

AMENDMENT NO. 1

(1) GROUP B. Variables Tests. (V2 Inspection Level Tests)

Delete the figures in the LAL, Bogey, UAL and ALD columns and insert "Record".

(2) GROUP C. Vibration Noise.

Amend the maximum limit to 100 (from 25).

(3) GROUP E. Post Fatigue and Post Shock Tests.

Vibration Noise.

Amend the maximum limit to 150 from 40 and 4.0 for Post Fatigue and Post Shock respectively.

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N.50468R

T.V.C. Office
for R.A.E.

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION CV.4009

ISSUE 2. DATED 6.4.56.

AMENDMENT No. 2.

GROUP E. POST FATIGUE AND POST SHOCK TESTS.

VIBRATION NOISE.

Amend the maximum limit of 150 mV. (inserted by Amendment No.1) to read 450 mV.

GROUP F. STABILITY LIFE (1 hour).

CHANGE IN MUTUAL CONDUCTANCE.

Amend the maximum limit to read 10% from 5%.

INTERMITTENT LIFE. TEST POINT (500 hours).

ELECTRODE INSULATION.

Amend the existing test to read as follows:

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min	LAL	Bogey	UAL	Max.	ALD	
	Electrode Insulation	Vh = 6.3v. Note 8.	4.0									
		Vg1 - all = -100v.			R	50	-	-	-	-	-	MΩ
		Vg2 - all = -300v.			R	50	-	-	-	-	-	MΩ
		Va - all = -300v.			R	50	-	-	-	-	MΩ	

TEST POINT (1000 hours).

HEATER CURRENT.

Delete all reference to this test.

At the end of this group add the following test:

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min	LAL	Bogey	UAL	Max.	ALD	
	Electrode Insulation	Vh = 6.3v. Note 8.	6.5									
		Vg1 - all = -100v.			R	30	-	-	-	-	-	MΩ
		Vg2 - all = -300v.			R	30	-	-	-	-	-	MΩ
		Va - all = -300v.			R	30	-	-	-	-	MΩ	

Specification MOB(A)/CV4009 Similar to American Specification 5749/6BA6W Issue 2 Dated 6.4.56 To be read in conjunction with BS.448 BS.1409 and K1001	<u>SECURITY</u>	
	<u>Specification</u> UNCLASSIFIED	<u>Valve</u> UNCLASSIFIED

TYPE OF VALVE - Reliable Mixture Variable μ H. F. Pentode CATHODE - Indirectly heated ENVELOPE - Glass PROTOTYPE - CV.454 R. E. T. M. A. DESIGNATION - 5749/6BA6W	<u>MARKING</u> K1001/4 Additional Markings:- 5749/6BA6W
	<u>BASE</u> BS.448/B7G

<u>RATING</u>				<u>CONNECTIONS</u>		
			Note	Pin	Electrode	
Heater Voltage	(V)	6.3	C	1	g1	
Heater Current	(A)	0.3		2	g3	
Max. Heater - Cathode Voltage	(V)	± 150	A	3	h	
Max. Operating Anode Voltage	(V)	330	A	4	h	
Max. Anode Voltage ($I_a = 0$)	(V)	500	A	5	a	
Max. Anode Dissipation	(W)	3.3	A	6	g2	
Max. Operating Screen Voltage	(V)	135	A	7	k	
Max. Screen Voltage ($I_{g2} = 0$)	(V)	330	A			
Max. Screen Dissipation	(W)	0.7	A			
Mutual Conductance	(mA/V)	4.4	B			
Max. Grid 1 - Cathode Resistance for Cathode Bias	(Ω)	0.5				
Max. Grid 1 - Cathode Resistance Fixed Bias	(Ω)	0.1				
Max. Bulb Temperature	($^{\circ}$ C)	165	C			
Max. Shock (short duration)	(g)	500				
Max. Acceleration (continuous operation)	(g)	2.5				
Inner Amplification Factor ($\mu g_1 g_2$)		24				
Mutual Conductance ($g_1 = -20V$)	($\mu A/V$)	40				
Anode Impedance	(Ω)	1.0				
				<u>DIMENSIONS</u>		
				See BS.448/B7G/2.1 Size Ref. No. 2		
				Dimension (mm)	Min.	Max.
				A seated height	-	47.5
				C diameter	16.0	19.0
				D overall length	-	54.5

<u>CAPACITANCES (pF)</u>			<u>MOUNTING POSITION</u>		
C in (nom.)		5.5	D	Any	
C out (nom.)		5.0	D		
C _a , g ₁ (max.)		0.0035	D		

NOTES

A. Absolute value.

B. Measured at $V_a = 250V$, $V_{g2} = 100V$, $V_{g3} = 0$, $R_k = 68\Omega$ ($I_a = 11mA$, $I_{g2} = 4.2mA$.)

C. Caution to Electronic Equipment Design Engineers: Special attention should be given to the temperature of valves to be operated in aircraft. Reliability will be seriously impaired if the maximum bulb temperature is exceeded. The life expectancy may be reduced if conditions other than those specified for life tests are imposed on the valve and will be reduced appreciably if absolute maximum ratings are exceeded. Both reliability and performance will be jeopardised if heater voltage ratings are exceeded: life and reliability performance are directly related to the degree that regulation of the heater voltage is maintained at its centre-rated value.

