

Temperature controller assembly instructions

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1/20/16

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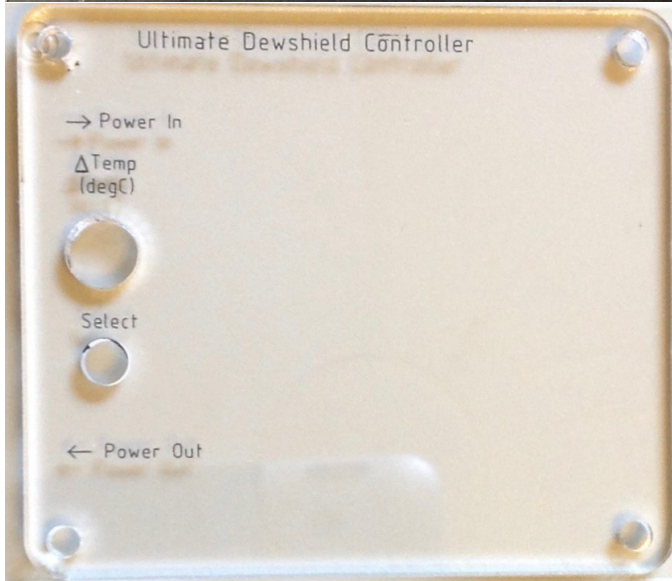
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Preparing the top cover



The lettering on the top cover can only be seen after it has been filled in with some Rub N'Buff.

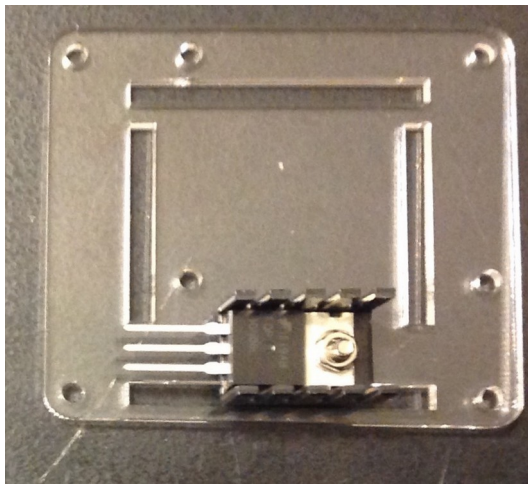
Use a little rubbing alcohol to clean off the access after rubbing in Rub N'Buff.



Installing the MOSFET and heatsink to the back cover



The MOSFET must be screwed onto the heat sink with a thin layer of thermal compound and then mounted onto the back cover. **Make sure that the orientation of the cover is correct!**



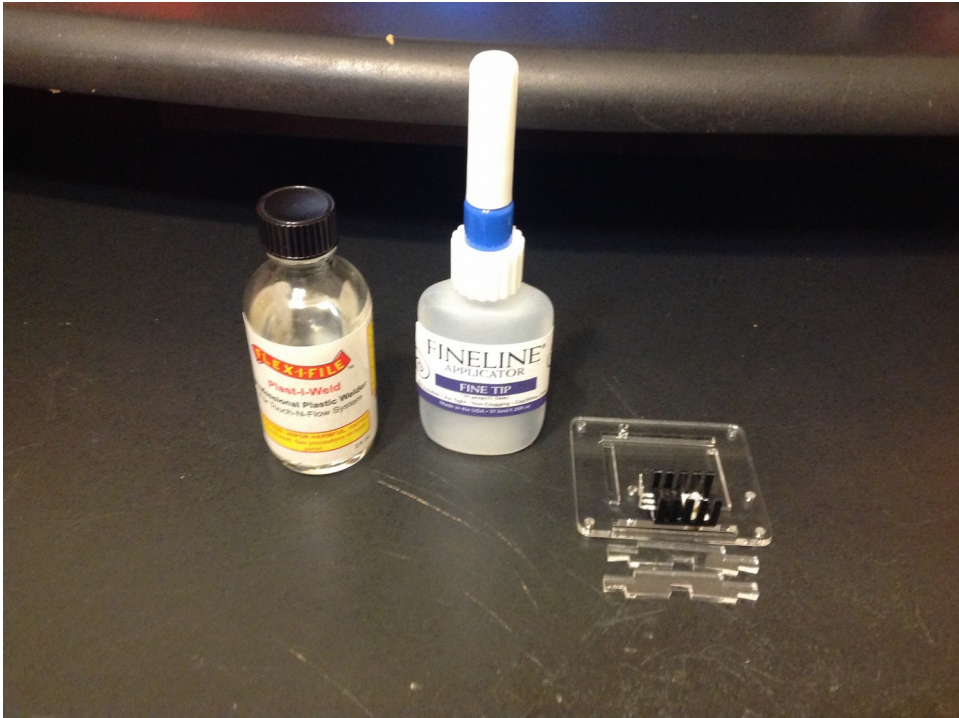
Bend and adjust the legs of the MOSFET so that it will go through its mounting holes on the PCB when the PCB is mounted on its 1/2" spacers.

