



Detector Support Group

Weekly Report, 2016-06-01

Ongoing Projects

1. Hall B Gas System

Hardware (George, Marc, Mindy, Sahin, Anatoly)

1.1 Drift Chambers

- George: "I updated the DCGAS and LTCC gas system critical path documents. In both cases we are waiting for critical path items to be completed by Hall B Engineering before we can continue."
- Waiting for Hall B Engineering.

1.2 HTCC

- Installed in TEDF.
- Waiting to be installed in hall.

1.3 LTCC

- George: "I updated the DCGAS and LTCC gas system critical path documents. In both cases we are waiting for critical path items to be completed by Hall B Engineering before we can continue."
- Waiting for Hall B Engineering.

1.4 SVT

- Installed and operating in EEL Rm 124 (big clean room).

1.5 RICH

- Created cooling circuit valve panel design.
- ASME relief valve approval
- Compressor and gas tank
- Space availability on forward carriage.

1.6 MicroMegas

- Waiting for information.

1.7 Forward Tagger

- Waiting for information.



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Software (Marc, Brian, George, Mary Ann)

1.8 Drift Chambers

- Ready for testing in hall.
- ★ Tested PID controller.

1.9 HTCC

- Ready for testing in hall.
- Installed and operating in TEDF.
- ★ Ambient humidity monitoring added to HTCC software.

1.10 LTCC

- Development in progress.

1.11 SVT

- Installed and operating in EEL Rm 124 (big clean room).

1.12 RICH

- Waiting for information.

1.13 MicroMegas

- Waiting for information.

1.14 Forward Tagger

- Waiting for information.

2. Hall B Magnet Slow Controls (Brian, Tyler, Peter, Amanda)

Work Request for Hall B Magnet Slow Controls: November 6, 2015

2.1 Task 1: Test power supply PLC code with actual Danfysik Power supply.

Background: Josh has written a new PLC driver and did some limited testing (simulation) for communicating with the 4000 A Danfysik power supplies. Prospective PLC programmer will need knowledge of Danfysik power supply communication protocols, serial communications through RTA 435-NBX module, and will need to coordinate testing with the DC Power group. The code is intended to be reusable, so it will be relevant for both Torus and Solenoid. Actual testing will likely occur with the Solenoid power supply.

Time Estimated: 2 man-weeks: 1 each for testing and debugging.

- **Completed.**



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2.2 Task 1a: Work with Wesley Moore to define/develop EPICS screen(s) for power supply status/control.

Background: Hall B is using CSS/BOY (VERY similar to Hall D). Programmer would need to understand the underlying data structure for the MPS control, be familiar (or be made familiar) with Hall D's PSU EPICS screens and work with Wesley to get the screens defined and functioning. Test the power supply control through the EPICS interface. Assuming this is the same person as 1, above.

Time Estimated: Anticipate this would be 2 weeks of effort.

- **Completed.**

2.3 Task 2: Work with Wesley Moore to define/develop Cryo EPICS screens for Distribution Can and Torus Service Tower.

Background: Familiarity with the Hall D and Cryo group practices, specifically those regarding valve control. Programmer will need to be able to navigate the PLC programs to determine which tags are relevant, understand the underlying data structures, simplify the P&ID's in order to get 'enough' information onto the EPICS screens for Cryo control.

Time estimated: 1 week each for Distribution Can and Torus Service Tower.

- **No Activity**
 - ★ Leak checks and repairs in progress; vacuum has improved and turbo pumps can be used.

2.4 Task 3: Solenoid Bore Heater control.

Background: Krister and Josh have put together a preliminary control system for the solenoid bore heaters. If their preliminary system is approved, this could be a stand-alone task within the overall Solenoid PLC program. This is ON-OFF control of 32 heaters based on the readout of 16 thermocouples. Task would include some definition of wiring, generation of wiring diagrams, hardware configuration, and actual control code.

Time Estimated: 2-3 man-weeks.

