Final words on recommended plan for Scintillator KLM bias connections from power supplies to readout “RHIC” boards

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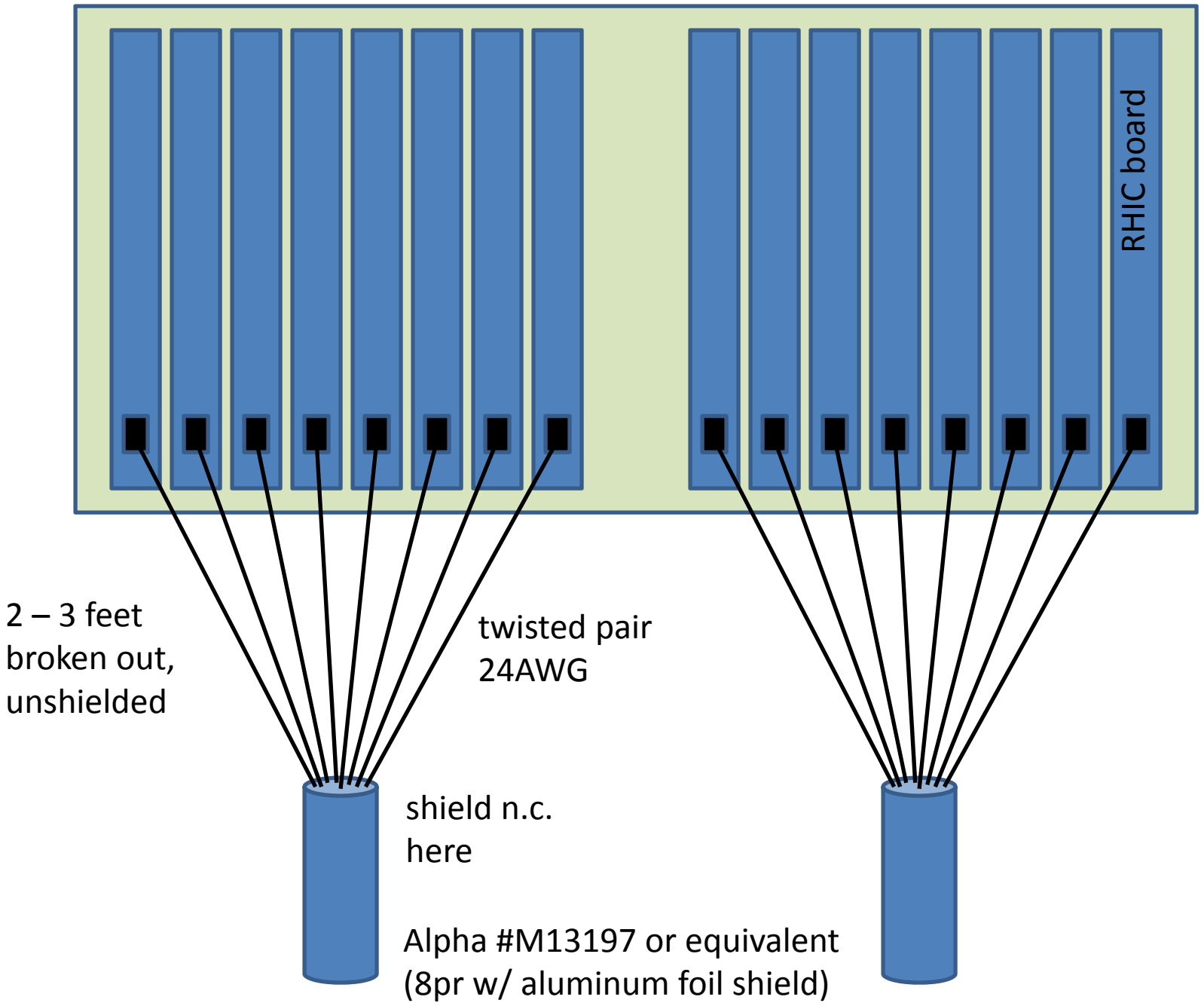
[Based on proposal sent out on 2/11/2015 and subsequent discussions as far as I know of them.]

