MINISTRY OF AVIATION D.L.R.D/R.A.E. VALVE ELECTRONIC **C.V4106**

Specification MOA/CV.4106	SECURITY	
	Specification	Valve
Issue No.1. Dated 1.12.60.	Unclassified	Unclassified
To be read in conjunction with K1001, BS448 and BS1409		

TYPE OF VALVE:- Reliable Pulse Tetrode

CATHODE:- Indirectly Heated

ENVELOPE:- Glass (parallel sided)

PROTOTYPE:- VX3524(similar to CV2659 (3D21A))

MARKING

See K1001/4

See K1001/A1V/D2 for dimensions (V) applies

BASE BS448/B8-0

RATINGS
(All limiting values are absolute)

			Notes
Heater Voltage	(V)	6.3	B
Heater Current	(A)	1.3	B
Heater Voltage	(V)	12.6	C
Heater Current	(A)	0.65	C
Max. Anode Voltage (D.C)	(kV)	4.0	D,E
Max. Anode Voltage (Pulse)	(kV)	5.0	
Max. Anode Dissipation	(W)	15	
Max. Screen Voltage (D.C)	(V)	850	E
Max. Screen Dissipation	(W)	3.5	
Max. Grid Voltage (positive and negative)	(V)	220	
Max. Grid Dissipation	(W)	0.5	
Max. Cathode Current (D.C)	(mA)	150	
Max. Cathode Current (pulse)	(A)	10	
Max. Anode Current (Pulse)	(A)	7.5	
Max. Peak Heater Cathode Voltage	(V)	± 150	
Max. Pulse Length	(μ secs)	10	F
Min. Heating Time	(secs)	45	
Max. Bulb Temperature	(°C)	240	G
Inner Amplification Factor(μgl/g2)		9.5	
Max. Shock (Short duration)	(g)	500	
Max. Acceleration (Continuous)	(g)	2.5	

CONNECTIONS

PIN	ELECTRODE
1	Heater Centre Tap HCT
2	Heater H
3	Internal Conn. IC
4	Screen Grid g2
5	Internal Conn. IC
6	Control Grid g1
7	Heater H
8	Cathode and base shell k (Note A)
TC	Anode a

DIMENSIONS
See K1001/A1/D1

Dimensions mm.	Min.	Max.
"A" Overall length	-	100
"B" Diameter	-	34
"L" Seated height	-	85

CAPACITANCES (pF)
NOTE H

C in (nom)	14.5
C out (nom)	12.0
Cag 1.(max)	1.55

TOP CAP
BS448/CT1.

MOUNTING
Any

NOTES

A. WARNING If a base retaining device is used, the clamp must be insulated when the potential is other than earth.

B. Heaters parallel connected.

C. Heaters series connected.

D. With maximum screen voltage of 400 V and when no transients are present (essentially resistive anode load) maximum D.C. anode voltage of 4.5kV D.C. may be applied.

NOTES (Cont'd)

E. A series resistance must be inserted in the power supply to limit the D.C. short circuit current to less than 0.5A.

F. Total pulse length in any 240μsec., period shall not exceed 12μsecs., under less onerous conditions, however, this limitation may be exceeded.

G. Temperature over the top 15 m.m. of the bulb to be limited to 150°C.

H. Measured on a 1 Mc/s bridge in fully screened holder. No shield, all I.C. connections left floating.

I. The Joint Services Catalogue Number is 5960-99-037-2303.

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Test conditions unless otherwise stated:

V_h(V)	Va(V)	Vg2(V)	I_a(mA)
6.3	250	150	60

K1001	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min	Limits Bogey	Limits Max.	Units
	Group A								
	Insulation	Vg1-all = -100V Vg2-all = -300V		100%	R	100 100	-	-	M M
	Reverse Grid Current	Rg1 = 500K max.		100%	Ig_1	-	-	3	µA
	Peak Anode Current	Va = 420V Vg2 = 800V Vg1 = -150V Note 1.		100%	I_a pk.	6.25	-	-	A
	Peak Screen Current	As for peak anode current test. Note 1.		100%	Ig_2 pk.	-	-	3.5	A
	Peak Grid Current (1)	As for peak anode current test Note 1.		100%	Ig_1 pk.	-	-	2	A
	Peak grid Current (2)	Va = 420V Vg2 = 800V Vg1 = -150V Note 2.		100%	Ig_1 pk.	30	-	-	mA
	High Voltage Pulse Operation	Va D.C.= 4 kV Vg2 D.C.= 800V Vg1 D.C.=-150V R_L = 3.9K in parallel with a 11 mH choke, in series with a 500Ω resistor. Note 1.		100%	-		Note 3		
	Group B	Overall AQL	2.5						
	Heater Current		0.65	II	Ih	1.17	1.3	1.43	A
	Heater Cathode Leakage Current	Vhk= ± 100V	0.65	II	Ih_k	-	-	25	µA
	Negative Grid Voltage		0.65	II	$-Vg_1$	7.25	9.25	11.25	V
	Screen Current		0.65	II	Ig_2	-	-	9.0	mA
	Mutual Conductance		0.65	II	gm	7.5	9.5	11.5	mA/V

