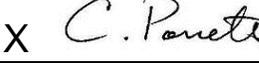


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Doc No. PS-C-ASD-PRC-209	Author: H. Fernandes	Effective Date: 21 Jun 2016 Review Frequency: 3 yrs	Version 1
Title: Mezzanine-implemented LOTO for the 3PW			Technical

Reviewed by:

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Approved by:

6/20/2016

X Ferdinand Willeke

Ferdinand Willeke
Accelerator Division Director
Signed by: Willeke, Ferdinand

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VERSION HISTORY LOG

VERSION	DESCRIPTION	DATE
1	First Issue.	21Jun2016

ACRONYMS

3PW	Three Pole Wiggler	LOTO	Lockout/Tagout
BNL	Brookhaven National Laboratory	NSLS-II	National Synchrotron Light Source II
CSS	Controls System Studio	PPE	Personal Protective Equipment
ESH	Environment, Safety & Health	SBMS	Standards Based Management System
FLOCO	Floor Coordinator	VAC	Volts Alternating Current
ID	Insertion Device	CSS	Cascading Style Sheets Software
lb	Pound		

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1 PURPOSE AND SCOPE

The purpose of this procedure is to provide instructions for LOTO of the NSLS-II 3PW from the mezzanine-resident rack, to protect against radiation when the 3PW is not in use.

The scope of this procedure includes 1) performing Centrally Controlled LOTO from the mezzanine racks on the 3PW for beam testing and/or ring commissioning 2) performing Centrally Controlled LOTO to safely take all 3PWs out of service before ring operations.

2 DEFINITIONS

- 2.1 Centrally Controlled LOTO: LOTO of systems or equipment to prevent personnel injury and/or exposure to hazardous energy, for operational reasons.
- 2.2 Equipment Protection System (EPS): The engineered interlocks that protect ring-resident equipment during NSLS-II operations.
- 2.3 Affected Employees: Employees who are required to use machines or equipment on which a servicing and maintenance LOTO is being performed. For the NSLS-II, this is typically the Operations Staff.
- 2.4 Primary Authorized Employee: An Authorized Employee who is designated by their department/division to coordinate complex-group LOTO procedures. The Primary Authorized Employee coordinates workforces and ensures continuity of LOTO protection for all involved (both Authorized and Affected Employees). They are the first to apply their lock and the last to remove their lock from a group LOTO. At the NSLS-II, Primary Authorized Employees apply Centrally Controlled LOTO for the protection of other workers as well.

3 RESPONSIBILITIES

- 3.1 Authorized and Qualified ID Group Personnel
 - 3.1.1 Perform the following procedure using proper PPE in accordance with the SBMS Subject Area, *Electrical Safety* and the Arc Flash Warning label posted on the disconnect or circuit breaker that powers the equipment to be de-energized.
 - 3.1.2 Apply Centrally Controlled LOTO, as described in this procedure.

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3.1.3 Communicate this procedure to all Affected Workers.

3.1.4 Address any concerns of the Affected Workers.

3.2 ID Group Cognizant Engineer/Technical Authority

3.2.1 Provides or directs system expert support for 3PW System operation.

3.2.2 Provides clarification on any 3PW System related issues in this procedure.

3.3 ESH Staff/Operations Staff (e.g., Lead Operator or FLOCO)

3.3.1 ESH Staff provides clarification and guidance on any ESH issues that arise during the execution of this procedure.

3.3.2 Apply Centrally Controlled LOTO, as required.

4 PREREQUISITES

4.1 Primary Authorized Employees performing this procedure have completed training for PS-C-ASD-PRC-005, *Centrally Controlled Lockout/Tagout (LOTO) Procedure*.

4.2 Refer to Figure 4-1 when necessary for a wiring diagram depicting the connections between the Control Rack and the 3PW.

