



Detector Support Group

Weekly Report, 2016-1-27

New Projects

Gossary: EDC = Estimated Date of Completion.
PID = Proportional – Integral - Derivative

I. Hall D PLC System

Peter, Tyler, Amanda, Marc

Task: Locate and document (including spares) the eight PLC systems in use.
EDC: 02/15/2016.
Comments: Starting on 01/27/2016
Action: Downloaded Alan-Bradley reports.
Status: Work in progress.

II. Hall B DC HV

Mary Ann, Anatoly, Sahin

Task: Clean and test DC HV crates and cards.
EDC: 02/15/2016
Comments: Seven cards left to clean and test, other than the four in the test stand, which is currently being used. In all, there are ~ 11 cards with problems.
Action: Mark Taylor contacted CAEN. Repairing a card will cost ~\$1,000. Mark has submitted PRs for repair.
Status: Work in progress.

III. Hall B Gas System Hardware

George, Sahin, Mindy, Anatoly

Task: Install Gas System hardware.
EDC: TBD
Comments: Routing of DC gas lines requires manifolds to be placed on the Torus. This is expected to occur sometime in May/June of 2016. With regards to LTCC gas, C₄F₁₀, lead time is about 9 months.
Action: Started work on installing gas lines.
Status: Work in progress.



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Ongoing Projects

Hall B

I. Gas System Slow Controls

Brian, George, Marc, Mary Ann, Amanda, Tyler

Task: Complete PID controller test.
EDC: 01/31/2016
Comments: **Determining optimal settings.**
Action: Started data runs with different values of P, I, and D
Status: Work in progress. PID controller works as of 01/12/2016.

II. Magnet Slow Controls

Brian, Peter, Amanda, Tyler

Task: Setup PLC workstations and look at code.
EDC: 01/15/2016
Comments: **Detailed steps for task 1a provided.**
Action: Krister working on PS (task 1a)
Status: Brian turned off and disconnected (from mains) the power supply Krister connected to power the controls side of the MPS before leaving the Hall.

Mark Todd verified that the *documentation doesn't match the implementation at all*, namely the control board isn't in the PS, but the external display. What is marked as P13 on the control board is really X3 on the rear of the display chassis.

Brian's initial test with a terminal emulator didn't work, but he suspects it is something simple like the jumpers not being set correctly, so that's what his focus will be on tomorrow now that he knows where stuff is located.

As a side, it is really quite inconvenient to have the control board in the display chassis. Gaining access requires completely removing it from the rack and taking 6 small screws off the cover as well. Brian is not sure if there will be a way to make that easier, but for sure during any troubleshooting/debugging in the future having access to the LEDs and buttons would be helpful.



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III. DC Installation

George, Marc, Mindy, Sahin

Task: Prepare for August installation!

EDC: N/A.

Comments: Installation scheduled to start 08/01/2016. For an estimated installation time of one chamber per week, installation would be completed end of January 2017. *This estimate does not include time contingency.* Plan is to first install all six chambers of RI, flow gas, and check the chambers, then proceed to RII and then to RIII. If an 'on-board' problem is detected after installation of a region, to fix the problem would require a week. If we anticipate problems with two boards of the total 252 boards (~1%), installation would be completed mid January 2017. If time contingency is included, completion date would be end of January 2017.

Action: No change in status.

Status: Yet to start.

HDICE

Peter, Brian, Mary Ann, Amanda, Tyler, Mindy, Sahin

Task: Fabricate prototype RF cables.

EDC: 01/31/2016

Comments: Connectors ordered, yet to be received. Delay is apparently due to bad weather. Andy Sandorfi approved procurement of components for the RF box. DSG is not sure whether the order for the bulk of cable has been placed.

Action: Two of eight cables fabricated. At this point, DSG has decided to fabricate only four cables (a rack's worth) and hand it over for testing, rather than all eight (two racks worth). Once it has been determined that the cables perform satisfactorily, the remaining cables will be fabricated.

