MINISTRY OF ~~AVIATION~~ TECHNOLOGY DLRD/RRE

VALVE ELECTRONIC

CV4031

Amdt 2

Specification ~~MOA~~ Min Tech/CV4031
Issue 1A Dated 7th April, 1965
To be read in conjunction with B.S.448, B.S.1409 and K1001

Amdt 2

SECURITY	
Specification	Valve
Unclassified	Unclassified

← Indicates change

TYPE OF VALVE - Reliable Double Triode
CATHODE - Indirectly heated
ENVELOPE - Glass
Amdt. 1 PROTOTYPE - CV.~~850~~ 858
R.E.T.M.A. DESIGNATION - 6101/6J6WA

MARKING

K1001/4

Additional Marking:- 6101/6J6WA

BASE

B.S.448/B7G

RATINGS AND CHARACTERISTICS

(Absolute, non-simultaneous and not for Inspection purposes)

			Note
Heater Voltage	(V)	6.3	D
Heater Current	(A)	0.45	
Max. Operating Anode Voltage	(V)	330	
Max. Anode Voltage (Ia = 0)	(V)	550	
Max. Anode Dissipation (per section)	(W)	1.6	
Max. Heater - Cathode Voltage	(V)	+100	
Max. Cathode Current	(mA)	25	B
Max. Bulb Temperature	(°C)	165	D
Max. Shock (short duration)	(g)	500	
Max. Acceleration (continuous operation)	(g)	2.5	
Max. Operating Frequency	(Mc/s)	250	
Mutual Conductance	(mA/V)	5.6	A
Anode Impedance	(kΩ)	6.3	A
Amplification Factor		38	A

CAPACITANCES (pF)

C in (nom.) per section	2.45	C
C' out (nom.)	0.45	C
C" out (nom.)	0.40	C
ca,g (nom.) per section	1.5	C
Ch,k (nom.)	5.4	C

CONNECTIONS

Pin	Electrode	
1	Anode (2)	a"
2	Anode (1)	a'
3	Heater	h
4	Heater	h
5	Grid (1)	g'
6	Grid (2)	g"
7	Cathode	k

DIMENSIONS

B.S.448/B7G/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

MOUNTING POSITION

Any

NOTES

A. At Va = 100V; Vg = 0; Rk = 50 ohms (Ia = 9.0 mA approx.) ←

B. Difficulty may be encountered if this valve is operated for long periods of time with very small values of cathode current.

C. Without screen.

D. 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.

E. NATO Stock No. 5960-99-000-4031.

(278497)

To be performed in addition to those testsapplicable in K1001

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

Test Conditions:- unless otherwise specified

Vh(V) 6.3 | Va(V) 100 | Vg(V) 0 | Rk(ohms) 50 | Note 6

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Sym-bol	Limits						Unit
						Min	LAL	Bogey	UAL	Max	ALD	
7.1	Glass Strain	No Voltages	6.5	I								
	GROUP A											
	Electrode Insulation	Vh = 6.3 Note 1 Vg to all = -100V		100%	R	100	-	-	-	-	-	MΩ
		Va to all = -300V		100%	R	100	-	-	-	-	-	MΩ
	Reverse Grid Current	Va = 250V; Rk = 500Ω Rg = 1MΩ max. Note 10		100%	Ig	-	-	-	-	0.5	-	µA
	GROUP B											
		Combined AQL	1.0	II								
	Heater Current		0.65	II	Ih	420	-	450	-	480	-	mA
5.3	hk Leakage Current	Vhk = ± 100V Notes 2 and 10	0.65	II	Ihk	-	-	-	-	10	-	µA
		Vhk = -100V, Cathode Positive. Note 10		V2	Ihk	~~To be recorded and agreed later~~ 2						µA
	Anode Current (1)		0.65	II	Ia	6.5	-	-	-	11.5	-	mA
				V2	Ia	To be recorded and agreed later						mA
	Anode Current (2)	Va = 250V; Vg = -30V	0.65	II	Ia	-	-	-	-	75	-	µA
	Mutual Conductance		0.65	II	gm	4.0	-	-	-	7.5	-	mA/V
				V2	gm	To be recorded and agreed later						mA/V
	GROUP C											
	Change of Mutual Conductance	Vh = 5.7V Notes 3 and 7	2.5	I	Δ gm	-	-	-	-	15	-	%
11.1	Vibration Noise	Va(b) = 250V; RL = 2kΩ Notes 9, 10 and 11	2.5	I	VaAC	-	-	-	-	15	-	mV/ rms

