Fpix Burnin Box – Status and Plans

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Outline:

A box exists! But a lot of work to do.

Finalizing shelf layouts for plaquettes and panels

Feedthrough of signals

What should be read out?

Multiplexing

What does the control computer do?

The second box.

Schedule

As shown in previous slides, the structure of the first box exists!

Still a lot of work to do on it, hang the door, install the insulation, make holes for various pentrations, install thermoelectric coolers, install water plumbing for coolers, wire electrical connections etc.

All the materials needed for these have been bought.

While still here at UVa box and controls will be tested with dummy heat loads.

The control computer is operational and is talking via Labview and GPIB with the Keithley multimeter.

Next step is to hook up serial interface to the Omega temperature controllers on the thermolectric cooler power supply boxes.

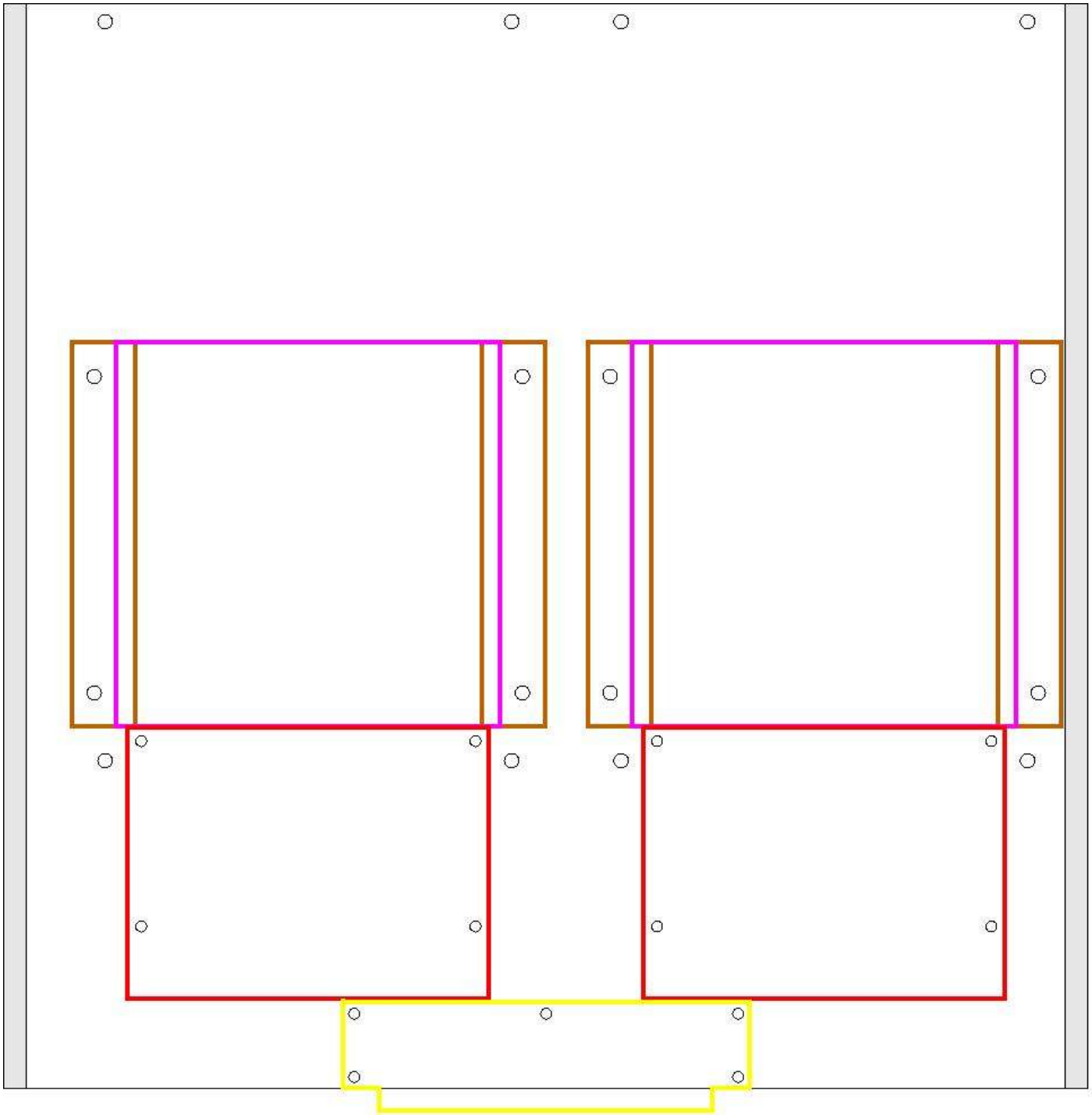
Design of shelves to hold plaquettes/panels

