



SPECIAL VALVES

Velocity-Modulated Oscillator

Code: V271C/3M

The V271C/3M is a single-transit velocity-modulated oscillator of a new type for operation in the frequency range 6 850–7 350 Mc/s.

It is intended for use as a frequency modulated transmitting valve in radio links. No forced air cooling is required for operation up to the conditions specified as maximum ratings.

CATHODE

Indirectly-heated, oxide-coated

Heater voltage	6.3	V
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Nominal current	0.25	A
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DIMENSIONS

Nominal overall length	5¼ in.,	134	mm
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Nominal overall width	4¼ in.,	108	mm
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Nominal overall depth	1.9 in.,	69	mm
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Base	B8G		
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Weight of packaged assembly, including magnet but excluding tuning and output circuits	900	g
	31.8	oz

MOUNTING

The valve has fitted on each side a flange plate with three OBA tapped holes into which are screwed special studs shown on the outline drawing.

The circuits have special flanges with quick release attachments which engage under the heads of the studs, as shown in Fig. 1.

Alternatively the tuning and output circuits may have plain flanges which are attached to the plates by OBA knurled screws. In this case the special studs are removed by unscrewing them.

February 1961

V271C/3M—1

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SPECIAL VALVES**Velocity-Modulated Oscillator****Code: V271C/3M****MAXIMUM RATINGS**

Voltages are given with respect to cathode unless otherwise stated.

Maximum direct anode voltage	600	V
Maximum direct resonator voltage	600	V
Maximum direct drift tube voltage, with respect to resonator	200	V
Maximum direct screen voltage	400	V
Maximum direct anode dissipation	27	W
Maximum direct resonator dissipation	18	W
Maximum direct drift tube dissipation	3	W
Maximum direct screen dissipation	2	W
Maximum total dissipation for all electrodes except heater	40	W
Maximum direct cathode current	65	mA
Maximum temperature of mica window seal	130	°C
Maximum temperature of any other part of valve envelope	300	°C

TYPICAL OPERATING CONDITIONS

Conditions are given for operation in Mode 15 ($3\frac{3}{4}$ cycles) and Mode 19 ($4\frac{3}{4}$ cycles). The Mode numbers are the number of quarter periods of oscillation occupied by electrons in transit through the drift space.

Mode 15

Frequency-modulated oscillator in the frequency range 6 850–7 350 Mc/s.

Direct anode voltage	550	V
Direct resonator voltage	530	V
Direct grid voltage	—50	V
*Direct drift tube voltage	395 to 505	V
†Direct screen voltage, approximately	180	V

*This is adjusted to give maximum power output at the operating frequency set by the tuning piston. Graphs of frequency as a function of piston position and drift tube voltage are shown in Figs. 3 and 4. The frequency-modulating voltage is applied to the drift tube only.

†This is adjusted to give a cathode current of 60 mA with a corresponding anode current of 30 to 40 mA.



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Mode 19

Oscillator in the frequency range 6 850–7 350 Mc/s.

Direct anode voltage	370	V
Direct resonator voltage	350	V
Direct grid voltage	—50	V
*Direct drift tube voltage	240 to 310	V
†Direct screen voltage, approximately	120	V

*This is adjusted to give maximum power output at the operating frequency. The graph of piston position versus operating frequency is the same as for Mode 15.

†This is adjusted to give a cathode current of 45 mA with a corresponding anode current of 22 to 30 mA.

PERFORMANCE

The valve should be used with the tuning and output circuits shown in Fig. 1. With the operating conditions as previously specified and the coupling slug adjusted to give maximum power output into a waveguide load whose V.S.V.V.R. is less than 1.2 the following performance should be obtained.

Mode 15

Power output, minimum	800	mW
Electronic tuning between half-power points, minimum	± 8.5	Mc/s
Modulation sensitivity when loaded for maximum power	250 to 450	kc/s per V
Minimum mechanical tuning range obtained by variation of piston position	6 850 to 7 350	Mc/s

Typical Characteristic Curves

Tuning piston position versus frequency	Figure 3
Power output versus frequency	Figure 5
Electronic tuning versus frequency	Figure 6

Mode 19

Power output, minimum	200	mW
Electronic tuning between half-power points, minimum	± 6	Mc/s
Modulation sensitivity when loaded for maximum power	450 to 650	kc/s per V

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CIRCUITS

A diagram of the tuning and output circuits with a valve assembled is shown in Fig. 1. A separate diagram of the tuning circuit showing the reference plane for measurement of piston position is shown in Fig. 2.

