MINISTRY OF SUPPLY - D.L.R.D.(A)/R.A.F.

VALVE ELECTRONIC CV4064

Specification MOS(A)/CV.4064

Issue 1 Dated 14.9.56

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

SECURITY	
Specification	Valve
UNCLASSIFIED	UNCLASSIFIED

TYPE OF VALVE - Reliable Miniature H.F. Pentode with a limiting diode connected to g3

CATHODE - Indirectly heated

ENVELOPE - Glass

PROTOTYPE - CV2209

MARKING

K1001/4

BASE

BS.448/E7G

CONNECTIONS

Pin	Electrode
1	Grid g1
2	Cathode k
3	Heater h
4	Heater h
5	Anode a
6	Sup.+ diode g3 + d
7	Screen g2

RATING

(All limiting values are absolute)

			Note
Heater Voltage	(V)	6.3	C
Heater Current	(A)	0.35	
Max. Heater - Cathode Voltage	(V)	± 150	
Max. Operating Anode Voltage	(V)	300	
Max. Anode Voltage (Ia = 0)	(V)	550	
Max. Operating Screen Voltage	(V)	300	
Max. Screen Voltage (Ig2 = 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 (μ g1, g2)		42	
Mutual Conductance	(mA/V)	4.0	A
Anode Impedance	(MΩ)	0.1	A

DIMENSIONS

See B.S.448/E7G/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

CAPACITANCES (pF)

C in (nom.)	7.55	B
C out (nom.)	4.55	B
Ca, g1 (max.)	0.015	B

MOUNTING POSITION

Any

NOTES

A. Measured at Va = Vg2 = 200V; Vg1 = -3.45V; Vg3 = 0. (Ia = 7.5 mA; Ig2 = 4.5mA).

B. Measured with a 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 degree that regulation of the heater voltage is maintained at its centre-rated value.

CV4064

To be performed in addition to those applicable in K1001

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

Test Conditions = unless otherwise specified

Va(V)	Vg2(V)	Vg3(2K)	Vg1(V)	Vh(V)	Rk(Ω)
200	200	⊕ Connected to cathode	0	6.3	267

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min.	LAL	Beggy	UAL	Max.	ALD	
7.1	Glass Strain		6.5	I								
	GROUP A											
	Electrode Insulation	Vh = 6.3V. Note 1										
		Vg1 to all = -100V		100%	R	100	-	-	-	-	-	MΩ
		Vg2 to all = -300V		100%	R	100	-	-	-	-	-	MΩ
		Vg3 to all = -300V		100%	R	100	-	-	-	-	-	MΩ
		Va to all = -300V		100%	R	100	-	-	-	-	-	MΩ
	Reverse Grid Current	Rg1 = 500k Ω max.		100%	Ig1	-	-	-	-	0.5	-	μA
	GROUP B											
		Combined AQL	1.0									
	Heater Current		0.65	II	Ih	320	-	350	-	380	-	mA
5.3	hk Leakage Current	Vhk = ±100V; Note 3	0.65	II	Ihk	-	-	-	-	20	-	μA
		Vhk = -100V; Cathode Positive		V2	Ihk	-	-	-	5	-	-	μA
	Anode Current		0.65	II	Ia	5.6	-	7.1	-	8.6	-	mA
				V2	Ia	to be recorded and agreed later						mA
	g1 Cut Off Volts	Ia = 0.1 mA	0.65	II	-Vg1	-	-	-	-	11	-	V
	g3 Cut off Volts	Note 8	0.65	II	-Vg3	5	-	-	-	11.5	-	V
	Mutual Conductance		0.65	II	gm	3.15	-	4.05	-	5.4	-	mA/V
				V2	gm	to be recorded and agreed later						mA/V
	Screen Current		0.65	II	Ig2	2.7	-	4.35	-	6.0	-	mA
				V2	Ig2	to be recorded and agreed later						mA
	GROUP C											
		Combined AQL	6.5									
	Diode Current (g3)	Vg1 = -30V Vg3 = +20V	2.5	I	Ig3	1.0	-	-	-	-	-	mA
	Change of Mutual Conductance	Vh = 5.7V. Notes 2 and 7	2.5	I	Δgm	-	-	-	-	15	-	%

