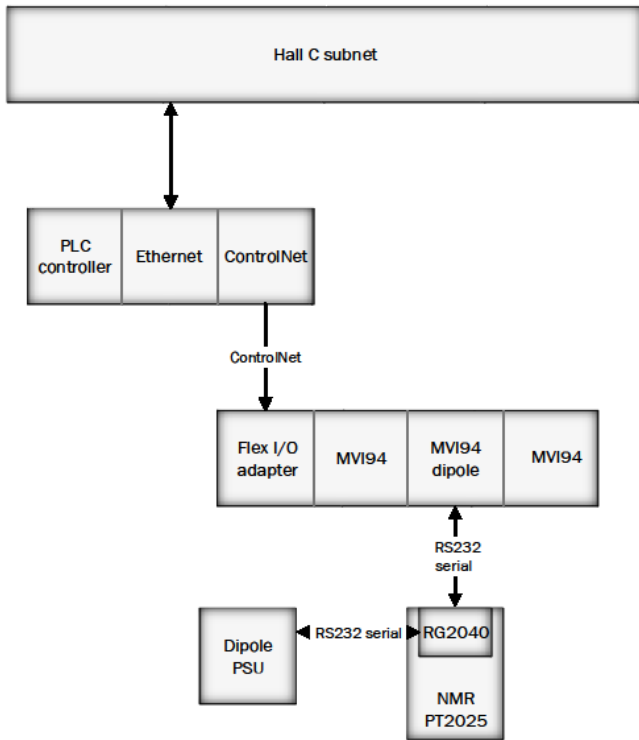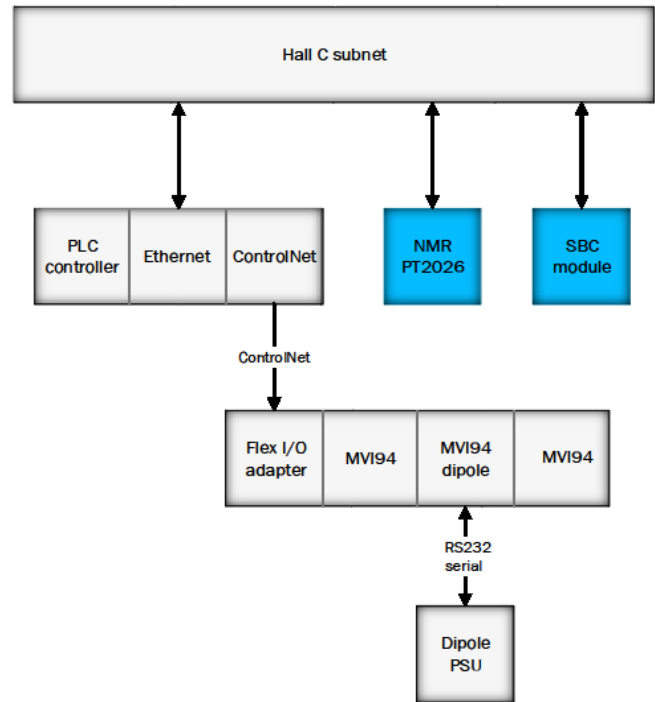# Detector Support Group
Weekly Report, 2018-06-27

Summary

Hall C

- Started flow diagram for SHMS dipole regulation PLC routine, based off function block diagram draft to show sequence of field regulation desired.
  - ✶ Select input source for **B** (manual or calculated), define max/min of **B**, select probe type, calculate I(**B**), set PSU, readback **B**.
- Investigated command functions used in RG2040 regulation module so that PLC code could be developed in a similar fashion.
- Two Visio drawings were created:
  - ✶ Current dipole NMR communication configuration for SHMS and HMS.
  - ✶ Proposed dipole NMR communication configuration for SHMS and HMS.

Current Hall C Dipole NMR Configuration for SHMS and HMS
M. A. Antonioli
6/22/18

Proposed Hall C Dipole NMR Configuration for SHMS and HMS
M. A. Antonioli
6/22/18

