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 Org: PHALLA

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Operational Safety Procedure Review and Approval Form # 66796
 (See [ES&H Manual Chapter 3310 Appendix T1 Operational Safety Procedure \(OSP\) and Temporary OSP Procedure](#) for Instructions)

Type:	OSP Click for OSP/TOSP Procedure Form Click for LOSP Procedure Form		
Serial Number:	ENP-18-66796-OSP		
Issue Date:	3/13/2018		
Expiration Date:	2/13/2020		
Title:	Testing and Adjusting Power Supplies while Energized		
Location: (where work is being performed) Building Floor Plans	101 - Experimental Hall A - A101 58 - Test Lab - 1150 58 - Test Lab - 1128 72 - Physics Storage - 100 72 - Physics Storage - 101 72 - Physics Storage - 102 23 - Experimental Staging - 102 55 - Technology & Engineering Development - 1602 55 - Technology & Engineering Development - 1603 55 - Technology & Engineering Development - 1604	Location Detail: (specifics about where in the selected location(s) the work is being performed)	All locations where power supplies operated by Hall A are installed. Hall A and Test Stands.

Risk Classification: (See ES&H Manual Chapter 3210 Appendix T3 Risk Code Assignment)	Without mitigation measures (3 or 4):	4
	With mitigation measures in place (N, 1, or 2):	2

Reason:	This document is written to mitigate hazard issues that are : Determined to have an unmitigated Risk code of 3 or 4
Owning Organization:	PHALLA
Document Owner(s):	Segal, Jack (segal@jlab.org) Primary Butler, Jessie (jbutler@jlab.org)

Supplemental Technical Validations

Mode 1: Class 1, 2, and 3 Electrical Equipment (Paul Powers, Todd Kujawa)
Mode 2: Class 2 and 3 Equipment (Paul Powers, Todd Kujawa)
Lock, Tag, Try (Paul Powers, Todd Kujawa)

Document History

Revision <input type="checkbox"/>	Reason for revision or update <input type="checkbox"/>	Serial number of superseded document <input type="checkbox"/>
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Comments for reviewers/approvers: **Andrew Kimber has been removed from the list of reviewers.**

Attachments ▣

Procedure: ***Hall_A_power_supplies_Document-24048.pdf***
 THA: ***Hall_A_power_supplies_Document-17166.pdf***
 Additional Files:

Review Signatures

Additional Authorization : Physics ES&H Liaison	Signed on 9/29/2017 9:48:54 AM by Bert Manzlak (manzlak@jlab.org)
Subject Matter Expert : Electricity->Mode 1: Class 1-> 2-> and 3 Electrical Equipment	Signed on 9/29/2017 8:57:19 AM by Todd Kujawa (kujawa@jlab.org)
Subject Matter Expert : Electricity->Mode 2: Class 2 and 3 Equipment	Signed on 9/29/2017 8:57:24 AM by Todd Kujawa (kujawa@jlab.org)
Subject Matter Expert : Lock-> Tag-> Try	Signed on 9/29/2017 8:57:28 AM by Todd Kujawa (kujawa@jlab.org)

Approval Signatures

Division Safety Officer : PHALLA	Signed on 9/29/2017 10:02:29 AM by Ed Folts (folts@jlab.org)
Org Manager : PHALLA	Signed on 10/3/2017 11:34:47 AM by Cynthia (Thia) Keppel (keppel@jlab.org)
Safety Warden : Experimental Hall A - A101	Signed on 9/29/2017 11:03:33 AM by Jessie Butler (jbutler@jlab.org)
Safety Warden : Experimental Staging - 102	Signed on 3/13/2018 11:37:30 AM by Jack Segal (segal@jlab.org)
Safety Warden : Physics Storage - 100	Signed on 9/29/2017 10:01:04 AM by Andrew Lumanog (andrewl@jlab.org)
Safety Warden : Physics Storage - 101	Signed on 9/29/2017 10:01:23 AM by Andrew Lumanog (andrewl@jlab.org)
Safety Warden : Physics Storage - 102	Signed on 9/29/2017 10:01:31 AM by Andrew Lumanog (andrewl@jlab.org)
Safety Warden : Technology & Engineering Development - 1602	Signed on 10/12/2017 12:06:07 PM by Todd Ewing (jtewing@jlab.org)
Safety Warden : Technology & Engineering Development - 1603	Signed on 10/12/2017 12:06:09 PM by Todd Ewing (jtewing@jlab.org)
Safety Warden : Technology & Engineering Development - 1604	Signed on 10/12/2017 12:06:28 PM by Todd Ewing (jtewing@jlab.org)
Safety Warden : Test Lab - 1128	Signed on 9/29/2017 10:38:17 AM by Douglas Higinbotham (doug@jlab.org)
Safety Warden : Test Lab - 1150	Signed on 9/29/2017 10:38:32 AM by Douglas Higinbotham (doug@jlab.org)

Operational Safety Procedure Form
(See [ES&H Manual Chapter 3310 Appendix T1 Operational Safety Procedure \(OSP\) and Temporary OSP Procedure](#) for instructions.)

