Ongoing Projects

1. Hall B Gas System
1.1 Drift Chambers
Hardware
- 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."
- Installed and implemented mixing system (Ar, CO_2) in EEL.

Software
- Ready for testing in hall.
  - ✸ Tested PID controller.

1.2 HTCC
Hardware
- Installed in TEDF.
- Waiting to be installed in hall.

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

1.3 LTCC
Hardware
- 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."

Software
- Software development in progress.

1.4 SVT
Hardware
- Installed and operating in EEL Rm 124 (big clean room).
- Ready for installation in hall.

Software
- Installed and operating in EEL Rm 124 (big clean room).
- Ready for testing in hall.

1.5 RICH
Hardware
- Created cooling circuit valve panel design.
- Waiting for pressure system analysis and approval by Hall B Engineering – Saptarshi.
- Identified compressors and gas tank.
  - ✸ Have part numbers.
- Space available on top deck of Forward Carriage.
- Cooling system diagram and parts list updated for higher flow components.
- Nitrogen purge system diagram and parts list updated for higher flow components.

Software
- Waiting for information and equipment.

1.6 MicroMegas

Hardware

- Waiting for funding to buy equipment.

Software

- Waiting for funding to buy equipment.

1.7 Forward Tagger

Hardware

- Waiting for information.

Software

- Waiting for information.

2. Hall B Magnet Slow Controls

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.**

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.**

3. HDICE
3.1 Fabricate RF Attenuation/Switching Unit
- **In progress.**
  - ✳ Completed fabrication of unit.
  - ✳ Developed and tested VIs to set NMR-AFP switch, read NMR-AFP switch, and read termination and cable keys.
  - ✳ Started development of code to test Unit.

3.2 Develop NMR program
- **In progress.**
  - ✳ Expanded magnetic field span capabilities to allow settings up to 1000 gauss for a NMR sweep.
  - ✳ Developed and tested subroutines to enable switching of operational modes for NMR sweeps.
  - ✳ Debugged graph displays.

3.3 Mathematica
- **No progress.**

4. RICH
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.
    - ▪ Tiles inspected and photographed.

4.2 Develop nitrogen purge system.
- **In progress.**
  - ✳ Purge system diagram and parts list updated for higher flow components.

4.3 Develop air cooling system.
- **In progress.**
  - ✳ Cooling system diagram and parts list updated for higher flow components.
  - ✳ Created cooling circuit valve panel design.
  - ✳ Waiting for pressure system analysis and approval by Hall B Engineering– Saptarshi.
  - ✳ Identified compressors and gas tank.
    - ▪ Have part numbers.
  - ✳ Space availability on top deck of Forward Carriage.

4.4   Develop interlock system.
- **In progress.**
  - ✶ Wrote documentation on signals monitored.
  - ✶ Compiled preliminary list of interlock components.

5   Hall D PLC Systems

5.1   Sync PLC timestamp with MPS timestamp.
- **In progress.**
  - ✶ Configured 1756-EWEB module as an external time source to get local time from JLab Server using Network Time Protocol.
  - ✶ Input JLab server time to PLC controller.
  - ✶ Wrote new sub-routine for PLC to sync MPS clock with PLC controller clock.

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.
- **In progress.**
  - ✶ 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.
  - ✶ Spikes in strain gauge signals observed again on 6/3/2016.
  - ✶ Will discuss solution with Tim and Nick.

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.**
  - ✶ Updating documentation as systems are being reviewed.

Antonioli, Mary Ann
Hall B
HDice
- Completed control wiring of module 1of RF Switching/Attenuation Unit.
  - ✶ Completed fabrication of Unit.
- Continued software development for Unit, completing sub-Vis:
  - ✶ Set NMR-AFP switch,
  - ✶ Read NMR-AFP switch,
  - ✶ Read term. and cable keys.
  - ✶ All tested OK.
- Began next level of software (testing of Unit).
  - ✶ Wrote test for switch.

DSG
- Imported into InDesign and formatted Amanda's note on voltage taps.
- Compiled, formatted, and edited weekly report.

