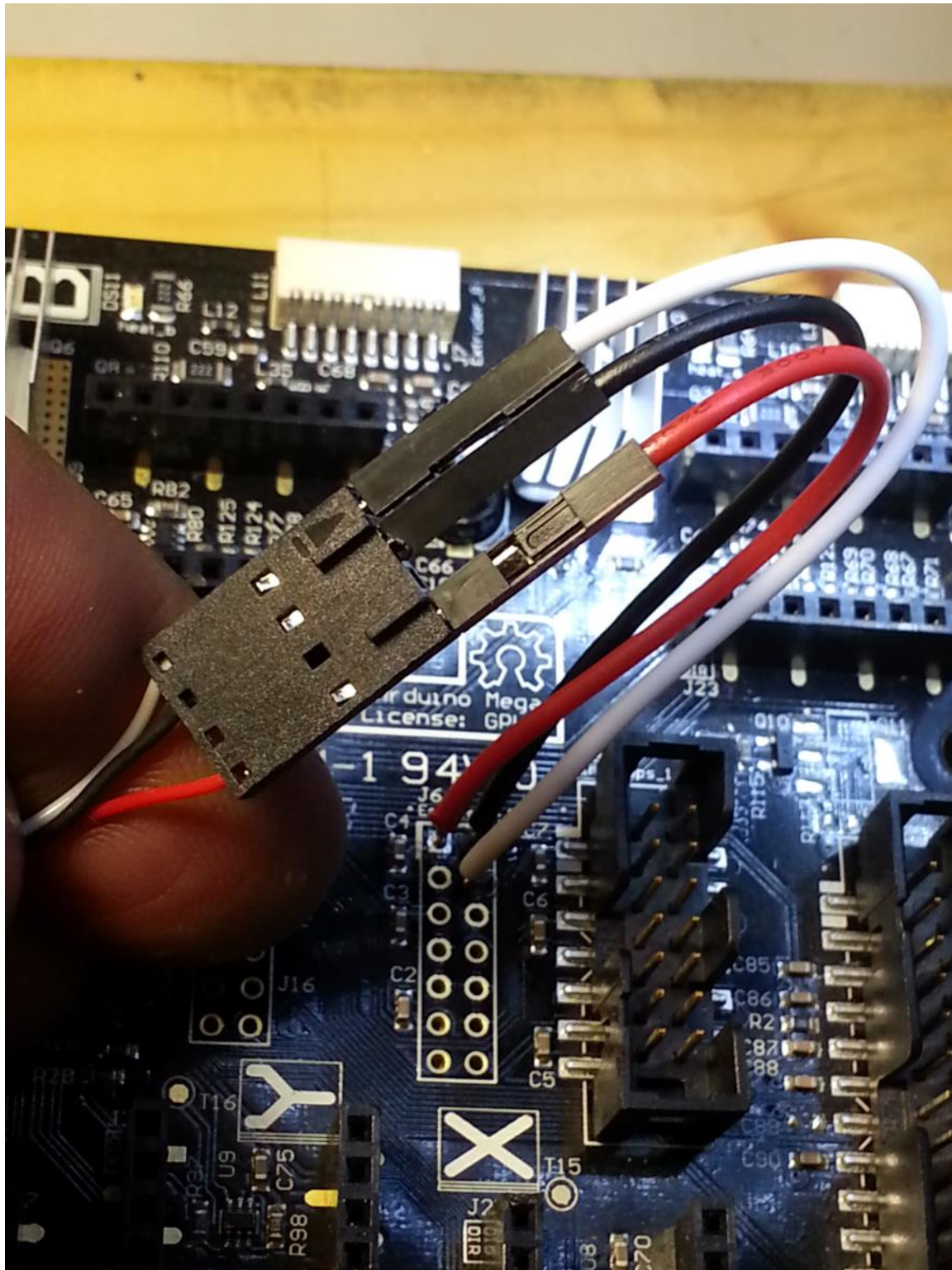


Next, install header pins on the Mightyboard, and then slip the heatshrink-wrapped terminals onto the pins:



Install Method 2 - solder jumper wires to Mightyboard

For this method, we use prototyping jumper wires with pins on the ends. (These are commonly used with Arduino learning kits and other electronics breadboarding kits.) Cut and strip one end off each jumper, and solder the wires on to the mainboard. Then, connect the pins into the Molex SL connector.



