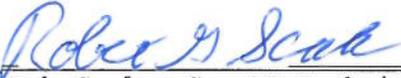


ACCELERATOR DIVISION DEPARTMENTAL PROCEDURE

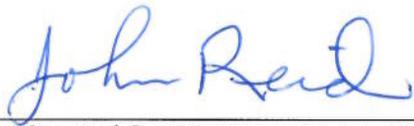
RF DEPARTMENT

ADDP-RF 2016-0006

BOOSTER R.F. Ferrite Bias Supply LOCKOUT/TAGOUT PROCEDURE

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1.0 PURPOSE AND SCOPE

The purpose of this Accelerator Division Department Procedure (ADDP) is to outline and detail the conduct of LOCKOUT/TAGOUT (LOTO) for the maintenance of Booster radio frequency **Ferrite Bias Power Supply**. This power supply needs to be locked out when working on the supply or the cavity in the tunnel.

2.0 PERFORMANCE OF MAINTENANCE ACTIVITIES

The Ferrite Bias Power Supplies are located in the Booster East equipment gallery at periods 14 through 17 and in the Booster West equipment gallery at periods 20 through 24.

This equipment has a lockable, 480 Volt disconnect located on wall at the rear of the equipment. There is also a 120 Volt circuit breaker on the front of the power supply.

For an overview of this system, refer to the block diagram (attachment 2).

3.0 AUTHORIZED PERSONNEL

An Accelerator Division employee is authorized to perform this LOTO procedure if he/she has necessary **knowledge** and **current training**.

Lists of employees who are authorized to perform this procedure are to be maintained by the RF Department Head.

4.0 THE NECESSITY OF WRITTEN LOTO PROCEDURE

This requires a written procedure because:

1. There are two energy sources
2. A single lockout device won't lock out the equipment.

5.0 THE STEPS OF LOCKOUT/TAGOUT PRIOR TO MAINTENANCE ACTIVITY

The authorized employee performs the following steps prior to performance of maintenance activity.

- 5.1 **Prepare:** The authorized employee shall understand the hazards involved and how to control them. If an authorized employee does not have this knowledge, he/she is not qualified to perform the LOTO procedure or maintenance activity.

- 5.2 **Notify:** The authorized employee should, as necessary, notify affected area personnel of the LOTO and maintenance activity. Affected personnel include those who might normally use the equipment or who would be affected by the unavailability of the equipment. Maintenance activities in the Accelerator Division normally require notification of the Crew Chief in the Main Control Room (x3721).
- 5.3 **Shut Down:** The authorized employee shall shut down or turn off the equipment or system by using the normal stopping procedure.
- Place the power supply in local and press the off button on the control unit which is located on the front panel.
- 5.4 **Isolate:** The authorized employee shall isolate the equipment or system from the energy source.
1. Locate the 480 Volt circuit breaker associated with the Ferrite Bias Power Supply and move the handle to the off position (see list Attachment 1. **Requires Class 0 PPE as follows:**
 - a. Long sleeve cotton shirt
 - b. Hearing protection
 - c. Safety glasses
 - d. Leather insulating gloves
 2. Locate the 120 Volt circuit breaker on the front of the power supply and switch it to OFF. **Remove 120-volt twist-lock connector from power source located above the ferrite bias supply.**
- 5.5 **Lock and Tag Out:** The authorized employee shall lock and tag out the energy isolating device. The lock installed shall be red in color and have only one key. The authorized employee shall keep the single key in his/her exclusive control at all times from application until return to service or shift change. An approved DANGER - DO NOT OPERATE tag, properly filled out, and should be securely attached to the lock.
- 5.6 **Relieve/Restrain Stored Hazardous Energy:**
- N/A
- 5.6 **Verify:** The authorized employee shall check by conclusive test that the source of energy has been isolated from the equipment and that the equipment is inoperable. **Place a digital meter at the 480V input terminals at the top of the Ferrite Bias Supply to insure there is no input 480 voltage. Must check Phase to Phase and each Phase to Ground. Important - Verification is mandatory as the wall 480V disconnect is the only air gap between live 480-volt distribution and the input 480-volt terminal block inside the bias supply.**
- Place a meter on the outlet on the front panel to **insure 120 Volt power is absent.**
- The equipment is now locked out and tagged out. Service and maintenance activity may begin.**

6.0 SPECIAL REQUIREMENTS FOR SHIFT/PERSONNEL CHANGE

N/A

7.0 THE FIVE STEPS FOR RETURN TO SERVICE

The authorized employee must perform the following five steps prior to returning the equipment to service after service or maintenance activity.