The valve is designed to operate into Waveguide No. 14, correct loading being obtained by adjustment of the coupling slug. Some adjustment may be necessary to obtain maximum power when tuning over the available frequency range.

The tuning circuit is of 1 in. $\times$ $\frac{1}{2}$ in. internal section waveguide incorporating a non-contact tuning piston moved directly by a micrometer.

MODULATION

Frequency modulation is obtained by variation of the drift tube voltage with respect to resonator.

The direct drift tube current does not exceed 5 mA; the input capacitance is 20 to 30 pF and the slope resistance is of the order of 25 kilohm.

THERMAL DRIFT AND STABILITY

The initial thermal drift from cold to the final operating frequency is between 9 Mc/s and 13 Mc/s and is completed in less than 5 minutes.

The variation of frequency with ambient temperature is between 50 and 100 kc/s per °C over the range covered by movement of the tuning piston.

MAGNET

The magnet is adjusted and locked in position during the testing of the valve and *should not be re-adjusted* during the life of the valve.

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CONTINUED

Type 495-LVA-352

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OUTPUT CIRCUIT.
GUIDE SIZE 14.

TUNING CIRCUIT.

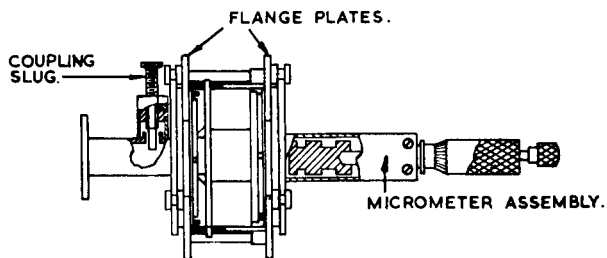
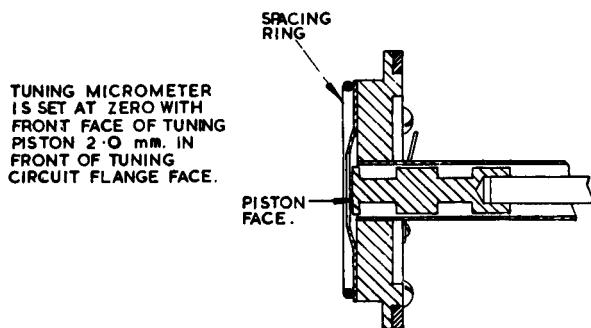


FIG. 1



TUNING MICROMETER
IS SET AT ZERO WITH
FRONT FACE OF TUNING
PISTON 2.0 mm. IN
FRONT OF TUNING
CIRCUIT FLANGE FACE.

FIG. 2

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CONTINUED

Fig. 3.—Typical Mechanical Tuning Characteristic.

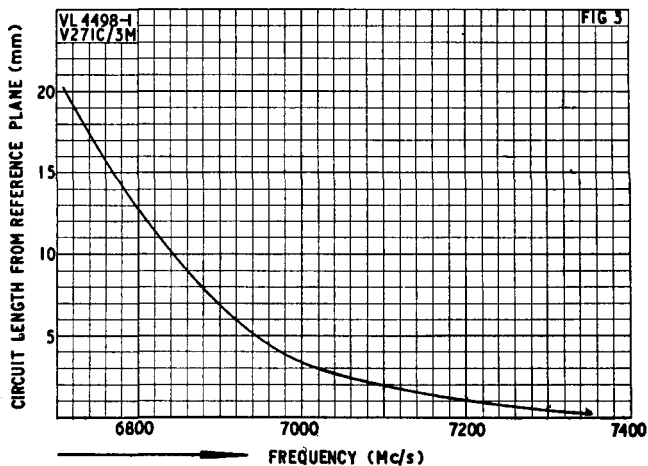
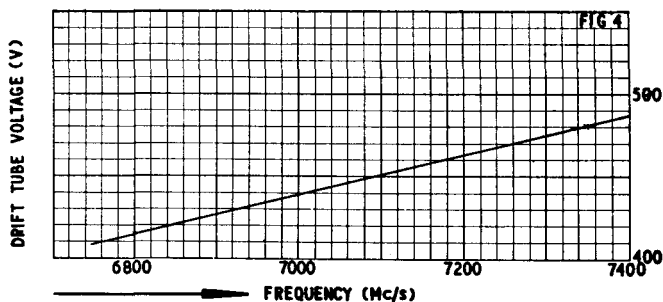


Fig. 4.—Typical Optimum Drift Tube Voltage Characteristic.





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Fig. 5.—Typical Power Output Characteristic.

