

HCal Tasks List

HCal Working Group

March 15th 2021

Jefferson Lab

Detector Inventory

[Q2] Detector Inventory and Status

| Have[/Need/Diff] | Name | Location and/or Comments |
|--------------------------------|----------------------------|-----------------------------------|
| 4 | Sub-assemblies | TestLab |
| 16 | HCal LED Fiber boxes | On HCal |
| * 4/8/-4 | HCal LED Power boxes | 4 in TestLab, 4 assembling at CMU |
| 2 | Cosmic Paddles | Above HCal |
| complete 192/196/+4 | XP2262 PMTs (12-stage) | 10 need greasing |
| 96/106/+10 | XP2282 PMTs (8-stage) | On HCal |
| 1 | Detector Stand & Mezzanine | On-site (maybe in Hall?) |
| 1 (set) | Floor plates | Hall A |
| 1 | DC Power supply (~6 V) | In Test Lab (spares at CMU) |
| 1 | HV NIM supply | In Test Lab |

* incomplete or needs attention

Front-End Electronics Inventory

[Q2] Front End Electronics Inventory and Status

| Have[/Need/Diff] | Name | Location and/or Comments |
|---|--|--|
| 3 | Racks | Test Lab |
| 7 | NIM Crates | Test Lab Racks |
| 10 | Patch Panels | Test Lab Racks |
| 18 | Splitter Panels | Test Lab Racks |
| 18 | PS 776 NIM Amps | Test Lab Racks |
| 19 | PS 706 Discriminators | Test Lab Racks |
| 1 In Hand * 0/18/-18 channels | NIM Discriminator with remote controller | Should exist somewhere at JLab, need to find |
| In Hand (needs adapter) * | DAC or other remotely controlled voltage source for above discriminators | Need to get from somewhere, either VME based DAQ or something else |
| 18 | 16-channel Summing Modules | Test Lab Racks |
| * In Hand 0/4/-4 | 4 quad summing modules for "super cluster" | Need to determine if they are still needed |

* incomplete or needs attention

[Q2] DAQ Inventory and Status

| Have[/Need/Diff] | Name | Location and/or Comments |
|------------------|--|--|
| 3 | Racks | Test Lab |
| 2 | VXS Crates (with CPU + TI) | Test Lab Racks |
| 2 | LeCroy HV Crates with RPi controller | Test Lab Racks |
| 300/292/+8 | LeCroy HV channels (25 cards total) | Test Lab Racks 1 fADC currently being repaired |
| * 18/19/-1 | FADC | Test Lab Racks, missing 1 for reference signal |
| 5 | F1TDC | Test Lab Racks |
| 2 | FADC SD | Test Lab Racks |
| 1 | F1TDC SD | Test Lab Racks |
| 1 | "DVCS" Pulser | Test Lab Racks |
| * ?? | Need 9 ethernet plugs for 2x (Crate + ROC + VTP + HV) + 1x for Computer | Have sufficient at Test Lab via 2 unmanaged switches. Are we taking these to the hall? |

2 VTPs

Test Lab Racks (need firmware)

* incomplete or needs attention

[Q2] Cable Inventory and Status

| Have[/Need/Diff] | Name | Location and/or Comments |
|------------------|---|---|
| 288 | 100 m RG58 for FADC | Test Lab |
| * | "288" | 100 m RG58 for TDC |
| * | 12/28/-16 | 100 m RG58 for Summing modules + cosmic paddles + LED controllers |
| * | 13 | 75 m HV multi-core cables (RG59?) 24 channels each |
| * | 0 | BB Trigger Cables (as short as feasible) |
| 288 | 16 m PMT - Amp cables | Test Lab between detector and racks. |
| 288 * many | miscellaneous cables that connect between amp and splitters, discriminators, F1s, etc.. | Test Lab there is sufficient "small" varying length cables to connect all needed channels |
| 8/60/52 | Overlapping cluster trigger logic (2m RG58) | Have cables to test, but want uniform |
| 1 | Overlapping cluster trigger (as short as feasible) | Need to secure. |

