

Specification M.O.A./CV 5963 Issue No. 1                      Dated 1.2.63 To be read in conjunction with K1001	<b><u>SECURITY</u></b> Specification              Valve Unclassified              Unclassified
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TYPE OF VALVE: Electron Multiplier Noise Source ENVELOPE: Glass PROTOTYPES: PS 2719	<b><u>MARKING</u></b> See K1001/4																																												
<b><u>RATINGS</u></b> (All limiting values are absolute)	<b><u>BASE</u></b> BS444B/B11A																																												
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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  $T_{amb} = 20^{\circ}C \pm 5^{\circ}C$ .

	TEST	TEST CONDITIONS	AQL %	Insp. Level	Symbol	LIMITS		Units
						Min.	Max.	
a	Anode Dark Current	V <sub>ht</sub> = 650 V <sub>dc</sub> (+ 2%) Light Flux = 0 Note 1	-	100%	I <sub>a</sub> (dark)	-	0.15	μA
b	Overall Sensitivity	V <sub>ht</sub> = 650 V <sub>dc</sub> (+ 2%) Light Flux = 1X10 <sup>-5</sup> Lumens Notes 1, 2	-	100%	S	0.15	-	A/ Lumen
c	Anode Current (for given noise output)  1) Initial 2) Change after 1 hours operation.	V <sub>ht</sub> = 600 V <sub>dc</sub> (+ 2%) Notes 1, 3, 4.	-	100%	I <sub>a(N)</sub> ΔI <sub>a(N)</sub>	- -	200 +12.5 or 5.0 Which-ever is greater	μA % μA
d	Noise Output Spectrum (Relative)  1. 0.2 Mc/s 2. 0.5 Mc/s 3. 2 Mc/s 4. 5 Mc/s 5. 7 Mc/s 6. 10 Mc/s	V <sub>ht</sub> = 600 V <sub>dc</sub> Notes 1, 4 and 5		Q.A.				
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 Ca-all	3.3 5.2	4.3 6.2	pF pF

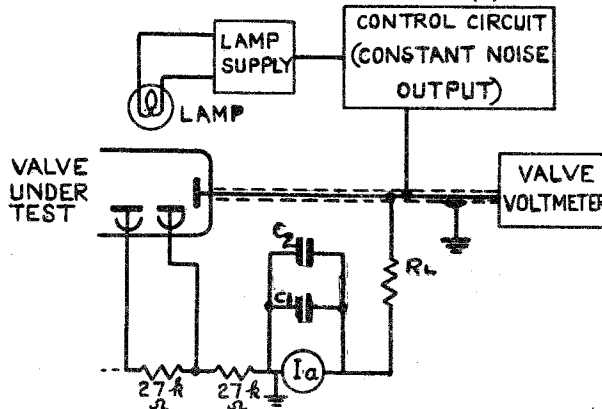
	TEST	TEST CONDITIONS	AQL %	Insp. Level	Symbol	LIMITS		Units
						Min.	Max.	
f	Resonance Search	<p>The valves shall be vibrated with simple harmonic motion in each of three mutually perpendicular planes over the frequency range 50 to 500 c/s. Sweep speed not greater than one octave per minute.</p> <p>Acceleration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

TESTS (Cont'd.)

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

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  $\pm 5\%$  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  $I_a(N)$  in the following circuit:-