- Configured Ethernet (ENBT and EN2T) modules for a test where the Ethernet modules will replace two ControlNet (CN2/B) modules in the SHMS Q1 and Heater Exchanger (HX) PLC chassis.
  - ✶ IP address assigned on the Hall C subnet for the two Ethernet modules.
    - ▪ Q1 PLC chassis: Ethernet module EN2T (129.57.165.17)
    - ▪ HX PLC chassis: Ethernet module ENBT (129.57.165.18)
  - ✶ Ethernet modules connected to the DSG-PLC chassis to configure IP ports and change firmware versions.
    - ▪ Firmware versions were not compatible with RS-LOGIX v16.
  - ✶ Proper firmware version and EDS files for the Ethernet modules configured.
    - ▪ EN2T module with firmware version 2.07
    - ▪ ENBT module with firmware version 4.04.
  - ✶ RSLinx used to test revision and configuration for both Ethernet modules.
  - ✶ New version of SHMS PLC program created to include the modifications made to add two new Ethernet modules.
    - ▪ New version of ACD PLC program created based on current PLC program, which is running on the SHMS PLC controller.
    - ▪ I/O configuration modified by adding two Ethernet modules in PLC program under the Ethernet network that is currently used by the PLC controller chassis.
    - ▪ Fourteen I/O modules configured for Q1 (x9) and HX (x5).
    - ▪ All I/O modules verified to have the same configurations, revision numbers, RPI /RTS, names and engineering units as the modules used with the ControlNet modules.
- Weekend test of SBC concluded.
  - ✶ SBC maintained communications with NMR over the course of the weekend (polling instrument temperature at 1Hz).
- Ability to power-on NMR with Aux connector verified after AC has been reset.
- For UPS relay card, 27 conductor D sub to ferrule cable fabricated and tested.

FT

- SubVI developed to monitor standard deviations and standard error of the averaged hardware interlock signals.
- Bad hardware interlock sensor signals debugged.
  - ✶ All calorimeter temperature signals were giving readings indicative of a disconnected sensor.
  - ✶ Wiring for calorimeter temperature sensors verified to be working properly on cRIO side.
    - ▪ No RTD resistance could be measured from wire disconnect after disconnecting wire from cRIO chassis.
    - ▪ Working hodoscope temperature sensors were connected to signal cable of non-working calorimeter sensors. Hodoscope sensors could be read from hardware interlocks.
    - ▪ Problem is at calorimeter end.

HDice

- NMR **B** field range limits debugged and tested.
  - ✴ Field scans' range expanded to 1000 Gauss.
- Fast Resonance Scanner data-logger programs debugged.
  - ✴ Fast Resonance Scanner reported an error communicating with the data-logger program on start-up.
    - ▪ Data-logger initialization revised and added to LabVIEW project file.
  - ✴ IBC and PD versions of the Fast Resonance Scanner data-logger programs debugged and tested.
- Four RF cables fabricated for Rack #2.

SVT

- Gain scans started to provide baseline for spare modules in dry box in preparation for modifying HFCB HV connection to bottom side.
- SubVI developed to monitor standard deviations and standard error of the averaged hardware interlock signals.
  - ✴ SubVI was added to LabVIEW user interface to avoid CPU usage increase when adding calculation to Real-Time application.
- RTD, humidity, and environmental cables disconnected and terminated for patch panel conversion.
  - ✴ New boards were installed on the patch panel and the new terminated connectors were connected to the PCBs.

Gas System

- Machine work completed for installation of dual power supplies and power supply redundancy module for MFC power chassis.

Hall D

- All 435-NBX modules updated to latest firmware (July 18, 2016).
  - ✴ After update, responses from devices were not able to be read by PLC.
  - ✴ ASCII line termination settings did not properly restored after update; correcting line termination settings manually resolved issue.

Antonioli, Mary Ann

- Began changes to **FT** cRIO code to enable individual sensor averaging and trip delay, number of samples to average, and time of delay.

- Made two Visio drawings
  - ✶ Current dipole NMR configuration for SHMS and HMS.
  - ✶ Proposed dipole NMR configuration for SHMS and HMS.

- Began work on testing next cRIO module.
  - ✶ Wired two channels of 9205 module for testing.
  - ✶ Voltage "bleeds" to other channels; Pablo working on problem.

Bonneau, Peter

HDice

- User interface debugging and testing of both asynchronous and synchronous operating modes on the NMR program.
  - ✶ Updated and corrected system status window display during NMR field scans.
  - ✶ Debugged and tested NMR field range limits.
    - ▪ Field scan range limit has been expanded to 1000 Gauss.
- Debugged Fast Resonance Scanner data-logger programs.
  - ✶ Fast Resonance Scanner reported an error communicating with the data-logger program on start-up.
    - ▪ Revised data-logger initialization and added to LabVIEW project file.
  - ✶ Debugged and tested both IBC and PD versions of the Fast Resonance Scanner data-logger programs.
- Debugging VISA drivers for use on the Oxford Mercury iPS power supply with USB interface.
  - ✶ Power supply has intermittent stability issues during a set followed by a read-back command sequence.
  - ✶ When power supply fails, it either reports an incorrect read-back value or causes the computer to reboot with the "blue screen of death".
  - ✶ Using a DSG written test program, the failure was isolated to the VISA sub-VI for power supply read-back status.

