



# Detector Support Group

## Weekly Report, 2018-07-18

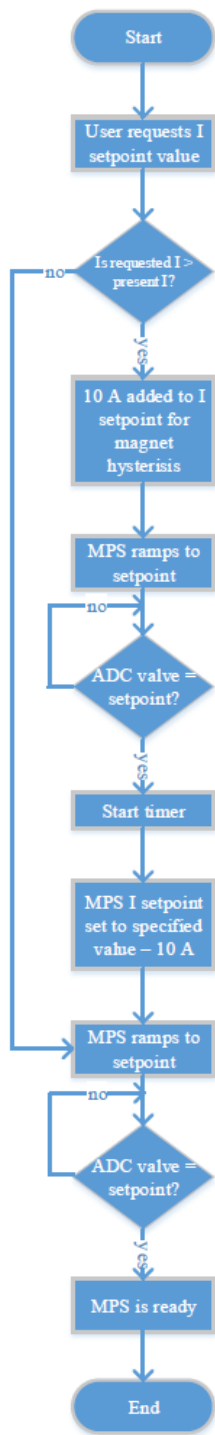
### Summary

#### Hall C

- SHMS PLC system successfully upgraded from RSLogix 5000 version 16 to version 20.
  - ★ Required software updates installed on the PC *skylla7*.
    - RSLogix 5000 v20.
    - RSNetwork v27 (used to set up ControlNet configurations).
    - ControlFlash v15 (used to upgrade module firmware).
  - ★ Firmware upgraded for PLC controllers and modules in Primary and Secondary PLC chassis.
    - Controller 1756-L62/B – from 16.81 to 20.58
    - ControlNet 1756-CN2/B – from 20.011 to 20.022
    - Ethernet module 1756-EN2T/B – from 2.007 to 4.008
    - Redundancy module 1756-RM/A – from 2.005 to 3.004
  - ★ Updated PLC's project file from RSLogix 5000 v16 to v20
    - Re-enabled redundancy synchronization between Primary and Secondary chassis.
- ControlNet modules (CN2B) successfully swapped with Ethernet modules in the SHMS Q1 and Heat Exchanger (HX) I/O Chassis.
  - ★ .ACD PLC program modified to add EN2T module to Q1 chassis and ENBT to HX chassis.
  - ★ Firmware version for Ethernet modules upgraded:
    - Q1's EN2T to v5.8
    - HX's ENBT to v6.6.
  - ★ Ethernet modules configured in the .ACD project file under existing Ethernet network running on the Primary/Secondary PLC chassis.
  - ★ After all upgrades, .ACD file successfully downloaded to PLC and run with no problems.
  - ★ Copy of the SHMS v20 ACD file was given to Mike Fowler to run on *skylla7*.
- Current monitoring loop routine developed in ladder logic for HMS's Q1.
- Testing started on DSG-PLC of first version of Quadrupoles' current regulation PLC routine.
  - ★ Danfysik power supply simulation program for debugging and testing Hall C PLC programs is under development.
- Installed D-sub connector to terminal block adapter for wiring of APC UPS monitoring.
- DSG is waiting on more information and/or cabling work from Hall C on several tasks.
  - ★ Spectrometer vacuum controls
  - ★ HMS & SHMS shutter controls
  - ★ UPS status read-back
  - ★ spectrometer break controls
  - ★ Valve tune responses
  - ★ SHMS LVDT I/O module tasks.
- Flow chart for current monitoring loop generated.

# Detector Support Group

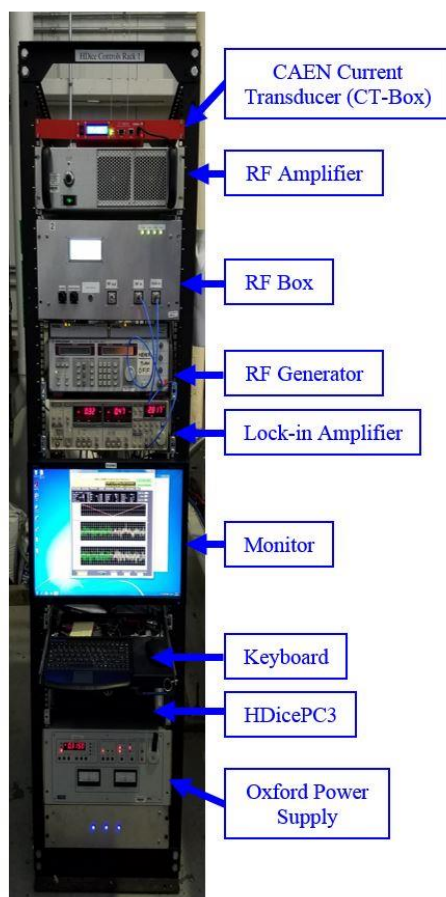
## Weekly Report, 2018-07-18



Flow chart for Hall C magnets' current monitoring loop.

