Summary

Hall C

- Investigated error code received when two ControlNet modules were swapped with two Ethernet modules (ENBT and EN2T) in the SHMS Q1 and Heater Exchanger (HX) PLC chassis.
  - ✶ Cause of error not found after testing and debugging ENBT and EN2T Ethernet modules on DSG-PLC and Standalone PLC test stations.
  - ✶ When contacted, Rockwell tech support concluded that neither EN2T nor ENBT module can be used with RSLogix 5000 version 16.
    - DSG did not agree with their conclusion since a previous test on Standalone PLC was performed successfully with similar conditions and configurations as the SHMS system.

- Second test successfully performed on Standalone PLC with DSG-PLC chassis and EN2T and ENBT modules in configuration that mimics the SHMS PLC system.
  - ✶ Used ENBT firmware revision 4.8, EN2T firmware revision 2.7, and RSLogix 5000 v16.
  - ✶ After test, noted that the only major difference between test setup and actual SHMS PLC systems was the redundancy configuration.
  - ✶ Contacted Rockwell tech support again with the results of test, resulting in the conclusion that:
    - ENBT and EN2T modules can be use with RSLogix 5000 v16 if redundancy system is not used.
    - With redundancy system, firmware upgrades for ENBT to v6.01 and EN2T to v4.2 are required.
  - ✶ Required firmware for the two Ethernet modules are not supported by RSLogix 5000 v16.

- RSLogix5000 must be updated from version 16 to version 20 to use Ethernet modules in the SHMS Q1 and HX PLC chassis.
  - ✶ Version 20 is the latest the SHMS's 1756-L62 model PLC controller can support.
  - ✶ Version 20 is also compatible with Windows 10.
  - ✶ If any version newer than v20 is desired, different PLC controllers will be needed.

- Development started of PLC routine for Dipole field regulation.
  - ✶ Requested and received table for I(**B**) relation to add to the PLC code.

HMS Dipole I(B)
Best Fit: $y = 337.42x^5 - 1{,}474.97x^4 + 2{,}333.59x^3 - 1{,}515.64x^2 + 1{,}455.61x - 11.06$
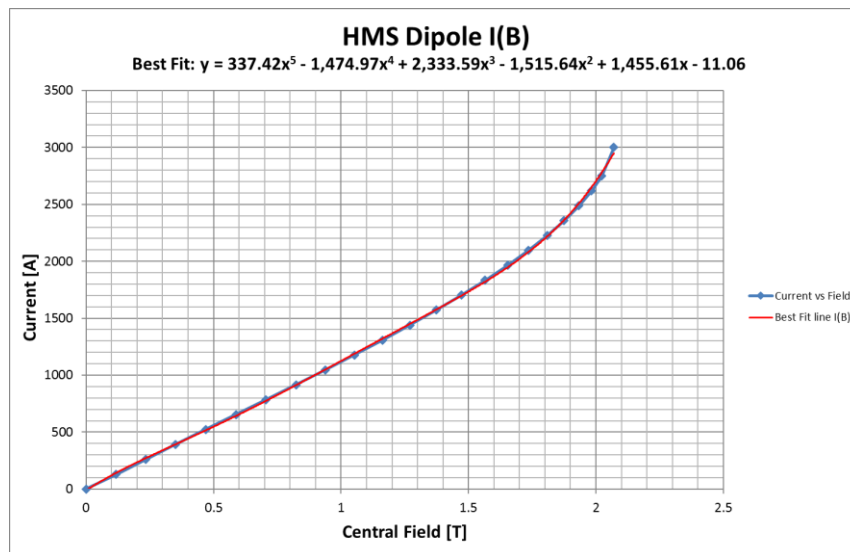
Plot generated from received table of I(**B**) relation. Data was fit with a fifth-degree polynomial fit.