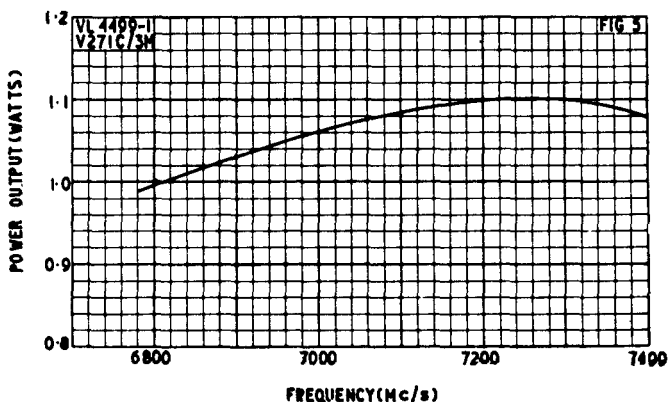
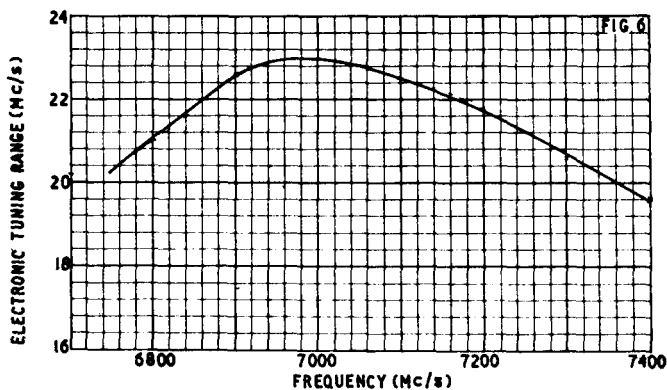
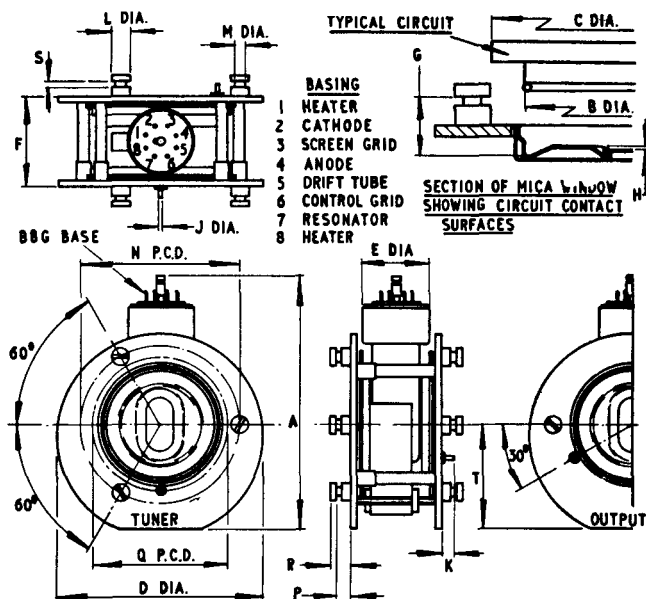


Fig. 6.—Typical Variation of Electronic Tuning Range with Operating Frequency.



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DIM.	MILLIMETRES	INCHES	DIM.	MILLIMETRES	INCHES
A	138,1 MAX.	5 $\frac{7}{8}$ MAX.	K	6,4 $\pm$ 0,4	$\frac{1}{4} \pm \frac{1}{16}$
B	57,63 MAX.	2.269 MAX.	L	9,53 $\pm$ 0,00 -0,25	0.375 $\pm$ 0.000 -0.010
C	74,40 MAX.	2.929 MAX.	M	4,75 $\pm$ 0,13	0.187 $\pm$ 0.005
D	108,0 $\pm$ 1,6	4 $\frac{1}{4} \pm \frac{1}{16}$	N	84,33 NOM.	3.320 NOM.
E	38,1 MAX.	1 $\frac{1}{2}$ MAX.	P	7,54 $\pm$ 0,18	0.297 $\pm$ 0.007
F	51,6 MAX.	2 $\frac{1}{16}$ MAX.	Q	71,42 NOM.	2.812 NOM.
G	16,69 $\pm$ 0,51	0.657 $\pm$ 0.020	R	10,72 $\pm$ 0,79	0.422 $\pm$ 0.031
H	1,78 MIN.	0.070 MIN.	S	2,36 $\pm$ 0,18	0.093 $\pm$ 0.007
J	3,18 $\pm$ 0,25	0.125 $\pm$ 0.010	T	55,6 $\pm$ 0,8	2 $\frac{1}{8} \pm \frac{1}{16}$

NOTE.—Basic figures are inches.