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

VALVE ELECTRONIC **CV.4510**

SPECIFICATION: MOS/CV.4510
Issue No. 1 Dated 15.7.58
To be read in conjunction with K.1001, BS.448 and BS.1409.

SECURITY	
SPECIFICATION	VALVE
Unclassified	Unclassified

TYPE OF VALVE:- Reliable Micro-Miniature Triode with Flying Leads.
CATHODE:- Directly Heated.
ENVELOPE:- Metal Case.
PROTOTYPE:- F3A2.

MARKING

See K.1001/4

CV. No., T.A. Letters Factory and Date Code only required.

RATINGS
(All limiting ratings are absolute.)

			NOTES
Filament Voltage	(V)	0.9	
Filament Current	(mA)	90	
Max. Anode Voltage (Ia = 0)	(V)	250	
Max. Anode Dissipation (25°C)	(mW)	200	B
Max. Anode Dissipation (150°C)	(mW)	150	B
Max. Anode Temperature	(°C)	150	
Max. Acceleration (Continuous Operation)	(g)	20	
Max. Shock (short duration)	(g)	500	

TYPICAL OPERATING CONDITIONS

Anode Voltage	(V)	160
Negative Grid Voltage	(V)	0.5
Mutual Conductance	(mA/V)	0.4
Anode Impedance	(KΩ)	110

CAPACITANCES (pF)

Cag (nom.)	1.75
Caf (nom.)	0.7
Cfg (nom.)	0.5

BASE

See drawing on page 6, Fig.1.

CONNECTIONS

Lead No.	Electrode
1	Grid g
2	Filament f
3	Filament f
4	Grid g
Case	Anode a NOTE A

DIMENSIONS

See drawing on page 6, Fig.1.

MOUNTING POSITION

Any.

NOTES

A. Soldered connection to be made to top of can only.

B. To achieve this dissipation the valve requires to be run into grid current when changes in contact potential may occur.

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TESTS

To be performed in addition to those applicable in K.1001.

The tests shall be performed in the specified order unless otherwise agreed with the Inspecting Authority.

TEST CONDITIONS:- Unless otherwise specified.

Vf = 0.9V. Va = 150V. Vg = -0.5V

K.1001 REF.	TEST	TEST CONDITIONS	AQL %	INSP LEVEL	SYM-BOL	LIMITS MIN.	LAL	BOGEY	UAL	MAX.	ALD	UNITS
	GROUP A											
	Visual Inspection	No voltages Notes 1, 2.	-	100%	-	-	-	-	-	-	-	-
	Inoperatives		-	100%	-	-	-	-	-	-	-	-
	Electrode Insulation	Va-all = -500V. Vg-all = -100V.	-	100%	R	10000	-	-	-	-	-	MΩ
			-	100%	R	10000	-	-	-	-	-	MΩ
	Reverse Grid Current (1)	Rg = 500KΩ max.	-	100%	-Ig1	-	-	-	-	0.05	-	µA
11.1	Vibration Noise (1)	Acceleration = 20g min. Frequency = 70 cps to 3kcps. Va(b) = 150V. RL = 27KΩ Vg = 0 Rg = 500Ω Note 3.	-	100%	Vg (AC)	-	-	-	-	50	-	µV peak
	Voltage Gain	Va(b) = 150V RL = 270KΩ Rg = 1MΩ Note 4.	-	100%		27	-	28.5	-	30	-	dbs
	GROUP B											
	Filament Current		0.4	II	If	85	-	90	-	95	-	mA
	Anode Current (1)		0.4	II	Ia	500	-	700	-	900	-	µA
				V2	Ia	To be recorded and agreed later						µA
	Mutual Conductance		0.4	II	gm	300	-	400	-	500	-	µA/V
				V2	gm	To be recorded and agreed later.						µA/V
	GROUP C											
	Anode Current (2)	Vg = -3.5V.	2.5	I	Ia (tail)	-	-	-	-	50	-	µA
5.12	Lead Fragility	No voltages	2.5	I	-	-	-	-	-	-	-	-
	Change of Mutual Conductance	Vf = 0.8V. Note 8.	2.5	I	Δgm	-	-	-	-	15	-	%
	Reverse Grid Current (2)	Vf = 1.0V. Adjust Vg for Ia = 1.0 mA. Notes 8 and 9.	2.5	I	-Ig1	-	-	-	-	0.1	-	µA

