Detector Support Group

Weekly Report, 2018-02-14

Summary

Hall B Magnets

- DSG discussed results of the test performed on 02/09/18 to measure Torus coil temperatures changes vs ramp down rates as well as to check performance of improve cryogenic system (PID parameters were changed).
  - Torus ramped down from 3770 [A] to 0 [A] at 1.5 [A/s], during this process coil temperatures increased ~ 0.2[K].
  - Cryo system seems to have worked well because ΔT is close to zero.

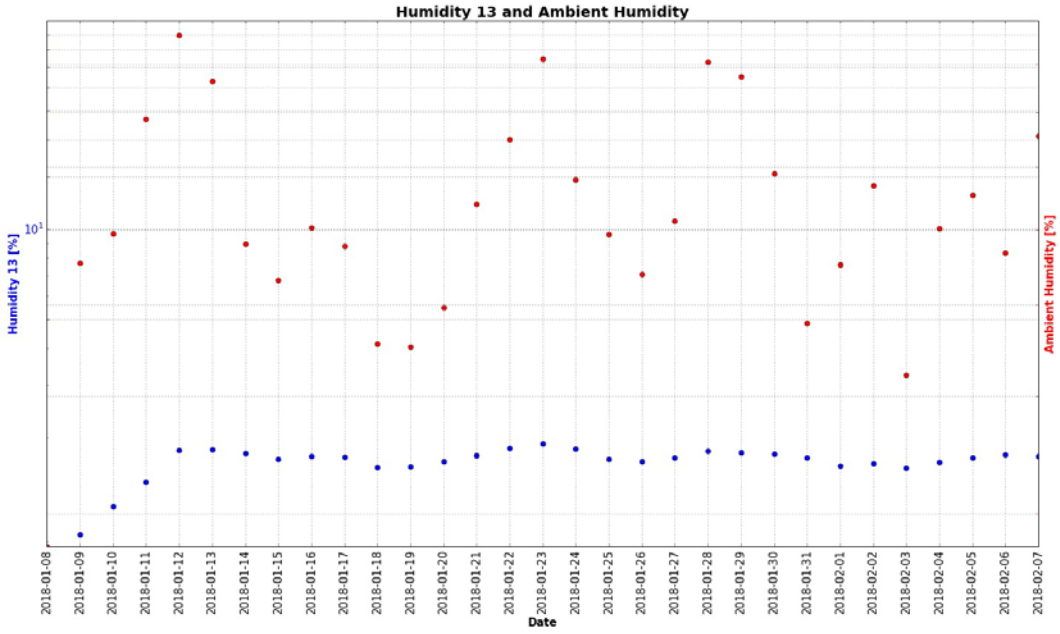
SVT

- Leak sensor tested.
  - Unable to set proper threshold (sensor signal was 3 [mV] when it detected liquid). Typical signal, when sensor detects liquid, should be ~ 9.5 [V].
  - Interlock disabled due to undesired trips generated as a result of the 3 [mV] signal read-back from leak sensor.
- R3S11 HFCB temperature sensor cable re-terminated.
- Initial design (parts and basic schematic) for PCB to be use in the Interlock system's patch panel board started.
- Ambient temperature sensor, located near the SVT, debugged, sensor generated undesired trips even when the sensor readouts were within the preset temperature limits.
  - Unsolved problem: requires SVT Hardware interlock program to go-offline.
- Program written in *Rust* to read the voltage/current for the 8 modules in the test stand.
  - For voltage and current, program logs the data and automatically adjusts the voltage based on current.
- SVT Hardware interlock program tested.
  - Eighteen interlocks tested individually to verify proper functions of averaging samples and Interlock trip delay features added as an upgrade.
    - Seventeen interlocks working.
    - Interlock for Coolant temperature which fails being debugged.
    - Spreadsheet generated with the results for each signal tested.

RICH

- Miscellaneous components, fittings/brackets/hardware for New RICH N2 gas panel ordered
  - Assembly of RICH N2 gas panel started.
- Reflectivity test station's LabVIEW program updated to integrate multi-meter and monochromator commands into one program.
  - Previous version required two PCs and two separate LabVIEW programs.
  - Written test procedure and documentation added to front panel tabs for reference.
  - Code added to put monitors to sleep using Windows system commands when program is started. Important because test room has to be dark (No ambient light).
  - Code added to sound a beep at the end of the program, indicating program is completed.
  - Control features program modified to be enabled/disabled using controls in the "Expert" tab.

