CV 5963

MINISTRY OF AVIATION D.L.R.D./R.A.E.

Specification M.O.A./CV 5963	SECURITY
Issue No. 1 Dated 1.2.63	Specification: Unclassified / Valve: Unclassified
To be read in conjunction with K1001	

TYPE OF VALVE: Electron Multiplier Noise Source

ENVELOPE: Glass

PROTOTYPES: PS 2719

RATINGS

(All limiting values are absolute)

			NOTES
Maximum H.T. Supply	(V)	650	
Maximum Voltage Step between successive electrodes	(V)	65	A
Typical Noise Output	(mV)	3.5	B
Maximum Ambient Temperature Range	(°C)	-40 to + 70	

CAPACITANCES (pF)

Ca-d9	Nominal	3.8	D
Ca-all	Nominal	5.7	D

NOTES

A. Between k and d1, d1/d2, d2/d3, d3/d4, d4/d5, d5/d6, d6/d7, d7/d8, d8/d9, d9/a.

B. The quoted voltage is the r.m.s. value of a Gaussian voltage distribution over a bandwidth of 30 kc/s to 10 Mc/s when operated in the circuit shown on Page 5 Note 3.

C. The Joint Service Catalogue Number is 5960-99-037-3168.

D. Measurements made with valve unscreened.

MARKING

See K1001/4

BASE

BS4448/B11A

CONNECTIONS

Pin No.	Electrode	
1	Dynode No. 1	d1
2	" " 2	d2
3	" " 3	d3
4	" " 4	d4
5	" " 5	d5
6	" " 6	d6
7	" " 7	d7
8	" " 8	d8
9	" " 9	d9
10	Anode	a
11	Cathode	k

DIMENSIONS (mms)

See drawing on page

	Min.	Max.
Overall length		94
Diameter		34
Seated Height		80

MOUNTING POSITION

Any

TESTS

To be performed in addition to those applicable to K1001.

No tests are to be performed until at least 28 days after pumping.
Unless otherwise stated the tests shall be performed at Tamb = 20°C ± 5°C.

	TEST	TEST CONDITIONS	AQL %	Insp. Level	Symbol	LIMITS Min.	LIMITS Max.	Units
a	Anode Dark Current	Vht = 650 Vdc(± 2%) Light Flux = 0 Note 1	-	100%	Ia (dark)	-	0.15	µA
b	Overall Sensitivity	Vht = 650 Vdc(± 2%) Light Flux = $1X10^{-5}$ Lumens Notes 1, 2	-	100%	S	0.15	-	A/ Lumen
c	Anode Current (for given noise output)	Vht = 600 Vdc(± 2%) Notes 1, 3, 4.	-	100%				
	1) Initial				Ia(N)	-	200	µA
	2) Change after 1 hours operation				ΔIa(N)	-	+12.5 or 5.0 Which-ever is greater	% µA
d	Noise Output Spectrum (Relative)	Vht = 600 Vdc Notes 1, 4 and 5		Q.A.				
	1. 0.2 Mc/s					0.3	1.3	dB
	2. 0.5 Mc/s					0.4	1.4	dB
	3. 2 Mc/s				N	-1.0	0	dB
	4. 5 Mc/s					-1.1	-0.1	dB
	5. 7 Mc/s					-1.1	+0.9	dB
	6. 10 Mc/s					-0.3	+1.7	dB
e	Capacitances	To be measured on a 1 Mc/s R.F. Bridge Valve unscreened. The capacitance of the holder to be balanced out.	6.5	IC				
					Ca-d9	3.3	4.3	pF
					Ca-all	5.2	6.2	pF

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	TEST	TEST CONDITIONS	AQL %	Insp. Level	Symbol	LIMITS Min.	LIMITS Max.	Units
f	Resonance Search	The valves shall be vibrated with simple harmonic motion in each of three mutually perpendicular planes over the frequency range 50 to 500 c/s. Sweep speed not greater than one octave per minute. Acceleration 2g Vht = 600V d.c. Note 1 Ia = 100 µA R_L = 2.2kΩ ± 5% by passed by 0.02 µF ± 20% capacitor Note 11		1 valve per batch or 2% of batch which-ever is greater	Va(a.c.)		5	mV r.m.s.
	Post Resonance Search Test Initial Anode Current for given noise output	Vht = 600V d.c. Notes 1, 3, 4 and 12			Ia(N)		200	µA
g	Continuous Acceleration	The valves shall be subjected to continuous acceleration of 13g for 1 min, while being operated under the following conditions Vht = 600V ± 2% (Note 1) Light source adjusted for Ia = 100 µA		Q.A.	I_a		±10	µA
	Post Continuous acceleration Test Initial Anode Current for given noise output	Notes 1, 3 and 4			$I_a(N)$		200	µA

TESTS (Cont'd.)

