

ADMIRALTY SURFACE WEAPONS ESTABLISHMENT

CV6127

Specification AD/CV6127 Issue No. 1A dated 28th July, 1964. To be read in conjunction with K1001	<u>SECURITY</u>	
	<u>Specification</u> Unclassified	<u>Valve</u> Unclassified

<u>TYPE OF VALVE:</u> Travelling-wave tube limiter			<u>MARKING</u> See K1001/4	
<u>CATHODE:</u> Indirectly heated			<u>BASE</u> Special: Pin spacing as for B9A See drawing on page 7	
<u>ENVELOPE:</u> Glass				
<u>PROTOTYPE:</u> VX7161				
<u>RATING</u> <u>All limiting values are absolute</u>			<u>CONNECTIONS</u>	
			Pin	Electrode
Heater Voltage	(V)	6.3	1	Helix and Grid 3 hel
Heater Current	(A)	0.45	2	Grid 2 g2
Max. Grid 2 Voltage	(V)	230	3	I.C.
Max. Helix Voltage	(V)	230	4	Heater h
Max. Collector Voltage	(V)	330	5)	Heater-Cathode-Grid 1 h,k,g ₁
Max. Helix Current	(uA)	100	6)	
Max. Collector Current	(uA)	350	7)	
			8	I.C.
			9	I.C.
			End Cap	Collector Col
<u>TYPICAL OPERATING CONDITIONS</u>			<u>DIMENSIONS</u> See drawing on Page 7	
Grid 2 Voltage	(V)	20 to 140	A,D B,D	
Helix Voltage	(V)	170 to 220		
Collector Voltage	(V)	300	<u>MOUNTING POSITION</u> ANY (see note F on page 2)	
Helix Current	(uA)	0 to 10		
Collector Current	(uA)	125 to 320	<u>OPERATING TEMPERATURE</u> See note G on page 2.	
Frequency Range	(Mc/s)	2500 to 4100		
Small Signal Gain	(dB)	11 to 23	<u>WEIGHT</u> Valve only 1½ oss. Solenoid only (see note J on page 2) 12½ lbs.	
Max. Working Saturated Power output	(uW)	500		
Min. Working Saturated Power output	(uW)	60		
Focusing Field Strength (nom)	(oersteds)	440		
Noise factor (nom)	(dB)	16		

NOTES

- A. This electrode draws very low current (less than 10 μ A) Grid 2 voltage must not exceed helix voltage.
- B. Voltage adjusted for optimum value at 3300 Mc/s.
- C. When operated in the approved circuit (No. 495-LVA-007) the current in the field coils giving this field strength is 10 amps.
- D. All voltages are relative to the cathode. The collector is normally earthed.
- E. The saturated power obtained at synchronous helix potential. The maximum saturated power refers to the output at 23 dB gain. The minimum saturated power is for a collector current of 125 μ A.
- F. The valve will operate in any position with suitable fixing arrangements on the mount.
- G. During operation the solenoid temperature must not be allowed to exceed that value at which the solenoid resistance is 1.25 times the cold resistance measured in an ambient temperature of 20°C. This implies forced air cooling if the ambient temperature exceeds 30°C.
- H. A set of operating data (including setting-up procedure) is supplied with each valve.
- J. The preferred solenoid (495-LVA-007) is not supplied with the valve.
- K. When mounting the valve in the approved circuit it is advantageous to give the valve a slight clockwise rotation to ease its entry. The valve should then be rotated in the same direction until the valve and circuit markings are aligned.
- L. The valve gain will not vary by more than $\pm \frac{1}{2}$ dB when subjected to a vibration acceleration of 1g over the frequency range 5 c/s - 30 c/s. It will operate satisfactorily after application, in any direction, of 20g peak square-shaped shock pulses with a 6 m sec. base. The performance after application of 30g shocks is marginal.
- M. Valve NATO Stock No. 5960-99-037-3506
Solenoid NATO Stock No. 5950-99-972-1105

TESTS

To be performed in addition to those applicable in K1001.

Tests are to be performed in the specified order unless otherwise agreed with the Inspecting Authority.

<u>Test Conditions</u> - unless otherwise stated:-								
V_h V_{hel} $V_{col.}$ $I_{col.}$ Solenoid (V) (V) (V) (μA) current 6.3 200 300 125 10 amps.								
K	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits		Units
						Min.	Max.	
a	Heater Current	No voltages except V_h No magnetic field Note 1.		100%	I_h	0.37	0.63	A
b	Grid 2 Voltage	Notes 2 and 3		100%	V_{g2}	20	100	V
c	Helix Current	V_{g2} = Value obtained in test b. Note 2.		100%	I_{hel}	-	50	μA
d	Helix Voltage	V_{g2} = value obtained in test b. Notes 2 and 4.		100%	V_{hel}	170	220	V
e	Small signal gain.	V_{g2} = value obtained in test b. V_{hel} = value obtained in test d. Notes 2, 6 and 11.		100%		11	20	dB
f	Working Saturated Power output	V_{g2} = value obtained in test b. V_{hel} = value obtained in test d. Notes 2 and 10.		100%		-12	-4	dBm
g	Helix Voltage at 23 db Gain.	V_{g2} = Adjust V_{hel} = Adjust Notes 2 and 7		100%	V_{hel}	170	220	V
h	Grid 2 Voltage at 23 dB Gain.	V_{g2} = Adjust V_{hel} = Value obtained in test g Notes 2 and 8		100%	V_{g2}	20	140	V
j	Collector Current to obtain 23 dB Gain.	V_{g2} = Adjust V_{hel} = Value obtained in test g. Notes 2 and 8.		100%	I_{col}	-	320	μA