- Average humidity measured by nitrogen volume sensors calculated for each day of first month of detector operation in Hall B using Python program.
  - ✶ Humidity increased when air-cooling was first turned on January 12, 2018
  - ✶ Humidity in RICH is affected by ambient humidity in the hall.



Plot shows the Average of RICH Nitrogen Volume Humidity #13 and Hall B Forward Carriage Average Ambient Humidity for each day from January 8, 2018 to February 7, 2018. Plot shows that RICH's internal humidity is affected by ambient humidity.

RTPC

- Several versions of P&I diagrams generated.

HDice

- RF Attenuation box upgrades started.
  - ✶ Debugging on the unit started:
- Isolation material for second rack attached.

DC

- Pressure sensors to DC CO2 supply added.
  - ✶ Pressure sensors located at upstream of the regulators used to CO2 supply.
  - ✶ The new pressure sensors will provide a warning to change the dewars.

FT

- Debugged problems to connect developmental cRIO system, which is to be used to simulate FT Hardware Interlock system.

cRIO Test Station

- cRIO test station messaging code analyzed.

Antonioli, Mary Ann

HDice

- Completed cabling of HDice RF box and began testing.
  - Passed: set to AFP, remote interlock, attenuator B
  - Failed: set to NMR, attenuator A, all key tests.
  - Began troubleshooting.
    - Checked all wiring.
    - Per Peter, checked various connections with meter and ran tests individually to check bit responses.
    - After a few changes, no difference in test results.

- Analyzed cRIO test stand messaging code written by Pablo. Began adding some previously written 9207 tests and debugging.
- Attended monthly Workers Safety Committee meeting.
  - Presentation given by Paul Collins of new philosophy (Human Performance Improvement), which acknowledges that everyone makes errors and do not place blame.
  - Discussed Hall C notable event of incorrect hut entry.
  - HR policy written for telecommuting could affect bad weather days.

Bonneau, Peter

HDice

- Developing programming for data readout synchronization for the current shunt and the lock-in amplifier.
  - Due to the lack of internal storage memory for the current measurements, the data from the CT-Box must be read at the acquisition rate.
  - The lock-in amplifier is externally triggered by the CT-box current shunt.
  - The raw data is stored on the computer and decoded after the scan is completed.
- Worked with Mary Ann on the upgrade to the RF attenuation box.
  - Debugging has started on the unit.
    - Attenuator, coax switch, and front panel keys are failing the tests.
    - In/output DIO module connections are being investigated.

SVT

- Worked with Pablo on the SVT Hardware Interlock System upgrades.
  - Testing of the upgraded SVT hardware interlock real-time and user interface software was discussed. Threshold and delay trip interlock testing underway.
- Investigated issues with ambient temperature interlock.
  - Temperature interlocks trips even though within threshold levels. System needs to be taken off-line to debug further.

Magnets

- Met with Amanda, Pablo, and Tyler regarding issues encountered with the Torus and Solenoid magnets during the current run.
  - Discussed about the on-going tests to measure Torus temperature rise vs ramp rates. Starting at 3770 [A] (positive polarity) a ramp down to 0A was initiated using a

ramp rate of 1.5 A/s. The maximum temperature rise on the coils was observed to be about 0.2 K.

- Researched the possible use of National Instruments **single-board cRio's** (sbcRio) in projects such as HDice and future RICH sectors

Campero, Pablo

Magnets

- Monitored Solenoid and Torus magnet on a daily bases through EPICS screens, Mya Archiver and posted logbooks.
  - ✶ Discussed with Peter, Tyler and Amanda about the results of the test performed to measure Torus temperatures vs ramp rates.
    - Torus ramped down from 3770 A to 0 A at 1.5 A/s. Noticed temperature increments ~ 0.2[K].

FT

- With Amanda debugged FT Hardware Interlock LabVIEW program.
  - ✶ Unable to communicate User Interface with Real Time in the cRIO that was set up to run the development version of the FT Interlock program.
  - ✶ To solve problem:
    - Installed software in the RT cRIO to allow stream connections.
    - Deployed shared variables in the cRIO controller. Noticed long time to upload variables due to local cross cable connection.
    - Increased timeout threshold to a value > 5 [s].

