VALVE ELECTRONIC

ADMIRALTY SIGNAL AND RADAR ESTABLISHMENT

CV2480

Specification AD/CV2480 Issue No.1 dated 1st August, 1958 To be read in conjunction with K1001	SECURITY Specification: Unclassified Valve: Unclassified

Type of Valve: Broad-band T.R. Cell for Pre-pulse operation.

Prototype: VX1002

MARKING

See K1001/4

DIMENSIONS

See drawing on page 6.

Ratings

(All limiting values are absolute)

		Note
Operating Frequency Range (Mc/s)	8,500 to 10,000	
Max. Peak Power (kW)	200	A, D
Min. Peak Power (kW)	4	A
Min. D.C. Primer Supply Voltage (V)	-950	
Max. D.C. Primer Current (μA)	185	B
Min. D.C. Primer Current (μA)	100	B
Max. Pre-pulse Primer Peak Current (mA)	10	C
Pre-pulse duration (μ Sec)	2	C
Pulse Impedance at 10 mA Peak (KΩ)	50	

N O T E S

A. Duty cycle 0.001.

B. The D.C. main primer current shall be limited by a series resistance of which at least 1 MΩ must be placed adjacent to the terminal.

C. The leading edge of the pulse applied to the pre-pulse primer shall precede the main R.F. pulse by 0.2 μsecs. The working life of the cell can be extended by using pre-pulse peak currents less than 10 mA, but as a result the high power spike leakage may become greater than 0.1 ergs/pulse.

D. Operation at this power level results in considerably reduced life. For satisfactory operation at power levels above 50 kW, it is recommended that the cell be preceded by a pre-T.R. cell.

TESTS

To be performed in addition to those applicable in K1001 and after a holding period of 7 days.

	Test Conditions		Test	Limits		No. Tested	Note
	Primer Supply V. D.C.			Min.	Max.		
a	-900	Test to be performed at least seven days after any previous discharge.	Primer Breakdown The delay between the application of the voltage to the D.C. primer and the breakdown is to be measured (Secs)	-	5	100%	1
b	-1000		Primer Operating Voltage (V)	180	250	100%	1
c	-1000	Line to be energised with not more than 10 mW R.F. and terminated in a load matched better than 1.02:1 V.S.W.R.	V.S.W.R. (i) At 8500 and 8650 Mc/s	-	1.4:1	100%	1
			(ii) At 8850, 9050, 9250, 9450, 9650, and 9850 Mc/s	-	1.25:1	100%	
			(iii) At 10,000 Mc/s	-	1.3:1	100%	
d	-1000	Valve shall be mounted between impedances matched with V.S.W.R. better than 1.1:1. Line shall be energised with not more than 10 mW R.F. Test frequencies:- 8500 Mc/s and 10,000 Mc/s.	Insertion Loss (i) At 8500 Mc/s and 8850 Mc/s (dB)		1.0	100% or S	1 2
			(ii) At 10,000 Mc/s (dB)	-	0.8		
e	-1000	Test frequency = 9375 Mc/s ± 50 Mc/s P.R.F. = 1000 c.p.s. + 10% Power Output = 200 kW peak ± 15% Rate of rise of magnetron pulse = 100 kV/µsec ± 10% Pulse length measured at level 10% below peak of pulse:- (i) 0.15 µsec ± 0.02 µsec (ii) 1.0 µsec ± 0.1 µsec	High Power Leakage (i) Spike Energy (ergs/pulse)	-	0.3	100%	1 3
			(ii) Total Power (mW peak)	-	100	100%	