* incomplete or needs attention

Old To-Do List

- DAQ operational and detector fully assembled.
- Cosmics/calibrations will resume when test lab access is restored.
- To do: <https://docs.google.com/document/d/1S--0K01QL0gP-EP-2nf8LSBLx6Y6d6TAFrWK1UkRxBE/>
- 279/288 Grease remaining PMTs.
- Ongoing Calibrate relative PMT QEs.
- Ongoing Voltage scans.
- Ongoing Calibrate PMTs with cosmics.
- Soon Simulation cosmics vs. real.
- Completed Finish CODA 3 upgrade.
- Test summing module trigger.
- Online monitoring/alarms.
- Analysis scripts.
- Assemble remaining pulser boxes.
- Fabricate shims.
- Move to Hall A.
- Install dry air supply.
- Personnel:
 - 2 postdocs: Scott Barcus and Juan Carlos Cornejo.
 - 2 students: Vanessa Brio and Sebastian Seeds.
 - Brian Quinn and Bogdan Wojtsekhowski.
 - New collaborators: Jim Napolitano and Donald Jones.

Old To-Do List Updated

- DAQ operational and detector fully assembled.
 - Cosmics/calibrations will resume when test lab access is restored.
 - To do: <https://docs.google.com/document/d/1S--OK01QL0gP-EP-2nf8LSBLx6Y6d6TAFrWK1UkRxBE/>
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- ✓ 279/288 Grease remaining PMTs.
 - Ongoing Calibrate relative PMT QEs.
 - Ongoing Voltage scans.
 - Code Written Calibrate PMTs with cosmics.
 - ✓ Simulation cosmics vs. real.
 - ✓ Completed Finish CODA 3 upgrade.
 - Ongoing Test summing module trigger.
 - Online monitoring/alarms.
 - Ongoing Analysis scripts.
 - Ongoing Assemble remaining pulser boxes.
 - Fabricate shims.
 - April? Move to Hall A.
 - Distribution panel in Test Lab Install dry air supply.
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- Personnel:
 - 2 postdocs: Scott Barcus and Juan Carlos Cornejo.
 - 2 students: Vanessa Brio and Sebastian Seeds.
 - Brian Quinn and Bogdan Wojtsekhowski.
 - New collaborators: Jim Napolitano and Donald Jones.

Other Completed Items

- All DAQ electronics tested and working.
 - Summing module tests in progress.
- Operational decoder and readout lists (CODA 2→CODA 3).
- Full database implemented.
- Flags file to configure ROC prescales.
- Event display available.
- Available Triggers:
 - Cosmic trigger.
 - LED pulser trigger.
 - Summing module overlapping cluster trigger.
- Documentation in progress:
 - HCal user manual.
 - Cable maps/interactive documentation.
 - Software documentation.
- LED and cosmic HV calibration scripts (work ongoing).

Hardware Remaining Tasks

- Assemble 4 remaining pulser boxes (CMU).
 - In progress.
- Fabricate remaining 3 shims that go between subassemblies.
 - Will be produced by JLab.
- Move HCal to Hall A.
 - Coordinating between Jessie, BB, and HCal.
 - * HCal will move first.
 - Decable and label HCal cables before moving.
 - Swap cables with BB pre/shower.
 - * BB has 256 100 m cables.
 - * Make up ≈ 40 -50 remaining from ECal cables in ESB.
- Setup HCal in the hall (≈ 1 month very limited access).
 - Recable detector and install long cables from FE to DAQ.
 - Reestablish DAQ.
 - Synchronize timings with BB.
- Install clean air supply for PMTs in the hall.
 - Albert Shahinyan has developed a plan. Air distribution panel in Test Lab.

DAQ/Software Remaining Tasks

- Test summing module overlapping region trigger.
 - Integrate VME DAC.
 - * Library written.
 - * Build adapter cable (identifying parts).
 - * Check channels individually and take cosmic data.
- Measure relative QE between PMTs.
 - Mostly done, but need to move PMT across subassemblies.
- Measure long cable attenuation.
 - In progress.
- Implement online monitoring software.
 - Analysis plots under development.
 - * SBS collaboration must select method to display monitor plots.
- Create alarms for HV etc.
 - Hall A alarm handler.

- LED gain and online monitoring scripts.
 - Perform gain stability studies.
 - Preliminary scripts written.
- Write scripts to verify HV as expected for hadrons.
 - Currently measuring gain curves for PMTs.
 - Preliminary scripts written.
- Write scripts to measure proton and neutron efficiency.
 - Simulations and scripts coming soon.

No showstoppers foreseen.