- NMR probe for PT2026 borrowed from Hall C for SBC code development.
  - ✦ With probe, PT2026 can be used to test field lock and readback functions in SBC's code.
  - ✦ Using permanent magnet on hand ($\mathbf{B} \approx 1.0$ T), PT2026 was unable to lock on to field as probe's operating range is too high (1.13 T minimum field required for probe).
    - ▪ Will need to order a permanent magnet with higher field to allow NMR unit to get a lock on to field for further testing of the SBC code.
- Current monitoring loop PLC routine for quads completed.
- 37-pin D-sub-to-terminal-block adapter ordered and received for UPS monitoring wiring.
- Documentation generated for Hall C PLC System:
  - ✦ "Ladder-Logic" flow chart of current regulation loop
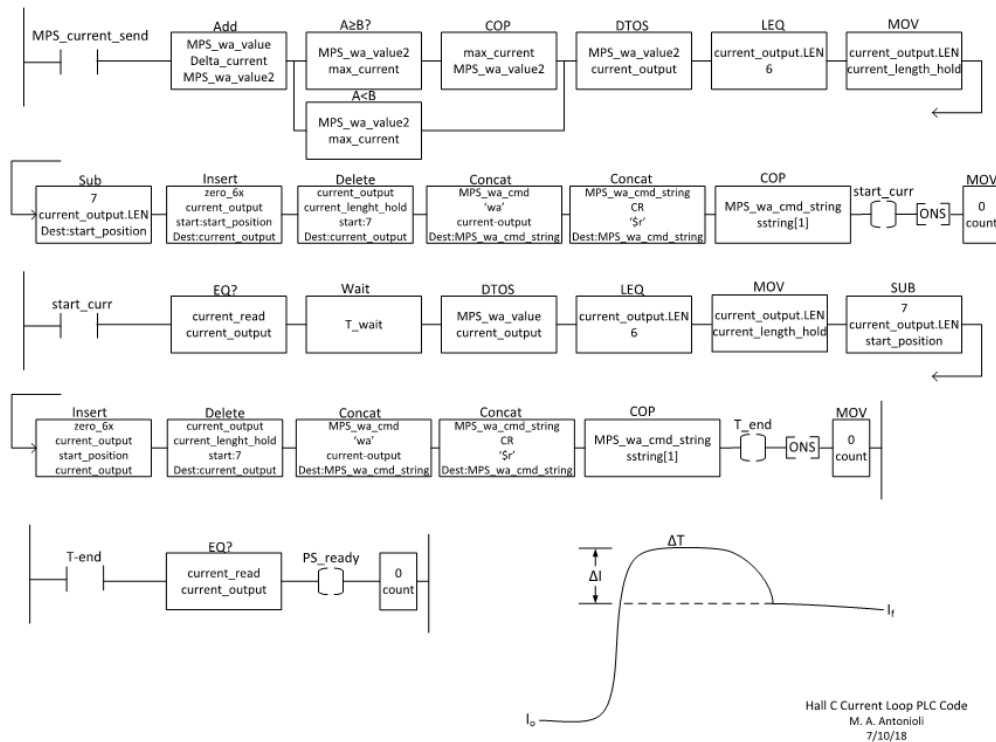
Hall C Current Loop PLC Code "Ladder-Logic" flow chart.

HDice
- Test run of 2000 cycle sweeps on the NMR program successfully completed.
  - Asynchronous mode was enabled using the Stanford Model SR844 RF Lock-in Amplifier.
  - NMR buffer acquisition rate was based on the lock-in amplifier internal oscillator (512 Hz max).
  - 32 million error-free, asynchronous triggers occurred during the test.
  - NMR program has now passed 2000 cycle sweeps in both synchronous and asynchronous modes.
- HDicePC3 computer and LabVIEW programs upgraded to LabVIEW 2018.

RICH
- Pressure transducer installed on upgraded nitrogen gas panel to monitor supply nitrogen pressure at panel.
- Review of upgraded nitrogen panel started by Dave Kashy, design authority.
  - Fittings on panel require tightening to meet Swagelok specifications.
  - Parts list and schematic updates are in progress.
- Firmware for hardware interlock cRIOs updated.
  - N2 cRIO updated from 3.0.0f0 to 6.0.0f1
  - EP cRIO updated from 4.0.0f0 t0 6.0.0f1

FT
- Changes complete for hardware interlock system to enable individual sensor averaging and trip delay, number of samples to average, and time of delay.
- Upgraded and tested Hardware Interlock System cRIO and program.
  - cRIO firmware updated to 6.0.0f1.
  - cRIO system software updated to LabVIEW 2018.
  - Interlock system program upgraded to and tested with LabVIEW 2018.
- Calorimeter temperatures #1 - #6 have been repaired.
  - Problem was at connections at the detector end; Hardware Interlock cRIO was operating correctly.

RTPC
- MKS 627B absolute pressure transducer tested with Fluke 3130 calibrator.
  - Voltage output readings are reasonable, but transducer is unable to be zeroed because the calibrator does not go low enough.

DC
- Gas mixing system's TCU values verified at 0 and 100% CO_2.
  - Gas calibration sequence performed on DC Mix 1 against the 10.2% CO_2/Ar standard.

Gas System
- Internal wiring of the first Mass Flow Controller power chassis started.
- Gas report data-logging software and signal display development underway.

