

SPECIFICATION CV4031 ISSUE 1 DATED 26.10.56

AMENDMENT 1

PAGE 3

GROUP E

RESONANCE SEARCH

DELETE

ALL "LIMITS" IN MAX. COLUMN (20, 100 AND 350)

INSERT

"TO BE RECORDED AND AGREED LATER".

T.V.C. Office  
for Royal Aircraft Establishment.

30th November, 1956

Z.13233.R.

ELECTRONIC VALVE SPECIFICATION

SPECIFICATION CV.4031

ISSUE 1 - DATED 26TH OCTOBER, 1956.

AMENDMENT NO.2.

GROUP F.

Intermittent Life      Test Point (1000 hrs)

Electrode Insulation

Delete all reference to Heater Current Test.

Add at the end of this Group the following:-

K1001 Ref.	Test	Test Conditions	AQL INSP. %	SYMBOL	LIMITS						
					MIN	LAL	BOGEY	UAL	MAX	AID	UNITS
	ELECTRODE INSULATION	Vh = 6.3 Note 1 Vg to all = -100V Va to all = -300V	6.5	R R	30 30	- -	- -	- -	- -	- -	MΩ MΩ

December, 1957

T.V.C.

SPECIFICATION MOS(A)/CV4031  
ISSUE 1 DATED 26.10.56

AMENDMENT NO. 3.

Page 1    Note A    Amend to read:-  
At  $V_a = 100V$ ;  $V_g = 0$ ;  $R_k = 50$  ohms ( $I_a = 9.0$  mA approx)

Page 5    Note 6    Amend to read:-

Test each section separately with the grid and anode of the opposite section earthed.

April, 1959

R.R.E.

N.54773/D

ELECTRONIC VALVE SPECIFICATIONS  
SPECIFICATION MOS(A)/CV 4070 ISSUE NO.1. DATED 8.1.57  
AMENDMENT NO.4

- (i) Page 1. (Top of Page) Amend "Ministry of Supply M.O.S.(A) R.A.E." to read "Ministry of Aviation - DLRD/RRE".
- (ii) Page 1. Specification Title Amend "Specification MOS(A)CV.4070" to read "Specification MOA/CV4070".
- (iii) Page 3 Group D. Capacitance

Against 'Ck,gh' in the column headed "Limits, Min.", delete "7.0" and substitute "6.5".

November, 1964

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

(222410)

Specification MOS(A)/CV4031	<u>SECURITY</u>	
Issue 1 Dated 26.10.56.	<u>Specification</u>	<u>Valve</u>
To be read in conjunction with B.S.448, B.S.14C9 and K.1001	UNCLASSIFIED	UNCLASSIFIED

TYPE OF VALVE - Reliable Double Triode	<u>MARKING</u> K1001/4
CATHODE - Indirectly heated	
ENVELOPE - Glass	
PROTOTYPE - CV.858	
R. E. T. M. A. DESIGNATION - 6101/6J6MA	Additional Marking:- 6101/6J6MA
	<u>BASE</u> B.S.448/B7G

<u>RATING</u>		Note	<u>CONNECTIONS</u>		
(All limiting values are absolute)			Pin	Electrode	
Heater Voltage	(V) 6.3	D	1	Anode (2)	a <sup>#</sup>
Heater Current	(A) 0.45		2	Anode (1)	a <sup>#</sup>
Max. Operating Anode Voltage	(V) 330		3	Heater	h
Max. Anode Voltage (Ia = 0)	(V) 550		4	Heater	h
Max. Anode Dissipation (per section)	(W) 1.6		5	Grid (1)	g <sup>#</sup>
Max Heater - Cathode Voltage	(V) ± 100		6	Grid (2)	g <sup>#</sup>
Max Cathode Current	(mA) 25	B	7	Cathode	k
Max. Bulb Temperature	(°C) 165	D			
Max. Shock (short duration)	(g) 500				
Max. Acceleration (continuous operation)	(g) 2.5				
Max. Operating Frequency	(Mc/s) 250				
Mutual Conductance	(mA/V) 5.6	A			
Anode Impedance	(kΩ) 6.3	A			
Amplification Factor	38	A			
				<u>DIMENSIONS</u> B.S.448/B7G/2.1 Size Ref. No.2	
				Dimensions (mm)	Min.    Max.
				A seated height	-    47.5
				C diameter	16.0    19.0
				D overall length	-    54.5
				<u>MOUNTING POSITION</u>	
				Any	

<u>CAPACITANCES</u> (pF)		
C in (nom.) per section	2.45	C
C <sup>i</sup> out (nom.)	0.45	C
C <sup>#</sup> out (nom.)	0.40	C
ca,g (nom.) per section	1.5	C
Ch,k (nom.)	5.4	C

  

<u>NOTES</u>	
A.	At Va = 100V; Vg = -4.5V (Ia = 9.0mA approx.)
B.	Difficulty may be encountered if this valve is operated for long periods of time with very small values of cathode current.
C.	Without screen.
D.	<u>Caution to Electronic Equipment Design Engineers:</u> 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.

