ADMIRALTY SIGNAL AND RADAR ESTABLISHMENT

VALVE ELECTRONIC

CV4083

Specification AD/CV4083.

Issue 1 dated 29th April, 1958.

To be read in conjunction with K1001. BS448 and BS1409.

SECURITY

Specification	Valve
Unclassified	Unclassified

TYPE OF VALVE -Reliable Miniature HF Pentode with Flexible leads.

CATHODE -Indirectly heated.

ENVELOPE -Glass

PROTOTYPE -CV2209 (but without limiting diode on G3)

R.E.T.M.A. Designation -

MARKING
K1001/4

BASE
BS448/B7G/F

CONNECTIONS

Pin	Electrode
1	g_2
2	k
3	h
4	h
5	a
6	g_3
7	g_2

DIMENSIONS

See BS448

Dimensions(mm)	Min.	Max.
A. seated height	-	47.5
C. diameter	16.0	19.0
D. length of leads	38.0	-

RATINGS
(All limiting values are absolute)

			Note
Heater Voltage	(V)	6.3	C
Heater Current	(A)	0.3	
Max. Heater-Cathode Voltage	(V)	±150	
Max. Operating Anode Voltage	(V)	300	
Max. Anode Voltage (I_a= 0)	(V)	550	
Max. Operating Screen Voltage	(V)	300	
Max. Screen Voltage (I_{g2} = 0)	(V)	400	
Max. Anode Dissipation	(W)	3.0	
Max. Screen Dissipation	(W)	1.5	
Max. Bulb Temperature	(°C)	200	C
Max. Shock (short duration)	(g)	500	
Max. Acceleration (continuous operation)	(g)	2.5	
Inner Amplification Factor ($\mu g_1, g_2$)		42	
Mutual Conductance	(mA/V)	4.0	A
Anode Impedance	(megohm)	0.1	A

CAPACITANCES (pF)

C. in (nom)		7.2	B
C. out (nom)		4.3	B
$C_{a1\ g1}$ (max)		0.01	B

MOUNTING POSITION

Any

NOTES

A. Measured at $V_a = V_{g2} = 200V$; $V_{g1} = -3.45V$, $V_{g3} = 0$; ($I_a = 7.5$ mA; $I_{g2} = 4.5$ mA).

B. Measured with close fitting metal screen.

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 extent that the heater voltage is maintained at its rated value.

CV4083

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.

V_a (Supply)	V_{g2} (Supply)	V_{g3} (Supply)	V_{g1} (Supply)	V_h (Supply)	R_k (Ω)
200V	200V	0V	0V	6.3V	287