[Install Method 3 - solder connection cable directly to Mightyboard](#)

This approach is not recommended, as it makes it harder to disconnect and remove the cable. However, you could directly solder the wires to the pins.

[Install Method 4 - using dual-row Molex SL housing](#)

This should be the easiest/cleanest method as long as there is no solder yet in J6. (There were reports of some batches of Rev G mainboard with the holes in J6 already filled with solder.)

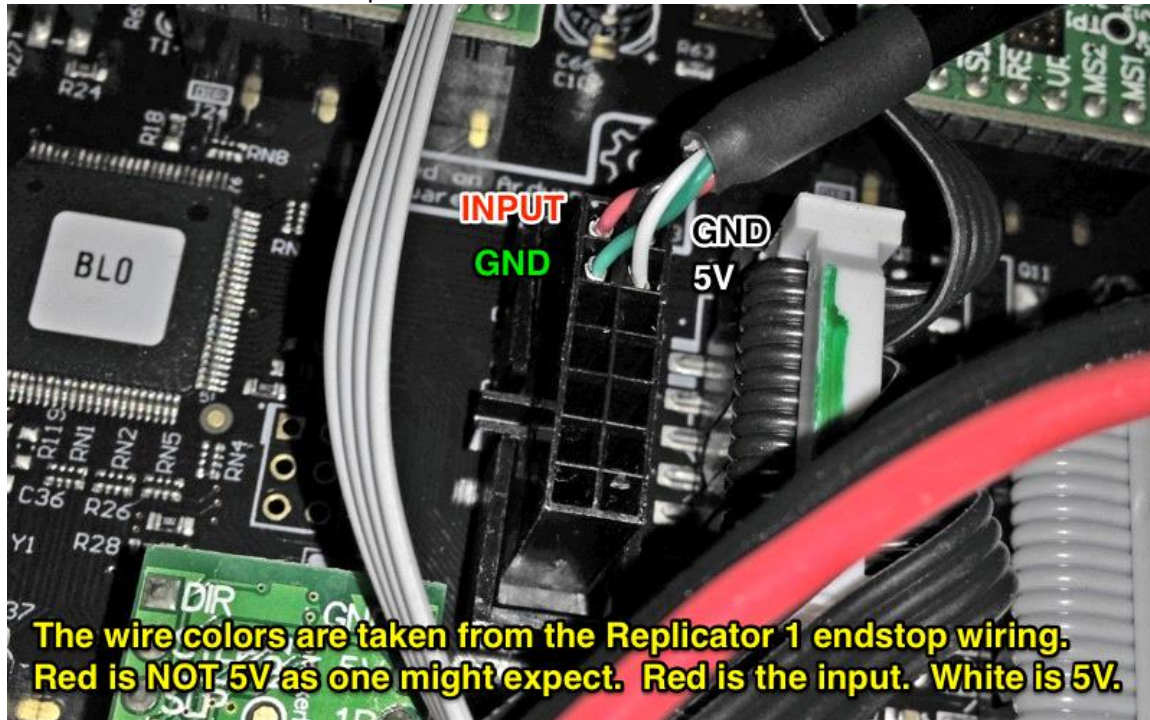
You will need to install a 14-pin (dual-row 2x7 pin) header at J6.

Next, remove the crimp pins from the single-row SL connector and migrate them to a dual-row SL

terminal housing. Digikey sells them: <http://www.digikey.com/product-detail/en/22-55-2141/WM2524-ND/171968>)

Mount the connector to the header.

Note: we do not have our own pictures, as we have not yet done this ourselves. However, the end-result would be similar to this picture from extrud3d.com:



RAMPS Board

RAMPS controller running modified Marlin firmware

Special thanks to Ziggy from the Robo3D forums.