TESTS (Cont'd)

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K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Sym-bol	Limits Min	LAL	Bogey	UAL	Max.	ALD	Unit
	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 holder. Valve not screened.	6.5	IC	Cin	1.4	-	-	-	2.8	-	pF
					C'out	0.25	-	-	-	0.65	-	pF
					C"out	0.25	-	-	-	0.55	-	pF
					Ca,g	1.2	-	-	-	1.8	-	pF
					Chk	2.5	-	-	-	7.5	-	pF ←
	Amplification Factor											
	Reverse Grid Current	Vh=7.0V, Rg=1M max Notes 7,8,10 Va=250V. Rk=500Ω	6.5 6.5	IA 1A	Ig μ	28 —	— —	— —	— —	48 1.0	—	μA

Amdt 1 ←2

	GROUP E											
11.2	Resonance Search	Va(b) = 250V; RL = 2kΩ Frequency:-	2.5	IC								
		(1) 25 - 200 c/s			VaAC	To be recorded						mVrms ←
		(2) 200 - 500 c/s			VaAC	and agreed						mVrms ←
		(3) 500 - 2500 c/s			VaAC	later						mVrms ←
	Fatigue	Vh = 6.9V Note 4		IA								
	Post Fatigue Tests											
		Combined AQL	4.0									
5.3	hk Leakage Current	Vhk = ± 100V Note 2	2.5		Ihk	-	-	-	-	20	-	μA
	Reverse Grid Current	Va = 250V; Rk = 500Ω; Rg1 = 1MΩ max. Note 10	2.5		Ig1	-	-	-	-	1.0	-	μA
	Mutual Conductance		2.5		gm	3.5	-	-	-	7.5	-	mA/V
	Vibration Noise	As in Group C	2.5		VaAC	-	-	-	-	35	-	mVrms
11.4	Shock	Hammer Angle = 30° No Voltages		IA								
	Post Shock Tests											
		Combined AQL	4.0									
5.3	hk Leakage Current	Vhk = ± 100V Note 2	2.5		Ihk	--	-	-	-	20	-	μA
	Reverse Grid Current	Va = 250V; Rk = 500Ω; Rg = 1MΩ Note 10	2.5		Ig	--	-	-	-	1.0	-	μA
	Mutual Conductance		2.5		gm	3.5	-	-	-	7.5	-	mA/V
11.1	Vibration Noise	As Group C	2.5		VaAC	-	-	-	-	35	-	mVrms

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Sym-bol	Limits						Unit
						Min.	LAL	Bogey	UAL	Max.	ALD	
	GROUP F											
AVI/5	Life	Note 5										
	Stability Life (1 hour)											
	Change in Mutual Conductance		1.0	I	gm	-	-	-	-	15	-	%
	Intermittent Life											
	Test Point 500 hours											
		Combined AQL	6.5	IA								
AVI/5.6												
	Inoperatives		2.5									
	Heater Current		2.5		Ih	420	-	-	-	480	-	mA
5.3	hk Leakage Current	Vhk = ± 100V. Note 2	2.5		Ihk	-	-	-	-	20	-	µA
	Reverse Grid Current	Va = 250V; Rk = 500Ω: Rg = 1MΩ max. Note 10	2.5		Ig	-	-	-	-	0.75	-	µA
	Mutual Conductance		2.5		gm	3.5	-	-	-	7.5	-	mA/V
	Average Change of Mutual Conductance				gm	-	-	-	-	15	-	%
	Electrode Insulation	Vh = 6.3 Note 1	4.0									
		Vg to all = -100V			R	50	-	-	-	-	-	MΩ
		Va to all = -500V			R	50	-	-	-	-	-	MΩ
	Test point 1000 Hrs											
		Combined AQL	10									
AVI/5.6	Inoperatives		4.0									
5.3	hk Leakage Current	Vhk = ± 100V Note 2	4.0		Ihk	-	-	-	-	20	-	µA
	Reverse Grid Current	Va = 250V, Rk = 500Ω Rg = 1MΩ max. Note 10	4.0		Ig	-	-	-	-	1.0	-	µA
	Mutual Conductance		4.0		gm	3.25	-	-	-	7.5	-	mA/V
	Electrode	Vh = 6.3 Note 1										
	Insulation	Vg to all = -100V	6.5		R	30	-	-	-	-	-	MΩ
		Va to all = -300V			R	30	-	-	-	-	-	MΩ

