


4.5 BEAM PULSING OPTIONS cont.

CAPACITIVE BEAM PULSING with EGG-3H PULSE JUNCTION CYLINDER: INSTALLATION

	CAUTION
	Support the Pulse Junction Cylinder so that no force is exerted on the gun feedthrough. Otherwise the ceramic feedthrough may be damaged.

NOTE
Surfaces of the Electron Gun exposed to vacuum, and high voltage insulator ends on the cables, should not be handled with bare hands. Use clean room gloves to keep parts free of fingerprints and contaminants.
The minimum bend radius of the H.V. Source cable is 0.25 meters. Do not twist cables.

1. Refer to the power supply and electron gun installation procedures in Sections 2.2 and 2.3.
2. Install the EGG-3H Pulse Junction Cylinder on the 2¼ CF gun flange, as shown in Fig. 4.5.3. Observe the key when connecting the four pins. **CAUTION: Avoid tilting, twisting or excessive force**, otherwise the ceramic feedthroughs may be damaged.
 - a. **If the electron gun is mounted horizontally, the Pulse Junction Cylinder must be supported**, because the EGG-3H feedthrough cannot withstand the weight of the unsupported Pulse Junction Cylinder and cable.
 - b. If the electron gun is mounted vertically, ensure that the Pulse Junction Cylinder and cable are **protected from rocking or bumping**, otherwise feedthrough breakage could occur.
3. Connect the H.V. Multiconductor Source cable to the flange end of the Pulse Junction Cylinder
4. Using a user-supplied coaxial cable, connect the Pulse Input BNC on the cylinder to the output of a separate user-supplied pulse generator.

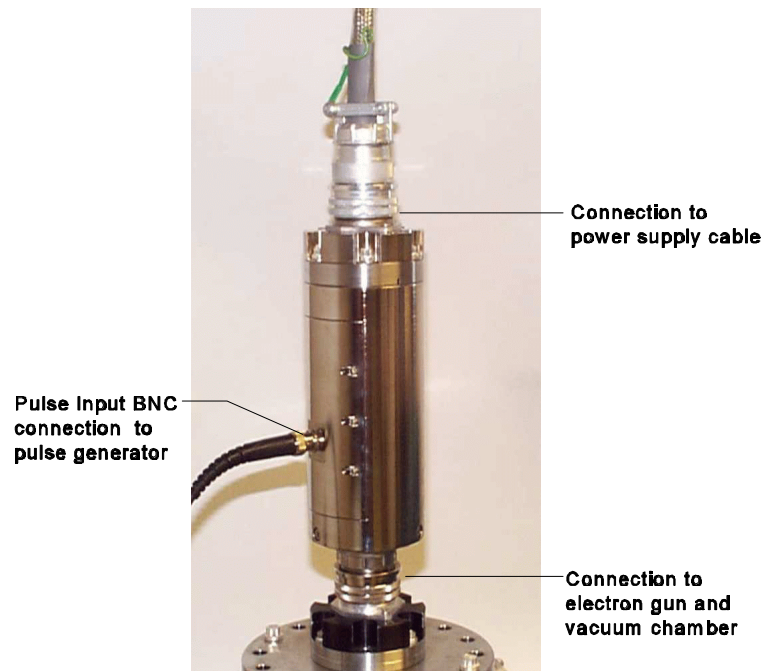
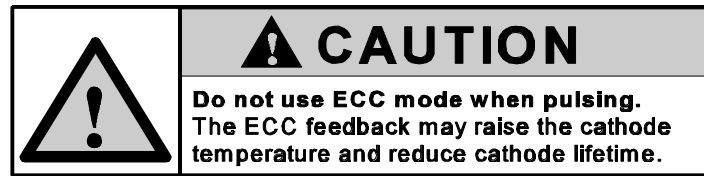


Figure 4.5.3 EGG-3H Pulse Junction Cylinder showing connections

4.5 BEAM PULSING OPTIONS cont.



CAPACITIVE BEAM PULSING with PULSE JUNCTION CYLINDER: OPERATION

1. Start up the Electron Gun in normal Source mode according to Section 4.2. **CAUTION: Do not use ECC mode when pulsing.**
2. On the EGPS, adjust the Grid voltage with the **GRID** potentiometer to just completely cut off the electron beam current. (The way the voltages control the beam is described below.)
3. On the user-supplied pulse generator, set the input pulse:
 - a. Turn on the generator, and set the desired pulse rate.
 - b. Adjust the positive voltage input to the Pulse Junction Cylinder so that the desired pulsed beam current is achieved.
 - c. Using an oscilloscope, the pulse amplitude and the grid voltage can be fine-tuned to reduce ringing and improve beam output. Note: When monitoring the beam pulse, the input impedance of the oscilloscope may need to be changed by use of a terminating resistor.
4. When not using the pulsing option: Disconnect the user-supplied pulse generator. **The input BNC on the Pulse Junction Cylinder should NOT be grounded** or else the grid in the gun will be grounded.