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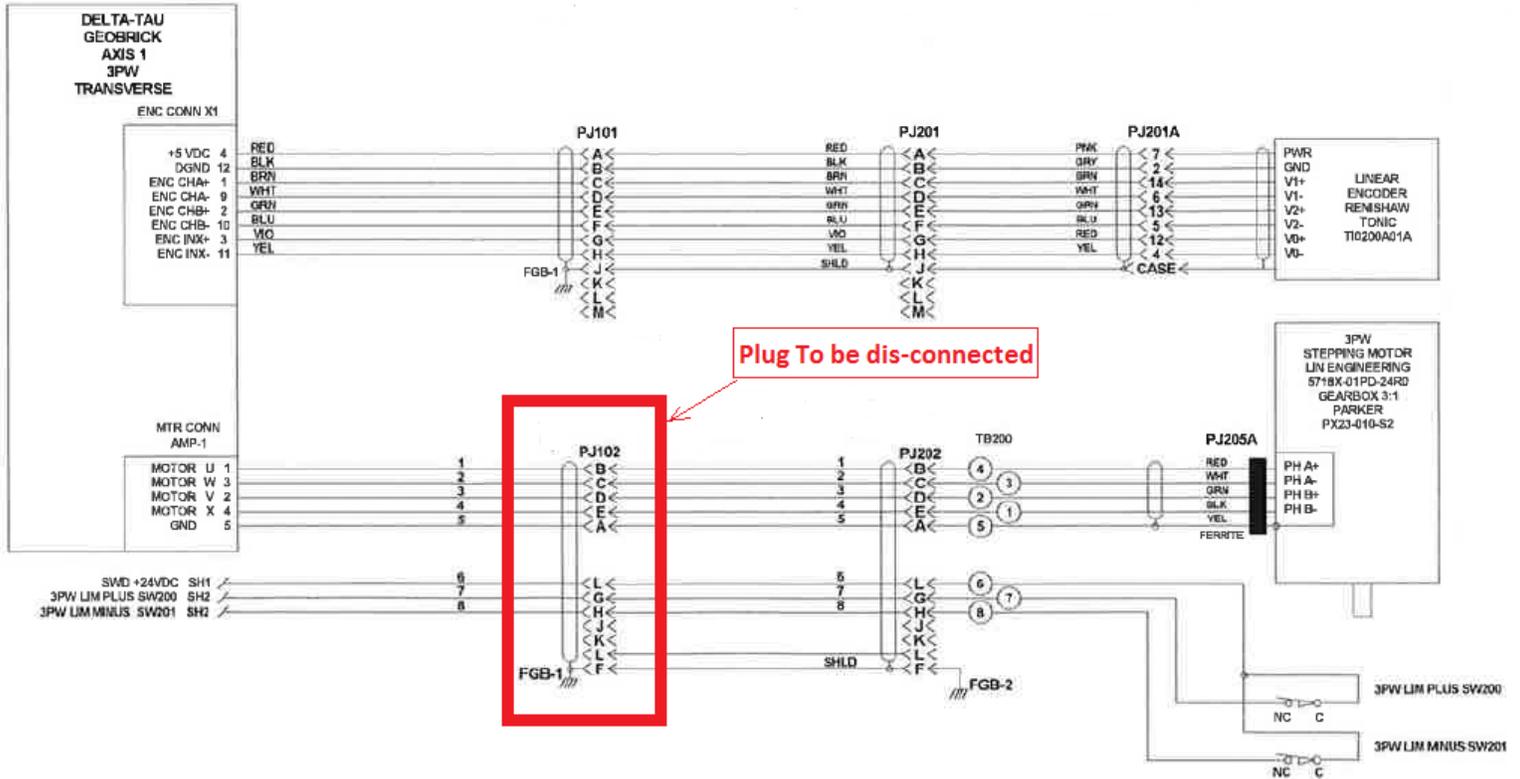


Figure 4-1: Control Rack to 3PW Cabling

- 4.3 Each Primary Authorized Employee performing this procedure has facility specific PPE available.
- 4.4 For each 3PW to which LOTO will be applied, the following equipment/tools are required and available:
- One (1) red-banded padlock; (Master series 31, BNL stock # I65062)
 - One (1) yellow Plug Lockout Boot (Prinzing Enterprises # PL023, See Fig 4-2).
 - One (1) Solid red lockout tag, (BNL stock number S81046) for Centrally Controlled LOTO
 - Lockout key Lock Box, (Emedco MGB11, size: 6"h x 9"w x 3-1/2"d or equivalent)

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Figure 4-2: Plug Lockout Boot

- 4.5 Contact Operations Staff or ESH Staff to confirm availability to assist with the LOTO.
- 4.6 Notify the Control Room, Mechanical Engineering Group Leader, Deputy Instrumentation Group Leader and the Lead Beamline Scientist of the impending LOTO.

