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C-A OPERATIONS PROCEDURES MANUAL

8.1.7 Turn on of RFQ 1

Text Pages 2 through 4

Hand Processed Changes

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Approved: \_\_\_\_\_ ***Signature on File*** \_\_\_\_\_  
Collider-Accelerator Department Chairman Date

V. LoDestro

## 8.1.7 Turn On of RFQ1

### 1. Purpose

To provide instructions for Linac specialists on how to turn on the Radio Frequency Quadrupole 1, (RFQ 1), located in the Low Energy Beam Transport.

### 2. Responsibilities

2.1 Linac specialists are responsible for executing this procedure.

2.2 The Linac Operations Coordinator is responsible for ensuring that this procedure is implemented accurately and completely.

### 3. Prerequisites

3.1 All personnel involved in working on any electrical system or equipment in the C-A shall be familiar with BNL ES&H Standards 1.5.0, 1.5.1 and 1.5.2. C-A will provide on-site/work specific training to individuals in the electrical safety aspects of their job functions and assignments.

3.2 Main RF water system or 10th System deionized water is on.

3.3 Tank 1 Cavity Cooling water system is on.

3.4 Low Level RF Drive system is operating.

3.5 RFQ vacuum is  $<5 \times 10^{-6}$  Torr.

3.6 Security system is satisfied, Linac is secured for beam or the Tank 1 beam stop must remain closed.

3.7 The Linac Operations Coordinator shall be consulted prior to turn on.

3.8 Qualified and trained Linac specialists.

3.9 Check that the temperature of the driver output circulator is  $80^{\circ}\text{F} \pm 5^{\circ}\text{F}$ .

### 4. Precaution

4.1 RF drive and pick-up coax cables are connected to the feed loop and all control ports.

## 5. Procedures

- 5.1 Check that the main 480 VAC RFQ 1, Buncher #1 and 208 VAC RFQ 1 disconnect switches are on, located behind the RFQ driver cart.
- 5.2 In panel box #100 energize:
  - 208 VAC disconnect, ckts #2, 4 & 6.
  - RFQ LCS rack #3 ckt #17
  - RFQ LCS rack #5 ckt #16
- 5.3 Check that the following RFQ 1 driver cabinet circuit breakers are on:
  - #'s 1,2,3,4,5,6
  - Air blower
  - 30 Kvdc anode P.S.
- 5.4 If no malfunction indications appear on The Panel View RFQ1 Driver AC Logic Screen, located at the RFQ1 LCS Rack 5, an off indication will appear. Remove any local lock condition by depressing the off control, F1, and turn on the filaments. Observe the following range of operating parameters
  - 7651 Filament Voltmeter, 5.9 - 6.3 VAC.
  - 7651 Grid bias meter, 120 - 150 VDC.
  - Within 2 minutes the red on light should come on.
  - The Driver Filament malfunction should now be gone from the High Voltage Logic Screen.
- 5.5 Check that the Automatic Frequency Control located in rack #5, Linac RFQ 1 Monitoring, is set in the auto and local modes.
- 5.6 Check that the phase and amplitude reference controls are set for remote operation and that the amplitude malfunction LED is blinking, Located in RFQ Amp & Phase Nim, rack #6 of the Buncher 1 Local Control Station.
- 5.7 If no malfunction indications appear on the High Voltage Logic Screen; an off indication will appear. Remove any local lock condition by depressing the off control, F1, and turn the high voltage on. If a remote lock condition still exists, clearance to operate must come from the LEBT RF PLC Screen located in the ICR Rack F2. Observe the following range of operating parameters:
  - 7651 screen grid P.S., 550 - 600 Vdc.
  - 7651 Anode P.S., 4.5 - 5.0 Kvdc.
  - 4616 grid bias P.S., 250 - 300 Vdc.
  - 4616 screen mod p.s., 1.7Kv – 2Kv.
  - 4616 anode is approx. 15 Kv – 17Kv.

- 5.8 If no malfunction indications appear on the RFQ Pulsing Logic Bucket; a green off indication will appear. Remove any local lock condition by depressing the off control and turn the pulsing on. If a remote lock condition exists clearance to operate must come from the Panel View Linac Status, RF Pulsing Screen located in the ICR Rack 6. The RF Drive will also come on with this control.
- 5.9 Run Spreadsheet and check for the correct RFQ 1 phase and amplitude settings. Reset to the last saved file in all for all PPM users.
- 5.10 If all malfunction lights go out the RFQ 1 is now operating. If not, check the following scope pulsed monitors at the RFQ 1 monitoring rack #5 for correct operation:
- RF Gradient, amplitude is .2 Volts @ 260 on the slideback detector.
  - Phase Control Loop is nulled.
  - Phase Monitor Loop is nulled.
  - 4616 IN; Fwr. Power >3.0 v. & Rev. Power <.5 v.
  - 4616 Out, Rev. Power <1.0 volt, FWR Power > 8 Volts.
  - RFQ Loop Rev Power < 1 Volt.
- 5.11 If RFQ Loop Rev. Power is >1.0 volts initiate procedure called out in attachment #1.
- 5.12 If problems persist and RFQ is still not operating at the correct level or sparking is noticed in the 4616 anode cavity, coax or RFQ 1 cavity, do not restart, secure pulsing and high voltage. Refer condition to a systems specialist.

**6. Documentation**

None

**7. References**

None

**8. Attachments**

- 8.1 [C-A-OPM-ATT 8.1.7.a "Procedure to Lock the Automatic Frequency Control Loop for RFQ 1"](#).