K	Test	Test Conditions	AQL %	Insp. Level	Sym- bol	Limits		Units
						Min.	Max.	
k	Gain Variation	V_{g2} = value obtained in test h. V_{hel} = value obtained in test g. I_{col} = value obtained in test j. Notes 2, 9 and 11.		100%		- Variation 5		dB
l	Spurious Oscillations	V_{g2} = Adjust V_{hel} = Value obtained in test g. Notes 2 and 5.		100%		No oscillations should be detected.		
m	Cold Attenuation	Measured at a frequency of 3300 Mc/s No voltages. No magnetic field. Notes 2 and 11.		100%		45	-	dB
n	Life	Notes 2 and 3			Note 14.			
p	Operational Vibration	Acceleration = 1g Frequency Range 6 c/s to 30 c/s. V_{hel} = value obtained in test g. V_{g2} adjusted to give value of I_{col} obtained in test j. Notes 2 and 12.			T.A.		Gain variation ± 1	dB
q	Shock	Peak Acceleration = 20g. Duration of shock = 6 m secs. No voltages Note 13.			T.A.	Valve must satisfy test clauses (a) to (m) after shock test.		

NOTES

1. The heater current shall be read at least three minutes after switching on.
2. These tests shall be performed in a solenoid (495-LVA-007) which has been approved by the Type Approving Authority by comparison with the reference standard held by that Authority.
3. Adjust the grid 2 voltage to obtain a collector current of 125 μ A.
4. Adjust helix voltage for maximum small signal gain at 3300 Mc/s, with an input power not greater than -40 dBm.
5. The value of collector current obtained in test k is increased by 10% by adjusting grid 2, and the helix voltage swept by a 50 c/s voltage of r.m.s. value 30V, about the value obtained in test d. The R.F. output against helix voltage characteristic is examined on an oscilloscope, with an r.f. input of less than -40 dBm. The characteristic should be a smooth curve with a maximum at the optimum helix voltage, and should decrease and increase as the input level is decreased and increased. Any oscillation present will give an output which does not decrease with input level or discontinuities in the otherwise smooth trace.
6. Small signal gain shall be measured at 2500, 3000, 3300, and 4100 Mc/s with an input not greater than -40 dBm.
7. Vary the collector current by adjusting the grid 2 voltage to obtain a small signal gain of 23 dB at 3300 Mc/s, with the helix voltage adjusted for maximum gain at this frequency. The input level shall not be greater than -40 dBm.
8. Vary the collector current by adjusting the grid 2 voltage to obtain a small signal gain of 23 dB at 3000 Mc/s. The input level shall not be greater than -40 dBm.
9. The small signal gain shall be measured at 2500, 2700, 3300, 3600, 3900 and 4100 Mc/s with the collector current set at the value obtained in test j. The input shall not be greater than -40 dBm in each case. The difference between any two readings shall not be greater than 5 dB.
10. The working saturated power output shall be measured at 2500, 3000, 3300 and 4100 Mc/s.
11. At Type Approval, measurements shall be taken at intervals of 100 Mc/s over the band 2500 to 4100 Mc/s.
12. The frequency of vibration shall be varied through the range in steps of 1 c/s, at 1 minute intervals. The R.F. input, at a frequency of 4100 Mc/s and a level adjusted to give an output at least 5 dB below the saturated output at that frequency, shall be modulated with a square-wave pulse, the output being detected and displayed on an oscilloscope. The variation in gain shall be measured with the direction of vibration a) perpendicular to the valve axis and b) parallel to the valve axis.
13. The valve alone shall be subjected to 6 shocks in each of 3 directions (a) perpendicular to valve axis, (b) parallel to valve axis in direction of collector and (c) parallel to valve axis in direction of base. The shock pulse shall be approximately rectangular in shape with a peak acceleration of 20g and a width (at 50% of peak height) of 6 m secs.

