



# Velocity Modulated Oscillator

Code: V230A/1K (CV234)

The V230A/1K is a velocity modulated oscillator of the coaxial-line type for operation in the frequency range 1700 to 3700 Mc/s.

## CATHODE.

Indirectly-heated, oxide-coated

Heater voltage	6.3	V
Nominal current	0.3	A

(A.C. frequencies above 1.5 kc/s must not be used)

## DIMENSIONS.

Maximum overall length	81	mm
Maximum bulb diameter	20.1	mm
Base	B7G	
Net weight	22.5	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 3400 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 9 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 300 mW over the frequency range 2700 to 3400 Mc/s when operated in the circuit of Figure 10 and when the load is adjusted for maximum output power, with an input of 15 watts. A typical curve of output power versus frequency is given in Figure 2.

**Oscillator in the frequency range 1700 to 3700 Mc/s.**

Most valves, when operated in a coaxial-line tuning circuit such as that shown in Figure 11, will oscillate over the frequency range 1700 to 3700 Mc/s. A typical curve of output power versus frequency is given in Figure 3. When operating at frequencies below 2100 Mc/s, an anode current of between 30 and 35 mA should be used. An increase in anode current above this value will usually result in a decrease in output power.



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## CIRCUIT.

A drawing of a suitable circuit for the 2700 to 3400 Mc/s range is shown in Figure 10. It is to be noted that it is identical with that specified for the V235A/1K (CV2221). Curves of unloaded starting current and tuner position versus frequency for an average valve in this circuit are given in Figures 4 and 5.

A coaxial-line tuning circuit for the 1700 to 3700 Mc/s range is shown in Figure 11, and this is identical with that specified for the V233A/1K (CV2190). Curves of unloaded starting current and circuit length for an average valve in this circuit are given in Figures 6 and 7.

## OUTPUT COUPLING.

The specified output power is obtainable by means of a coupling loop inserted through the wall of the circuit, as shown in Figures 10 and 11. An alternative position in the back of the tuning piston is shown in Figure 11.

Satisfactory loading of the valve when feeding 70 ohm coaxial cable is obtained, but it is usually necessary to make an adjustment to the loop orientation when tuning the oscillator over the entire frequency range.

## 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 Figures 4 and 6 the unloaded starting current for a typical valve is plotted as a function of frequency using the recommended circuits.

To illustrate the importance of good tuning circuit construction, a curve of power output versus the unloaded starting current of the valve circuit combination is given in Figure 8.

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## OUTPUT MODULATION.

### (a) Amplitude modulation.

The voltage required is dependent both upon the particular operating conditions, and the loading of the valve. For 100 per cent modulation it is only necessary to reduce the anode current to a value below the starting current of oscillation.

Modulation of either the grid ( $g_1$ ) or the screen ( $g_2$ ) is permissible. For the screen, however, positive modulating voltages are necessary, and, since the screen takes current, adequate modulation power should be provided.

### (b) Frequency modulation.

Although the valve is not specifically designed for frequency modulation about  $\pm 1$  Mc/s is available by variation of the resonator voltage.

