

## 4.9 BEAM BLANKING AND PULSING OPTION

Beam blanking deflects the electron beam to one side of the electron gun tube to interrupt the flow of electrons to the target without actually turning off the beam. The voltage applied to the blanker plate in the gun is controlled by a potentiometer on the EGPS Power Supply. Blanking can be used to pulse the final beam current repeatedly on and off in response to a TTL signal input. The blanker voltage required for beam cutoff depends on the gun configuration and on the beam energy.

### DESCRIPTION OF CONTROLS

The following controls and terminals are found on the **EGPS Power Supply front panel**:

- Blanker Switch:** An amber pushbutton switch labeled **BLANK** that enables or dis enables the power supply in the blanker unit. When the switch is off, the Beam Blanker output is switched to ground to allow normal operation of the Electron Gun.
- Blanker Control:** A ten-turn potentiometer that voltage programs Blanker power supply (0 to 600V for EMG-12, 0 to 300V for EMG-14 and ERG-21).
- Normal/Invert Switch:** A toggle switch labeled **NORMAL/INVERT** controls the type of output produced by the Beam Blanker unit. (See Figure 4.9.1)
- TTL BNC:** An input BNC labeled **TTL INPUT** on the front of the Power Supply is for the input of a TTL pulse generator or signal generator with +5 volts square wave output for pulsing operation of the Beam Blanker.

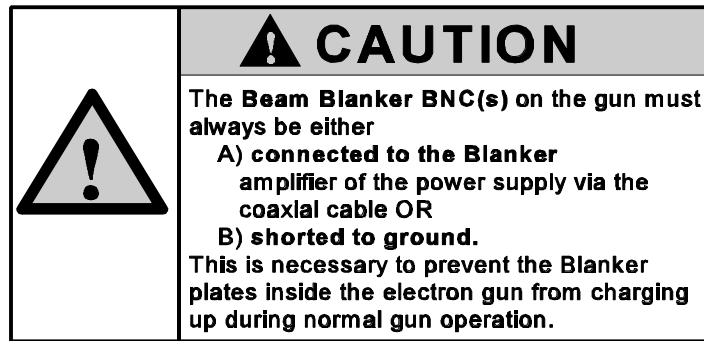
The following terminal is found on the **EGPS Power Supply back panel**:

- Blanker Output:** An output BNC, labeled **BLANKER** on the Power Supply connects with the BNC connector on the Electron Gun via a 3.0 m length of 50 ohm (RG-58) coaxial cable.

The following terminal(s) are found on the **Electron Gun**:

- Blanker BNC:**
- For EMG 12/14:** An input BNC on one of the mini conflat flanges on the Flange Multiplexer on the Electron Gun connects the input from the Power Supply to the blanker plates inside the gun.
- For ERG 21:** An input BNC with a **black ring** on the blanker control box on the side of the Electron Gun connects the input from the Power Supply to the blanker plate inside the gun. The other BNC (unmarked) on the blanker control box on the side of the Electron Gun must be **grounded**; it is shipped with a BNC grounding cap.

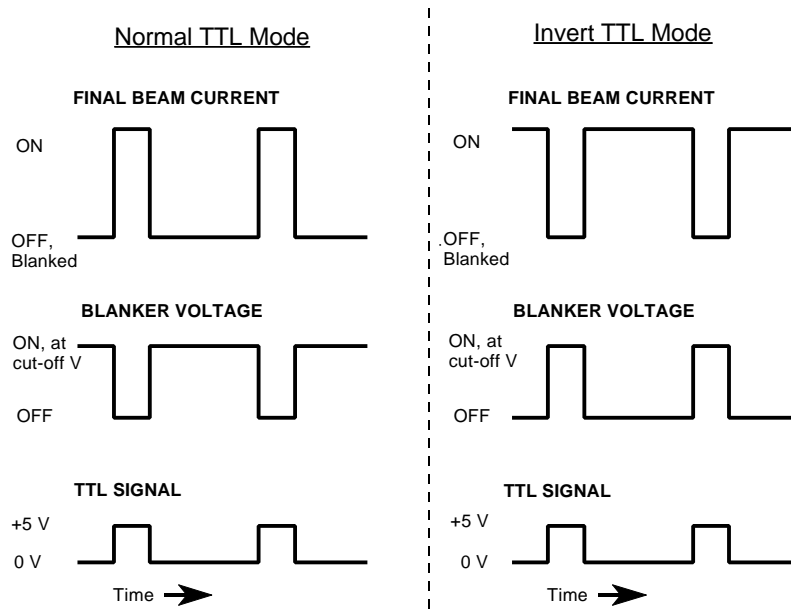
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#### OPERATION OF THE BEAM BLANKER

1. Set-up:
  - a. Connect a 0 V to +5 V square wave signal TTL generator to the **TTL INPUT** BNC on the Power Supply. Monitor the input signal with an oscilloscope.
  - b. Connect the Blanker coaxial cable between **BLANKER** BNC on the Power Supply and the Blanker BNC on the Electron Gun.  
**For ERG-21 only**, connect the cable from the Power Supply to the BNC marked with a **black band** on the blanker control box on the side of the Electron Gun, and ensure that the other BNC on the blanker control box is grounded.
2. Operation:
  - a. On the EGPS, depress the amber pushbutton labeled **BLANK** to energize the Beam Blanker system.
  - b. Set the blanker voltage with the **BLANKER** potentiometer, as read on the DVM, with **FUNCTION** in the Blanker position and the Blanker LED light on.
  - c. Determine the appropriate blanking voltages needed for beam cutoff. (See the Data Section or Fig. 4.9.2 below) Due to small system variations, the user should independently confirm that beam cutoff is achieved.
  - d. Turn the blanker on and off using the 0 V to +5 V **TTL** input signal for pulsing, or manually by switching the **NORMAL/INVERT** toggle switch up and down.
  - e. Monitor the beam current using a Faraday cup at the end of the gun, connected to a high speed current amplifier which is then connected to an oscilloscope. The amplifier is needed due to the input capacitance of the oscilloscope, and must have a rise time fast enough for pulse width desired.
  - f. Depending on the operating conditions, the voltage applied to the blanker plate, and the amount of electron scattering inside the gun, there may still be some beam current at the target, when the blanker is on; further adjustment of parameters may be needed.
3. Inverting the signal (optional): Invert the signal by changing the toggle switch labeled **NORMAL/INVERT** to the **INVERT** position. (See Figure 4.9.1) For example: If the beam is on for 1.0 msec and blanked for 10.0 msec with the switch in the **NORMAL** position, switching to the **INVERT** position will cause the beam to be on for 10.0 msec and blanked for 1.0 msec.

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**Figure 4.9.1 Normal and inverted pulsing TTL Signal, Blanker response to signal, and Beam Current response**