Status: Work in progress.

IV. HTCC

Mary Ann, Mindy, Anatoly, Sahin

Task: Fabricate cables.

EDC: 07/31/2016

Comments: Crimpers and, 100 BNC and 50 Lemo connectors have been received. Additional 50 Lemo connectors yet to be received.

Action: Fifty HV cables cut. Signal cable moved to ESB for cutting. Fifteen of one hundred signal cables manufactured.

Status: Work in progress.



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DSG

V. Databasing in SQLite
Amanda, Tyler, Brian

Task: Database and histogram HV currents of SVT modules.
EDC: 01/15/2016
Comments: **It appears 6 of 66 modules in current SVT assembly has issues.**
Action: Further investigation to see if this problem is batch dependent has started.
Status: Work in progress

VI. Test Station
Team: Tyler, Amanda, Mary Ann, Peter, Brian

Task: Communicate to cRIO/ output to excel
EDC: 01/15/16
Comments: **Given the current work load, this project has been deferred to a later time.**
Action: N/A
Status: Communication established, 01/11/2016; trying to write output to EXCEL.



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Completed Projects

I. Gas System Hardware
George, Marc, Mindy, Sahin

Task: Setup for PID controller test.
EDC: 01/15/2016
Status: **Completed 01/13/2016.**

Comments: Hall B Engineering *still* needs to fix: circuit breaker (extension cord is being used), bolt rack, and solenoid panel.

Action: DSG communicated issue to Hall B Engineering. Rack bolted.
Status: **Circuit breaker and solenoid panel need to be fixed.**

II. Detector pre-installation, cleaning, repairing, and testing.
Team: Mary Ann, Mindy, Anatoly, Sahin

Task: Fabricate, label and test 252 DC LV cables.
EDC: 01/29/2016
Status: **Completed 01/16/2016.**



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Antonioli, Mary Ann

Hall B

DC

- Tested 4 HV cards.
 - ★ No problems found.
 - ★ Seven more HV cards are available for testing.

Gas System

- Made flowchart of PID controller loop.

DSG

- Attended 3-day Core 1 LabVIEW class.

Arslan, Sahin & Sitnikov, Anatoly

Hall B

Gas System

- Completed work on solenoid control box.
 - ★ Rewired, and attached control box to solenoid distribution box.
- Anatoly and I cleaned gas shed and reorganized.
- Replaced the old components with new components, modified some of the lines
- Installed
 - ★ LTCC MFC C4F10, MFC LN2 VENT.
 - ★ DCR1-2 MFC CO2, MFC Ar.
 - ★ DCR3 MFC CO2, MFC Ar.
 - ★ HTCC MFC.
 - ★ New vacuum pump.
- Labeled all cables and components.
- Disassembled LTCC Solenoid MFC total of 6, reorganized and cleaned the area
- Assembled storage rack.

DC

- Cleaned two HV modules
- Helped Mac Mestayer with DC troubleshooting

HTCC

- Anatoly and I cut, 101x81' LV cables. Cables are done
- Transferred left over cable to EEL room 108.



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Bonneau, Peter

Hall B

Magnet Systems

- Revised communication check out procedure for MPS to 435NBX ASCII PLC Gateway module.

HDICE

- Updated component analysis of RF Switching and Attenuation Box to include the replacements for the discontinued parts.
- Started update of LabVIEW program flow and verification procedures for Rotation of Target Polarization Program

SVT

- Monitored SVT Hardware Monitoring System Interlocks on a daily basis.
- SVT coolant temperature has decreased to 6°C.

Hall D

- Generated Rockwell system reports for Hall D PLC systems. Reports are available on at M:\DSG_Slow_Controls\Hall D\PLC Systems.
 - ★ BCAL (DS) (268 Pages).
 - ★ BCAL (US) (269 Pages).
 - ★ FCAL / Pair Spectrometer (119 Pages).
 - ★ FDC / CDC Gas System (304 Pages).
 - ★ Solenoid (834 Pages).
 - ★ Start Counter / Hall Environment / HV Reset (81 pages).
 - ★ Tagger / Amorphous Radiator (29 Pages).
 - ★ Target (267 Pages).

