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# 6130/3C45 HYDROGEN THYRATRON

POSITIVE-CONTROL TRIODE TYPE

**GENERAL DATA****Electrical:**

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3  $\begin{cases} +5\% \\ -10\% \end{cases}$  . . . ac or dc volts

Current at 6.3 volts:

Minimum. . . . . 2 amp

Average. . . . . 2.3 amp

Maximum. . . . . 2.5 amp

Minimum heating time . . . . . 2 minutes

Direct Interelectrode Capacitances

(Approx.):

Grid to anode. . . . . 3.9  $\mu\text{f}$ Grid to cathode. . . . . 8.6  $\mu\text{f}$ Ionization Time (Approx.)<sup>□</sup> . . . . . 0.6  $\mu\text{sec}$ Deionization Time (Approx.) . . . . . 25  $\mu\text{sec}$ 

Anode-Cathode Voltage Drop (Approx.)

at middle of pulse duration. . . . . 150 volts

Maximum Variation in Firing Time (Jitter). 0.06  $\mu\text{sec}$ **Mechanical:**

Operating Position . . . . . Any

Maximum Overall Length . . . . . 5-3/16"

Seated Length. . . . . 4-3/8"  $\pm$  3/16"

Maximum Diameter . . . . . 1-9/16"

Weight (Approx.) . . . . . 3 oz

Cooling. . . . . Natural

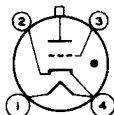
Bulb . . . . . T12

Cap. . . . . Small (JEDEC No. C1-1)

Base . . . . . Medium-Shell Small 4-Pin, Micanol (JEDEC No. A4-9)

Basing Designation for BOTTOM VIEW . . . . . 4BL

Pin 1 - Heater  
Pin 2 - Cathode,  
Circuit  
Returns



Pin 3 - Grid  
Pin 4 - Heater,  
Cathode  
Cap - Anode

**PULSE-MODULATOR SERVICE****Maximum and Minimum CCS<sup>®</sup> Ratings, Absolute Values:**For pressures down  
to 70 mm of Hg<sup>#</sup>

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

PEAK ANODE VOLTAGE:

Forward ( $E_{\text{bmf}}$ )<sup>\*</sup> . . . . . 3000 max. voltsInverse. . . . . 5% of  $E_{\text{bmf}}$  min. voltsAfter anode-current pulse:<sup>▲</sup>During first 25  $\mu\text{sec}$  . . . . . 1500 max. voltsAfter first 25  $\mu\text{sec}$ . . . . . 3000 max. volts

□, ●, #, \*, ▲: See next page.

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**HYDROGEN THYRATRON**

*For pressures down to 70 mm of Hg\**

<b>GRID VOLTAGE:</b>		
Negative (DC or Peak), before conduction. . . . .	200 max.	volts
Peak positive-pulse. . . . .	175 min.	volts
<b>ANODE CURRENT:</b>		
Peak . . . . .	35 max.	amp
Average <sup>o</sup> . . . . .	0.045 max.	amp
Rate of rise . . . . .	750 max.	amp/ $\mu$ sec
<b>OPERATION FACTOR</b> <sup>†</sup> . . . . .	$3 \times 10^8$ max.	
<b>PULSE DURATION</b> <sup>*</sup> . . . . .	6 max.	$\mu$ sec
<b>AMBIENT-TEMPERATURE RANGE</b> . . . . .	-50 to +90	$^{\circ}$ C

**Typical Operation:**<sup>‡</sup>

*At 2000 pps in accompanying circuit with pulse duration of 0.5  $\mu$ sec*

<b>DC Anode-Supply Voltage</b> . . . . .	1250	volts
<b>Peak Anode Voltage:</b>		
Forward. . . . .	3000	volts
Inverse:		
Immediately after anode-current pulse. . . . .	530	volts
<b>GRID VOLTAGE:</b>		
Negative, before conduction. . . . .	0	volts
Peak positive-pulse (Unloaded) . . . . .	175	volts
<b>Effective Grid-Circuit Resistance</b> . . . . .	1000	ohms
<b>ANODE CURRENT:</b>		
Peak . . . . .	35	amp
Average <sup>o</sup> . . . . .	0.035	amp
<b>Operation Factor</b> <sup>†</sup> . . . . .	$2.1 \times 10^8$	
<b>Peak Power Output to Pulse Transformer (T)</b> . . . . .	43000	watts

**Maximum Circuit Values:**

<b>Effective Grid-Circuit Resistance</b> . . . . .	1500 max.	ohms
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- $\square$  Defined as the time interval between the point on the rising portion of the grid pulse which is 26 per cent of the peak unloaded-pulse amplitude and the point on the anode-current pulse which is 26 per cent of its peak amplitude. The anode-current pulse has a maximum time rise of 0.05  $\mu$ sec. The grid pulse has a minimum peak amplitude of 130 volts, a maximum rise time of 0.5  $\mu$ sec, and is supplied by a driver having a maximum internal impedance of 1500 ohms.
- $\bullet$  Continuous Commercial Service.
- $\#$  Corresponds to altitude of about 50,000 feet.
- $\ast$  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 75,000 volts per second.
- $\blacktriangle$  Exclusive of spike not having more than 0.05  $\mu$ sec duration.
- $\circ$  Averaged over any cycle.
- $\dagger$  Defined as *Peak Forward Anode Volts x Pulse-Repetition Rate (pps) x Peak Anode Amperes (excluding spike)*.

$\clubsuit, \spadesuit$ : See next page.



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

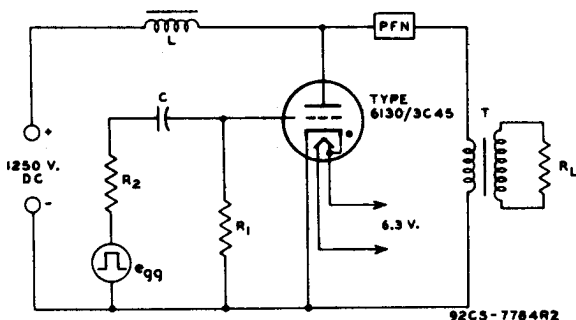
## OPERATING CONSIDERATIONS

The *anode* is brought out of the tube to a Small cap. The connector for this cap should be of the heat-radiating type and the connector lead should have ample current-carrying capability for the operating requirements.

*Shielding* of the 6130/3C45 should be provided if it is operated in the presence of strong electric fields which will ionize the gas within the tube. Any such ionization will cause erratic performance.

*Cooling* of the 6130/3C45 is accomplished by natural circulation of air around it. Under no circumstances should a stream of cooling air be applied to the glass envelope.

## TYPICAL PULSE-MODULATOR CIRCUIT



- C: Blocking Capacitor, 0.001  $\mu$ f  
 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  $\mu$ sec  
 R<sub>1</sub>: Grid Resistor, 30,000 ohms  
 R<sub>2</sub>: Effective Resistance of grid circuit, 1000 ohms  
 R<sub>L</sub>: Load Resistance. Value reflected into primary of transformer (T) is 35 ohms.  
 T: Matching Pulse Transformer

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## HYDROGEN THYRATRON

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