

Detector Support Group

Weekly Report, 2017-10-04

Status

Torus

- MPS internal faults investigated after Fast dump on the Torus and cross bars circuits were burned.
 - * Found metallic debris inside, most likely from machining work.
 - * Inside of MPS cleaned and debris collected.



Debris found in MPS.



Debris found in MPS; long copper coil is ~6 mm in diameter.



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RICH

- Reflectivity test station moved from EEL 108A to EEL 121b, DSG small cleanroom.
- Eight humidity sensors connected to Hardware Interlock cRIO to read humidity during nitrogen purge test of cosmic dark-box.
- Hardware Interlock LabVIEW program reconfigured to load hard-coded default interlock limits rather than loading interlock limits from configuration file.
 - ★ Issues with configuration file where file was wiped when program starts lead to change.
- Differential of temperature in the RICH E-Panel calculated, assuming power dissipated is 250 W in the electronic FPGA boards.
 - ★ Total air mass found ~ 145 [g]
 - ★ Calculated heat generated ~ 15.000 J with 250 W power dissipated every minute.
 - ★ Found $\Delta T \sim 103$ C.
- HTSB cables fabricated.
- Stainless steel manifold for cooling system with 40-foot and 16-foot 1/2" OD plastic piping machined and tested.
 - ★ New stainless steel manifold designed as alternative to 3D-printed parts.

	40-ft long 1/2" OD line	16-ft long 1/2" OD line
Gas Panel Pressure Regulator Setting [psi]	Flow Recorded [liters/minute]	Flow Recorded [liters/minute]
10	200	200
20	280	300
30	350	380
40	425	460
50	500	560
60	600	600+

Results from tests of stainless steel manifold for RICH cooling system.

HDIce

- NMR program altered to allow temperature and level sensors to save data to file during alarm loop (liquid level below threshold).
- Power supply issue is being debugged.
 - ★ Power supply will vary by 1G at start and at end of runs.
 - ★ Wrote Extend Resolution VI to GPIB. Seemed to work but problem came back during 500 run test.

SVT

- Hardware interlock system real-time program debugged for the removal of region 4 instrumentation and interlock control.
- R3 S11 B HFCEB debugged after temperature sensor failed again.
 - ★ Fixed by disconnecting and reconnecting terminal block.



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MVT

- LabVIEW program for automatic mix controls of the Forward Vertex Tracker tested.
 - ★ Gases to be mixed are C₄H₁₀, CF₄, and Ar.

LTCC

- Percentage of loss attributed to S5 piping is ~ 1.5%.

Gas Systems

- Trip hazards removed from area around RICH valve panel.
 - ★ Unused extension cords, power strips, and network cables.
- Flow control orifices received for HTCC CO₂ gas supply and MVT pre-mix backup supply.
- HP LN₂ dewar ordered for RICH purge testing.
- Ten cylinders of dry air ordered for HTCC work.



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Antonioli, Mary Ann

- Assisted Mindy with **RICH** cable fabrication.
 - * Prepared pins for crimping.
 - * Made labels.
 - * Cut 300+ pieces of heatshrink.
- On cRIO **test stand**, completed subVI to read one channel of NI-9207 module.
- Began formatting and editing Tylers's **Note** on RICH mirror testing.
- Continued editing Pablo's **Note** on Solenoid control and monitoring.

Bonneau, Peter

Forward Tagger

- Developed initialization subroutines for the water detection instrumentation of the Hardware Interlock System.
 - * A hardware installation procedure for the chiller contact module was completed.

HDice

- Worked with Amanda and Pablo on the NMR program refinements.
 - * The implementation of a GPIB-based command for high-resolution mode on the Oxford power supply.
- All known issues with the Rack #2 NRM system has been resolved.
- To continue hardware work on NMR synchronization of the current shunt measurements, the instrumentation from Rack #1 is needed.

SVT

- Debugging the hardware interlock system real-time program for the removal of region 4 instrumentation and interlock control.
 - * Setup DSG cRio test stand to debug revisions to hardware interlock program.
 - * Corrected interlock error on ambient temperature sensor #2.
 - * Revised project file for SVT system installed ADC for cooling system.
 - * Corrected reset hold issue on the user interface program.

