

ELECTRONIC VALVE SPECIFICATION

SPECIFICATION CV.4063

ISSUE 1 - DATED 5th APRIL, 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:-

K1001 Ref.	Test	Test Conditions	AQL %	INSP. LEVEL	Symbol	LIMITS					
						MIN	LAL	BOGEY	UAL	MAX	AID
	ELECTRODE INSULATION	Vh = 6.3. Note 6 Vg1 -all = -100V Vg2 -all = -300V Va -all = -300V	4.0		R R R	50 50 50	- - -	- - -	- - -	- - -	MΩ MΩ MΩ

Test Point (1000 hrs)

Delete all reference to Heater Current Test

Add at the end of this Group the following:-

K1001 Ref.	Test	Test Conditions	AQL %	INSP. LEVEL	Symbol	LIMITS					
						MIN	LAL	BOGEY	UAL	MAX	AID
	ELECTRODE INSULATION	Vh = 6.3. Note 6. Vg1 -all = -100V Vg2 -all = -300V Va -all = -300V	6.5		R R R	30 30 30	- - -	- - -	- - -	- - -	MΩ MΩ MΩ

December, 1957.

T.V.C.

ELECTRONIC VALVE SPECIFICATIONS.

SPECIFICATION NOS(A) CV4063

ISSUE 1 DATED 5.4.56.

AMENDMENT NO. 2

Page 2 . GROUP B Mutual Conductance.

Amend Limits to the following:-

Min.	LAL.	Bogey	UAL	Max.	ALD
1.95	2.33	2.55	2.77	3.15	0.493

GROUP C Vibration Noise.

Amend Max. Limit to 15mV rms.

Page 3 GROUP D Capacitance

Amend AQL_o to 6.5

CV4063

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

Specification MOS(A) CV4063 Issue 1 Dated 5.4.56 To be read in conjunction with BS.448 BS.1409 and K1001	<u>SECURITY</u>	
	<u>Specification</u>	<u>Valve</u>
	UNCLASSIFIED	UNCLASSIFIED

TYPE OF VALVE - Reliable Miniature H.P. Pentode			<u>MARKING</u> K1001/4	
CATHODE - Indirectly heated			Additional Markings:- 6516	
ENVELOPE - Glass			<u>BASE</u> BS.448/B7G	
PROTOTYPE - CV.136				
R. E. T. M. A. DESIGNATION - 6516				
<u>RATING</u>			<u>CONNECTIONS</u>	
		Note	Pin	Electrode
Heater Voltage (V)	6.3	C	1	g1
Heater Current (A)	0.2		2	k+g3
Max. Heater - Cathode Voltage (V)	±150	A	3	h
Max. g1-g2 Voltages D.C. (V)	300		4	h
Max. g1 - Cathode Voltage D.C. (V)	100		5	a
Max. Operating Anode Voltage (V)	300	A	6	NC
Max. Anode Voltage (Ia = 0) (V)	550	A	7	g2
Max. Anode Dissipation (W)	4.75	A, D		
Max. Operating Screen Voltage (V)	275	A	<u>DIMENSIONS</u>	
Max. Screen Voltage (Ig2 = 0) (V)	550	A	See BS.448/B7G/2,1	
Max. Screen Dissipation (W)	0.8	A, D	Size Ref. No. 2	
Max. Mean g1 current (mA)	3.3		Dimensions (mm)	Min. Max.
Max. Mean Cathode Current (mA)	23		A seated height	- 47.5
Max. Grid 1 - Cathode Resistance for Cathode Bias (kΩ)	680		C diameter	16.0 19.0
Max. Grid 1 - Cathode Resistance Fixed Bias (kΩ)	220		D overall length	- 54.5
Max. Bulb Temperature (°C)	180	C		
Max. Shock (short duration) (g)	500			
Max. Acceleration (continuous operation) (g)	2.5			
Max. Operating Frequency (Mc/s)	100			
Inner Amplification Factor (μg1, g2)	12			
Mutual Conductance (mA/V)	2.55	B		
Anode Impedance (MΩ)	0.2	B		
<u>CAPACITANCES (pF)</u>			<u>MOUNTING POSITION</u>	
i in (nom.)	4.25	D	Any	
c out (nom.)	6.5	D		
Ca, g1 (max.)	0.3	D		
<u>NOTES</u>				
A. Absolute values.				
B. Measured at Va(b) = 250V; Vg2 = 250V; Vg1 = -13.5V (Ia = 16mA; Ig2 = 2.25mA.)				
C. <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.				
D. Measured with a close fitting metal screen.				