D. Measured without screen.

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TESTS

To be performed in addition to those applicable in K1001

Tests shall be performed in the specified order unless otherwise agreed with the Inspecting Authority

Test Conditions - unless otherwise specified												
		Vh(V)	Va(V)	Vg1(V)	Vg2(V)	Vg3(V)	Rk(ohms)	Ck(μF)				
		6.3	250	0	100	0	68	1000				
K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min.	LAL	Bogay	UAL	Max.	ALD	
11.1	Vibration	No Voltages		100%								
7.1	Glass Strain	No Voltages	2.5	I								
<u>GROUP A</u>												
	Electrode	Vh = 6.3V. Note 8		100%	R	100	-	-	-	-	-	MΩ
	Insulation	Vg1 to all = -100V Vg2 to all = -300V Va to all = -300V		100%	R	100	-	-	-	-	-	MΩ
	Reverse Grid Current	Vg1 = -1V. Note 6. Rg1 = 500kΩ max.		100%	Ig1	-	-	-	-	0.5	-	μA
<u>GROUP B</u>												
	Heater Current	Combined AQL	1.0	II								
5.3	hk Leakage Current	Vhk = ±100V Note 1 Vhk = -100V cathode positive	0.65	II	Ih	275	-	-	-	325	-	mA
			0.65	II	Ihk	-	-	-	-	20	-	μA
				V2	Ihk	-	-	-	5	-	-	μA
	Anode Current		0.65	II	Ia	8.5	-	-	-	13.5	-	mA
				V2	Ia	-	9.4	11.0	12.6	-	2.5	mA
	Screen Current		0.65	II	Ig2	2.8	-	-	-	5.6	-	mA
				V2	Ig2	-	3.4	4.2	5.0	-	1.4	mA
	Mutual Conductance		0.65	II	gm	3.6	-	-	-	5.2	-	mA/V
				V2	gm	-	3.91	4.4	4.89	-	0.9	mA/V
<u>GROUP C</u>												
	Change of Mutual Conductance	Combined AQL	6.5	I								
	Mutual Conductance	Vh = 5.7V. Note 7	2.5	I	Δ gm	-	-	-	-	15	-	%
	Reverse Grid Current	Vg1 = -20V Rk = 0	2.5	I	gm	5	-	-	-	100	-	μA/V
	Vibration Noise	Vh = 6.9V Va = 300V, Vg2 = 125V Vg3 = 0. Note 4	2.5	I	Ig1	-	-	-	-	1.0	-	μA
11.1	Vibration Noise	RL = 2kΩ. Note 2.	2.5	I	Va AC	-	-	-	-	25	-	mV rms

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K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min.	LAL	Bogey	UAL	Max.	ALD	
GROUP D												
7.2	Base Strain	No voltages	6.5	IA								
5.9	Capacitances	Measured on 1 Mc/s bridge with valve mounted in a fully shielded socket. Valve not screened.	6.5	IC	C in C out Ca g1	4.4 3.5 -	- - -	5.5 5.0 -	- - -	6.6 6.5 0.0035	- - -	pF pF pF
	g3 Control	Vg1 = -4V Ia = 50 μA	6.5	IA	-Vg3	70	-	-	-	140	-	V
	Inner Amplification Factor	Max. Grid swing = 1V	6.5	IA	μg1g2	16	-	24	-	32	-	
GROUP E												
11.2	Resonance Search	RL = 2k Ω Frequency:- 25 - 500 c/s	2.5	IC								
					Va AC	-	-	-	-	100	-	mV rms
11.3	Fatigue	Vh = 6.9V Note 3		IA								
Post Fatigue Tests												
		Combined AQL	4.0									
5.3	hk Leakage Current	Vhk = ± 100V Note 1	2.5		Ihk	-	-	-	-	30	-	μA
	Reverse Grid Current	Vg1 = -1V Note 6 Rg1 = 500k Ω max.	2.5		Ig1	-	-	-	-	1.5	-	μA
	Mutual Conductance		2.5		gm	3.3	-	-	-	5.2	-	mA/V
11.1	Vibration Noise	As in Group C	2.5		Va AC	-	-	-	-	40	-	mV
11.4	Shock	Hammer Angle = 30° No voltages		IA								
Post Shock Tests												
		Combined AQL	4.0									
5.3	hk Leakage Current	Vhk = ±100V Note 1	2.5		Ihk	-	-	-	-	30	-	μA
	Reverse Grid Current	Vg1 = -1V Note 6 Rg1 = 500k Ω max.	2.5		Ig1	-	-	-	-	1.5	-	μA
	Mutual Conductance		2.5		gm	3.3	-	-	-	5.2	-	mA/V
11.1	Vibration Noise	As in Group C	2.5		Va AC	-	-	-	-	4.0	-	mV rms
AVI/5	Life	Rg1 = 100k Ω ± 20% Vhk = 150V D.C. Heater positive. Note 5										

