Detector Support Group
Weekly Report, 2016-04-06

<u>Ongoing Projects</u>

I. <u>Hall B Magnet Slow Controls</u> (**Brian**, Tyler, Peter, Amanda)

Task:	Test Power supply's PLC to EPICS interface.
EDC:	03/15/2016
Activity:	Tested and installed new firmware in NBX435 module, which hopefully resolved problems with transmission of partial commands. Initially 5 errors out of 1000 transactions now zero errors for 4000 transactions.
Comments:	Testing part done for positive current. Need to redo negative current settings with GUI. Cable between power supply and remote display fixed. Wiring of service tower is being done. GUI for voltage taps and cryogen developed, first pass. Distribution box (DBX) has leak, so back to Cryo. department.

<u>Status:</u>   <u>Delayed.</u>

II. <u>Hall B Gas System: Slow Controls</u> (**Marc**, Brian, George, Mary Ann,)

Task:	Deploy LabVIEW based slow controls software system for **DC, LTCC, HTCC, SVT, MicroMegas, Forward Tagger,** and **RICH**.
EDC:	07/31/2016.
Activity:	Installed LTCC instrumentation hardware. Installed temperature sensors, scales, and cables for distillation unit and C_4F_{10} supply tank.
Comments:	Present status:

#	Detector	Gas	Hardware		Software	Deployed	Tested
			Piping	Instrumentation			
1	DC	Ar/CO_2	$\mathbf{X}^\dagger$	✓	✓	✓	**X**
2	HTCC in Hall B	N_2	**X**	**X**	**X**	**X**	**X**
3	HTCC in TEDF	N_2	✓	✓	✓	✓	✓
4	LTCC	C_4F_{10}	$\mathbf{X}^\dagger$	✓	✓	**X**	**X**

5	SVT	N_2	**X**	**X**	✓	✓	✓
6	RICH	N_2	**X**	**X**	**X**[††]	**X**[††]	**X**[††]
7	Micromegas in EEL V.1	Pre-mix Ar/C_4H_{10}	✓	✓	**N/A**	**N/A**	**N/A**
8	Micromegas in EEL V.2	Mix Ar/C_4H_{10}	**X**	**X**	**N/A**	**N/A**	**N/A**
9	Micromegas in Hall B	Ar, C_4H_{10}, C_2H_6, Ne[††], CF_4	**X**	**X**	**X**[††]	**X**[††]	**X**[††]
10	Forward Tagger in EEL	N_2	✓	✓	**N/A**	**N/A**	**N/A**
11	Forward Tagger in Hall B	N_2	**X**	**X**	**X**	**X**	**X**

[†] Waiting on Hall B Engineering.

[††] Waiting for more information.

Status: **Work in progress.**

II. Hall B Gas System: DC Hardware in hall (**George**, Marc, Mindy, Sahin, Anatoly)

Task: Install Gas System hardware.

EDC: N/A (Depends on HallB Engineering)

Activity: **None**

Comments: George: *"I updated the DCGAS and LTCC gas system critical path documents. In both cases we are waiting for critical path items to be completed by Hall B Engineering before we can continue."*

Status: **Work in progress.**

III. Hall B Gas System: LTCC Hardware in hall (**George**, Marc, Mindy, Sahin,Anatoly)

Task: Install Gas System hardware.

EDC: N/A (Depends on HallB Engineering)

Activity: LTCC instrumentation hardware done.

Comments: *George: "I updated the DCGAS and LTCC gas system critical path documents. In both cases we are waiting for critical path items to be completed by Hall B Engineering before we can continue."*

Status: **Work in progress.**

IV.   **Hall B Gas System: HTCC in TEDF (Brian**, Marc, George, Mindy, Sahin,Anatoly)

Task:	Conduct pressure study.
EDC:	N/A.
Activity:	Pressure study performed.
Comments:	None.
Status:	**Completed.**

V.   **Hall B HDICE (Mary Ann**, Peter, Amanda, Tyler, Mindy, Sahin)

Task:	Fabricate RF box. Task includes draw fabrication drawing in AutoCAD, write drivers for DIO modules, and develop RF box test program review.
EDC:	N/A.
Activity:	Set up test stand for DIO module. Started testing drivers.
Comments:	Will send e-mail to move Oxford power supply.
Status:	**Work in progress.**

