

# Hall C PLC Tasks Meeting – DSG Questions

June 4, 2018 1:30PM to 2:30PM

DSG's Questions and further details/questions are in black text.

Answers previously received are in blue.

Answers in green were discussed in the meeting.

**Meeting Attendees:** Peter Bonneau, Pablo Campero, Brian Eng, Mike Fowler, Steven Lassiter, Tyler Lemon, Jack Segal

1. Where are the PLC module drawings and system diagrams?
  - Is there a master list of all Hall C PLC diagrams?
  - Drawings needed to verify PLC layouts generated by DSG.
  - Drawings will be used to determine what channels to wire new signals to.
  - Mike suggested sending a direct e-mail to Steve Lassiter to request the drawings.
  - All diagrams and drawings are on M: Drive.
  - Steve will send DSG copies of drawings so we can verify our PLC layouts.
  
2. What commands need to be sent to the NMR-PT2026 Tesla Meter.
  - Read magnetic field and status to determine if PT2026 is locked onto field.
  - How often should data from the NMR unit should be requested?
  - NMR-PT2026 only used for both SHMS and HMS dipole magnet.
  - NMR teslameter allows user to input a magnetic field, and then the dipole's power supply will automatically be set at a current that results in input field.
  - NMR-PT2026 should perform sweep, lock on to field, and report field to PLC.
  - Depending on field readback, PLC will then adjust power supply current setpoint until dipole field is at its setpoint.
  - NMR routine runs constantly and PLC will continuously make changes to power supply current setpoint so magnetic field is constant.
  - For old NMR-PT2025 (uses serial communication), command sets for field regulation take ~3 seconds to be sent and then receive the response.
  - Steve will send DSG parameters for acceptable field and current regulation.

3. Where is the location of the HMS AB-Flex I/O modules?
  - Mike said they are located in the second floor Hall C counting house.
  - Amanda, Tyler and Pablo have checked Hall C and Hall C counting house, but they could not find the AB –Flex I/O modules for the HMS.
  - Flex I/O modules may be located in shielded HMS detector hut.
  - DSG will check area to confirm location.
  
4. Will DSG need to modify HMI files to show new signals to be added for tasks?
  - Example: Indicator for shutters, indicators for UPS
  - Mike is primary contact for HMI files and he will review any modifications.
  - DSG will make modifications to HMI files to learn controls and monitoring system.
  
5. How can DSG get all HMI files?
  - Mike will send DSG the HMI files.
  
6. How do we get access to Hall C Standalone PLC work area?
  - The door to work area is locked. Can we get a key or should we request door be unlocked when needed?
  - Steve will send DSG key numbers to standalone work area.
  - DSG will submit work request to get key for test station work area.
  
7. Is Skylla7 on UPS?
  - Should that UPS be monitored?
  - Skylla7 is on Hall C counting house emergency power.
  - UPS status for Skylla7 does not need to be monitored.
  
8. What version of HMS code should we modify?
  - DSG was given v20 and v21.
  - DSG should make changes to HMS code v20.
  - Version 21 has modifications to allow removal of forced inputs that remove bad temperature sensors in program.
    - i. Version 21 is under development by Steve.

9. What is the procedure for implementing changes to complete tasks?
- First, deploy modified or new routines to standalone PLC to test.
  - If no issues on standalone PLC, changes can be moved to HMS/SHMS PLC.
  - Do we need to coordinate with Hall C to test and deploy code?
  - Are there specific things (“forces” for modules, fault checking) that need to be verified before testing or deploying?
  - DSG should make changes and test on a standalone PLC.
  - Once tested, code with changes will be given to Steve for revisions.
  - Steve will then import code to SHMS or HMS PLC.

10. Are all UPSs on the generator circuit?

- UPS on second floor of counting house is on generator circuit.
- UPSs in spectrometer detector huts are not on generator.

