Summary

Hall C

- Tests conducted to determine the performance of the local chassis when it controls two remote chassis:
  a) both remote chassis using Controlnet modules.
  b) one remote chassis using Controlnet module and the other using Ethernet module.
  The remote chassis for both configurations were fully loaded.
  - ✳ Test performed using Standalone PLC test station.
    - Standalone PLC configured to mimic current configurations for SHMS PLC system.
    - "DSG-PLC" chassis added to Standalone PLC system to get a total of three PLC chassis as follow:
    - Local chassis: populated with the controller, Ethernet module (EN2T) and Controlnet module.
    - Remote chassis #1: configured with Controlnet module and I/O modules.
    - Remote chassis #2: configured with I/O module and initially a Controlnet module and then with an Ethernet module.
  - ✳ Two PLC ACD files created:
    - First program configured with Controlnet network to transfer data between the local chassis and the two remote chassis.
    - Second program configured with one remote chassis using a Controlnet module and second remote chassis with Ethernet module.
  - ✳ Test results showed that the configuration of the system with the Ethernet module and Controlnet module works without problems.
    - Measured time to take the PLC off-line and recover communications was < 60 s.
    - CPU I/O memory performance of PLC (local) controller was not affected when an Ethernet module was used in second chassis.
- Device-Level Ring (DLR) network topology researched for PLC communication.
  - ✳ Mike Fowler suggested, for security reasons, DLR network be added to SHMS I/O chassis instead of standard Ethernet/IP configuration for the Ethernet modules.
    - SHMS PLC system would have existing Ethernet/IP module in local chassis allowing remote access to the PLC, defeating the purpose of creating an isolated DLR network for security purposes.
    - 1756-EN2TR module needed for DLR network not compatible with SHMS PLC version 16 of RSLogix5000.
    - Subnets Hall C and Hall C Dev are behind the computer center's firewall, hence secure.
- Problem found with VISA open/close connection on NMR PT2026.
  - ✳ Vendor confirmed problem with hardware.

- Two SBCs ordered as an adapter to enable data transmission between NMR & PLC.

- SHMS PLC network map (version 1) generated.

