

SPECIFICATION M.C.S.(A) CV4012

ISSUE 1 DATED 6th APRIL 1956

AMENDMENT 1

P B Variables Tests (V2 Inspection Level Tests)

ote the figures in the IAL, Bogcy, UAL and ALD columns
insert Record.

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

Specification MOS/CV4012 Issue 2. Dated 20.11.57. To be read in conjunction with BS.448, BS.1403 and K1001.	<u>SECURITY</u>	
	<u>SPECIFICATION</u>	<u>VALVE</u>
	UNCLASSIFIED	UNCLASSIFIED

—————> Denotes a change.

TYPE OF VALVE	-	Reliable Miniature Reptode		<u>MARKING</u> See K1001/4 Additional Markings:- 5750/6BEGW		
CATHODE	-	Indirectly Heated		<u>BASE</u> BS.448/B7G		
ENVELOPE	-	Glass		<u>CONNECTIONS</u>		
PROTOTYPE	-	6BEG CV453		Pin Electrode		
NEAREST AMERICAN SPECIFICATION	-	MIL-E-1/3. 5750/6BEGW.		Note		
R.E.T.M.A. DESIGNATION	-	5750/6BEGW		Pin Electrode		
<u>RATING</u>				<u>DIMENSIONS</u>		
Heater Voltage	(V)	6.3	C	1	g1 (osc)	
Heater Current	(A)	0.3		2	k + g5	
Max. Heater - Cathode Voltage	(V)	±100	A	3	h	
Max. Operating Anode Voltage	(V)	330	A	4	h	
Max. Operating Grid 2 and 4 Voltage	(V)	110	A	5	a	
Max. Grid 2 and 4 Supply Voltage	(V)	330	A	6	g2 + g4	
Max. Anode Dissipation	(W)	1.1	A	7	g3 (Sig)	
Max. Grid 2 and 4 Dissipation	(W)	1.1	A	See BS.442/371/2.1 Size Ref. No.2		
Max. Mean Cathode Current	(mA)	15.5	A			
Max. Grid 1 Current	(mA)	0.5	A	<u>DIMENSIONS</u>		
Conversion Conductance	(mA/V)	0.47	B	Size Ref. No.2		
Conversion Conductance at Vg3 = -30V	(μA/V)	10.0		Dimension (mm) Min. Max.		
Anode Impedance	(MΩ)	1.0	B	A seated height	-	47.5
Max. Bulb Temperature	(°C)	165	C	C diameter	16.0	19.0
Max. Shock (Intermittent Operation)	(g)	500		D Overall length	-	54.5
Max. Acceleration (continuous operation)	(g)	2.5		<u>MOUNTING POSITION</u>		
<u>CAPACITANCES (pF)</u>				Any		
C in (nom.)		7.5	D			
C out (nom.)		13.5	D			
Ca, g3 (max.)		0.35	D			
<u>NOTES</u>						
A. Absolute Value.						
B. Measured at Va = 250V; Vg2 = Vg4 = 100V; Vg1 = 0; Vg3 = -1.5V (Ia = 3mA; Ig2 + g4 = 7.5 mA)						
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.						

760R

Z.16250.R.