FT

- Worked with Amanda, Tyler, and Pablo on debug and testing of the FT Hardware Interlock System.
  - ✶ A recent EPICS softIOC reboot corrupted the configuration file.
    - ▪ A new default configuration file was created and installed.
  - ✶ The calorimeter temperatures are reading off-scale high.
    - ▪ Resistance measurements read open at the cRio input cables.
    - ▪ Interlock cRio is correctly operating. Problem is at the detector end.
  - ✶ All other FT signals are working correctly

Hall C

- Meeting with Mike Fowler regarding Hall C HMS and SHMS PLC control systems.
  - ✦ The dipole field regulation routine and interface to the NMR was discussed. NMR firmware issues is causing intermittent hardware lock-up problems.
- Held daily status and planning meeting on HMS and SHMS PLC control systems.

Campero, Pablo
Hall C

- With regards to HMS and SHMS Dipole field regulation PLC routine.
  - ✦ Draft function block diagram version provided by Mike Fowler to show sequence of field regulation desired.
  - ✦ Based in notes provided by Mike Fowler started flow diagram for Dipole regulation PLC routine.
  - ✦ Researched about command's functions used in RG2040 regulation module.
  - ✦ Generated diagram with Dipole serial communications with the proposed implementation of the new SBC cards that will be used to communicate NMR unit with HMS and SHMS PLCs.
- In preparation for the test, where two ControlNet (CN2/B) modules will be swapped by two Ethernet modules (ENBT and EN2T) to be performed in the SHMS Q1 and Heater Exchanger (HX) PLC chassis:
  - ✦ Assigned IP address on the Hall C subnet for two Ethernet modules as follow:
    - ▪ Q1 PLC chassis: Ethernet module EN2T (129.57.165.17)
    - ▪ HX PLC chassis: Ethernet module ENBT (129.57.165.18)
  - ✦ Connected Ethernet modules to the DSG-PLC chassis to configure IP ports and change firmware versions, which were not compatible with RS-LOGIX v16.
  - ✦ Configured proper firmware version and EDS for the Ethernet modules.
    - ▪ EN2T module with firmware version 2.07
    - ▪ ENBT module with firmware version 4.04.
  - ✦ Used RSLink to tested revision and configurations for both Ethernet modules
  - ✦ Created new version for the SHMS PLC program, it includes the modifications made to add two new Ethernet modules.
    - ▪ Created new version of ACD PLC program based in current PLC program running the SHMS PLC controller.
    - ▪ Modified I/O configurations by adding two Ethernet modules in PLC program under the Ethernet network that is currently used by the PLC controller chassis.
    - ▪ Configured a total of fourteen I/O modules for Q1 (x9) and HX (x5).
    - ▪ Verified that all I/O modules have same configurations, revision numbers, RPI /RTS, names and engineering units as the previous used with ControlNet modules.
- Generated Hall C weekly report with the status of task performed by DSG.
- Updated DSG- Hall C PLC task list.

With Brian update 435NBX modules for Hall D Solenoid and FDC/CDC Gas Systems.
  - ✦ Firmware upgrade to latest release version.

* ✦ Re-enable and tested communications with the PLCs and controllers where 435NBX modules is used to transfer data from Controllers (ASCII format) to PLC.

* Collaborated with Amanda and Tyler to debug **FT** hardware interlock system.
    * ✦ Reported bad readouts from temperatures and humidity sensors, also set values for thresholds were out of normal operation values.
    * ✦ Noticed that configuration file was corrupted.
        * Re-configure default configuration file.
        * Downloaded new configuration file in the FT cRIO SD card.
        * Deploy LabVIEW program and generated start up application in FT cRIO.
    * ✦ All readouts and thresholds returned to its normal values except for the Calorimeter temperatures
        * Checked connections and measured resistance in connectors J3 and J4 at the cRIO side and noticed those temperature sensors are disconnected.

* Researched about NI 9205 ADC module to be tested in the **cRIO Test Station**
    * ✦ Unable to test module, issues with floating voltage for all channels.
* Revised and edited Solenoid Cooldown PLC Programs **DSG note**

Eng, Brian

SVT
* Started gain scans on spare modules in dry box in preparation for adding kludge HV wire to bottom side (to get baseline measurements).
* Fixed elog gain scan plotting program, had to manually recompile ROOT.

RTPC
* Met with Carlos (Brian, Marc & George from DSG) to discuss panel assembly, once again reminded to have a DA assigned otherwise risk delays and extra work

HTCC
* Discussions with Marc & Youri on what to do during magnet quench, Youri is worried about helium damaging PMTs. He still needs to get more information from Hall B Engineering, current MFC can flow 38 SLM CO_2.

Hall B Mangets
* Updated training slides to DRAFT2, sent to Rubin for review.