### HDice

- Debugging and testing completed of NMR program with VISA power supply drivers.
  - ★ Program designed for Oxford Mercury iPS power supply with USB interface.
  - ★ Power supply's intermittent stability issues during field scans debugged.
- Prepared for move of equipment to HDice lab.
  - ★ On the computer HDicePC3, all programs (NMR, Fast Resonance Scanner, Rotation of Target Polarization, hardware test programs, and device drivers) added to the top-level directory and tested with the instrumentation.
  - ★ All equipment disconnected from DSG test area and their configuration documented.
- Installed all instrumentation on “Rack #1” in the HDice lab.
  - ★ Connected power, communication, and signal cables for all instrumentation.
  - ★ Grounded all instrumentation on Rack #1 to HDice lab structure to avoid noise in equipment.
  - ★ Connected Oxford power supply to clean power source.
  - ★ Successfully ran NMR LabVIEW program for 1000 cycles.
    - Program to be tested on magnet later.



HDice Rack 1 with all equipment in run. Photo shows rack with 1000-cycle NMR scan in progress.

# Detector Support Group

## Weekly Report, 2018-07-18

### Hall B Magnets

- PLC time-sync configuration changed to use Precision Time Protocol (PTP) timeserver.
- cRIOs updated to LabVIEW 2018 and PTP enabled for time synchronization
- PR submitted for cRIO-9045 for use as spare.

### SVT

- Cooling system's two flow meters tested to gauge their state of operation.
  - ★ Both had inconsistent flow measurements and showed evidence of internal moisture.
  - ★ During test, the "in" meter stopped working and upon further investigation, internal corrosion was found from excessive internal moisture.



Photos of SVT "in" flowmeter showing evidence of internal moisture.

### RICH

- Six 2-cm thick aerogel tiles received and inspected.
  - ★ Tiles stored in dry-box in DSG small cleanroom gowning area.
- Swagelok gauge used to check fittings for proper tightening on upgraded nitrogen panel.
- Flow test performed of RICH N<sub>2</sub> gas panel upgrade in Hall B Gas Shed.
  - ★ ~60 slm achieved for each output channel for a total of ~120 slm.

### LTCC

- C<sub>4</sub>F<sub>10</sub> purchase order sent to vendor by procurement on July 9, 2018.
  - ★ Expected lead-time for delivery is 6 – 8 weeks.
- S2 and S3 reinstalled after leak sealing by Hall B Mechanical.
  - ★ S2 filled with nitrogen and the MFC zeroed.
    - Initial daily leakage numbers indicate a rate of ~80 liters per day.
  - ★ S3 is has the remainder of the C<sub>4</sub>F<sub>10</sub> that was left over from the S5 test during the previous run.



# Detector Support Group

## Weekly Report, 2018-07-18

### Gas System Controls

- Internal wiring of the first MFC power chassis completed.

### Hall D Solenoid

- PLC time-sync configuration changed to use PTP timeserver.
- PXI controller and chassis swapped for new controller and repaired chassis.
  - \* Controller is latest model for PXI and was updated to LabVIEW 2018.
  - \* Chassis' power supply and fan were repaired after failure in spring 2018.

### Hall D Slow Controls

- In Hall D Slow Controls Meeting, discussed:
  - \* DSG's calibration of the Solenoid ADC's for NI PXI.
  - \* Hall D's request for help from DSG on development of CSS screens for DIRC.
  - \* Hall B's RICH interlocks and FPGA temperature read-back in comparison to DIRC's proposed monitoring system.

### cRIO Test Stand

- Code developed for NI-9205 ADC module manual tests.
  - \* Samples, mean, accuracy and standard deviation; integral nonlinearity; and dynamic range.
  - \* Incorporated manual tests into overall program.

### LERF Cryomodule 1

- Last eight cable bundles unbundled and relabeled.
- Sample terminations to determine proper strip lengths performed.
- Jackets stripped off all cables.