CV4012/2/1

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												
K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min.	LAL	Rogey	UAL	Max.	ALD	
		Vh(V) 6.3	Va(V) 250	Vg1(V) 0	Vg2 + g4(V) 100	Vg3(V) -1.5						
7.1	Glass Strain	No Voltages	6.5	I								
	<u>GROUP A</u>											
	Electrode Insulation	Vh = 6.3V Note 10 Vg1 to all = -100V Vg3 to all = -100V Va to all = -300V	100% 100% 100%		R R R	100 100 100	- - -	- - -	- - -	- - -	MΩ MΩ MΩ	
	Reverse Grid 3 Current	Vg3 = -2V; Va = 250V Note 4	100%		Ig3	-	-	-	-	1.0	μA	
	<u>GROUP B</u>											
	Heater Current	Combined AQL	1.0 0.65	II II	Ih	275	-	-	-	325	mA	
5.3	hk Leakage Current	Vhk = ±100V Note 1 Vhk = -100V Cathode positive	0.65	II V2	Ihk Ihk	- -	- -	- -	- 2	10 -	μA μA	
	Anode Current	Note 4	0.65	II V2	Ia Ia	1.9 -	To be recorded -	3.0	-	4.1 -	mA mA	
	Grid 2 + Grid 4 Current	Note 4	0.65	II V2	Ig2 + g4 Ig2 + g4	5.2 -	To be recorded -	7.5	-	9.8 -	mA mA	
	Conversion Conductance	Note 4	0.65	II V2	gc gc	280 -	To be recorded -	575	-	750 -	μA/V μA/V	
	Oscillator Mutual Conductance	Va + g2 + g4 = 100V Note 5	0.65	II V2	gm gm	5.5 -	To be recorded -	7.25	-	9.0 -	mA/V mA/V	
	<u>GROUP C</u>											
	Conversion Conductance	Combined AQL Vg3 = -6V	6.5 2.5	I I	gc	40	-	-	-	200	μA/V	
	Oscillator Mutual Conductance	Vh = 5.7V Va + g2 + g4 = 100V Notes 5, 6.	2.5	I	gm	4.5	-	-	-	-	mA/V	
	Reverse Grid 1 Current	Vh = 6.9V Va = 330V Vg2 + g4 = 110V Note 6	2.5	I	Ig1	-	-	-	-	3.0	μA	
11.1	Vibration Noise	Vg1 = Vg3 = -3V; RL = 10kΩ, Note 2	2.5	I	VaAC	-	-	-	-	25	mV rms	

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K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min.	LAL	3 σ g _y	UAL	Max.	ALD	
	<u>GROUP D</u>											
7.2	Base Strain	No Voltages	6.5	IA								
5.9	Capacitance	Measured on 1Mc/s Bridge with the valve mounted in a fully shielded socket. Valve screened. Note 7.	5.5	IC	C in C out C _{a,g3}	6.0 11.0 -	- - -	- - -	- - -	9.0 15.0 0.35	- - -	pF pF pF
	Conversion Conductance	V _{g3} = -30V	6.5	IA	gc	1.0	-	10	-	50	-	μA/V
	Oscillator Amplification Factor	V _a = 100V; V _{g3} = 0 Note 5	6.5	IA	μA	17	-	-	-	25	-	
	Cathode Current	V _a = 100V; V _{g3} = 0 Note 5	6.5	IA	Ik	16	-	-	-	33	-	mA
	Cathode Current	V _a = 100V; V _{g1} = -24V V _{g3} = 0, Note 5	6.5	IA	Ik	-	-	-	-	50	-	μA ←
	<u>GROUP E</u>											
11.2	Resonance Search	R _L = 10kΩ; V _{g1} = V _{g3} = -3V Frequency Range 1. 25-200 c/s 2. 200-500 c/s	2.5	IC	VaAC VaAC	- -	- -	- -	- -	20 100	- -	mV rms mV rms
11.3	Fatigue	V _h = 6.8V Note 3		IA								
	<u>Post Fatigue Tests</u>											
	Combined AQL											
5.3	hk Leakage Current	V _{hk} = ±100V Note 1	2.5		Ihk	-	-	-	-	30	-	μA
	Reverse Grid 3 Current	V _{g3} = -2V. Note 4	2.5		Ig3	-	-	-	-	2.0	-	μA
	Conversion Conductance	Note 4	2.5		gc	250	-	-	-	-	-	μA/V
11.1	Vibration Noise	As in Group C	2.5		VaAC	-	-	-	-	40	-	mV rms
11.4	Shock	Hammer Angle = 30° No Voltages		IA								
	<u>Post Shock Tests</u>											
	Combined AQL											
5.3	hk Leakage Current	V _{hk} = ±100V Note 1	2.5		Ihk	-	-	-	-	30	-	μA
	Reverse Grid 3 Current	V _{g3} = -2V Note 4	2.5		Ig3	-	-	-	-	2	-	μA

