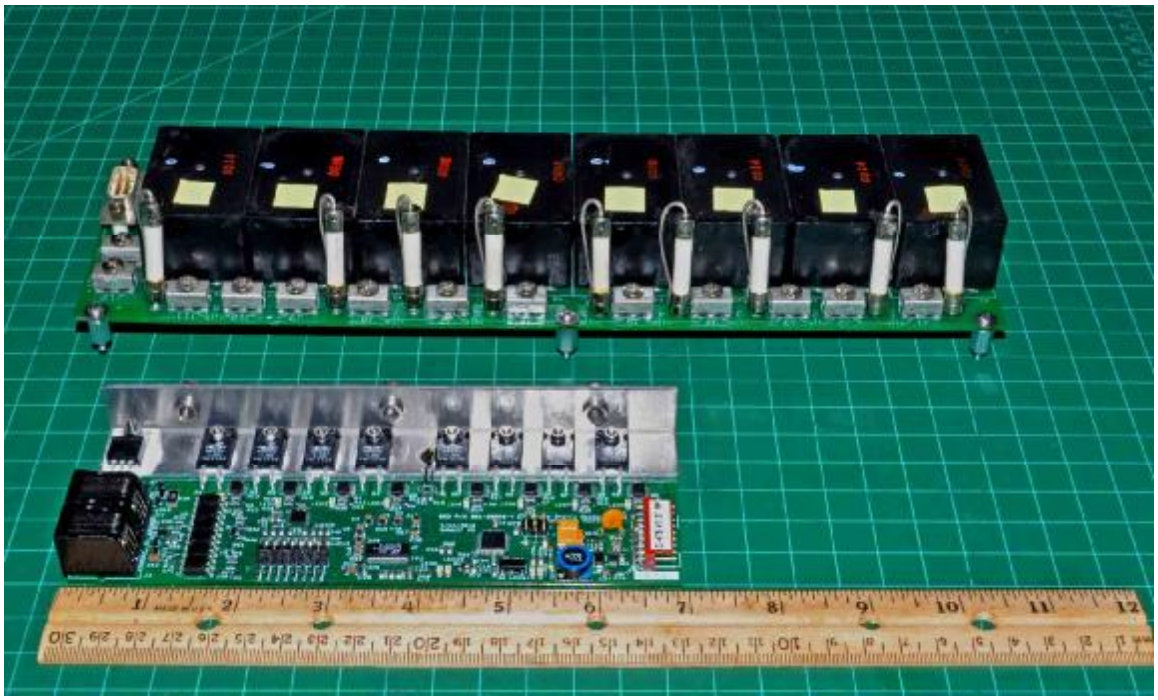
The Volt Vette Project
Chapter 51

Battery Management, Part 2

After a great deal of thought I decide to install the Manzanita Micro Battery Management System. It costs more than the other systems but it also does a lot more.