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TESTS (Cont'd)

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K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min.	LAL	Bogey	UAL	Max.	ALD	
AVI/5.1	<u>Stability Life (1 hour)</u>			I								
	Change in Mutual Conductance		1.0		Δgm	-	-	-	-	5	-	%
AVI/5.2	<u>Survival Rate Life (100 hrs.)</u>			II								
AVI/5.6	Inoperatives		0.65									
AVI/5.3	<u>Intermittent Life</u>			IA								
	<u>Test Point 500 hrs.</u>	Combined AQL	6.5									
AVI/5.6	Inoperatives		2.5									
	Heater Current		2.5		Ih	275	-	-	-	325	-	mA
5.3	hk Leakage Current	Vhk = $\pm 100V$ Note 1	2.5		Ihk	-	-	-	-	40	-	μA
	Reverse Grid Current	Vg1 = -1V Note 6 Rg1 = 500k Ω	2.5		Ig1	-	-	-	-	1.5	-	μA
	Mutual Conductance		2.5		gm	3.0	-	-	-	5.2	-	mA/V
	Average Change of Mutual Conductance				Δgm	-	-	-	-	15	-	%
	Mutual Conductance	Vh = 5.7V	2.5		gm	2.5	-	-	-	5.2	-	mA/V
	Electrode Insulation	Vg1-all = -100V Vg2-all = -300V Va-all = -300V	4.0 4.0 4.0		R R R	50 50 50	- - -	- - -	- - -	- - -	- - -	M Ω M Ω M Ω
	<u>Test Point 1000 hrs.</u>	Combined AQL	10.0									
AVI/5.6	Inoperatives		4.0									
	Heater Current		4.0		Ih	275	-	-	-	325	-	mA
5.3	hk Leakage Current	Vhk = $\pm 100V$ Note 1	4.0		Ihk	-	-	-	-	40	-	μA
	Reverse Grid Current	Vg1 = -1V Note 6 Rg1 = 500k Ω	4.0		Ig1	-	-	-	-	2.0	-	μA
	Mutual Conductance		4.0		gm	2.7	-	-	-	5.2	-	mA/V
	<u>GROUP G</u>											
AIX/2.5	Electrical Retest after 28 days holding period			100%								
AVI/5.6	Inoperatives		0.5									
	Reverse Grid Current	Vg1 = -1V Note 6 Rg1 = 500k Ω max.	0.5		Ig1	-	-	-	-	1.0	-	μA

NOTES See Overleaf

NOTES

1. Heater positive and negative successively.
2. The valve shall be mounted so that the direction of vibration is parallel to the minor axis of the electrode structure.
Vibration frequency = any fixed frequency in the range 25 - 100 c/s.
Min. peak acceleration = 2.5g.
The test shall be of sufficient duration to obtain a steady reading of noise output.
3. Valves shall be vibrated in each of the three required planes for not less than 30 hours (100 hours total). Heater switched 1 min. on 3 min. off. No other voltages. Min. peak acceleration = 5g; frequency 170 ± 5 c/s.
4. Adjust Vg1 to give Ia = 11.0 mA. For this test the valve shall be preheated for five minutes under the test conditions. Ig1 shall not be rising or out of limit after a total of 10 minutes.
5. For life tests Va and Vg2 may deviate from the specified value by ± 50 volts providing the average dissipation is within 10% of the value obtained under the specified conditions. Fixed bias may be used.
6. This is an additional bias applied relative to the negative end of the cathode resistor.
7. Change of mutual conductance is expressed

$$\frac{(\text{gm at } 6.3\text{V}) - (\text{gm at } 5.7\text{V})}{(\text{gm at } 6.3\text{V})} \times 100\%$$
8. Heater and cathode strapped and considered as a single electrode.