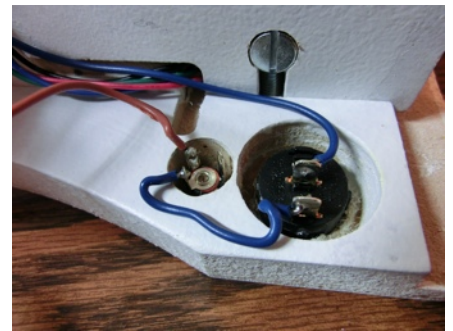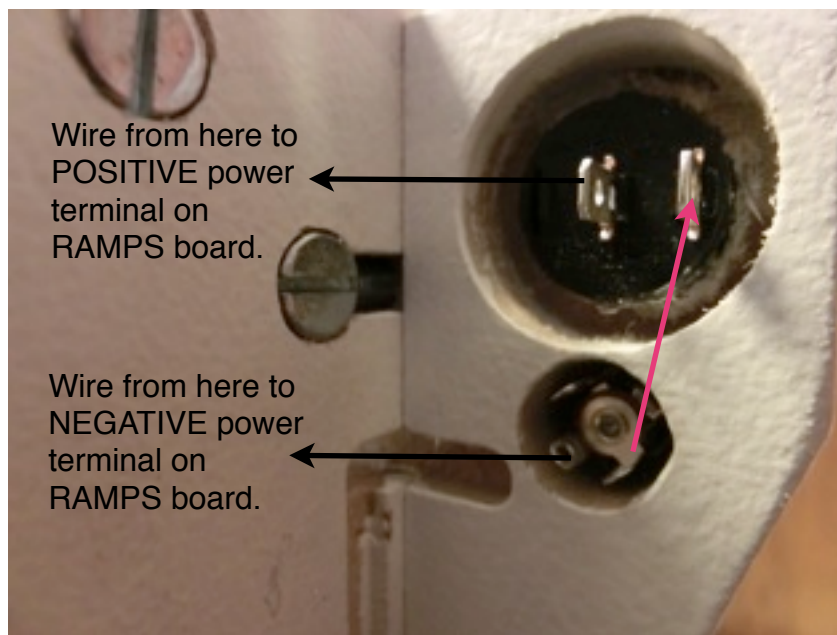# SUMPOD Build Instructions – Part 4a

Its down to the wire! (that is, time to connect it all together!)

For some of you that are more advanced, you can certainly skip a lot of this and just go by the pictures and wiring diagrams. I have written this trying to keep novice builders in mind. Also, my sequence is simply my own choice, and in most cases, you can work on the parts in any order. Also, I've tried to keep the pictures clear but this part has been a challenge without a good macro lens arrangement. That will be fixed soon!

This picture shows the installation of the power switch and the power jack. To get started on this

Wire from here to POSITIVE power terminal on RAMPS board.

Wire from here to NEGATIVE power terminal on RAMPS board.

you will need to connect a wire from the center terminal (positive) of the power jack to one of the switch lugs as shown. Note carefully the polarity of the wires coming from the switch and the power jack.
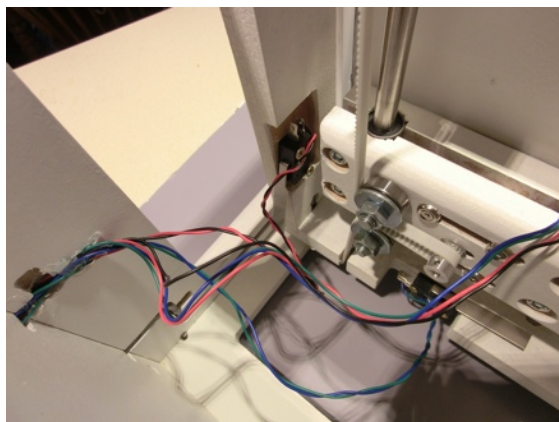

The stepper motors have a huge amount of wire attached. For starters, I halved the lengths. Even so, you will find what remains is too long, but for now you will need some hookup wire for endstops and the hot end.