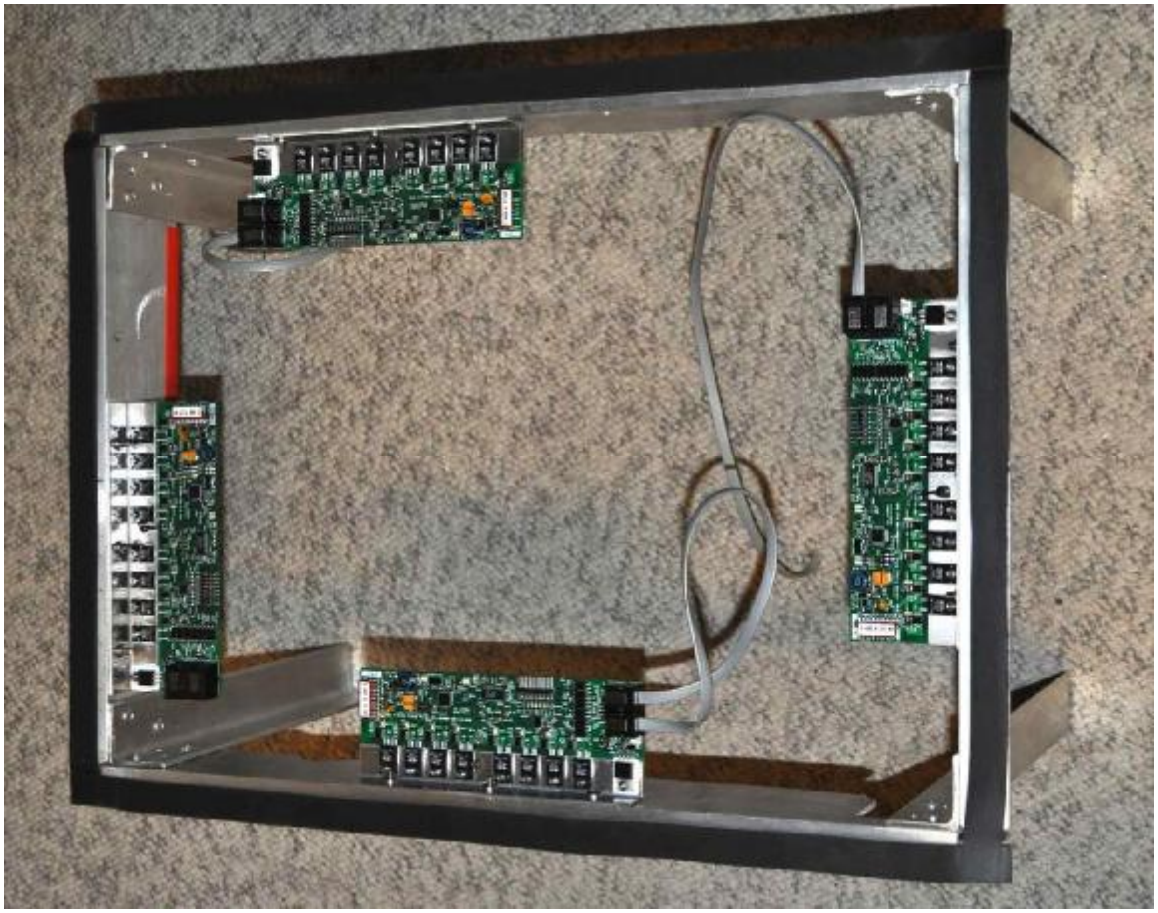
As you can see in the photo above, the Manzanita regulator boards are much smaller than Lee's, but do not have the big fuses for protection against unforeseen problems. Instead, Manzanita boards have something called a poly fuse, which is rated at only 50 milliamps (my cell phone battery is rated at 1,200 milliamps).

Unfortunate, since the Volt Vette Project often sails into uncharted seas!

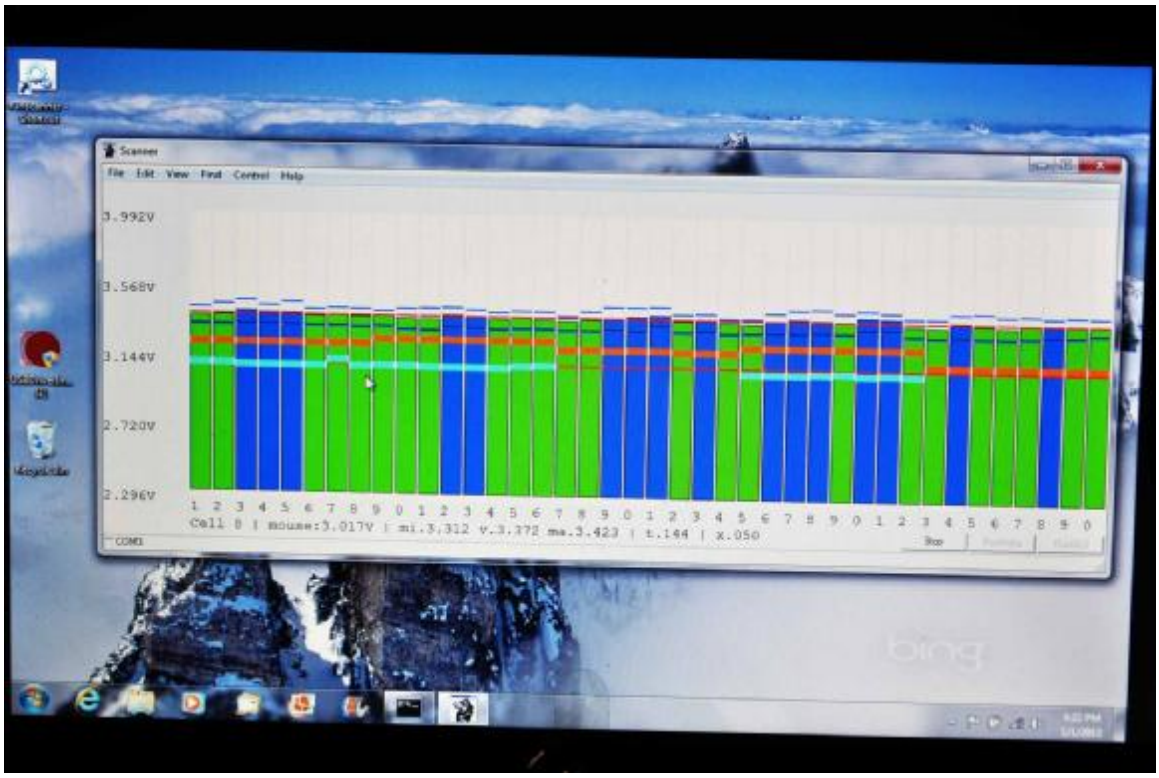
In any case, like many BMS, this system prevents lithium cells from being overcharged by turning the excess electricity into heat. That means the boards