K1001	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min.	LAL	Bogey	UAL	Max.	ALD	
	Reverse Grid Current	Vh = 6.9V; Rk = 560Ω Va = Vg2 = 300V; Note 6	2.5	I	Ig1	-	-	-	-	1.0	-	µA
11.1	Vibration Noise	Va(b) = Vg2 = 250V; Vg3 = 0; Vg1 = 4.5V RL = 2kΩ; Note 5	2.5	I	VaAC	-	-	-	-	15	-	mVrms
	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 screened	6.5	IC	Cin Cout Cg1,g2	6.5 3.9 -	- - -	7.55 4.55 -	- - -	8.6 5.2 .015	- - -	pF pF pF
	Inner Amplification Factor	~~Ik = 12.0 mA~~ Note 9	6.5	IA	µg1,g2	~~34~~ 30	-	~~42~~ 38	-	~~50~~ 46	-	
	GROUP E											
11.2	Resonance Search	Va(b) = Vg2 = 250V; RL = 2kΩ Frequency:-	2.5	IC								
		(1) 25 to 200 c/s			VaAC	-	-	-	-	50	-	mVrms
		(2) 200 to 500 c/s			VaAC	-	-	-	-	100	-	mVrms
		(3) 500 to 2500 c/s			VaAC	-	-	-	-	350	-	mVrms
11.3	Fatigue	Vh = 6.9V; Note 4		IA								
	Post Fatigue Tests											
		Combined AQL	4.0									
5.3	Ik Leakage Current	Vhk = ±100V; Note 3	2.5		Ihk	-	-	-	-	40	-	µA
	Reverse Grid Current	Rg1 = 500k Ω max.	2.5		Ig1	-	-	-	-	1.0	-	µA
	Mutual Conductance		2.5		gm	2.8	-	-	-	5.4	-	mA/V
11.1	Vibration Noise	As in Group C	2.5		VaAC	-	-	-	-	25	-	mVrms
11.4	Shock	Hammer Angle = 30° No Voltages		IA								
	Post Shock Tests											
		Combined AQL	4.0									
5.3	Ik Leakage Current	Vhk = ±100V; Note 3	2.5		Ihk	-	-	-	-	40	-	µA
	Reverse Grid Current	Rg1 = 500 k Ω max.	2.5		Ig1	-	-	-	-	1.0	-	µA
	Mutual Conductance		2.5		gm	2.8	-	-	-	5.4	-	mA/V
11.1	Vibration Noise	As in Group C	2.5		VaAC	-	-	-	-	25	-	mVrms
	GROUP F											
AVI/5	Life	Vh = 6.3V; Va = 250V Rk = 150 Ω										

CV4064

BS301 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min.	LAL	Beggy	UAL	Max.	ALD	
	Stability Life (1 hour)			I								
	Change in Mutual Conductance		1.0		Δgm	-	-	-	-	10	-	%
A.VI/5.3	**Intermittent Life**			IA								
	Test Point (500 hrs)	Combined AQL	6.5									
	Inoperatives		2.5									
	Heater Current		2.5		Ih	320	-	-	-	380	-	mA
5.3	hk Leakage Current	Vhk = ±100V; Note 3	2.5		Ihk	-	-	-	-	40	-	μA
	Reverse Grid Current	Rg1 = 500kΩ max.	2.5		Ig1	-	-	-	-	1.0	-	μA
	Mutual Conductance		2.5		gm	2.7	-	-	-	5.4	-	mA/V
	Average Change of Mutual Conductance				gm	-	-	-	-	15		%
	Anode Current		4.0		Ia	5.05	-	-	-	8.6	-	mA
	Electrode Insulation	Vh = 6.3V Note 1 Vg1 to all = -100V Vg2 to all = -300V Vg3 to all = -300V Va to all = -300V	4.0. 4.0 4.0 4.0.		R R R R	50 50 50 50	- - - -	- - - -	- - - -	- - - -	- - - -	MΩ MΩ MΩ MΩ
	Test Point (1000 hrs)	Combined AQL	10.0									
A.VI/5.6	Inoperatives		4.0									
	Heater Current		4.0		Ih	320	-	-	-	380	-	mA
5.3	hk Leakage Current	Vhk = ±100V Note 3	4.0		Ihk	-	-	-	-	40	-	μA
	Reverse Grid Current	Rg1 = 500kΩ max.	4.0		Ig1	-	-	-	-	1.0	-	μA
	Mutual Conductance		4.0		gm	2.5	-	-	-	5.4	-	mA/V
	Anode Current		6.5		Ia	4.6	-	-	-	8.6	-	mA
	✳											
	GROUP C											
A.IX/2.5	Electrical Re-test after 28 days holding period			100%								
A.VI/5.6	Inoperatives		0.5									
	Reverse Grid Current	Rg1 = 500kΩ max.	0.5		Ig1	-	-	-	-	0.75	-	μA