	Test Conditions		Test	Limits		No. Tested	Note
	Primer Supply V. D.C.			Min.	Max.		
f	-1000 + pre-pulse	Test conditions as for test e.	High Power Leakage with applied Pre-Pulse Spike (ergs/pulse)	-	0.1	100%	1 4
g	-1000	The test frequency of the simulated echo pulse shall be within the range 9000 to 9500 Mc/s and its power incident on the cell shall not exceed 10 mW, other conditions as in test e.	Recovery Time The time shall be measured from the trailing edge of the transmitter pulse for an insertion loss exceeding that immediately before the transmitter pulse by 6 dB (/uSec)	-	3	5%	1
h	-1000	Applied power varied from 100 mW peak to 100 watts peak. Other conditions as in test e.	Low Power Leakage Max. total leakage power shall be recorded. (mW peak)	-	250	5%	1
j	-1000	Test frequencies:- 8500, 9000, 9500 and 10,000 Mc/s. The line shall be energised at a convenient lower power level.	Electrical Length The length of R.C.S.C. No. 16 size waveguide having the same electrical length as the cell shall be determined. (i) 8500 Mc/s (Degrees) (ii) 9000 Mc/s (Degrees) (iii) 9500 Mc/s (Degrees) (iv) 10,000 Mc/s (Degrees)	 155 245 307 375	 195 285 347 415	 100% or S 100% or S 100% or S 100% or S	1 2
k	-1000	As for test e.	Position of Short The distance of the effective R.F. short behind the input flange shall be measured. (ins.)	0.014	0.028	T.A.	1 5
l	-1000	The line shall be energised with not more than 4 kW peak R.F. measured immediately after the cell. Other conditions as in test e.	Arc Loss (dB)	-	0.8	T.A.	1

TESTS (Cont'd).

	Test Conditions		Test	Limits		No. Tested	Note
	Primer Supply V. D.C.			Min.	Max.		
m	-1000 + pre-pulse	Each valve preceded by a pre-TR (VX9179) shall be mounted on E plane T junctions of an approved design, and followed by a matched load:- Other conditions as in Tests e and f, (except test e (i) and that peak power incident upon each pre-TR to be 50kW min.)	Life Test Valves to be run for 500 hours. Number of valves which exceed life test limits in any respect. (Note 6) (No.)	-	1	T.A. and 6 or 5% (whichever is the greater number)	1,4, 6,7.

NOTES

1. The primer supply shall be D.C. having a peak to peak ripple voltage not exceeding 1%, and shall be negative with respect to the body of the cell. The supply shall be connected to the D.C. primer through a resistance chain of 5.5 MΩ ± 5%, of which at least 1 MΩ must be adjacent to the primer terminal.

2. An approved sampling test may be employed. In the event of failure of a sample, the lot from which the sample was drawn shall be subjected to 100% test.

3. This test shall be performed using a CV2284 or equivalent Magnetron. Measurements shall be made with a thermistor mount having the following characteristics:-

   Efficiency E (Ratio of $\frac{\text{Measured power}}{\text{Incident power}}$) to be greater than 90%.
   V.S.W.R. between 9275 and 9475 Mc/s to be not greater than 1.1:1.
   V.S.W.R. between 9125 and 9625 Mc/s to be not greater than 1.3:1.

   If the measured leakage powers are P1 and P2 microwatts at pulse lengths of 0.15(t_1) and 1.0(t_2) microseconds, and the pulse repetition frequency is f then:

   (i) Spike energy = $\frac{10P_1}{Ef}$ ergs/pulse.

   (ii) Total power = $\frac{1000P_2}{Eft_2}$ mW Peak.

4. Pre-pulse characteristics:-

   Peak amplitude: 650V ± 10%.
   Duration: 2 µsec.

   The leading edge of the pre-pulse must precede the main RF pulse by 0.2 µsec, and shall be applied to the pre-pulse electrode through a 51 KΩ resistor which must be adjacent to the pre-pulse connector on the cell.

5. This test may be done using a ring circuit magic T with a metal plate termination. Adjust the tuning plunger for optimum matching; then replace the metal plate by the valve and re-adjust. The distance moved by the tuning plunger gives the distance of the effective R.F. short circuit from the front flange.

6. Life Test Limits:-

   (a) V.S.W.R. (at all test frequencies except 8650, 9050, and 9450 Mc/s.) (i) 1.5:1 (ii) 1.4:1 (iii) 1.5:1