Subtext: This is ready to begin procurement as far as I know. But I (Gerard) do not have responsibility to decide this. I see no problem with the plan presented here, I have checked it as fully as I can. Recommend those responsible proceed accordingly. Please let me know if anything winds up having to be changed, I will update this document accordingly.

Scinti FEE crate (**generic**; EKLM actually 7 RHIC/section, BKLM actually 1 section per crate not 2)



EKLM:

- 8 crates
- 16 bias cables
- one line unused in each bias cable
- cable run 150 ft

BKLM

- 4 crates
- 4 bias cables
- cable run 115 ft

Total installed cable length 2860 ft

FYI I did not in any way verify the 150ft, 115ft figures, I presume they are correct.

Long cable:

- Equivalent types: **Alpha Wire # M13197** or **Alpha Wire # 5478C** or **Belden # 9508**
- All are completely equivalent for our purpose… Even wire color code is same.
- Diameter is slightly different, but not enough to matter.
- All are NEC type CMG and are rated for 300VAC
  - → Meets all necessary safety requirements for this application
- Go ahead with procurement of either 3000 ft or 3500 ft (former should be ok, if we take some care about it). If problems can buy 500ft more later.
- Procure any one of those three types, whatever is best cost. Probably we should not mix types, please.

Cable assembly

End #1: A DB25M connector (with 30µin gold pins, and a suitable backshell for the cable). Wire the twisted pairs as follows:

Pair #	Color A	Color B	Conn pin A	Conn pin B
1	black	red	1	2
2	black	white	4	5
3	black	green	7	8
4	black	blue	10	11
5	black	yellow	23	24
6	black	brown	20	21
7	black	orange	17	18
8	red	white	14	15

and wire the drain wire to connector pin 13.

The usage will be that wire A of the pair is the bias return (ground at RHIC board) and wire B of the pair is the bias (negative). *This convention and pinout should (if I didn't screw up) facilitate a simpler patchpanel board layout.*

Cable assembly

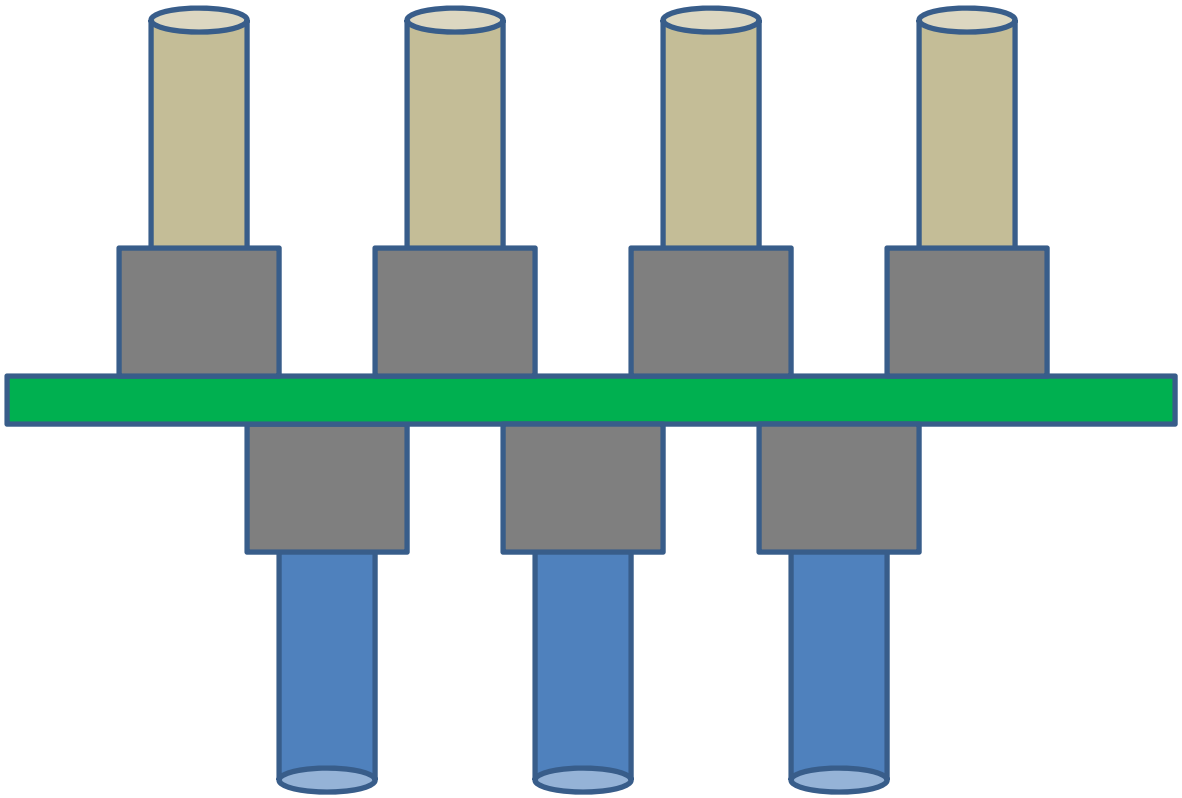
End #2: Break out each pair seperately over (2??) feet of cable. FYI pairs as follows

