DSG-RICH R&D Meeting

Date: April 30, 2021
Time: 11:00AM – 12:00PM

Attendees: Mary Ann Antonioli, Peter Bonneau, Aaron Brown, Pablo Campero, Brian Eng, George Jacobs, Tyler Lemon, Marc McMullen, and Amrit Yegneswaran

1. SHT35 sensor PCB

Peter Bonneau, Brian Eng, Tyler Lemon, and Marc McMullen

- Preparing fabrication documents to be sent to Advanced Circuits
- Tyler Lemon will send SHT35 sensors already on hand to Advanced Circuits so they can use them in board assembly

2. Hardware Interlock System LabVIEW remote interface

Pablo Campero

- Development in progress of LabVIEW remote interface
- Remote interface will use network variables to communicate to RICH-II hardware interlock system for monitoring 48 temperature sensors, 48 humidity sensors, two airflows, buffer tank pressure, and nitrogen flow

3. Hardware interlock cabling

Peter Bonneau and Tyler Lemon

- Will use small, flat CAT7 Ethernet cable inside RICH-II where less space is available, since no convenient tooling is available for connecting RJ45 ports
  - Maximum cable lengths inside RICH-II is ~17 ft, so ~40-ft cable assemblies will be procured and cut
    - Molex connector will be crimped onto cut end for attaching to SHT35 sensor PCB
- Will use regular, bulk CAT7 Ethernet cable outside of RICH-II
  - Allows for easier crimping of RJ45 connectors onto ends
  - Cable size is less important because cable is run through empty space or large cableways
- CAT7 feedthrough couplers will be used to pass cable from outside RICH-II into N_2 volume and as a disconnect at RICH-II's patch panel

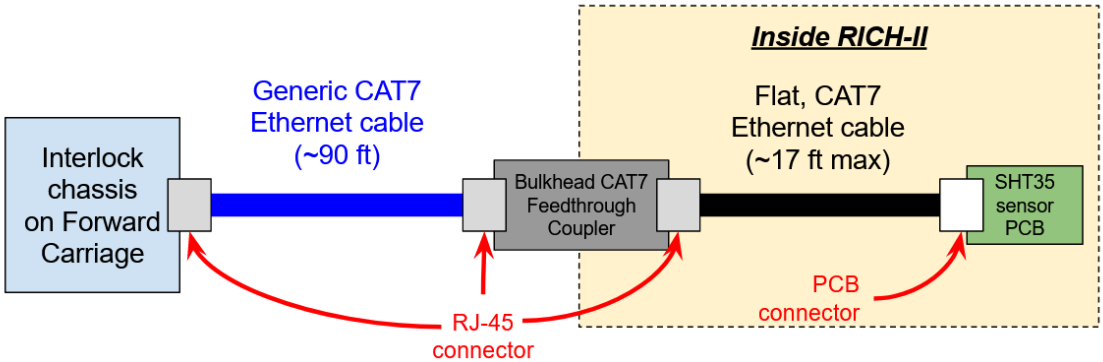

Diagram showing a simplification of components to be used for RICH-II hardware interlock cabling

4. Air cooling system

George Jacobs and Tyler Lemon

- RICH-I requires significantly more air cooling than what was originally estimated, using ~90% capacity of the air distribution system
  - New compressor is specified to be able to provide ~1600 L/min
    - Old compressor is able to provide ~1000 L/min
- RICH-I requires higher air pressure than originally estimated as a result of air delivery via high velocity air nozzles
  - Researching flow and pressure sizing for regulator used on air distribution panel
- RICH-I requires an additional air dryer to lower the humidity level of the cooling air due to the leakage of cooling air into the N_2 volume during operation
  - Marco Mirazita requested a prototype RICH-I Electronic Panel (EP) to be shipped to INFN so they can test gaskets/seals for electronics to better prevent EP-to-N_2 volume leaks
  - Both compressors have integrated dryers that lower moisture content of output air to ~1200 ppmV H_2O, or ~5% RH at 70° F
    - Moisture content of air measured by Easidew hygrometer in buffer tank

5. N_2 system

George Jacobs and Tyler Lemon

- RICH-I N_2 volume requires higher purge flow rate than expected due to leakage, so RICH-I uses ~90% capacity of the N_2 purge system
  - RICH-I was never tested to see what flow is required to maintain a sub-5% RH level; will be done for RICH-II
  - RICH-II may be sealed better from new EP-N_2 volume seal
    - RICH-I had no seal between electronics and N_2 volume so there is significant leakage from N_2 volume to EP and then to atmosphere
  - RICH-II will have a solid carbon fiber exit window rather than a Mylar/Tedlar sheet stretched over an aluminum frame
    - Leaking most likely from creases in Mylar/Tedlar sheet and poor epoxying of sheet to frame
- RICH-I requires higher N_2 pressure than originally estimated due to length of the gas lines and higher flow rate requirement
  - Researching flow and pressure sizing for regulator used on N_2 distribution panel
  - N_2 supply pressure is limited to ~35 psi by Hall B N_2 supply system design