$$V_{ht} = 600V \pm 2\% \text{ (Note 1)}$$

$$\text{Total anode circuit capacitance } (C_s) = 16pF \pm 2 pF.$$

$$R_L = 1 \text{ kilohm } \pm 2\%$$

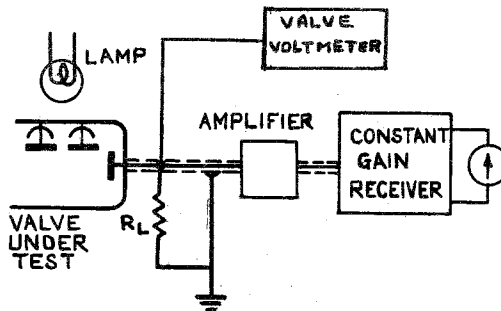
$$C_1 = 0.5 \mu F \text{ paper}$$

$$C_2 = 0.002 \mu F \text{ ceramic}$$

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:-



$$V_{ht} = 600V \text{ (Note 1)}$$

$$\text{Total anode circuit capacitance } (C_s) = 16 pF \pm 1 pF.$$

$$R_L = 1 \text{ kilohm } \pm 1\%$$

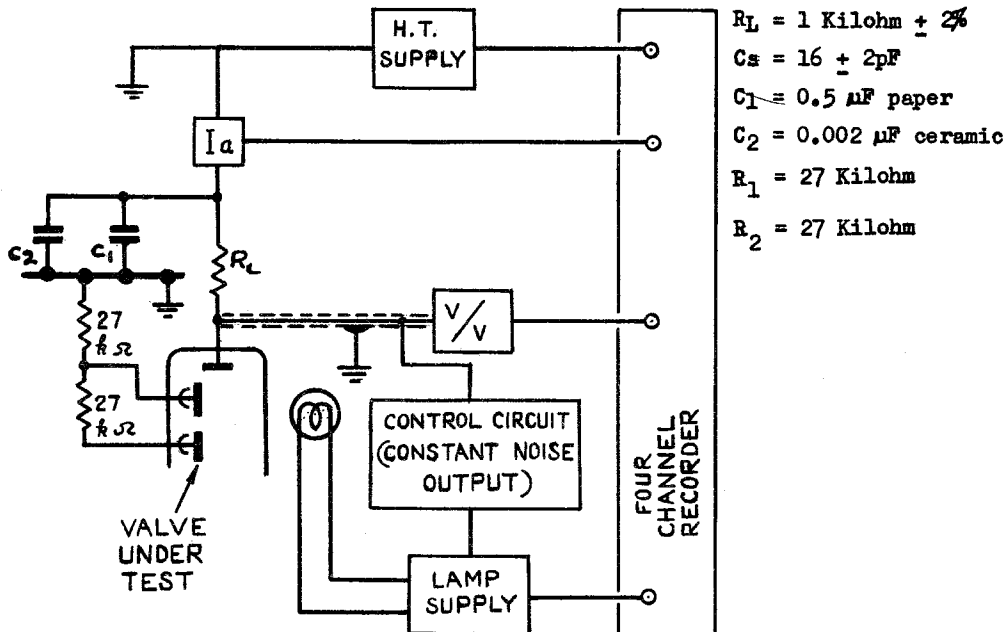
The lamp supply voltage shall be adjusted to give a noise output of 3.5 mV r.m.s. (gaussian voltage distribution). With the constant gain receiver tuned to 1.0 Mc/s. the gain shall be adjusted to give a reading of about 75% full scale on its signal level indicator.

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

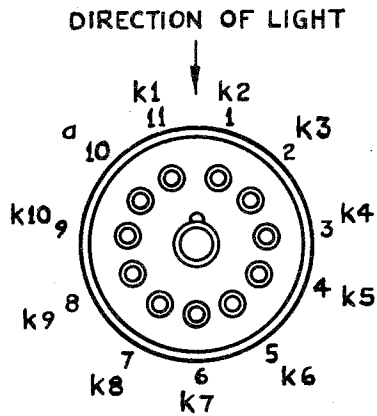
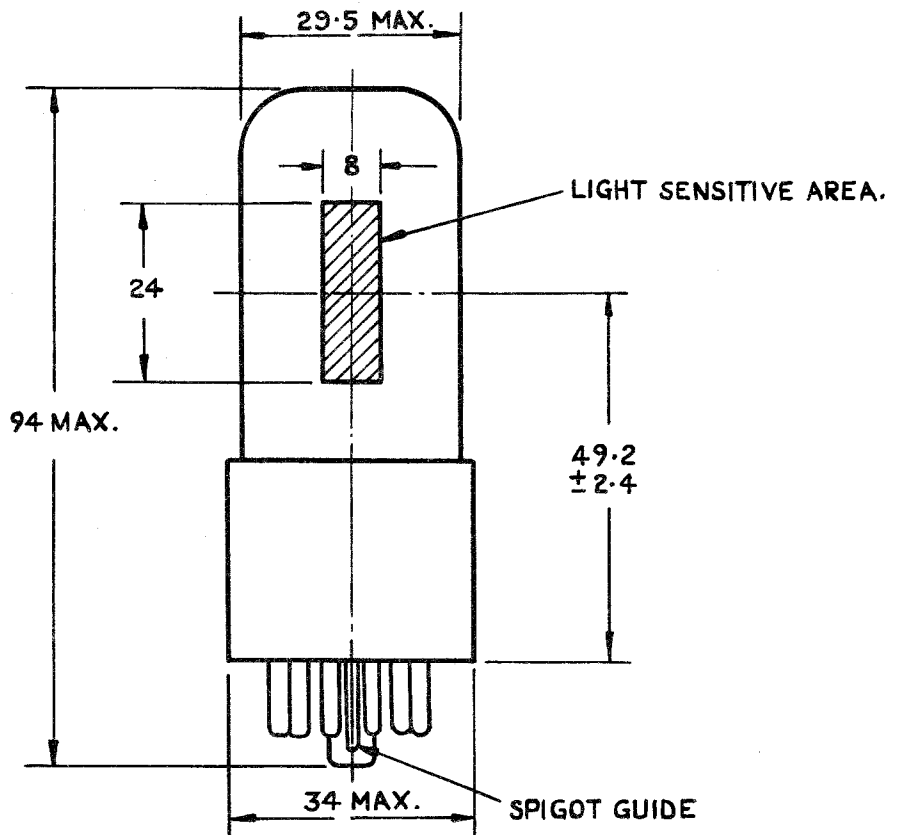
The readings are to be converted to dB relative to the 1 Mc/s setting and corrected for the response of the circuit at the appropriate frequencies.

NOTES (cont'd.)

6. Two valves in every three shall be run with  $T_{amb} = 70^{\circ}\text{C} \pm 5^{\circ}\text{C}$ . The remaining sample shall be run with  $T_{amb} = 20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ .
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  $\pm 10\%$  by an automatic feedback control of the light source. The following test circuit shall be used.



8. Record values of  $I_a$  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  $\Delta I_a(N)$  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.