Based on plaquette carrier design by Kirk Arndt, panel carrier design by Greg Derylo and interface board by Mike Matulik.

Next two slides show layout of shelf for plaquettes and panels.

The interface board, assumed same dimensions in both cases, is in the same place in both, as is the edge connector board at the rear.

Plenty of room, for plaquettes, but the layout for panels is very tight.

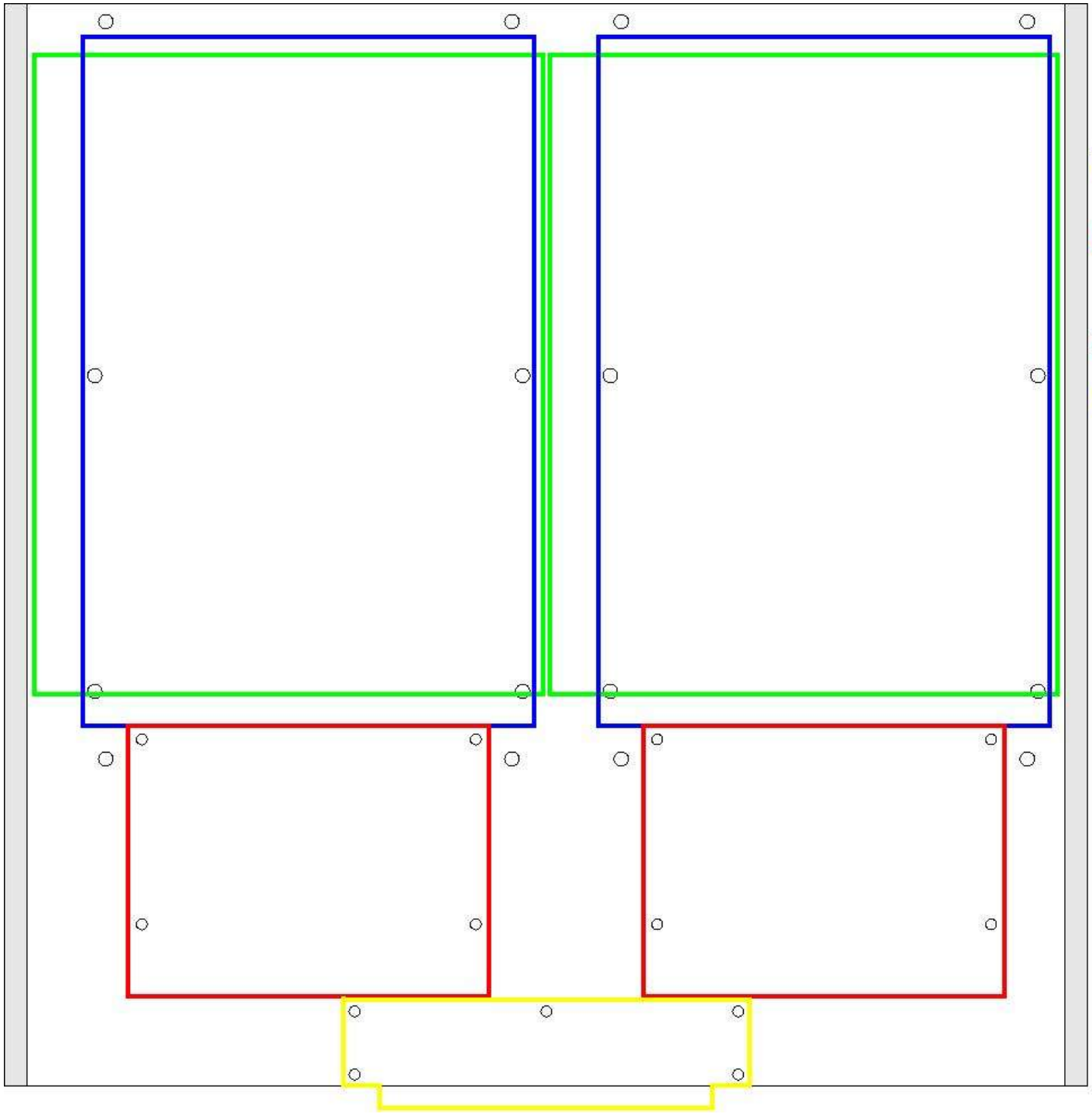


magenta – plaquette mounting

red – interface board

yellow – edge connector board

brown – clamps



blue – panel mounting plate

green – panel outer box

red – interface board

yellow – edge connector board

Unfortunately, after seeing the actual box, this tight fit got even tighter.

The 11.5 inch dimension needs to be reduced by about 0.12 inches.

This is because I didn't realize that the “3/4 inch” Aluminum plates are actually about 0.790 inch thick and because the slotted plate bows in the middle after the slots are cut.

There is room to make this adjustment, but only about 0.13 inch of free space remains in the panel layout (plaquette layout not a problem).

It would be very useful if you could send me 2 plaquette carriers (without the actual plaquette but with the output connector that plugs into the interface board), 2 panel carriers (do any exist yet?) with the outer plastic boxes and the output connector, and 2 interface boards.

Then I could put together an actual full shelf for both configurations before going ahead and drilling the mounting holes on all 10 shelves.

Feed through of signals:

The best way to get signals in and out appears to be to put an edge connector board on the rear of the shelf that plugs into a “backplane” that contains wires to propagate signals to outside the box.

Needed wires are (for each plaquette):

- Power into interface board (3 wires)
- Bias voltage for pixels (2 wires)
- Current draw readout? (2 wires)
- Data output (50 ohm cable)
- Control cable, 17 pair flat cable

Each shelf may have a temperature sensor (2 wires)

Have I forgotten anything?

Once we agree on a complete list I propose to make a prototype and send it to Fermilab so you can put it into an actual setup and verify that all the needed connections are propagated successfully.

