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|  | **Operational Safety Procedure Form****(See** [**ES&H Manual Chapter 3310 Appendix T1 Operational Safety Procedure (OSP) and Temporary OSP Procedure**](http://www.jlab.org/ehs/ehsmanual/3310T1.htm) **for instructions.)** |  |
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| Title: | Battery Bias Box maintenance |  |
| Location: | various | **Type:**  | ** OSP****TOSP** |  |
| Risk Classification (per [Task Hazard Analysis](https://www.jlab.org/ehs/ehsmanual/Glossary.htm#THADef) attached)(See [*ESH&Q Manual Chapter 3210 Appendix T3 Risk Code Assignment*](http://www.jlab.org/ehs/ehsmanual/3210T3.htm).) | Highest Risk Code Before Mitigation  | 2 |  |
| Highest Risk Code after Mitigation (N, 1, or 2): | 1 |  |
| Owning Organization: | Center for Injectors and Sources | Date: | 9 January 2020 |  |
| Document Owner(s): | Marcy Stutzman |  |

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| **DEFINE THE SCOPE OF WORK** |
| 1. **Purpose of the Procedure –** Describe in detail the reason for the procedure (what is being done and why).
 |
| Battery bias boxes are used to provide an isolated DC bias for measuring photocurrent from photocathodes throughout the lab. The batteries provide bias at voltages from 150 to 400V by connecting 22.5 V batteries in series, and have external isolated BNC feedthroughs on the supply to connect to the photocathode vacuum system and a picoammeter to measure very low currents.  |
| 1. **Scope –** include all operations, people, and/or areas that the procedure will affect.
 |
| This OSP describes the precautions that are required to test or change the batteries in our battery box supplies.  |
| 1. **Description of the Facility –** include building, floor plans and layout of the experiment or operation.
 |
| These battery boxes are located in the injector tunnel, the injector service building, the UITF enclosure, Test lab 1137, the gun test stand and the LERF vault, as well as other potential locations.  |

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| **ANALYZE THE HAZARDS and IMPLEMENT CONTROLS** |
| 1. **Hazards identified on written Task Hazard Analysis**
 |
| The battery bias boxes are typically operated at voltages between 200 and 250V, but some have enough batteries to achieve 400V. DC bias over 250V and current over 5 mA but less than 500 VA/V can be achieved with these battery bias boxes. This makes it an electrical class 2 system. Manipulating the batteries in the system makes it Mode 3 work. This cannot be done with the system de-energized since it is a battery system.  |
| 1. **Authority and Responsibility:**
 |
|  | * 1. **Who has authority to implement/terminate**
 |
|  | The group leader for the Center for Injectors and Sources (Joe Grames) has authority to implement/terminate this task |
|  | * 1. **Who is responsible for key tasks**
 |
|  | Members of the CIS group, with current electrical safety training, have authority to perform this operation.  |
|  | * 1. **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](http://www.jlab.org/ehs/ehsmanual/3210T1.htm))
 |
|  | The subject matter expert for electrical hazards should review this task |
| 1. **Personal and Environmental Hazard Controls Including:**
 |
|  | * 1. **Shielding**
 |
|  | None |
|  | * 1. **Barriers** (magnetic, hearing, elevated or crane work, etc.)
 |
|  | None |
|  | * 1. **Interlocks**
 |
|  | None |
|  | * 1. **Monitoring systems**
 |
|  | None |
|  | * 1. **Ventilation**
 |
|  | None |
|  | * 1. **Other (Electrical, ODH, Trip, Ladder)** (Attach related Temporary Work Permits or Safety Reviews as appropriate.)
 |
|  | Electrical hazards due to exposed voltages |
| 1. **List of Safety Equipment:**
 |
|  | * 1. **List of Safety Equipment:**
 |
|  | Insulating gloves should be used to manipulate the batteries |
|  | * 1. **Special Tools:**
 |
|  | Insulated tools, as needed, should be used to aid in the insertion of the batteries into the holders |
| 1. **Associated Administrative Controls**
 |
|  | Two qualified workers will be present during the procedure |
| 1. **Training**
 |
|  | * 1. **What are the Training Requirements** (See [List of Training Skills](https://www.jlab.org/div_dept/train/index.html))
 |
|  | Workers must have SAF603A and SAF603N2 to perform this task |

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| **DEVELOP THE PROCEDURE** |
| 1. **Operating Guidelines**
 |
| Perform this work in a dry location  |
| 1. **Notification of Affected Personnel (who, how, and when include building manager, safety warden, and area coordinator)**
 |
| The second trained electrical worker will be notified that the procedure is beginning and they should remain in the area until completion.  |
| 1. **List the Steps Required to Execute the Procedure:** from start to finish.
 |
| 1. Place the battery bias box in a dry location to work
2. Open the battery bias box cover
3. Put on insulating gloves
4. As needed, test the individual batteries with a voltmeter
5. Remove batteries, as needed from the system
6. Inspect the box to determine if it has an external current limiting resistor installed.
	1. If so, label the battery bias box with the maximum voltage and the maximum current with the resistor
	2. If not, install current limiting resistor in series if possible for this application.
7. Install new batteries
8. Close cover
9. Record date of battery replacement on the outside of the box and operational parameters.
 |
| 1. **Back Out Procedure(s)** i.e. steps necessary to restore the equipment/area to a safe level.
 |
| Let the other qualified electrical worker know that the task has been completed |
| 1. **Special environmental control requirements:**
 |
|  | * 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](https://jlabdoc.jlab.org/docushare/dsweb/View/Collection-1349) below
 |
|  | n/a |
|  | * 1. **Environmental impacts** (See [EMP-04 Project/Activity/Experiment Environmental Review](https://jlabdoc.jlab.org/docushare/dsweb/View/Collection-1349))
 |
|  | Spent batteries will be taped over the terminals and disposed of in battery recycling |
|  | * 1. **Abatement steps (**secondary containment or special packaging requirements)
 |
|  | n/a |
| 1. **Unusual/Emergency Procedures** (e.g., loss of power, spills, fire, etc.)
 |
| None |
| 1. **Instrument Calibration Requirements** (e.g., safety system/device recertification, RF probe calibration)
 |
| None |
| 1. **Inspection Schedules**
 |
| None |
| 1. **References/Associated/Relevant Documentation**
 |
| Task hazard analysis |
| 1. **List of Records Generated** (Include Location / Review and Approved procedure)
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**Submit Procedure for Review and Approval** (See [ES&H Manual Chapter 3310 Appendix T1 OSP & TOSP Instructions – Section 4.2 Submit Draft Procedure for Initial Review](https://www.jlab.org/ehs/ehsmanual/3310T1.htm#SubmitforReview)):

* Convert this document to .pdf
* Open electronic cover sheet:

<https://mis.jlab.org/mis/apps/mis_forms/operational_safety_procedure_form.cfm>

* Complete the form
* Upload the pdf document and associated Task Hazard Analysis (also in .pdf format)

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

**Expiration:** Forward to ESH&Q Document Control

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| **Form Revision Summary****Revision 1.5 – 04/11/18 –** Training section moved from section 5 Authority and Responsibility to section 9 Training**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](http://www.jlab.org/ehs/ehsmanual/3210T3.htm).**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

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| **ISSUING AUTHORITY** | **FORM TECHNICAL POINT-OF-CONTACT** | **APPROVAL DATE** | **REVIEW DATE** | **REV.** |
| ESH&Q Division | Harry Fanning | 04/11/18 | 04/11/21 | 1.5 |

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