RICH

- Worked with Tyler on the installation debugging of the RICH Hardware Interlock System.
 - * Issues with thresholds being set to zero on cRio boot were resolved by switching initialization to the default mode. This default mode provides a fixed value for each of the thresholds upon cRio reboot.
 - * Cabling and feed-thrus for the temperature & humidity sensors were discussed.
 - * Recommended replacement of the +5V power supply to resolve the noise issue reported with the humidity sensors. Tested replacement supply before installation.

Magnet Systems

- Discussions with Brian and Pablo regarding the metal debris, improper response of the emergency dump switch, and the failure of the SCR in the crowbar circuit of the Torus power supply.



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- Worked with Mary Ann on development of the National Instruments Compact-Rio test station.
 - ★ Debugging the automatic mode of the test program.

Campero, Pablo

Torus

- Investigated MPS internal faults with Brian after Fast dump on the Torus and cross bars circuits were burned.
 - ★ Vacuumed up to remove all debris and residual material (cooper, silver, dust)
 - ★ Wiped down all surfaces inside the MPS with shop rags and isopropyl alcohol.
 - ★ Used the microscope to take pictures at the lowest zoom level.
 - ★ Found that rather than being strands of wire as was initially guessed, the residual material found was most look like chips from machining work like drilling or cutting.

RICH

- Collaborated to set the test for the 316 steal stainless manifold.
 - ★ Connected air supply lines from the compressor to the manifold.
 - ★ Set pressure to 60 psig in the pressure gauge in the RICH gas panel.
 - ★ Measured the air flow in the mass-flow controller ~ 600 l/min.
- Prepared eight humidity sensors for the Nitrogen purge test.
 - ★ Striped three cables per each humidity sensor.
 - ★ Monitored all sensor values after their connection on the cRIO control systems.
- Calculated the differential of temperature in the RICH E-Panel assuming power dissipated of 250 W in the electronic FPGA boards.
 - ★ Total air mass found ~ 145 [g]
 - ★ Calculated heat generated ~ 15.000 J with 250 W power dissipated every minute.
 - ★ Found $\Delta T = 102$ K.

HDice

- Solved issues for the LabVIEW NMR program, with Amanda.
 - ★ Solved instability set current issues in the power supply, by adding extended resolution GPIB commands in the NMR program.
 - ★ Added alarm action (send email) when temperature target is exceeded.
 - ★ Added 1st and 2nd LHe level thresholds (16 and 12 inches) interlocks to alarm when limit low limits are present.
 - Action for implemented interlock to ramp down the power supply to 1000 G at first threshold and to 0 G at 2nd threshold.
 - For both thresholds the program was configured to send automatic email to alarm the on-call person.
 - ★ Tested the sending of the emails to the on call person when temperature or LHe levels are exceeded. They worked properly.



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Eng. Brian

SVT

- R3 S11 B HFCB Temperature failed again.
 - ★ Fixed by disconnecting and reconnecting terminal block. Replacing cable between terminal block and V450 had no effect.

Magnets

- Modified alarm set points in EPICS prior to ramping.
- Ramped torus to half field and solenoid to full field during first shift (second shift managed to get to full torus current in both positive and negative polarities before torus MPS failure): <https://logbooks.jlab.org/entry/3485906>

Torus

- Investigating MPS failure (ramped down, but not at controlled ramp or fast dump speeds): <https://logbooks.jlab.org/entry/3486179>
- Found metallic debris inside MPS: <https://logbooks.jlab.org/entry/3486246>
- Cleaned inside of MPS with Pablo and collected the debris:
<https://logbooks.jlab.org/entry/3486789>

Hoebel, Amanda

- Created statistics and histograms for DC TCU 1 and TCU 2 data from 9/30 to 10/3.
- Made presentation on TCU1 and TCU2 statistics and histogram data.

HDICE

- Altered NMR program to allow temperature and level sensors to save data to file during alarm loop.
- Debugged power supply issue.
 - ★ Power supply will vary by 1G at start and at end of runs.
 - ★ Wrote Extend Resolution VI to GPIB. Seemed to work but problem came back during 500 run test.
- Worked on request to vary sweep rate before run start.
 - ★ That option was already implemented. HDIce group did not know how to use it.