What should the control computer read out and record?

We have a Keithley 2700 DMM with 2 40-channel multiplexor units (I'm assuming one for each of 2 burnin boxes)

What should these 40 channels be used for?

The only thing absolutely needed is one channel for the humidity sensor. (note that there are 2 temperature sensors that are read out through the temperature controllers).

Possible things to read out:

Temperatures on individual shelves

Current draw of plaquette electronics

Bias voltage and/or current drawn on the bias voltage.

This whole question is largely one of what cables and connectors are needed.

(for instance, if Droege supplies are used for the bias voltage, the voltage and current are available on lemo outputs)

I have begun thinking about a rack panel to serve as the interface to the Keithley DMM.

What happens to the signals after they leave the box?

Unless we build 20 (40) DAQ systems some sort of multiplexor is needed.

I have not thought about this much, commercial multiplexors exist, but are expensive.

What exactly does the control computer do?

Presumably it has one big loop that controls the temperature cycle, as well as manual control of the temperature.

Every so often (1 minute?) it reads all the voltages etc and feeds the results to some database.

Does it have any more interaction with the data acquistion other than passively through the database? (does the DA tell it to start, or vice-versa?)

Status of the second box:

The intention has been to build 2 boxes.

I don't intend to put the second box into the UVa shop until I know what's wrong with the first one! (if anything)

However almost all the parts for the second box have been purchased, including parts for the thermoelectric cooler power supplies.

(a note: the second box will have slightly lower cooling capacity – the models of the thermoelectric coolers used in the first box are no longer being made.)

Schedule:

I think a useful box could exist in 2 to 3 months.

Beyond that there may be a tradeoff between perfecting the first box and finishing the second box.