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min	LAL	Bogey	UAL	Max	ALD	Units
7.1	Glass Strain		6.5	1								
	GROUP A											
	Electrode Insulation	V_h = 6.3V Note 1										
		V_{g1} to all = -100V		100%	R	100	-	-	-	-	-	MΩ
		V_{g2} to all = -300V		100%	R	100	-	-	-	-	-	MΩ
		V_{g3} to all = -300V		100%	R	100	-	-	-	-	-	MΩ
		Va to all = -300V		100%	R	100	-	-	-	-	-	MΩ
	Reverse Grid Current	R_{g1} = 500KΩ max.		100%	I_{g1}	-	-	-	-	0.5	-	μA
	GROUP B	Combined AQL	1.0									
	Heater Current		0.65	11	I_h	275	-	300	-	325	-	mA
	hk Leakage Current	V_{hk} = ± 100V Note 3	0.65	11	I_{hk}	-	-	-	-	20	-	μA
		V_{hk} = -100V Cathode Positive		V2	I_{hk}	-	-	-	5	-	-	μA
	Anode Current		0.65	11	I_a	5.6	-	7.1	-	8.6	-	mA
				V2	I_a	To be recorded and agreed later						mA
	g1 Cut-off volts	I_a = 0.1 mA	0.65	11	$-V_{g1}$	-	-	-	-	11	-	V
	g3 Cut-off volts	Note 7.	0.65	11	$-V_{g3}$	5	-	-	-	11.5	-	V
	Mutual Conductance		0.65	11	gm	3.15	-	4.05	-	5.4	-	mA/V
				V_2	gm	To be recorded and agreed later						mA/V
	Screen Current		0.65	11	I_{g2}	2.7	-	4.35	-	6.0	-	mA
				V2	I_{g2}	To be recorded and agreed later						mA
	GROUP C	Combined AQL	6.5									
	Change of Mutual Conductance	V_h = 5.7V Note 2	2.5	1	Δgm	-	-	-	-	15	-	%
	Reverse Grid Current	V_h = 6.9V $V_a(b) = V_{g2}(b)$ = 300V; R_k = 560Ω R_{g1} = 500KΩ Note 6.	2.5	1	I_{g1}	-	-	-	-	1.0	-	μA
11.1	Vibration Noise	$V_a(b) = V_{g2}(b)$ = 250V; $V_{g3}(b)$ = 0; $V_{g1}(b)$ = 4.5V; RL = 2kΩ Note 5.	2.5	1	V_gAC	-	-	-	-	15	-	mV RMS
	GROUP D											
5.12	Lead fragility	No voltages	6.5	1A								
5.9	Capacitances	Measured on 1 Mc/s bridge with valve mounted in a fully shielded socket. Valve screened.	6.5	1C	C_{in}	6.2	-	7.2	-	8.3		pF
					C_{out}	3.7	-	4.3	-	5.0		pF
					C_{ag1}	-	-	-	-	0.01		pF
	Inner Amplification Factor	I_k = 12 mA	6.5	1A	$\mu_{g1,g2}$	~~34~~ 30	-	~~42~~ 38	-	~~52~~ 46	-	

CV4083

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	LAL	Bogey	UAL	Max.	ALL	Units
	GROUP E											
11.2	Resonance Search	$V_{a(b)} = V_{g2(b)} = 250V$; RL = 2K Ω	2.5	1C								
		Frequency: (1) 25 to 200c/s			V_aAC	-	-	-	-	Record	-	(mV (RMS
		(2) 200 to 500c/s			V_aAC	-	-	-	-	Record	-	(mV (RMS
		(3) 500 to 2500c/s Note 8.			V_aAC	-	-	-	-	Record	-	(mV (RMS
11.3	Fatigue	V_h = 6.9V Note 4.		1A								
	POST FATIGUE TESTS											
		Combined AQL	4									
	hk Leakage Current	V_{hk} = ± 100V Note 3.	2.5		I_{hk}	-	-	-	-	40	-	/uA
	Reverse Grid Current	R_{g1} = 500KΩ max.	2.5		I_{g1}	-	-	-	-	1.0	-	/uA
	Mutual Conductance		2.5		g_m	2.8	-	-	-	5.4	-	mA/V
11.1	Vibration noise	As in Group C	2.5		V_aAC	-	-	-	-	25	-	(mV (RMS
11.4	Shock	Hammer angle= 30° No Voltages	-	1A								
	POST SHOCK TESTS											
		Combined AQL	4.0									
5.3	hk Leakage Current	V_{hk} = ± 100V Note 3	2.5		I_{hk}	-	-	-	-	40	-	/uA
	Reverse Grid Current	R_{g1} = 500kΩmax.	2.5		I_{g1}	-	-	-	-	1.0	-	/uA
	Mutual Conductance		2.5		g_m	2.8	-	-	-	5.4	-	mA/V
11.1	Vibration noise	As in Group C	2.5		V_gAC	-	-	-	-	25	-	(mV (RMS
	GROUP F											
A V1/5	Life	V_h = 6.3V; $V_{a(b)}$ = 250V R_k = 150Ω R_{g1} = 500KΩ										
	STABILITY LIFE (1 HOUR)			1								
	Change in Mutual conductance		1.0		Δgm	-	-	-	-	10	-	%
A V1/	INTERMITTENT LIFE			1A								
5.3	Test point (500 hrs)	Combined AQL	6.5									
	Inoperatives		2.5									
	Heater Current		2.5		I_h	275	-	-	-	325	-	mA
5.3	hk Leakage Current	V_{hk} = ± 100V Note 3	2.5		I_{hk}	-	-	-	-	40	-	/uA
	Reverse Grid Current	R_{g1} = 500KΩmax.	2.5		I_{g1}	-	-	-	-	1.0	-	/uA
	Mutual Conductance		2.5		gm	2.7	-	-	-	5.4	-	mA/V
	Average change of Mutual Conductance				Δgm	-	-	-	-	15	-	%
	Anode Current		4.0		I_a	5.05	-	-	-	8.6	-	mA
	Electrode Insulation	V_h=6.3V Note 1										
		V_{g1} to all =-100V	4.0		R	50	-	-	-	-	-	M Ω
		V_{g2} to all =-300V	4.0		R	50	-	-	-	-	-	M Ω
		V_{g3} to all =-300V	4.0		R	50	-	-	-	-	-	M Ω
		V_a to all =-300V	4.0		R	50	-	-	-	-	-	M Ω
	TEST POINT (1000 HOURS											
		Combined AQL	10.0									
AV1/5.6	Inoperatives		4.0									
	Heater Current		4.0		I_h	320	-	-	-	380	-	mA
	hk Leakage Current	V_{hk} = ± 100V Note 3	4.0		I_{hk}		-	-	-	40	-	/uA
	Reverse Grid Current	R_{g1} = 500KΩMax.	4.0		I_{g1}		-	-	-	1.0	-	/uA
	Mutual Conductance		4.0		gm	2.5	-	-	-	5.4	-	mA/V
	Anode Current		6.5		I_a	4.6	-	-	-	8.6	-	mA