Hall D

- Solenoid PXI ADC input modules calibrated using automatic test program.
  - ✱ Krohn-Hite Model 523 DC source used to calibrate to eight modules.
  - ✱ All eight modules (eight channels each) passed calibration test.
- Information provided in Hall D Slow Controls Meeting regarding the design of the SVT and FT hardware interlock system's interface to MPOD crates.
  - ✱ For SVT, MPOD crates interlocked via the front panel whole-crate disable signal.
  - ✱ For FT, MPOD is interlocked at the board-level via the LV output connector.
    - ▪ Hall D plans to use this type of interlock.

cRIO Test Station

- Wiring of NI-9264 analog output module to NI-9205 ADC input module completed, tested, and debugged.
- Development started of User Interface for NI-9205 ADC input module tests.

LERF

- Cables unbundled, routed, and relabeled for Cryomodule 1 cable termination
- Population of one of six VME FSD boards for Machine Protection System in progress.

Antonioli, Mary Ann

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

- Made Visio drawing of **Hall C** current loop PLC code.

- For **cRIO test stand**:
  - ★ Completed wiring of 9205 module; tested and debugged with Pablo.
  - ★ Began writing code for User Interface.

- Imported, laid out, and edited Tyler's Note; posted as 2018-08.
- Imported, laid out, and completed first edit of Pablo's Note.

Bonneau, Peter

HDice

- Successfully completed a test run of 2000 cycle sweeps on the NMR program. For test:
  - ★ Asynchronous mode was enabled using the Stanford Model SR844 RF Lock-in Amplifier.
  - ★ NMR buffer acquisition rate was based on the lock-in amplifier internal oscillator (512 Hz max).
  - ★ 32 million error-free asynchronous triggers occurred during the test.
  - ★ NMR program has passed 2000 cycle sweeps on both synchronous and asynchronous modes.
- Upgraded HDicePC3 computer and LabVIEW programs to LabVIEW 2018.
  - ★ Upgraded and tested NMR program, Fast Resonance Scanner program, test programs, and all instrumentation device drivers.

FT

- Upgraded and tested Hardware Interlock System cRIO and program.
  - ★ cRIO firmware updated to 6.0.0f1.
  - ★ cRIO system software updated to LabVIEW 2018.
  - ★ Interlock system program upgraded to and tested with LabVIEW 2018.
- Calorimeter temperatures #1 - #6 have been repaired.
  - ★ Hardware Interlock cRIO was operating correctly; problem was at connections at the detector end.

PLC Control Systems

- Held daily status and planning meeting on HMS and SHMS PLC control systems.
  - ★ Work on the field regulation routine and interface to NMR and the power supplies is progressing.
  - ★ Discussed next steps in the ControlNet to Ethernet module swap on the SHMS.
  - ★ DSG is waiting on information and/or cabling work from Hall C on spectrometer vacuum controls, HMS & SHMS shutter controls, UPS status read-back, and spectrometer break controls.

Hall D
- In Hall D Slow Controls Meeting answered questions regarding the design of the SVT and FT hardware interlock system's interface to MPOD crates.
  - ✶ For SVT, MPOD crates interlocked via the front panel whole-crate disable signal.
  - ✶ For FT, MPOD is interlocked at the board-level via the LV output connector.
    - ▪ Hall D plans to use this type of interlock.

Campero, Pablo
Hall C
- Started development of PLC routine for HMS and SHMS Dipole field regulation.
  - ✶ Requested I= f (B) relation to add to the PLC code.
    - ▪ Received sample table with values of I= f (B) for the HMS dipole.
- Investigated error code received when swapping two ControlNet modules with two Ethernet modules (ENBT and EN2T) in the SHMS Q1 and Heater Exchanger (HX) PLC chassis
  - ✶ During tests, received error message stating "Service Request Error: Invalid mode or State for service request (Code 16#000c)".
    Performed more debugging/testing over the Ethernet modules 1756-ENBT and 1756-EN2T on the DSG PLC and Standalone PLC test stations, but could not find cause of error.
  - ✶ Rockwell tech support's conclusion was that neither EN2T nor ENBT module can be used as communication modules in RSLogix5000 version 16.
    - ▪ DSG did not agree with their conclusion since a test was successfully performed previously on the Standalone PLC with similar conditions and configurations as the SHMS system.
- Performed a second test on the Standalone PLC using DSG-PLC chassis and the two EN2T and ENBT modules to mimic configuration in SHMS PLC systems
  - ✶ Used ENBT firmware revision 4.8 and EN2T firmware revision 2.7.
  - ✶ Used controller revision and RSLogix version 16.
  - ✶ The test ran with no problems.
  - ✶ After test, we noticed that the only major difference between the Standalone setup and the actual SHMS PLC systems was the redundancy configuration.
  - ✶ Contacted Rockwell tech support with the results of our second test on the Standalone PLC, resulting in the conclusion that:
    - ▪ 1756-ENBT and 1756-EN2T modules can be use with RSLogix5000 v16 as long as redundancy system is not used.
    - ▪ If redundancy system is to be used, firmware upgrades for ENBT to version 6.01 and EN2T to version 4.2 are required.
  - ✶ Required firmwares for the two Ethernet modules are not supported by RSLogix5000 version 16.
- To use Ethernet modules the SHMS Q1 and HX PLC chassis, RSLogix5000 msut be updated from verison 16 to version 20.
  - ✶ Version 20 is the latest the SHMS 1756-L62 PLC controller can support.
  - ✶ Version 20 is compatible with Windows 10.
  - ✶ If any version newer than 20 is desired, different PLC controllers will be needed.