- **Descoped.**

2.5 Task 3b: Work with Wesley Moore to define/develop EPICS screen for Solenoid Bore Heater Control.

Background: Not available

Time Estimate: 1 week

- **Descoped.**

2.6 Task 4: Coordinate checkout of Distribution Box PLC program after Distribution Box installation.

Background: Download PLC code to PLC, verify all IO, verify operation and read-back from valves, perform initial setup of temperature readout units and LN2 readout unit. Ensure data is being transferred to/from EPICS correctly. During checkout, identify and correct any wiring problems or software bugs.

Time Estimated: 2 weeks.

- **Not started.**



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3. HDICE

3.1 **Fabricate RF Attenuation/Switching Unit (Mary Ann, Peter, Amanda, Tyler, Mindy, Sahin)**

- **In progress.**
 - * Developed and tested LabVIEW code for read-back of RF Switching/Attenuation Unit attenuators and remote interlock.
 - * Completed RF and interlock cables for test station.
 - * Wired control wiring for DIO modules 1, 2, and 3.

3.2 **Develop and troubleshoot HDICE NMR program (Peter, Amanda, Mary Ann, Tyler, Pablo)**

- **In progress.**
 - * Added functions to read the RF Attenuation/Switching Unit status during operation of NMR program.
 - * Implemented code to display information on settings used for NMR sweep.

4. RICH (Tyler, Amanda, Peter, Brian, Mary Ann, George, Mindy, Sahin, Marc, Anatoly)

4.1 **Visually inspect aerogel on arrival.**

- **In progress.**
 - * Inspection of aerogel will occur when received at JLAB.
 - * Shipment of 10 tiles received on 5/19/2016 inspected and photographed.

4.2 **Develop interlock system.**

- **In progress.**
 - * Designed interlock diagram.
 - * VESDA systems researched for smoke detection.
 - * Preliminary list compiled for interlock hardware.

4.3 **Develop nitrogen purge system.**

- **In progress.**
 - * Purge system diagram and parts list updated for higher flow components.

4.4 **Develop air cooling system.**

- **In progress.**
 - * Cooling system diagram and parts list updated for higher flow components.



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5. Hall D PLC Systems (Pablo, Peter, Brian, Tyler, Amanda, Mary Ann, Marc)

5.1 Sync PLC timestamp with MPS timestamp.

- **Not started.**
 - ★ Password needed to access EWEB module to get time stamp.

5.2 Troubleshoot sporadic signal in Coil 3 He return temperature sensor.

- **Completed on 5/27/2016.**
 - ★ Swapped sensor from redundant sensor terminal block to main sensor terminal block.
 - ★ Traced cabling to check any cable interconnects.
 - ★ Could not replicate sporadic signal; will continue monitoring.

5.3 Troubleshoot sporadic signal in Coil 1 strain gauges.

- **Completed on 5/27/2016.**
 - ★ Noted sporadic signal in Coil 1 strain gauges when checking Coil 3 He return sensors cabling.
 - ★ Checked connection at coil, noted spikes when moving cables.

5.4 Add interlock timestamp to PLC GUI screen.

- **Completed 5/10/2016.**
 - ★ Added button interlocks PLC GUI to open new screen with channel number of tripped interlocks and the time stamp of trip.
 - ★ Time stamp screen is sorted by time of trip.

5.5 Re-write PLC code to prevent CAEN HV crates from crashing when PLC reboots.

- **In progress.**
 - ★ Comparing documentation for layouts of PLC.
 - ★ Generating report and revised the sequences in system program.

5.6 Replace batteries in all PLC controllers.

- **Not started.**
 - ★ Batteries yet to be ordered.

5.7 Update documentation and schematics.

- **In progress.**
 - ★ Documentation updating as systems are being reviewed.



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Antonioli, Mary Ann

Hall B

HDice

- Worked on wiring of RF Switching/Attenuation Unit.
 - * Completed control wiring of modules 1, 2, and 3.

DSG

- Continued editing Pablo's note on Hall D PLC system.
 - * Re-formatted and edited remaining two tables.
- Compiled, formatted, and edited weekly report.

