ADMIRALTY SURFACE WEAPONS ESTABLISHMENT

VALVE ELECTRONIC

CV6071

Specification AD/CV6071 Issue No. 1 dated 5th October, 1960. To be read in conjunction with K1006 except where otherwise stated. (Note 3)	SECURITY	
	Specification	Valve
	Unclassified	Unclassified

TYPE OF VALVE: Ruggedised velocity modulated oscillator for use with external cavity resonator.

CATHODE: Indirectly heated

ENVELOPE: Metal and glass

PROTOTYPE: VX5048

MARKING

K1001/4

BASE

Pee Wee 4 pin with modified skirt

See K1006 A4-76

RATINGS				NOTE
Heater Voltage		(V)	6.3	
Heater Current		(A)	1.2	
Frequency Range		(Mc/s)	2700 to 4100	A
Resonator Voltage	(Normal)	(V)	300	B
Resonator Voltage	(Maximum)	(V)	350	B
Resonator Dissipation	(Maximum)	res (W)	16	C
Reflector Voltage	(Normal)	(V)	-70 to -350	B.D.
Reflector Voltage	(Maximum)	(V)	-500	B
Nominal Power Output at 3100 Mc/s		(mW)	100	E
Maximum Impedance in reflector to Cathode circuit		(MΩ)	0.25	F
Electronic Tuning Range at 3100 Mc/s		(Mc/s)	35	E

CONNECTIONS

Pin	Electrode
1	I.C.
2	Heater
3	I.C.
4	Heater & Cathode
T.C.	Reflector
Discs	Resonator

TOP CAP

CT1. See B.S.448: 6/1.1

DIMENSIONS

See Drawing on Page 6

MOUNTING POSITION

Any

NOTES

A. The valve is designed to plug into an external resonator. The frequency coverage and other properties may be modified considerably by the resonator design. Tests on the valve are confined to the frequency range 2700-4100 Mc/s but frequencies outside this band may be obtained with suitable resonators. Details of the valve seating and contact arrangements are shown in the drawing on Page 6.

B. The voltages quoted are relative to the cathode. The valve is normally operated with the resonator at earth potential.

C. The temperature of the valve envelope must not exceed 150°C.

D. For the frequency band 2700 to 4100 Mc/s the $2\frac{3}{4}$ cycle reflector mode is used. Over this band the normal reflector voltage is given by the formula.

$$Er = Sf - 256$$

where $S = 135V/Kmc/s$

and f = frequency in Kmc/s

The reflector voltage adjustment should allow for $\pm$ 50 volts variations from valve to valve.

E. Measured with Eres = 300V and the $2\frac{3}{4}$ cycle mode. ΔF measured between the half power points of the mode using a quarter-wavelength radial line resonator.

F. If a high impedance reflector supply is used the circuit must include a diode to prevent Er becoming positive.

G. The Joint Services Catalogue No. is 5960-99-037-2299.

ELECTRON TUBE, KLYSTRON, SEPARATE

CAVITY TYPE CV6071

This specification is to be read in conjunction with K1006 except where otherwise stated. (Note 3).

RATINGS	Ef V	Ec2/Ec3 Vdc	Er Vdc	Pi W	T_c °C	Altitude ft.
Absolute Maximum:		350	-500	16	150	10,000
Normal:	6.3	300	-70 to -350			
Absolute Minimum:			Note 1			

Dimensions: See drawings on Page 6. Cathode: Coated unipotential.

Pee Wee 4 pin with modified skirt. See K1006. A4-76

Pin No.	1	2	3	4	Discs	T.C.
	I.C.	Heater	I.C.	Heater /Cathode	Resonator	Reflector

Test Conditions: (unless otherwise specified)

Ef V	Eres Vdc	Er Vdc	Test Cavities Note 2	Load
6.3	300	Adjust for max. power in $2\frac{3}{4}$ cycle mode.		v.s.w.r. 1.1 max. W.G. No. 10 for cavities A & B W.G. No. 11 for cavities C & D

Qualification Approval Tests:

