Ministry of Aviation D.L.R.D./R.A.E.

Valve Electronic

C.V.4105

Specification M.O.A./CV.4105

Issue No.1A Dated 9.2.1961

To be read in conjunction with K.1001, BS448 and BS1409.

CLASSIFICATION	
Valve	Specification
Unclassified	Unclassified

→ indicates a change

Type of Valve:- Reliable U.H.F. Low Noise Grounded Grid Triode.

Cathode:- Indirectly Heated.

Envelope:- Glass.

Prototype:- VX3527, CV2453

MARKING

K1001/4

BASE

BS448/B9A

RATINGS

(All limiting values are absolute)

Heater Voltage	(V)	6.3	
Heater Current	(A)	0.37	
Max.Anode Voltage	(V)	200	
Max.Anode Dissipation	(W)	2.5	
Max.Grid Voltage	(V)	0	
Min.Grid Voltage	(V)	-20	
Max.Cathode Current	(mA)	20	
Max.Heater-Cathode Voltage	(V)	100	
Max.Bulb Temperature	(°C)	180	
Max.Shock (Short Duration)	(g)	500	
Max.Acceleration (Continuous Operation)	(g)	2.5	
Mutual Conductance	(mA/V)	14	A
Amplification Factor		50	A
Noise Factor	(dB)	11.5	

CONNECTIONS

PIN	ELECTRODE	
1	Control Grid	g
2	Cathode	k
3	Control Grid	g
4	Control Grid	g
5	Anode	a
6	Control Grid	g
7	Heater	h
8	Heater	h
9	Control Grid	g

DIMENSIONS

BS448/B9A/2.1.

Dimensions	Min.	Max.
'A' Seated Height	-	49
'C' Diameter	19.0	22.2
'D' Overall Length	-	56

CAPACITANCES (pF) NOTE B.

Cin (nom)	4.5
Cak (nom)	0.085
Cout (nom)	1.8

MOUNTING POSITION

Any

NOTES

A. Measured at Va(b) 180V, RL = 3.3kΩ. Rk = 68Ω.

B. Valve screened.

C. The Joint Service Catalogue Number is 5960-99-037-2293.

C.V.4105

TESTS

To be performed in addition to those applicable in K1CC1.

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)	RL (kΩ)	Rk (Ω)	Vg (V)
6.3	180	3.3	68	0

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min.	LAL	Bogey	VAL	Max.	ALD	
7.1	Glass Strain	No voltages	6.5	I	-	-	-	-	-	-	-	-
	Group A											
	Electrode Insulation	Vh = 6.3V Note 1										
		Vg1 -all = -20V	-	100%	R	20	-	-	-	-	-	MΩ
		Va -all = -250V	-	100%	R	100	-	-	-	-	-	MΩ
	Reverse Grid Current (1)	Vg1 = -1.0V Rg1 = 500KΩ max	-	100%	-Ig1	-	-	-	-	1.0	-	µA
	Group B											
		Combined AQL	1.0									
	Heater Current		0.65	II	Ih	330	-	370	-	410	-	mA
5.3	Heater Cathode Leakage Current	Vhk = ± 100V Note 2	0.65	II	Ihk	-	-	-	-	10	-	µA
		Vhk = -100V Cathode positive		V2	Ihk	-	-	-	2	-	-	µA
	Anode Current (1)		0.65	II	Ia	11.5	-		-	20	-	mA
				V2	Ia	To be recorded and agreed later						mA
	Mutual Conductance	Max.grid input signal 100mV r.m.s. Note 3	0.65	II	gm	11.0	-		-	18.5	-	mA/V
				V2	gm	To be recorded and agreed later						
	Group C											
		Combined AQL	6.5									
	Anode Current (2)	Vg = -4.0V	2.5	I	Ia	-	-	-	-	2.6	-	mA
→	Reverse Grid Current (2)	Vh=6.9V, Vg1=-1.0V Rg1 = 500KΩ max Notes 4 and 5	2.5	I	-Ig1	-	-	-	-	2.0	-	µA ←
	Change of Mutual Conductance	Vh = 5.7V Notes 5 & 6	2.5	I	gm	-	-	-	-	15	-	%
11.1	Vibration Noise	RL = 2kΩ, Va(b) = 250V Rk = 80Ω Ck = 100µF Cc = 0.1µF Note 7	2.5	I	Va AC	-	-	-	-	15	-	mV rms
	Noise Factor	F = 900 Mc/s Note 8	4.0	I	N	-	-	-	-	12.7	-	dB

