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Operational Safety Procedure Review and Approval Form # 63738
(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-16-63738-OSP

Issue Date:

11/28/2016

Expiration Date:

11/28/2019

Title:

CLAS12 Forward Tagger (FT) System

Location:
(where work is being performed)

Experimental Hall B

Location Detail:
(specifies about where in the selected location(s)
the work is being performed)

**Floor and
Space Frame**

[Building Floor Plans](#)

Risk Classification:

(See [ES&H Manual Chapter 3210 Appendix T3 Risk Code Assignment](#))

Without mitigation measures (3 or 4):

3

With mitigation measures in place (N, 1, or 2):

1

Reason:

This document is written to mitigate hazard issues that are :
Determined to have an unmitigated Risk code of 3 or 4

Owning Organization:

PHALLB

Document Owner(s):

Stepanyan, Stepan (stepanya@jlab.org) Primary

Supplemental Technical Validations ☐

Mode 1: Class 1, 2, and 3 Electrical Equipment (Paul Powers, Todd Kujawa)
Aerial Work Platforms (Scissor/Aerial Lifts, Boom Trucks) (Joe Thomas, Manny Nevarez)
Portable Hand Tools (Bert Manzlak, Paul Collins)
Static Magnetic Fields >5G: Fringe, High, & Quench Effect (Bob May, Jennifer Williams)
Regulated Waste: Solid or Liquid (Jennifer Williams, Scott Conley)
Fire Protection (Tim Minga)

Document History ☐

Revision ☐

Reason for revision or update ☐

Serial number of superseded document ☐

Comments for reviewers/approvers: ☐

Attachments ☐

Procedure: **osp_ft.pdf**

THA: **tha_ft.pdf**

Additional Files:

[Convert to PDF](#)

Review Signatures

Additional Authorization : Fire Protection - other than current engineered safeguards or fire watch	Signed on 11/2/2016 2:12:07 PM by Tim Minga (minga@jlab.org)
Additional Authorization : Physics ES&H Liaison	Signed on 11/4/2016 1:47:11 PM by Todd Kujawa (kujawa@jlab.org)
Subject Matter Expert : Electricity->Mode 1: Class 1-> 2-> and 3 Electrical Equipment	Signed on 11/4/2016 1:47:14 PM by Todd Kujawa (kujawa@jlab.org)
Subject Matter Expert : Material Handling Equipment->Aerial Work Platforms (Scissor/Aerial Lifts-> Boom Trucks)	Signed on 11/2/2016 7:49:53 AM by Manny Nevarez (nevarezm@jlab.org)
Subject Matter Expert : Portable Hand Tools	Signed on 11/2/2016 7:39:43 AM by Paul Collins (paulc@jlab.org)
Subject Matter Expert : Static Magnetic Fields >5G: Fringe-> High-> & Quench Effect	Signed on 11/11/2016 3:01:33 PM by Jennifer Williams (jennifer@jlab.org)
Subject Matter Expert : Waste Generation->Regulated Waste: Solid or Liquid	Signed on 11/11/2016 3:02:00 PM by Jennifer Williams (jennifer@jlab.org)

Approval Signatures

Division Safety Officer : PHALLB	Signed on 11/11/2016 3:38:27 PM by Ed Folts (folts@jlab.org)
Org Manager : PHALLB	Signed on 11/28/2016 2:23:21 PM by Volker Burkert (burkert@jlab.org)
Safety Warden : Experimental Hall B	Signed on 11/14/2016 6:01:44 AM by Doug Tilles (tilles@jlab.org)

Operational Safety Procedure Form

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

Click
For Word Doc

Title:	CLAS12 Forward Tagger (FT) System		
Location:	Hall B	Type:	<input 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	3
		Highest Risk Code after Mitigation (N, 1, or 2):	1
Owning Organization:	INFN – Genova / JLab	Date:	10/31/2016
Document Owner(s):	Marco Battaglieri and Stepan Stepanyan		

DEFINE THE SCOPE OF WORK

1. Purpose of the Procedure – Describe in detail the reason for the procedure (what is being done and why).

The FT system in Hall B is designed to detect electrons and photons for CLAS12 for polar angles in the range of 2.5 to 4.5 deg. The FT includes three detectors, the FT-Cal (Calorimeter), the FT-Hodo (Hodoscope) and the FT-Trk (Tracker), and provides information to trigger readout of the CLAS12 spectrometer.

2. Scope – include all operations, people, and/or areas that the procedure will affect.

The FT-Cal includes 332 scintillation crystals readout with APDs. The FT-Hodo includes 232 scintillation tiles readout via WLS fibers and SiPMs. The FT-Trk consists of 4 layers of micromegas detectors. Operations of the FT subsystems requires HV and LV controls, Argon-Isobutane and Nitrogen gas systems, and a Glycol-based cooling system. The FT is readout via boards through signals cables. The FT Group is responsible for ensuring the system is fully operational for running with CLAS12. Only system experts as defined in the FT Operations Manual are authorized to work on the hardware, change system parameters, or perform any servicing work.

3. Description of the Facility – include building, floor plans and layout of the experiment or operation.

The FT is installed downstream the CLAS12 target supported by a mechanical structure attached to the Torus inner ring. Access to the detector system is not possible during CLAS12 operation. Electronics and other ancillary equipment for the FT operations are located on the ground floor, first and third level space frame. Cables and services from the FT detectors to the electronic racks are routed in cable trays along the Torus coils and under the subway.