Cementing the supports onto the back cover

You will have to first select the direction that you want to attach temperature controller to the dew shield.

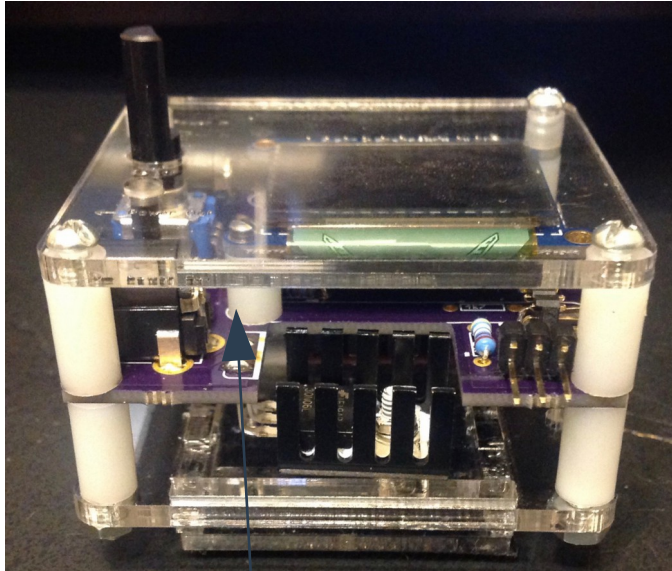
I wanted to attach the controller to the side of the dew shield and so I'm using the shorter curve supports.

Use an acrylic cement with a fine line applicator to weld the acrylic supports together. A youtube video from this [link](#) shows you how. If there is any overflow or drops of cement that land on the acrylic, do **not** wipe it off! Let it dry by itself and there will not be a trace of it dries.



I did not add the cross beams until I installed the PCB because I wanted to be able to further adjust the MOSFET during the PCB installation. Once the cross beams are installed, the head of the MOSFET's screw is basically inaccessible.

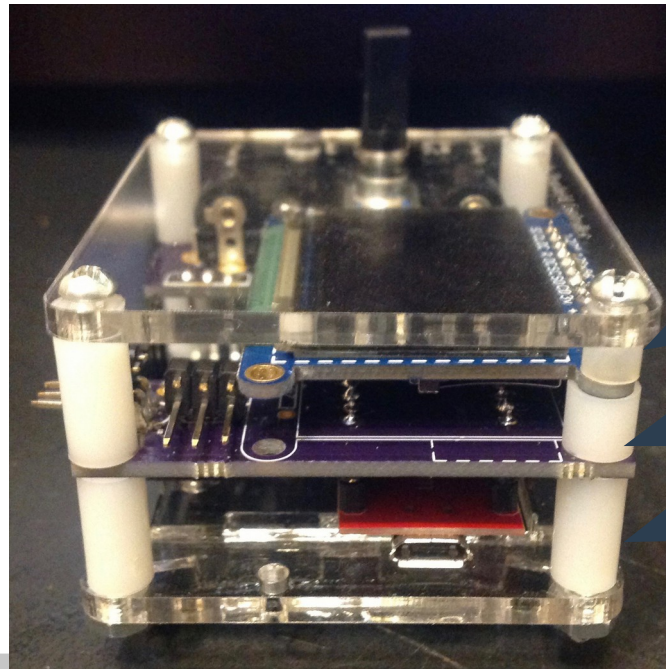
Assembling the top and bottom covers to the PCB



1/4"

The covers and PCB are attached with 1.5" 4-40 screws and 1/2 inch nylon standoffs.