Hall C SHMS PLC Network Map
M. A. Antonioli
6/8/18
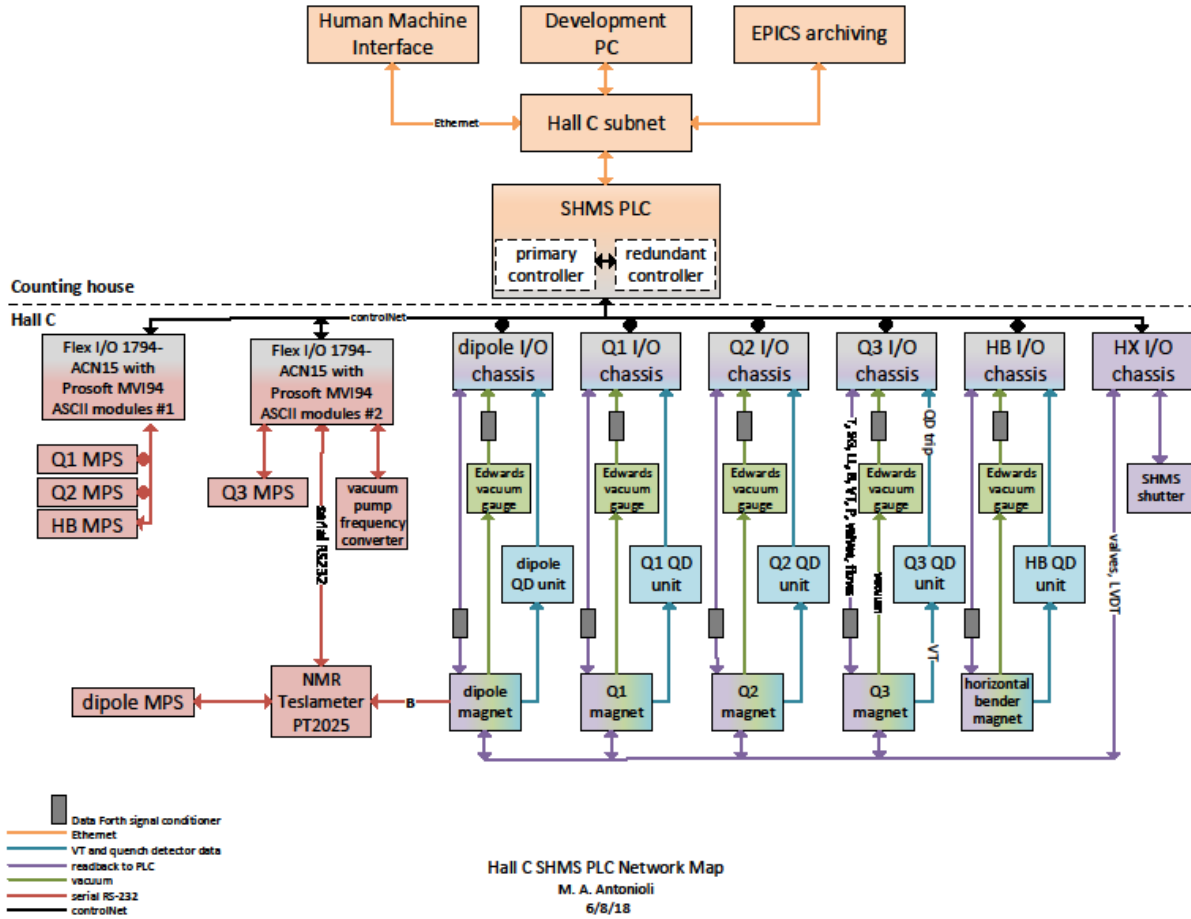
RICH

- Standard deviation (SD) calculation added to hardware interlock's LabVIEW User Interface (UI) program.
  - ✦ Adding SD calculation for averaged signals to cRIO's real-time program caused a significant increase in CPU usage.
    - ▪ When SD calculations are performed in UI program, resources from local PC are used without affecting cRIO's CPU usage.
  - ✦ Modifications complete for EP cRIO and in progress for N2 cRIO.

Magnets

- Cryo-con units upgraded to latest firmware (version 2.16).
- Communications map of PLC programs for solenoid cooldown generated.

Hall B Solenoid PLC
Cooldown Programs
M. A. Antonioli
rev. 6/11/2108
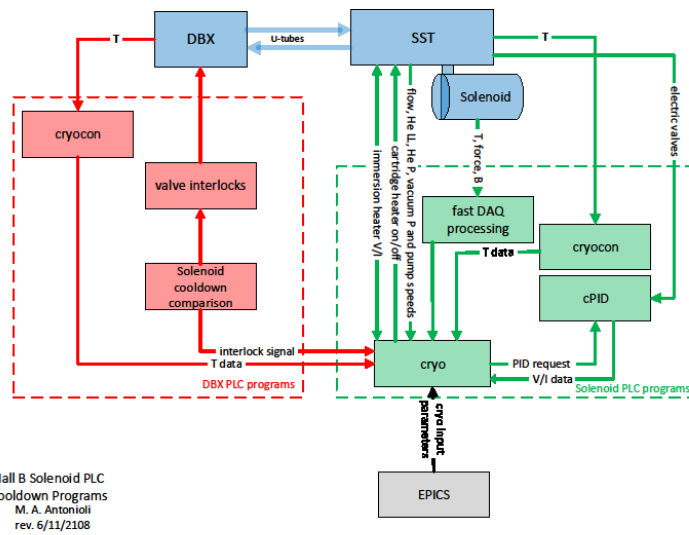
HDice

- Test run of NMR program completed successfully for 2,000 sweeps.
  - ✦ HDIce requested ~1,500 sweeps.
  - ✦ Synchronization mode was enabled using CT-Box.

