RCA

# 3C45

# HYDROGEN THYRATRON

POSITIVE-CONTROL, TRIODE TYPE

## GENERAL DATA

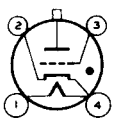
**Electrical:**

| | | |
|---|---|---|
| Heater, for Unipotential Cathode: | | |
| Voltage | 6.3 $^{+5\%}_{-10\%}$ | ac or dc volts |
| 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 | $\mu\mu$f |
| Grid to Cathode | 8.6 | $\mu\mu$f |
| Ionization Time (Approx.)[□] | 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" ± 1/4" |
| Seated Length | 4-1/8" ± 1/4" |
| Maximum Diameter | 1-9/16" |
| Bulb | T-12 |
| Cap | Small (JETEC No.C1-1) |
| Base . . Medium-Shell | Small 4-Pin, Micanol (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● Ratings,** ***Absolute Values:***

| | | |
|---|---|---|
| DC ANODE-SUPPLY VOLTAGE | 800 min. | volts |

□ 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 ($E_{bmf}$)* | 3000 max. | volts |
| Inverse | 5% of $E_{bmf}$ min. | volts |
| After anode-current pulse:▲ | | |
| During first 25 μsec | 1500 max. | volts |
| After first 25 μsec | 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° | 0.045 max. | amp |
| Rate of Rise | 750 max. | amp/μsec |
| OPERATION FACTOR† | $3 \times 10^8$ max. | |
| PULSE DURATION● | 6 max. | μsec |
| AMBIENT TEMPERATURE | -50 to +90 | °C |

**Typical Operation♦ at 2000 pps in Circuit of Fig.1:**

| | *Pulse Duration of 0.5 μsec* | |
|---|---|---|
| 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° | 0.035 | amp |
| Operation Factor† | $2.1 \times 10^8$ | |
| Peak Power Output to Pulse Transformer (T) | 43000 | watts |

**Maximum Circuit Values:**

| | | |
|---|---|---|
| Effective Grid-Circuit Resistance | 1500 max. | ohms |

* 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.

▲ Exclusive of spike not having more than 0.05 microsecond duration.

♦ 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 enclosure for the tube may be necessary.

° Averaged over any cycle.

†,●: See next page.



TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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

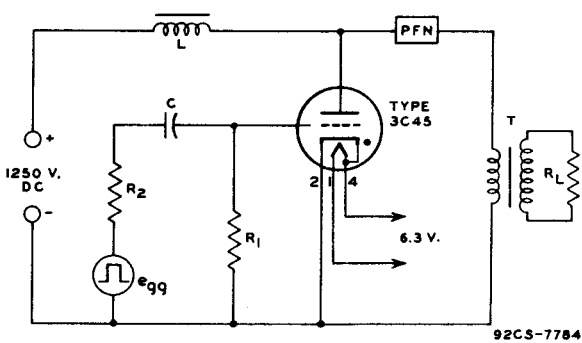
* Pulse duration is defined as the time interval between points on the pulse envelope at which instantaneous amplitudes are equal to 70.7% of the maximum amplitude excluding spike.

## 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.*




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

$R_1$: Grid Resistor, 30000 ohms

$R_2$: Effective Resistance of grid circuit, 1000 ohms

$R_L$: Load Resistance. Value reflected into primary of transformer (T) is 35 ohms.

T: Matching Pulse Transformer

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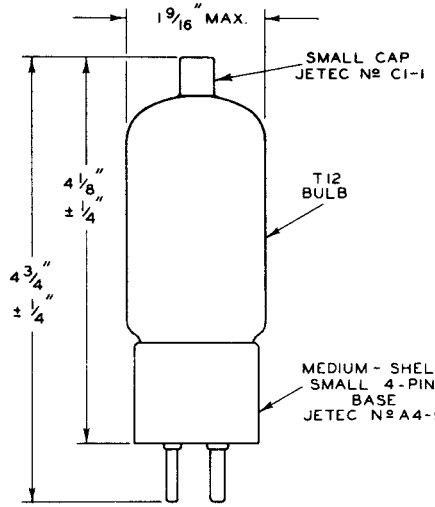


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