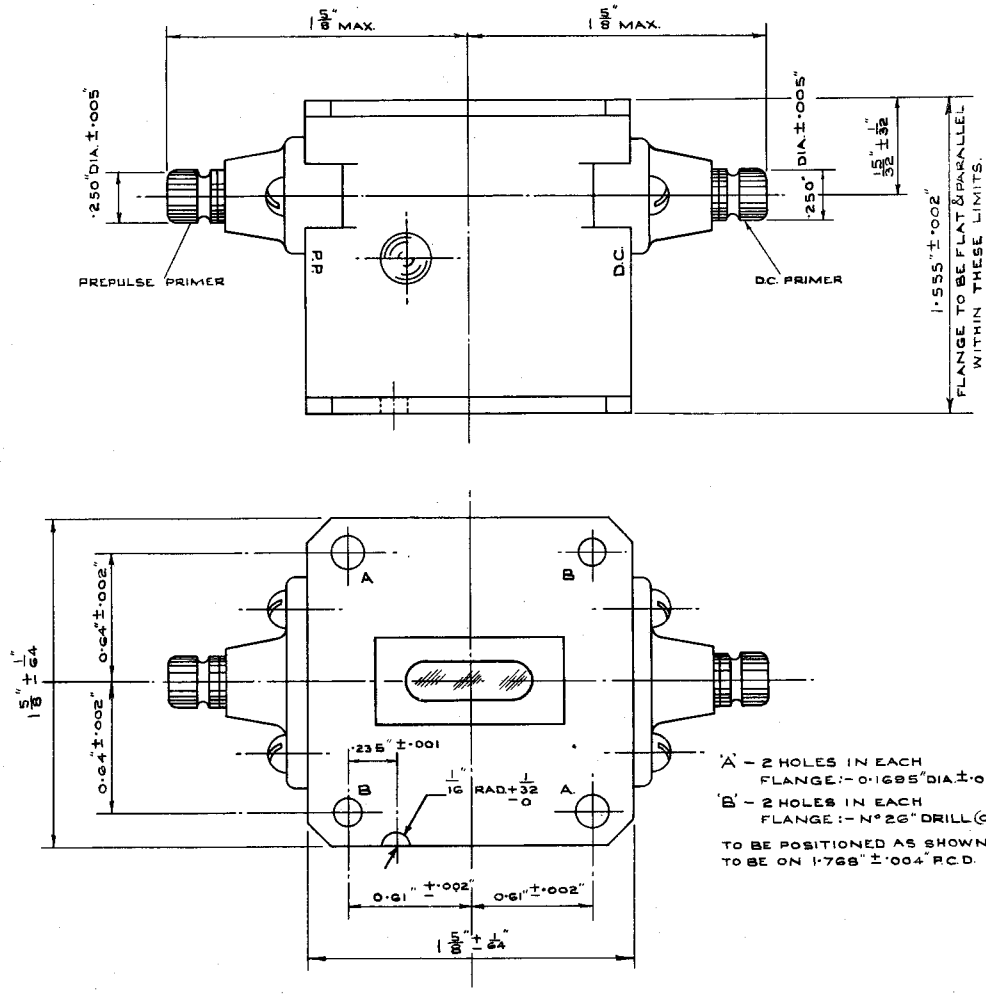
   (b) Insertion Loss (dB): 1.2 at 8500 and 8850 Mc/s
   1.0 at 10,000 Mc/s.

   (c) High Power Leakage: (i) Spike 0.4 ergs/pulse
   (ii) Total Power 100 mW.

   (d) High Power Leakage with Pre-pulse: 0.1 ergs/pulse.

   (e) Recovery Time: 5 µsec.

7. The life test samples are to be picked at random from the production batch. For the initial contract the life test results are to be used for record purposes only, but in any subsequent contracts, production batches represented by the sample, shall be rejected in the event of the failure of the sample to pass the life test.


1 5/8" MAX.
1 5/8" MAX.
·250" DIA. ±·005"
·250" DIA. ±·005"
15/32" ± 1/32"
1·555" ± ·002"
FLANGE TO BE FLAT & PARALLEL WITHIN THESE LIMITS.
PREPULSE PRIMER
P.P.
D.C.
D.C. PRIMER
A
B
B
A
0·64" ± ·002"
0·64" ± ·002"
1 5/8" ± 1/64
·235" ± ·001
1/16" RAD. +1/32 −0
0·61" ± ·002"
0·61" ± ·002"
1 5/8" ± 1/64
'A' – 2 HOLES IN EACH FLANGE :– 0·1685" DIA. ± ·004"
'B' – 2 HOLES IN EACH FLANGE :– N° 26" DRILL (0·147" DIA)
TO BE POSITIONED AS SHOWN AND TO BE ON 1·768" ± ·004" P.C.D.