7.1 **Check Equipment:** Check the equipment and the immediate area around it to ensure that nonessential items and tools are cleared, and that the equipment is ready for safe operation.

7.2 **Check Work Area:** Check the work area to ensure that all employees are safely positioned or removed from the area as necessary and/or appropriate.

7.3 **Verify:** Verify that all controls for the equipment are in the neutral or off position.

7.4 **Remove Padlocks and Tags and Reenergize:** The authorized employee who installed the lock and tag shall remove them and reconnect the equipment to the energy source from which it was isolated. Note that this action, for some equipment, may result in the immediate operation of the equipment.

7.5 **Notify:** The authorized employee should, as necessary, notify affected area personnel of the completion of maintenance and LOTO activity. If the Crew Chief in the Main Control Room was notified prior to the activity, he/she should be notified of the completion of the activity.

This completes the requirements for returning the equipment to service.

8.0 PROCEDURE TRAINING REQUIREMENTS

Authorized employees are required to have had LOTO training (Level 1 and Level 2) and have read and understand this LOTO procedure. Personnel using this procedure shall be trained on the job. After reviewing this document, the employee shall perform the steps accompanied by an authorized employee with previous experience.

9.0 PROCEDURE DISTRIBUTION

A single controlled copy of this procedure shall be assigned and distributed to:

- The Accelerator Division Operations Department Head

Attachment 1

Ferrite Bias Power Supply Disconnect & Breaker Locations

DHP-Y-BE5			
Booster East Gallery Disconnect Switch located behind RF Station on Wall		Booster East gallery FBS Outdoor Yard Breakers 225 Amp	Booster East Gallery 120 Volt Control power
Station #			
1	G14-SS-01	13-15-17	G15-PP-01 Breaker 22
2	G14-SS-04	19-21-23	G15-PP-01 Breaker 24
3	G15-SS-01	14-16-18	LP-BE-7/G15-PP-02 Breaker 30
4	G15-SS-04	20-22-24	LP-BE-7/G15-PP-02 Breaker 29
5	G16-SS-01	26-28-30	LP-BE-7/G15-PP-02 Breaker 20
6	G16-SS-04	44-46-48	LP-BE-7/G15-PP-02 Breaker 19
20	G16-SS-06	56-58-60	G15-PP-06 Breaker 20
19	G16-SS-08	50-52-54	LP-BE-7/G15-PP-02 Breaker 18
7	G17-SS-02	68-70-72	G17-PP-01 Breaker 4
8	G17-SS-04	62-64-66	LP-BE-7/G15-PP-02 Breaker 17

DHP-Y-BW1			
Booster West Gallery Disconnect Switch located behind RF Station on Wall		Booster West gallery FBS Outdoor Yard Breakers 225 Amp	BoosterWest Gallery 120 Volt Control power
Station #			
17	G20-RF-SS-2	80-82-84	LP-BW-7/G23-PP-02 Breaker 02
18	G20-RF-SS-3	74-76-78	LP-BW-7/G23-PP-02 Breaker 04
9	G21-RF-SS-2	13-15-17	LP-BW-7/G23-PP-02 Breaker 18
10	G21-RF-SS-4	19-21-23	LP-BW-7/G23-PP-02 Breaker 17
11	G22-RF-SS-2	25-27-29	LP-BW-7/G23-PP-02 Breaker 24
12	G20-RF-SS-4	31-33-35	LP-BW-7/G23-PP-02 Breaker 23

Booster West gallery FBS			
Booster West Gallery Disconnect Switch located behind RF Station on Wall		Booster West gallery FBS Outdoor Yard Breakers 225 Amp	BoosterWest Gallery 120 Volt Control power
Station #			
13	G23-RF-SS-1	50-52-54	LP-BW-7/G23-PP-02 Breaker 30
14	G23-RF-SS-10	56-58-60	LP-BW-7/G23-PP-02 Breaker 29
15	G24-RF-SS-2	62-64-66	LP-BW-7/G23-PP-02 Breaker 08
16	G24-RF-SS-4	68-70-72	LP-BW-7/G23-PP-02 Breaker 06

Booster West Gallery Disconnect Switch located on Side Wall			
Station #			BoosterWest Gallery 120 Volt Control power
21	FBS #21	DHP-L4-1-2 Breaker 2-4-6	PP-L4-1-2 Breaker 1
22	FBS #22	DHP-L4-1-2 Breaker 8-10-12	PP-L4-1-2 Breaker 3

Attachment 2
Block Diagram