FT

- Hardware Interlock System upgraded to LabVIEW 2017.

LTCC

- PID control tested for MFC vs pressure on S6.
  - ✦ PID control found to overshoot the target pressure.
    - ▪ Pressure increases because the fill is faster than the leak.
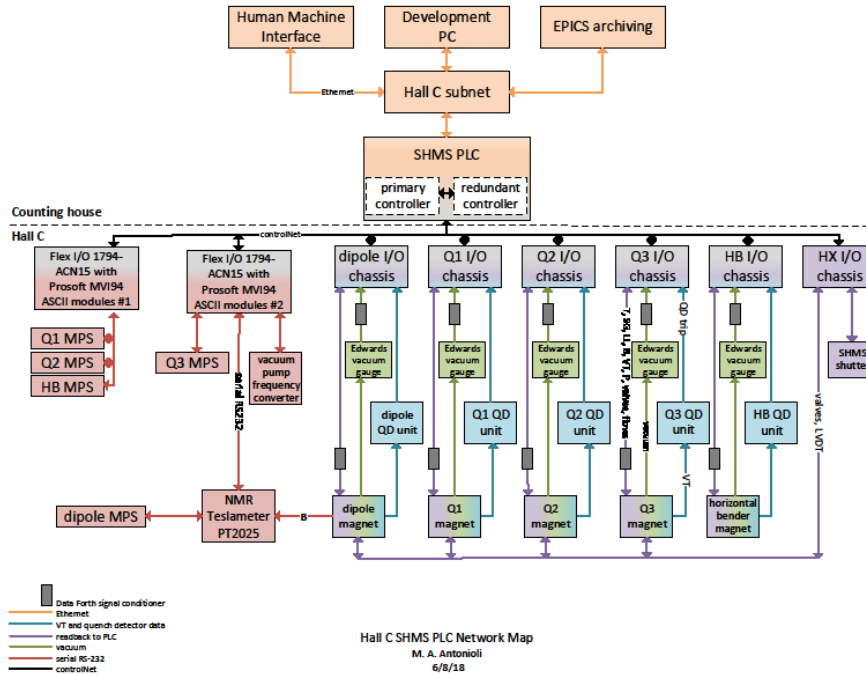
Gas System

- RTPC valve panel diagram created.
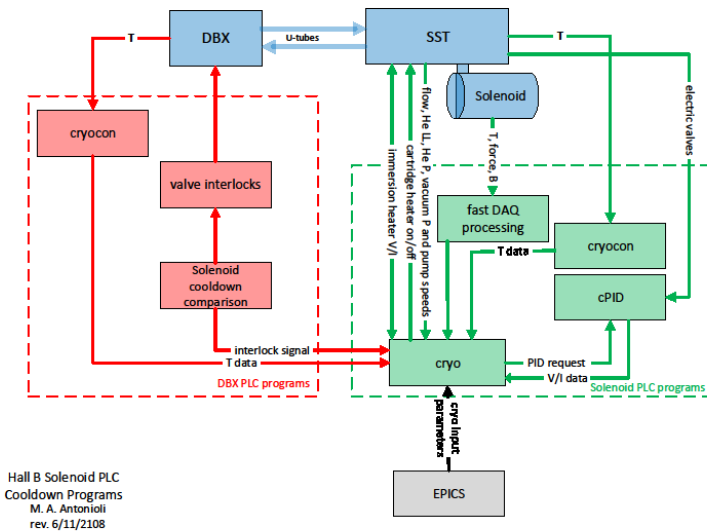- Four bottles of 90/10 Ar/CO_2 ordered for DC.

Antonioli, Mary Ann

- Drew in Visio, Hall C SHMS PLC network map.

Hall C SHMS PLC Network Map
M. A. Antonioli
6/8/18

- Made changes to **SVT** control monitoring code configuration file.
- Completed Visio drawing of **Solenoid** cooldown PLC program communications.