VI.   **Hall B HDICE (Peter**, Amanda, Tyler, Mary Ann, Mindy, Sahin)

Task:	Develop calibration test program for the CAEN current transducer box. Develop and test instrument drivers.
EDC:	N/A.
Activity:	Developing applications to test drivers for Krohn-Hite current source and Fluke amplifier.
Comments:	None.
Status:	**Work in progress.**

VII.   **Hall B RICH** (**Tyler**, Amanda, Peter, Brian, Mary Ann, George, Mindy, Sahin, Marc, Anatoly)

Task:	Clear area in DSG cleanroom.
EDC:	N/A.
Activity:	Cleared room. Moved one table to EEL Rm. # 126 for MPOD test station.
Comments:	None.
Status:	**Completed on 04/01/2016.**

VIII.   **Hall B RICH** (**Tyler**, Amanda, Peter, Brian, Mary Ann, George, Mindy, Sahin, Marc, Anatoly)

Task:	Prepare for mirrors arriving in May 2016. Move optical table from big cleanroom EEL Rm. #124 to DSG clean room, EEL Rm. # 121B.
EDC:	04/30/2016
Activity:	E-mailed Latifa Elouadrhiri requesting SVT benches. Request accepted. Contacted Eugene Pasyuk about PRAD set up blocking big cleanroom exit. Was informed that PRAD setup will be disassembled 04/25/2016. Contacted Bob Miller to schedule move of optical benches. Doug Tilles reconnoitered the areas.
Comments:	None.
Status:	**Work in progress.**

IX.   **Hall D PLC Systems** (**Pablo**, Peter, Brian, Tyler, Amanda, Mary Ann, Marc)

Task:	Locate and document (including spares) the eight PLC systems in use.
EDC:	03/15/2016
Activity:	Report done for all eight PLC systems.
Comments:	Nick Sandoval sent spares spreadsheet.
Status:	**Completed on 04/01/2016.**

X. Hall D Data basing of solenoid Voltage Taps (Amanda)

Task:	SQLite data basing of Hall D solenoid voltage taps.
EDC:	07/31/2016
Activity:	Databased all available voltage tap readings from solenoid.
Comments:	None.
Status:	**Completed 04/01/2016.**

Antonioli, Mary Ann
Hall B
HDICE
- Added code to some drivers of DIO modules of the RF/Attenuation box, to decipher module's response to a command.
- Fabricated connectors and cables for DIO module test stand.
- Set up test stand and began testing drivers.
- Attended review.

DSG
- Laid out and began editing of George's note on the LTCC gas system.
- Edited webpage:
  - ✦ Add Pablo's bio.
  - ✦ Changed photo and archived previous photo.
- Set up new computer.

Arslan, Sahin
Hall B
DC
- Removed two rotameters and installed two new rotameters for DC endplate purge lines.
- Picked up three spare pumps from HTCC cleanroom in TEDF.
  - ✦ Pumps will be used for DC R3 in gas shed, temporarily.
  - ✦ These three spare pumps make up flow volume of one failed pump (3:1).
- Attached appropriate fittings to spare pumps and connected all three together in series.
- Removed old failed pump and set them aside to be excessed.
- Installed three pumps.

Pumps ready for installation.

Pumps installed.

HDICE
- Working on RF box fabrication.
- Attend review.

MicroMegas
- Removed from behind the EEL building, three bottle of C_4H_{10} used for MVT.
- Provided (30/70) CO_2 /Ar gas bottle for PRAD

Bonneau, Peter

Hall B

HDICE
- Developed project status summary and upcoming work summary for review.
- Set up demonstration of Rotation of Target Polarization program.

RF Switching/Attenuation box.
- Working with MaryAnn on interconnects, hardware (USB to RS485 converter), and software setup needed for testing ICP CON DAq modules.
- Working with Sahin on layout of RF components and power supplies.
  - ✶ Base plate completed.

Current calibration test station
- Working with Tyler and Amanda on development of calibration program which will be used first on HDICE; however, designed is such that it can be used in any application where precision voltage or current source is needed.
  - ✶ Reviewed error handling and instrument status outputs from NI-VISA device drivers.
  - ✶ Discussed development and testing status for upper level current calibration VI.