The OLED is securely attached to the PCB using two 1/4" nylon standoffs. The OLED and the top cover with a 4 mm spacer. In order to get this spacing, you must use the low profile 0.1" spacing pins from www.jameco.com, and the sockets from www.sparkfun.com.

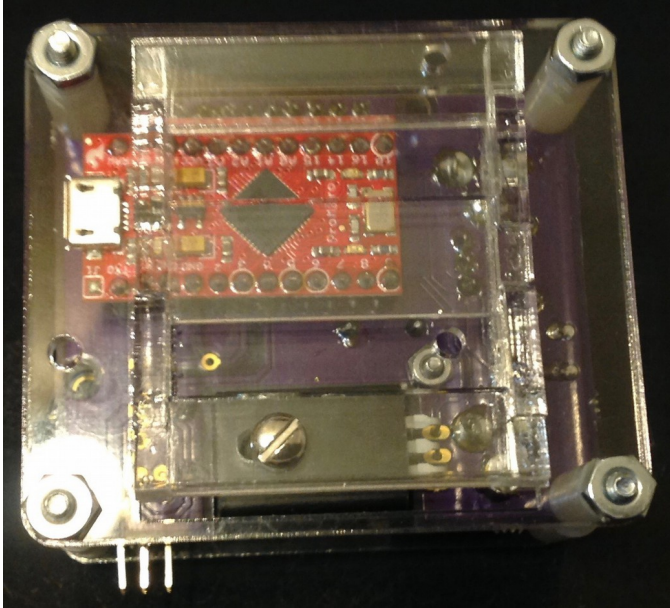


4 mm

1/4"

1/2"

Add cross beam supports and velcro

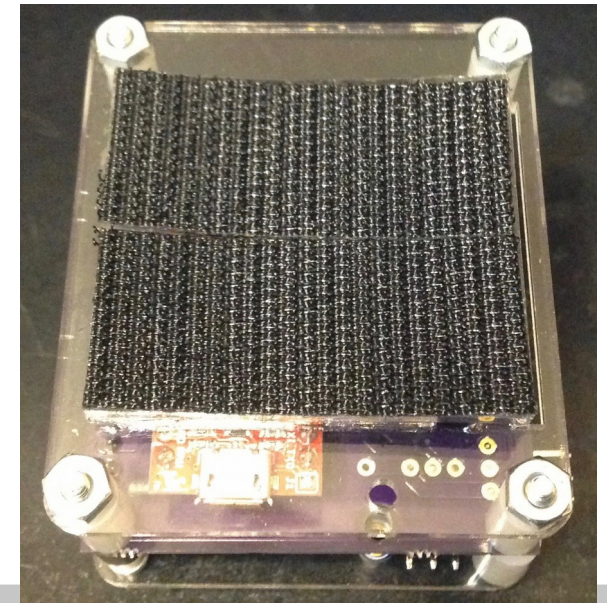


Next, the cross beam supports are cemented.

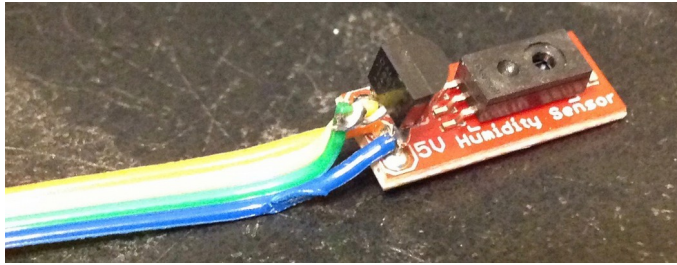
The MOSFET can be soldered to the PCB after all its components are soldered on.

The top and bottom covers are attached with 1.5" screws with 1/2" spacers.

Velcro is stuck to the curved support structure.