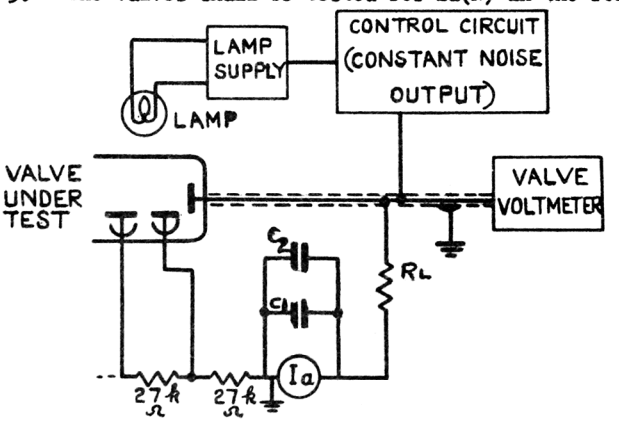
	TEST	TEST CONDITIONS	AQL %	Insp. Level	Symbol	LIMITS Min.	LIMITS Max.	Units
h	Change in anode current at given noise output while temperature cycling.	Vht = 600 Vdc ± 2% Notes 1, 3, 4, 8. Operate for 10 minutes followed by 30 minutes with no illumination 2 such cycles at 20 ± 5°C Then successive operating periods at -40 ± 5°C) 20 ± 5°C) 70 ± 5°C) 20 ± 5°C) -40 ± 5°C) 20 ± 5°C) 70 ± 5°C) 20 ± 5°C)	-	QA	Ia(N)	I_1	1.6 I_1	µA
j	Life Test Life Test End Point Anode Current 3.5 mV noise output.	Vht = 600 Vdc(Nominal) Notes 1, 4, 6, 7. Minimum duration 50 cycles. Each cycle shall consist of a period of 4 hrs. on, followed by a period of 8 hours off. Vht = 600 Vdc ± 2% Notes 1, 3, 4, 13		3 valves per batch or 3% of batch, whichever is greater	Ia(N)	-	500	µA

NOTES

1. The voltage steps from the cathode, through dynode 1 etc. to the anode shall be nominally equal and obtained from a chain of ten 27 kilohm ± 5% resistors across the supply voltage.

2. The light flux shall be incident on an aperture 20 mm x 5 mm centred on the centre of the cathode.

3. The valves shall be tested for Ia(N) in the following circuit:-



Vht = 600V ± 2% (Note 1)

Total anode circuit capacitance (Cs) = 16pF ± 2 pF.

R_L = 1 kilohm ± 2%

C_1 = 0.5 µF paper

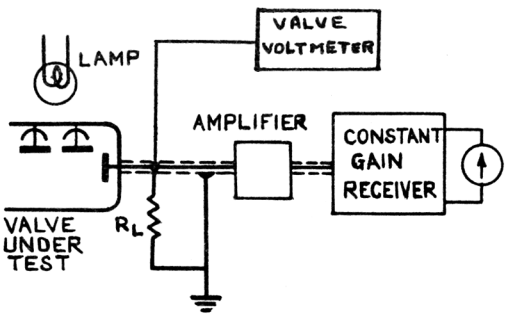
C_2 = 0.002 µF ceramic

The adjustable reference shall be set to produce 3.5 mV r.m.s. (gaussian voltage distribution) of noise at the anode.

See also Note 10.

4. The valves must not be exposed to bright light during handling.

5. The valves shall be tested in the following circuit:-



Vht = 600V (Note 1)

Total anode circuit capacitance (Cs) = 16 pF ± 1 pF.

R_L = 1 kilohm ± 1%

The lamp supply voltage shall be adjusted to give a noise output of 3.5 mV r.m.s. (gaussian voltage distribution). With the constant gain received tuned to 1.0 Mc/s. the gain shall be adjusted to give a reading of about 75% full scale on its signal level indicator.

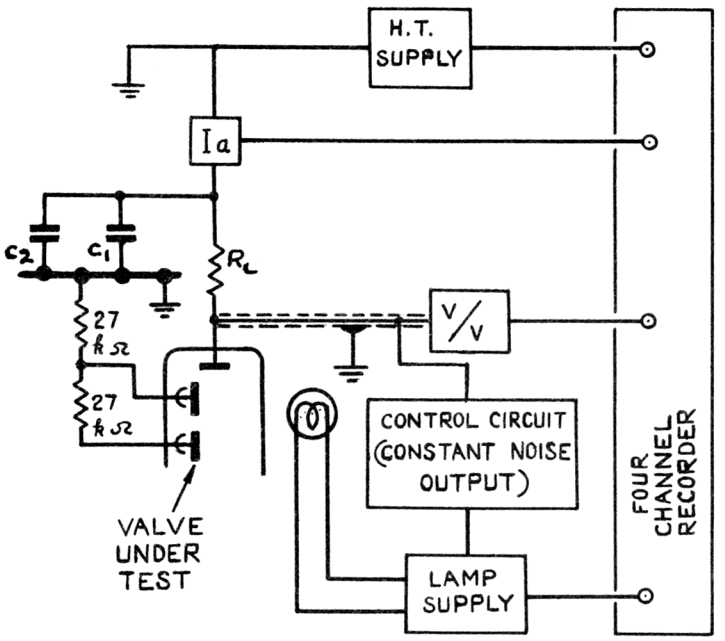
The signal level indicator reading shall then be noted for receiver frequencies of 0.2, 0.5, 2, 5, 7 and 10 Mc/s.