SVT
- Reviewed recent operation history of the Hardware Interlock System performance.
  - ✶ CPU usage is low, averaging 8%.
- Monitored SVT Hardware Interlock System daily.
  - ✶ No trips observed during past week.
  - ✶ Humidity has been a problem, recently, in the big cleanroom.

Hall D
- Held daily meeting on Hall D status and EPICS controls monitoring.
- Monitored Hall D slow control systems daily.
  - ✶ On Monday 10 FCAL HV bases were replaced due to communication issues and HV drop outs (HV went to 0 [V] for no reason).

DSG
- Set up computer for the MPOD Test Station.

Campero, Pablo
Hall B
HDICE
- Reviewed all information about the Hall B HDICE requested tasks and progress.
- Investigated mechanical and electrical specifications, factors and parameters in the construction of Molex Temp-Flex Air-Dielectric Ultra-Low-Loss Flexible Microwave Coaxial cable that was selected.

Hall D
Detector
- Monitored logbook with Peter, Amanda, and Tyler.
  - ✦ Alarm handler reported FCAL HV channel 4:24 was fluctuating below 500 [V], the state was ON with set value at 1722 [V].
  - ✦ On 3/30 noticed that current in solenoid was increasing up 500 [Amp] and current in FDC was decreasing.
    - ▪ For a change from 0 – 450 [A] of the solenoid, the FDC currents dropped from about 4.5 [µA].
- Monitored EPICS
  - ✦ Viewed solenoid CRYO screen, noted variation in flow of tank mix in its level indicators of Argon and also of CO_2.
    - ▪ Displaying a value of 90 [l/m].

SLOW CONTROLS
- Wrote and completed report on all eight PLC systems.
  - ✦ Developed functions and number of spares for every single system.

DSG
- Setup MPOD module in EEL room 121.
  - ✦ Set up with Amanda and Tyler, KEITHLEY Multimeter 2002, MPOD module, and PC- computer in the test area room 121.
  - ✦ Established as new administrator in computer with help of Peter to get access to the software to make configurations with MPOD module.
  - ✦ Tested and set up the communication between MPOD module and PC-computer via USB port, using MUSE software.
  - ✦ Observed and analyzed readouts displayed in the MPOD module and also in the software MUSE.
    - ▪ Noted there was communication full - duplex (Write/Read) data.

Eng, Brian
Hall B
Gas System
- Added more shared variables to EPICS clients, cleaned up variables as well (renaming, putting them in virtual folders).

- Swapped out current input module for universal input module (with isolated channels) for H_2O sensors because of noise issues with prior module.
- Swapped out an analog output with a relay module for AC Power control.

Magnets

- New firmware for 435NBX seems to have fixed issues with duplicate partial commands. Previously ~0.5% failures, now none in 4k commands worth of spy cable captures.
- Changed PLC code to handle when in negative polarity.
  - ⁎ CSS screen doesn't handle this case yet though.

HDICE

- Attended review.

Hall D

- Received new computer (for Hall D subnet, mostly for LabVIEW/PXI development, and also PLC).
  - ⁎ Started setting up computer. Currently updating Windows.

Hoebel, Amanda
Hall B
HDICE

- Worked with Tyler on CT-Box readout in automatic mode.
  - ⁎ Current to read out from CT-Box is typed into VI front panel; amplifier (Fluke) and calibrator (Krohn-Hite) adjust amplification accordingly.
- Attended review.

SVT

- Wrote report on 8 spare modules.
  - ⁎ Includes current-draw strip chart of 16 channels and delta graph of channel current change from one week to next.

Hall D
Detector

- Viewed PXI voltage taps histograms in ROOT.
  - ⁎ Automating voltage tap readings read from PXI.
- Monitored logbook.
  - ⁎ Noted FCAL channel 4:24 HV was below 500[V].

Jacobs, George
Hall B
Gas Systems

- Setup gas mixing system for MVT in EEL room 124.
- Added MKS type 647B controller operator's manual to MVT HBList.
- Modified Hall B gas shed piping for new O_2 and H_2O sensors.