must be attached to a metal heat sink that can dissipate the heat and keep the regulator boards from getting too hot.

For this purpose I make a metal frame that slips into the middle battery box.



Next, I attach 4 boards near the top of the frame.
The gray cables go to my windows laptop and enable me to communicate with all the regulator boards. Each board has it's own brain chip, so there is no need to have dozens and dozens of commutation wires running to a central location.

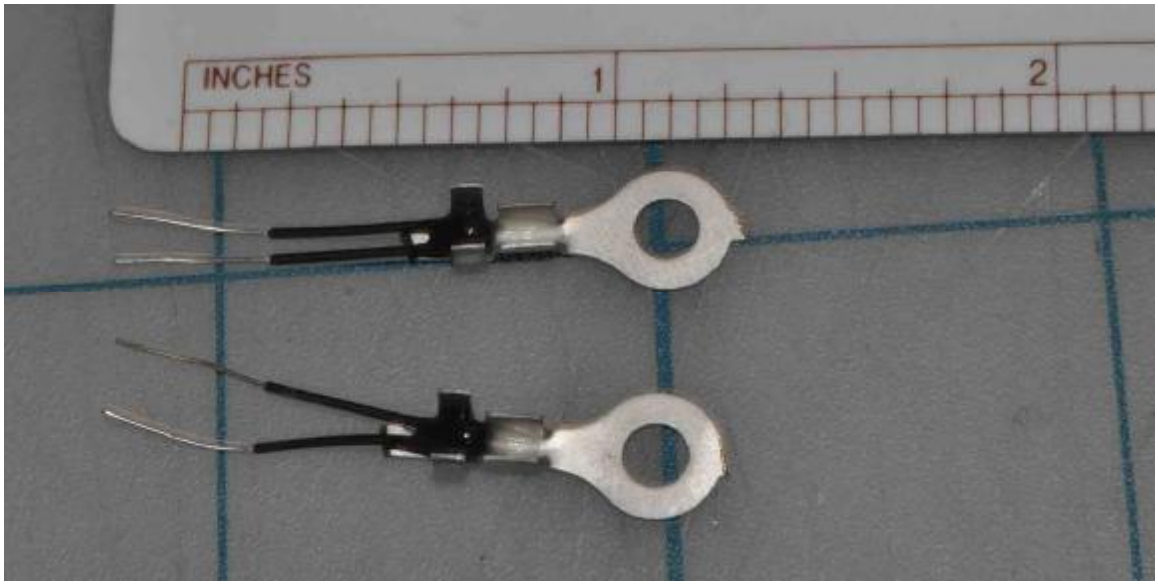


The boards can display a graph, on my laptop, showing the condition of each cell.
The first thing we notice, in the photo above, is that all the cells in all the batteries have almost exactly the same charge. This is very good news. All the cells are working together.
For test purposes, I have told all the regulators to charge up each cell to only 3.400 volts. When a cell gets to that point it's bar turns from green to blue.