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K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Sym-bol	Limits						UNIT
						Min.	LAL	Bogey	UAL	Max.	ALD	
	GROUP G											
AIX/2.4												
	Electrical Re-test after 26 days holding period			100%								
AVI/5.6												
	Inoperatives		0.5									
	Reverse Grid Current	Va = 250V; Rk = 500 Ω Rg = 1M Ω max. Note 10	0.5				-	-	-	0.75	-	µA

NOTES

1. Heater and Cathode strapped and considered as a single electrode.
2. Heater positive and negative successively.
3. The Change of Mutual Conductance is expressed:-

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

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.
5. Life Test Conditions. Vhk = 180V heater positive. Va not less than 125 volts. Rk = 50 Ω
6. Test each section separately. Both sections to be operating normally, i.e. current from both halves flowing through the common cathode bias resistor.
7. Pre-heat the valves for 5 minutes with both sections operating under the test conditions.
8. Ig shall not be rising or out of limit after a total of 10 minutes.
9. The valve shall be mounted so that the direction of Vibration is parallel to the minor axis of the mounting structure. Vibration frequency = any fixed frequency in the range 25 - 100 c/s. Max. peak acceleration = 2g. The test shall be of sufficient duration to obtain a steady reading of noise output.
10. Test with the sections connected in parallel.
11. Parasitic suppressors of 50 ohms are permissible. Connect cathodes to earth through 1500 ohms. Ck = 1000µ F. Grids connected to earth.

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION M.O.A./CV.4031, ISSUE 1A, DATED 7th APRIL, 1965.

AMENDMENT NO. 1

Page 1 Prototype

Delete "CV.850" and substitute "CV.858"

Page 3 Group D. At the end of these tests insert the following additional test:-

K1001 Ref.	TEST	TEST CONDITIONS	AQL %	INSP LEVEL	SYM BOL	LIMITS						UNITS
						MIN	LAL	BOGEY	UAL	MAX	ALD	
	GROUP D CONTD. Reverse Grid Current	Vh = 7.0V; Rg = 1M max. Notes 7, 8 and 10.	6.5	1A	Ig					1.0		µA

(230080) March, 1966. T.V.C. for R.R.E.

✓ APS 6/5/66

ELECTRONIC VALVE SPECIFICATIONS.

SPECIFICATION MOA/CV4031; ISSUE 1A; DATED 7TH APRIL, 1965.

AMENDMENT NO 2

1. Page 1

(a) Amend Specification Authority - "MINISTRY OF AVIATION DLRD/RRE " to read "MINISTRY OF TECHNOLOGY - DLRD/RRE"

(b) Amend "Specification MOA/CV4031" to read "Specification Min. Tech/CV4031".

2. Page 2 Group B hk Leakage Current test.

In the "Limits" columns against Insp. Level "V2" delete "To be recorded and agreed later" and insert "2" in the sub-column headed UAL.

3. Page 3 Group D Reverse Grid Current Test (Inserted by Amendment No.1)

In the column headed "Test Conditions" insert "Va = 250V, Rk = 500Ω".

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

JAB 63/68

May, 1967.