## CV4031

TESTS

To be performed in addition to those applicable in K1001

Test to be performed in the specified order unless otherwise agreed with the Inspecting Authority

Test Conditions* - unless otherwise specified												
K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min	LAL	Bogey	UAL	Max	ALD	
		Vh(V) 6.3	Va(V) 100	Vg(V) 0	Rk(ohms) 50	Note 6						
7.1	Glass Strain	No Voltages	6.5	I								
	<u>GROUP A</u>											
	Electrode Insulation	Vh = 6.3 Note 1 Vg to all = -100V Va to all = -300V		100% 100%	R R	100 100	- -	- -	- -	- -	- -	M Ω M Ω
	Reverse Grid Current	Va = 250V; Rk = 500 Ω Rg = 1M Ω max. Note 10		100%	Ig	-	-	-	-	0.5	-	μA
	<u>GROUP B</u>											
		Combined AQL	1.0	II								
	Heater Current		0.65	II	Ih	420	-	450	-	480	-	mA
5.3	hk Leakage Current	Vhk = ± 100V Notes 2 and 10 Vhk = -100V, Cathode Positive. Note 10	0.65	II	Ihk V2	-	-	-	-	10	-	μA μA
	Anode Current (1)		0.65	II	Ia V2	6.5	-	-	-	11.5	-	mA mA
	Anode Current (2)	Va = 250V; Vg = -30V	0.65	II	Ia	-	-	-	-	75	-	μA
	Mutual Conductance		0.65	II	gm V2	4.0	-	-	-	7.5	-	mA/V mA/V
	<u>GROUP C</u>											
	Change of Mutual Conductance	Vh = 5.7V Notes 3 and 7	2.5	I	Δgm	-	-	-	-	15	-	%
11.1	Vibration Noise	Va(b) = 250V; RL = 2k Ω Notes 9, 10 and 11	2.5	I	VaAC	-	-	-	-	15	-	mVrms
	<u>GROUP D</u>											
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 holder. Valve not screened.	6.5	IC	Cin C <sup>1</sup> out C <sup>2</sup> out C <sub>g,g</sub> Chk	1.4 0.25 0.25 1.2 3.3	- - - - -	- - - - -	- - - - -	2.8 0.65 0.55 1.8 7.5	- - - - -	DP DP DP DP DP
	Amplification Factor		6.5	IA	μ	28	-	-	-	48	-	

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units	
						Min	LAL	Bogey	UAL	Max	ALD		
	Reverse Grid Current	Vh = 7.0V; Rg = 1MΩ max. Notes 7, 8 and 10	6.5	IA	Ig	-	-	-	-	1.0	-	μA	
11.2	<u>GROUP E</u>												
	Resonance Search	Va(b) = 250V; RL = 2kΩ Frequency:- (1) 25 - 200 c/s (2) 200 - 500 c/s (3) 500 - 2500 c/s	2.5	IC									
					VaAC	-	-	-	-	20	-	mVrms	
					VaAC	-	-	-	-	100	-	mVrms	
					VaAC	-	-	-	-	350	-	mVrms	
	Fatigue	Vh = 6.9V Note 4		IA									
	<u>Post Fatigue Tests</u>												
			Combined AQL	4.0									
	5.3	hk Leakage Current	Vhk = ± 100V Note 2	2.5		Ihk	-	-	-	-	20	-	μA
		Reverse Grid Current	Va = 250V; Rk = 500Ω; Rg1 = 1MΩ max. Note 10	2.5		Ig1	-	-	-	-	1.0	-	μA
	Mutual Conductance		2.5		gm	3.5	-	-	-	7.5	-	mA/V	
	Vibration Noise	As in Group C	2.5		VaAC	-	-	-	-	35	-	mVrms	
11.4	Shock	Hammer Angle = 30° No Voltages		IA									
<u>Post Shock Tests</u>													
		Combined AQL	4.0										
5.3	hk Leakage Current	Vhk = ± 100V Note 2	2.5		Ihk	-	-	-	-	20	-	μA	
	Reverse Grid Current	Va = 250V; Rk = 500Ω; Rg = 1MΩ Note 10.	2.5		Ig	-	-	-	-	1.0	-	μA	
	Mutual Conductance		2.5		gm	3.5	-	-	-	7.5	-	mA/V	
11.1	Vibration Noise	As Group C	2.5		VaAC	-	-	-	-	35	-	mVrms	
A VI/5	<u>GROUP F</u>												
	Life	Note 5											
	<u>Stability Life (1 hour)</u>												
	Change in Mutual Conductance		1.0	I	Δgm	-	-	-	-	15	-	%	
	<u>Intermittent Life</u>												
	<u>Test Point 500 hours</u>	Combined AQL	6.5	IA									
A VI/5.6	Inoperatives		2.5										
	<del>Heater Current</del>		<del>2.5</del>		<del>Ih</del>	<del>1.20</del>	<del>-</del>	<del>-</del>	<del>-</del>	<del>1.80</del>	<del>-</del>	<del>mA</del>	