The picture on the left shows the next wiring steps I took. These were to run the wires from the Y axis

motor, and the Z and Y endstops. Note that you need to allow sufficient length of wire to accommodate the full travel of the platform but not so much wire to get it all tangled in the moving Y axis. I used twisted pairs of wires from excess stepper motor wire for the X and Y endstops. My preference was to wire these with the switch in the normally open position as non-sensed condition. More on that later. I bundled the entire group of wires -- the two endstops and the stepper motor set through the center front channel. For now, I left plenty of extra wire at the exit into the bottom of the unit. I did not use the nylon wire clamps here because mine were a bit too wide to fit into the cutouts, and I like to hot melt glue the wire bundle in place. I used not only the cutouts for the nylon wire clamps, but also tacked the wires at different places, such as the end of the channel here, to keep things neat.

Next I ran the wires for the X endstop. You can see the twisted pair coming from the wire channel and then looping behind the belt. Again, I soldered the wires here instead of using the push on connectors, if only to save space. Again, run the endstop wire pair down through the channel, fixing it in place with either hot melt glue or the nylon wire clamps. Leave lots of excess through the bottom for later hookup.
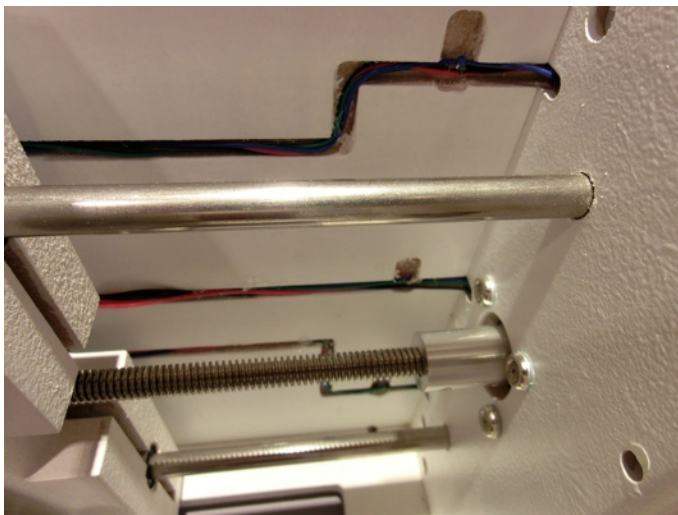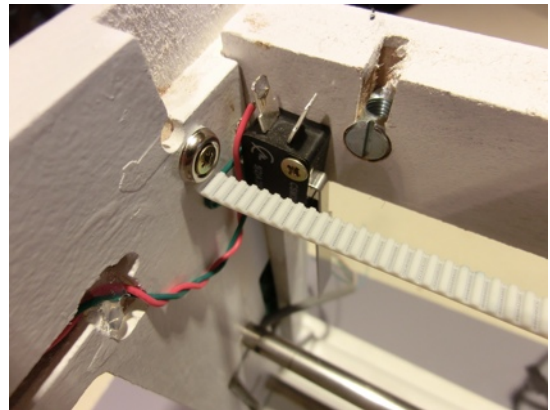
This picture is a little crazy but shows the wires running in the channels from the extruder motors and the wires for the hot end in the middle channel. The Sumpod is laying on its left side. I ran 5 wires to the hot end -- two for the heater, two for the thermistor, and one for the fan control. Don't use the heater for the fan. One of the thermistor wires is at ground potential, so that can work as the return for the fan. Thus the center channel will have 9 wires - 5 for the hot end and 4 from the X axis motor.
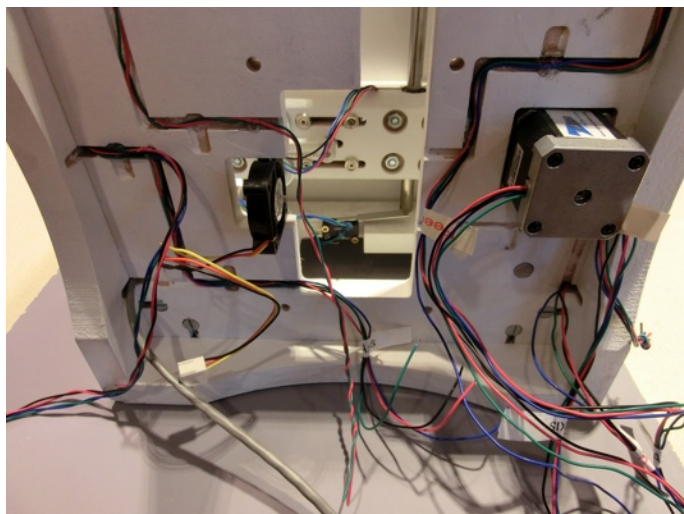
It is starting to get a little messy down underneath! One suggestion: label the wire sets so that you don't have to constantly go back and confirm what they go to! You can see that I've glued the sets into place and that the general lengths are at least good enough to fit to the RAMPS board.