5 PRECAUTIONS AND LIMITATIONS

- 5.1 The 3PW is constructed with permanent magnets that do not have an on/off switch. Internal magnetic loads of hundreds of pounds may be present. Since the magnetic gap is not guarded, magnetic materials should be kept clear of the “beam centerline” area. A selection of non-magnetic tools is available from the ID Group.
- 5.2 All steps in this procedure require Centrally Controlled LOTO, and shall be performed in accordance with PS-C-ASD-PRC-005, *Centrally Controlled Lockout/Tagout (LOTO) Procedure*. LOTO for any other purpose shall not be performed as part of this procedure.
- 5.3 Only a person that is identified as a Primary Authorized Employee may perform Centrally Controlled LOTO on the 3PW and Control Rack.

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5.4 The following equipment remains powered during the performance of this procedure:

- The 3PW Control Rack, powered by a floor-mounted 208 VAC junction box and a 110 VAC power strip with outlets on both sides
- The position limit switches (for readback of open/close position to the 3PW)
- The encoder

5.5 The 3PW Control Rack at Cell 22 resides on the ring inner side on the mezzanine above Cells 22 (labeled MC22-RG-G1). Refer to Table 5-1 for the relative position of the 3PW with reference to rack for installed 3PWs in the ring.

Table 5-1: Rack Location of 3PWs on Mezzanine

Beamline	3PW Location in Ring	Rack Position on Mezzanine	Channel on Delta Tau	Cable Tag Nomenclature
FIS/MET	Cell 22	MC22RG-G1	8	SR-C22BM-FE-FIS3PW:AX1 MTR 1
XFP	Cell 17	MC18RG-E4	8	SR-C17BM-FE-XFP3PW:AX1 MTR 1
CMS	Cell 11	MC12RG-E4	8	SR-C11BM-FE-CMS3PW:AX1 MTR 1
TES	Cell 8	MC9RG-E4	8	SR-C8BM-FE-TES3PW:AX1 MTR 1
QAS	Cell 7	MC8RG-E4	8	SR-C7BM-FE-QAS3PW:AX1 MTR 1
BMM	Cell 6	MC7RG-E4	8	SR-C6BM-FE-BMM3PW:AX1MTR 1
XFM	Cell 4	MC5RG-E4	8	SR-C4BM-FE-XFM3PW:AX1 MTR 1

5.6 Deviations from expected configuration(s) require a halt to this procedure for evaluation by the ID Group Cognizant Engineer.

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6 PROCEDURE

6.1 Apply Centrally Controlled LOTO

Caution: During and after completion of this LOTO procedure, the 3PW Control Rack remains energized; only the cable connector for the motor is disconnected.

6.1.1 Obtain the appropriate padlocks, Plug Lockout Boot (Figure 4-2) and solid red lockout tags.



Figure 6-1: CSS 3PW Control Page

6.1.2 On the CSS ID Control Page for 3PW, command the Driven Axis System to go to the fully retracted position:

- Press the “MOVE OUT” button as indicated in Figure 6-1 in CSS.
- Confirm that the 3PW status “OUT” indicator in Figure 6-1 is ON in CSS.

6.1.3 IF ring access is available, THEN visually verify that the 3PW is in the retracted position.

6.1.4 Confirm that the 3PW and its Controller Channel 4 are safe to shut down.

6.1.5 Complete all information required on the face of the solid red lockout tags.

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6.1.6 Notify the Deputy Instrumentation Group Leader that the required 3PW motor will be disconnected and refer to Table 5-1 for the channel number.

Note: As agreed upon by the Instrumentation Group, the motor cable may be “unplugged hot,” as the controller is shared by other beamline and front end components.

6.1.7 Disconnect the motor cable connector located behind the control rack, as indicated in Figure 6-2 and Table 5-1.

Note: The figure below is an example of the Cell 17 motor cable. All 3PWs will have their cables marked accordingly.