Hall B Solenoid PLC
Cooldown Programs
M. A. Antonioli
rev. 6/11/2108

- Edited and posted Note -06.
- Attended Worker Safety Committee meeting.
  - ★ Discussed arc flash in ESR2 from transformer work; still under investigation
  - ★ There will be an Emergency Management exercise on 6/19.

Bonneau, Peter

HDice

- A DSG test run of 2000 cycle sweeps was successfully completed on the NMR program.
  - ✦ Synchronization mode was enabled using CT-Box current shunt hardware.
  - ✦ The new hardware-triggering interface from Pulse Research Lab was used during the test.
  - ✦ 31.7 million synchronized error-free triggers occurred during the test.
- Worked with Amanda on the implementation, debugging, and testing of the NMR program using VISA power supply drivers.

SVT

- Worked with Tyler and Mary Ann on the SVT Hardware Interlock System software upgrade.
  - ✦ Upgrade will allow individual sensor settings for interlock trip delay (time-over-threshold) and signal averaging.
  - ✦ Tested upgrade coding on cRio test stand. The interlock trip delay signal averaging settings need to be added to the configuration file

FT

- Upgraded and tested Hardware Interlock System.
  - ✦ The cRio system software and the interlock system program was upgraded to LabVIEW 2017.

Hall C

- Held daily status and planning meeting on HMS and SHMS PLC control systems.
  - ✦ Work on the Controlnet to Ethernet replacement procedure and test program is progressing.
- Recommended using Jlab license server infrastructure to host Hall C PLC licenses.
  - ✦ The computer center is responsible for support and maintenance.
  - ✦ Only Hall C approved users will have access on the Jlab license server.

Campero, Pablo

Hall C

- Revised new priority task list proposed by Steve Lassiter and Mike Fowler.
  - ✦ Adjusted task schedule based in new priority list
  - ✦ Noticed discrepancies between list issued on May 1st and new task list issued on June 5th.
- Tested Controlnet versus Ethernet network modules to be implemented in SHMS PLC.
  - ✦ Made a plan with detailed steps to implement Ethernet module in faulted I/O PLC chassis.
  - ✦ Performed pre-test using Standalone PLC test station. Set up Standalone PLC to mimic current configurations for SHMS PLC system which has I/O PLC modules and PLC controller in separate PLC chassis.
  - ✦ Added "DSG-PLC" chassis to the Standalone PLC system to get a total of three PLC chassis as follow:
    - ▪ Chassis #1: Local chassis with the controller and EN2T and Controlnet module
    - ▪ Chassis #2: Remote 1 configured with Controlnet module and I/O modules.

- Chassis #3: Remote 2, configured with I/O module and initially a Controlnet module and then with an Ethernet module.
  - ✶ Verified proper hardware module configuration using RS-Link classic and RSNetworx for Controlnet software
  - ✶ Created two PLC ACD files
    - The first PLC program configured with all Controlnet network to transfer data between the Local chassis and the two Remote PLC chassis.
    - The second PLC program configured with the combined network configurations with Remote 1 chassis using a Controlnet module and Remote 2 with Ethernet module, this simulated the changes that needs to be implemented.
  - ✶ The results of the test showed that Ethernet module work without any problem when it was used to replace the Controlnet module.
    - Measured time to take the PLC off line and recover communications was < 1min.
    - PLC controller CPU I/O memory performance was not affected when a Ethernet module was used in Local2 PLC chassis.
- Generated Hall C weekly report with the status of task performed by DSG.

- Researched bit resolution for all NI I/O modules used by DSG in Hall B detectors.
  - ✶ Generated table with resolution values in bits.
  - ✶ Table will provide information to continue with cRIO test stand development.
- Revised and edited Solenoid Cooldown PLC DSG note
  - ✶ Corrected diagram with Cooldown PLC programs communications.
  - ✶ Generated table with explanations of function for 4 main Cooldown PLC programs.