You can see also the grey LAN cable at the bottom left which will connect to the LCD panel. However after this was taken, I replaced the LAN cable with my own 8 wire bundle (again made from excess stepper motor wire!) because the conductors would not take up solder! This is because they were aluminum wires. Good for lightweight LAN cable, not good for soldering. You might want to try out your LAN cable by tinning one wire first before you install it.

Now for some fun! You need to terminate each stepper motor and endstop in a terminal which will be placed in an inline connector. I like to keep the connectors on the carrier strip as I do this. If you are lucky to have the particular crimping tool for these, then you know what to do. If not, like me, then the general approach is this: strip off 2mm of wire, then tin the end with a soldering iron. The tinning keeps the fine strands together (and at times I will twist them before doing this). Place the wire in the terminal so that the smaller crimping area lines up with the tinned end of your wire. Then using a fine needle nose pliers, carefully bend over the tabs to trap the soldered end. The wire strain relief tabs at the end of the connector get folded over and crimped next. Now if you are careful, you can solder the wire in place. This is tricky! A very fine tip and steady had are needed, and the terminal will not fit if you get any

solder outside of it on any surface. I've had many years of experience doing this sort of assembly, and I still manage to mess up one or two each time. Usually it is because of too much solder. If you tinned the wire well and then crimped it soundly, there really is not much need to solder it. However, the real frustration will come when you pull on a wire and it slides out of the terminal later! Soldering eliminates that completely. So I'll leave that up to you.
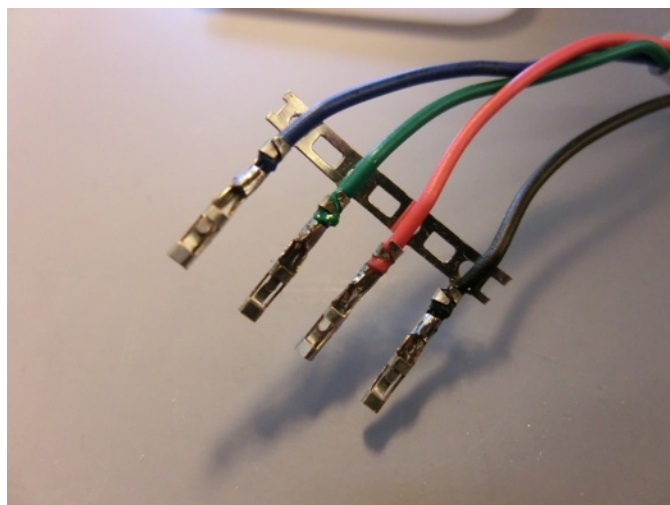
This picture shows how each stepper motor should be wired and terminated in one of the inline connectors. Note the order of the colors!!! This is VERY important. To be sure, it is from the top, BLACK, GREEN, BLUE, RED.

You will also need to put the three endstops into two-pin inline connectors, as well as the thermistor. Polarity is of no importance for these at all. You will not place connectors on the two heater wires, as those will be installed into a compression terminal.

