



Detector Support Group

Weekly Report, 2018-01-17

Summary

RICH

- Bad EP cRIO humidity sensor #15 debugged.
 - ★ Input voltage at ADC verified to confirm sensor was not working.
 - ★ Replacement of broken sensor to be done at later date because sensor only measures ambient conditions and redundant sensor on same board works properly.
- One HV cable replaced, requiring operation of man-lift.
- Hardware interlock air-cooling tank's pressure interlock trips investigated.
 - ★ Appeared that compressor could not keep up with set total flow of ~950 slm.
 - ★ Pressure behaved normally after collaborators adjusted flow to ~900 slm.
 - ★ Cycling dead band of compressor changed from 100 psi – 113 psi to 104 psi – 113 psi to have tank be filled more frequently.
- Increase in flow for Airflow 1 investigated.
 - ★ Airflow 1 set to 500 slm, but increased to ~550 slm over time, tripping the high limit interlock for Airflow 1.
 - ★ Cause of increase thought to be compressor's on-off cycle affecting airflow.
 - ★ To make airflow more stable and not affected by compressor's cycle, air-cooling panel's regulator setting was decreased from maximum (~60 psi) to ~45 psi.
- Reset of hardware interlock limits on EP cRIO debugged.
 - ★ Limits for EP cRIO all reset to zero.
 - ★ Cause of limit reset was not reboot of cRIO; verified by cRIO's uptime counter showing ~160 hours since last reboot.
 - ★ Soft IOC was rebooted at same time limits were reset, pointing to soft IOC as source of issue.
 - Nathan Baltzell found IOC configuration error causing soft IOC to not save parameters for EP cRIO PVs.
 - Error fixed and tested successfully

SVT

- LabVIEW project generated to test hardware interlock program updates on the development cRIO system (DSGDEV2).
- Forty subVIs written to add features to hardware interlock program:
 - ★ Trip delay timers for temperature and humidity signals.
 - ★ Signal averaging RTD and HFCB temperatures.
- Failed gain scan e-log entries debugged.
 - ★ Package manager on Mac changed how it handled proxies, causing ROOT installation used to run gain scan to fail.
- Failed R3 S11 B HFCB temperature sensor fixed by disconnecting and reconnecting its cable on patch panel.



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- Tested SVT temperature and humidity sensor board prior to installation in Hall B.
- Spreadsheet created in Excel to compare electron noise counts (ENC) of module sides.
 - * ENC measured in gain scans of modules.
 - * Good ENC is ~1600e; bad ENC is greater than ~1800e.
 - * Some sides with high ENC much greater than 1800e have been turned off.

	Total Sides	Good Sides ENC < 1800e	Bad Sides ENC > 1800e	Sides Turned Off
R1	20	0	15	5
R2	28	25	2	1
R3	36	34	2	0

MVT

- Mixing logic of LabVIEW program changed to use a state machine to have gas flow increase or decrease based on pressure setpoints.
- Ten bottles of premix delivered on January 12, 2018.
 - * Premix currently in use after weather caused the Isobutane to condense in the line during testing of mixing system by MVT staff.
- Procurement contacted to have the original Isobutane MFC repaired.

LTCC

- Scale installed for use in C₄F₁₀ single sector test.
 - * Scale zeroed and spanned after installation.
 - * Approximately 150Kg of C₄F₁₀ on hand for test.
- C₄F₁₀ supply connected to valve panel; components and connections leak checked.

HDice

- For RF Box 1:
 - * Power wiring on connectors and modules completed.
 - Wiring to terminal block remains.
 - * Module-to-module control wiring completed.
 - * Front and back panels labeled.
 - * Two RS485 adapter connectors fabricated.
 - * RS485 D-sub connector wired and connected to panel.
- LabVIEW program written to test Gauss offset from NMR power supply
- Development started of test program for lock-in amplifier / CT-box integration.
 - * Program will test the external triggering capability of the CT-box while connected to the lock-in amplifier.
 - * Base command routines developed that initialize the lock-in amplifier internal buffering for data acquisition.
- NMR LabVIEW programming and instrumentation debugged, tested, and documented
 - * Oxford power supply and RF Box connected and tested with NMR program.
 - * Modified program for NMR RF Box I/O module identification test to accept modules with and without external display option.



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BONuS RTPC

- Quote received from MKS on mass flow controllers (MFCs) and Baratron pressure transducers.
- Quote received for 20% CO₂ in Helium, certified standard mix.
 - * part# HE CD20C-K: \$214.30 each with 21 day lead time
- Updated RTPC gas system P&I diagram and components spreadsheet

Hall D Magnet

- Failed PXI network connections debugged.
 - * Primary Ethernet port on PXI controller stopped working, causing PXI to switch automatically to secondary Ethernet port.
 - * After plugging network cable into secondary Ethernet port, PXI operated as normal.
 - * Replacement PXI controller will be ordered.

cRIO test stand

- Offset error test updated for both manual and automatic modes to compare error to specs.
- SubVIs written for least significant bit calculation, current differential nonlinearity test for manual mode, and current differential nonlinearity for automatic mode.
- Current accuracy added to manual mode program.