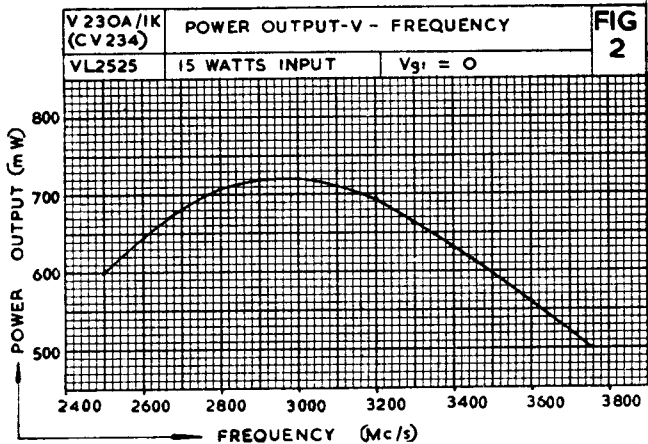
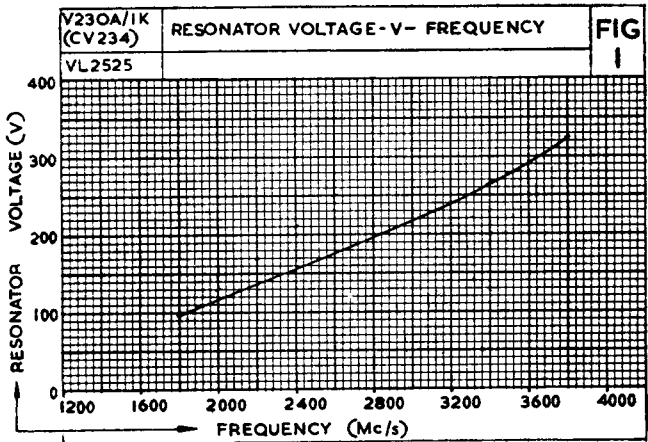
## MAGNET AND MAGNET ALIGNMENT.