RICH

- Moved reflectivity test stand into small clean room with Tyler, Mindy, Pablo, and Amrit.
- Received key to EEL 124.
- Created and edited weekly report.

Jacobs, George

- Receive quote for RICH nylon tubing.
- Met with HTCC gas DA, Matt M.
- Discussed RICH air cooling supply lines pressure system requirements.
- Removed trip hazards (unused extension cords, power strips, network cables, etc) from area around RICH valve panel.



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- Received flow control orifices for HTCC CO₂ gas supply and MVT pre-mix backup supply.
- Ordered HP LN₂ dewar for RICH purge testing.
- Ordered 10 cylinders of Dry air for HTCC work.
- Participated in Hall B Eng meeting.

Leffel, Mindy

FT

- Worked on condensation sensor.
 - ★ Attached cable gland to contact enclosure, connected wire and printed labels (still waiting on final length).

RICH

- Contributed to the disassembling, cleaning, and moving of laser test stand.
- Fabricated HTSB cables.
 - ★ Cut four more 65' lengths.
 - ★ Stripped and crimped pins on nine temp cables.
 - ★ Stripped ferrule end: nine humid cables 8", four temp cables 2".
 - ★ Cut four cable bundles back to requested 20' length.
 - ★ Soldered jumpers to two temp cables.

Lemon, Tyler

RICH

- Moved reflectivity test station from EEL 108A to EEL 121b, DSG small cleanroom with Mindy, Pablo, Amanda, and Amrit.
 - ★ Cleaned test station prior to move with Mindy.
 - ★ Moving test station allows for the removal of darkbox and the use of spherical mirror stand while taking reflectivity measurements.
- Connected eight humidity sensors to Hardware Interlock cRIO to read humidity during nitrogen purge test of cosmic darkbox.
- Reconfigured Hardware Interlock LabVIEW program to load hard-coded default interlock limits rather than loading interlock limits from configuration file.
 - ★ Issues with configuration file where file was wiped when program starts lead to change.
 - ★ Configuration file wipe will be debugged and use of file will be re-enabled once solution to prevent file wipe is found.
- Tested stainless steel manifold for cooling system with 40-foot and 16-foot ½" OD plastic piping.
 - ★ New stainless steel manifold designed as alternative to 3D-printed parts.
 - Manifold is 111-cm long ½" OD stainless steel pipe with ten 2-mm holes spaced every 11.5 cm.
 - ★ Tests used as proof-of-concept of stainless steel manifold after redesign.
 - ★ Piping of varying lengths used to connect gas panel to stainless steel manifold pipes.



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	40-ft long 1/2" OD line	16-ft long 1/2" OD line
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Results from tests of stainless steel manifold for RICH cooling system.

McMullen, Marc

- Monitored the DC TCU plots. The TCUs have been measuring the gas standard for four weeks.
 - ★ Continued TCU measurements of the standard.

RICH

- Machined two stainless steel manifolds using ½ inch O.D. tube.
- GandR is scheduled to deliver parts by 10/9.
- Received hardware for the three fabrications.
- Researched and received quote for extruded aluminum kit.
 - ★ This kit will be assembled as the second front panel installation tool.
- Started assembling components to increase the compressed air supply line to 1 inch.
- Discussed improvements to the Nitrogen supply filters with the Hall D work coordinator.
 - ★ Hall D uses a 4 staged approach to filter: 13u, 7u, 0.5u, and 0.01u.

MVT

- Continued work on MVT gas mixing software
 - ★ Tested the automatic mix controls for the Forward Vertex Tracker, which uses C4H10, CF4, and Ar.

LTCC

- Hall B has not reconnected the Sector 5 detector. Percentage of loss attributed to the piping is down to 1.5%.

	S3	S4	S5
Total Avg	131.561	70.066	58.076
Since Dead Band Change	122.188	51.872	45.148
S3 S4 S5 Leak Thru Pipes (Liters per day)	14.155	8.426	0.606
Piping % of total detector leak	11.585	16.244	1.342