

4.5 BEAM PULSING OPTIONS cont.

BEAM PULSING with DUAL POLARITY GRID POWER SUPPLY

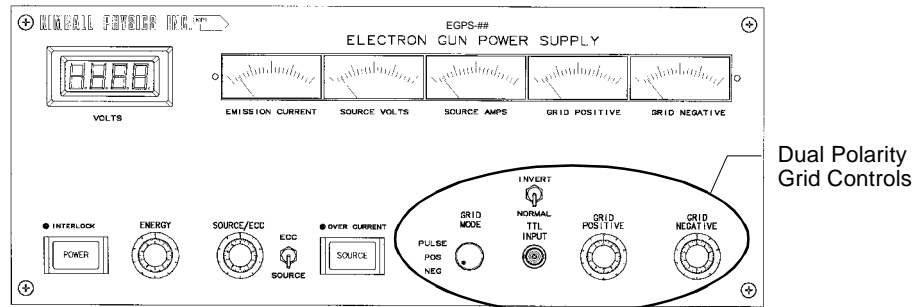


Figure 4.5.3: Front panel of a typical Power Supply with Dual Polarity Grid Pulsing option, showing controls

This method of pulsing requires a main Power Supply unit containing two grid supplies which is ordered at time of purchase; it cannot be added to an existing system without extensive rebuilding of the Power Supply at the factory. A user-supplied TTL (transistor-transistor logic) pulse source is also required. TTL pulse widths from 2 μ s to DC at repetition rates up to 100 Hz may be employed. This type of pulsing is an option for guns which normally have only a positive grid, which extracts more electrons but can not cut off the beam.

With the dual polarity grid pulsing option, beam pulsing is accomplished using a TTL signal to alternate between two Grid supplies: one negative and the other positive. The negative grid supply is set by the user to a voltage which cuts off the electron beam. The positive supply should be adjusted to a voltage which allows optimum beam current. Switching the output rapidly between these two supplies then pulses the electron beam off and on. The block diagram, Fig. 4.5.5 below, shows the relation of the supplies.

The amount of beam current emitted by the gun is a function of both energy and grid voltage. See the Data Section for graphs of Beam Current vs Grid Voltage at various Energy values. Precise beam current levels vary with operating conditions, so the user must determine appropriate grid voltages for the specific operating conditions employed.

DESCRIPTION OF DUAL GRID CONTROLS

- Grid Mode Switch:** A three-position rotary switch labeled **GRID MODE** that switches the polarity of the Grid voltage between positive and negative (**POS** and **NEG**), or allows Grid pulsing with a separate TTL source (**PULSE**).
- TTL Input BNC:** A BNC to receive a 0 to +5 VDC TTL input signal from a user-supplied TTL source for pulsing.
- TTL Invert Switch:** A two-position toggle switch labeled **INVERT/NORMAL** that inverts the grid pulse signal. This provides a method of inverting the pulse output.
- Positive Grid Control:** A ten-turn potentiometer labeled **GRID POSITIVE** that voltage programs the positive Grid (G-1) power supply.
- Negative Grid Control:** A ten-turn potentiometer labeled **GRID NEGATIVE** that voltage programs the negative Grid(G-1) power supply.

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DESCRIPTION OF DUAL GRID CONTROLS cont.

Positive Grid Voltage Meter: An analog meter labeled **GRID POSITIVE** that monitors positive Grid (G-1) bias voltage.

Negative Grid Voltage Meter: An analog meter labeled **GRID NEGATIVE** that monitors negative Grid (G-1) bias voltage.

BEAM PULSING with DUAL POLARITY GRID POWER SUPPLY: OPERATION

1. Connect a user-supplied 0 to +5 VDC TTL source to the **TTL INPUT** BNC on the front of the EGPS Power Supply.
2. Set the required Grid voltages:
 - a. Follow the Normal Start Up Procedure.
 - b. With the **GRID MODE** switch in the **POS** position, adjust the **GRID POSITIVE** potentiometer to set the positive grid supply to the voltage which produces optimum beam current and uniformity. Monitor on the analog **GRID POSITIVE** meter.
 - c. With the **GRID MODE** switch in the **NEG** position, adjust the **GRID NEGATIVE** potentiometer to set the negative grid supply to the voltage which completely cuts off the beam. Monitor on the analog **GRID NEGATIVE** meter.
3. To begin pulsing, turn the **GRID MODE** switch to the **PULSE** position:
 - a. Set the TTL switch to either **NORMAL** or the **INVERT** position. The **INVERT/NORMAL** switch reverses the TTL logic and so provides a method of inverting the pulse output. (See Figure 4.5.4, below)
 - b. In **NORMAL** mode:
 - 0 V TTL input = negative grid supply = beam cut-off
 - +5V TTL input = positive grid supply = beam on
 - c. In **INVERT** mode:
 - 0 V TTL input = positive grid supply = beam on
 - +5V TTL input = negative grid supply = beam cut-off
4. Turn on the user-supplied 0 to +5 VDC TTL source, and adjust the pulse rate as desired.
5. To turn off pulsing: Set the **GRID MODE** switch in the **POS** position. Disconnect the TTL source.