Tests (cont'd)

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K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	LAL	Bogey	VAL	Max.	ALD	Units
	Group D											
7.2	Base Strain	No voltages	6.5	IA	-	-	-	-	-	-	-	-
AIII	Capacitances	Measured on a 1 Mc/s bridge with valve mounted on a fully shielded socket. Valve Screened Note 10.	6.5	IC	Cin	3.6	-	4.5	-	5.4	-	pF
					Cak	-	-	-	-	0.11	-	pF
					Cout	1.4	-	1.8	-	2.2	-	pF
Amdt.1	Group E											
11.2	Resonance Search	RL = 2kΩ Va(b) = 250V Frequency (1) 25-200c/s (2) 200-500c/s (3) 500-2500c/s	2.5	IC	Va VaAC) VaAC) VaAC)	To be recorded and agreed later						 mVrms mVrms mVrms
11.3	Fatigue	Vh = 6.3V Note 9	-	IA								
	Post Fatigue Tests											
		Combined AQL	4.0	-	-	-	-	-	-	-	-	-
5.3	Heater Cathode Leakage Current	Vhk = ± 100V	2.5	-	Ihk	-	-	-	-	20	-	µA
	Reverse Grid Current (1)	Vg1 = -1.0V Rg1 = 500kΩ max	2.5	-	-Ig1	-	-	-	-	1.5	-	µA
	Mutual Conductance	As in Group A	2.5	-	gm	10.5	-	-	-	-	-	mA/V
11.1	Vibration Noise	As in Group C	2.5	-	VaAC	-	-	-	-	25	-	mVrms
Amdt.1	11.4 Shock	Hammer Angle = 30° No voltages applied		IA								
	Post Shock Tests	Combined AQL	4.0	-	-	-	-	-	-	-	-	-
5.3	Heater Cathode Leakage Current	Vhk = ± 100V	2.5	-	Ihk	-	-	-	-	20	-	µA
	Reverse Grid Current (1)	Vg1 = -1.0V Rg1 = 500kΩ max	2.5	-	-Ig1	-	-	-	-	1.5	-	µA
	Mutual Conductance	As in Group A	2.5	-	gm	10.5	-	-	-	-	-	mA/V
11.1	Vibration Noise	As in Group C	2.5	-	VaAC	-	-	-	-	25	-	mVrms
Amdt.1	~~11.4 Shock~~											
	Group F											
AVI/5	Life											
AVI/5.1	Stability Life (1 hour)											
→	Change in Mutual Conductance		1.0	I	Δgm	-	-	-	-	10	-	% ←

Tests (cont'd)

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits						Units
						Min.	LAL	Bogey	VAL	Max.	ALD	
AVI/ 5.3	Intermittent Life											
	Test Point 500 Hrs.	Combined AQL	6.5	IA	-	-	-	-	-	-	-	-
AVI/ 5.6	Inoperatives		2.5	-	-	-	-	-	-	-	-	-
5.3	Heater Cathode Leakage Current	Vhk = ± 100V	2.5	-	Ihk	-	-	-	-	25	-	µA
	Reverse Grid Current (1)	Vg1 = -1.0V Rg1 = 500kΩ max	2.5	-	-Ig1	-	-	-	-	1.5	-	µA
	Mutual Conductance	As in Group B	2.5	-	gm	8	-	-	-	-	-	mA/V
	Average Change in Mutual Conductance		-	-	Δgm	-	-	-	-	22.5	-	%
	Electrode Insulation	Vh = 6.3V	4.0	-	-	-	-	-	-	-	-	-
		Vg1 -all = -20V	-	-	R	10	-	-	-	-	-	MΩ
		Va -all = -250V	-	-	R	50	-	-	-	-	-	MΩ
	Noise Factor	F = 900 Mc/s Note 8	4.0	-	N	-	-	-	-	14	-	dB
	Group G											
AIX/ 2.5	Electrical retest after 28 days holding period		-	100%								
AVI/ 5.6	Inoperatives		0.5	-	-	-	-	-	-	-	-	-
	Reverse Grid Current (1)	As in Group A	0.5	-	-Ig1	-	-	-	-	1.5	-	µA

