

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION CV.4070

ISSUE 1. DATED 8.1.57.

AMENDMENT No. 1.

GROUP F. INTERMITTENT LIFE. TEST POINT (500 hours).

Delete the existing Electrode Insulation Test (at end of group) and substitute the following:

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min	LAL	Bogey	UAL	Max.	AID	
	Electrode Insulation	Vh = 6.3v. Note 5. Vg - all = -100v. Va - all = -300v.	4.0		R R	50	-	-	-	-	-	MΩ mΩ
						50	-	-	-	-	-	

TEST POINT (1000 hours).

Delete all reference to the Heater Current test.

Add at the end of this group (after Anode Current test) the following:

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min	LAL	Bogey	UAL	Max.	AID	
	Electrode Insulation	Vh = 6.3v. Note 5. Vg - all = -100v. Va - all = -300v.	6.5		R R	30	-	-	-	-	-	MΩ MΩ
						30	-	-	-	-	-	

Z.16136.R.

Director,  
Royal Aircraft Establishment.

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION CV4070

ISSUE 1 DATED 8TH JANUARY 1957

AMENDMENT NO.2

Page 1: Under RATING.

Against Amplification Factor, delete 100 and insert 90

Page 3: Under GROUP D.

Against Amplification Factor, amend Limits Min. from 85 to 75 and Limits Max. from 115 to 105.

March 1960  
NK16546/D

R.R.E.

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION M.O.S. (A) CV 4070

ISSUE 1 DATED 8.1.57.

AMENDMENT NO. 3.

Page 2 GROUP D At bottom of page

Against "Equivalent Noise Resistance with grid earthed" Amend figure in column headed "Limits Max" from "400" to "550" ohms

May 1960  
N. 17176/D

T.V.C. for R.R.E.

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION M.O.A./CV.4070 ISSUE 1. DATED 8th JANUARY 1957

AMENDMENT NO.5

Page 4. Group F. Test Point (500 hrs.).

Against Anode Current in Max. Limits column amend "11.0" mA to read "12.0"mA.

Page 4. Group F. Test Point (1,000 hrs.).

Against Anode Current in Max. Limits column amend "11.0"mA to read "12.0"mA.

March, 1965.

T.V.C. for R.R.E.

Specification MOS(47)CV4070

Issue 1 Dated 8.1.57.

To be read in conjunction with B.S.448, B.S.1409 and K.1001

**SECURITY**

Specification

Valve

UNCLASSIFIED

UNCLASSIFIED

<p><b>TYPE OF VALVE</b> - Reliable Miniature Grounded Grid Triode</p> <p><b>CATHODE</b> - Indirectly Heated</p> <p><b>ENVELOPE</b> - Glass</p> <p><b>PROTOTYPE</b> - CV417</p> <p><b>R.E.T.M.A. DESIGNATION</b> - 6AQ4</p>		<p><b>MARKING</b></p> <p>K1001/4</p> <p>Additional Markings:-</p> <p>6AQ4</p>																									
<p><b>RATING</b></p> <p>(All limiting Values are absolute)</p>		<p><b>BASE</b></p> <p>BS448/576</p>																									
<p><b>CONNECTIONS</b></p>		<table border="1"> <thead> <tr> <th>Pin</th> <th>Electrode</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Grid</td> <td>g</td> </tr> <tr> <td>2</td> <td>Cathode</td> <td>k</td> </tr> <tr> <td>3</td> <td>Heater</td> <td>h</td> </tr> <tr> <td>4</td> <td>Heater</td> <td>h</td> </tr> <tr> <td>5</td> <td>Cathode</td> <td>k</td> </tr> <tr> <td>6</td> <td>Grid</td> <td>g</td> </tr> <tr> <td>7</td> <td>Anode</td> <td>a</td> </tr> </tbody> </table>		Pin	Electrode		1	Grid	g	2	Cathode	k	3	Heater	h	4	Heater	h	5	Cathode	k	6	Grid	g	7	Anode	a
Pin	Electrode																										
1	Grid	g																									
2	Cathode	k																									
3	Heater	h																									
4	Heater	h																									
5	Cathode	k																									
6	Grid	g																									
7	Anode	a																									
<p><b>Heater Voltage</b> (V) 6.3 C</p> <p><b>Heater Current</b> (A) 0.3 C</p> <p><b>Max. Anode Voltage (Ia = 0)</b> (V) 550 C</p> <p><b>Max. Operating Anode Voltage</b> (V) 275 C</p> <p><b>Max. Anode Dissipation</b> (W) 3.0 C</p> <p><b>Max. Mean Cathode Current</b> (mA) 17 C</p> <p><b>Max. Heater - Cathode Voltage</b> (V) 2150 C</p> <p><b>Max. Grid - Cathode Voltage</b> (V) 100 C</p> <p><b>Max. Operating Frequency</b> (Mc/s) 250 C</p> <p><b>Max. Bulb Temperature</b> (°C) 165 C</p> <p><b>Max. Shock (short duration)</b> (g) 500 C</p> <p><b>Max. Acceleration (continuous operation)</b> (g) 2.5 C</p> <p><b>Min. Grid Voltage to ensure cut off to a slope of 100µA/V</b> (V) -8.0 C</p> <p><b>Mutual Conductance</b> (mA/V) 8.5 A</p> <p><b>Amplification Factor</b> 100 A</p>		<p><b>DIMENSIONS</b></p> <p>See BS448/576/2.1 Size Ref.No. 2</p> <table border="1"> <thead> <tr> <th>Dimensions (mm)</th> <th>Min.</th> <th>Max.</th> </tr> </thead> <tbody> <tr> <td>A seated height</td> <td>-</td> <td>47.5</td> </tr> <tr> <td>C diameter</td> <td>16.0</td> <td>19.6</td> </tr> <tr> <td>D overall length</td> <td>-</td> <td>54.5</td> </tr> </tbody> </table>		Dimensions (mm)	Min.	Max.	A seated height	-	47.5	C diameter	16.0	19.6	D overall length	-	54.5												
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<p><b>CAPACITANCES (pF)</b></p> <p>Cg, kh (nom.) 5.25 B</p> <p>Cg, kh (max.) 0.2 B</p> <p>Cg, g (nom.) 3.8 B</p> <p>Ck, gh (nom.) 8.5 B</p>		<p><b>Mounting POSITION</b></p> <p>Any</p>																									
<p><b>NOTES</b></p> <p>A At Va = 250V; Vg = -1.5V; (Ia = 10 mA)</p> <p>B Measured with a close fitting metal screen connected to grid.</p> <p>C <b>Caution to Electronic Equipment Design Engineers:</b> 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.</p>																											