Arslan, Sahin
Hall B
RICH
- Continued drawing AutoCAD layout for air compressors and air tank in forward carriage.

Lay Out for Rich Air Compressors and Air Tank
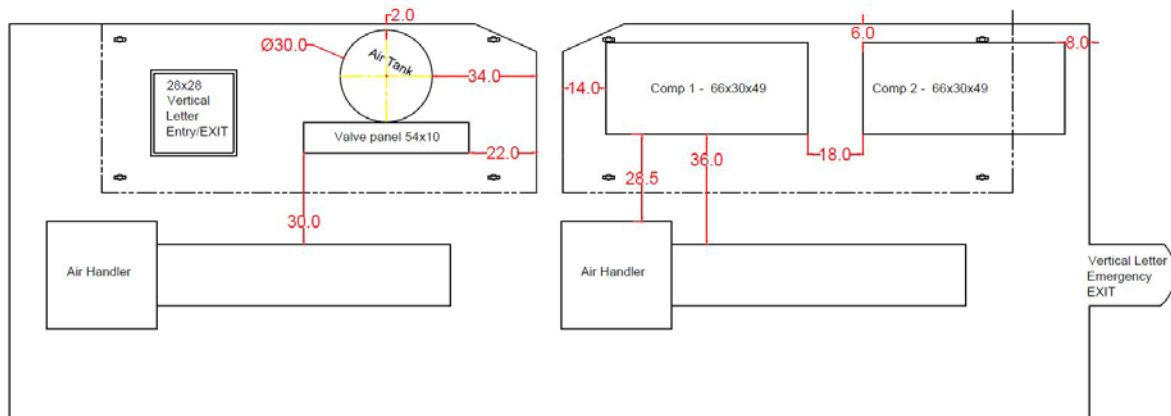
Sahin Arslan
Detector Support Group

SVT
- Replaced N_2 gas bottle.
DC
- Replaced Ar gas bottle for R1S4 test.
Forward Tagger
- Replaced N_2 gas bottle.

Hall D

- Attended tech meeting.
  * Reviewed maintenance and upgrade for summer shut-down.
  * Reviewed training for summer shut-down: Solenoid Vacuum System Controls Check and Hall D Beam Line Vacuum procedures.

Bonneau, Peter
Hall B
HDice

- Debugging and adding features to HDice NMR program.
  * Expanded and tested magnetic field span capabilities to allow settings up to 1000 gauss for a NMR sweep.
  * Developed and tested subroutines to enable switching of operational modes for NMR sweeps, needed due to hardware changes in the RF Attenuation/Switching Unit.
  * Documented procedures for implementation of new code and programming upgrades.
- Working with MaryAnn on development of software for DIO modules and RF Attenuation/Switching Unit.
  * Testing of individual VIs for setting and readback of RF routing switch.
  * Discussed next steps in development of Unit test program.
- Completed debug and testing of the third RF Attenuation/Switching Unit.
- Developed HDice project status summary of work done by DSG.
- Showed Amanda how to set up HDice computer to operate NMR test stand.

SVT

- Hardware interlock system tripped on Tuesday due to removal of Micromegas from SVT.
- Monitored SVT Hardware Interlock System on a daily basis.

RICH

- Reviewed specifications for humidity sensors for possible use in RICH interlock system.
  * The HIH-4030 humidity sensor has a typical accuracy of ±3.5% RH and has analog output voltage proportional to the relative humidity. This sensor has worked well in the SVT and is easily interfaced to the NI cRIO ADC module.
  * The Sensirion SHT75 (used by INFN) has a typical accuracy of ±1.8% RH. The I^2C interface on this sensor is not addressable, requiring a dedicated communication line and clock.
- Worked with Tyler on revised cost estimate for the RICH interlock system.

Hall D

- Due to a decrease in He pressure, the flow to leads on the solenoid dropped below trip levels. The magnet was not powered and Cryo was notified.
- Monitored Hall D slow control systems on a daily basis.

Campero, Pablo
Hall B
HDICE
- Worked on Mercury iPS magnet power supply.
  - ✶ Wrote LabVIEW sub-VI to read and set system commands to the power supply.