DSG

- Added 435NBX ASCII PLC Gateway module to PLC Test Station.
 - ★ This module will allow testing of communication between a RS232 serial device and a PLC System.

Eng. Brian

Hall B

SVT

- Weekly meeting:
 - ★ Additional modules having HV issues (R1 S8, also R4 S9 tripped again).
 - ★ Made log entry: <https://logbooks.jlab.org/entry/3372253>.
 - ★ Latifa will call a separate meeting with experts to discuss issue.

Gas System

- Assigned IPs to all MFCs going inside accelerator fence to 160 subnet, set units to SLM, where available set gas type as well.
- Contacted MKS to have other gases (C₄F₁₀, 10%CO₂/Ar) added to gas table.
- Tested analog output of temperature display of C₄F₁₀ distillation unit with Marc.



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Magnets

- Meeting with Rubin, Josh, Wesley, Amanda, and Tyler to go over upcoming schedule.
 - ★ Still waiting for MPS wiring and networking before being able to test communication.
- Setting up new workstation on Hall B Subnet in EEL.
 - ★ Loaded AB 27 software.
 - ★ Installed LabVIEW in order to communicate with cRIO in Hall. This also included updating those various software suites to current versions.

Hoebel, Amanda

Hall B

- Completed SAF111 (walkthrough).

Hall D

- Monitored Hall D logbook.
 - ★ The cooling plates on 4D and 19D of the BCAL had temperatures of 9.1[C] and 10.3[C] instead of a value closer to 7[C]. Elton believes the thermal contact of these plates to the cooling tube is poor.

DSG

- Created a spreadsheet containing SVT sensor current values for the original Hamamatsu data, burn-in data, and data from runs taken in December and January.
- Attended LabVIEW Core 1 training.

Jacobs, George

Hall B

Gas System

- Development of DC PID controller pressure control completed.
- Dressed 1" DCGAS lines into cable tray running from L1 to L3 space frame in Hall B.
- Wired up DC pressure protection solenoid control box on L3 space frame.
- Replaced bad DCGAS return pump with spare unit.
- Installed HTCC CO₂ MFC on L1 space frame in Hall B.
- Wrote up scope of work documents for HTCC gas system and SVT purge system installation in Hall B.
- Disconnected LTCC gas system components on L3 forward carriage in preparation of equipment re-location.
- Ordered gas fitting adapters for installing new MFC's on LTCC gas panel.
- Installed pressure transducer on C₄F₁₀ return tank.
- Removed 6 obsolete MFCs, modified the piping, and installed 6 new MFCs in gas shed.
- Removed obsolete MFC's from LTCC gas panel, determined parts needed to install replacements.
- Excessed miscellaneous obsolete equipment in gas shed.



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- Meeting with Joshua Tschirhart, Hall B designer, on final design for the DCGAS TORUS manifolds.

Other Detectors

- Installed gas supply for GEM in EEL rm 125, 30% CO₂ in Ar.

Leffel, Mindy

Hall B

HDice

- Terminated two of four cables, will be able to complete when remaining connectors arrive.

HTCC

- Terminated 15 signal cables.

DSG

- Completed forklift practical, certification complete.

Lemon, Tyler

Hall B

Gas System

- Replaced Basic PID VI with Advanced Auto-tuning PID VI.
 - ★ Created necessary controls for initiating the auto-tuning and indicators for the tuned parameters.
- Plotted transients in Excel and Mathematica in order to attempt to determine which PID controller parameters were best for correcting transients.
- Created with Mary Ann a flow chart for the PID controller loop test portion of the LabVIEW code.