### Workers Safety Committee

- Heat stress injury due to lack of AC in cafeteria kitchen being discussed.



# Detector Support Group

## Weekly Report, 2018-07-18

### Antonioli, Mary Ann

- Contributed to installation of equipment into HDice Rack 1.
- Made Visio flowchart of Hall C current regulation loop.
- For cRIO test stand:
  - ★ Wrote code for NI-9205 ADC module manual tests:
    - Samples, mean, accuracy and standard deviation; integral nonlinearity; and dynamic range ( $\pm 10$  V range).
  - ★ Incorporated manual tests into overall program.
- Attended Workers Safety Committee meeting.
  - ★ Emergency Management Exercise discussed.
  - ★ Heat stress injury due to lack of AC in cafeteria kitchen being analyzed.
- Took LERF training.

### Bonneau, Peter

#### HDice

- Completed debugging and testing NMR program with VISA power supply drivers.
  - ★ Program designed for Oxford Mercury iPS power supply with USB interface.
  - ★ Debugged power supply's intermittent stability issues during field scans.
    - Program would freeze and/or read-back an incorrect power supply status.
  - ★ Started extended test run of cycle sweeps on the NMR program with asynchronous mode enabled.
- Configured HDicePC3 computer in preparation for the move to the HDice lab.
  - ★ HDice programs (NMR, Fast Resonance Scanner, Rotation of Target Polarization, hardware test programs, and device drivers) added to the top-level directory and tested with the instrumentation.
  - ★ DSG group members added as computer administrators to this machine.
  - ★ Program that prevents the PC from going to sleep into screen-saver mode was onto the computer.
- Disconnected all equipment and documented the configuration in preparation for the move to the HDice lab.

#### PLC Control Systems

- Held daily status and planning meeting on HMS and SHMS PLC control systems.
  - ★ Reviewed completion of the ControlNet to Ethernet module swap on the SHMS.
  - ★ Discussed writing a Danfysik power supply simulation program for debugging and testing Hall C PLC programs.
  - ★ DSG is waiting on information and/or cabling work from Hall C on spectrometer vacuum controls, HMS & SHMS shutter controls, UPS status read-back, spectrometer break controls, valve tune responses, and SHMS LVDT I/O module tasks.



## Detector Support Group

### Weekly Report, 2018-07-18

- Attended Hall D Slow Controls Meeting.
  - \* DSG calibrated the Solenoid ADC's for NI PXI.
  - \* Hall D requested help from DSG on the development of CSS screens for DIRC.
  - \* Discussed RICH interlocking and FPGA temperature read-back in comparison to DIRC's proposed monitoring system.

## Campero, Pablo

### Hall C

- Upgraded SHMS PLC from version 16 to version 20.
  - \* Installed required software updates on the PC *skylla7*.
    - RSLogix 5000 v20.
    - RSNetwork v27 (used to set up ControlNet configurations).
    - ControlFlash v15 (used to upgrade module firmware).
  - \* Upgraded firmware version for PLC controllers and modules in Primary and Secondary PLC chassis.
    - Controller 1756-L62/B – from 16.81 to 20.58
    - ControlNet 1756-CN2/B – from 20.011 to 20.022
    - Ethernet module 1756-EN2T/B – from 2.007 to 4.008
    - Redundancy module 1756-RM/A – from 2.005 to 3.004
  - \* Updated PLC's project file from RSLogix 5000 v16 to v20
  - \* Downloaded updated .ACD program to SHMS PLC
  - \* Re-enabled redundancy synchronization between Primary and Secondary chassis.
  - \* Primary and Secondary PLC chassis are running without problems.
- Swapped ControlNet modules (CN2B) with Ethernet modules in the Q1 and Heat Exchanger I/O Chassis.
  - \* .ACD PLC program V20 modified to add two Ethernet modules.
  - \* Firmware version for Ethernet modules was upgraded:
    - Q1's EN2T to v5.8
    - HX's ENBT to v6.6.
  - \* Configured all I/O modules in Q1 and HX PLC chassis with the same configurations, names, and engineering units.
  - \* Set up Ethernet modules in the .ACD project file under existing Ethernet network running on the Primary/Secondary PLC chassis.
  - \* After all upgrades were completed, .ACD file successfully downloaded to PLC and run with no problems.
  - \* Copy of the SHMS v20 ACD file was given to Mike to run on *skylla7*.
- Checked first version of Quadrupoles' current regulation PLC routine with Amanda.
  - \* Downloaded PLC routine in DGS PLC to start testing.
- Updated DSG-Hall C PLC task list.
- Generated DSG-Hall C PLC weekly report.