SVT

- With Brian troubleshot SVT instrumentation and controls issues.
  - ✶ Installed and tested leak sensor
    - Unable to find proper threshold to set (sensor signal only show up as a 3mV when it detects liquid). Normal threshold expected when sensor detects liquid should be ~ 9.5 [V]
    - Disable interlock due to undesired trips as a result of noise voltage input signal read.
  - ✶ Debugged ambient T2 sensor, sensor generated undesired trips even when the sensor readouts were within the limits.
    - Unsolved problem, due to it required SVT Hardware interlock program to go-offline. Wait more debugging until next longer SVT shutdown period.
- Tested SVT Hardware interlock program
  - ✶ 18 signals were tested individually to verify Averaging samples and Interlock trip delay features added as an upgrade.
    - 17 interlock working, and 1 interlock for Coolant temperature fail.
    - Generated spreadsheet with the results for each signal tested.

- With MaryAnn worked in the development of a user interface (UI) for the **cRIO Test Station.**
  - ✶ Modified UI LabVIEW program to add commands used to send set points values (number of samples, voltage range, and step size) to the cRIO controller (real time).

- Tested LabVIEW code upgrades made by MaryAnn.
  - Debugged issues to receive data in the real time program.
  - Ensured proper communication between user interface and real time by checking correct transference of data and commands.
- Worked on the proposal for the **PLC Test Station.**
  - Updated quotation for Control-Logix Allen Bradley PLC hardware needed for the PLC test Station.
  - Discussed main hardware components like I/O PLC modules that will be implemented.
    - Generated proposal document with the reason and fundamentals of the importance of implementing a DSG PLC test station to achieve an effective support.
    - Hardware based in I/O PLC modules currently used in Hall B and Hall D.
- Edited DSG weekly report for the week of 2/07/2018.

Eng, Brian

SVT

- With Pablo tested leak sensor, couldn't find a good threshold (detect leak = 3mV, not much higher than the noise).
- Re-terminated R3S11 HFCB temperature with Marc.
- Swapped SVT chiller with Calvin and Yuri: https://logbooks.jlab.org/entry/3529886.
- Began initial design (parts & basic schematic) for PCB at SVT patch panel board.
- Wrote a program in Rust to read the voltage/current for the 8 module test stand
  - For voltage and current program logs the data and automatically adjusts the voltage based on current, proceeded to accidentally delete it while debugging.

Gas System

- Added pressure sensors to **DC** CO2 supply: https://logbooks.jlab.org/entry/3529760
- Increased precision of C4F10 scale measurement (from 1 kg to 0.1 kg) for **LTCC**.

- Upgraded two MAC computers from version macOS 10.11/12 to macOS 10.13.

Hoebel, Amanda

FT

- Connected cRIO to PC and Hardware Interlocks LabVIEW program.
- Debugged problems connecting Hardware Interlocks program to cRIO.
  - "LabVIEW failed to load shared library" error.
    - Had to install RealTime to cRIO to fix problem.
  - "Command Stream from UI" was causing error.
    - Real Time and UI Main programs did not have enough time to synch.
    - Increased "Network Stream Connect Timeout" from 5s to 50s.
    - Program would connect to cRIO.
  - Thresholds did not update LabVIEW UI.
    - Threshold controls were set to EPICS instead of LabVIEW.

Jacobs, George

DC

- Ordered calibration gasses for DC.
- Discussed with Mac M about DC Gas flow rates and pressures.

Gas Systems

- For **RTPC** generated:
  - "RTPC-02-07-2018 P&I diagram and Components" spreadsheet.
  - "RTPC-02-08-2018 P&I diagram and Components" spreadsheet.
  - "RTPC-02-09-2018 P&I diagram and Components" spreadsheet.
- Generated **DMS** series layout.
- Ordered miscellaneous components, fittings/brackets/hardware for NEW **RICH** N2 gas panel.
  - Started assembly of RICH N2 gas panel.
- Discussions with Jack Segal and Zhiwen Zhao on C4F10 gas fill and recovery.
- Ordered four Dewars for the **HTCC.**
- Discussed with Mauri U. on **LTCC** S5 test status.