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min	LAL	Bogey	UAL	Max	ALD	
	GROUP G											
A IX/2.5	Electrical Re-test after 28 days holding period.			100%								
A VI/5.6	Inoperatives		0.5									
	Reverse Grid Current	R_{g1} = 500K max.	0.5		I_{g1}	-	-	-	-	0.75	-	µA

NOTES

1. Heater and Cathode strapped and considered as a single electrode.

2. Change of Mutual Conductance is expressed as a percentage, so:-

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

3. Heater positive and negative successively.

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. Min. peak acceleration = 5g. Frequency = 170 ± 5 c/s.

5. The valves shall be mounted so that the direction of vibration is parallel to the minor axis of the valve electrode structure.

   Vibration frequency = any fixed frequency in the range 25 - 100 c/s. Min. peak acceleration = 2g. The test shall be of sufficient duration to obtain a steady reading of noise output.

6. Prior to this test the valve shall be pre-heated for 5 minutes under the test conditions. The maximum time between pre-heating and testing shall be 2 seconds. I_{g1} shall not be rising or out of limit after a total of 10 minutes.

7. V_a = 200V; V_{g2} = 100V; adjust V_{g1} so that I_k = 10 mA when V_{g3} = 0. Then adjust V_{g3} to give I_a = 0.1 mA.

8. At present readings for this test are to be recorded. It is envisaged that a subsequent issue of the specification will include limit figures for this test.

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION AD/CV4083, ISSUE NO. 1
DATED 29TH APRIL, 1968

AMENDMENT NO. 4

Page 2. Test conditions - unless otherwise specified

Under V_{g3} (Supply), after 0V add:-

"with respect to cathode."

Page 2. Group D. Inner Amplification Factor

Amend to read "See Note 9".

Page 4

Add Note 9 as follows:-

"9. An approved dynamic method of measuring Inner Amplification Factor may be used."

Admiralty Surface Weapons
Establishment

January, 1969.