Arslan, Sahin

Hall B

RICH

- Drawing layout for air compressors and air tank in forward carriage.

SVT

- Replaced two N₂ gas bottles
 - * One bottle for SVT.
 - * One bottle for the modules that are being tested in big clean room.

DSG

- Inventoried gas bottles.

Bonneau, Peter

Hall B

HDice

- Troubleshooting and updating NMR program.
 - * Added multiple sequences and programmed sub-VIs to implement the reading of the RF Attenuation / Switching Unit status during the running of the NMR program.
 - * Implemented LabVIEW code to display on the RF Attenuation/Switching Unit front panel the program operating mode, attenuation settings, and current cable / termination used.
 - * Modified T_{up}=T_{down} minimum operating range from 15 to 10 seconds.
 - * Documented procedure for code fixes.
- Showed Amanda specific code for formation of data files.
 - * Use of test table files and run parameters
 - * Operation of field scan and various steps in the program.
 - * Output data files lack corresponding field/current readings for the lock-in amplifier buffer read-back data.

SVT

- Monitored SVT Hardware Interlock System on a daily basis.



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RICH

- Researched instrumentation needed to implement humidity/temperature sensors used in other parts of the RICH system.
 - * The Sensirion SHT75 uses a derivation of the I²C serial communication protocol; however it is not addressable on the bus as in other I²C devices. This would require a dedicated serial data line and clock for each sensor.
 - * Found an I²C “C” type module for use with National Instruments cRio. Will only support one sensor per module at ~\$450/sensor and module, and use a full slot for one sensor.
- A daily meeting was held on instrumentation and tasks.

Hall D

- On 5/28, communication from the three Solenoid 435NBX modules was lost, causing multiple solenoid alarms including vapor cooled lead flow, lead temperature, and coil dT temperatures.
 - * The power was cycled and communication was restored.
 - * The cause of the communication loss is under investigation.
- Monitored Hall D slow control systems on a daily basis.

Campero, Pablo

Hall B

HDICE

- Worked on Mercury iPS magnet power supply.
 - * Generated sub-VIs in LabVIEW 2015 to read/write SCPI commands.
 - * Generated signal commands (VOLT, CURR, CSET, etc.).

SVT

- Collaborated with Tyler and Amanda on the LV card test.
 - * Set up the nominal values of the voltage and current on LV card 3 before re-connecting in SVT test stand.
 - * Removed LV card 3 from the MPOD test stand.
 - * Swapped LV card 4 from SVT test stand to MPOD test stand.

Hall D

Slow Controls

- Met with Nick concerning task list for solenoid controls problem with strain gauges in Coil 1.
 - * Received and analyzed drawings for the solenoid Coil 1 sensor (Strain Gauge 2) connector wire map to cable SCN-13, sent by Scot Spiegel.
 - * Worked with Tyler and Amanda to check the connection in the socket connected to Coil 1; noted wrong connection in one pin.
 - * Reviewed the strain gauge in MYA Viewer after the failure; did not see any significant jump in the signal; needs to be monitored.
- Located Allen Bradley document named Integrated Architecture and CIP Sync Configuration to aid in working on time synchronization between PLC and MPS.



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Detector

- Revised Sequence Frequency Chart-Allen Bradley manual to check possible solutions to HV Reset issue.

DSG

- Set up DSGPLC1 as a personal computer to work on in EEL 121C.
- Configured Blue Jeans software and set up audio inputs to use PC-HallDSC9 with large screen in EEL 121C.
- Took Hall D Worker Safety Awareness Training walkthrough.
- Prepared Power Point presentation on Hall D PLC solenoid control systems.

Eng. Brian

Hall B

- Found that chiller couldn't maintain -20°C; FT group is looking into it.