CV4063

TESTS

Page 2

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(b)(V)	Vg1(V)	Vg2(V)	Rk(ohms)	Ck(μF)				
		6.3	250	0	250	740	1000				
K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits					Units
						Min.	L.M.	Bogey	U.M.	Max.	
11.1	Vibration	No Voltages		100%							
7.1	Glass Strain	No Voltages	2.5	I							
	<u>GROUP A</u>										
	Electrode Insulation	Vh = 6.3V Note 6 Vg1 to all = -100V Vg2 to all = -300V Va to all = -300V		100%	R	100	-	-	-	-	mΩ
				100%	R	100	-	-	-	-	mΩ
				100%	R	100	-	-	-	-	mΩ
	Reverse Grid Current			100%	Ig1	-	-	-	0.5	-	μA
	<u>GROUP B</u>										
	Heater Current	Combined AQL	1.0	II	Ih	184	-	-	-	216	mA
	hk Leakage Current	Vhk = 4100V Note 1 Vhk = -100V cathode positive	0.65	II	Ihk	-	-	-	-	10	μA
			0.65	II	Ihk	-	-	-	3	-	μA
	Anode Current		0.65	II	Ia	12	-	-	-	18	mA
				V2	Ia	-	13.9	15.0	16.1	-	2.47
	Screen Current		0.65	II	Ig2	1.3	-	-	-	2.7	mA
				V2	Ig2	-	1.74	2.0	2.26	-	0.575
	Mutual Conductance		0.65	II	gm	1.95	-	-	-	3.15	mA/V
				V2	gm	-	2.44	2.55	2.66	-	0.495
	<u>GROUP C</u>										
	Change of Mutual Conductance	Vh = 5.7V Note 5	2.5	I	Δgm	-	-	-	-	15	%
	Anode Current	Vg1 = -50V	2.5	I	Ia	-	-	-	-	50	μA
	Reverse Grid Current	Vh = 6.9V; Va = 300V; Vg2 = 235V. Note 4	2.5	I	Ig1	-	-	-	-	1.0	μA
11.1	Vibration Noise	RL = 2kΩ or with fixed bias Vg1 = -13.5V Note 2	2.5	I	Va AC	-	-	-	-	2.5	mV rms

CV4063

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min.	LAL	Bogey	UAL	Max.	ALD	
	<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 socket. Valve screened.	2.5	IC	C in C out Ca g1	3.5 5.8 -	- - -	4.25 6.5 -	- - -	5.0 7.2 0.3	- - -	pF pF pF
	Inner Amplification Factor	Vary Vg1. Ia = 16 mA Grid swing IV. max.	6.5	IA	μg1 g2	10	-	12	-	14	-	
	<u>GROUP E</u>											
11.2	Resonance Search	Va = 250V; RL = 2kΩ Frequency:- (1) 25 - 200 c/s (2) 200 - 500 c/s (3) 500 - 2500 c/s	2.5	IC	Va AC Va AC Va AC	- - -	- - -	- - -	- - -	20 100 500	- - -	mV rms mV rms mV rms
11.3	Fatigue	Vh = 6.9V Note 3		IA								
	<u>Post Fatigue Tests</u>											
		Combined AQL	4.0									
5.3	hk Leakage	Vhk = ± 100V Note 1	2.5		Ihk	-	-	-	-	20	-	μA
	Reverse Grid Current		2.5		Ig1	-	-	-	-	1.0	-	μA
	Mutual Conductance		2.5		gm	1.8	-	-	-	3.2	-	mA/V
11.1	Vibration Noise	As in Group C	2.5		Va AC	-	-	-	-	25	-	mV
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 1	2.5		Ihk	-	-	-	-	20	-	μA
	Reverse Grid Current		2.5		Ig1	-	-	-	-	1	-	μA
	Mutual Conductance		2.5		gm	1.8	-	-	-	3.2	-	mA/V
11.1	Vibration Noise	As in Group C	2.5		Va AC	-	-	-	-	25	-	mV rms

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min.	LAL	Bogey	UML	Max.	ALD	
	<u>GROUP F</u>											
AVI/5	Life	Rg1 = 100kΩ ± 20% Rk = 740Ω ± 10% Vhk = 150V D.C. Heater Positive										
AVI/5.1	<u>Stability Life (1 hour)</u>			I								
	Change in Mutual Conductance		1.0		Δgm	-	-	-	-	10	-	%
AVI/5.2		Survival Rate Life (100 hrs.)		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	184	-	-	-	216	-	mA
5.3	hk Leakage Current	Vhk = ±100V Note 1	2.5		Ihk	-	-	-	-	30	-	μA
	Reverse Grid Current		2.5		Igl	-	-	-	-	1.0	-	μA
	Mutual Conductance		2.5		gm	1.7	-	-	-	3.2	-	mA/V
	Average Change of Mutual Conductance				Δgm	-	-	-	-	15	-	%
	Electrode Insulation	Vg1-all = -100V Vg2-all = -300V Vs-all = 300V	4.0 4.0 4.0		R R R	50 50 50	- - -	- - -	- - -	- - -	- - -	MΩ MΩ MΩ
AVI/5.3	<u>Test Point 1000 hrs.</u>	Combined AQL	10.0									
AVI/5.6	Inoperatives		4.0									
	Heater Current		4.0		Ih	184	-	-	-	216	-	mA
5.3	hk Leakage Current	Vhk = ±100V Note 1	4.0		Ihk	-	-	-	-	30	-	μA
	Reverse Grid Current		4.0		Igl	-	-	-	-	1.0	-	μA
	Mutual Conductance		4.0		gm	1.6	-	-	-	3.2	-	mA/V
	<u>Dynamic Life Test (100 hrs.)</u>		2.5	IA								
	Valve operated as tripler Change of output power.	Note 7			ΔP out	-	-	-	-	20	-	%
	<u>GROUP G</u>											
AIX/2.5	Electrical Retest after 28 days holding period			100%								
AVI/5.6	Inoperatives		0.5									
	Reverse Grid Current		0.5		Igl	-	-	-	-	0.75	-	μA

See Opp Page

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 = 2g.
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 and not less than 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 V_{g1} to give $I_a = 15$ mA. For this test the valve shall be preheated for five minutes under the test conditions. I_{g1} shall not be rising or out of limit after a total of 10 minutes.
5. The change of mutual conductance is expressed as

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

6. Heater and Cathode strapped and considered as a single electrode.
7. Tripler Final stage conditions:-

$V_a = V_{g2} = 300V$; I_a plus $I_{g2} = 20$ mA approximately. $I_{g1} = 1.6$ mA; $R_L = 1k\Omega$; output frequency = 70 to 75 Mc/s. Power output = 0.9W.
A suitable circuit for carrying out this test is shown below.

