DESCRIPTION

This new device employs the field of a permanent magnet to guide the electron flow from cathode to anode.

A controlling electrode, designated 'gate', replaces the conventional wound grid with its attendant problems of emission and distortion. The gate, which is of solid and robust construction, is used to modulate the flow of electrons, and is positioned so that very few electrons are intercepted by it.

As the gate dissipation is negligible, the gain of the tube is very high (approximately 30dB), and the driving power required for full output is low compared with that for a conventional triode. However, the drive voltage is as high as with a conventional triode, ensuring as good a rejection of spurious drive signals.

The relatively high impedance of the gate circuit allows the use of additional components of moderate power ratings for power control or switching in this circuit.

The tube may be used with advantage in r.f. amplifiers, oscillators and r.f. heating applications. The efficiency is good at low anode voltage as well as at higher levels.

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A particular feature of the tube when used for r.f. heating is its ability to withstand interruption of oscillation resulting from circuit or loading faults; this is because the anode dissipation at full h.t. and zero bias is well within the tube rating at anode voltages up to 4kV.

High efficiency operation at low anode voltage is obtained because of the low anode bottoming potential, whilst the overall efficiency of the tube is enhanced by the lower heating power associated with the matrix type cathode.

The construction of the whole tube is very robust and the breakage and distortion hazards encountered in high temperature filamentary emitters are eliminated.

Anode cooling is effected by means of a newly developed integral, low pressure drop, transverse flow water jacket. Base cooling is not required at operating frequencies below 1MHz.

CATHODE
Indirectly heated, matrix type

HEATER
Heater voltage 12.5 V
Heater current 12 A

CHARACTERISTICS
Amplification factor 42
Mutual conductance 40 mA/V

DIRECT INTERELECTRODE CAPACITANCES
Gate to anode 55 pF
Gate to cathode 63 pF
Anode to cathode (gate earthed) 6.8 pF

MECHANICAL DATA
Dimensions Connection detail
Magnet As shown in Figure 4
A recommended permanent magnet, the outline of which is shown in Figure 4 can be supplied as an additional accessory.
Mounting position Unrestricted
Weight of valve, approx. 10 lb 7 oz 4.75 kg

COOLING REQUIREMENTS
For an anode dissipation of 10kW, a water flow of 1.5 gal/min (6.8 l/min) is required. No other cooling is required at operating frequencies below 1MHz. At higher frequencies forced-air cooling of the seals may be necessary to keep their temperatures within the maximum rating of 220°C.
LIMIT RATINGS AND TYPICAL OPERATING CONDITIONS

CLASS C. INDUSTRIAL HEATING OSCILLATOR

Limit Ratings
Max. direct anode voltage (peak value of direct voltage plus ripple) 6.5 kV
Max. direct anode voltage for fail-safe if oscillation ceases 4 kV
Max. peak cathode current 24 A
Max. direct anode current 5.5 A
Max. direct anode dissipation (continuous) 8 kW
Max. direct gate voltage 750 V
Max. frequency for above ratings 10 MHz

Typical Operating Conditions (Measured in induction heating generator)
Direct anode voltage* 2.5 3.0 4.0 5.0 6.0 6.0 kV
Direct gate voltage -470 -440 -445 -415 -520 -500 V
Direct anode current 4.49 5.02 5.15 5.25 5.2 2.7 A
Peak r.f. gate voltage 1007 1004 987 947 1107 870 V
Direct gate current
on load 90 85 86 80 100 16 mA
off load 170 160 160 150 180 30 mA
Gate bias resistor 5.2 5.2 5.2 5.2 5.2 33 kW
Gate dissipation 48.5 48 46.5 42.5 58.7 6 W
Power input 11.2 15 20.6 26.25 31.2 16.2 kW
Anode dissipation 4.1 5.3 6.3 7.25 8.0 3.2 kW
Power output
(octillator) 7.1 9.7 14.3 19.0 23.2 13 kW
Power into load at 90% transfer efficiency 6.4 8.7 12.9 17.1 20.9 11.7 kW

* In the event of cessation of oscillation the valve remains within P_a limit at V_g = 0, V_e ≥ 4kV.
Fig. 1. Typical Anode Current and Gate Current versus Anode Voltage
Fig. 2. Typical Constant Current Characteristics
Fig. 3. Typical Anode Current versus Gate Voltage
Fig. 4. Tube Outline

<table>
<thead>
<tr>
<th>dim.</th>
<th>m.m.</th>
<th>ins.</th>
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<tbody>
<tr>
<td>A</td>
<td>117,5 max.</td>
<td>4·625 max.</td>
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<tr>
<td>B</td>
<td>162 max.</td>
<td>6 3/8 max.</td>
</tr>
<tr>
<td>C</td>
<td>273 max.</td>
<td>10 3/4 max.</td>
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<tr>
<td>D</td>
<td>177,8 ± 0,8</td>
<td>7 ± 1/32</td>
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<tr>
<td>E</td>
<td>81 approx.</td>
<td>3 3/16 approx.</td>
</tr>
<tr>
<td>F</td>
<td>7,94</td>
<td>5/16</td>
</tr>
<tr>
<td>G</td>
<td>16 approx.</td>
<td>5/8 approx.</td>
</tr>
<tr>
<td>H</td>
<td>45,72 ± 0,8</td>
<td>1·80 ± 0·03</td>
</tr>
<tr>
<td>J</td>
<td>43 max.</td>
<td>1 11/16 max.</td>
</tr>
<tr>
<td>K</td>
<td>76 approx.</td>
<td>3 approx.</td>
</tr>
<tr>
<td>L</td>
<td>25,4 approx.</td>
<td>1 approx.</td>
</tr>
<tr>
<td>M</td>
<td>18,7 ± 0,4</td>
<td>0·736 ± 0·015</td>
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Fig. 5. Magnet Outline

<table>
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<th>dim</th>
<th>mm</th>
<th>ins</th>
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<tbody>
<tr>
<td>A</td>
<td>196.9 ± 0.8</td>
<td>7 3/4 ± 1/32</td>
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<tr>
<td>B</td>
<td>230 approx.</td>
<td>9 approx.</td>
</tr>
<tr>
<td>C</td>
<td>38 max.</td>
<td>1 1/2 max.</td>
</tr>
<tr>
<td>D</td>
<td>19 approx.</td>
<td>3/4 approx.</td>
</tr>
<tr>
<td>E</td>
<td>57 approx.</td>
<td>2 1/4 approx.</td>
</tr>
<tr>
<td>F</td>
<td>238 approx.</td>
<td>9 3/8 approx.</td>
</tr>
<tr>
<td>G</td>
<td>48 approx.</td>
<td>1 7/8 approx.</td>
</tr>
<tr>
<td>H</td>
<td>13.5 ± 0.4</td>
<td>17/32 ± 1/64</td>
</tr>
</tbody>
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