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 9.) 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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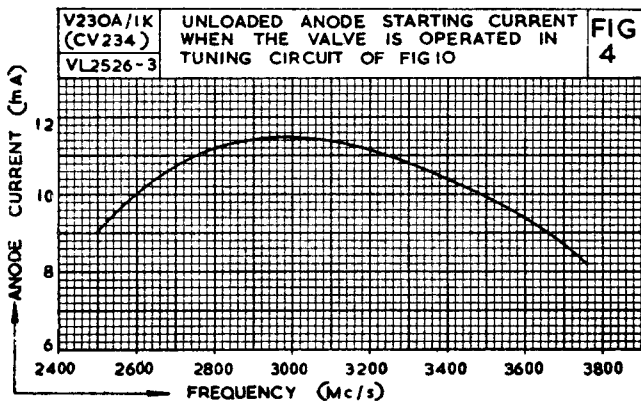
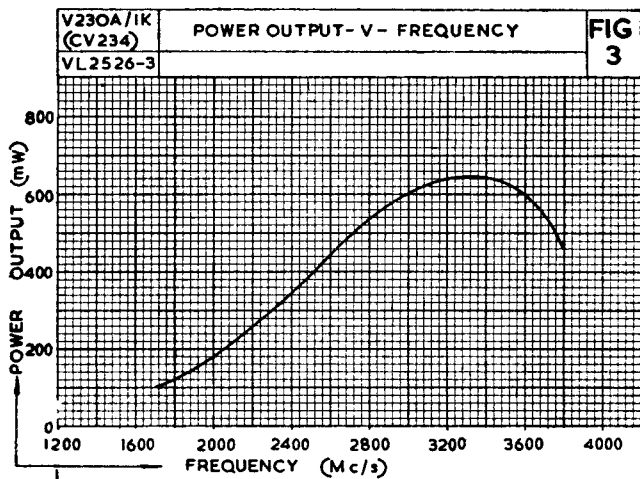
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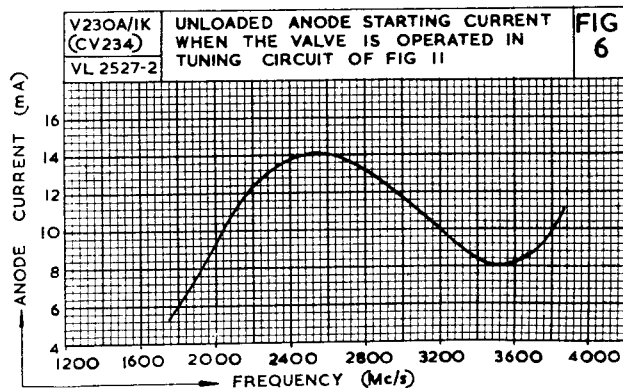
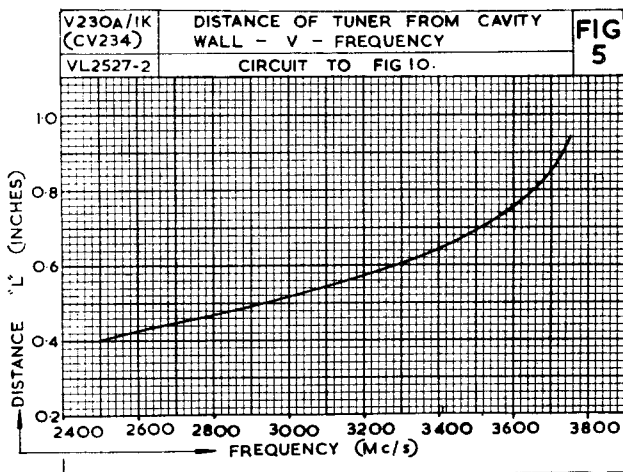
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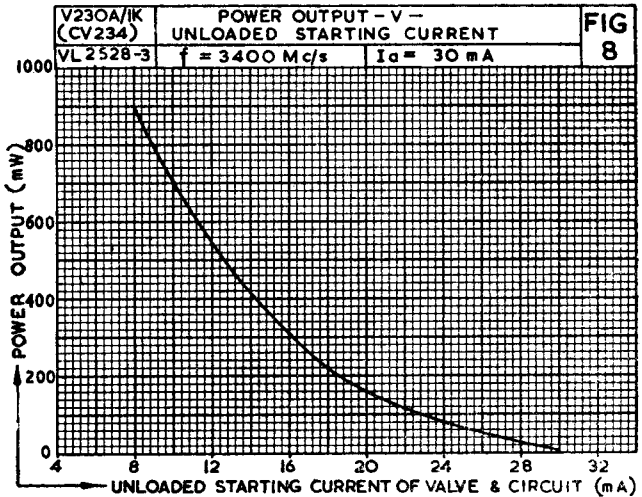
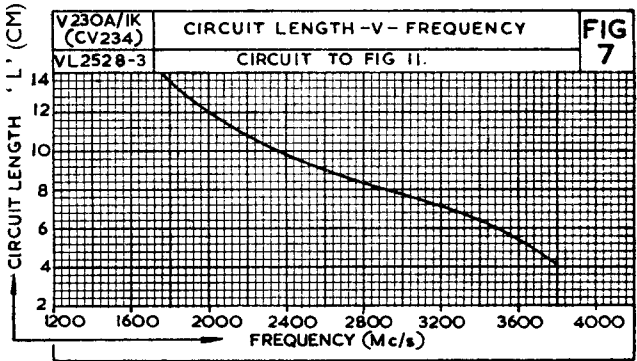
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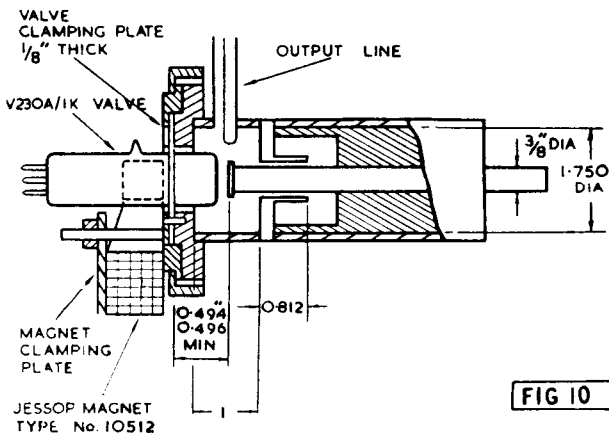
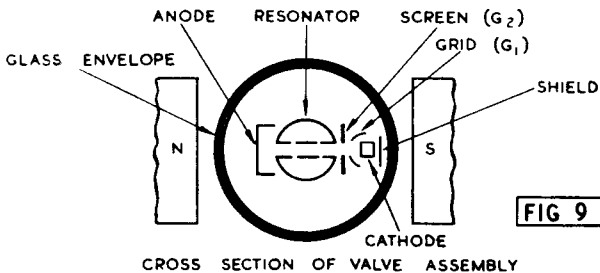