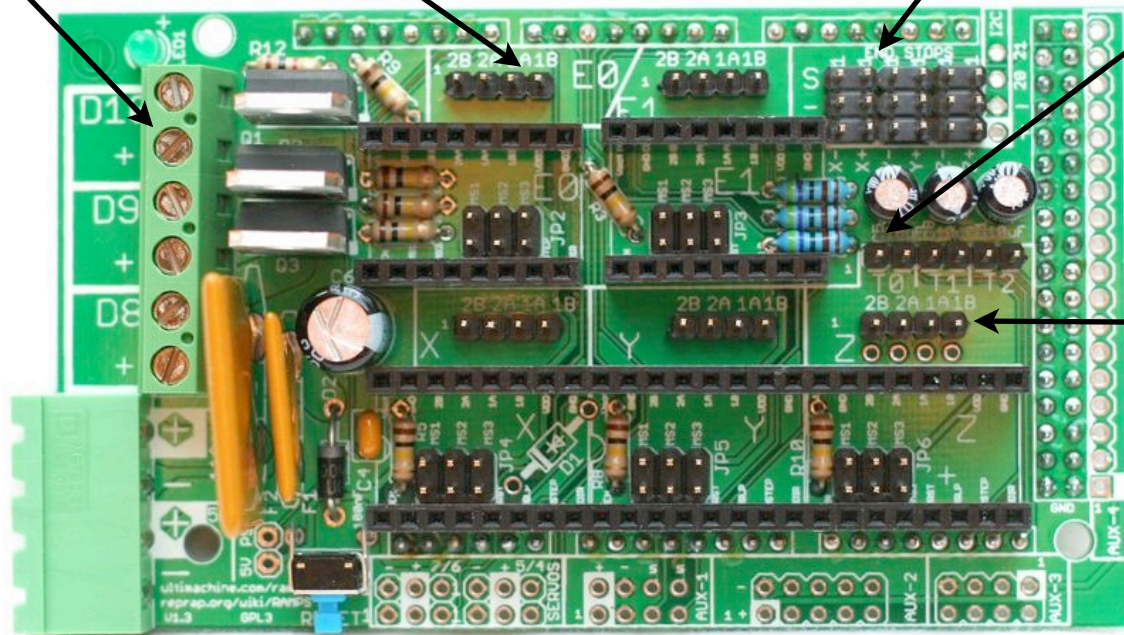Extruder 0 stepper motor (same as single extruder)

This picture is from the RAMPS documentation on the reprap.org site.

Endstops: X to X-, Y to Y- and Z to Z +

Two wires from heater to D10

Thermistor to T0

X, Y, and Z stepper motors

I highly recommend that you visit the RAMPS page on reprap.org here:

http://reprap.org/wiki/RAMPS1.3

before working on all of this wiring installation.