11. How will we be able to test logic for UPS fault monitoring?

- Is there a spare UPS anywhere?
- No spare UPS available for testing.

12. What is the desired action for a UPS fault?

- Should PLC initiate a controlled ramp or fast dump?
- PLC should send an alert, halt any rotation, and ramp down power supplies.
- DSG will write routine to monitor UPS status and output a summary tag of any UPS faults.

13. Is reporting of different faults needed for UPS?

- Steven mentioned any fault on UPS should give an error and interlock should be a Boolean OR of faults.
- With status monitoring for UPSs, we would be able to monitor for individual faults. Is this needed?
  - Example: Should we be able to tell from the signals whether UPS status is “battery low” or “AC power failure”?
- Only relevant signals are whether UPS is running on battery or whether UPS battery is bypassed.
- Number of input channels in PLC chassis will limit number of signals that can be monitored.

14. How many Edwards vacuum gauges will need to be added to HMS?

- One gauge will be added.
- Gauge may not be an Edwards gauge; type yet to be determined.

15. Is there an Edwards vacuum gauge available for testing?

- No, all gauges on hand in use.
- The logic for monitoring the gauge has already been developed on SHMS, so DSG will only have to add that logic to HMS code.

16. What is the new Edwards vacuum gauge monitoring on HMS?

- Gauge will monitor vacuum in HMS spectrometer's beam envelope bore.

17. Are the new HMS Edwards vacuum gauges already installed?

- No, new gauges are not on hand.

18. Who will generate wiring diagrams for hardware modifications required to complete tasks?

- Should DSG make rough drafts of modifications to give to appropriate Hall C person to make changes to official documentation?
- DSG can make changes to documentation.
- Hall C will designate a person responsible for Hall C documentation, including wiring diagrams and drawings.
- DSG will give any modified or updated drawings to that person.

19. Are there two shutters, one for HMS and one for SHMS?

- Yes: HMS shutter is not yet installed, SHMS shutter is installed.

20. Are either shutter signals existent or implemented in the code?

- If so, what kind of signal are they?
- SHMS shutter is implemented.
  - i. Currently monitoring only open/closed status; if shutter is removed, status is shown as closed.
  - ii. New monitoring signals will indicate whether shutter is open, closed, in transition, or uninstalled.
- HMS shutter is not yet implemented.
- Joe Beaufait is contact for information on shutter wiring and controls.

21. What "controls" should be added to the code for the shutters?

- Shutters are controlled by a variable frequency drive.
- Controls will allow shutter to be opened or closed remotely.

22. Is there a specific place to add the SHMS shutter code?

- Location should match SHMS shutter programming.
  - i. "Cryo" Program in "AUX\_Commands" routine.

23. Where is the SHMS shutter located in the code?

- The task is to "modify" the code, indicating it is already in PLC program somewhere.
- Existing code is in "Cryo" Program in "AUX\_Commands" routine.

24. What is your priority for the tasks?

- No specific task is higher priority.
- Timeframe to complete tasks is during summer shutdown.
  - i. Shutdown ends August 20, 2018.
- If any tasks are incomplete at end of summer shutdown, they can be implemented during the next shutdown.
- Discussed a potential new task (below) that would be a high priority task.

### **Items discussed that were not part of DSG's questions list:**

1. New potential task to test use of Ethernet/IP communication in place of ControlNet for SHMS PLCs.
  - a. Task would be a high priority task.
  - b. SHMS system had problems with ControlNet modules, most likely due to radiation issues.
  - c. Task would involve changing two I/O PLC chassis to communicate with controller over Ethernet rather than ControlNet.
  - d. PLCs changed to Ethernet communication would act as test for system to see if Ethernet communication is more stable in high-radiation environments than ControlNet.
  
2. All changes to PLC code should be made using Ladder Logic or Function Block Diagrams.
  - a. Steve, Mike, and Jack prefer Ladder Logic and Function Block Diagrams to make program more readable to non-experts.