- ✴ Hall C must determine a date and final decision to proceed with the implementation and upgrades to the PLC system.
- Updated DSG- Hall C PLC task list.

- Calibrated PXI ADC input modules With Brian, Amanda, and Tyler.
    - ✴ Connected Krohn-Hite Model 523 DC source to eight PXI ADC input modules.
    - ✴ Ran LabVIEW test code to test each channel of the ADC input modules.
    - ✴ After performing auto-calibration, all eight modules passed test according to the specs established by National Instruments.

- For the **cRIO Test Station**, tested wiring connections between NI 9205 ADC input module and NI9264 ADC output module.
    - ✴ Ran LabVIEW program to test 16 channels on 9205 ADC module.
    - ✴ Test passed with no problems.

Eng, Brian
RTPC
- Tested MKS 627B absolute pressure transducer with Fluke 3130 for proper operation.
    - ✴ Voltage output readings are reasonable, but transducer is unable to be zeroed because the calibrator does not go low enough.

Hall C
- Borrowed NMR probe for PT2026 from Hall C.
    - ✴ Probe's range is too high (1.13 T minimum) for permanent magnet on hand.
    - ✴ Will need to order a higher field magnet to allow NMR unit to get a lock on to field for further testing of the SBC code.
- Tested EN2T & ENBT on standalone PLC again
    - ✴ Worked with no issues using only RSLogix5000 version 16.
- Tried swapping out ControlNet modules with EtherNet/IP on HX & Q1 remote chassis in SHMS PLC setup.
    - ✴ Still had errors after swap.
    - ✴ Rockwell support verified that the issue is due to the SHMS having redundancy enabled, we need to install higher firmware on communication modules.
- Filled a support ticket (4007098822) to get verification that all modules & firmware will work with version 20.
    - ✴ Version 20 is latest version supported by L62 controller & newest version supported on Windows 10.

Hall D
- Updated calibration on PXI ADC modules: https://logbooks.jlab.org/entry/3580322

Hoebel, Amanda
Hall C
- Finished current monitoring loop.
- Made ladder-logic "flow chart".

- Replaced ControlNET modules with Ethernet modules in SHMS.
  - ★ Did not work due to compatibility issues in the software version with Ethernet redundancy; need version 20.

Hall D
- Calibrated ADC modules for PXI with Brian, Tyler, and Pablo.

Jacobs, George
Gas Systems
- Short RTPC meeting with Carlos about valve panel assembly requirements
- Discussions with RTPC pressure systems DA
- Discussions with procurement on C4F10 PR
- Discussions with Hall B on C4F10 PR status
- Discussions with RICH N2 panel DA

Leffel, Mindy
- Took online portion of SAF302 Aerial Lift and SAF502 Forklift basics safety trainings.
- For LERF Cryomodule 1 cable termination:
  - ★ Unbundled, routed, and relabeled cables.
  - ★ Researched MC connector termination.
- Continued populating one of six VME FSD boards for Engineering Division's Machine Protection System.

Lemon, Tyler
Hall C
- Wrote note on UPS monitoring task.
- Ordered 37-pin D-sub-to-terminal-block adapter for UPS monitoring wiring.

- Met with Dave Kashy to discuss upgraded **RICH** nitrogen panel.
  - ★ Pressure transducer will be added to system to monitor supply nitrogen pressure.
    - ▪ George PT installed on gas panel after meeting.
    - ▪ Parts list and schematic updates are in progress.

- Completed modifications of **FT** hardware interlock system configuration file utility with Mary Ann.

- Calibrated **Solenoid** PXI ADC modules with Brian, Pablo, and Amanda.
  - ★ Used automatic calibration program previously developed by Brian.
  - ★ Calibration program uses Krohn-Hite Model 523 DC source to provide voltages at set values (values used given by National Instruments).
  - ★ All modules and channels passed.

McMullen, Marc
DC

- Verified TCU value at 0 and 100% CO2.
- Ran gas calibration sequence on DC Mix 1 against the 10.2% standard.

Gas System Controls

- Started internal wiring of the first Mass Flow Controller power chassis.
- Worked on Gas Report data-logging software and signal display.