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| TITLE: Hall B Solenoid System Cryogenics, Pre-Cooldown Instrument Checkout Procedure | DATE: 02/13/2017 |
| BY: Pablo Campero and Renuka Rajput-Ghoshal |  |
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| APP: Ruben Fair |  |

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| REV. | DESCRIPTION  | BY  | CHK. | APP. | APP. | DATE  |

**DEFINITIONS:**

TR = Cernox

TD = Silicon Diode

TP = Platinum RTD

TC = Thermocouple

PT = Pressure Transducer

DP = Differential Pressure Transducer

**Purpose**

The purpose of this document is to provide a general procedure for verifying ‘sensible’ readouts of cryogenic instruments prior to cooldown and to make available a location to record the results of the same.

**General Information**

In general, the individual performing these checks will use the EPICS screens to verify the readback of the instruments. Any ‘back door’ checks require expert access to the PLC and/or cRIO systems.

The recommended EPICS screens are listed on each page of the checklist.

**Procedure for Thermometers (TR, TD, TP, TC):**

For each thermometer listed in the following checklists, record the actual and the expected value along with the date and the initials of the individual performing the checkout.

**Procedure for Pressure Transducers (PT, DP):**

For each sensor listed in the following checklists, record the actual and expected value along with the date and the initials of the individual performing the checkout.

**NOTE:**

For pressure transducers, a sensible reading could be ~0, ~1 or ~3 Atm-absolute depending on whether the circuit is under vacuum, bled up to ambient pressure or under pressure (due to pressure checks), respectively.

**Procedure for Load Cells (LC):**

For each sensor listed in the following checklists, record the actual and expected value along with the date and initials of the individual performing the checkout.

**Distribution Box and Ancillary Piping Thermometers**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instrument ID | Expected Value [K] | Actual Value [K] | Pass/Fail | Initials | Date |
| TD8512 |  |  |  |  |  |
| TP8523 |  |  |  |  |  |
| TD8522DR |  |  |  |  |  |
| TD8522TR |  |  |  |  |  |
| TD8522SR |  |  |  |  |  |
| TD8513S |  |  |  |  |  |
| TP8557S |  |  |  |  |  |
| TD8513T |  |  |  |  |  |
| TP8557T |  |  |  |  |  |
| TP8567 |  |  |  |  |  |
| TP8564 |  |  |  |  |  |
| TP8552 |  |  |  |  |  |
| TP8555 |  |  |  |  |  |
| TP8565 |  |  |  |  |  |
| TC8559F |  |  |  |  |  |
| TC8559M |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

**Use the following EPICS screen to verify instruments on this page:**

**Solenoid-Cryo DBX** (it opens up Torus Distribution Box-PLC Screen, the DBX is common for the solenoid and the torus magnet)

|  |
| --- |
| TC8559F |
|  TC8559M |

I couldn’t see these two on EPIC screen, could you please check these?

These two sensors are located on the Torus Nitrogen Epics screen.

The question here is if we need them? --- Probably not

**Distribution Box and Ancillary Piping Pressure Transducers**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instrument ID | Expected Value [Atma] | Actual Value [Atma] | Pass/Fail | Initials | Date |
| PT8552 |  |  |  |  |  |
| PT8554 |  |  |  |  |  |
| PT8555 |  |  |  |  |  |
| PT8565 |  |  |  |  |  |
| PT8563 |  |  |  |  |  |
| PT8561 |  |  |  |  |  |
| PT8512 |  |  |  |  |  |
| PT8513T |  |  |  |  |  |
| PT8557T |  |  |  |  |  |
| PT8557S |  |  |  |  |  |
| PT8513S |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

**Use the following EPICS screen to verify instruments on this page:**

**Solenoid-Cryo DBX** (it opens up Torus Distribution Box-PLC Screen, the DBX is common for the solenoid and the torus magnet)

**Solenoid Service Tower (Lead and Magnet Reservoirs) Thermometers**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instrument ID | Expected Value [K] | Actual Value [K] | Pass/Fail | Initials | Date |
| TR8610 |  |  |  |  |  |
| TR8611 |  |  |  |  |  |
| TR8671 |  |  |  |  |  |
| TR8670 |  |  |  |  |  |
| TR8672 |  |  |  |  |  |
| TR8673 |  |  |  |  |  |
| TR8674 |  |  |  |  |  |
| TR8624A |  |  |  |  |  |
| TR8624B |  |  |  |  |  |
| TR8622A |  |  |  |  |  |
| TR8622B |  |  |  |  |  |
| TP8621A |  |  |  |  |  |
| TP8621B |  |  |  |  |  |
| TP8611 |  |  |  |  |  |
| TP8620A |  |  |  |  |  |
| TP8620B |  |  |  |  |  |
| TP8675 |  |  |  |  |  |
| TP8675r |  |  |  |  |  |
| TP8622A |  |  |  |  |  |
| TP8622Ar |  |  |  |  |  |
| TP8622B |  |  |  |  |  |
|  |  |  |  |  |  |

**Use the following EPICS screen to verify instruments on this page:**

**Solenoid Helium-SST**

**Solenoid Service Tower Pressure Transducers**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instrument ID | Expected Value | Actual Value | Pass/Fail | Initials | Date |
| PT8620 |  |  |  |  |  |
| PT8670 |  |  |  |  |  |
| PT8675A |  |  |  |  |  |
| PT8677 |  |  |  |  |  |
| LL8620DP |  |  |  |  |  |
| LL8670DP |  |  |  |  |  |
|  |  |  |  |  |  |

