



# Velocity Modulated Oscillator

Code: V247C/1K

This valve is a low-voltage coaxial-type V.M. oscillator for the frequency range 4 570 to 4 750 Mc/s capable of being frequency modulated.

## CATHODE.

Indirectly-heated, oxide-coated

Heater voltage	6.3	V
Nominal current	0.3	A

## DIMENSIONS.

Maximum overall length	80	mm
Maximum bulb diameter	20.1	mm
Base	B7G	
Net weight	22	g

## MOUNTING.

This valve is designed to mount by means of the resonator disc so that the antenna couples with a suitable tuned 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 direct screen dissipation	1.5	W

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## TYPICAL OPERATING CONDITIONS.

Oscillator in the frequency range 4 570 to 4 750 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 the resonator and reaches the anode. See Figure 4 for a sketch of the electrode assembly.

### Screen Voltage ( $V_{g2}$ )

Adjusted to give a cathode current of 50 mA and should be varied during the valve life so as to maintain the cathode current at a constant value. Where the valve is to be used in unattended equipment, it is recommended that this variation be made automatically. The anode current should be between 33 and 40 mA.

A typical value of screen voltage is 120 volts.

### Screen Current ( $I_{g2}$ )

This will not be greater than 5 mA provided that the screen voltage does not exceed the resonator voltage.

### Resonator Voltage ( $V_{res}$ )

This should be adjusted to give maximum power output and varies between 225 and 260 volts over the mechanical tuning band.

### Anode Voltage ( $V_a$ )

This is kept constant throughout the tuning band at 300 volts.



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### PERFORMANCE.

This valve should be operated in a tuning circuit as shown in Figure 5 with the coupling slug and the resonator voltage adjusted for maximum power output. With the operating conditions as specified, the following performance should be obtained.

Power output, minimum	200	mW
Variation of output with frequency over the specified tuning range, less than	3	db
Electronic tuning range, between half power points, minimum	$\pm 8.5$	Mc/s

Typical curves of power output, electronic tuning range and circuit length versus frequency are shown on Figures 1, 2 and 3.

### MODULATION.

Frequency modulation is obtained by variation of the resonator voltage. The figures for electronic tuning range are those for the valve loaded so as to give maximum output power and the modulation sensitivity under these conditions is between 0.4 and 0.6 Mc/s per volt. If the loading on the valve is reduced, the electronic tuning range will be increased somewhat but the sensitivity will be reduced. The change in slope of the characteristic will be about 10 per cent for a deviation of about 60 to 70 per cent of the half power value.

Distortion components for small deviations (less than  $\pm 2$  Mc/s) at the correct resonator voltage will be about 50 db down on the fundamental.

The input capacitance when using the circuit shown in Figure 5 is between 20 and 30 pF.

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## THERMAL DRIFT AND STABILITY.

The total thermal drift from cold to the final operating frequency is between 7 and 10 Mc/s and is completed in about five minutes.

The frequency change with ambient temperature is about 50 kc/s per degree Centigrade.

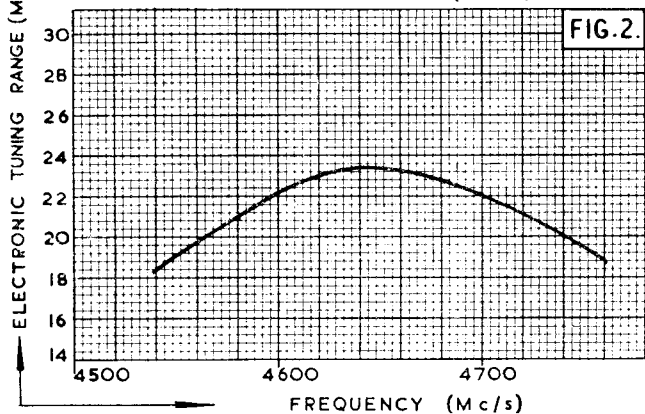
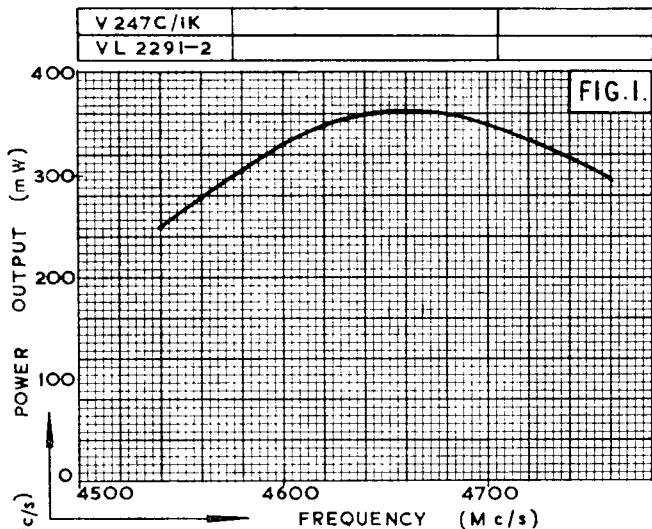
## MAGNET AND MAGNET ALIGNMENT.