MPOD test station

- Drivers developed in LabVIEW for Keithley multimeter to measure DC voltage

Worker Safety Committee.

- Issues discussed:
 - * Recent snow “removal”
 - * Decision to open Lab on Friday January 5, 2018.



Detector Support Group

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Antonioli, Mary Ann

- For **HDice** RF Box 1:
 - * Completed power wiring on connectors, modules, etc.
 - Wiring to terminal block remains.
 - * Completed module-to-module control wiring.
 - * Labeled front and back panels.
 - * Fabricated two RS485 adapter connectors.
 - * Wired RS485 D-sub connector and connected to panel.
- For **cRIO test stand**:
 - * Updated offset error test for both manual and automatic modes to compare error to specs.
 - * Wrote subVIs for least significant bit calculation, current differential nonlinearity test for manual mode, and current differential nonlinearity for automatic mode.
 - * Added current accuracy to manual mode.
- Attended monthly Worker Safety Committee meeting.
 - * Main discussion was on issues with recent snow “removal” and decision to open Lab on Friday.

Bonneau, Peter

HDice

- Started development of the lock-in amplifier / CT-box integration test program.
 - * Program will be used to test the external triggering capability of the CT-box while connected to the lock-in amplifier.
 - * Developed base command routines that initialize the lock-in amplifier internal buffering used for data acquisition.
- Worked with Amanda, Mary Ann, and Mindy on the debug, test, and documentation of the NMR LabVIEW programming and instrumentation.
 - * Setup of the test station for Rack #1 hardware and software development underway.
 - The Oxford power supply and RF box connected and tested with NMR program.
 - * Debugged initialization error in NMR RF Box I/O module identification test.
 - Program modified to accept modules with and without external display option.
- Completed work plan for 2018.

Magnet Systems

- Met with Amanda, Pablo, and Tyler on a daily basis regarding issues encountered with the Torus and Solenoid magnets during the engineering run.
 - * A SoftIOC caused a Torus and COMMS error while magnets were energized.
 - No ramp-downs occurred because of the error.
 - Issue was resolved by a SoftIOC reboot.



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SVT

- SVT Hardware Interlock System
 - * Tested SVT temperature and humidity sensor board assembly prior to installation in Hall B.
 - * Worked with Pablo on the completion of the SVT interlock upgrades.

Campero, Pablo

Magnets

- Monitored Solenoid and Torus in a daily basis during the engineering run.
- Generated Solenoid SOE channel description table for use during debugging process of a Fast Dump event.

RICH

- Collaborated with Tyler troubleshooting EP cRIO humidity sensor #15.
 - * Interlock controls showed incorrect readout values for the sensor.
 - * Measured input voltage at the ADC module to verify sensor was not working.
 - * Replacement of broken sensor to be done at later date.
 - Sensor only measures ambient conditions.
 - Redundant sensor on board works properly.

SVT

- Generated new LabVIEW project to test hardware interlock program updates on the developmental cRIO system (DSGDEV2).
- Wrote 40 subVIs to added new features to hardware interlock program. Features added:
 - * Trip delay timers for temperature and humidity signals.
 - * Signal averaging RTD and HFCB temperatures.

Eng. Brian

LTCC

- Setup S5 mass flow controller (MFC) for C₄F₁₀ gas
 - * <https://logbooks.jlab.org/entry/3510431>
 - * Gas type changed to C₄F₁₀
 - * Full scale of MFC set to 4.2 slm
- Performed zero and span calibration on C₄F₁₀ supply scale with Marc and Calvin.
 - * <https://logbooks.jlab.org/entry/3510785>
- Moved code for scale from gas shed to forward carriage cRIO.



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SVT

- Debugging failed gain scan e-log entries.
 - * ROOT is required for gain scan program.
 - * Package manager on Mac had changed how it handled proxies, which caused ROOT installation to fail.
- Fixed failed R3 S11 B HFCEB temperature sensor.
 - * Dis/re-connected cable on patch panel.
 - * Sensor then failed again.

MVT

- Changed mixing logic to match DC
 - * <https://logbooks.jlab.org/entry/3511391>
 - * Mixing system now uses a state machine to have either the flow increasing or decreasing based on pressure setpoints.

Hall D Magnet

- Debugging failed PXI network connections.
 - * <https://logbooks.jlab.org/entry/3512380> and <https://logbooks.jlab.org/entry/3514747>
 - * Primary Ethernet port on PXI controller stopped working.
 - * PXI automatically switched to secondary Ethernet port, copying its settings from failed primary port.
 - * After plugging network cable into secondary Ethernet port, PXI operated as normal.
 - * Replacement PXI controller will be ordered.

Hoebel, Amanda

HDice

- Wrote LabVIEW program to test Gauss offset from NMR power supply.

SVT

- Created spreadsheet in Excel for modules with good electron counts and bad electron counts.
 - * Electronic counts measured in gain scans of modules.
 - * Good electron counts are ~1600e; bad electron counts are greater than ~1800e.