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Title:	Testing and Adjusting Power Supplies while Energized		
Location:	All Locations where Power Supplies operated by Hall A are installed, Hall A and Test Stands	Type:	<input checked="" type="checkbox"/> OSP <input type="checkbox"/> TOSP
Risk Classification (per Task Hazard Analysis attached) (See ESH&Q Manual Chapter 3210 Appendix T3 Risk Code Assignment.)	Highest Risk Code Before Mitigation		4
	Highest Risk Code after Mitigation (N, 1, or 2):		2
Owning Organization:	Hall A	Date:	April 11, 2017
Document Owner(s):	Jack Segal, Jessie Butler		

DEFINE THE SCOPE OF WORK

1. Purpose of the Procedure – Describe in detail the reason for the procedure (what is being done and why).
To provide guidelines for operating and testing Power Supplies while energized. Guidelines include recognizing hazards, implementing mitigations, choosing proper PPE and following safe work standards.
2. Scope – include all operations, people, and/or areas that the procedure will affect.
Testing and measurement of DC power supplies including Mode 1 and Mode 2 work on Class 2 or Class 3 equipment. Safety guidelines to follow while operating and testing power supplies
3. Description of the Facility – include building, floor plans and layout of the experiment or operation.
Typical operation will be power supplies in Hall A designated operational or Test areas with properly assigned clearance areas. Typical areas for testing by type as follows: 1. Box Power Supplies: Hall A and Test Stands

ANALYZE THE HAZARDS and IMPLEMENT CONTROLS

4. Hazards identified on written Task Hazard Analysis
See attached THA Worksheet
5. Authority and Responsibility:
5.1 Who has authority to implement/terminate
Halls A and C Group Leader or Deputy
5.2 Who is responsible for key tasks
Senior Test Personnel for the system as determined by the Head of the Halls A and C Spectrometer Support Group and the Hall A Work Coordinator
5.3 Who analyzes the special or unusual hazards including elevated work, chemicals, gases, fire or sparks (See ES&H Manual Chapter 3210 Appendix T1 Work Planning, Control, and Authorization Procedure)

Senior Test Persons leading the tests are responsible for analyzing the hazards

5.4 What are the Training Requirements (See http://www.jlab.org/div_dept/train/poc.pdf)

1. SAF 104 LT&T training
2. Equipment specific LT&T training
3. Equipment specific training and qualification
4. SAF 603A Electrical Worker qualification
5. NFPA70E training
6. SAF603N1 ARC Flash, SAF603N2 Electrical Emergencies, SAF603N3 Electrical Safety for Qualified Worker.

6. Personal and Environmental Hazard Controls Including:

6.1 Shielding

None

6.2 Barriers (magnetic, hearing, elevated or crane work, etc.)

Barriers and covers to prevent inadvertent contact with live electrical equipment. Barriers and covers to protect against ARC flash hazards.

6.3 Interlocks

Door Interlocks, Temperature Interlocks, Load Interlocks, Water Flow Interlocks, Ground Fault Interlocks have to be working during tests.

6.4 Monitoring systems

Fire protection systems are installed in most test areas

6.5 Ventilation

High power testing must be conducted in spaces with adequate air/water cooling for operating power supplies. High power loads must be located in ventilated areas to allow for proper air/water cooling.

