SVT Hardware Interlock System Update

Detector Support Group

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NI cRIO Processor Failure

• After the power outage on 3-6-2018, the SVT Hardware Interlock System cRio 9067 processor failed to boot.

• The system was bypassed to enable the SVT HV/LV and chiller to operate without the interlock system.
Replacement Processor

• A replacement cRio has been ordered and delivery is expected by 3-27-2018.

• Replacement cRio is NI-9035.
  – Same as the other interlock systems.

• In the interim, a loaner cRio NI-9035 has been installed, configured, and tested.
New Program Features - EPICS Interface

- EPICS client interface.
- Link to CSS screen added to SVT Hard Interlocks on main SVT overview.
- Four main tabs on EPICS user interface.
- Same layout as LabVIEW user interface.
- SoftIOC reset added to main Hall B IOC screen.
New Program Features - EPICS Interface

Summary of Interlocks

Interlock Status and Signal Monitoring

Thresholds And Enable Control Settings

LV/HV Power Supply Inhibits
New Program Features - Data logging

- Added EPICS Data logging
  - 118 EPICS SVT hardware interlock signals to Mya archiving.
  - Requested same dead band as similar slow control signal type (temperature, humidity, etc.).
New Program Features – Averaging

• **Added Averaging Option**
  
  – Allows for input signal averaging before interlock processing.
  
  – Controls accessible via LabVIEW user interface only.
  
  – Currently set to 100 samples, 10ms sampling.
New Program Features – Trip Delay

• **Added Trip Delay Option**
  
  – Allows option for time delay before tripping interlock.

  – Controls accessible via LabVIEW user interface only.

  – Currently set to 3 seconds.
New Program Features – User Interface

• **LabVIEW User Interface**
  
  – Adds delay trip control and signal averaging control.
  
  – Adds threshold configuration file status, up time counter, and system heartbeat.
  
  – Region 4 deleted.
  
  – User Interface link now loaded and tested on SVTINTERLOCKS computer in counting house.
New Program Features – Threshold Control

• Two modes of threshold control.

  • LabVIEW and EPICS control – Only one can be in control at a time.

  • Control mode chosen via LabVIEW user interface only.

  • Threshold control status indicator available on EPICS threshold control screen.
New Program Features – Threshold Control

• All thresholds are saved as a text file on SD drive in cRIO.
  
  – File is automatically updated with timestamp upon any threshold change.
  
  – Thresholds are automatically restored on cRIO boot.
  
  – Threshold configuration file status available on LabVIEW interface.
LabVIEW Real-Time Program Update

• Correctly reads negative coolant temperatures.
• Fixed ambient temperature T2 interlock.
• Humidity readings below 0% RH not permitted.
• Corrected in/out coolant flow signals.
• Region 4 deleted from interlock logic.
• Leak sensor repaired and tested.
Summary

• On 3-6-2018, the SVT Hardware Interlock System cRio processor failed to boot.

• A replacement cRio has been ordered and delivery is expected by 3-27-2018.

• In the interim, a loaner cRio has been installed, configured, and tested.

• The latest version of the hardware interlock program has been installed and tested.

• All outstanding hardware and software issues have been resolved with this SVT Hardware Interlock System update.
SVT Status

SVT Overview

Region Status

- Region 1: ALARM
  - HV ON: MIXED
  - LV ON: MIXED
- Region 2: OK
  - HV ON: ALL ON
  - LV ON: ALL ON
- Region 3: OK
  - HV ON: ALL ON
  - LV ON: ALL ON

Soft Interlocks

- On/Off Status: ALL ON

Hard Interlocks

- HV/LV Inhibit

Severities

- Humidity: OK
- Temperature: OK
- Dewpoint: OK
- Inlet Flow: OK
- Outlet Flow: OK
- Inlet Temp: OK

IOCs

- Chiller 1
  - Main
    - Status: OFF
    - External Temp: -18.570
    - Outlet Flow: 2.44 lpm
  - Secondary
    - Status: running

SVT Hybrid Temperatures

SVT HV Voltages

SVT HV Currents