Hall D
Slow Controls
- Monitored signals of strain gauge 2 (SG2) in coil 1 of the solenoid magnet.
  - ✶ Checked SG2 signal and compared it with SG3, SG4 and SG5 in MYA Viewer.
  - ✶ Discussed with Tim and Nick pictures of most significant changes (~ -60 and 83 lbF) during the period monitored (05/29 to 06/01).
- Monitored readout signal of coil 3 helium return temperature diode (SC3_TDS_HR3) between 05/24 and 06/01.
  - ✶ The signal observed (~6 K) look reasonable, but will continue monitoring until magnet powered.
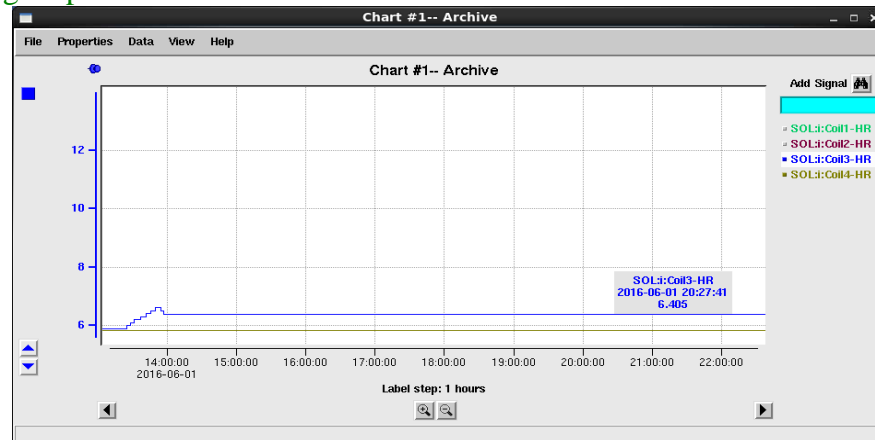
- Worked with Nick on synchronizing time clock between PLC and MPS.
  - ✶ Researched grandmaster, master, and slave synchronizing clocks with Allen-Bradley Common Industrial Protocol (CIP) Sync architecture.
  - ✶ Checked connections and communication between 485 NBX module, PLC, and MPS.
  - ✶ Configured 1756-EWEB module as an external time source to get local time from JLab Server using NTP and then pushed local time across Control Logix L62 controller.
  - ✶ Established PLC controller as Grandmaster wall-clock time and set up CIP Sync configurations for ENETs modules to run as slaves.
  - ✶ Wrote code in RSLOGIX 5K "MPS-Schedule" main subroutine to set wall-clock time on PLC controller.
  - ✶ Wrote new subroutine named "MPS_Set_Time" to send the time of Grandmaster wall-clock to MPS in real time as string values.

Eng, Brian
Hall B
SVT

- Modified Java elog code for gain scans to handle when scans are run close to a minute boundary since the data files are saved in a directory that is timestamped.
  - ✶ Sometimes this would cause errors when the directory saved was off by a minute.
  - ✶ This timestamping was introduced for the parallel gain scan code.
- Updated cRIO to not update EPICs PV on bad values.
  - ✶ Bad values were caused when cRIO was having timing issues and wasn't sampling flow rate fast enough, and was trying to get the mean of no numbers, which returns a NaN.
  - ✶ This caused the alarm handler to reset the alarm state, which in turn sent thousands of emails when the flow went bad.

Hall D
Solenoid

- Found that NBX modules are using old firmware (from 2012).
  - ✶ Discussing if they should be upgraded.