Moving the cursor across the bars yields more data, which is displayed below the graph. In this case, I see that cell number 8 is a cold 50 degrees, shown by the light blue line, and it's regulator board is a hot 144 degrees, shown by the orange line.

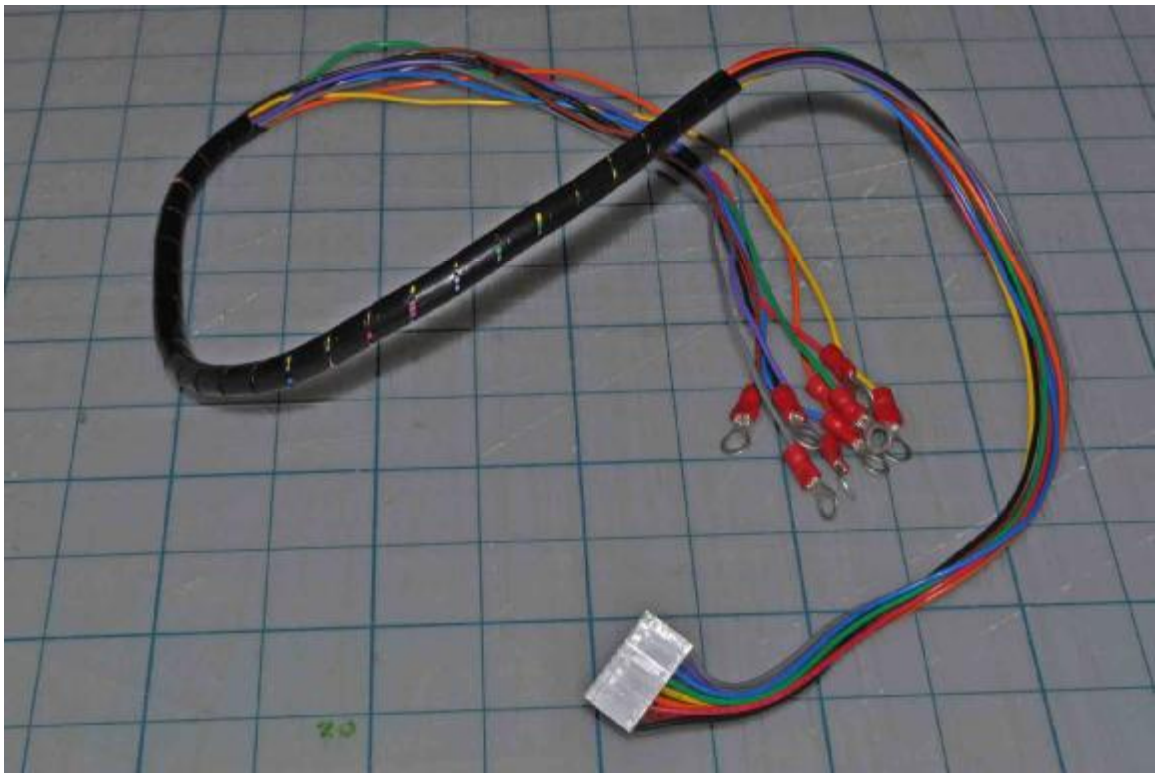
The history of the cell is also displayed, mi., shows the lowest recorded voltage was 3.312, and ma., shows the highest recorded as being 3.423 volts. In the middle, v. shows the present voltage as 3.372.

To gather this data I had to run 3 thin 22 gauge wires from each cell back to a regulator board. A temperature sensor had to be mounted to each cell, but the manual did not say how.