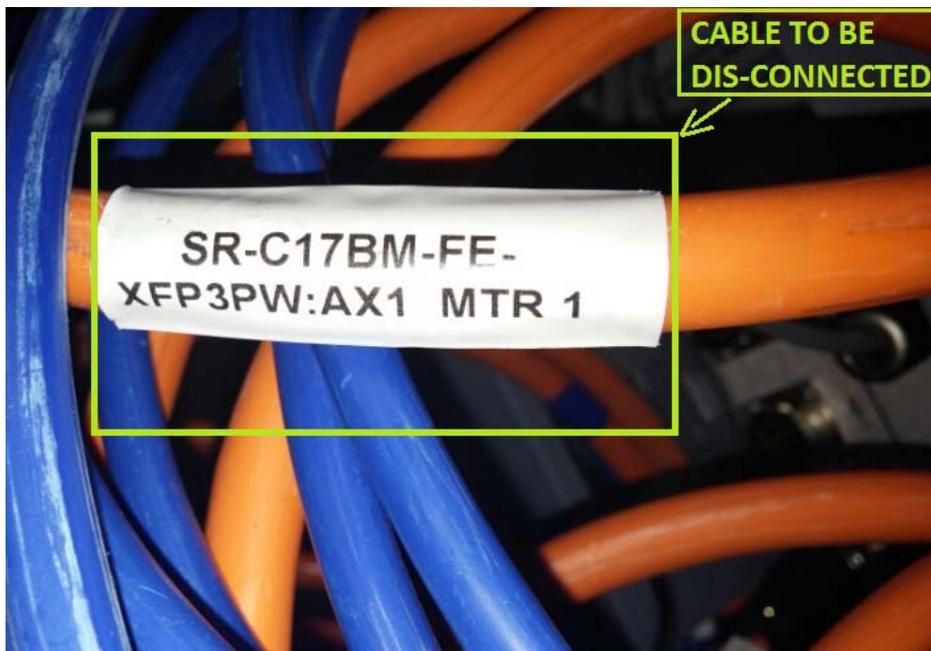


Figure 6-2: Typical 3PW Motor Cable

6.1.8 Insert the motor cable connector indicated in step 6.1.7 into the Plug Lockout Boot (Figure 6-3).

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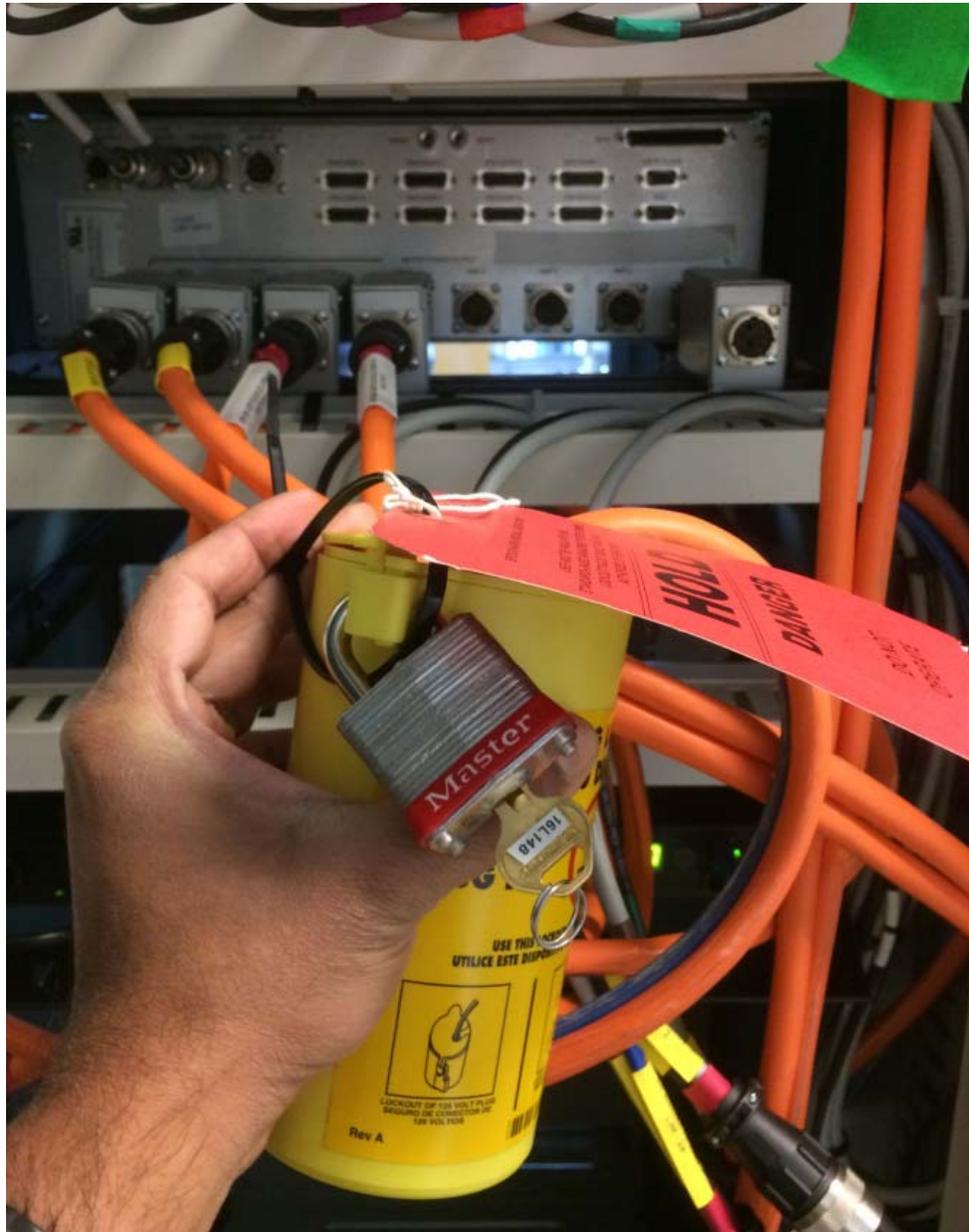