Leffel, Mindy

HDICE

- Rubber isolation material for second rack
  - Cut, attached double sided tape, and punched screw holes.
- For HDice RF box.
  - Fabricated one SMA to SMA cable.
  - Tinned 14 SMA adapters and soldered to SMA connectors.
  - Tinned five N adapters and soldered to N connectors.
  - Measured, cut, and labeled nine RF cables for third RF box.

Lemon, Tyler

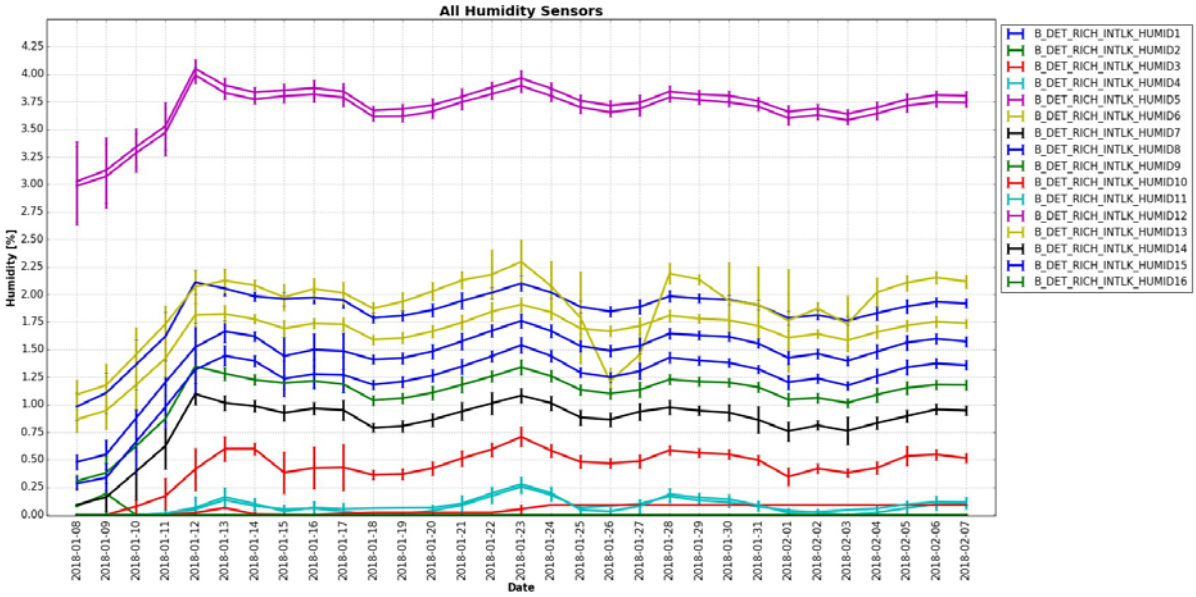
RICH

- Updated reflectivity test station's LabVIEW program to integrate multimeter and monochromator commands into one program.
  - Previous version required two PCs and two separate LabVIEW programs.
    - One PC ran monochromator program.
    - Seconds PC ran multimeter and data acquisition program.
  - Added written test procedure and documentation to front panel tabs for reference.
  - Added code to put monitors to sleep using Windows system commands when program is started.
    - Previously to prevent excess light noise from monitor, user had to cover mouse over button that started program, turn monitor off, and then click start button.
    - New version automatically turns monitors off and then back on at appropriate times in program to avoid excess light noise.
  - Added code to sound a beep at the end of the program, indicating program is completed.

- User only knew previous version of program had finished running by waiting for monochromator to stop making noise.

✶ All features can be enabled/disabled using controls on “Expert” tab.

- Calculated average humidity measured by nitrogen volume sensors for each day of first month of detector operation in Hall B using Python program previously written.
  ✶ Humidity increased when air-cooling was first turned on January 12, 2018



Average humidity measurement by day for all nitrogen volume sensors. Error bars on plot are standard deviation calculated along with each daily average.

McMullen, Marc

MVT

- Received RMA for C4H10 Mass Flow Controller.

SVT

- Assisted with repairs for the temperature sensor and patch panel
- Started PCB design for new patch panel boards.
  ✶ New boards will use 0.100’’ pitch header connectors instead of screws terminals.

DC

- Installed new pressure transducers for DC CO2 supply.
  ✶ The new transducers will provide Hall B mechanical with an earlier warning to change the dewars.