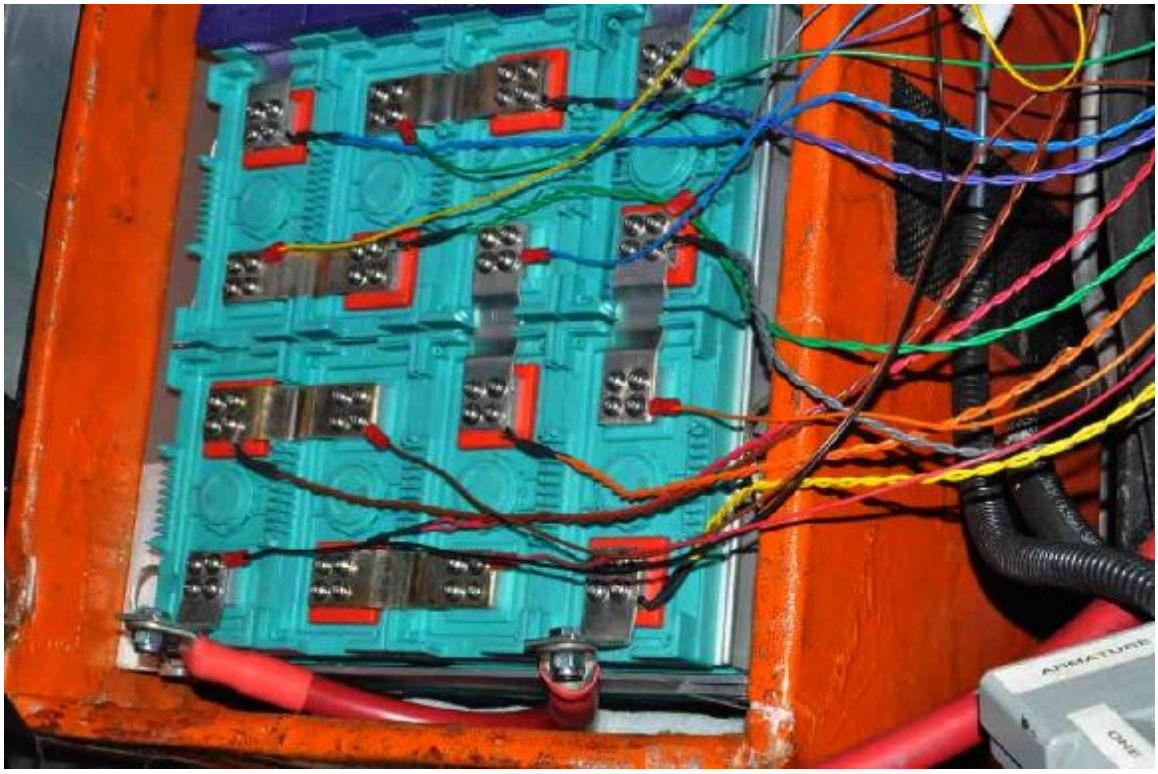


I finally decided to super glue each sensor to a metal ring terminal. After that

I ever so carefully soldered the tiny sensor leads to the braided wiring harness.

