



# Detector Support Group

## Weekly Report, 2018-10-10

### Summary

#### Hall B Magnets

- FastDAQ data analyzed to determine cause of September 29, 2018 Solenoid Fast Dump.
  - ★ No voltage spikes present prior to the fast dump.
  - ★ Plotted and compared QD channels to set thresholds; found that no thresholds were exceeded.
  - ★ Cause of dump still yet to be determined.
- PLC Sequence of Events (SOE) timestamps are not being saved correctly in Mya Archiver.
  - ★ SOE timestamps are double precision floats but they are being saved as single precision, leading to loss of precision
  - ★ IOC had problems reading the PLC array tag that holds the timestamps when attempting to convert single precision to double precision.
  - ★ As temporary method to access SOE timestamps without connecting to PLC, script developed to read timestamps in correct, double precision float format.
- *Solenoid Voltage Taps Values at Fast Dumps* table updated with data from February 19, 2018 (fast dump event #12).
  - ★ Synchronization, jitter-removal, and timestamp-correction options used during data retrieval.
  - ★ Found that no QD#1 channels (supposed cause of dump) went over thresholds prior to dump.

#### HDice

- Ability added to either continue cycles or abort program after liquid helium level or temperature sensor alarms go off.
- Rack #1's ability to continue runs after interlocks debugged.
  - ★ When sensors trigger an interlock, NMR program will stop cycles and loop over sensor readouts until user selects to reset alarms.
  - ★ After resetting alarms, program prompts user to select to "continue runs" or "abort program".
  - ★ When "continue runs" was selected, the power supply would ramp to the appropriate value, but the CT-Box would not start acquisition.
  - ★ Problem found to be that the power supply needed a "hold" command to hold the power supply until the CT-Box was ready.
- Liquid helium level or temperature sensor interlocks successfully tested for both low and low-low alarm values.
- Time stamps in sensor log debugged.
  - ★ Time stamps are supposed to be printed in log file with temperature and liquid level sensor values, but incorrect timing is written to log file.
- CT-Box acquisition stop when "stop cycle" is selected debugged.
  - ★ When "stop cycle" is selected, the cycle stops but the CT-Box would not turn off when "exit program" was selected.
- LabVIEW program developed to test attenuation settings of RF Box.
  - ★ Program uses waveform generator to send a 1 MHz sine wave through RF Box, measures the output signal using an oscilloscope, and calculates attenuation value of output signal.



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### RICH

- Intermittent RICH readout fibers disconnects investigated.
  - ★ 19 disconnects since January 1, 2018.
  - ★ FPGA voltage monitoring, scaler, and temperature data for a tile are incorrect or zero when fiber disconnect occurs.
  - ★ From the analysis so far:
    - Fiber disconnects are limited to single tile
    - Disconnects appear to be randomly distributed across the 128 tiles.
    - HV is stable when a fiber disconnect occurs.
  - ★ LV and number of fibers connected is being investigated and added to EPICS archiver.

### Hall B Gas System

- Way to separate MFCs in controls program investigated to prevent one MFC disconnect from stopping flow to all other MFCs on the same cRIO.
  - ★ Change should be possible, but would require significant code modifications.
  - ★ Hall B must decide how they want MFC failures to be handled before proceeding with changes.
- Gas controls GUI modified to add debug mode to the expert screen to enable MFCs to continue to operate while an MFC is disconnected.

### LTCC

- Faults scenarios determined for the LTCC gas recovery system

### Hall C Magnets

- PT2026 NMR Unit has lock issues at the lower end of the probe range
  - ★ Unit has only tracked field well from ~1.3 – 1.5 T

### Hall D PXI

- DSG Hall D PC upgraded to Windows 10.

### cRIO Test Stations

- Integral nonlinearity test developed for manual mode for  $\pm 0.2$  V range and  $\pm 1$  V range.
- Agilent logic analyzer setup and programmed for signal analysis of the single-board cRIO (sbcRIO) FPGA I/O.
  - ★ The sbcRIO is being investigated for possible use in future detector slow controls and monitoring systems.

### DSG

- Three DSG notes edited:
  - ★ 2018-14 CAENels CT-Box Current Measurement System for HDice (posted to DSG website)
  - ★ 2018-15 Hall D PXI Calibration (posted to DSG website)
  - ★ MFC power chassis note (editing in progress).



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### Antonioli, Mary Ann

#### cRIO Test Station.

- Developed, tested, and debugged integral nonlinearity test for manual mode for  $\pm 0.2$  V range and  $\pm 1$  V range.
- Edited and posted two DSG notes:
  - ★ 2018-14 CAENels CT-Box Current Measurement System for HDice
  - ★ 2018-15 Hall D PXI Calibration.
- Formatted and edited MFC power chassis Note.
- Attended Communication Barriers Training.
- Attended Workers Safety Committee meeting.
  - ★ As required for committee members, read and approved 40 page Worker Safety and Health Program Description document.

### Bonneau, Peter

#### HDice

- Worked with Amanda, Tyler, and Pablo on troubleshooting NMR program issues on HDice rack #1.
  - ★ NMR program failed to read helium temperature and level while triggering the lock-in amplifier in synchronous operation mode.
  - ★ Since the CT-box does not have internal data storage during a scan, the computer must be able to accept the binary data at the triggering rate.
  - ★ The simultaneous reading of both the helium temperature and level sensor ports during acquisition was interfering with CT-box parallel data acquisition.
  - ★ Individual sequenced temperature and level communication ports resolved the issue.
  - ★ NMR program successfully completed 1500 cycle test.
- Analyzed NMR program for optimization of sensor sampling and VISA port handling.
- Documentation on HDice NMR program synchronous operation mode is being developed.