6.6 Other (Electrical, ODH, Trip, Ladder) (Attach related Temporary Work Permits or Safety Reviews as appropriate.)

As required

7. List of Safety Equipment:

7.1 List of Safety Equipment:

1. Longs Sleeve shirt and pants (non-melting)
2. Voltage rated gloves with leather protectors
3. Safety glasses
4. ARC Flash rated hood/ suit, minimum of 8 cal/cm², arc flash protective clothing; pants and shirt/ or coveralls
5. ARC Flash rated face shield, minimum 8 Cal/cm², arc rated balaclava
6. Hearing Protection
7. Safety Shoes

7.2 Special Tools:

1. Voltage rated meters and probes
2. Insulated Tools
3. High Voltage probes
4. High Voltage or High Current transducers

8. Associated Administrative Controls

1. SAF 104, General Lock, Tag, and Try (LT&T) training
2. Equipment specific LT&T training, equipment specific operations and manuals
3. EH&S Manual electrical safety Chapter 6200
4. Task Hazard Analysis form 331T0T1
5. SAF603A, Electrical safety Awareness
6. SAF603N1, SAF603N2, SAF603N3, NFPA70E training

DEVELOP THE PROCEDURE

9. Operating Guidelines

Mode 1 and Mode 2 work on Class 2 or Class 3 equipment as defined in the EH&S Manual Chapter 6230.

10. Notification of Affected Personnel (who, how, and when include building manager, safety warden, and area coordinator)

1. Hall A Work Coordinator via email and phone
2. Halls A and C Spectrometer Support Group Leader via email and phone
3. Other Groups: ATLAS and E-mail

11. List the Steps Required to Execute the Procedure: from start to finish.

1. Test Plan put together by person leading the test. The test plan must use this OSP as part of the guidelines.
2. Proper PPE and Work Tools gathered
3. Task Hazard Analysis performed by Senior Test Person/qualified test personnel
4. Test Plan approved by Halls A and C Spectrometer Support group leader or Senior Test Personnel if in Hall A Test Stands
5. Testing/Adjustment under general guidance of this OSP
6. Restoration of circuits and equipment. Follow ABIL requirements if necessary
7. Inspection of test data and approval for restoring operation from Senior Test Personnel

12. Back Out Procedure(s) i.e. steps necessary to restore the equipment/area to a safe level.

1. LT&T equipment according to equipment specific procedures
2. Remove all test equipment
3. Restore all circuits to their proper operational condition
4. Re-test interlocks
5. Restore operation of power supply

13. Special environmental control requirements:

13.1 List materials, chemicals, gasses that could impact the environment (ensure these are considered when choosing Subject Mater Experts) and explore [EMP-04 Project/Activity/Experiment Environmental Review](#) below

None

13.2 Environmental impacts (See [EMP-04 Project/Activity/Experiment Environmental Review](#))

None

13.3 Abatement steps (secondary containment or special packaging requirements)

None

14. Unusual/Emergency Procedures (e.g., loss of power, spills, fire, etc.)

None

15. Instrument Calibration Requirements (e.g., safety system/device recertification, RF probe calibration)

1. Testing and verifying proper operation of multi-meters and test probes

- 2. Calibration of Current and voltage transducers and readouts if required
- 3. Interlocks re-certification if required

16. Inspection Schedules

Hall A maintenance periods

17. References/Associated/Relevant Documentation

2004 Edition NFPA70E Electrical Safety

18. List of Records Generated (Include Location / Review and Approved procedure)

- 1. HALOG Entries where necessary
- 2. ABIL tag and Log Entry if necessary

Click

To Submit OSP
for Electronic Signatures

Distribution: Copies to Affected Area, Authors, Division Safety Officer

Expiration: Forward to ESH&Q Document Control

Form Revision Summary

Revision 1.4 – 06/20/16 – Repositioned “Scope of Work” to clarify processes

Qualifying Periodic Review – 02/19/14 – No substantive changes required

Revision 1.3 – 11/27/13 – Added “Owning Organization” to more accurately reflect laboratory operations.

Revision 1.2 – 09/15/12 – Update form to conform to electronic review.

Revision 1.1 – 04/03/12 – Risk Code 0 switched to N to be consistent with [3210 T3 Risk Code Assignment](#).

Revision 1.0 – 12/01/11 – Added reasoning for OSP to aid in appropriate review determination.

Revision 0.0 – 10/05/09 – Updated to reflect current laboratory operations

ISSUING AUTHORITY	FORM TECHNICAL POINT-OF-CONTACT	APPROVAL DATE	REVIEW DATE	REV.
ESH&Q Division	Harry Fanning	06/20/16	06/20/19	1.4

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Task Hazard Analysis (THA) Worksheet

(See [ES&H Manual Chapter 3210 Appendix T1](#)
[Work Planning, Control, and Authorization Procedure](#))