Ref.	Test	Conditions		Min.	Max.	
3.1	Qualification Approval					
4.5	Holding Period	28 days				
K1005	Carton Drop					
K1001-10	Humidity	No Voltages				
K1001-12	Torque (Note 4)					
	Oscillation (1)					
	Vibration	Note 5	ΔF		0.5	Mc/s
			ΔPo		5	%
	Shock	Note 6	ΔF		3	Mc/s
			ΔPo		5	%

REF.	TEST	CONDITIONS		Min.	Max.	
Qualification Approval Tests (contd.):-						
	Oscillation (2)	Test Cavity A Note 2				
4.15.1	Power Output		Po	100	-	mW
4.10.7.3.1	Frequency	Difference of frequency from that marked on test cavity A	ΔF	-	±25	Mc/s
4.10.5.4	Reflector Voltage Electronic Tuning:	Record	Er	-70	-120	V
-	Frequency Range)	Difference between	ΔF	25	-	Mc/s
-	Er Range)	values giving 50% of max. Po	ΔEr	20	40	V
-	Slope	Er varied ±5V about the value recorded above	$\frac{dF}{dEr}$	0.4	1.5	Mc/s/V
4.15.7.2	Hysteresis			-	50	%
5.15.1	Power Output compared with value at Eres = 300V	Vary Eres from 290-310V	Po	80	120	%
	Oscillation (3)	Test Cavity D Note 2				
4.15.1	Power Output		Po	60	-	mW
4.10.7.3.1	Frequency	Difference of frequency from that marked on test cavity D	ΔF	-	±50	Mc/s
4.10.5.4	Reflector Voltage Electronic Tuning:	Record	Er	-250	-340	V
-	Frequency Range)	Difference between	ΔF	17	-	Mc/s
-	Er Range)	values giving 50% of max. Po	ΔEr	45	85	V
-	Slope	Er varied ± 5V about the value recorded above	$\frac{dF}{dEr}$	0.2	0.5	Mc/s/V
4.15.7.2	Hysteresis			-	50	%
4.15.1	Power Output compared with value at Eres = 300V	Vary Eres from 290-310V	Po	80	120	%
	Oscillation (4)	Test Cavity C Notes 2 and 7				
	Excess Noise		S/N	160	-	dB/c.p.s.

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REF.	TEST	CONDITIONS		Min.	Max.	
	Acceptance Tests:-					
4.5	Holding Period	28 days				
4.10.8	Heater Current		If	1.0	1.35	A
-	Emission	Valve can be mounted in any suitable cavity. Adjust Er for no oscillation Ef varied from 5.8 to 6.8V. Referred to Ires at 5.8V.	Δ Ires	-	15	%
	Oscillation (5)	Test Cavity B Note 2				
4.15.1	Power Output		Po	100	-	mW
4.10.7.3.1	Frequency	Difference of frequency from that marked on test cavity B, Record frequency	Δ F	-	±30	Mc/s
4.10.5.4	Reflector Voltage	Record	Er	-130	-190	V
	Electronic Tuning: Frequency Range) Er Range)	Difference between values giving 50% of max. Po	Δ F Δ Er	25 35	- 65	Mc/s V
	Slope	Er varied ± 5V about the value recorded above	$\frac{dF}{dEr}$	0.25	0.85	Mc/s/V
4.15.7.2	Hysteresis			-	50	%
4.10.4.8	Resonator Current	Er as recorded above	Ires	25	45	mA
4.10.6.7.1	Total Reflector Current	Er as recorded above	Ir	-	4	/uA
4.15.1	Power Output compared with value at Eres = 300V	Vary Eres from 290-310V	Po	80	120	%

