Velocity Modulated Oscillator

Code: V235A/1K (CV2221)

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	mm
Maximum bulb diameter	20.1	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

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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 $\pm$ 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.

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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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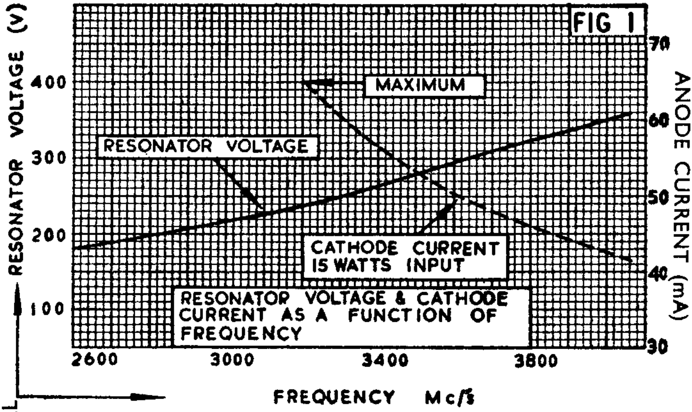
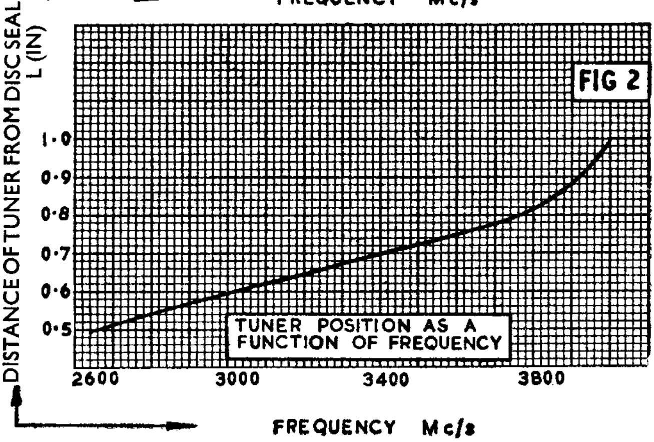
V235A/1K		
VL2006-2		





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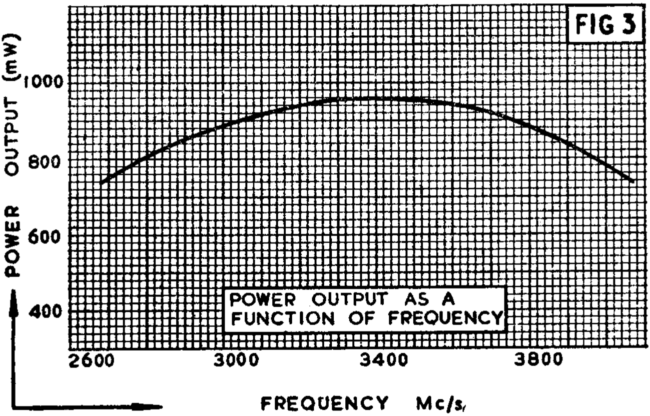
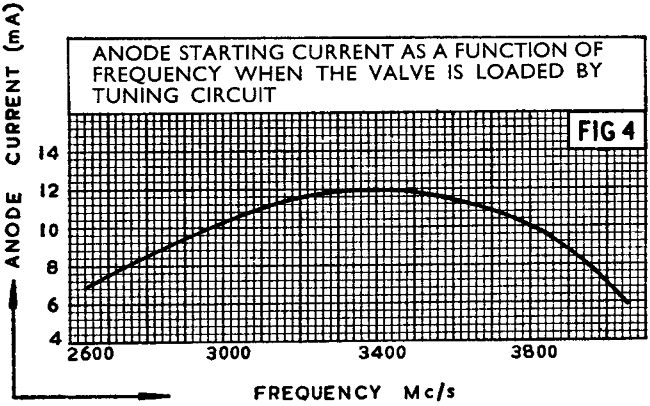
V 235 A/1K		
VL 2007		





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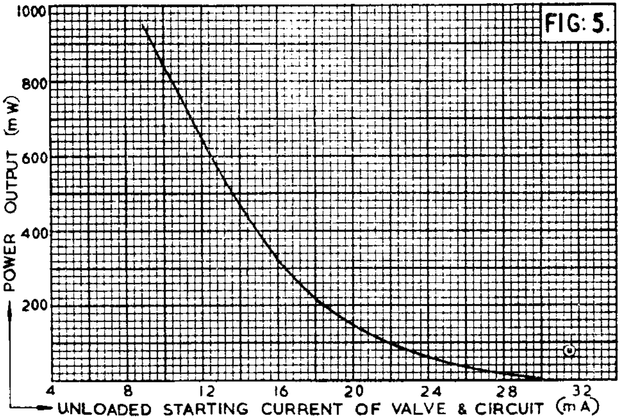
V235A/IK		f = 3800 Mc/s
VL 2524		Ia = 30 mA



