

<b>Jefferson Lab</b> Thomas Jefferson National Accelerator Facility	TITLE:	<b><u>ES&amp;H Manual</u></b>
DOCUMENT ID:	<b>3310 Appendix T2</b> <b>Operational Safety Procedure Form</b>	
		<a href="#">Click for OSP/TOSP Instructions</a>

<b>Serial Number:</b> <u>ENG-11-035-OSP</u> (Assigned by <u>ESH&amp;Q Document Control</u> x7277)			
<input checked="" type="checkbox"/> <b>OSP</b> <input type="checkbox"/> <b>TOSP</b> *Attach the Task Hazard Analysis (THA) related to this procedure			
<div style="display: flex; justify-content: space-between;"> <div> <b>Issue Date:</b> <u>9/7/2011</u>  <small>(No more than three years from Issue Date except TOSP which is three months from issue date)</small> </div> <div> <b>Expiration Date:</b> <u>9/7/2014</u> </div> </div>			
<b>Title:</b> <u>Procedure for Maintenance and Operation of Hall A FZ Magnets and FZ Power Supplies</u>			
<b>Location:</b> <u>Hall A</u>			
<b>Risk classification</b> <small>(See <u>ESH&amp;Q Manual Chapter 3210 Appendix T3 Risk Code Assignment.</u>)</small>		<b>Without mitigation measures (3 or 4):</b> <u>3</u> <b>With mitigation measures in place (0, 1, or 2):</b> <u>0</u>	
<b>Document Owner(s):</b> <u>Vick Chen, Simon Wood</u>			<b>Date:</b> <u>9/7/2011</u>
<b>Supplemental Technical Validations:</b>			
<b>Hazard Reviewed (per <u>ES&amp;H Manual 2410-T1</u>):</b> <u>Electrical</u>		<b>Subject Matter Experts Signature:</b> <u>Todd Kujawa</u> <i>[Signature]</i>	
		<b>Date:</b> <u>9-20-11</u>	
<b>Approval Signatures:</b>			
<b>Print</b>		<b>Signature</b>	<b>Date:</b>
Division Safety Officer: <u>Henry Robertson</u>		<i>[Signature]</i>	<u>9/20/11</u>
Department or Group Head: <u>William Merz</u>		<i>[Signature]</i>	<u>9/20/11</u>
Safety Warden of Area: <u>Ed Folts</u>		<i>[Signature]</i>	<u>9/20/11</u>
Other Approval(s): <u>Steve Suhring</u>		<i>[Signature]</i>	<u>9-20-11</u>
<b>Document History:</b>			
<b>Revision:</b>	<b>Reason for revision or update:</b>	<b>Serial number of superseded document</b>	

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ESH&Q Division	Harry Fanning	10/05/09	01/01/10	10/05/12	0	1 of 6

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**1. Purpose of the Procedure**

Safe handling procedure for the Hall A FZ1 and FZ2 magnets and their power supplies during operation, maintenance and troubleshooting activities.

**2. Scope – include operations, people, and/or areas where procedure applies**

Allow safe operation by the EES DC Group and Hall A personnel for the FZ1 and FZ2 magnets and power supplies at the Hall A for the g2p experiment.

**3. Description of the Facility: (include floor plans and layout of a typical experiment or operation)**

Gallery with various electrical/electronic racks and equipment. The FZ power supplies are to the right of the truck ramp in Hall A. The FZ1 and FZ2 magnets are installed on the beam line before the target.

**4. Authority and Responsibility:**

**4.1 Who has authority to implement/terminate**

William Merz, Howard Smith, Simon Wood

**4.2 Who is responsible for key tasks**

Simon Wood, Howard Smith

**5. Who analyzes the special or unusual hazards (See [ES&H Manual Chapter 3210 Appendix T1 Work Planning, Control, and Authorization Procedure](#))**

EES DC Group

**6. Personal and environmental hazard controls including:**

**6.1 Shielding**

None.

**6.2 Interlocks**

Rotating red beacon when power supply is energized. The beacon box is interlocked to disable the power supply if the beacon box is not plugged into AC power. Thermal switches for detection of over temperature.

