This is a velocity-modulated oscillator of the coaxial line type for CW operation in the frequency range 2700 to 4000 Mc/s.

**CATHODE.**
Indirectly-heated, oxide-coated
Heater voltage 6.3 \( V \)
Nominal current 0.3 \( A \)
(AC frequencies above 1.5 kc/s must not be used)

**DIMENSIONS.**
Maximum overall length 73 \( \text{mm} \)
Maximum bulb diameter 20.1 \( \text{mm} \)
Base B7G
Net weight 21 \( g \)

**MOUNTING.**
The valve is designed to mount by means of the resonator disc so that the antenna couples into a suitable tuning circuit.

**MAXIMUM RATINGS.**
Maximum mean input power to all electrodes, other than the heater 15 \( W \)
Maximum direct cathode current 65 \( mA \)
Maximum direct screen voltage 400 \( V \)
Maximum screen dissipation 1.5 \( W \)
TYPICAL OPERATING CONDITIONS.

Oscillator in the frequency range 2700 to 4000 Mc/s.

Grid Voltage ($V_{g1}$)

40 volts negative with respect to cathode. The use of bias improves the proportion of cathode current which passes through the resonator and reaches the anode. See Figure 6 for a sketch of the electrode assembly.

Resonator voltage ($V_{res}$)

At 3300 Mc/s, 250 V ± 5 per cent. For other frequencies the resonator voltage is approximately proportional to the square of the frequency. See Figure 1.

Screen voltage ($V_{g2}$)

Zero to $V_{res} + 50$ volts. Adjusted to obtain the appropriate value of cathode current.

Screen current ($I_{g2}$)

Not greater than 5 mA.

Anode voltage ($V_a$)

10 to 20 volts positive with respect to resonator.

Output power ($P_o$)

Not less than 500 mW over the frequency range 2700 to 3800 Mc/s and not less than 350 mW over the frequency range 3800 to 4000 Mc/s when operated in the tuning circuit of Figure 7, and when the load is adjusted for maximum power output. In Figure 3 power output of a typical valve is plotted as a function of frequency for a cathode input of 15 watts.
Velocity Modulated
Oscillator

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CIRCUIT.

Figure 7 shows a sketch of a suitable tuning circuit. The frequency of oscillation is a function of tuner position. Curves of tuner position as a function of frequency are plotted in Figure 2. The valve will operate satisfactorily in other types of circuit, with certain differences in performance. Further information may be obtained on application to the Chief Valve Engineer, Standard Telephones and Cables, Limited, Dowlish Ford Mills, Ilminster, Somerset.

OUTPUT COUPLING.

The specified output power is obtainable over the entire range 2700 to 4000 Mc/s by means of a coupling loop inserted through the cylindrical wall of the circuit.

Satisfactory loading of the valve into 70 ohm coaxial cable is obtainable and it is usually necessary to make an adjustment of the loop orientation when tuning the oscillator over the frequency range. For applications where such adjustment of the loop is inadmissible, the impedance of the load must be transformed by means of an appropriate impedance matching technique.

UNLOADED STARTING CURRENT.

The anode current at which oscillations just start, when the valve is loaded only by the circuit, is referred to as the "unloaded starting current", and serves as a useful measure of the efficiency of the tuning circuit. In Figure 4 the unloaded starting current for a typical valve is plotted as a function of frequency using the recommended circuit.

To illustrate the importance of good circuit construction a curve of power output versus the unloaded starting current of the valve circuit combination is given in Figure 5.

MAGNET AND MAGNET ALIGNMENT.

A permanent magnet is used to focus the electron beam. The recommended magnet is Jessop Type No. 10512, but any magnet giving a uniform field of approximately 1200 oersteds over a 22 mm gap can be used. The magnet must be aligned so that the best ratio of anode current to cathode current is obtained. (See Figure 6.) Three holes are punched in the valve disc and locate on pins fixed to the valve clamping plate. Once the magnet has been aligned, and has been securely clamped with respect to the locating pins, no further adjustment will be necessary when replacing valves. It is recommended that at least three, and preferably six, valves are used to establish the initial alignment of the magnet.

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V235A/1K
VL2006-2

FIG 1

ANODE CURRENT (mA)

RESONATOR VOLTAGE & CATHODE CURRENT AS A FUNCTION OF FREQUENCY

CATHODE CURRENT 15 WATTS INPUT

FIG 2

TUNER POSITION AS A FUNCTION OF FREQUENCY

TENTATIVE DATA.
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<table>
<thead>
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<tr>
<td>VL 2007</td>
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</table>

**FIG 3**

Power Output as a function of Frequency

**FIG 4**

Anode Starting Current as a function of Frequency when the valve is loaded by tuning circuit

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V235A/1K

VL 2524

\[ f = 3800 \text{ Mc/s} \]

\[ I_a = 30 \text{ mA} \]

FIG. 5.

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![Diagram of valve assembly](image)

**FIG. 6**

Cross Section of Valve Assembly

![Diagram of valve components](image)

**FIG. 7**

Valve Clamping Plate

CV2221 Valve

Magnet Clamping Plate

Jessop Magnet Type No. 10512

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**BASING**

1. CONTROL GRID.
2. CATHODE.
3. HEATER.
4. HEATER.
5. ANODE.
6. RESONATOR.
7. SCREEN GRID.

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<tr>
<th>DIM</th>
<th>MILLIMETRES</th>
<th>INCHES</th>
<th>DIM</th>
<th>MILLIMETRES</th>
<th>INCHES</th>
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<tr>
<td>A</td>
<td>73 MAX.</td>
<td>2 7/8 MAX.</td>
<td>P</td>
<td>13.5 ± 4.0</td>
<td>0.53 ± 0.16</td>
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<td>B</td>
<td>42 MAX.</td>
<td>1.65 MAX.</td>
<td>Q</td>
<td>8.5 MAX.</td>
<td>0.33 MAX.</td>
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<tr>
<td>C</td>
<td>20-1 MAX.</td>
<td>0.79 MAX.</td>
<td>R</td>
<td>3.2 ± 0.15</td>
<td>0.125 ± 0.005</td>
</tr>
<tr>
<td>D</td>
<td>30.96 ± 0.06</td>
<td>1.218 ± 0.002</td>
<td>S</td>
<td>3.2 - 0.00</td>
<td>0.093 - 0.000</td>
</tr>
<tr>
<td>E</td>
<td>24 MAX.</td>
<td>0.94 MAX.</td>
<td>T</td>
<td>2.36 ± 0.06</td>
<td>0.093 ± 0.000</td>
</tr>
<tr>
<td>J</td>
<td>46.0 ± 0.4</td>
<td>1 13/16 ± 1/4</td>
<td>U</td>
<td>2.79 ± 0.13</td>
<td>0.110 ± 0.005</td>
</tr>
<tr>
<td>K</td>
<td>11.1 MIN.</td>
<td>0.437 MIN.</td>
<td>W</td>
<td>2.79 - 0.00</td>
<td>0.093 - 0.000</td>
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<tr>
<td>M</td>
<td>0.3 MAX.</td>
<td>0.012 MAX.</td>
<td>N</td>
<td>18 MAX.</td>
<td>0.710 MAX.</td>
</tr>
</tbody>
</table>

**NOTE 2—BASIC FIGURES ARE INCHES.**

**NOTE 3—ALSO MIN. CLAMPING DIA.**

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Tentative data.

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