Hoebel, Amanda
Hall B
SVT

- Created Mathematica plots.
  - ✶ Total current draws of five new modules (Fig 1) and total current draws of three old modules (Fig 2).
  - ✶ Delta mean values and standard error of five new modules (Fig 3) and delta mean values and standard error of three old modules (Fig 4).
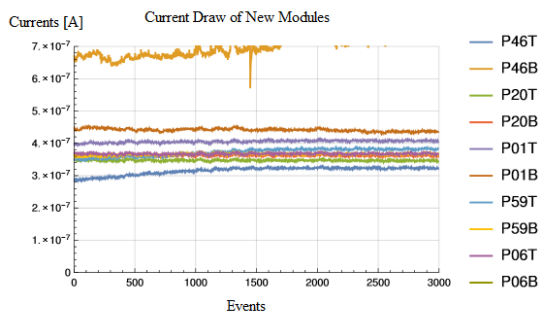

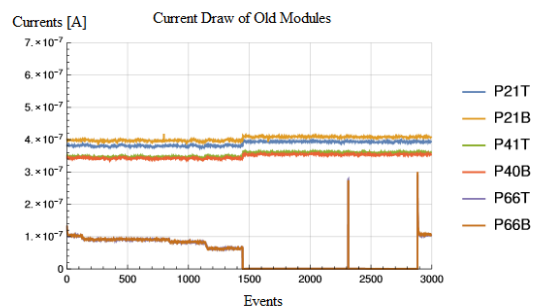Fig. 1 Current draw of five new modules over three weeks.

Fig. 2 Current draw of three old modules over three weeks.
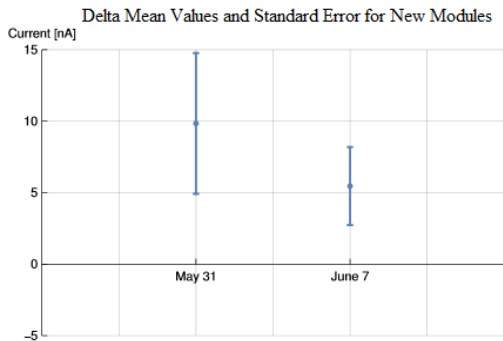
Fig. 3 Change of mean values and standard error from one week to the next, for five new modules.
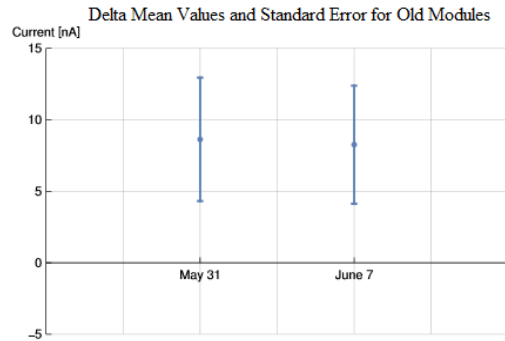

Fig. 4 Change of mean values and standard error from one week to the next, for three old modules.

HDICE
- Fixed bug in NMR Control LabVIEW program.
  - ✳ Bug would take away left part of measurements in field graph.
  - ✳ Now both left and right side of measurements are kept in field graph.
- Ordered N, BNC, and SMA connectors.

RICH
- Wrote safety system interlocks report.

Hall D
Magnet
- Worked in Hall D on Coil 1 strain gauge signal problem with Tyler.
  - ✳ MYA Viewer showed increase in signal when Tyler pinched clamp on coil 1 strain gauge 2 cable.

Jacobs, George
Hall B
MVT
- Discussions with Franck S about upcoming ERR.
  - ✳ Provided diagrams, cost estimates, and ppt.

RICH
- Designed N_2 purge circuit valve panel.
- Determined preliminary layout of air cooling compressor and tank at the top level of forward carriage.
- Discussed air cooling and N_2 purge interlocks with Marco M.
- Had phone meeting with Marco M and Marco C about air cooling and N_2 purge diagrams.
- Provided detailed feedback on Amanda's interlock document.
- Started writing gas supply utilities document.

Leffel, Mindy
Hall B
HDICE

- Worked on cables for second RF Switching/Attenuation Unit.
  - ✶ Soldered adapters to all available connectors and soldered those connectors to cables.
  - ✶ Waiting for delivery of connectors to complete all nine cables.
- Terminated two more 8' cables for the cryostat.

Lemon, Tyler
Hall B
RICH

- Improved LabVIEW VI for scale to be used for aerogel weighing.
  - ✶ User can now choose to write data to either a text file or Excel file from one VI.
- Compiled preliminary parts and price list for interlock system.
- Wrote draft of OSP section for cooling system operational and back-out procedure.
- Discussed interlock system documentation paper with Amanda and Pete.

