FERRANTI

COLD CATHODE TETRODE

A gas-filled cold cathode arc discharge valve, designed for pulse operation. It is capable of passing a discharge current of the order of 250 Amperes peak, and is particularly suitable for Electronic Relays and Controls when short duration high peak current pulses are required.

PHYSICAL SPECIFICATION.

Base	International Octal.
Max. Seated Height	100 mm. (3$\frac{15}{16}$in.).
Max. Overall Length	114 mm. (4$\frac{1}{2}$in.).
Max. Base Diameter	33 mm. (1$\frac{5}{16}$in.).
Top Cap	Type CT1 ($\frac{1}{2}$in. dia.).
Mounting Position	Any.

BASE CONNECTIONS.

Pin 1—No connection.	Pin 5—Trigger Electrode No. 1.
Pin 2—No connection.	Pin 6—No Pin.
Pin 3—No connection.	Pin 7—No connection.
Pin 4—Trigger Electrode No. 2.	Pin 8—Cathode.
	Top Cap—Anode.

RATINGS.

Maximum Anode Voltage (Static) ...	550 volts.
Maximum Anode Voltage (working) ...	450 volts.
Minimum Anode Voltage (working) ...	320 volts.
Peak Inverse Anode Voltage	500 volts.
Max. Mean Anode Current	90 mA.
Maximum Average Grid Current ...	10 mA.
→ Max. Discharge Capacity	16 μF.

CHARACTERISTICS.

*Static Striking Voltage (tr_2 to tr_1)	90–140	volts.
Max. Repetition Frequency ...	250	per sec.
Min. Trigger Current required at V_a 450	50	μA.
Min. Trigger Current required at V_a 320	100	μA.

→ †Peak Anode Limits / Anode Current / Duration: A peak anode current of approx. 300 amps. results from the discharge of a 2 μFd. capacitor charged to 450 V. The discharge time is 5 μ secs. approx.

→ Luminous Intensity: Under discharge conditions noted above the peak luminous intensity is approx. 530 candelas.

TYPICAL OPERATION.

DC. Supply Voltage	420 volts.
Trigger Electrode No. 2 Voltage (V_{tr2})	60 volts.
§Trigger Pulse Amplitude (V_{tr_1})	160 volts.
Charging Resistor	3000 ohms.
Discharge Capacitor for operation at :—	
50 c.p.s.	2 μF.
250 c.p.s.	0·5 μF.

For further information on operation please refer to data sheet for NSP2 under "Notes on Operation." However, because of the increased supply voltage used with GN10, the circuits shown on the NSP2 Sheet will require some modification of component valves to provide the correct trigger electrode voltages.

→ DELAY TIME.

From 50 microseconds down to a few microseconds dependent on circuit conditions. In normal operation shortest delay times are ensured by using high values of Anode Voltage and trigger pulse energy.

*The limits quoted are to cover production variations, and refer to the triggering voltage for a low rate of change of electrode voltages, with tr_1 negative to tr_2. For pulse operation a higher trigger voltage is generally necessary. See under "Typical Operation" and "Notes on Operation."

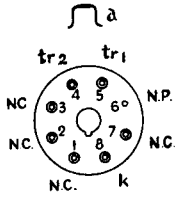
→ †A minimum of 5 amps. is necessary for the formation of an arc discharge with a tube drop of approx. 20 volts. If the main gap current is less than 5 amps. peak, a glow discharge is likely to form with a 70 volt drop and results in excessive cathode dissipation.

‡At instant of triggering.

§Negative in respect to cathode.

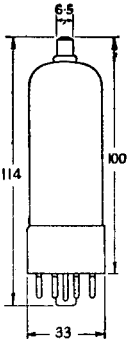
Issue 3
Jan., 1958

GN10



Base Connections

Underside View of Base



All dimensions shown are in millimetres.

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NOTES ON OPERATION.

On the quadrant diagram shown below the area enclosed by the loops is an area of non-conduction. If the vector sum of the voltages on two electrodes lies within the loop the valve will not fire. Any change of either or both of these voltages which causes the vector sum to fall outside the loop will trigger the valve by producing a glow discharge between one of the trigger electrodes and cathode or between the two trigger electrodes. This discharge will then initiate the arc discharge in the main anode—cathode gap. However to ensure reliable triggering and interchangeability, the valve should be triggered by a discharge between the two Trigger Electrodes, with a positive voltage on tr_2 and a negative going voltage on tr_1.

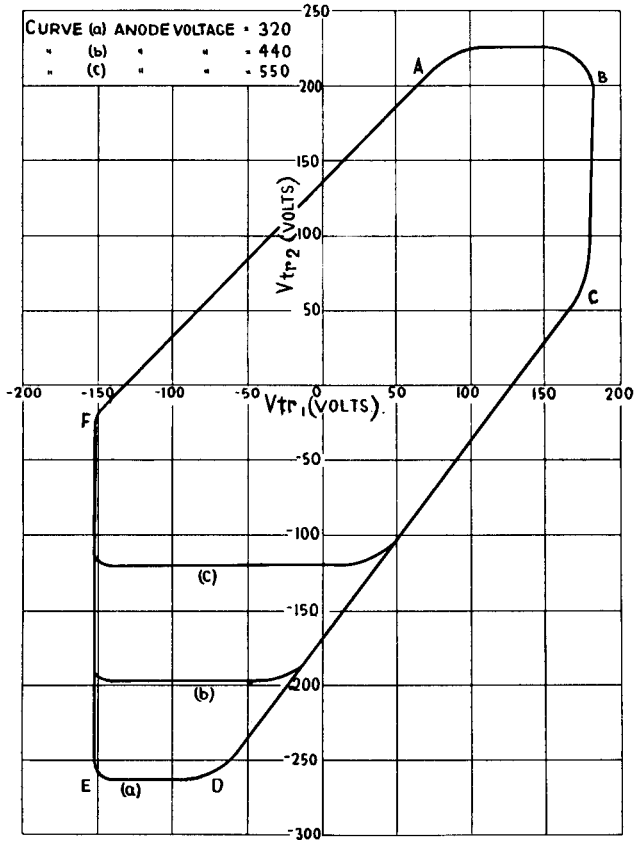
As the triggering impulse carries the vector sum of the applied voltages outside the loop, the point at which it crosses the loop indicates the manner in which the valve is triggered as follows :—

A—B Trigger Elec. 2 to Cathode.
B—C Trigger Elec. 1 to Cathode.
C—D Trigger Elec. 1 to Trigger Elec. 2.
D—E Cathode to Trigger Elec. 2.
E—F Cathode to Trigger Elec. 2.
F—A Trigger Elec. 2 to Trigger Elec. 1.

As noted above the most reliable operation is ensured by triggering between F and A, i.e., between tr_2 and tr_1.

For pulse operation it is necessary to apply a negative pulse of sufficient height and width, to trigger Electrode No. 1. A suitable trigger pulse is one about 150—200 volts which has a width of 30—100 microseconds at half the pulse amplitude.

The voltage on Trigger Electrode 2 should be approximately 60 volts positive at the instant of triggering.



AVERAGE STATIC TRIGGERING CHARACTERISTIC