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Sym- bol	Limits						Units
						Min	LAL	Bogey	UAL	Max	ALD	
5.3	hk Leakage Current	Vhk = ± 100V. Note 2	2.5		Ihk	-	-	-	-	20	-	µA
	Reverse Grid Current	Va = 250V; Rk = 500Ω; Rg = 1MΩ max. Note 10	2.5		Ig	-	-	-	-	0.75	-	µA
	Mutual Conductance		2.5		gm	3.5	-	-	-	7.5	-	mA/V
	Average Change of Mutual Conductance				Δ gm	-	-	-	-	15	-	%
	Electrode Insulation	Vh = 6.3 Note 1. Vg to all = -100V Va to all = -300V	4.0		R	50	-	-	-	-	-	MΩ
					R	50	-	-	-	-	-	MΩ
	<u>Test Point 1000 hours</u>	Combined AQL	10									
A VI/5.6	Inoperatives		4.0									
	Heater Current		4.0		Ih	420	-	-	-	480	-	mA
5.3	hk Leakage Current	Vhk = ± 100V Note 2.	4.0		Ihk	-	-	-	-	20	-	µA
	Reverse Grid Current	Va = 250V, Rk = 500Ω Rg = 1MΩ max. Note 10	4.0		Ig	-	-	-	-	1.0	-	µA
	Mutual Conductance		4.0		gm	3.25	-	-	-	7.5	-	mA/V
	<i>See opposite Page.</i>											
	<u>GROUP C</u>											
A IX/2.4	Electrical Re-test after 28 days holding period			100%								
A VI/5.6	Inoperatives		0.5									
	Reverse Grid Current	Va = 250V; Rk = 500Ω Rg = 1MΩ max. Note 10	0.5			-	-	-	-	0.75	-	µA

NOTES

1. Heater and Cathode strapped and considered as a single electrode.
2. Heater positive and negative successively.
3. The Change of Mutual Conductance is expressed:-

$$\frac{(\text{gm at } 6.3\text{V}) - (\text{gm at } 5.7\text{V})}{(\text{gm at } 6.3\text{V})} \times 100\%$$

4. Valves shall be vibrated in each of the three required planes for not less than 30 hours, and not less than 100 hours total. Heater switched 1 minute on 3 minutes off. No other voltages applied.
5. Life Test Conditions.  $V_{hk} = 180\text{V}$  heater positive.  $V_a$  not less than 125 volts.  $R_k = 50 \Omega$
6. Test each section separately with the elements of the opposite section earthed except where otherwise stated.
7. Pre-heat the valves for 5 minutes with both sections operating under the test conditions.
8.  $I_g$  shall not be rising or out of limit after a total of 10 minutes.
9. The valve shall be mounted so that the direction of Vibration is parallel to the minor axis of the mounting structure. Vibration frequency = any fixed frequency in the range 25 - 100 c/s. Max. peak acceleration = 2g. The test shall be of sufficient duration to obtain a steady reading of noise output.
10. Test with the sections connected in parallel.
11. Parasitic suppressors of 50 ohms are permissible. Connect cathodes to earth through 1500 ohms.  $C_k = 1000\mu\text{F}$ . Grids connected to earth.