REF.	TEST	CONDITIONS		Min.	Max.	
	Acceptance Tests (contd.):-					
	Oscillation (6)	Test Cavity C Note 2				
4.15.1	Power Output		Po	60	-	mW
4.10.5.4	Reflector Voltage	Record				
4.10.5.4	Reflector Voltage Tracking: Departure from calculated value	Compare with value predicted from formula in Note D, using values of Er and f obtained in Osc. 5 to determine exact value of parameter S	ΔEr	-	±15	V
4.10.7.3.1	Frequency:	Difference of frequency from that marked on test cavity C	ΔF	-	±40	Mc/s
	Electronic Tuning: Frequency Range) Er Range)	Difference between values giving 50% of max. Po	ΔF ΔEr	23 35	- 65	Mc/s V
	Slope	Er varied ± 5V about the value recorded above	$\frac{dF}{dEr}$	0.25	0.85	Mc/s/V
4.15.7.2	Hysteresis			-	50	%
4.11	Life Test	Note 8 Eh = 6.3 ± 0.1V	t	1000	-	hrs
4.11.4	Life Test End Points: Power Output	Po as a percentage of value at start of test	Po	50	-	%
4.15.7.2	Hysteresis			-	50	%

NOTES

1. Er should never be allowed to be positive.

2. The valves shall be tested in $\frac{1}{4}\lambda$ radial line cavities, having fixed iris coupling into the appropriate waveguide. The cavities shall be similar to the reference cavities (see A.S.W.E. Drawings Nos. CR33966 to CR33996 inclusive) which shall be used only for testing of the test cavities. The nominal characteristics of the test cavities are:-

CAVITY	FREQUENCY Mc/s	NOMINAL LOADED Q QL
A	2695	100
B	3150	200
C	3580	200
D	4070	400

/The .....

The resonant frequency shall be clearly and indelibly marked on each test cavity and shall not differ by more than ± 25 Mc/s from the appropriate value above. The test cavity frequency shall be determined by measuring the frequency of oscillation of at least four valves in the test cavity and in the appropriate reference cavity. Then the resonant frequency for the test cavity is defined as the value marked on the reference cavity plus or minus the average difference determined. The measurements shall be made after warming up the valve and cavity to a frequency within ± 5 Mc/s of its steady value.

3. K1006 shall apply with the exception of paragraphs:-

4.7	4.9.1	4.9.4	4.9.9
4.8	4.9.2	4.9.5	4.9.18
4.9	4.9.3	4.9.8	4.9.19
			4.9.20

4. Water immersion test omitted for both base and cap. Torque of 12 in.lb. shall be applied between the phenolic moulding of the base and the envelope and 1.5 in. lb. between the top cap and the envelope.

5. The valve may be soldered into an approved cavity. The valve shall be vibrated along three mutually perpendicular axes, one of which is the major axis of the valve. The frequencies and amplitudes of vibration are to be as follows:-

FREQUENCY (c.p.s.)	AMPLITUDES (ins.)
2 - 10	± 0.03
10 - 15	± 0.01
15 - 30	± 0.004

The time taken to cover the vibration frequency range must not be less than 5 minutes. Change of frequency and change of power output shall be measured during the vibration test.