CAPACITIVE BEAM PULSING with PULSE JUNCTION CYLINDER: DESCRIPTION OF GRID PULSING VOLTAGES AND BEAM RESPONSE

Pulsing of the beam current is accomplished by sending a pulse through a capacitor to the control grid aperture in the gun. A pulse width from 20 nsec to 100 μ sec, with up to a 10 MHz repetition rate (20% duty cycle maximum) can be achieved using an appropriate pulse generator.

The grid voltage is negative with respect to the cathode. To pulse the gun on, positive voltage pulses are required. The grid voltage on the EGPS Power Supply should be turned up so that the electron beam is cut off. Data is supplied in the Data Section showing the grid cutoff values for the gun. By sending a pulse of the appropriate amplitude through the Pulse Junction Cylinder, the gun will be turned on for the duration of the pulse. The amplitude of the beam response depends not only on the pulse amplitude, but also on other operating parameters, such as energy, focus and source current. Thus, the appropriate pulse amplitude must be determined empirically.

A capacitor in the Pulse Junction Cylinder isolates the high voltage from the low voltage pulse generator. The pulse is transmitted from a ground-referenced pulse generator, through this capacitor to the control grid which is floating at high voltage.

4.5 BEAM PULSING OPTIONS cont.

CAPACITIVE BEAM PULSING with PULSE JUNCTION CYLINDER: DESCRIPTION OF GRID PULSING VOLTAGES AND BEAM RESPONSE cont.

Figure 4.5.4 illustrates the beam current response in fast beam pulsing. The grid power supply and pulse generator outputs superimpose to produce the voltage at the grid aperture; for example, a grid cut off voltage of -300 V plus a positive pulse of +200 V yields a pulse of -100 V applied to the grid inside the gun. This grid voltage then controls the beam current. The values shown for illustration purposes are for an EGG-3H Electron Gun at high Energy range; the actual values of grid cut off and beam current will vary with the gun and operating parameters (see Data Section).

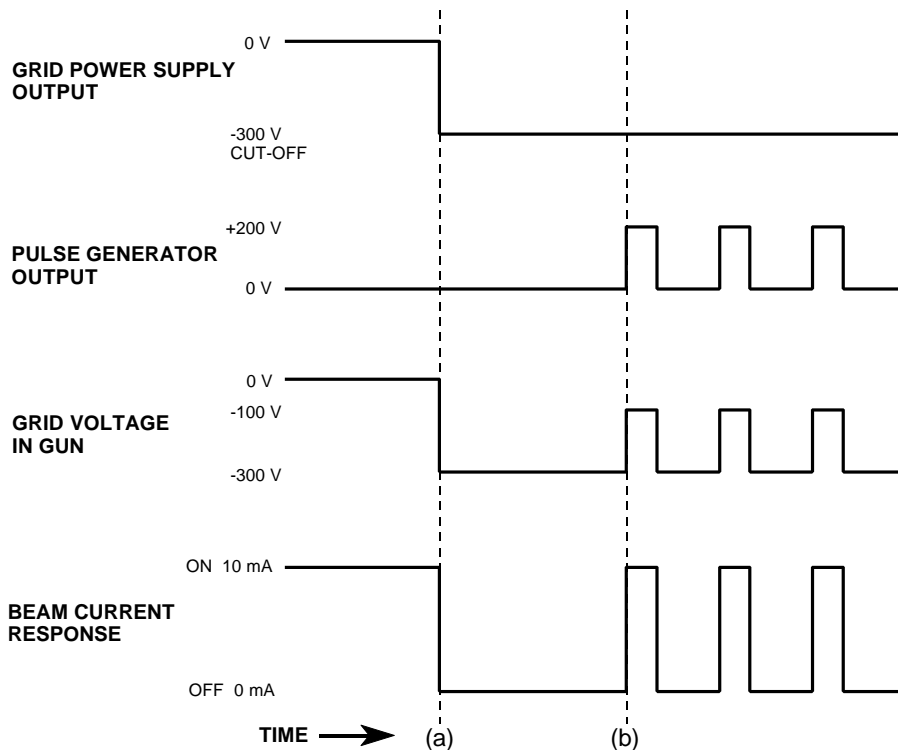


Figure 4.5.4 Capacitive Fast Beam Pulsing diagram: At time (a) the grid power supply control is set to the cut off voltage, and at time (b) the pulse generator is turned on.

This completes the Capacitive Beam Pulsing Instructions.