Connect the signal lines to the circled locations below

Red circle = 5V (White wire)

Black circle = 0V (Black wire)

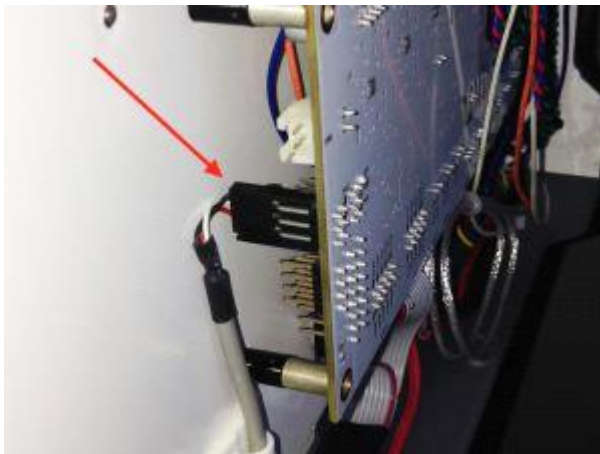
Blue circle = Pause Signal Line (Red wire)

○ J23, pin 5	PC7	P1, pin 4	FilamentFault	Red
J23, pin 3	+5V	P1, pin 1	Vin	White
J23, pin 1	Ground	P1, pin 2	Ground	Black

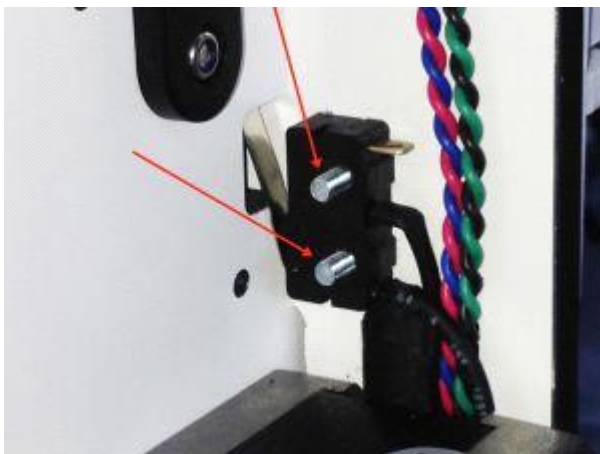
- When attaching the bracket, the position of the Z-axis switch may have shifted. Be sure to adjust the zero position of the bed using menu option "Advanced->Adjust buildplate."

Rewire the connection cable to match the UM2 pinout on J23.

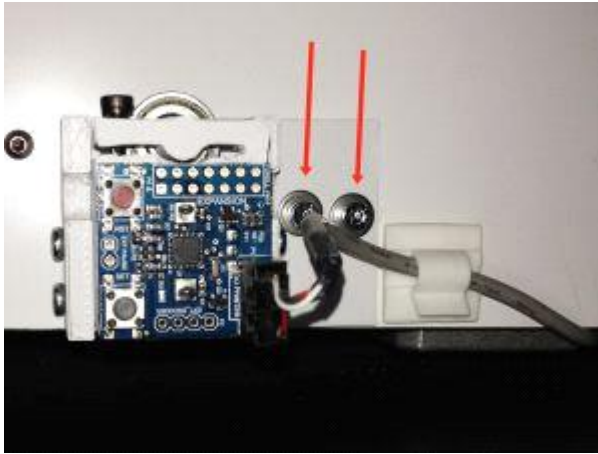
The pictures are from <https://ultimaker.com/en/community/view/7436-more-information-during-print?page=10&sort=#reply-120284> and are included here for convenience and archiving:



Connection to UM2 mainboard



Use existing screw hole for the Z microswitch



Tunell monitor mounted on the outside, using the existing Z microswitch mounting holes.

The filament enters from the left and exits from the right in this picture.

For original write up of the work to make the UM2 installation possible, please visit <https://ultimaker.com/en/community/view/7436-more-information-during-print?page=10&sort=#reply-120284> (installation) and <https://ultimaker.com/en/community/view/7436-more-information-during-print?page=10&sort=#reply-122063> (firmware).