Magnet

- Attended magnet meeting.
 - ★ Reviewed what EPICS screens need to be created for the magnet system.

DSG

- Attended safety walkthrough given by Doug with Amanda.
- Attended LabVIEW Core 1 class given by National Instrument.
 - ★ Learned basics of LabVIEW and helpful shortcuts to program more efficiently.

McMullen, Marc

Hall B

Gas System

- Worked with Jacobs, Eng, and Lemon on PID controller test stand on SFL3 south.
 - ★ Modified LabView PID controller loop program to add the controls for R3.
 - ★ During R3 operation, discovered that the transducer is a 10 Torr full scale unit. So, ran PID controller loop using both R1/2 and R3 tanks.
 - ★ Controls worked well within alarm setpoints.

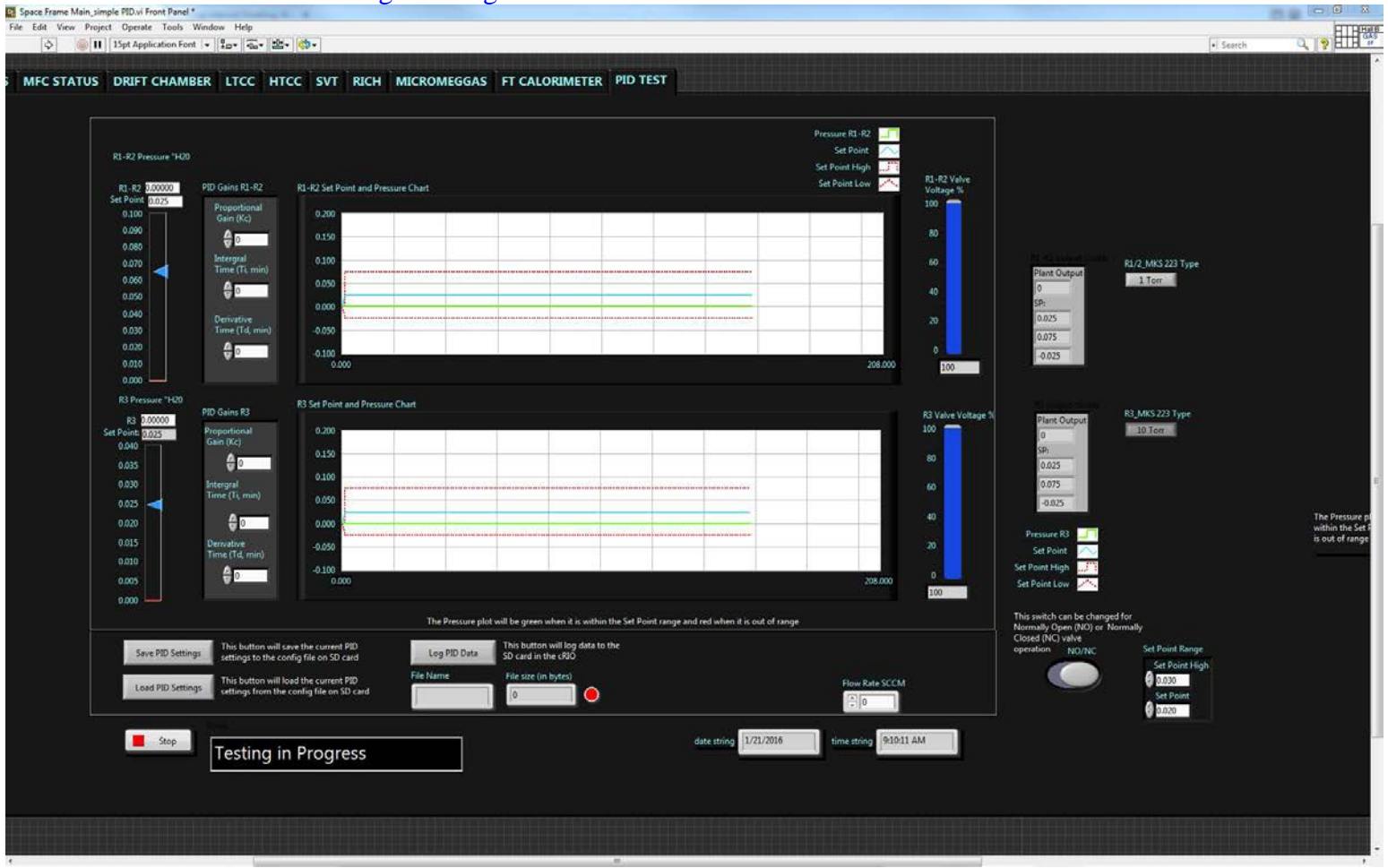


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★ Added selection buttons to GUI, so that either 1 or 10 torr transducers can be used during operations.

- Installed gas lines.
- Wired Gas Shed controls chassis.
- Completed testing of MFC power connectors.
- Started testing moisture sensor inputs.
- Completed research and testing of C₄F₁₀ distillation temperature input to Gas Shed controls chassis. Analog output of the temperature display supplies 1 [mV] per degree of temperature. Calibration will be required during setup.
- Started cabling list for gas shed controls and MFCs.



PID controller front panel display



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Work Request for Hall B Magnet Slow Controls

November 6th, 2015

- I. **Task 1: Test power supply PLC code with actual Danfysik Power supply.**
Background: Josh has written a new PLC driver and did some limited testing (simulation) for communicating with the 4000 A Danfysik power supplies. Prospective PLC programmer will need knowledge of Danfysik power supply communication protocols, serial communications through RTA 435-NBX module, and will need to coordinate testing with the DC Power group. The code is intended to be reusable, so it will be relevant for both Torus and Solenoid. Actual testing will likely occur with the Solenoid power supply.
Time Estimated: 2 man-weeks: 1 each for testing and debugging.