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min.	LAL	Bogay	UAL	Max.	ALD	
	Conversion Conductance	Note 4	2.5		gc	250	-	-	-	-	-	μA/V
	Vibration Noise	As in Group C	2.5		VaAC	-	-	-	-	40	-	mV rms
	GROUP F											
AVI/5	Life	Note 9										
	<u>Stability Life (1 hour)</u>											
AVI/5.1	Change in Conversion Conductance	Note 4	1.0	I	Δgc	-	-	-	-	20	-	%
AVI/5.3	<u>Intermittent Life</u>											
	Test Point 500 hrs.											
	Combined AQL											
	6.5											
AVI/5.6	Inoperatives		2.5									
	Heater Current											
	2.5											
	Ih											
	275											
	mA											
5.3	hk Leakage Current	Vhk = ±100V Note 1	2.5		Ihk	-	-	-	-	30	-	μA
	Reverse Grid 3 Current											
	Vg3 = -2V, Note 4											
	2.5											
	Ig3											
	2											
	μA											
	Conversion Conductance											
	Note 4											
	2.5											
	gc											
	250											
	μA/V											
	Average change of Conversion Conductance											
	Δgc											
	-											
	17											
	%											
	Cathode Current											
	Va = 100V Vg3 = 0 Note 5											
	4.0											
	Ik											
	12											
	mA											
	Electrode Insulation											
	Vh = 6.3V, Note 10											
	Vg1 to all = -100V											
	Vg3 to all = -100V											
	Va to all = -300V											
	4.0											
	R											
	50											
	MΩ											
	R											
	50											
	MΩ											
	R											
	50											
	MΩ											
	<u>Test Point (1000 hrs)</u>											
	Combined AQL											
	10.0											
AVI/5.6	Inoperatives		4.0									
5.3	hk Leakage Current	Vhk = ±100V, Note 1	4.0		Ihk	-	-	-	-	40	-	μA
	Reverse Grid 3 Current											
	Note 4											
	4.0											
	Ig3											
	2											
	μA											
	Conversion Conductance											
	Note 4											
	4.0											
	gc											
	250											
	μA											
	Cathode Current											
	Va = 100V, Vg3 = 0 Note 5											
	6.5											
	Ik											
	12											
	mA											
	Electrode Insulation											
	Vh = 6.3V Note 10											
	Vg1 to all = -100V											
	Vg3 to all = -100V											
	Va to all = -300V											
	6.5											
	R											
	30											
	MΩ											
	R											
	30											
	MΩ											
	R											
	30											
	MΩ											

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min.	LAL	Boggy	UAL	Max.	ALD	
AIX/2.5	<u>GROUP G</u>											
	Electrical Re-test after 28 days holding period.			100%								
	Inoperatives		0.5									
	Reverse Grid 3 Current	Note 4	0.5		Ig3	-	-	-	-	2.0	-	MA

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 40 to 100 c/s.
Min. peak acceleration = 2.5g.
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 a period of 99 hours (30 + 30 + 39 hours). Heater switched 1 minute on 3 minutes off. No other voltages.
Min. peak acceleration = 5g; frequency 170 ±5 c/s.
4. Measured with an alternating voltage applied to the oscillator grid via 20,000 ohms with a 6μF by-pass capacitor, such that the average direct grid current is 0.5 mA.
5. Anode and g2 + g4 connected at socket.
6. Adjust Vg1 to give Ik equal to 15.5 mA. Ig1 shall not be rising or out of limit after 10 minutes.
7. Pin Connections:-

Test	HP	LP	E
Cin	7	1, 2, 3, 4, 5, 6, C.	-
Cout	5	1, 2, 3, 4, 6, 7, C.	-
Cg3	7	5	1, 2, 3, 4, 6, C.

8. Valves shall be pre-heated under the test conditions for 5 minutes before making this test.
9. Life test conditions.
Vg1 = 16.5V 50 c/s rms through 1.0μF; Rg1 = 20kΩ to cathode; Va = 250V; Vg2 + g4 = 100V; Vg3 = -1.5V through 100kΩ; Vhk = 150V D.C., heater positive.
10. Heater and cathode strapped and considered as a single electrode.