**6.3 Other**

None.

**7. Monitoring systems**

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Hardware Interlocks to FZ power supplies
<b>8. Ventilation</b>
Air conditioned building
<b>9. List of safety equipment (i.e: personal protective equipment or special tools)</b>
LT&T, PPE according to the Warning sign.
<b>10. Associated administrative procedures</b>
LT&T training for box supplies
<b>11. Operating guidelines</b>
None
<b>12. Notification of Affected Personnel (How and Who)</b>
EES DC Power pager numbers: 584-0105 (Day), 584-0106 (Night)
<b>13. List of steps required to execute the procedure from start to finish.</b>
See the attached procedure.
<b>14. Back out procedures, i.e., steps necessary to restore the equipment/area to a safe level.</b>
LT&T, inspect and restore hardware to known safe state before power up.
<b>15. Special environmental control requirements:</b>
None
<b>16. Environmental Impacts (See <a href="#">EMP-04 Project/Activity/Experiment Environmental Review</a>)</b>
None
<b>17. Abatement Steps – Secondary Containment, or Special Packaging requirements</b>
None
<b>18. Training requirements</b>
Basic LT&T (SAF104), Equipment Specific LT&T, NFPA70E, CPR.
<b>19. Unusual/Emergency procedures e.g., Injury, Fire, Loss of power</b>
Shut off valve to LCW in case of water leak.
<b>20. Instrument calibration requirements, e.g., safety system/device recertification, RF probe calibration</b>

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None
<b>21. Inspection schedules</b>
During Hot checkout and scheduled Accelerator down.
<b>22. References/Associated Documentation</b>
ENG-08-016-SOP, Equipment Specific LT&T Procedure
<b>23. List of Records Generated (Include Location / Review and Approved procedure)</b>
None

**Authorized/Trained Individuals**


Print Name/Signature	Date
Bill Merz	
Ed Folts/Howard Smith	
Ron Lauze	
Sarin Philip	
Simon Wood	
Vick Chen	
Mark Todd	
Lee Broeker	
Cynthia Eller	
Max Tan	

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Operational Safety Procedure for Hall A's FZ1 and FZ2 Dipole Magnets and Power Supplies  
9/7/11

### Purpose of the procedure

The purpose of this document is to describe safe handling practices for the Hall A's FZ1 and FZ2 dipole magnets and their power supplies during operation, maintenance and troubleshooting activities. It evaluates the hazards and identifies measures implemented to mitigate the identified hazards. This document does not attempt to describe the function or operation of the FZ magnets and power supplies.

### Description

The location of the FZ1 and FZ2 magnets are on the beam line before the target in the Hall A, the FZ1 magnet is purple color, and the FZ2 is blue. The FZ1 power supply (marked as #7) is brown, and the FZ2 power supply (marked as #6) is blue. The power supplies are located inside Hall A to the right of the truck ramp.

### Authority and Responsibility

These magnets are used to steer the beam for Hall A's g2p experiment as required by Optics. All work associated with these magnets and power supplies must be authorized by Bill Merz (Engineer), or Simon Wood (Operations Coordinator), or their designee.

During normal operations (i.e., Beam delivery to Hall A), access to the magnets and power supplies is strictly forbidden. The reason to access either of the FZ magnets is to work on the magnet itself, which requires the power supply to be LT&T according to Jlab policies and procedures.

### Hazard Analysis

The hazards associated with magnets are electrical, magnetic and fire.

**Electrical** – The FZ1 magnet power supply is 320A/40V, the FZ2 power supply is 480A/40V. The power supply that supplies this current/voltage and the magnet power leads are Class 4 hazard.


**Magnetic** – The magnet's pole tip field is 3.784 kG. The magnetic field is primarily confined to the magnet gap. These fields may present a hazard to workers or any individuals using a pacemaker. They also may corrupt magnetic information storage media such as credit card strips and may affect mechanical watches.

**Fire** – There exists a potential fire problem associated with high current power supplies. An electrical short in one of the coils or an LCW flow failure could lead to a fire in the coils.