For the stepper motors, the 4 wire carrier can be reversed which reverses the sense of motion. While I followed the RAMPS specification for RBGB corresponding to 2A2B1A1B on the board, I later discovered that the X and Y would need to be reversed based on how the firmware was set up. So if you complete your unit and then discover one of the axis is going backwards from the intended setup, just flip the stepper connector end to end and the sense of the stepper motion will also be inverted too.
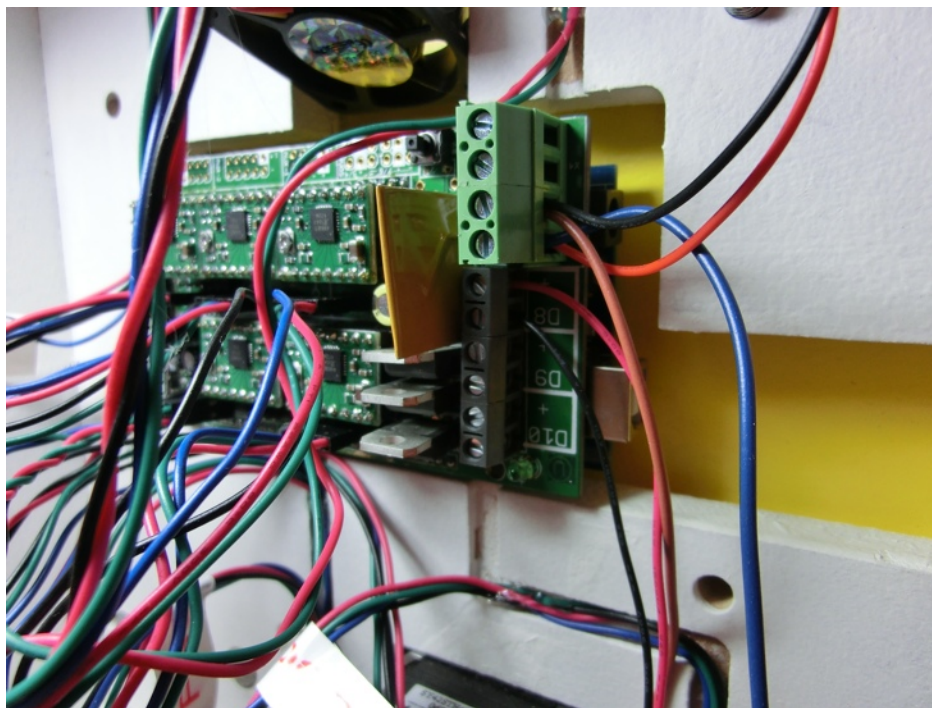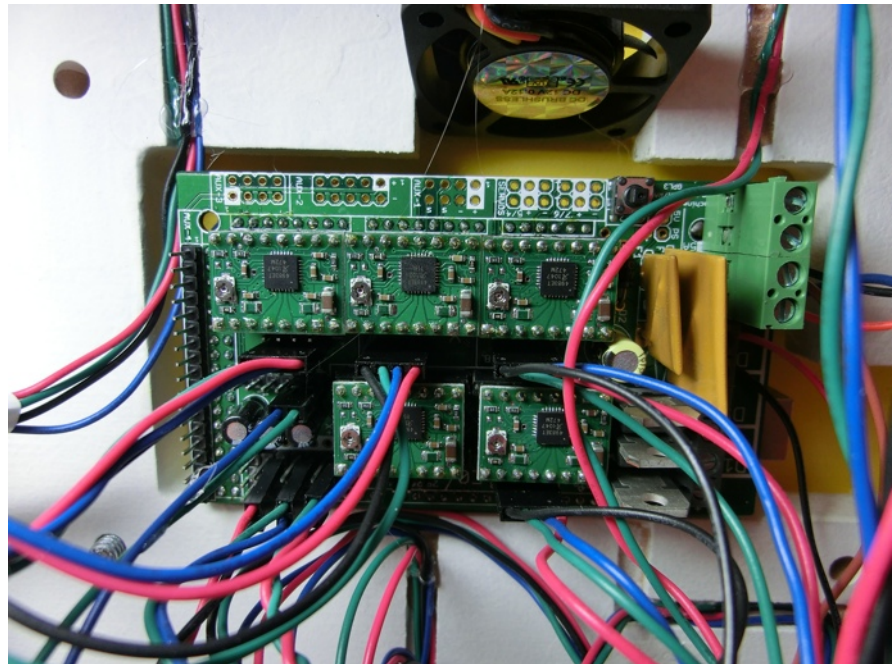
Do you see the mistakes? The heater wires are connected to D8 instead of D10! And, the power terminals are the lower pair of connectors not the upper set of two (those are separate for a heated bed power supply). I'll fix this picture later. The fan for the RAMPS board is connected directly to the 12V input here. The blue and brown wires come from the front panel edge with the power.

While it is hard to see, the LCD wiring is also in place on the left edge of the RAMPS board. Richard's site has the wiring instructions posted already, but given that I've seen a lot of confusion on this, I'll try to fix that (or maybe not...)