## 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)		Rk(ohms)		Ck		Limits				Units		
6.3		250		150		Note 6		Min	LAL	Bogey	UAL	Max	ALD	
K1001 Ref.	Test	Test Conditions		AQL %	Insp. Level	Symbol								
7.1	Glass strain	No Voltages		6.5	I									
	<u>GROUP A</u>													
	Electrode Insulation	Vh = 6.3V, Note 5 Vg to all = -100V Va to all = -300V		100%		R	100	-	-	-	-	-	-	MΩ
	Reverse Grid Current			100%		Ig	-	-	-	-	0.5	-	-	μA
	<u>GROUP B</u>													
	Heater Current	Combined AQL		1.0	II									
5.3	Heater - Cathode Leakage Current	Vhk = 8100V, Note 1 Vhk = -100V, Cathode positive		0.65	II	Ih	270	-	300	-	330	-	-	mA
	Anode Current			0.65	II	Ia	8.0	-	-	-	12.0	-	-	mA
	Mutual Conductance			0.65	II	V2	9.26	10.0	10.74	-	-	1.65	-	mA/V
							7.0	-	-	-	10.0	-	-	mA/V
							7.9	8.5	9.1	-	-	1.24	-	mA/V
	<u>GROUP C</u>													
	Change of Mutual Conductance	Vh = 5.7V, Note 4		6.5	I	Δgm	-	-	-	-	15	-	-	%
	Anode Current	Vg = -5V		2.5	I	Ia	-	-	-	-	0.75	-	-	mA
11.1	Vibration Noise	Va(b) = 250V; RL = 2KΩ; Rg = 100KΩ; Vg = 1.5V. Cathode bias may be used Rk = 150Ω, Note 2		2.5	I	VaAC	-	-	-	-	10.0	-	-	mVrms
	<u>GROUP D</u>													
7.2	Base Strain	No Voltages		6.5	IA									
	Equivalent Noise Resistance with grid earthed			6.5	IA	Req	-	-	-	-	400	-	-	Ω