### Hazard Mitigation

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**Electrical** – Access to the FZ magnets and FZ power supplies is allowed by the individuals listed on the OSP, they are appropriately trained. Doors to the power supply are locked and interlocked. Access to the power supply shall only be made after following “Lock and Tag Procedures” for the FZ power supply. When working on the power supply, the responsible people must follow the guidelines in the electrical safety chapter 6200 of the Jefferson Lab EH& S manual and the Box Power Supply Lock and Tag Procedure.

**Magnetic** – Signs are posted which indicate the presence of a high magnetic field (these are standard Jefferson Lab safety signage) that read “High Magnetic Field – no pace maker or Credit Cards”. In addition, a red flashing light located near the magnet is on when the power supply is turned on, and will not allow power supply to energize if unpowered.

**Fire** –The magnet coils are protected from overheating by water cooling and by a set of thermal switches (Klixons) which are interlocked to the power supply. The thermal switch is interlocked to terminate power to the magnets.

### Operating guidelines

Only Authorized personnel can work with the magnets or its instrumentation. They must have read and signed this OSP and follow Jlab's Lock and Tag procedures. During normal operations, there is no reason to access either of the magnets or its instrumentation, since all the read backs are available remotely.

### Unusual Emergency Procedures


A large “mushroom type” Emergency OFF Button is located on the front of the magnet power supply enclosure that will de-energize the power supply and magnet when depressed.

Notes:

1. The FZ power supplies and the FZ magnets can be turned on via remote control
2. Power supply status can be determined by looking at the front panel of the FZ supply. It shows contactor status and output current and voltage.
3. A warning rotating red beacon is placed near each of the magnets to indicate the power supply is operating.
4. Other Hall A safety procedures for magnets apply to these FZ magnets.

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			<b>3210Appendix T2</b> <b><u>Task Hazard Analysis</u> (THA) Worksheet</b>		<a href="#">Click For Word Doc</a>
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<b>Author:</b>	Vick Chen, Simon Wood				
<b>Date:</b>	9/23/2011	<b>Task #:</b> If applicable		<b>Frequency of use:</b>	Whenever work is performed on the FZ power supplies and FZ magnet.
<b>Complete all information. Use as many sheets as necessary</b>					
<b>Task Location:</b>	Hall A		<b>Task Title:</b>	Test or Maintenance on the FZ Power Supplies/Magnets	
<b>Division:</b>	Engineering		<b>Department:</b>	Electrical Engineering System	
<b>Lead Worker:</b>	Bill Merz, Sarin Philip, Simon Wood				
<b>Mitigation already in place:</b> <a href="#">Standard Protecting Measures</a> <a href="#">Work Control Documents</a>		Basic LT&T, Equipment Specific LT&T, NFPA70E, CPR,ENG-08-016-SOP, ENG-11-035-OSP.			

Sequence of Task Steps	Task Steps/Potential Hazards	<a href="#">Consequence Level</a>	<a href="#">Probability Level</a>	<a href="#">Risk Code</a> (before mitigation)	Proposed Mitigation (Required for <a href="#">Risk Code</a> >2)	Safety Procedures/ Practices/Controls/Training	<a href="#">Risk Code</a> (after mitigation)
1	Electric Shock	High	Low	3	LT&T, proper PPE, E-Stop switch.	Basic and equipment specific LT&T training	1
2	Overheating Problem	Medium	Low	2	Valves and Screen Annunciation	Check LCW pressure and water flow rate.	1

	Highest <a href="#">Risk Code</a> before Mitigation:	3		Highest <a href="#">Risk Code</a> after Mitigation:	1
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### Task Hazard Analysis (THA) Worksheet

When completed, if the analysis indicates that the [Risk Code](#) before mitigation for any steps is “medium” or higher ( $RC \geq 3$ ), 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](#).)

ISSUING AUTHORITY	FORM TECHNICAL POINT-OF-CONTACT	APPROVAL DATE	EFFECTIVE DATE	EXPIRATION DATE	REV.
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