I've lined up the two ends of the wiring so that you can easily see the connections and corresponding terminals. Remember, the color of the wires doesn't matter, but the point to point connections do! In this case, I've used excess stepper wires to do the connections instead of the LAN cable.
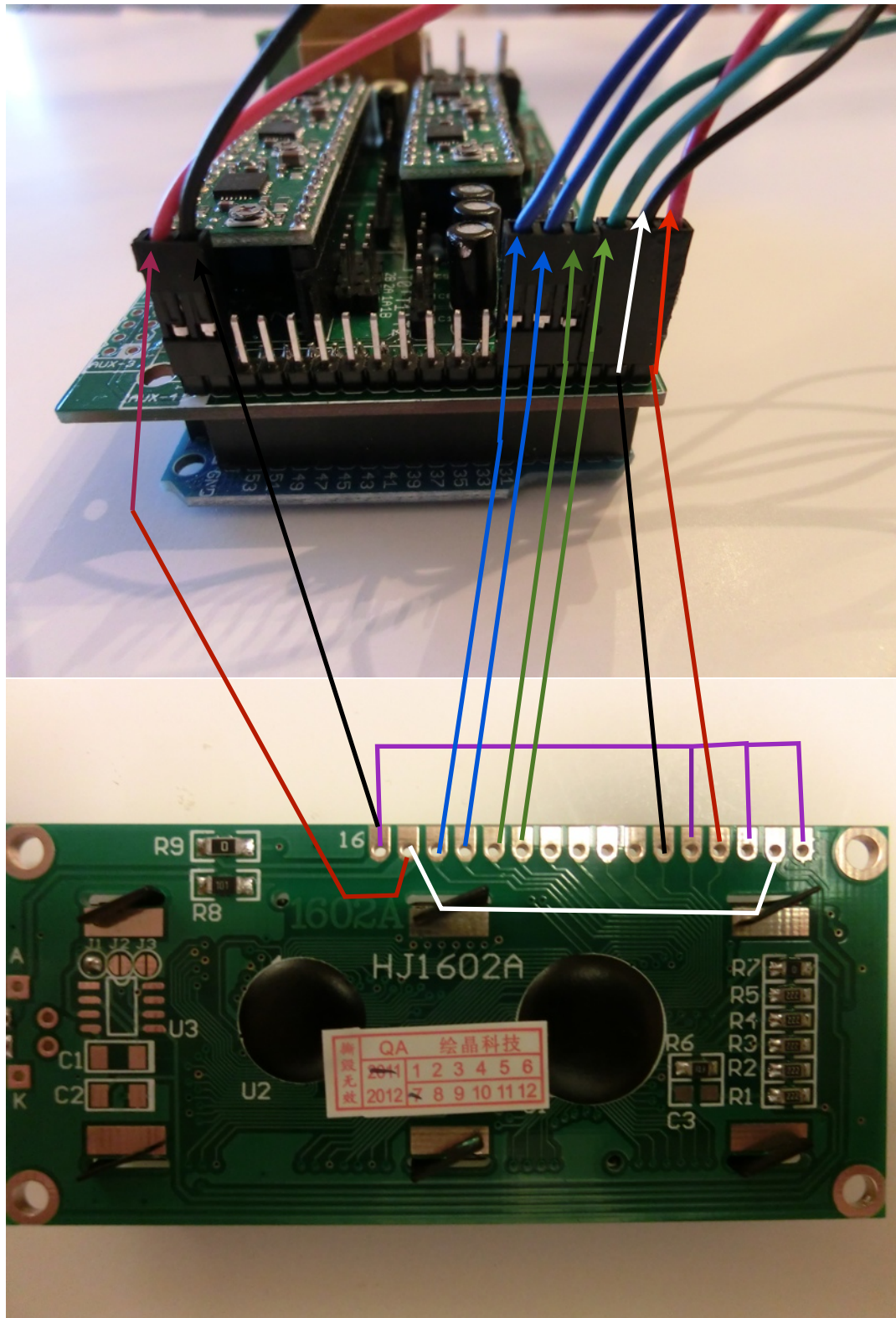
Now, remember also that you should run the wires from the LCD through the chassis to the bottom before putting the plastic inline connectors on the ends of the wires. It makes it a lot easier, not to mention that the 6-pin connector will not fit through the opening to the bottom unless you remove the front panel to allow it to clear.

More to come! I thought I would get this published so that eager Sumpod builders would have enough to get things to a good finish. I have a list of additional pointers and tips that will be released very soon but as I've said on my blog, my "day job" has been intense for the last few weeks and spare time is at a premium!