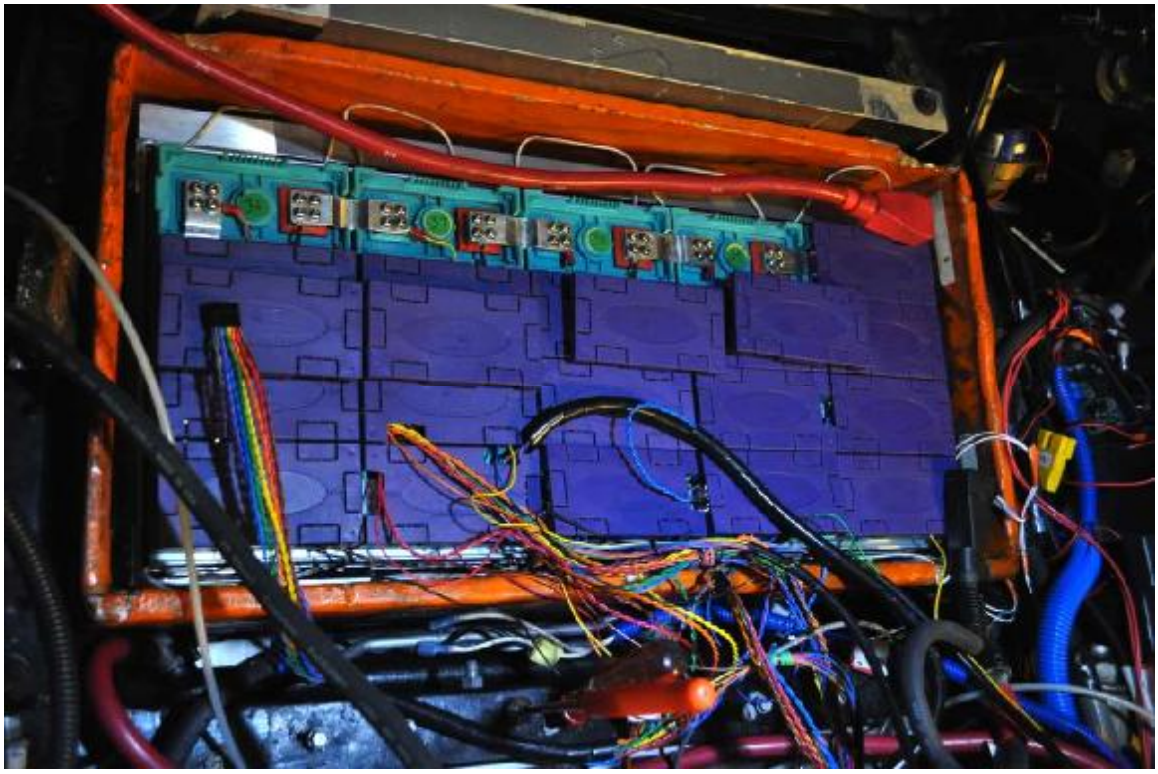


The volt sensor wires get a different style ring terminal that is attached to the negative post of each cell.



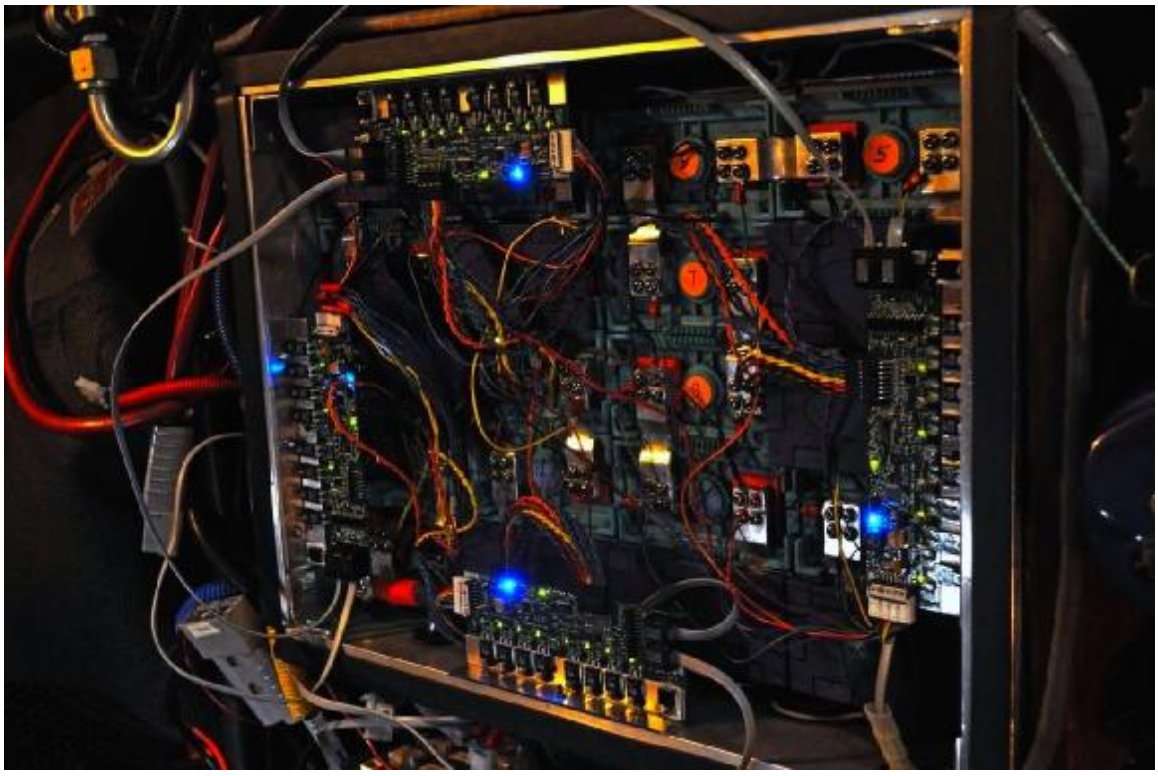
Something like the photo above.