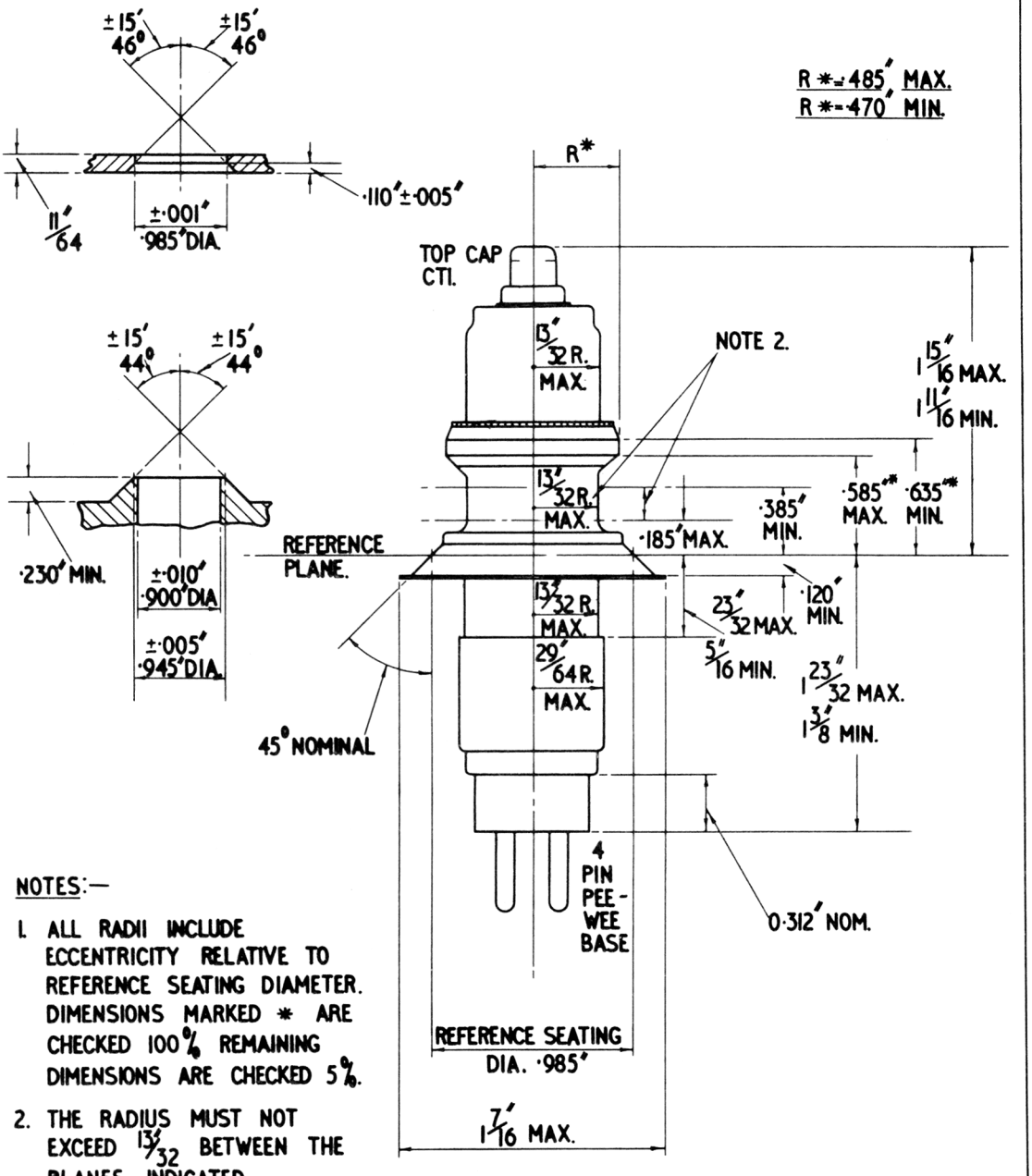
6. The valve shall be accelerated along the three axes, in an approved cavity, as in Note 5. The acceleration shall be 30g and the minimum duration 10 milli-seconds.

Frequency and power output shall be measured before and after the complete shock test.

7. The ratio of signal to average noise over a 10 Mc/s bandwidth centred at 30 Mc/s away from the C.W. frequency shall not be less than 160 dB/c.p.s. A broadband non-balanced mixer shall be used throughout the noise tests. For the purpose of the noise measurement, a CV1881 coupled to a suitable S Band waveguide mount may be employed as the comparison standard.

8. The valve shall be life tested in a suitable cavity in thermal connection with a heat sink, which must ensure that the valve envelope temperature does not exceed 150°C. A sample of six valves may be selected for Qualification Approval tests and Qualification Approval given if the average of the lives is not less than 1000 hours. For production testing a minimum of 1% shall be subjected to life test.

RECOMMENDED METHOD OF CLAMPING REFERENCE SEATING



NOTES:—

1. ALL RADII INCLUDE ECCENTRICITY RELATIVE TO REFERENCE SEATING DIAMETER. DIMENSIONS MARKED * ARE CHECKED 100% REMAINING DIMENSIONS ARE CHECKED 5%.
2. THE RADIUS MUST NOT EXCEED 13/32 BETWEEN THE PLANES INDICATED. CAVITY DESIGNERS PLEASE NOTE.