ECAL PMT Base Fabrication
a Status Report

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w/ many thanks to M. Jones (JLab) for delivering the talk

- Reminder…
- Current Status
- Outlook
Reminder...

- Design & build ~700 bases for ECAL
- ... based on the design shown

- Challenges/steps:
  - Recover sockets from old Russian dividers (not available for purchase, we tried!)
  - Get base design validated by experts.
  - Order a (small) set of prototypes
  - Solder wires, cables (and) components (if acquiring bare boards – not favored option!)
  - Verify that prototypes hold HV and produce signal comparable w/ existing bases.
Work done (since our last report) (Jorge, John)

- Consulted electronics experts (F. Barbosa (JLab) and K. Giovanetti (JMU)) – they did not find any obvious/glaring problems w/ the design, which is based on the schematic provided by MJ.

- EagleCAD artwork was sent to two vendors (one local, C-ville, Va, one in the Far East) and a small set of boards was ordered from each. All surface-mount components.

- ver. 1: Purple board – domestic (bare, rough – deburred, components soldered at JMU)

- ver. 2: Green board – Far East, got a “promo” package of 5 fully stuffed boards + 5 bare for $30! Edges nice too, no blood when handling!
Work done ...

✦ ver. 1 testing:
  ✦ Voltage rating of capacitors too close to spec.
  ✦ (i.e. they tend to burn out – not good!)

✦ ver. 2 testing:
  ✦ Greatly increased the voltage rating of caps. No more burn-outs!
  ✦ Boards hold up to 1500 V.
  ✦ Prone to sparking due to the distance between HV soldering points (see red lines in the picture below) – In case anyone asks, we do apply conformal coating at the end and that helps, occasionally.
**Work done ...**

- Based on this experience we:
  - Designed ver. 3:
    - Increased distance between the +/- locations on the board
    - Larger distance between all traces on the board
    - Increase overall length of the board by \(\sim 0.33''\) (as per B.W. suggestion) to allow for a larger distance between the signal and HV cable stress-relieving straps (blue lines in the figure)
  - Ver. 3 boards were ordered (Far East) this week. Should be here by the end of the month.
  - A back-up, through hole version of the board was laid out in EagleCAD as well.
  - We will try to build a couple of these in-house (more as a proof of principle).
Work done ...  
(James, John)

- In parallel w/ the board building/testing...
- We continued the socket-harvesting program
- long, arduous, and not very rewarding (though important)

James @ work

~300 sockets

7/17/2019
To do List:

- **JMU:** Wire up test ver. 3 board (3x = charm??)
- **JMU:** Continue/finish socket desoldering task
- **JMU:** Signal cables salvaged from old dividers as well.
- **JLab:** If ver. 3 is OK move to ordering the full set of boards. M.J. indicated that the process will be handled by JLab.
  - need to be mindful of vendor restrictions, the cost might go up depending on where the boards are ordered from.
  - need HV connectors (black, bullet-type) for the boards.
- **JMU:** once boards are received we can wire and test them all up.