Hall D

Solenoid

- Installed NI LabVIEW software that isn't installed by default and is used by the PXI (EtherNet/IP & DaqMX)
- Upgraded NI software on PXI to latest available version (2015 SP1).
- Researched sending current time from PXI to PLC,.
 - * Can only send 8-bit unsigned integers and PLC needs a string.
 - * Nick/Pablo looking for workaround.

Hoebel, Amanda

Hall B

SVT

- Swapped MPOD test stand LV card and spares test stand LV card.
- Created Mathematica plots of total current draws (Fig. 1) and current draws only after adapter was fixed (Fig. 2).

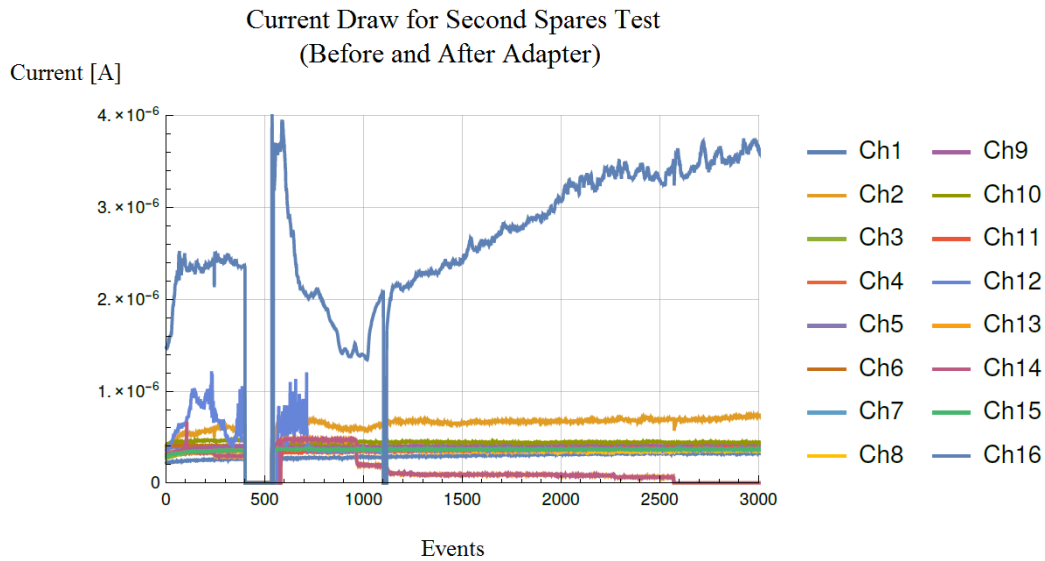


Fig. 1 Current draw of spare modules for May 9 – May 31. Currents at 0[nA] indicate shut-off of high voltage to allow for LV card swap. Currents of LV card with bad adapter are shown from large 0[nA] gap to small 0[nA] gap (events ~600 to ~1100). Adapter was fixed after small 0[nA] gap.