CAUTION: FOR GUN START UP AND FOR NORMAL DC OPERATION (NO PULSING), THE GRID MODE SWITCH MUST BE IN THE POS POSITION. If the switch is left in PULSE or NEG position, the negative grid may cut off the beam and no spot will be observed; this could cause the user to improperly increase the source current, which could damage the cathode.

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BEAM PULSING with DUAL POLARITY GRID POWER SUPPLY cont.

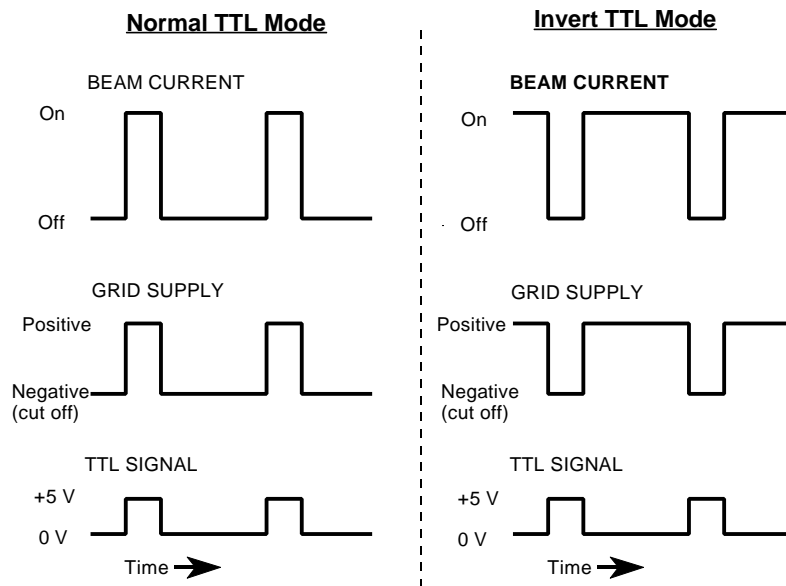


Figure 4.5.4 Normal and inverted pulsing TTL Signal, alternating Grid Supplies, and Beam Current Response

The following block diagram shows the relation of the two grid supplies for a gun with the dual polarity grid pulsing option.

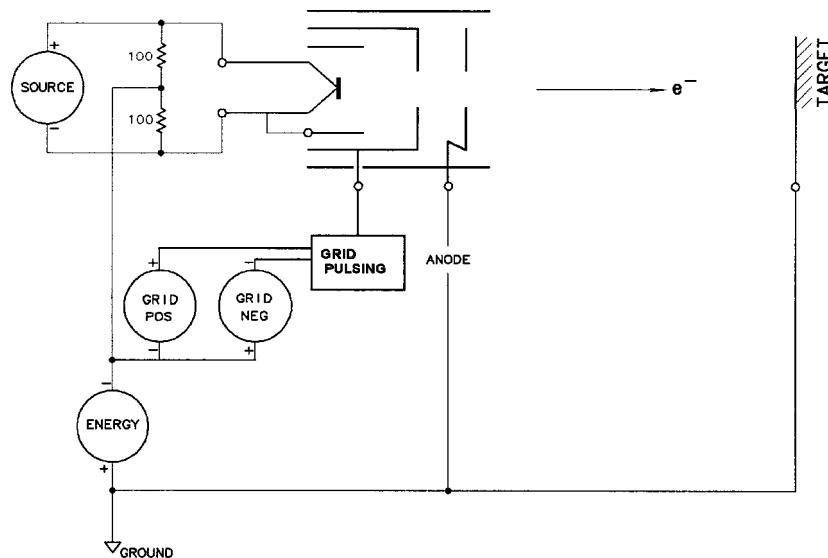


Figure 4.5.5 Block Diagram for Typical Electron Gun with Dual Polarity Grid Pulsing

This completes the Beam Pulsing Instructions.