Figure 6-3: Plug Lockout Boot Applied to Cable Connector

Note: Apply a solid red lockout tag using a 50 lb rated zip-tie.

6.1.9 Apply a padlock AND a solid red lockout tag to the Plug Lockout Boot, in accordance with PS-C-ASD-PRC-005, *Centrally Controlled Lockout/Tagout (LOTO) Procedure*, as indicated in Figure 6-3.

6.1.10 Challenge the padlocks to ensure that they are installed securely.

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6.2 Test Centrally Controlled LOTO

6.2.1 On the CSS ID Control Page for 3PW, command the Driven Axis System to go to the fully retracted position.

- a. Press the "MOVE IN" button as indicated in Figure 6-1 in CSS.
- b. Confirm that the CSS readout on the limit switch indicator does not show a change in value.

6.2.2 Place all keys to the padlocks in the Lockout key Lock Box.

6.2.3 Apply a padlock AND solid red lockout tag to the Lock Box.

6.2.4 Operations Staff OR ESH Staff apply a padlock and solid red lockout tag to the Lock Box.

Note: After the Operations Staff or ESH Staff apply their padlock to the Lock Box, it will be kept in the Control Room for the duration of the LOTO.

6.2.5 Notify the Control Room that LOTO has been successfully applied.

6.2.6 Document Centrally Controlled LOTO in accordance with PS-C-ASD-PRC-005, *Centrally Controlled Lockout/Tagout (LOTO) Procedure*.

6.3 Restoring Equipment to Service - Clear LOTO

6.3.1 Verify that the reason for the LOTO is complete.

6.3.2 Confirm that the 3PW and Controller Channel 4 are safe to enable.

6.3.3 Contact Operations Staff OR ESH Staff for removal of their padlocks from the Lock Box.

6.3.4 Notify the Control Room, Deputy Instrumentation Group Leader, Mechanical Engineering Group Leader and the Lead Beamline Scientist of the intent to return to service.

6.3.5 Recover the padlock keys from the Lock Box in accordance with PS-C-ASD-PRC-005, *Centrally Controlled Lockout/Tagout (LOTO) Procedure*.

6.3.6 Remove all padlocks, Plug Lockout Boots and solid red lockout tags.

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- 6.3.7 Connect the plug for the 3PW motor cable indicated in Figure 6-2.
- 6.3.8 On the CSS ID Control Page for 3PW, command the Driven Axis System to go to the fully retracted position.
- Press the "MOVE IN" button as indicated in Figure 6-1.
 - Confirm that the 3PW status indicated in Figure 6-1 "in" indicator is ON in CSS.
- 6.3.9 IF ring access is available, THEN visually verify that the 3PW is in the retracted position.
- 6.3.10 Notify the Control Room, Mechanical Engineering Group Leader, Deputy Instrumentation Group Leader and Lead Beamline Scientist that LOTO has been successfully removed.
- 6.3.11 Return the group LOTO red tags AND padlocks to the LOTO station.
- 6.3.12 Document the clearing of Centrally Controlled LOTO in accordance with PS-C-ASD-PRC-005, *Centrally Controlled Lockout/Tagout (LOTO) Procedure*.

7 REFERENCES

- 7.1 SBMS Subject Area, *Electrical Safety*
- 7.2 PS-C-ASD-PRC-005, *Centrally Controlled Lockout/Tagout (LOTO) Procedure*

8 ATTACHMENTS

None.

9 DOCUMENTATION

None.

-END-