A permanent magnet is used to form the electron beam. The recommended magnet is Jessop Type No. 10512, but any magnet giving a uniform field of approximately 1 200 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 4). 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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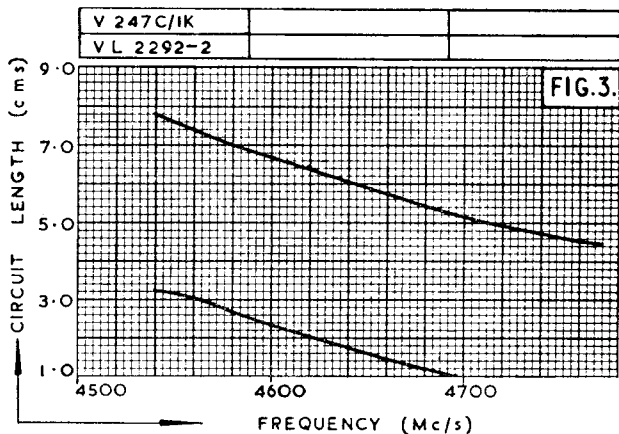
Tentative data  
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Fig. 4

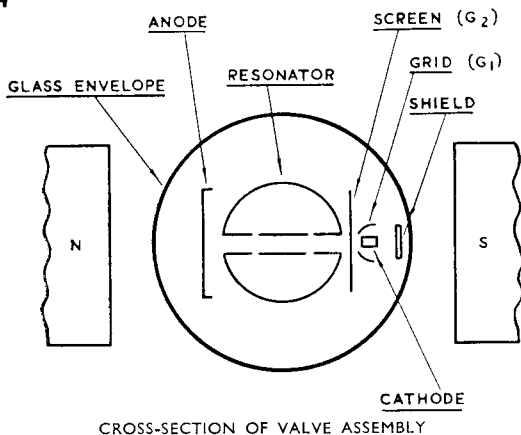
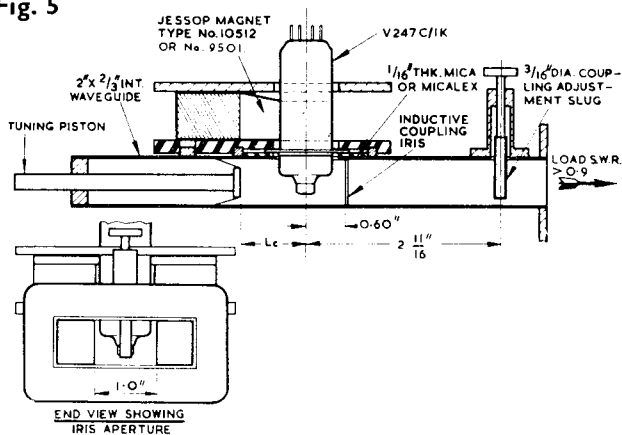
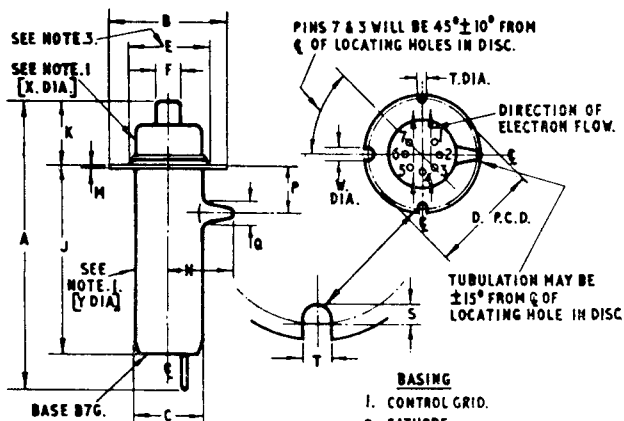


Fig. 5



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

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

**NOTE 3.** ALSO MIN. CLAMPING DIA.

DIM.	MILLIMETRES	INCHES	DIM.	MILLIMETRES	INCHES
A	80 MAX.	3.15 MAX.	P	$13.5 \pm 4.0$	$0.53 \pm 0.16$
B	31.75 MAX.	$1 \frac{1}{4}$ MAX.	Q	8.5 MAX.	0.33 MAX.
C	20.1 MAX.	0.79 MAX.	S	$1.6 + 0.13$	$0.062 + 0.005$
D	$30.96 \pm 0.06$	$1.218 \pm 0.002$			$- 0.00$
E	24 MAX.	0.94 MAX.	T	$2.36 + 0.06$	$0.093 + 0.002$
F	8.12 MAX.	0.320 MAX.			$- 0.00$
J	56 MAX.	2.2 MAX.	W	$2.79 + 0.13$	$0.110 + 0.005$
K	16.5 MAX.	0.65 MAX.			$- 0.00$
M	0.3 MAX.	0.012 MAX.	X	21.59 MIN.	0.850 MIN.
N	18 MAX.	0.710 MAX.	Y	20.32 MIN.	0.800 MIN.