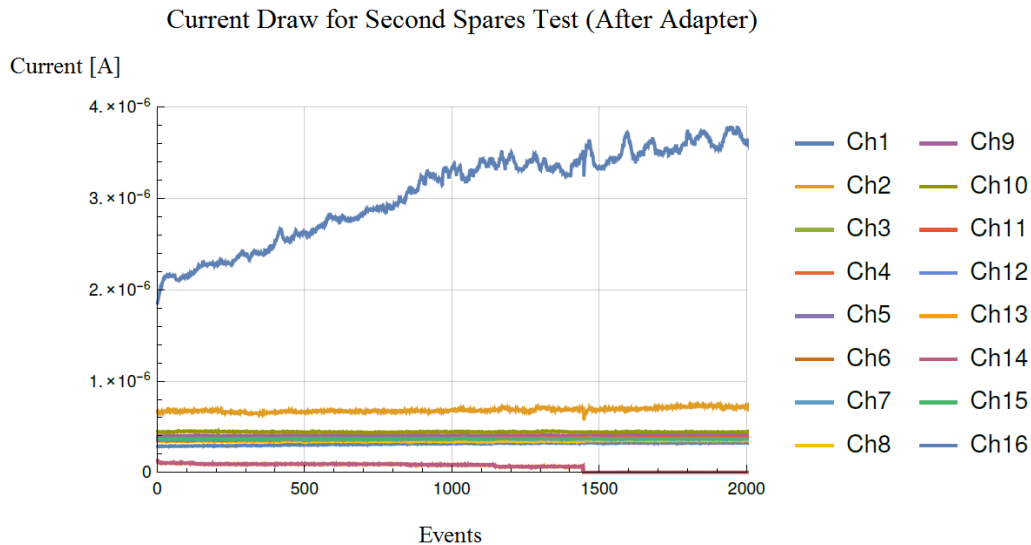


Fig. 2. Current draws of spare modules for May 17 – May 31 after adapter was fixed. Modules of Ch14 and Ch13 were turned off. Plotted currents for Ch13 are behind Ch14 and are not visible.



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RICH

- Met with Tyler, Pete, and Pablo on RICH status.

HDice

- Discussed NMR Control LabVIEW program with Pete.

Hall D

Magnet

- Worked in Hall D on strain gauge signal problem with Tyler and Nick.
 - * Nick loosened clamps on strain gauge cables on Coil 1 of solenoid.
 - * Shook cables to cause spikes in MYA viewer.
 - * No spikes found, problem believed to be fixed.

Jacobs, George

Hall B

DC

- Ordered UHP Ar gas for R1 test stand in EEL rm 125.

HTCC

- Continuation of discussions with Youri S. on changing gas to CO₂.
 - * Need to purchase CO₂ press regulator and CO₂ dewars.
 - * Youri S. will clear purchases with Volker B.

RICH

- Created cooling circuit valve panel design.
- Provided feedback on detector design feature that severely limits cooling air flow.
- Discussions with Saptarshi on details of air cooling circuit components and relief valves.

Misc

- Ordered N₂ gas for Forward Tagger, SVT, and MVT.

Leffel, Mindy

Hall B

HDICE

- Worked on cables for second RF Switching/Attenuation Unit.
 - * Cut all nine cables.
 - * Trimmed jackets, all other layers, and center conductors to length.
 - * Tinned center conductors and braid.
 - * Started soldering adapters to connectors.

FT-Cal (Forward Tagger- Calorimeter)

- Worked with members of INFN.
 - * Removed resistors and capacitors from 10 more preamplifiers, to reduce gain.
 - * Made modifications to two preamplifiers, for testing purposes.



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Lemon, Tyler

Hall B

RICH

- Wrote VIs to read and record measurements on scale procured for aerogel weighing.
 - * VIs print measurement on front panel when “print” button is pushed on scale.
 - * Separate VIs to write measurements to either Excel or text file.
- Updated overall task list.
- Wrote draft of THA for N₂ purge and cooling systems for review dry run.

HDICE

- Reviewed and discussed NMR LabVIEW code with Amanda, Pablo, and Peter.
- Reviewed writing VISA drivers with Pablo and Amanda for Oxford Mercury iPS.

Hall D

Magnet

- Troubleshooting spikes in Coil 1 strain gauge signal with Amanda and Nick Sandoval.
 - * Jumps from ~ -150000 [lb f] to ~50000 [lb f] previously observed in MYA Viewer for Coil 1 Strain Gauge 2 signal.
 - * Disconnected cable from coil to check connector pins.
 - * Pinched and jiggled cables to try to replicate jumps; signal could not be replicated.
 - * Determined possible cause of jumps could be connector had pinched a wire and cut its insulation causing a short.

Detectors

- Monitored Logbook and EPICS screens on a daily basis.