Hall C
* SBC maintained communications with NMR over the weekend (polling instrument temperature @ 1Hz).
* Verified that NMR can be powered on with Aux connector (ordered plugs to make cable) after AC has been reset.

Hall D

- Upgraded firmware on spare NBX435, no issues. Needed to restore settings from backup after upgrade, only network information was retained.
- Upgraded on all 435 modules: **https://logbooks.jlab.org/entry/3578800**

Hoebel, Amanda

FT

- Debugged Calorimeter RTDs not working with Tyler and Pablo.
  - ✶ Hardware interlocks showed no signal from RTDs.
  - ✶ Ohmed-out cable on cRIO end.
    - ▪ Could not find any resistance.
  - ✶ Tyler swapped Calorimeter for Hodoscope RTDs.
    - ▪ RTDs read out for Calorimeter location, showing no problem on cRIO side.
  - ✶ Problem seems to be on detector side.

Hall C

- Worked on current monitoring loop.
  - ✶ Loop needs to check current for reaching max value.
  - ✶ Once max value is reached, change slew rate to 0.

Hall D

- Updated 435-NBX modules to latest firmware with Brian, Tyler, and Pablo.
  - ✶ After update, one module did not read properly.
  - ✶ ASCII line did not have proper termination after module restart.

- Received laptop owner transfer from Mary Ann.

Jacobs, George

Absent

Leffel, Mindy

HDICE

- Controls rack cables.
  - ✶ Fabricated, attached heat shrink, and tested all four RF cables.
  - ✶ Three N-N cables.
  - ✶ One N-BNC cable.

SVT

- Started populating an additional sloco patch panel board 1.

Hall C

- UPS repay card.
  - ✶ Fabricated and tested 27 conductor D sub to ferrule cable.

Lemon, Tyler

SVT

- Developed subVI to monitor standard deviations and standard error of the mean for averaged hardware interlock signals.
  - ★ SubVI was added LabVIEW user interface to avoid CPU usage increase when adding calculation to Real-Time application.

FT

- Developed subVI to monitor standard deviations and standard error of the mean for averaged hardware interlock signals.
  - ★ Update of hardware interlock system to give individual averaging controls is in progress so subVI was developed using cRIO module's network shared variables rather than the user interface.
  - ★ As with RICH and SVT, subVI will be used on LabVIEW user interface to avoid CPU usage increase when adding calculation to Real-Time application.
- Debugged bad hardware interlock sensor signals with Pablo and Amanda.
  - ★ All calorimeter temperature signals were giving readings indicative of a disconnected sensor.
  - ★ Verified cRIO wiring for calorimeter temperature sensors is correct by moving working hodoscope temperature sensors to connector of non-working signals.
  - ★ Confirmed that cable is disconnected on detector side of cable when attempting to measure resistance from disconnect at cRIO chassis.
  - ★ Hall B Engineering and FT collaborators will check cabling to detector.

Hall D

- Updated all 435-NBX modules to latest firmware and debugged issues after update with Brian, Pablo, and Amanda.
  - ★ Modules allow PLC to communicate to other devices using serial and ASCII commands.
  - ★ After update, responses from devices were not able to be read by PLC.
  - ★ Found that ASCII line termination settings were not properly restored after update.
  - ★ Manually correcting line termination settings for modules resolved issue.

- Attended National Instruments' Tidewater LabVIEW User Group Meeting.
  - ★ Meeting was to restart the local user group for LabVIEW.
  - ★ Discussed LabVIEW NXG, the next generation of LabVIEW.
    - ▪ NXG does not yet support cRIO, but will in the next few years.
- Installed LabVIEW NXG on "dsgcontrols1".
  - ★ Tested feature to convert regular LabVIEW 2017 code to LabVIEW NXG code.
  - ★ Tested auto-setup of hardware connected to PC with Keithley 2002 mulitmeter.

McMullen, Marc

RTPC

- Met with Carlos, George, and Brian on Jlab Pressure system requirement. Reinforced the need to for the group to forward the design to Hall B Engineer so that a design authority could be assigned. This will prevent future delays.

Gas System

- Started assembly of the first MFC power chassis. Completed machine work necessary to install dual power supplies and power supply redundancy module.

HTCC

- Discussed procedures for emergency release of helium and the potential damage to the HTCC PMTs with Brian and the system owner. The max flow of the system is 50slm of N2/Air or 38slm of CO_2. The detector owner needs to provide information on what needs to be done in case of an emergency and how damage to the detector can be mitigated using the purge system. We can then work on solutions to increase the flow during the emergency.

SVT

- Complete patch panel conversion. Disconnected and terminated all RTD, humidity, and environmental cables. Installed new boards on the patch panel and connected the new terminated connectors to the PCBs.