ANALYZE THE HAZARDS and IMPLEMENT CONTROLS

4. Hazards identified on written Task Hazard Analysis

Hazards to personnel associated with this device are high voltage and low voltage, and the use of flammable gas for the FT-Trk.

Hazards to the FT-Cal detector include cooling fluid leaks or condensation, over-voltage to the photosensors, preamplifiers or light monitoring system, absence of cooling or cooling failure.

Hazards to the FT-Hodo detector include over-voltage to the photosensors, preamplifiers or light monitoring system, absence of cooling and exposure to non-ionising UV radiation from the LED system.

Hazards to the FT-Trk detector include mechanical damage, gas leaks and gas over-pressure, wrong LV

settings that could damage the FEUs, absence of cooling or cooling failure which would overheat the FEUs.

To account for the presence of fringe magnetic fields from the CLAS12 magnets in the system location, no ferric materials are employed in the detector: an hazard may nevertheless arise during maintenance operations in case metallic tools are used and for people with cardiac pacemakers, other electrical medical devices, or metallic implants.

5. Authority and Responsibility:

5.1 Who has authority to implement/terminate

Marco Battaglieri / Stepan Stepanyan

5.2 Who is responsible for key tasks

Marco Battaglieri / Stepan Stepanyan, authorized FT experts, Hall B technicians, Hall B 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](#))

Ed Folts and JLab ESH&Q subject matter experts

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

SAF111, fall protection training (if using a ladder or manlift), ladder training (if using a ladder), harness training (only if going up in a manlift), manlift training (only for manlift operators), electrical worker required (only for HV system service work)

6. Personal and Environmental Hazard Controls Including:

6.1 Shielding

None

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

Warning cones, signage and ropes to identify ongoing work areas during cable maintenance.

6.3 Interlocks

Hardware interlocks for voltage, cooling and gas systems.

6.4 Monitoring systems

Voltage, temperature, gas flow and pressure meters to monitor FT operational parameters.

6.5 Ventilation

Gas is ventilated outside the experimental hall into atmosphere.

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

For servicing, ladder training, man-lift training, harness training, electrical worker (see list in 5.4)

7. List of Safety Equipment:

7.1 List of Safety Equipment:

No personnel protective equipment is needed for testing or operating the FT system from the Counting House or the Space Frame. When accessing the detectors using a man-lift a harness is required. Gloves and safety glasses will be used to handle coolant, glycol.

7.2 Special Tools:

The used coolant will be disposed of by JLab's EH&S staff.

8. Associated Administrative Controls

Check all signs before entering the work area. Consult with the Hall B Work Coordinator before starting on any servicing work related to the detector hardware.

DEVELOP THE PROCEDURE

9. Operating Guidelines

The operating guides for both general Hall B Collaboration members and FT system experts are detailed in full in the FT System Operations Manual (https://clasweb.jlab.org/wiki/index.php/CLAS12_OPS_Doc)

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

The Hall B Work Coordinator is to be consulted before any FT servicing work on the detector hardware. Routine signal checkout and VME electronics work should be done only by FT system experts.

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

All system operation steps are detailed in the FT System Operations Manual.

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

All system operation steps are detailed in the FT System Operations Manual.

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)

None

16. Inspection Schedules

None

17. References/Associated/Relevant Documentation

See the FT System Operations Manual for instructions to operate and interact with the system.

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

None

[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](#))

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Author:	Marco Battaglieri	Date:	10/31/2016	Task #: If applicable	
Complete all information. Use as many sheets as necessary					
Task Title:	CLAS12 Forward Tagger (FT) System	Task Location:	Hall B		
Division:	Physics	Department:	Hall B	Frequency of use:	Continuously
Lead Worker:					
Mitigation already in place: Standard Protecting Measures Work Control Documents	All workers on the FT system must complete SAF111 (Hall B safety training)				

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	Electrical shock (from LV and HV)	L	L	1	Not applicable	Work only on de-energized equipment.	N
2	LED flasher	L	L	1	Not applicable	Work only on de-energized equipment	N
3	FT-Cal coolant	L	L	1	Not applicable	The cooling circuit parameters are monitored and interlocked to the chiller operations	N
4	Servicing detector components – manlift or ladder access, potential fall hazards	H	M	3	A harness must be used for manlift operations or on ladders where a fall of more than 4 ft. may occur.	Harness training, manlift training, ladder training, fall protection training	1
5	Use hand-tools	L	L	1	Not applicable	Appropriate PPE and training.	N
6	Lifting loads (< 40 lbs.)	L	L	1	Not applicable	Appropriate ergonomic procedures.	N

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	Consequence Level	Probability Level	Risk Code (before mitigation)	Proposed Mitigation (Required for Risk Code >2)	Safety Procedures/ Practices/Controls/Training	Risk Code (after mitigation)
7	Servicing cables below floor gratings. Potential fall hazard due to grating removal.	L	M	2	Not applicable	Warning cones, signs and ropes to identify and isolate work areas.	1
8	Gas	L	L	1	Not Applicable	The flammable gas is a class 0 system and the gas is stored and vented outside	N

Highest Risk Code before Mitigation:	3	Highest Risk Code after Mitigation:	1
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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](#).)

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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By signing this page, you testify that you have read, understand, and agree to abide by the procedure specified in the above referenced work control document:

Serial Number: ENP-16-63738-OSP

Title: CLAS12 Forward Tagger (FT) System

Name

Signature

Date _____

[illegible]