**Use the following EPICS screen to verify instruments on this page:**

**Solenoid Helium-SST**

**Solenoid Thermometers**

**Coils 1-5**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instrument ID | Expected Value [K] | Actual Value [K] | Pass/Fail | Initials | Date |
| TR86105C1 |  |  |  |  |  |
| TR86106C1 |  |  |  |  |  |
| TR86107C2 |  |  |  |  |  |
| TR86108C2 |  |  |  |  |  |
| TR86109C3 |  |  |  |  |  |
| TR86110C3 |  |  |  |  |  |
| TR86111C4 |  |  |  |  |  |
| TR86112C4 |  |  |  |  |  |
| TR86113C5 |  |  |  |  |  |
| TR86114C5 |  |  |  |  |  |

**EPICS Screen: Solenoid Helium-Solenoid Temps -> Coils**

**Splices and Bobbin**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instrument ID | Expected Value [K] | Actual Value [K] | Pass/Fail | Initials | Date |
| TR86115SP\_C1\_C3 |  |  |  |  |  |
| TR86116SP\_C1\_C3 |  |  |  |  |  |
| TR86117SP\_C3\_C5 |  |  |  |  |  |
| TR86118SP\_C3\_C5 |  |  |  |  |  |
| TR86119SP\_C4\_C5 |  |  |  |  |  |
| TR86120SP\_C4\_C5 |  |  |  |  |  |
| TR86120SP\_C2\_C4 |  |  |  |  |  |
| TR86121SP\_C2\_C4 |  |  |  |  |  |
| TR86132BOB\_US |  |  |  |  |  |
| TR86133BOB\_DS |  |  |  |  |  |

**EPICS Screen: Solenoid Helium-Solenoid Temps -> Splices/Bobbin**

**Solenoid Thermometers**

**LHe Channels/ Cooling Plate**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instrument ID | Expected Value [K] | Actual Value [K] | Pass/Fail | Initials | Date |
| TR86101CP\_B |  |  |  |  |  |
| TR86102CP\_B |  |  |  |  |  |
| TR86103CP\_T |  |  |  |  |  |
| TR86104CP\_T |  |  |  |  |  |

**EPICS Screen: Solenoid Helium-Solenoid Temps -> LHe Channels**

**Radiation Shields**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instrument ID | Expected Value [K] | Actual Value [K] | Pass/Fail | Initials | Date |
| TP86128HS\_BO\_B\_BR |  |  |  |  |  |
| TP86129HS\_BO\_B\_BL |  |  |  |  |  |
| TP86130HS\_B\_OD |  |  |  |  |  |
| TP86131HS\_B\_OD |  |  |  |  |  |
| TP86134HS\_US\_CO\_LBR |  |  |  |  |  |
| TP86135HS\_DS\_CO\_LBR |  |  |  |  |  |
| TP86136HS\_US\_CO\_UBR |  |  |  |  |  |
| TP86137HS\_DS\_CO\_UBR |  |  |  |  |  |
| TP86138HS\_US\_CO\_UBL |  |  |  |  |  |
| TP86139HS\_DS\_CO\_UBL |  |  |  |  |  |
| TP86140HS\_DS\_CO\_LBL |  |  |  |  |  |
| TP86141HS\_US\_CO\_LBL |  |  |  |  |  |

**EPICS Screen: Solenoid Helium-Solenoid Temps -> Radiation Shields**

**Suspension**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instrument ID | Expected Value [K] | Actual Value [K] | Pass/Fail | Initials | Date |
| TR86123RS\_US\_T\_BL\_C |  |  |  |  |  |
| TR86124RS\_DS\_B\_BL\_C |  |  |  |  |  |
| TP86125RS\_US\_T\_BL\_M |  |  |  |  |  |
| TP86126RS\_US\_T\_BL\_M |  |  |  |  |  |
| TP86127RS\_DS\_B\_BL\_M |  |  |  |  |  |

**EPICS Screen: Solenoid Helium-Solenoid Temps -> Suspension**

**Solenoid Load Cells**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instrument ID | Expected Value [lb] | Actual Value [lb] | Pass/Fail | Initials | Date |
| RS86107DS\_BL\_B |  |  |  |  |  |
| ZS86107DS\_BL\_B |  |  |  |  |  |
| RS86106DS\_BL\_T |  |  |  |  |  |
| ZS86106DS\_BL\_T |  |  |  |  |  |
| RS86103DS\_BR\_T |  |  |  |  |  |
| ZS86103DS\_BR\_T |  |  |  |  |  |
| RS86102DS\_BR\_B |  |  |  |  |  |
| ZS86102DS\_BR\_B |  |  |  |  |  |
| RS86105US\_BL\_T |  |  |  |  |  |
| ZS86105US\_BL\_T |  |  |  |  |  |
| RS86108US\_BL\_B |  |  |  |  |  |
| ZS86108US\_BL\_B |  |  |  |  |  |
| RS86104US\_BR\_T |  |  |  |  |  |
| ZS86104US\_BR\_T |  |  |  |  |  |
| RS86101US\_BR\_B |  |  |  |  |  |
| ZS86101US\_BR\_B |  |  |  |  |  |

**Use the following EPICS screen to verify instruments on this page:**

**Solenoid Load Cells**