DSG

Mpod Test Stand

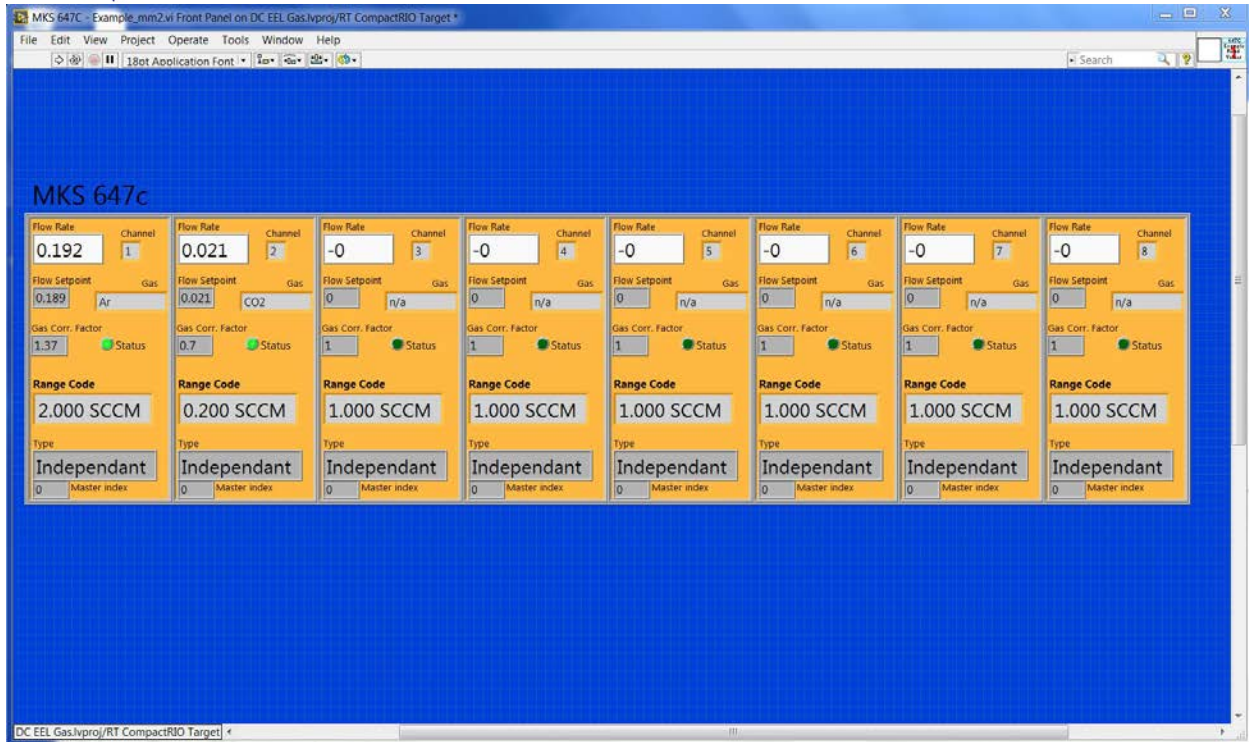
- Guided Anatoly's work in performing LV card 3 current test and LV card 4 voltage test.
- Analyzed data from LV card 3 tests in Mathematica.
 - * Calculated linear fit for both tests and calculated resistance load for current test.

McMullen, Marc

Hall B

Gas System

- DC Gas
 - * Installed cRIO in EEL125 on the R1S4 test set up to read out MKS-647c remotely using LabVIEW.
 - * Wrote LabVIEW code to read out MKS-647 remotely.



Front panel in LabVIEW for remote monitoring of the MKS-647c in EEL 125.

- HTCC
 - ★ Added ambient humidity to test stand by connecting the humidity sensor circuit from the HTSB to the cRIO.
 - ★ Updated LabVIEW code and GUI to display ambient humidity.
 - ★ Monitored gas flow.
- RICH
 - ★ Met with Lemon, Jacobs, and Eng to discuss cooling safety documentation.

DSG

Safety

- Installed two VOIP phones in Target group area which will alert personnel to various safety-related situations.

Sitnikov, Anatoly

Hall B

SVT

- Completed calibration of MPOD LV card 3 current test.
 - ★ Current—486 measurements.
- Calibrated MPOD LV card 4.
 - ★ Voltage—480 measurements.