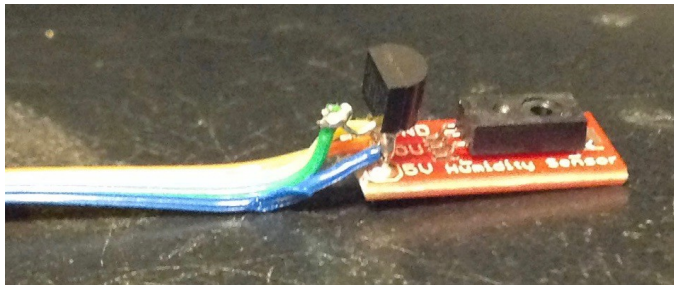


Adding DS18S20 to the humidity sensor



The temperature probe DS18S20 is soldered to the humidity sensor with its middle pin raised.

A 4 wire ribbon cable is used to connect the DS18S20/humidity sensor to the controller. Make sure the ribbon cable is long enough to reach where you want to mount the controller on the dew shield.

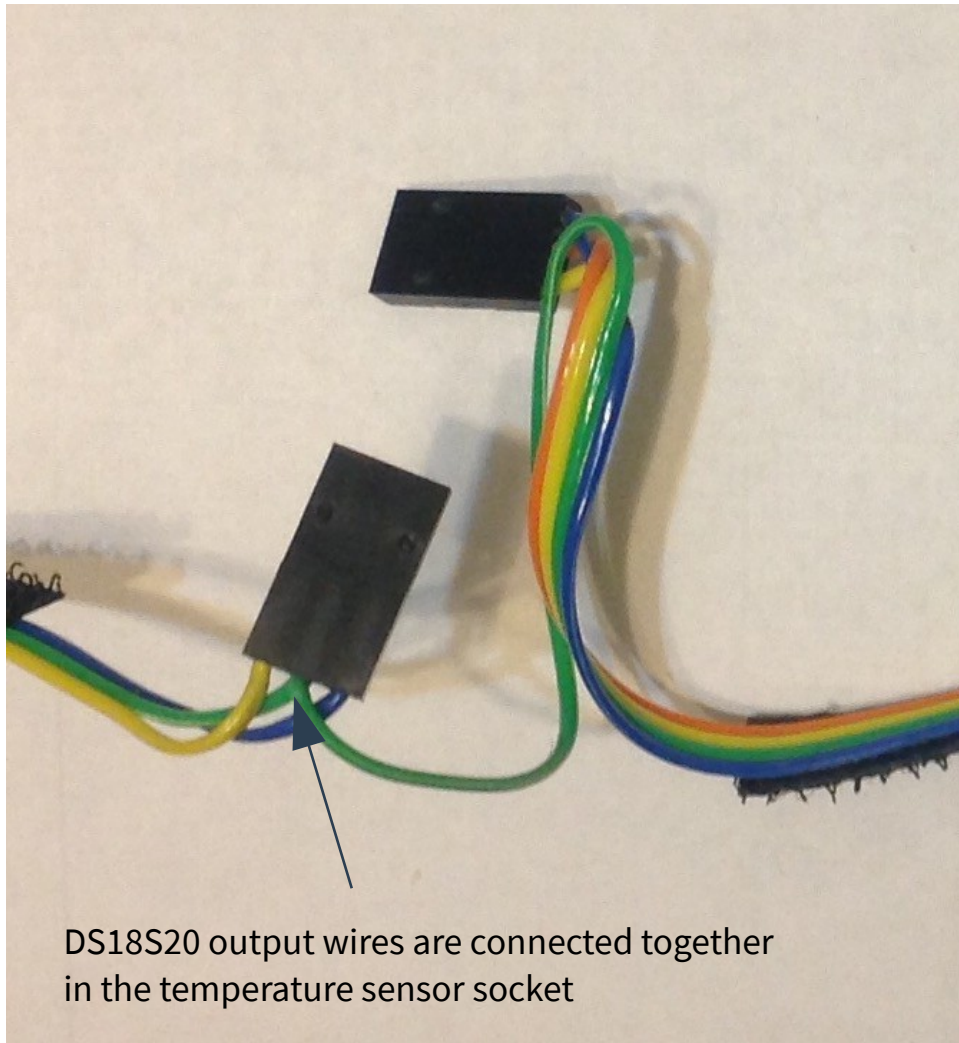


The GND and Power wires are soldered to the DS18S20 because they are common to both the DS18S20 and the humidity sensor.