The readings are to be converted to dB relative to the 1 Mc/s setting and corrected for the response of the circuit at the appropriate frequencies.

NOTES (cont'd.)

6. Two valves in every three shall be run with Tamb = 70°C ± 5°C. The remaining sample shall be run with Tamb = 20°C ± 5°C.

7. The valves shall be operated for 50 cycles with the noise output set to 3.5 mV r.m.s. (gaussian voltage distribution) across the anode load resistor and maintained constant within ± 10% by an automatic feedback control of the light source. The following test circuit shall be used.



R_L = 1 Kilohm ± 2%
Cs = 16 ± 2pF
C_1 = 0.5 µF paper
C_2 = 0.002 µF ceramic
R_1 = 27 Kilohm
R_2 = 27 Kilohm

8. Record values of Ia at beginning and end of each 10 minute operating period. I_1 is the minimum recorded value.

   The necessary temperature changes are made during the 30 minute "off" periods of the cycles.

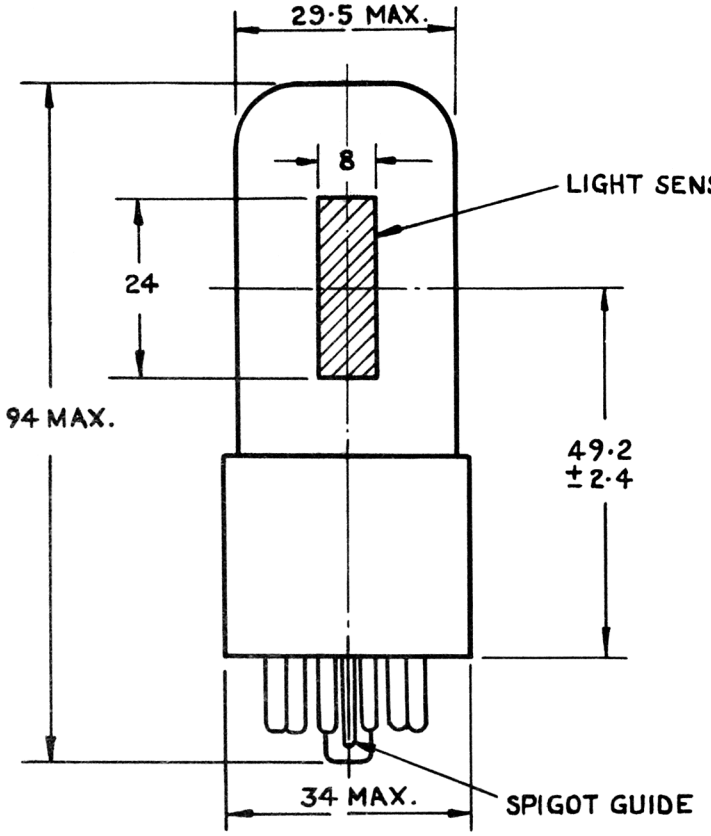
9. In test clause "c 2" any negative value of Δ Ia(N) is permissible.

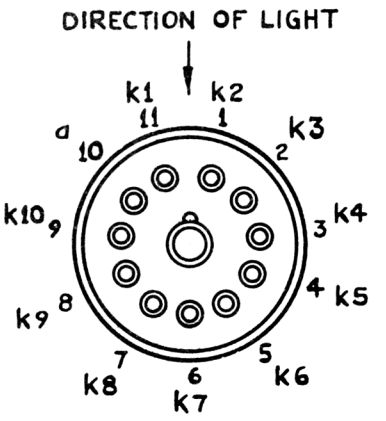
10. A suitable valve voltmeter is defined as one having a bandwidth greater than 0.2 Mc/s to 10 Mc/s. With this proviso a valve voltmeter whose deflection depends on the mean value of the voltage and whose scale indicates r.m.s. values of a sine wave will indicate 3.1mV on the scale for an input having a gaussian voltage distribution and an r.m.s. value of 3.5 mV.

11. Adjust illumination to give required anode current. Ensure that variations in effective illumination cannot occur during vibration.

12. If one valve fails a second sample is taken. If a total of two or more valves fail the batch is tested 100%.

13. If the number of failures does not exceed one the batch is acceptable. If there are two failures a second sample is tested. If there is a total of more than two failures the batch is rejected.





VIEW OF FREE END

B11A SUB-MAGNAL BASE

ALL DIMENSIONS IN mm.