- II. **Task 1a: Work with Wesley Moore to define/develop EPICS screen(s) for power supply status/control**
Background: Hall B is using CSS/BOY (VERY similar to Hall D). Programmer would need to understand the underlying data structure for the MPS control, be familiar (or be made familiar) with Hall D's PSU EPICS screens and work with Wesley to get the screens defined and functioning. Test the power supply control through the EPICS interface. Assuming this is the same person as 1, above.
Time Estimated: Anticipate this would be 2 weeks of effort.
- III. **Task 2: Work with Wesley Moore to define/develop Cryo EPICS screens for Distribution Can and Torus Service Tower.**
Background: Familiarity with the Hall D and Cryo group practices, specifically those regarding valve control. Programmer will need to be able to navigate the PLC programs to determine which tags are relevant, understand the underlying data structures, simplify the P&ID's in order to get 'enough' information onto the EPICS screens for Cryo control.
Time estimated: 1 week each for Distribution Can and Torus Service Tower.
- IV. **Task 3: Solenoid Bore Heater control (out of scope work):**
Background: Krister and Josh have put together a preliminary control system for the solenoid bore heaters. If their preliminary system is approved, this could be a stand-alone task within the overall Solenoid PLC program. This is ON-OFF control of 32 heaters based on the readout of 16 thermocouples. Task would include some definition of wiring, generation of wiring diagrams, hardware configuration, and actual control code.
Time Estimated: 2-3 man-weeks.
- V. **Task 3b: Work with Wesley Moore to define/develop EPICS screen for Solenoid Bore Heater Control**
Background: Not available
Time Estimate: 1 week
- VI. **Task 4: Coordinate checkout of Distribution Box PLC program after Distribution Box installation.**
Background: Download PLC code to PLC, verify all IO, verify operation and read-back from valves, perform initial setup of temperature readout units and LN2 readout unit. Ensure data is being transferred to/from EPICS correctly. During checkout, identify and correct any wiring problems or software bugs.
Time Estimated: 2 weeks.