Eng, Brian
LTCC
- Discussed options for upgraded LTCC system with Bob and Marc.
  - ✶ Trying to re-use/update the old distillation unit. Ordered new 0-6 "wc DP sensors for the system.
- Tested PID control of the MFC vs pressure on S6.
  - ✶ It does work but tends to overshoot the target pressure a bit and probably not the best way to do it since it can't flow a constant value, i.e. the fill is much faster than the leak and the minimum flow these MFCs can do will build pressure.

Hall B Magnets
- Upgraded all Cryo-con units to latest firmware:
  - ✶ https://logbooks.jlab.org/entry/3577375
  - ✶ https://logbooks.jlab.org/entry/3577387
  - ✶ https://logbooks.jlab.org/entry/3577391

Hall C
- Found problem with open/closing VISA connection on PT2026, vendor confirmed and will work on a fix.

- Since Python code on Windows computer works at a basic level, looked into getting a small Linux SBC to run the code as an adapter between the NMR & PLC. Had Marc order two of them with PCard:
  - https://libre.computer/products/boards/roc-rk3328-cc/

Hall D
- Installed LabVIEW 2017 since NI 488.2 drivers aren't available yet.
  - Only needed for calibrating the ADC modules.
  - There will need to be 2 reboots of the system so might as well at least upgrade one version.

Hoebel, Amanda
HDIce
- Added VISA flush to VISA sync program.
  - VISA program without flush has run on old supply without hang-up for ~600 cycles.

RICH
- Inspected gas pad at Hall D for potential configuration of Nitrogen cylinders for RICH, with Pablo, Tyler, and Marc.

Hall C
- Set up and performed Ethernet test on test station PLCs with Tyler and Pablo.
  - Set up DSG PLC, Standalone PLC, and Control PLC.
    - Control PLC controlled Standalone PLC through ControlNET.
    - Control PLC controlled DSG PLC through Ethernet.
  - Ran program to test toggling of relays to make sure relays in Standalone PLC toggled while DSG PLC Ethernet was unplugged, and to make sure relays in DSG PLC toggled while Standalone PLC ControlNET was unplugged.
  - Program worked as expected.

Jacobs, George
- Created RTPC-ValvePanel -6-7-2018 diagram.
- Listed additional parts required for RTPC valve panel concept.
- Meeting with Carlos about RTPC valve panel fabrication.

Leffel, Mindy
HDICE
- Trigger test.
  - Fabricated 10', male/male BNC cable.

SVT
- Completed fabrication of remaining eight HTSB2 cables.
  - Cut cable in bundles to same length.
  - Stripped jackets and insulation.
  - Crimped pins on all 112 conductors.
  - Inserted pins into connectors.
  - Still need to test and label.

Lemon, Tyler

RICH

- Added standard deviation calculations to hardware interlock system's LabVIEW User Interface (UI) program.
  - Adding standard deviation calculation for averaged signals to cRIO's real-time program caused a significant increase in CPU usage.
    - When standard deviation calculations are performed in UI program, resources from local PC are used without affecting cRIO's CPU usage.
  - Modifications complete for EP cRIO and in progress for N2 cRIO.
  - Tables below shows results from averaged signals using sampling settings currently in use for EP cRIO.

Sensor	Number of Samples	Units	Average	Standard Deviation	Comments
Temperature 1	50	°C	22.376	0.012	—
Temperature 2	50	°C	22.484	0.012	—
Temperature 3	50	°C	25.246	0.017	—
Temperature 4	50	°C	28.379	0.021	—
Temperature 5	50	°C	22.336	0.009	—
Temperature 6	50	°C	22.335	0.01	—
Temperature 7	50	°C	22.551	0.012	—
Temperature 8	50	°C	22.506	0.012	—
Temperature 9	50	°C	22.292	0.007	—
Temperature 10	50	°C	22.228	0.011	—
Temperature 11	50	°C	22.157	0.009	—
Temperature 12	50	°C	22.073	0.009	—
Temperature 13	50	°C	22.094	0.01	—
Temperature 14	50	°C	22.25	0.012	—
Temperature 15	50	°C	24.188	0.018	—
Temperature 16	50	°C	24.249	0.018	—

Table showing calculated averages and standard deviations for EP cRIO temperature Sensors.