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NOTES

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

2. Heater positive and negative successively.

3. Measured in a Mutual Conductance bridge, frequency 1 Kcps., or any other approved method.

4. Prior to this test the valve shall be preheated for five minutes under the test conditions.

5. -Igi shall not be rising or out of limit after a minimum time of 10 minutes, (including preheating time).

6. The change of gm is expressed thus:- $\frac{\text{gm at } 6.3V - \text{gm at } 5.7V}{\text{gm at } 6.3V}$

7. The valve shall be mounted so that the direction of vibration is parallel to the minor axis of the electrode structure. The vibration frequency shall be any fixed frequency within the range 25-100 c.p.s. The min. peak acceleration = 2g. The test shall be of sufficient duration to obtain a steady reading of noise output.

8. To be measured in an approved circuit. (See Figs.1 & 2 on page 5). See Specn. CV2453.

9. Valves shall be vibrated in each of three required planes for not less than 30 hrs. and not less than 99 hours (30 + 39 + 30 hrs.). Heater switched one minute on and three minutes off. No other voltages. Min. peak acceleration = 5g. Frequency = 170 c.p.s.

10. Capacitance connections as follows:-

Capacitance	H.P.	L.P.	E
Cin	2,7,8	1,3,4,6,9,C	5
Cak	H.P.	5	1,3,4,6,9,C
Cout	5	1,3,4,6,9,C	2,7,8

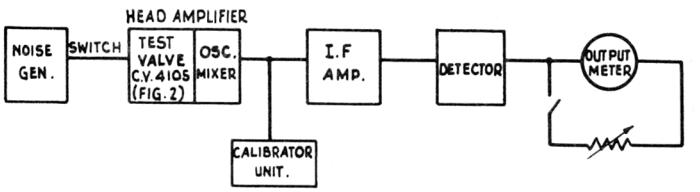

FIG.1 NOISE FACTOR SCHEMATIC DIAGRAM.

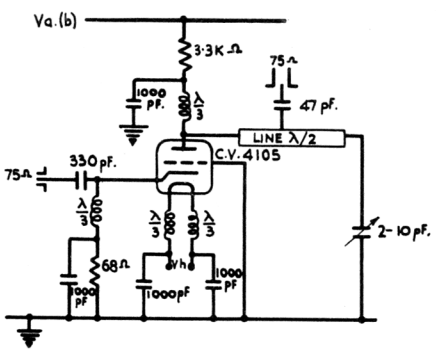

FIG.2. HEAD AMPLIFIER VALVE TEST CIRCUIT.

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION MOA/CV4105 ISSUE NO.1A DATED 9.2.61

AMENDMENT NO.1

Page 3

(i) In the column headed 'Test' immediately above 'Resonance Search' insert "Group E"

(ii) Between the now inserted 'Group E' and 'Note 10' (in the Test Conditions column) insert a dividing line across the complete tabulation.

/(iii)

(iii) Locate '11.4 Shock' (immediately above 'Post Shock Tests'). In the column headed 'Test Conditions' insert "Hammer Angle = 30^{o}, No voltages applied" and in the column headed 'Insp. Level' insert "IA"

(iv) Immediately above the dividing line separating 'Group F' delete "11.4 Shock"

(204687)

T.V.C. for R.A.E.

11/7/63