HYDROGEN THYRATRON
POSITIVE-CONTROL, TRIODE TYPE

GENERAL DATA

Electrical:
Heater, for Unipotential Cathode:
Voltage ........... 6.3 \pm 5\% ....... ac or dc volts
-10\%
Current at 6.3 volts:
Minimum ........... 2.0 ............ amp
Average ........... 2.3 ............ amp
Maximum ........... 2.5 ............ amp
Minimum Heating Time .... 2 minutes
Direct Interelectrode Capacitances (Approx.):
Grid to Anode ........... 3.9 \mu f
Grid to Cathode ........... 8.6 \mu f
Ionization Time (Approx.) \(^\circ\) ........... 0.6 \mu sec
Deionization Time (Approx.) ........... 25 \mu sec
Anode-Cathode Voltage Drop (Approx.):
At middle of pulse duration ........... 150 volts
Maximum Variation in Firing Time (Jitter) ........... 0.06 \mu sec

Mechanical:
Operating Position ........... Any
Overall Length ........... 4-3/4'' \pm 1/4''
Seated Length ........... 4-1/8'' \pm 1/4''
Maximum Diameter ........... 1-9/16''
Bulb ........... T-12
Cap ........... Small (JETEC No.C1-1)
Base ........... Medium-Shield Small 4-Pin, Micanof (JETEC No.A4-9)
BOTTOM VIEW

Pin 1—Heater
Pin 2—Cathode
Pin 3—Grid
Pin 4—Heater,
Cathode
Cap—Anode

Cooling ........... Natural

PULSE MODULATOR SERVICE

Maximum and Minimum CCS\(^\circ\) Ratings, Absolute Values:
DC ANODE-SUPPLY VOLTAGE ........... 800 min. volts

\(^\circ\) Defined as the time interval between the point on the rising portion of the grid pulse which is 26\% of the peak unloaded pulse amplitude and the point on the anode-current pulse which is 26\% of its peak amplitude.
The anode-current pulse has a time rise of 0.05 microsecond maximum. The grid pulse has a peak amplitude of 130 volts minimum, has a rise time of 0.5 microsecond maximum, and is supplied by a driver having 1500 ohms maximum internal impedance.

* Continuous Commercial Service.

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PEAK ANODE VOLTAGE:
Forward \((E_{bmf})^\ast\) ................ 3000 max. volts
Inverse .................................. 5% of \(E_{bmf}\) min. volts
After anode-current pulse:\(\uparrow\)
   During first 25 \(\mu\)sec .......... 1500 max. volts
   After first 25 \(\mu\)sec ......... 3000 max. volts

GRID VOLTAGE:
Negative (DC or Peak),
   before conduction .......... 200 max. volts
   Peak Positive Pulse .......... 175 min. volts

ANODE CURRENT:
   Peak .................................. 35 max. amp
   Average\(^0\) ................. 0.045 max. amp
   Rate of Rise .............. 750 max. amp/\(\mu\)sec
   OPERATION FACTOR\(\dagger\) . .... 3 \times 10^8 max.
   PULSE DURATION\(\ast\) ............... 6 max. \(\mu\)sec
   AMBIENT TEMPERATURE ....... -50 to +90 °C

Typical Operation\(\ast\) at 2000 pps in Circuit of Fig.1:

\(Pulse \) Duration of 0.5 \(\mu\)sec
DC Anode-Supply Voltage .............. 1250 volts
Peak Anode Voltage:
   Forward ......................... 3000 volts
   Inverse:
      Immediately after anode-
         current pulse .......... 530 volts
Grid Voltage:
   Negative, before conduction .... 0 volts
   Peak Positive Pulse (Unloaded) ... 175 volts
Effective Grid-Circuit Resistance .... 1000 ohms
Anode Current:
   Peak ................. 35 amp
   Average\(^0\) .......... 0.035 amp
   Operation Factor\(\dagger\) .... 2.1 \times 10^8
Peak Power Output to
   Pulse Transformer (T) .......... 43000 watts

Maximum Circuit Values:
Effective Grid-Circuit Resistance .... 1500 max. ohms

\(\ast\) In applications where the anode voltage is applied instantaneously, the
   power-supply filter should be designed so that the peak forward anode
   voltage is applied at a rate not to exceed 75000 volts per second.
\(\uparrow\) Exclusive of spike not having more than 0.05 microsecond duration.
\(\dagger\) Operation with a bulb temperature within the approximate range of 60°
   to 90°C measured on the bulb directly opposite the anode is recommended
   for longest life. To attain this temperature under operating conditions
   involving low ambient temperature, the use of a heat-conserving enclo-
   sure for the tube may be necessary.
\(^0\) Averaged over any cycle.

\(\ast\)\(\dagger\): See next page.

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† Defined as Peak Forward Anode Volts x Pulse Repetition Rate (pps) x Peak Anode Amperes (excluding spike).

* Pulse duration is defined as the time interval between points on the pulse envelope at which instantaneous amplitudes are equal to 70.7% of the maximum amplitude excluding spike.

OPERATING considerations

The ambient-temperature operating range for the 3C45 extends from -50° to +90°C (-58° to +194°F). Within this range, there is no appreciable effect on the electrical characteristics of the tube. However, for longest life, it is recommended that the tube be operated with a bulb temperature within the approximate range of 60° to 90°C (140° to 194°F). Under no circumstances should a stream of cooling air be applied to the glass envelope.

The Connector for the anode cap should be of the heat-radiating type and should have ample current-carrying capability for the operating requirements.

Fig.1 - Typical Pulse-Modulator Circuit
Operating at 2000 pps.

![Circuit Diagram]

- C: Blocking Capacitor, 0.001 μf
- Egg: Pulse Generator supplying peak positive pulse grid voltage of 175 volts (unloaded)
- L: Charging Choke, 5 henries
- PFN: Pulse-Forming Network with iterative impedance of 50 ohms, and a two-way transmission time of 0.5 microsecond
- R₁: Grid Resistor, 30000 ohms
- R₂: Effective Resistance of grid circuit, 1000 ohms
- Rₗ: Load Resistance. Value reflected into primary of transformer (T) is 35 ohms.
- T: Matching Pulse Transformer

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