- Modified and replaced piping as required to replace failed R3 DC pump with units purchased for HTCC.
- Ordered N_2 gas for EEL detector testing.

Safety
- Provided safety feedback on PRAD test setup in EEL room 125 to PRAD group and Physics DSO.

DSG
- Performed search for missing fall protection harness, submitted missing item form.

Leffel, Mindy
Hall B
HDICE
- Attended review meeting to discuss future tasks and manpower.
LTCC
- Cut and terminated 12 - 25' solenoid power cables.
Hall D
- Attended tech meeting.

Lemon, Tyler
Hall B
HDICE
- Attended review.
- Wrote paper for CT-Box test.
- Wrote program with Amanda in LabVIEW to set the current to be read by CT-Box.
  - ★ Program uses Fluke and Krohn-Hite drivers.
  - ★ Program steps:
    1. User inputs current demand value, e.g. 10 [A], to be read by CT-Box.
    2. Fluke driver sets current output range, 0—20 [A], (see table below) of the Fluke amplifier based on demand value at CT-Box, given in step 1.
    3. Program divides demand value desired by transconductance value to get Krohn-Hite output voltage, in this example 1 [V]. Ranges and transconductance values specified in table below.
    4. Krohn-Hite driver sets Krohn-Hite output voltage computed in step 3.
    5. Fluke driver puts Fluke into "Operational" mode allowing current of 1[V]*10 [A/V] = 10 [A] to be amplified and read at CT-Box.

Fluke 52120A Output Ranges and Corresponding Transconductance Values	
Range	*Transconductance [A/V]*
$0 - 2$ [A]	1
$0 - 20$ [A]	10
$0 - 120$ [A]	100

Table of transconductance values for the three output ranges of the Fluke 52120A Transconductance Amplifier.

Torus
- Tested MPS EPICS screens with Brian.
  - Noted software limits on what current setting was allowed caused any negative current demand setting to be coerced to 0 [A].
  - Noted EPICS indicator for MPS voltage output which indicates the demand current was reading back percentage of maximum voltage.
    - Maximum voltage output of MPS is 6 [V]

Hall D
Detector
- Monitored Logbook.
  - Noted on 3/30 FCAL HV:4:24 was reading below 500 [V] when it is set to 1722 [V]
- Monitored EPICS
  - Noted on 3/30 there was no alarm for FCAL HV: 4:24.
  - Noted on 3/31 CDC MFC5 had low flow warning and was flowing at 0.9 [l/m].

DSG
MPOD Test Station
- Set up with Amanda and Pablo PC for the test station.
  - Ensured Wiener MUSEcontrol software was installed.
- Created a Task Hazard Analysis with Amanda and Pablo for the test station's initial procedure.
  - Initial procedure overview: use MUSEcontrol software to set an MPOD LV channel to 1 [V], turn channel on, use multimeter probes to measure voltage on MPOD LV card adapter for each channel on LV card, turn channel off, repeat for all channels.

McMullen, Marc
Hall B
Gas System
DC Gas

- Added code to software with Brian Eng.
  - Heartbeats and CPU monitoring.
  - Mix gas pressure.
  - Modified H_2O readout.
- Modified gas shed chassis to work with an alternative to the previous current loop.

  - ★ New current loop is stable.
- Submitted work request for AC power (120 [VAC] 20 [A]) for pumps.
- Relocated remote AC switch to operate TCU power supply.

HTCC

- Started code for a new data logging tool, this tool should simplify the process of analyzing stored data.

LTCC

- Ran cables with Anatoly for distillation and C_4F_{10} supply tank , temperature sensors, and scales.

Safety/DSG

- Met with PRAD representatives to give guidance on safe work operations in EEL.
- Printed PRAD BList to be posted at test setup.
- Met with Amanda Hoebel and Tyler Lemon to discuss safety documentation.

Sitnikov, Anatoly
Hall B

LTCC

- Produced one cable for cRIO Current Loop for Gas System.
- Produced two cables MFC Flow for LTCC, each cable was 50 feet long.
- Produced two cables for Scale and temperature sensors.
- Ran cables with Marc for distillation and C_4F_{10} supply tank , temperature sensors, and scales.