##### Procedure for handling of high voltage leads

**associated with the -100kV control system.**

The design of the system allows safe handling of the leads which feed the Polarized sources. There are simple steps that can be followed which will totally isolate the leads and prevent the potential release of lethal energy. Once the leads are removed from the switchgear they are considered to be dead cables and may be handled accordingly. Although the cables are dead and the “gun” is safe, an added step has been developed which will be a visual indication of the safe mode. This visual indication is all that is required for trained workers to access the gun after it has been isolated from the high voltage system. A personal Lock and Tag is used for personal protection during the manipulation of the high voltage leads into and out of the switch box. All other manipulations are covered by administrative lock and tag and are considered to be configuration control. Workers involved in the manipulation must be trained on the system. Training records are maintained locally and on file.

Procedure for making a gun “Safe”:

1. Crew chief approval is obtained for a configuration change to the high voltage system.
2. -100kV system power supply is shut down. This should be verified by looking at the voltmeter on the front of the Glassman power supply.
3. The worker will inform others working in the area that the gun high voltage is about to be locked out.
4. The worker (or workers) performing the manipulation of the H.V. lead will open (de-energize) the main knife switch to the -100kV power supply and apply a personal danger lock and tag to the knife switch in rack INO1B02.
5. The worker will verify that the -100 kV power supply is de-energized by looking at the voltmeter on the front of the device and verifying that the LOTO device is secure to prevent the knife switch from being closed.
6. The worker shall then remove the Plexiglas cover to the -100kV output module. Removal of the cover breaks an additional hard-wire interlock which precludes energization of the -100kV power supply.
7. The output lead for the gun to be safed is removed. Although the lead has been grounded internally by deenergizing the power supply, the tip of the lead is touched to the grounded chassis of the output module to ensure the cable capacitance is truly discharged. A connector cover is then placed over the empty port.
8. The output lead is then placed into a grounded receiver tube that has been designed to accept the lead. The administrative lock and tag is used to lock the cable into the grounded receiver.
9. The output module Plexiglas cover is now replaced.
10. The worker will then inform others in the area that the gun high voltage knife switch is going to be unlocked.
11. The personal LOTO device used to lock the knife switch open shall be removed and the knife switch closed.
12. At this point, the system may be returned to operation. The key in the administrative lock is left inside the lock.

If tunnel access is obtained and there is a desire to perform work on the high voltage section of the polarized gun after it has been “safed”, then the following steps are performed:

1. The key is removed from the administrative lock upstairs and taken down to the tunnel.
2. The key is used to unlock the safety cable that holds the gun shroud in place.
3. The shroud is removed and placed face down near the gun.
4. The key, lock, and tag are kept with the shroud during gun maintenance.
5. Trained personnel entering the tunnel and wishing to work on the polarized source can now see that the –100kV feed cable has been removed from the gun. An electron gun without a -100kV feed cable is now just an ordinary vacuum component and is perfectly safe to work on.

# The back-out procedure is a reverse order of the events that occurred above. The shroud is replaced and the cable is locked to the gun table. The key is then carried up and inserted into the upstairs lock. At this point, the system could be left as is, or by closing the knife switch and locking it out, the system can be returned to full operational readiness.

Below is an example of the text on the Administrative tag:

# 

# **GUN 3**

## ADMINISTRATIVE LOCKOUT

### Manipulation by qualified personnel

#### Only. See SOP

### Condition 1: Gun operational

Key and lock shall be kept under

plexi-glass enclosure with the

H.V. Lead

### Condition 2: Gun Off-line

H.V. Cable locked in grounded

storage. Key remains in lock.

### Condition 3: Gun Maintenance

H.V. Cable locked in grounded

storage. Key taken downstairs

to unlock the gun shroud. Key

Remains with downstairs lock until

Maintenance is completed.