# Detector Support Group

## Weekly Report, 2018-07-18

### HDice

- Installed all instrumentation on “Rack #1” in the HDice lab
  - \* Connected power, communication, and signal cables for all instrumentation.
  - \* Grounded each instruments on Rack #1 to beam of the HDice lab structure to avoid any noise in the equipment.
  - \* Connected Oxford power supply to clean power source.
  - \* Successfully ran NMR LabVIEW program for 1000 cycles.
- Revised “Instrumentation, Controls and Monitoring System to Power up Hall B Solenoid” DSG note.

### Eng. Brian

#### SVT

- Tested SVT chiller flowmeters with Marc.
  - \* Found liquid in them.
  - \* One had corroded wires on the I/O connector.
  - \* Marc sent report of findings to Yuri and Hall B Engineering.

#### Hall B Magnets

- Changed PLC time sync configuration to use PTP time server.
  - \* <https://logbooks.jlab.org/entry/3581012>
- Upgrade cRIOs to 2018 and enabled PTP for time synchronization
  - \* <https://logbooks.jlab.org/entry/3581069>
- Submitted PR in for cRIO-9045 to use as spare since no issues have occurred with cRIO-9035 in use.

#### Hall C

- Upgrade software and firmware for SHMS PLC
  - \* <https://logbooks.jlab.org/entry/3581082>

#### Hall D

- Upgraded PXI to 2018 and swapped out controller for the newest one
  - \* <https://logbooks.jlab.org/entry/3581324>
- Changed PLC settings to use CC PTP server
  - \* <https://logbooks.jlab.org/entry/3581017>

### Hoebel, Amanda

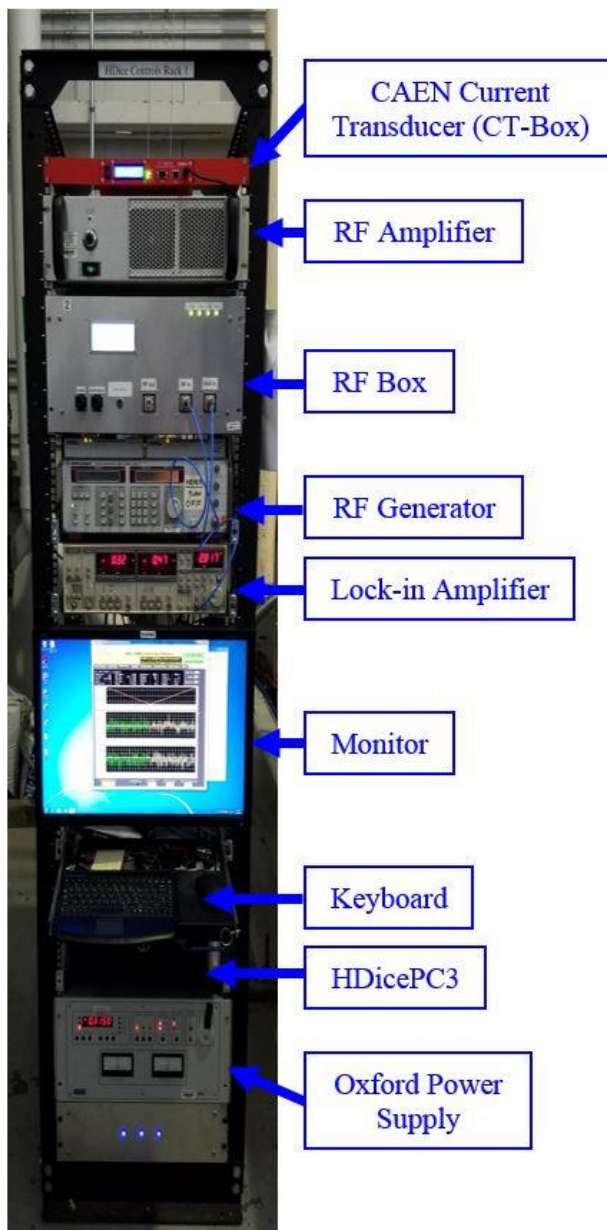
#### HDice

- Installed equipment into Rack #1.
  - \* Program successfully ran for 1,000 sweeps to check for hang-ups.
  - \* Program will be tested on magnet later.