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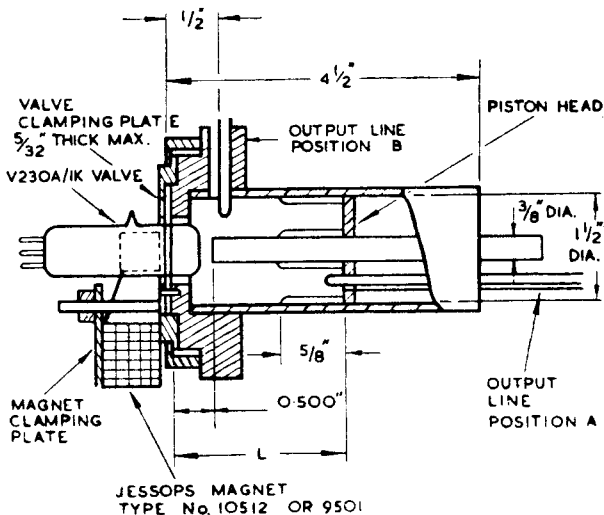
Ref.: V230A/1K

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Code: V230A/1K (CV234)



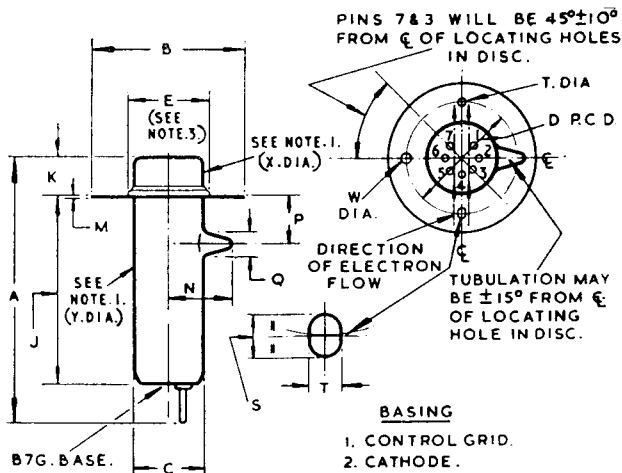
FIG. 11.





# Velocity Modulated Oscillator

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**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.

### BASING

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

DIM	MILLIMETRES	INCHES	DIM	MILLIMETRES	INCHES
A	81 MAX.	3.19 MAX.	P	$13.5 \pm 4.0$	$0.53 \pm 0.16$
B	42 MAX.	1.65 MAX.	Q	8.5 MAX.	0.33 MAX.
C	20.1 MAX.	0.79 MAX.	S	$3.2 + 0.13$ $- 0.00$	$0.125 + 0.005$ $- 0.000$
D	$30.96 \pm 0.06$	$1.218 \pm 0.002$	T	$2.36 + 0.06$ $- 0.00$	$0.093 + 0.002$ $- 0.000$
E	24 MAX.	0.94 MAX.	W	$2.79 + 0.13$ $- 0.00$	$0.110 + 0.005$ $- 0.000$
J	60 MAX.	2.36 MAX.	N	18 MAX.	0.710 MAX.
K	11.1 MIN. 12.5 MAX.	0.437 MIN. 0.494 MAX.	X	21.59 MIN.	0.850 MIN.
M	0.3 MAX.	0.012 MAX.	Y	20.32 MIN.	0.800 MIN.

**NOTE. 2.**—BASIC FIGURES ARE INCHES.

**NOTE. 3.**—ALSO MIN. CLAMPING DIA.