The middle leg of the DS18S20 is raised and a wire is soldered to it. The last wire is soldered directly to the middle hole of the humidity sensor.

Make sure that you have the wires correctly matched at the other end for power/ground, DS18S20 out and humidity sensor out. The colored wires help tremendously here!

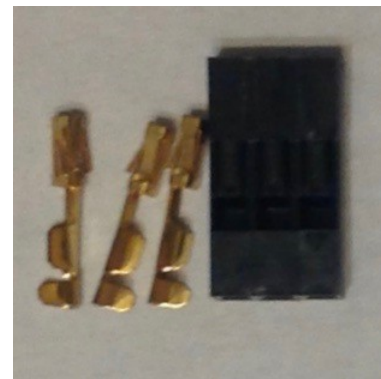
Making the sensor harness



DS18S20 output wires are connected together in the temperature sensor socket

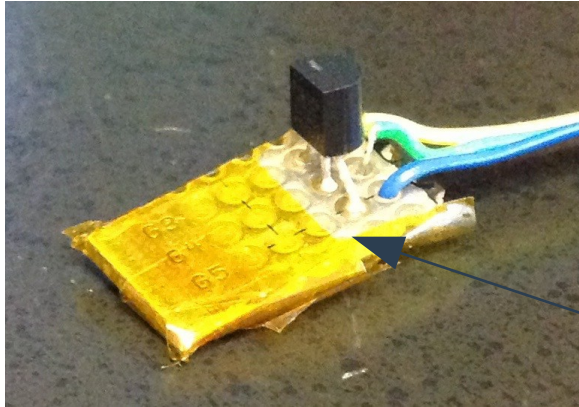
The DS18S20 temperature sensors are serially connected and so they are connected directly to the socket for the temperature sensors, i.e. two wires are soldered to the **same** pin.

In the example wiring I have on the left, yellow is 5V, blue is ground, green is temperature sensor out and orange is humidity sensor out.

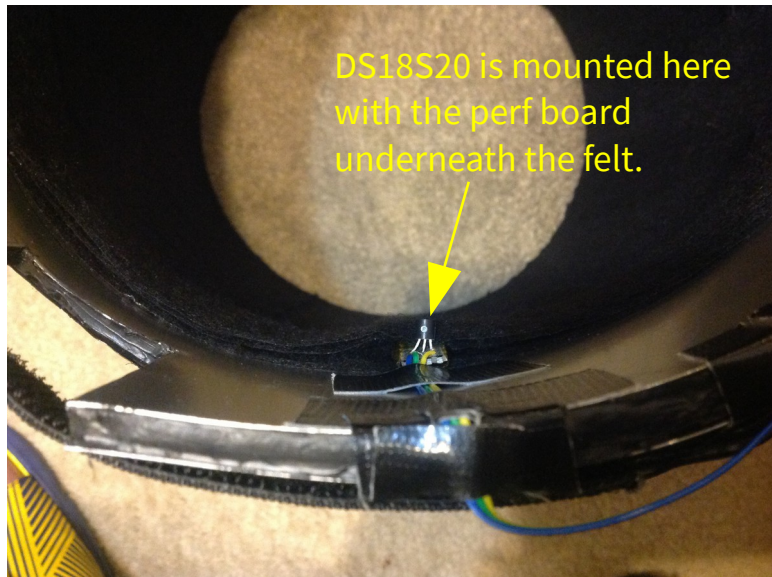


Wires are soldered to the gold pins and then inserted into the housing.