CT.4064/1/4 ✳ Add Electrode Insulation Test. Condns as 4.0 above. Comb AQL 6.5. Limit 30 MΩ min in each case

NOTES

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

2. Change of Mutual Conductance is expressed:-

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

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 applied. 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 electrode mounting 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 preheated for 5 minutes under the test conditions. Ig1 shall not be rising or out of limit after a total of 10 minutes.

7. Preheat the valves for 5 minutes under the test conditions before making this test.

8. Va = 200V; Vg2 = 100V; adjust Vg1 for Ik = 10mA with Vg3 = 0.
Vg3, adjust for Ia = 0.1 mA.

9. With Va = Vg2 = 200V, Vg3 = 0, adjust Vg1 to give Ik = 12mA. Then apply signal = +1 volt to g1. Reduce Vg2 to give Ik = 12mA

Inner amplification factor = change in Vg2.

ELECTRONIC VALVE SPECIFICATION

SPECIFICATION CV.4064

ISSUE 1 - DATED 14, SEPTEMBER, 1956

AMENDMENT NO.1.

GROUP F.

Intermittent Life Test Point (500 hrs)

Electrode Insulation

Delete the existing Electrode Insulation Test (at the end of Group) and Substitute the following:-

K.1001 Ref.	Test	Test Conditions	AQL %	INSP. LEVEL	Symbol	LIMITS						
						MIN	LAL	BOGEY	UAL	MAX	AID	UNITS
	ELECTRODE	Vh = 6.3V Note 1										
	INSULATION	Vg1 to all =-100V	4.0		R	50	-	-	-	-	-	MΩ
		Vg2 to all =-300V			R	50	-	-	-	-	-	MΩ
		VG3 to all =-300V			R	50	-	-	-	-	-	MΩ
		Va to all =-300V			R	50	-	-	-	-	-	MΩ

Test Point (1000 hrs)

Delete all reference to Heater Current Test

Add at the end of this Group (after Anode Current) the following:-

K.1001 Ref.	Test	Test Conditions	AQL %	INSP. LEVEL	Symbol	LIMITS						
						MIN	LAL	BOGEY	UAL	MAX	AID	UNITS
	ELECTRODE	Vh = 6.3V Note 1										
	INSULATION	Vg1 to all = -100V	6.5		R	30	-	-	-	-	-	MΩ
		Vg2 to all = -300V			R	30	-	-	-	-	-	MΩ
		Vg3 to all = -300V			R	30	-	-	-	-	-	MΩ
		Va to all = -300V			R	30	-	-	-	-	-	MΩ

Z.16181.R.

December, 1957 T.V.C.

ELECTRONIC VALVE SPECIFICATION CV 4064

ISSUE 1 DATED 14.9.56
AMENDMENT No. 2

PAGE 2 (Top Box) Test Conditions

Amend "Vg3(V) to "Vg3
0" connected
to cathode"

PAGE 3 GROUP D

Inner Amplification Factor

Under "Test Conditions" Delete Ik = 12mA and substitute "Note 9".

N 46653/D /NOTES

NOTES

Note 8 Delete "Adjust Vgl = 10mA" and substitute "Adjust Vgl for Ik = 10mA."

Note 9 New Note

"With Va = Vg2 = 200v, Vg3 = 0, adjust Vgl to give Ik = 12mA. Then apply signal = + 1 volt to g1. Reduce Vg2 to give Ik = 12mA. Inner amplification factor = change in Vg2".

December 1960 R.R.E.

AHS 9/3/61

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION CV.4064

ISSUE NO.1 DATED 14.9.1956.

AMENDMENT NO.3

Page 3, Group D. Inner Amplification Factor.

Amend Limits to read: 30 min. 38 bogie. 46 max.

April 1962
(22649)

Ministry of Aviation/R.R.E.

13/7/62