The sample size shall be as follows:-

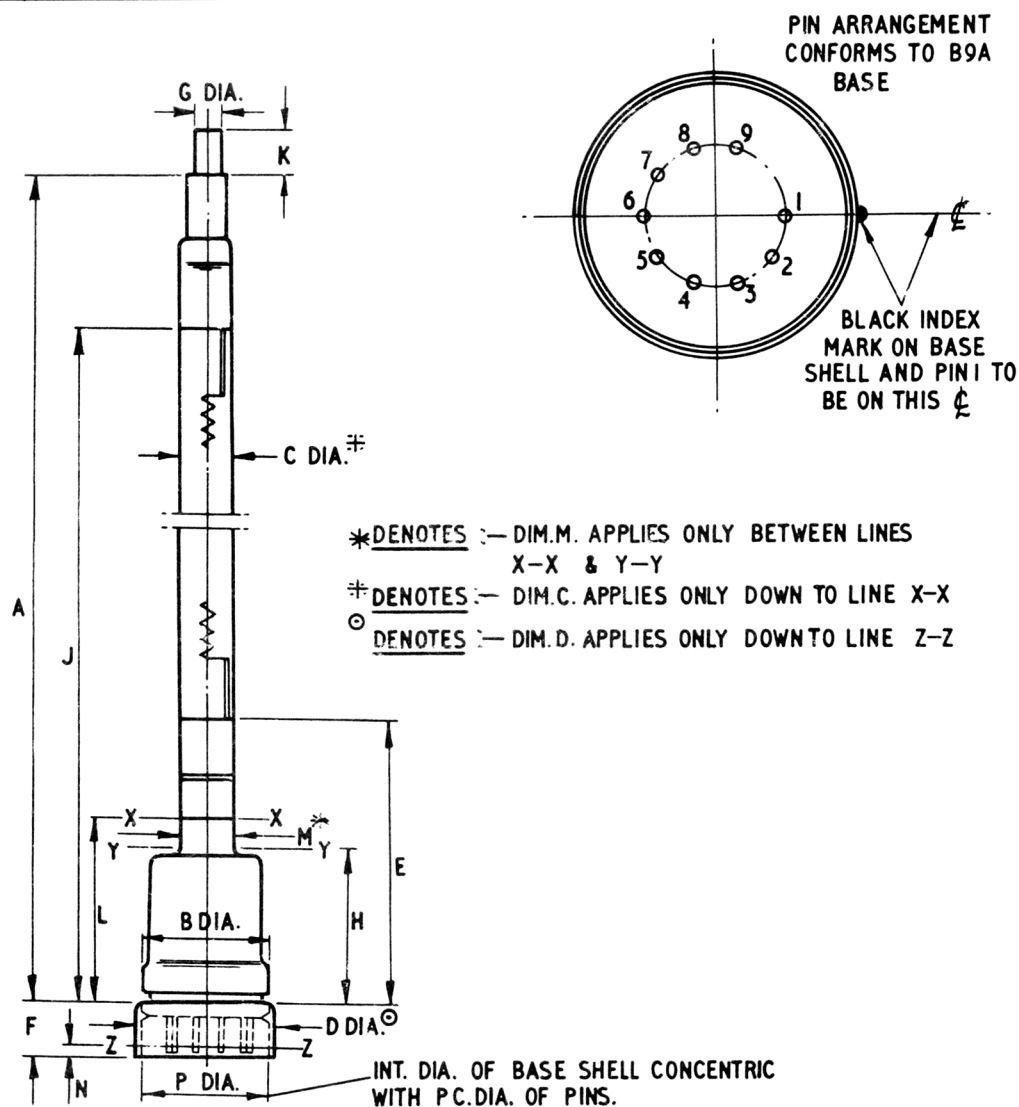
<u>Lot size</u>	<u>Sample size</u>
1 - 25	1
26 - 50	2
51 - 150	3
151 - or greater	2%

The manufacturer may test additional samples at his discretion. For the first lot of any production order, deliveries shall be held until satisfactory completion of a minimum of 250 hours life. Where previous life test data is available deliveries may be released at the discretion of the Inspection Authority. Thereafter, where previous results have proved satisfactory shipment of valves may be permitted without awaiting results of current tests.

For the purpose of this test the life of a valve shall be considered terminated when the performance of the valve falls outside any one of the test limits specified below:-

Test	Limits		Units
	Min.	Max.	
a	.37	.63	A
b	18	160	V
c	-	100	μ A
d	160	230	V
e	Small signal gain must not be more than 3 dB below that measured at 0 hours.		
f	-13	-3.5	dBm
g	160	230	V
h	18	V _{helix} in test g.	V
j	-	350	μ A
k	-	Variation 6.5	dB
l	No oscillations should be detected.		
m	-	40	dB

The target sample average life is 500 hours. In the event of a sample failure the Approving Authority must be informed. Shipments will only be stopped upon notification from the Approving Authority.



DIM.	MILLIMETRES	INCHES	DIM.	MILLIMETRES	INCHES
A	177.34 ± 0.63	6.982 ± 0.025	G	5.99 ± 0.18	0.236 ± 0.007
B	23.24 MAX.	0.915 MAX.	H	24.13 MAX.	0.950 MAX.
C	9.27 MAX.	0.365 MAX.	J	149.86 ± 0.38	5.900 ± 0.015
D	25.30 ± 0.18	0.996 ± 0.007	K	7.62 ± 0.76	0.300 ± 0.030
E	48.26 ± 0.89	1.900 ± 0.035	L	27.56 MAX.	1.085 MAX.
F	10.16 ± 0.63	0.400 ± 0.025	H	9.60 MAX.	0.378 MAX.
P	22.22 MIN	0.875 MIN	N	1.59 MAX.	0.063 MAX.

NOTE:- BASIC FIGURES ARE INCHES