Making the temperature probe mounted inside the dew shield



The DS18S20 is mounted on a perf board and insulated with kapton

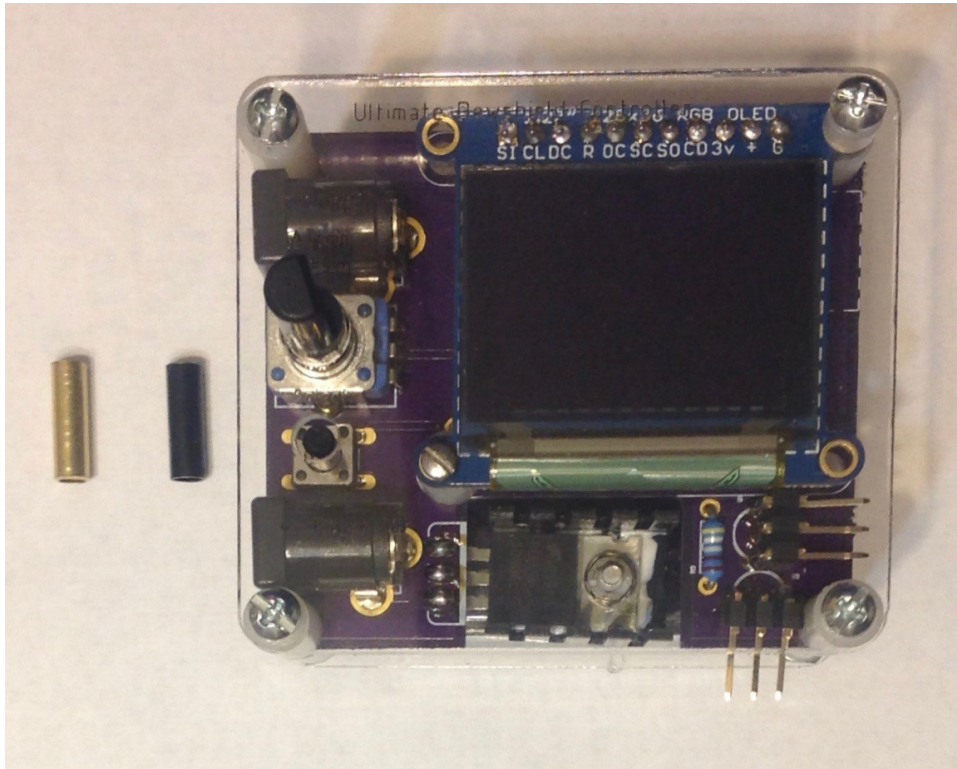


DS18S20 is mounted here with the perf board underneath the felt.



The DS18S20 is mounted below the telescope aperture so that there is no vignetting.

Making the push button (optional)



The push button switch is recessed below the front cover. In order to reach the button, I made a push button with a brass tube OD=5/32" and length 1/2" to reach it. I painted it black to keep the color scheme consistent.

Note: At this time, the button is not used at all. If I can think of something useful for this button to do, I will use it at a later date.

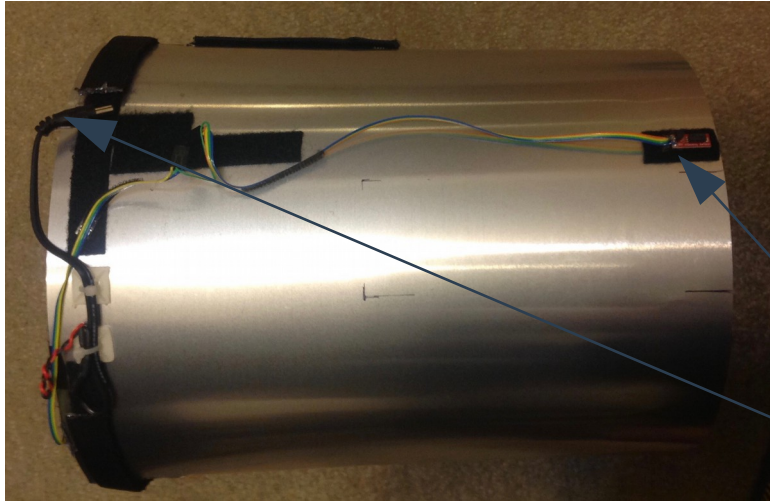
Adding a fuse to the power supply



Fuse holder with 3A fast acting fuse

I added a 3 A fuse to the output of the 5V, 3A power supply as a safety precaution. In principle, the current should never exceed 2.5 A.

Mounting the controller



Velcro pads are stuck on the locations where the humidity sensor and the controller will be set.

Humidity sensor

Connector to heating pads



Finally, the controller is mounted onto the dew shield with the power, heat pad cable, and the sensor cables connected. Once powered up, it keeps the inside of the dew shield at a set temperature above the ambient or the dew point at a level determined by the user using the pot.