Hall D
Magnet

- Following up on previous troubleshooting of Coil 1 Strain Gauges with Amanda.
  - ✶ While checking cable connections (while Amanda monitored MYA Viewer), noted spike in signal when cable was pinched (See plot below).
  - ✶ Largest spike was ~-500 [lb. f] – ~1000 [lb. f] in Strain Gauge 5.
  - ✶ Determined possible cause of spike is a short in the wire near connector, which would need to be replaced.
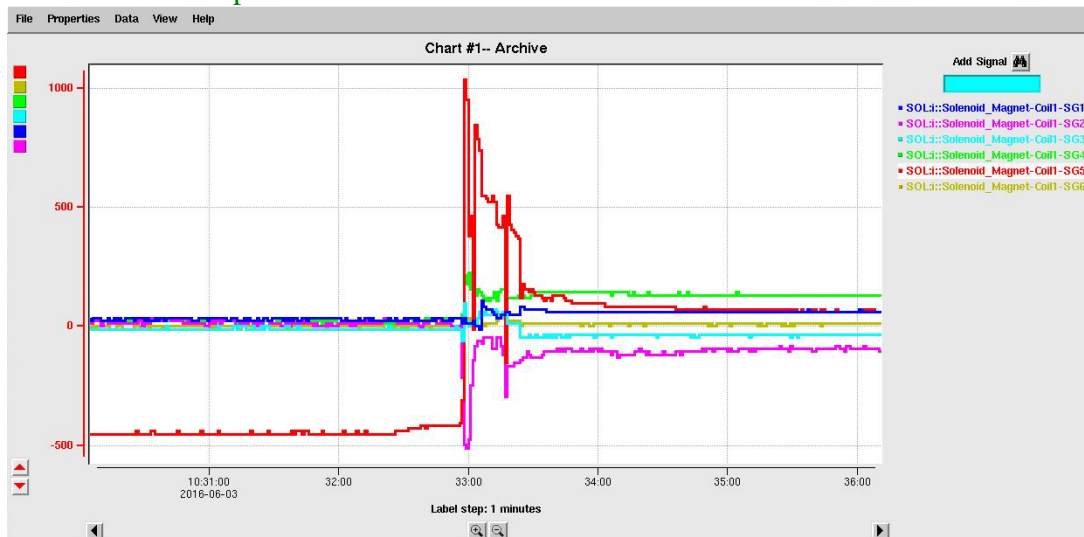
Screen-shot of MYA Viewer of strain gauge signals at time of trouble shooting on 6/3/2016 at 1033.
Noted signals have remained at values after spike.

Detectors

- Monitored logbook on a daily basis.

DSG

- Formatted project section of DSG weekly report into new format.

MPOD Test Station

- Guided Anatoly's work on LV card 4 current test and LV card 5 voltage test.
- Swapped LV card 4 for LV card 5 in SVT spare modules set up.
- Analyzed results from LV card 4 voltage test using Mathematica.
  - ✦ Calculated linear regression curve for set voltage vs. MPOD readback and set voltage vs. meter readback for each channel.

McMullen, Marc

Hall B

Gas System

- DC
  - ✦ Monitoring R1S4 in EEL 125 using LabVIEW.
  - ✦ For the HTCC, MVT, SVT, and RICH detectors added variables to LabVIEW project.
    - Similar variables that will be used to populate DC gas software.
  - ✦ Wired two analog channels from gas shed cRIO with signals from two DP-25s that will display pressure from DC exhaust manifolds.
  - ✦ Started Hallbgas mailing list.
    - Sent initial status of Hall B gas system controls to group.
- HTCC
  - ✦ Monitored gas flow.
- RICH
  - ✦ Met with Lemon, Jacobs, and Eng to discuss cooling and N_2 OSP document.

Sitnikov, Anatoly

Hall B

SVT

- Completed voltage test for MPOD LV card 4.
  - ✦ 1280 measurements.
- Performing MPOD current test LV card 4.
  - ✦ 456 measurements.