Brad stopped by and told me of a better, safer, wiring plan for the front battery box.
I gave myself a dope slap for not thinking of it sooner my very own self!

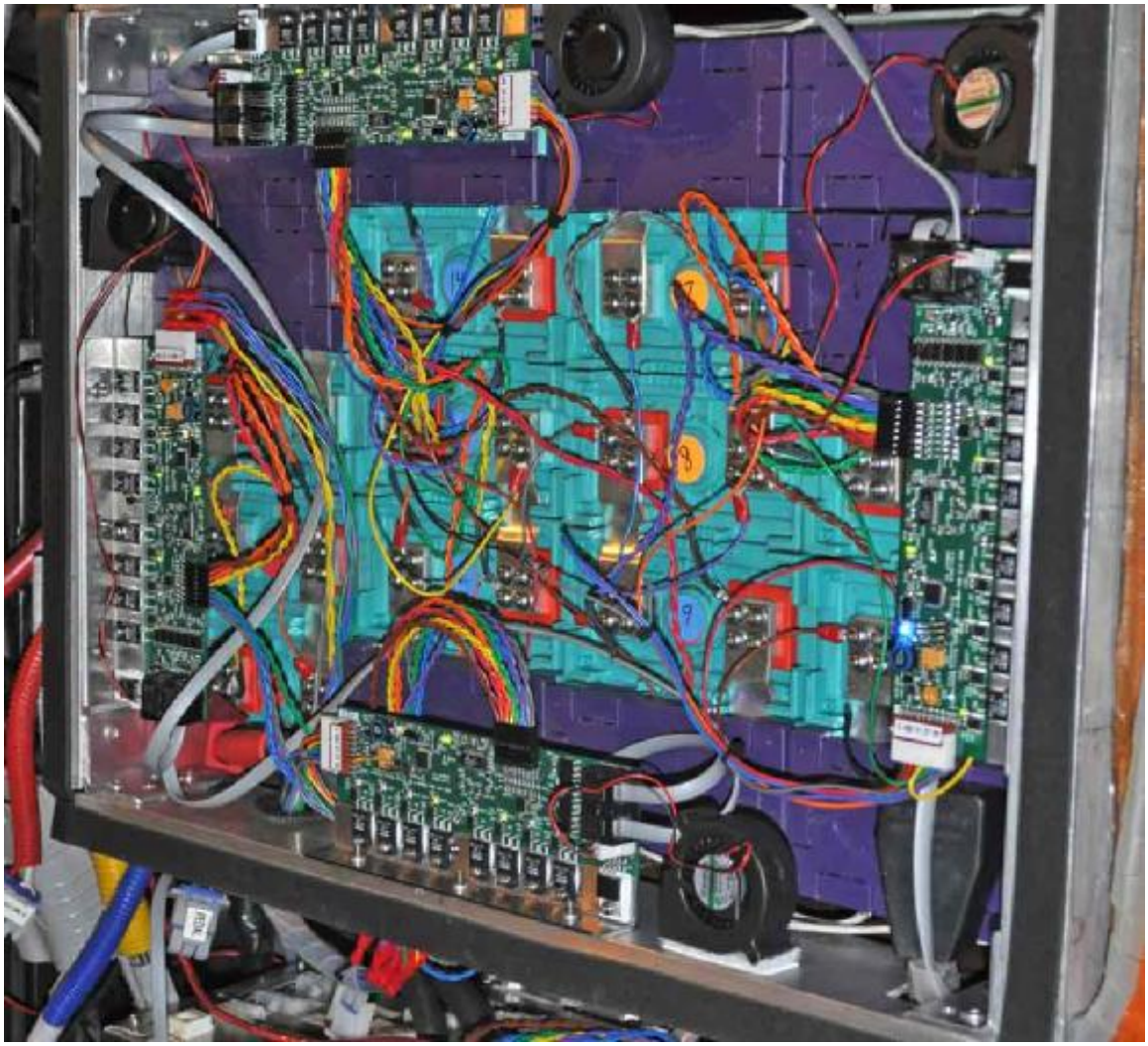


So I redid all the buss bars and wires. Hopefully now I’m finally finished with the front box.