#### RICH

- Investigation of RICH intermittently disconnecting readout fibers with Tyler.
  - ★ The FPGA voltage monitoring, scaler, and temperature data for a tile is incorrect or zero when the fiber disconnect occurs.
  - ★ Fiber will reconnect on its own without operator intervention.
  - ★ From the analysis so far, the fiber disconnects are limited to single tile and appear to be randomly distributed across the 128 tiles. The PV for the number of fibers connected is being added to the EPICS archiver signals for further investigation.
  - ★ HV is stable when a fiber disconnect occurs. LV is being investigated and added to the EPICS archiver signals.

#### DSG



# Detector Support Group

## Weekly Report, 2018-10-10

- Setup and programmed Agilent logic analyzer for signal analysis of the National Instruments single-board cRio (sbcRio) FPGA I/O. The sbcRio is being investigated for possible use in future detector slow controls and monitoring.

### Campero, Pablo

#### Hall B Magnets

- Analyzed FastDAQ data to figure out the reason for the Solenoid Fast Dump event on September 29, 2018.
  - ★ Discussed about the Fast DAQ data showed for this dump, no voltage spikes present prior to the Solenoid fast dump.
  - ★ Plotted and compared QD1 through QD8 voltage values with the set thresholds and found that none of them were exceeded.
- Researched specs for Proline Transducer VariTrans P29000 used between Resistor box and cRIO ADC input module for the voltage taps connections.
- Updating *Solenoid Voltage Taps Values at Fast Dumps* table.
  - ★ Completed fast dump event 12 occurred on 02/19/2018.
    - Used -JSD option to extract VTs values and noticed that none of the VTs had spikes that could go over the thresholds to generate a fast dump.
    - Verified that none of the QD#1 channels went over thresholds prior to this dump.

#### HDice

- Collaborate with Amanda to debug the NMR LabVIEW program.
  - ★ Added “Continue” option to the NMR program, this option allows the user to continue with cycles after it has been stopped due to LLHe interlock.
- Generated power point presentation for the Hall C PLC Task status report.

### Eng, Brian

#### Hall B Magnets

- Found that SOE timestamps archived by Mya aren't being saved correctly (double precision floats being saved as single precision leading to loss of precision). Tried getting those converted to long integers with Nathan, but IOC had problems reading the PLC array tag that holds the timestamps: <https://logbooks.jlab.org/entry/3606498>

#### Hall B Gas System

- Looked into separating MFCs, will require changing the code quite a bit, but should be possible. Still need to meet with Hall B so they can decide how they'd like failures to be handled.
- Meeting with Bob, Marc and Krister to go over LTCC controls setup.

#### Hall C Magnets

- PT2026 also has lock issues at the lower end of the probe range, so far it has only tracked well from ~1.3 – 1.5 T



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### Hall D PXI

- Upgraded computer to Windows 10

### Hoebel, Amanda

#### HDice

- Added ability to continue cycles after sensor alarms went off.
  - ★ User can also choose to abort program instead.
- Debugged Rack #1's ability to continue runs after interlocks.
  - ★ When sensors trigger an interlock, NMR program will stop cycles and loop over sensor readouts until user selects to reset alarms.
  - ★ Resetting alarms prompts user to select to continue runs or abort program.
  - ★ When "continue runs" was selected, the power supply would ramp to appropriate value for runs, but the CT-Box would not start acquisition.
  - ★ Problem found to be that the power supply needed a "hold" command to hold the power supply until the CT-Box was ready.
- Tested sensor interlocks.
  - ★ Worked correctly for both low and low-low alarm values.
- Debugged time stamps.
  - ★ Time stamps were supposed to be printed with temperature and liquid level sensor values, but timing is incorrect.
- Debugged CT-Box acquisition stop when "stop cycle" is selected.
  - ★ When "stop cycle" is selected, the cycle stops but the CT-Box would not turn off when "exit program" was selected.

### Jacobs, George

#### RICH

- RICH N2 gas system note in progress
- Created ecommerce order, PR380354P, for RICH N2 B/U testing components

### Leffel, Mindy

Vacation

### Lemon, Tyler

#### RICH

- Investigating cause of fiber disconnects.
  - ★ Occasionally, RICH electronics lose connection to DAQ readout.
    - 19 disconnects since January 1, 2018.
    - Distribution among tiles and timing appears to be random.
  - ★ Cause of disconnect is unknown.
  - ★ Looking at archived data in attempts to find trends on which tiles disconnect and conditions (power supply, environmental, or other) are common during times of fiber disconnects.
- Created slides on DSG's work on RICH for presentation on group in upcoming senior staff meeting.



## Detector Support Group

### Weekly Report, 2018-10-10

#### HDice

- Developed LabVIEW program to test attenuation settings of RF Box.
  - ★ Program uses waveform generator to send a 1 MHz sine wave through RF Box, measures the output signal using an oscilloscope, and calculates attenuation value of output signal.
  - ★ Finding specifications on waveform generator, RF Box components, and oscilloscope capabilities to determine smallest signal amplitude measureable.
    - At max attenuation (-63 dB), output signal is ~0.07% of input signal (10 V in becomes ~7 mV output signal).

#### McMullen, Marc

##### Gas Controls

- Modified gas controls GUI by adding debug mode to the expert screen. This switch will enable MFCs to continue to operate while an associated MFC is disconnected.

##### LTCC

- Attended gas controls meetings to determine the faults scenarios for the LTCC gas recovery system. Sent informative meeting notes to LTCC community.

##### DSG

- Completed MFC power chassis document. Started testing one of the chassis with a MFC.