Pair #	Color A	Color B
1	black	red
2	black	white
3	black	green
4	black	blue
5	black	yellow
6	black	brown
7	black	orange
8	red	white

Run each pair individually through some sleeving to keep the pair together neatly. Sleeving ends probably ~1 inch from connector.

Terminate the pair to TE # 1-794610-2 contacts and # 1445022-2 pin housing. Wire B of the pair goes to pin 1 of this connector, wire A of the pair goes to pin 2.

BKLM patch panel, 24 PS channels
2 required
3 PS module (6 PS cable) required

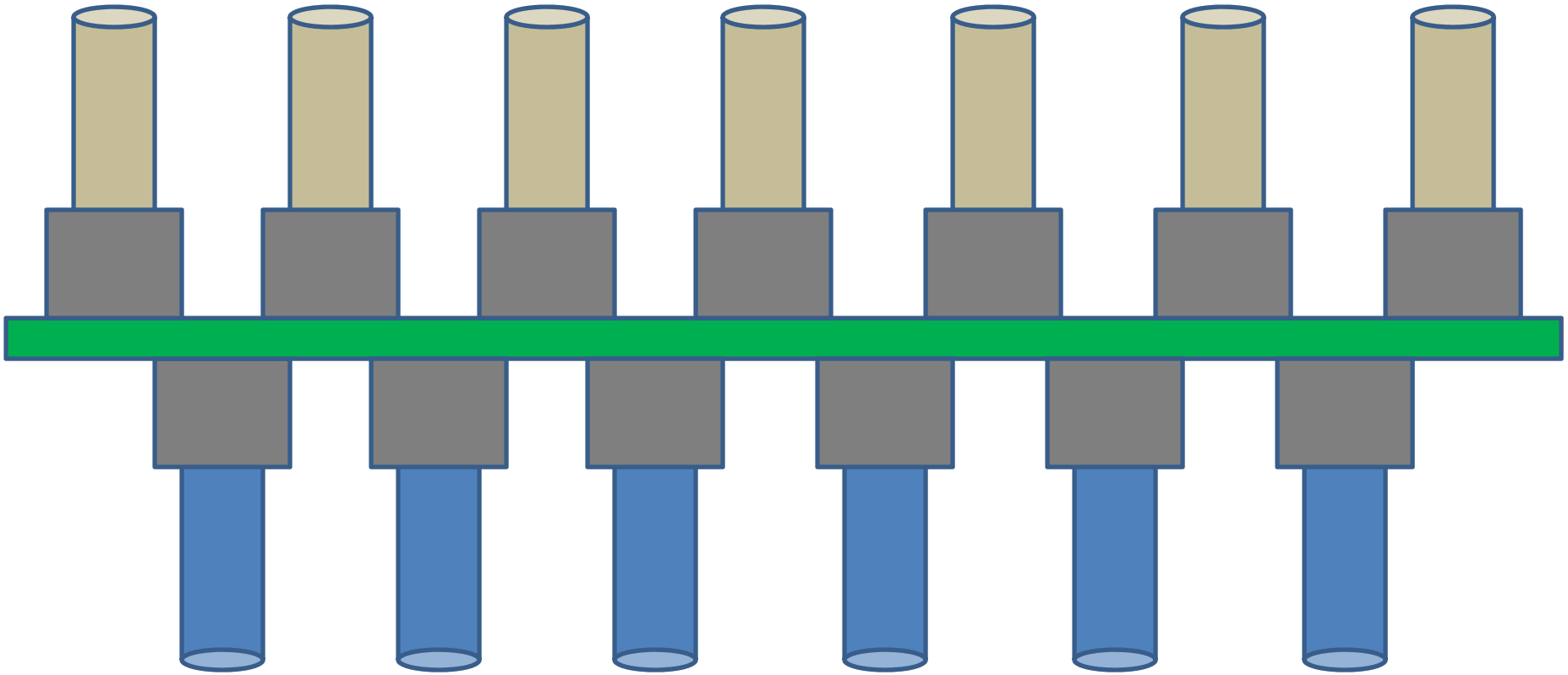


4x DB-37
any 1:1 DB-37 cable (>VW-1)
6 PS channel per cable

3x DB-25
cable to FEE
8 PS channel per cable

EKLM patch panel, 42 PS channels
3 required
10 PS modules (19 PS cables) required

7x DB-37
any 1:1 DB-37 cable (>VW-1)
6 PS channel per cable



6x DB-25
cable to FEE
7 PS channel per cable

The wiring diagram to be implemented in patchpanels is completely defined by the above slides accompanied by A1510 manual.

Patchpanel connectors: Vertical through hole D connectors with retainers at jackscrews holding them to PCB. There are many options. For decent ones, probably $10 each. I would not buy cheap connectors, it isn't worth it. So $600 - $800 in connector.

All connectors could be on one side, or on alternate sides as shown. Depends how it would be mounted. Note that I assumed alternate sides in choosing the optimal cable pinout, because I think this will be the lowest cost option for the patchpanels.

Board should be 0.093" thick. 2-layer board should be all we need.

If we need to do something with the enable pins on the PS connector – I don't know, didn't read the fine print – then do it here on this patchpanel PCB. Cables to the PS should be 1:1, a catalog item (somewhere).

Here is a vendor that could make the cable assemblies (both the long ones and the short DB37 ones, if those are not found elsewhere off the shelf).

http://www.blackbox.com/Resources/tools/cable-adapter-configurators.aspx

that is just one.
I am sure there are at least 100 US companies who'll make a cable like this. I haven't used the above company. I may be able to find some other candidates, if necessary, but I hope someone else can do this.

The DB37 cable assemblies can be 37 wire straight through M-F cables, which should be a stock item somewhere. Note that since they are internal to the rack, they do not need anything better than VW-1 fire rating. Of course, they must have minimum 150V voltage rating.

If not available as a stock item, then have them made (only a subset of pins actually are needed, and connector at patchpanel end ***COULD*** be changed to a smaller connector. I think we don't need any of the interlock pins (???) because that can be done to crate as a whole (???). If so then can use DB15 (12 pins wired, plus shield drain wire). I leave this trivial detail to someone else please. But straight through DB37M-DB37F may be the cheapest plan.