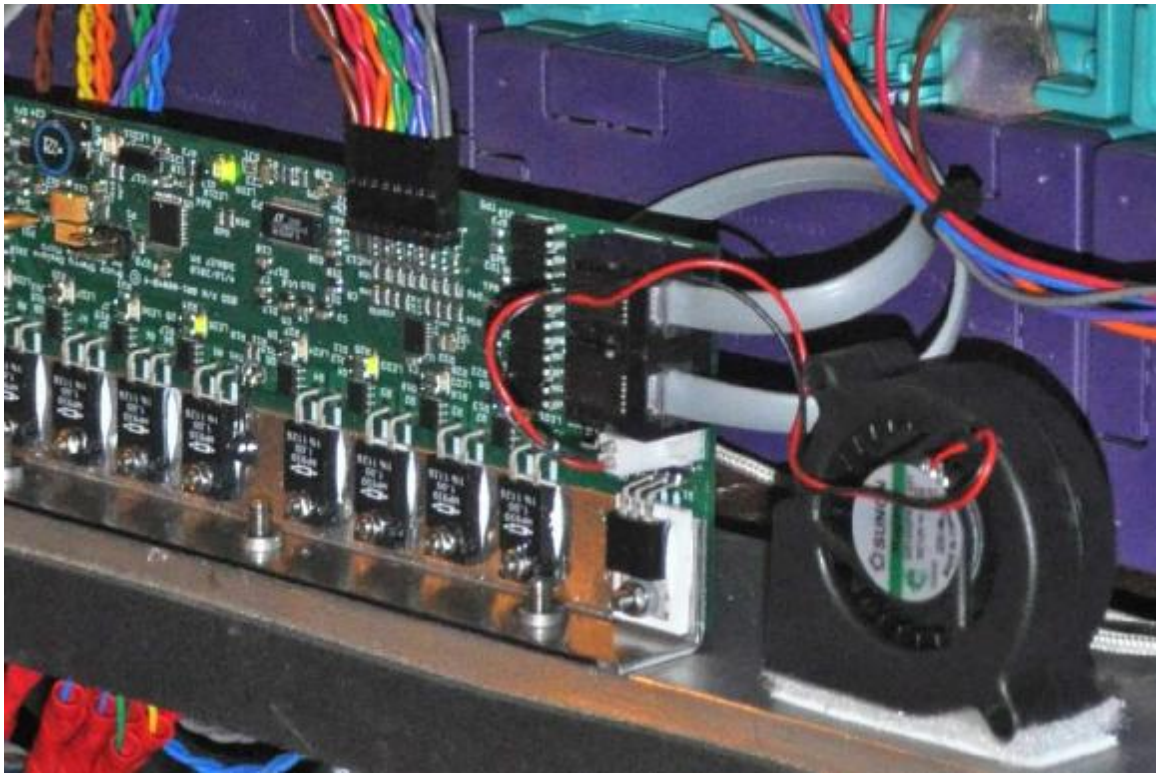
I put the electronics box back in place and put the 5th regulator board inside.



With every thing finally wired up you can see that the regulators put on quite a light show. The blue LED light flashes when the board is communicating with a computer. The green light next door indicates that the board is operating correctly.
The 8 green LEDs running down the length of the board flash when the cells get near full charge. The closer the cells get to being fully charged, the faster the lights flash. Kinda cool.



But not quite cool enough! If the boards get to 180 degrees they will switch off to keep from burning out. With my computer showing some of the boards reaching 160, I install a Manzanita cooling fan for each board.



These are 9 speed fans that plug into the boards. The hotter they get, the faster the fans run. If I like, I can also command the fans to run at a speed of my choosing. In any case, I no longer have to worry that the boards will overheat.

A big player in my battery management system is the battery charger itself. I chose the latest vision of the Manzanita Mico PFC-20 charger.

This charger will run on either 110 or 220 volts and charge up any battery pack from 12 to 450 volts. I pay for the optional push button voltage output gage and the expensive multimeter. I also pay extra to have this 20 amp charger beefed up to 30 amps.

My Chevy Volt is charged at 16 amps and 110 volts. In theory, the Vette can be charged at 30 amps and 240 volts. That's almost 4 times faster, if it works!

The Reg Bus cable connects the charger to the regulator boards so that the boards can tell the charger when to shut down.

Next: Road testing all this new stuff!