

Hall B Solenoid Fast Dump Investigation and Discussion

Date: October 15, 2018

Time: 2:00PM – 3:00PM

Attendees: Ruben Fair, Renuka Rajput-Ghoshal, Nick Sandoval, Onish Kumar, Pablo Campero, Brian Eng, Amanda Hoebel, Tyler Lemon, Probir Ghoshal

1. Discussed Probir's analysis of September 29, 2018 fast dump

- 1.1. Only voltage spike seen before dump was ~ 350 mV spike seen on VT19 ~70ms before current started to drop in Solenoid
 - 1.1.1. Spike was only ~ 1 ms long; would not have caused trip.
 - 1.1.2. From QD study, for a ~ 1 ms duration spike to trip QD, spike amplitude needs to be very large (at least greater than 5 V).
- 1.2. Noted that before current ramp down, there was ~ 1.1 A noise seen on IDCCT measurement.
 - 1.2.1. When checking IDCCT signal during smooth magnet operations, we saw several occasions of ~1 A noise that did not cause any sort of ramp down.
 - 1.2.2. ~ 1.1 A noise seems to be consequence of dump switch opening.
- 1.3. End result of discussion and analysis is that cause of fast dumps when no culprit is found on fastDAQ may be the magnet power supply (MPS).

2. Discussed modifications to controls system to monitor MPS internal faults and conditions.

- 2.1. MPS has internal controls system that protects itself from unsafe operations.
 - 2.1.1. MPS will dump current if there is an internal MPS fault.
- 2.2. Currently, there is no way to accurately monitor MPS internal faults using fastDAQ.
 - 2.2.1. MPS status being read over serial; too slow for accurate timestamping and reporting of internal faults.
- 2.3. Nick suggested adding logic to PLC to read MPS's internal sequence of events for internal faults.
 - 2.3.1. Would tell us whether MPS tripped due to an internal fault or external fault.
- 2.4. Will also connect MPS main contactor monitoring relay to PLC SOE module to get accurate timestamping of when MPS started dump.
 - 2.4.1. If an internal MPS fault is cause of fast dump, main contactor's SOE timestamp would be before any QD or other SOE timestamp.
- 2.5. Internal MPS voltages will be added to FastDAQ cRIO.
 - 2.5.1. Voltages would give indicator of potential internal faults during magnet operation.
- 2.6. DC power group will review proposed modifications to MPS before implementation.
 - 2.6.1. Expect review take one week.
- 2.7. Magnet Group will schedule work in hall to make necessary hardware changes for an upcoming accelerator downtime.
 - 2.7.1. Expect changes to take one full day (8 hours).
 - 2.7.2. Work may need to be split up into multiple days to fit into accelerator and RF recovery schedule.