Sensor	Number of Samples	Units	Average	Standard Deviation	Comments
Humidity 1	50	% RH	44.579	0.488	Outside of EP
Humidity 2	50	% RH	43.945	0.582	Outside of EP
Humidity 3	50	% RH	37.531	0.439	Outside of EP
Humidity 4	50	% RH	0	0	Known bad sensor, outside of EP
Humidity 5	50	% RH	0	0	Humidity at bottom range of sensor
Humidity 6	50	% RH	0.002	0.011	—
Humidity 7	50	% RH	0	0	Humidity at bottom range of sensor
Humidity 8	50	% RH	0	0	Humidity at bottom range of sensor
Humidity 9	50	% RH	0.019	0.061	—
Humidity 10	50	% RH	0.002	0.007	—
Humidity 11	50	% RH	0.035	0.109	—
Humidity 12	50	% RH	0.04	0.09	—
Humidity 13	50	% RH	0	0	Humidity at bottom range of sensor
Humidity 14	50	% RH	0	0	Humidity at bottom range of sensor
Humidity 15	50	% RH	0	0	Known bad sensor, ambient sensor
Humidity 16	50	% RH	36.933	0.363	Ambient sensor

Table showing calculated averages and standard deviations for EP cRIO humidity sensors.

Hall C

- Tested communication to PLC I/O chassis using Ethernet and ControlNet with Pablo and Amanda.
  - Hall C requested DSG to investigate reliability of Ethernet modules for PLC communication.

- Before test during experimental run, verification needed to show that a PLC controller can communicate to I/O chassis over ControlNet and Ethernet in the same program.
- DSG set up three PLC chassis for tests in two configurations:
  - Configuration 1: ControlNet from Controller Chassis to both I/O Chassis 1 and I/O Chassis 2 (current configuration of Hall C PLC system).
  - Configuration 2: ControlNet from Controller Chassis to I/O Chassis 1 and Ethernet from Controller Chassis to I/O Chassis 2.
- PLC communication was established and successfully tested for both Configuration 1 and Configuration 2.
- Received approval from Hall C to start reconfiguring SHMS PLC program to use Ethernet module in place of ControlNet module for HX I/O Chassis and Q1 I/O Chassis.

- Researched Device-Level Ring (DLR) network topology for PLC communication.
  - Hall C suggested DLR network instead of standard Ethernet/IP configuration for Ethernet modules to be added to SHMS I/O chassis since DLR is:
    - Independent of network.
    - In theory, more secure since DLR network consists of only devices hardwired into network.
      - For Hall C's PLC system, system would still have existing Ethernet/IP module allowing remote access to PLC, defeating the purpose of creating an isolated DLR network for security purposes.
  - Found that 1756-EN2TR module needed for DLR network is not compatible with version 16 of RSLogix5000.

McMullen, Marc
LTCC
- Met with Hall B Engineering to discuss the possible set up of controls for the LTCC Distillation and recovery unit. The system would be comprised of the old distillation system with some changes to the way it would run.
  - Continuous cooling of the distillation system.
  - Automated recovery of the gas vs. a batch method used in the past.

Gas System
- Ordered internal components for the MFC power chassis.

DC
- Ordered 4 bottles of 10% CO_2 in Argon.
  - The order should have a varied mixture, within 2% of the requested amount.

MVT
- Contacted MVT staff about ordering premix for the next run.

Hall C Magnets
- Ordered parts for the PLC controls computer.