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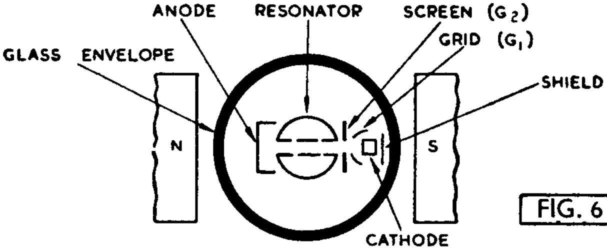

FIG. 6

CROSS SECTION OF VALVE ASSEMBLY

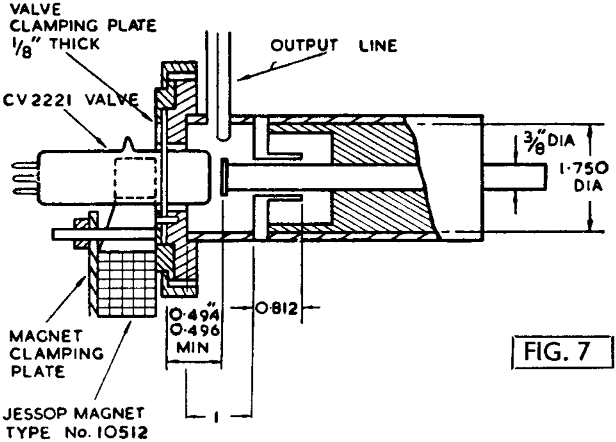

FIG. 7

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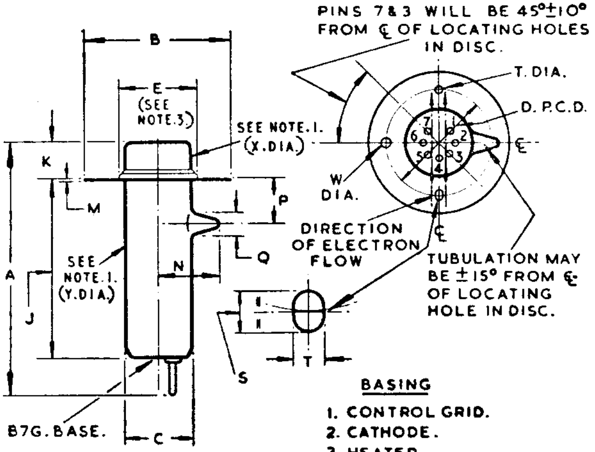

BASING

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

NOTE. 1. THIS PORTION OF BULB WILL NOT FOUL A CYLINDER OF INT. DIA. SPECIFIED WHICH IS CONCENTRIC WITH THE PITCH CIRCLE OF THE LOCATING HOLES IN THE DISC.

DIM	MILLIMETRES	INCHES	DIM	MILLIMETRES	INCHES
A	73 MAX.	$2\frac{7}{8}$ MAX.	P	13.5 ± 4.0	0.53 ± 0.16
B	42 MAX.	1·65 MAX.	Q	8·5 MAX.	0·33 MAX.
C	20·1 MAX.	0·79 MAX.	S	$3.2 \begin{smallmatrix}+0.13\\-0.00\end{smallmatrix}$	$0.125 \begin{smallmatrix}+0.005\\-0.000\end{smallmatrix}$
D	30.96 ± 0.06	1.218 ± 0.002			
E	24 MAX.	0·94 MAX.	T	$2.36 \begin{smallmatrix}+0.06\\-0.00\end{smallmatrix}$	$0.093 \begin{smallmatrix}+0.002\\-0.000\end{smallmatrix}$
J	46.0 ± 6.4	$1\frac{13}{16} \pm \frac{1}{4}$			
K	11·1 MIN. 12·5 MAX.	0·437 MIN. 0·504 MAX.	W	$2.79 \begin{smallmatrix}+0.13\\-0.00\end{smallmatrix}$	$0.110 \begin{smallmatrix}+0.005\\-0.000\end{smallmatrix}$
M	0·3 MAX.	0·012 MAX.	N	18 MAX.	0·710 MAX.
NOTE. 2:–BASIC FIGURES ARE INCHES.			X	21·59 MIN.	0·850 MIN.
NOTE. 3:–ALSO MIN. CLAMPING DIA.			Y	20·32 MIN.	0·800 MIN.

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