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K1001	Test	Test Conditions	AQL %	Insp. Level	Sym-bol	Limits Min	Limits Bogey	Limits Max.	Units
	Group C.	Combined AQL	4.0						
	Amplification Factor		2.5	I	μ_{g1-g2}	7.5	9.5	11.5	-
	High Voltage Tail Test	Va = 4kV Vg2 = 800V Vg1 = -150V R_K = 0 R_L = 2MΩ	2.5	I	Ia	-	-	300	µA
11.1	Vibration Noise	Note 4	2.5	I	V_aAC	-	-	50	mV rms.
	Emission	A + g2 + g1 strapped Vapk = 250V Note 5	2.5	I	I_apk	7.5	-	-	A
	Group D								
AIII	Capacitances	Measured on 1 Mc/s bridge with valve in fully screened holder. No shield. Note 6.	6.5	IC	C_{ag1} c_{in} C_{out}	- 13.0 11.0	- 14.5 12.0	1.55 16.0 13.0	pF pF pF
	Group E								
11.3	Fatigue	Vh = 6.9V Note 7.		IA					
	Post Fatigue Tests	Combined AQL	6.5						
	Heater Cathode Leakage Current	Vhk = ± 100V	2.5		I_{hk}	-	-	40	µA
	Reverse Grid Current	Rg1 = 500K max.	2.5		$-Ig_1$	-	-	3.5	µA
	Mutual Conductance		2.5		gm	7.0	-	11.5	mA/V
11.1	Vibration Noise	Note 8.	2.5		VaAC	-	-	100	mV rms.
11.4	Shock	No voltages. Hammer angle = 30°		IA					

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K1001	Test	Test Conditions	AQL %	Insp. Level	Sym-bol	Limits Min.	Bogey	Max.	Units
	Group E (cont'd)								
	Post Shock Tests	Combined AQL	6.5						
	Heater Cathode Leakage Current	Vhk = ± 100V	2.5		I_{hk}	-	-	40	µA
	Reverse Grid Current	Rgl = 500K max.	2.5			-	-	3.5	µA
	Mutual Conductance		2.5		gm	7.0	-	11.5	mA/V
11.1	Vibration Noise	Note 8	2.5		VaAC	-	-	100	mV rms
AVI/5	Group F								
	Life	Va = 3.5kV Vg2 = 800V Vgl = -150V Ia(pk)=6.5A approx. Pulse length = 20µ secs. P.R.F.= 50c/s Positive grid excursion = + 150V Anode load = 500Ω							
AVI/ 5.1	Stability Life Test (1 hour)								
	Change in Mutual Conductance		1.0	I	Δgm	-	-	15.0	%
AVI/ 5.3	Intermittent Life			IC					
	Test Point (500 hrs)								
AVI/ 5.6	Inoperatives		2.5			-	-	-	-
	Heater Cathode Leakage Current	Vhk = ± 100V	6.5		I_{hk}	-	-	35	µA
	Reverse Grid Current	Rgl = 500K	6.5		$-I_{gl}$	-	-	3.5	µA
	Mutual Conductance		6.5		gm	7.0	-	11.5	mA/V

K1001	Test	Test Conditions	AQL %	Insp. Level	Sym-bol	Limits. Min.	Bogey	Max.	Units
	Group F (Contd)								
	Peak Anode Current	V_a = 420V Vg2 = 800V Vgl = -150V Note 1.	6.5		Ia pk.	5.0	-	-	A
	Insulation	Vgl-all = -100V Vg2-all = -300V	6.5		R R	50 50	- -	- -	MΩ MΩ
	Group G								
AIX/ 2.5	Electrical re-test after 28 days holding period			100%					
AVI/ 5.6	Inoperatives		0.5		-	-	-	-	-
	Reverse Grid Current	Rgl = 500KΩ max.	0.5		$-Ig_1$	-	-	3.0	μA

NOTES

1. Valve to be driven with 2 μsec. pulses at p.r.f. 500 c/s so that the grid voltage rises to 150V positive (max.).

2. Valve to be driven with 2 μsec. pulses at p.r.f. 500 c/s so that the grid voltage rises to 50V positive (max.).

3. Valve shall be given a minimum pre-heat time of 60 secs. with heater volts only. Initial arcing may be tolerated but the valve shall be free from arcing after a period of 1 minute after the H.T. has been applied.

4. VA(b) 250V Rg_1 10KΩ Cg_2 2 μF
Vg2 150V R_K 900Ω C_a 0.5μF
R_L 2KΩ C_k 50μF g 2.5

5. T_p 2μsecs. p.r.f. 50 c/s.

6. The capacitance connections shall be:

Test	H.P.	L.P.	E.
Cagl	T.C.	6	1,2, ,4,7,8,C.
Cin	6	1,2,4,7,8,	T.C., C.
Cout	T.C.	1,2,4,7,8,	6, C.

7. Valves to be vibrated in each of the three required planes for not less than 30 hours, and not less than 100 hours, total. Heaters switched, one minute on, three minutes off. No other voltages applied. Minimum peak acceleration 5g. Frequency 170 c/s.

8. Test conditions for vibration noise in Group C. shall apply.