Magnet

- Monitored Torus and Solenoid via EPICS and logbooks.

ET

- Reviewed LabVIEW interlocks program.



Detector Support Group

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Jacobs, George

- Connected C₄F₁₀ supply to LTCC valve panel and leak checked components and connections.

BONuS RTPC

- Requested and received quote from MKS on mass flow controllers (MFCs) and Baratron pressure transducers.
- Received quote on 20% CO₂ in Helium, certified standard mix.
 - ★ part# HE CD20C-K: \$214.30 each with 21 day lead time
- Updated RTPC gas system P&I diagram and components spreadsheet

GAS Systems

- Submitted PR for funding the Hall B bulk liquid argon contract
- Ordered CO₂ for DC and HTCC

Leffel, Mindy

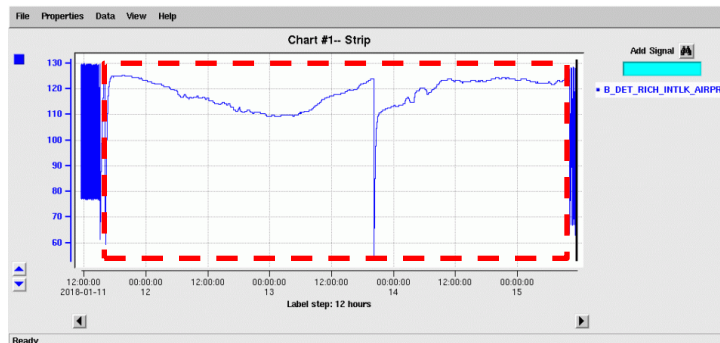
RICH

- Replaced one HV cable with Matteo.
 - ★ Operated man-lift during cable replacement.
- Drilled holes for and attached DIN rails on second cRIO chassis.

Lemon, Tyler

RICH

- Troubleshoot of hardware interlock air-cooling tank's pressure interlock trips.
 - ★ Pressure in air-cooling system's tank briefly dropped on January 13, 2018 to below 60 psi, tripping the air pressure low limit interlock.
 - ★ Noted in archived flow and pressure data (plot below), that it seems compressor was not able to provide ~950 slm flow as set on valve panel.
 - Pressure was not oscillating, following on-off cycle of compressor (data in red, dashed box on plot below).
 - Further supported by pressure returning to following compressor's on-off cycle when total airflow reduced to ~900 slm.



Plot of pressure [psi] in air-cooling system's tank from 2018-01-11 at 12:00 to 2018-01-15 at 12:00. Portion of plot in red, dashed box shows that compressor was not able to maintain pressure and operate in its normal on-off cycle.



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- Troubleshoot of increase in flow for Airflow 1 with Marc and George.
 - * Airflow 1 set to 500 slm, but increased to ~550 slm during time of pressure issues, tripping the high limit interlock for Airflow 1.
 - High interlock limit was set to 550 slm.
 - * To make airflow more stable and not affected by compressor's cycle, air-cooling panel's regulator setting was decreased from maximum (~60 psi) to ~45 psi.
 - Lower regulator setting should help air tank maintain pressure and cause airflow to stabilize and not follow on-off cycle of compressor.
 - * Will continue to monitor airflow stability and adjust regulator again if needed during next hall access period.
- Troubleshoot of reset of hardware interlock limits on EP cRIO with Peter.
 - * Issue noted in logbook: <https://logbooks.jlab.org/entry/3514481>
 - * Verified cause of limit reset was not reboot of cRIO.
 - Limit reset on reboot would point to issue with cRIO's configuration file.
 - PV indicating hours since cRIO's last reboot was at ~160 hours.
 - * Noted soft IOC was rebooted at same time limits were reset.
 - * Discussed issue and solution with Nathan Baltzell.
 - Nathan found IOC configuration error causing soft IOC to not save parameters for EP cRIO PVs.
 - Error fixed and tested successfully; limits remained unchanged on IOC reboot.
- Developed drivers in LabVIEW for Keithley multimeter to measure DC voltage for **MPOD test station**.
 - * Drivers written:
 - Set measurement range of multimeter
 - Set measurement mode (DC voltage, AC voltage, DC current, etc.)
 - Measure on user-set channel of multimeter.
- Compiled and edited DSG weekly report.

McMullen, Marc

MVT

- Ten bottles of premix delivered on January 12, 2018.
 - * Premix currently in use; MVT staff tested the mixing system until the weather caused the Isobutane to condense in the line.
- Contacted procurement on having the original Isobutane MFC repaired.

LTCC

- Installed scale with Brian for use with the single sector test.
 - * Zeroed and spanned scale after installation.
 - * There is approximately 150Kg of C₄F₁₀ on hand.



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RICH

- Investigated glitches in air-cooling circuit with Brian, George, and Tyler.
 - ★ Tyler adjusted compressor's cycling dead band from 100 psi – 113 psi to 104 psi – 113 psi.
 - ★ George adjusted the panel's regulator down to 45psi.
 - Flow values remained 500 slm for channel 1 and 400 slm for channel 2.