**Click
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Author:	Jack Segal	Date:	April 11, 2017	Task #: If applicable	N/A
Complete all information. Use as many sheets as necessary					
Task Title:	Testing and Adjusting DC Power Supplies while fully Powered	Task Location:	Hall A and Hall A Test Stands		
Division:	Physics	Department:	Hall A	Frequency of use:	Regular use during testing or troubleshooting DC Power Supplies
Lead Worker:	Jack Segal, Jessie Butler, or as assigned				
Mitigation already in place: Standard Protecting Measures Work Control Documents	SAF 104 –LT&T SAF603A –Basic Electrical Safety SAF603N – NFPA70E Equipment Specific LT&T Procedure for Power Supplies				

Sequence of Task Steps	Task Steps/Potential Hazards	Consequence Level	Probability Level	Risk Code (before mitigation)	Proposed Mitigation (Required for Risk Code >2)	Safety Procedures/ Practices/Controls/Training	Risk Code (after mitigation)
1	Lock and Tag of PS: Arc Flash Hazards, Exposure to Class 3 Voltages up to 2300VDC and 480VAC if not using VVU. High Current AC and DC buss	Medium	Medium	4/3	LT&T, using VVU to verify voltage is removed, use ground stick to remove stored energy. Barriers installed as required	Equipment Specific LT&T procedure and training, PPE usage, ground stick usage, Flash and Limited Approach Boundaries observed. Only Authorized people may perform work, 2-man rule	1
2	Energized testing of PS with Doors Open and interlocks bypassed, with barriers – Observation only: same hazards as #1 above	Medium	Medium	4/3	Area around PS is restricted for access to trained personnel, PPE as defined in document, No crossing of the prohibited approach boundaries allowed. Barriers/shields installed as required.	Hands off observation of indicator lights inside PS only, PPE required to be inside ARC Flash and Limited Approach Boundaries. Only Authorized people may perform work, 2-man rule	1

Task Hazard Analysis (THA) Worksheet

(See [ES&H Manual Chapter 3210 Appendix T1](#)
[Work Planning, Control, and Authorization Procedure](#))

Sequence of Task Steps	Task Steps/Potential Hazards	<u>Consequence Level</u>	<u>Probability Level</u>	<u>Risk Code</u> (before mitigation)	Proposed Mitigation (Required for <u>Risk Code</u> >2)	Safety Procedures/ Practices/Controls/Training	<u>Risk Code</u> (after mitigation)
3	Energized Testing of the PS with doors open and interlocks bypassed with test equipment installed while power supply is Locked out and de-energized. Use of Hands-Off techniques. Class 3 shock hazard, Arc Flash hazard	Medium	Medium	4/3	Perform measurement equipment connection with PS de-energized and LT&T where necessary. Re-energize supply to make measurements. L&T the PS to remove or reposition test equipment. Barriers/shields installed as required.	Hands Off observation of instruments connected to PS only, PPE required to be inside Arc Flash and Limited Approach Boundaries. Only Authorized people may perform work under supervision of senior personnel, 2-man rule, safety watch requirements	1
4	Energized Testing of the PS with doors open and interlocks bypassed, with test equipment, performed using Hands-On probing. Class 3 shock hazard, Arc Flash Hazard	Medium	Medium	4/3	Hands-on probing to make measurements on safe measurement points using appropriately rated equipment and PPE. Barriers/Shields installed as required to prevent inadvertent contact with nearby circuitry.	Procedures and techniques described in the document. PPE required, authorized personnel only under direct supervision of senior personnel, 2-man rule, safety watch requirements, voltage rated test equipment or isolated test equipment used	2
Highest <u>Risk Code</u> before Mitigation:				4	Highest <u>Risk Code</u> after Mitigation:		2

When completed, if the analysis indicates that the Risk Code before mitigation for any steps is “medium” or higher (RC≥3), then a formal [Work Control Document](#) (WCD) is developed for the task. Attach this completed Task Hazard Analysis Worksheet. Have the package reviewed and approved prior to beginning work. (See [ES&H Manual Chapter 3310 Operational Safety Procedure Program](#).)

Task Hazard Analysis (THA) Worksheet

(See [ES&H Manual Chapter 3210 Appendix T1](#)

[Work Planning, Control, and Authorization Procedure](#))

Form Revision Summary

Periodic Review – 08/13/15 – No changes per TPOC

Revision 0.1 – 06/19/12 - Triennial Review. Update to format.

Revision 0.0 – 10/05/09 – Written to document current laboratory operational procedure.

ISSUING AUTHORITY	TECHNICAL POINT-OF-CONTACT	APPROVAL DATE	REVIEW DATE	REV.
ESH&Q Division	Harry Fanning	08/13/15	08/13/18	0.1

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