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min	LAL	hoge	UAL	Max	ALD	
5.9	Capacitances	Measured on 1 Mo/s bridge with valve mounted in a fully shielded socket; valve screen connected to grid	6.5	IC	Cg, kh	3.9	-	5.25	-	6.6	-	pF
	Amplification Factor		6.5		IA	Ca, kh	-	-	-	-	0.2	-
						Ca, g	3.1	-	3.8	-	4.5	-
					Ck, gh	7.0	-	8.5	-	10.0	-	pF
11.2	<b>GROUP E</b>	Va = 250V; RL = 2kΩ Frequency:- (1) 25 - 200 c/s (2) 200-500 c/s (3) 500-2500 c/s	2.5	IC	VaAC	-	-	-	-	10	-	mVrms
	VaAC				-	-	-	-	50	-	mVrms	
11.3	Fatigue	Vh = 6.9. Note 3	4.0	IA	VaAC	-	-	-	-	150	-	mVrms
	<u>Post Fatigue Tests</u>				Combined AQL							
5.3	Heater - Cathode Leakage Current	Vhk = 1100V. Note 1	2.5		Ihk	-	-	-	-	20	-	μA
	Reverse Grid Current		2.5		Ig	-	-	-	-	1.0	-	μA
	Mutual Conductance		2.5		gm	6.0	-	-	-	10.0	-	mA/V
11.1	Vibration Noise	As in Group C	2.5		VaAC	-	-	-	-	25	-	mVrms
11.1	Shock Test	Hammer Angle = 30° No Voltages	4.0	IA								
	<u>Post Shock Tests</u>				Combined AQL							
5.3	Heater - Cathode Leakage Current	Vhk = 1100V. Note 1	2.5		Ihk	-	-	-	-	20	-	μA
	Reverse Grid Current		2.5		Ig	-	-	-	-	1.0	-	μA
	Mutual Conductance		2.5		gm	6.0	-	-	-	10.0	-	mA/V
11.1	Vibration Noise	As Group C	2.5		VaAC	-	-	-	-	25	-	mVrms
AV1/5	<b>GROUP F</b>	Va = 250V; Rk = 150 Vhk = 150V D.C. Rg = 100kΩ Heater positive	1.0	I								
	<u>Stability Life (1 hour)</u>											
	Change in Mutual Conductance		1.0		Δgm	-	-	-	-	10.0	-	%

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Sym- bol	Limits						Units
						Min	LAL	Bogey	UAL	Max	ALD	
AVI/5.3	<u>Intermittent Life</u>			IA								
	<u>Test Point 500 hours</u>	Combined AQL.	6.5									
AVI/5.6	Inoperatives		2.5									
	Heater Current		2.5		Ih	270	-	300	-	330	-	mA
5.3	Heater - Cathode Leakage Current	Vhk = ±100V. Note 1	2.5		Ihk	-	-	-	-	20	-	μA
	Reverse Grid Current		2.5		Ig	-	-	-	-	1.0	-	μA
	Mutual Conductance		2.5		gm	5.7	-	-	-	10.0	-	mA/V
	Average Change of Mutual Conductance				Δgm	-	-	-	-	15	-	%
	Anode Current		4.0		Ia	6.5	-	-	-	11.0	-	mA
	Electrode Insulation	Vh = 6.3V. Note 5 Vg to all = -100V Va to all = -300V	4.0 4.0		R R	50 50	- -	- -	- -	- -	- -	MΩ MΩ
	<u>Test Point (1000hrs)</u>	Combined AQL.	10.0									
AVI/5.6	Inoperatives		4.0									
	Heater Current		4.0		Ih	270	-	300	-	330	-	mA
5.3	Heater - Cathode Leakage Current	Vhk = ±100V. Note 1	4.0		Ihk	-	-	-	-	20	-	μA
	Reverse Grid Current		4.0		Ig	-	-	-	-	1.0	-	μA
	Mutual Conductance		4.0		gm	5.3	-	-	-	10.0	-	mA/V
	Anode Current		6.5		Ia	6.0	-	-	-	11.0	-	mA
	<u>GROUP G</u>											
AIX/2.5	Electrical Re-test after 28 days holding period			100%								
AVI/5.6	Inoperatives		0.5									
	Reverse Grid Current		0.5		Ig	-	-	-	-	1.0	-	μA

NOTES

1. Heater positive and negative successively.
2. The valve shall be mounted so that the direction of vibration is parallel to the electrode structure. Vibration frequency = any fixed frequency in the range 25 - 100 c/s. Min. peak acceleration = 2g. The test should 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 and not less than 99 hours (30 + 39 + 30 hrs.) total. Heater switched 1 minute on 3 minutes off. No other voltages. Min. peak acceleration = 5g; frequency = 170 ± 5 c/s.
4. The change of mutual conductance is expressed
 
$$\frac{(\text{gm at } 6.3\text{V}) - (\text{gm at } 5.7\text{V})}{(\text{gm at } 6.3\text{V})} \times 100\%$$
5. Heater and cathode strapped and considered as a single electrode.
6. Automatic bias to be by-passed by a capacitance sufficiently large to offer an impedance of not more than 3 ohms at the frequency of the grid signal where measurements are carried out dynamically.