# Detector Support Group

Weekly Report, 2018-07-18



HDice Rack 1 with all components installed.



# Detector Support Group

## Weekly Report, 2018-07-18

### Hall C

- Wrote current monitoring loop ladder logic in HMS program for Q1 magnet.
- Created flow chart for current monitoring loop.
- Worked with Pablo, Tyler, and Brian on upgrading SHMS program to v20 and swapping ControlNet modules with Ethernet modules.
  - \* Problems arose from time-sync configuration.

### Jacobs, George

#### Gas Systems

- Ordered Swagelock gap inspection gauges
- Discussions with procurement and Hall B on C<sub>4</sub>F<sub>10</sub> PR status.
- C<sub>4</sub>F<sub>10</sub> PO sent to vendor by procurement
- Installed pressure transducer and MV4 on RICH N<sub>2</sub> panel inlet
- Performed final tightening of Swagelock fittings on RICH N<sub>2</sub> valve panel using Swagelock gauge, MS-IG-468
- Performed flow test of RICH N<sub>2</sub> gas panel upgrade

### Leffel, Mindy

- Contributed to installation of HDice components in NMR rack 1.
- Worked with George checking gaps of fittings on RICH panel.
- LERF cryomodule 1 cable termination.
  - \* Unbundled and relabeled the last eight bundles.
  - \* Made sample terminations to determine proper strip lengths.
  - \* Stripped jackets of all cables.

### Lemon, Tyler

#### Hall C

- Updated firmware on SHMS PLC communication modules to a version compatible with RSLogix 5000 version 20 with Pablo, Brian, and Amanda.
  - \* Debugged issues with redundancy set up.
  - \* Firmware updated to:
    - Controller 1756-L62/B – from 16.81 to 20.58
    - ControlNet 1756-CN2/B – from 20.011 to 20.022
    - Ethernet module 1756-EN2T/B – from 2.007 to 4.008
    - Redundancy module 1756-RM/A – from 2.005 to 3.004
- Installed EN2T and ENBT Ethernet modules in Q1 and HX I/O Chassis with Pablo, Brian, and Amanda.
  - \* Reconfigured PLC program and debugged module configuration errors.
- Installed D-sub connector to terminal block adapter for wiring of APC UPS monitoring.

#### RICH

- Received and visually inspected six 2-cm thick aerogel tiles.



# Detector Support Group

## Weekly Report, 2018-07-18

### HDice

- Installed equipment in HDice lab with Amanda, Pablo, Mary Ann, and Mindy.
  - ★ Equipment installed in rack for final testing before turning DSG's completed work over to HDice group.

### Hall D Solenoid

- Swapped PXI controller and chassis for new controller and repaired chassis with Brian.
  - ★ Controller is latest model for PXI.
  - ★ Chassis' power supply and fan were repaired after failure in spring 2018.
  - ★ Debugged issues caused by aliasing of controllers' hostnames.
    - Aliasing the two operational PXI controllers to a generic *halld-pxi* hostname would in theory allow either controller to be used without having to change IOC configurations.
    - Aliasing did not work. PLC and IOC are looking for original controller's hostname and IP, regardless for controller installed.
    - Further debugging of networking by Hall D Slow Controls group required.

### McMullen, Marc

#### Controls

- Completed internal wiring of the first MFC power chassis.
  - ★ Testing of chassis should be complete by 7/20.

#### LTCC

- S2 and S3 reinstalled after leak sealing by Hall B mechanical.
  - ★ S2 has been filled with nitrogen and the MFC was zeroed.
    - Initial daily leakage numbers indicate a rate of 9 to 10 liters per day.
    - We will monitor for a week before assessing.
  - ★ S3 is has the remainder of the C<sub>4</sub>F<sub>10</sub> that was left over from the S5 test during the previous run.

#### SVT

- Tested cooling system flow meters in the DSG lab to gauge their state of operation.
  - ★ Both were found to have inconsistent flow measurements and showed evidence of internal moisture.
  - ★ During test, the "in" meter stopped working.
    - Upon further investigation, found internal corrosion from excessive internal moisture.
  - ★ DSGs findings were reported to the detector manager and Hall B engineering.