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K.1001 REF.	TEST	TEST CONDITIONS	AQL %	INSP LEVEL	SYM-BOL	LIMITS MIN.	LAL	BOGEY	UAL	MAX.	AID	UNITS
	GROUP E											
11.3	Fatigue	Vf = 0.9V. Min. Acceleration = 20g. Freq. = 170 cps Duration = 100 hours. Note 5.	-	I	-	-	-	-	-	-	-	-
	POST FATIGUE TESTS	Combined AQL = 2.5%										
	Reverse Grid Current (1)	As in Group A.	1.0	-	-Ig1	-	-	-	-	0.05	-	µA
	Mutual Conductance		1.0	-	gm	300	-	400	-	500	-	µA/V
11.1	Vibration Noise	As in Group A.	1.0	-	Vg (AC)	-	-	-	-	50	-	µV peak
	SHOCK	Min. deceleration = 5000g. No voltages. Note 10.	-	I	-	-	-	-	-	-	-	-
	POST SHOCK TESTS	Combined AQL = 2.5%										
	Reverse Grid Current (1)	As in Group A.	1.0	-	-Ig1	-	-	-	-	0.05	-	µA
	Mutual Conductance		1.0	-	gm	300	-	400	-	500	-	µA/V
11.1	Vibration Noise	As in Group A.	1.0	-	Vg (AC)	-	-	-	-	50	-	µV rms
	GROUP F											
AVI/ 5	Life	Note 6.										
AVI/ 5.1	Stability Life	(1 hour)										
	Change in Mutual Conductance		1.0	I	Δgm	-	-	-	-	10	-	%
AVI/ 5.3	Intermittent Life											
	Test Point 500 hours.	Combined AQL	4.0	IA								
AVI/ 5.6	Inoperatives		2.5	-	-	-	-	-	-	-	-	-
	Filament Current		2.5	-	If	85	-	90	-	95	-	mA
	Reverse Grid Current (1)	As in Group A.	2.5	-	-Ig1	-	-	-	-	0.05	-	µA
	Mutual Conductance		2.5	-	gm	260	-	-	-	500	-	µA/V
	Average Change of Mutual Conductance		2.5	-	Δgm	-	-	-	-	15	-	%
	Electrode Insulation	Va-all = -500V.	2.5	-	R	10000	-	-	-	-	-	MΩ
		Vg-all = -100V.		-	R	10000	-	-	-	-	-	MΩ

K.1001 REF.	TEST	TEST CONDITIONS	AQL %	INSP LEVEL	SYM-BOL	LIMITS MIN.	LAL	BOGEY	UAL	MAX.	AID	UNITS
	GROUP F (contd.)											
	Test Point 1000 hours. Combined AQL		6.5	IA								
AVI/ 5.6	Inoperatives		4.0	-	-	-	-	-	-	-	-	-
	Filament Current		4.0	-	If	85	-	90	-	95	-	mA
	Reverse Grid Current (1)	As in Group A.	4.0	-	-Ig1	-	-	-	-	0.05	-	μA
	Mutual Conductance		4.0	-	gm	240	-	-	-	500	-	μA/V
	Electrode Insulation	Va-all = -500V. Vg-all = -100V.	4.0	-	R	10000	-	-	-	-	-	MΩ
			-	-	R	10000	-	-	-	-	-	MΩ
	GROUP G											
AIV/ 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	-	-	-	-	0.05	-	μA
	GROUP H											
AIII	Capacitances	Measured on a 1Mc/s bridge. Valve mounted in an approved fully shielded socket. Note 7.		T.A.	Cag	1.6	-	1.75	-	1.9	-	pF
					Caf	0.66	-	0.7	-	0.74	-	pF
					Cfg	0.47	-	0.5	-	0.54	-	pF

NOTES

1. The valve shall be visibly inspected for good workmanship.

2. This test may be carried out in Group C.

3. The valve shall be mounted so that the direction of vibration is parallel to its minor axis. The test shall be of sufficient duration to obtain a steady reading of noise output.

4. A typical circuit for the measurement of voltage gain is shown on page 6, Fig.2.

5. The valves shall be vibrated in each of the three required planes for a total period of not less than 100 hours (30 + 39 + 30). Filament switched 1 minute on, three minutes off. No other voltages applied.

NOTES
(contd.)

6. The Life Test conditions are : -

The Life Tests to be carried out in an Ambient Temperature of 150°C and Vg = -1.5V. Va adj. for Wa = 100mW. (Ia = 0.6mA approx.)

7. Capacitance connections to be made as follows:

TEST	NP	LP	E
Cag	Can	1, 4	2, 3
Caf	Can	2, 3	1, 4
Cfg	2, 3	1, 4	Can

8. Prior to this test the valve shall be pre-heated for not less than five minutes under the test conditions.

9. Grid current shall not be rising or out of limit after a total time of ten minutes (including pre-heating time).

10. This test to be carried out using a lead block decelerator. Direction of shock to be applied along the longitudinal axis.

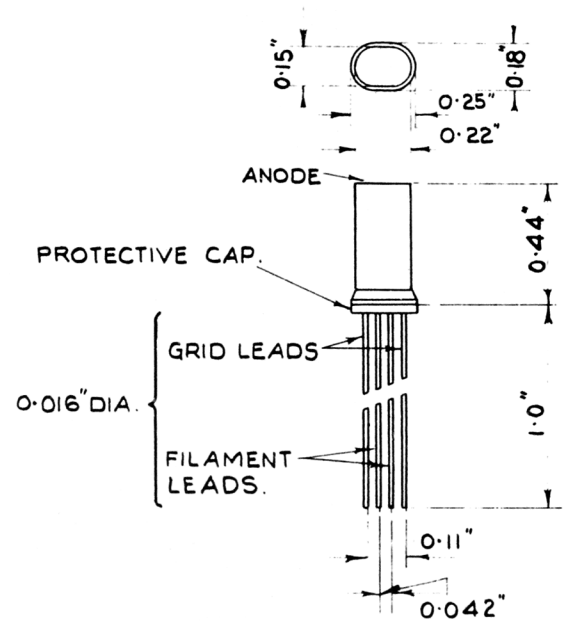

FIG.1. OUTLINE DRAWING.

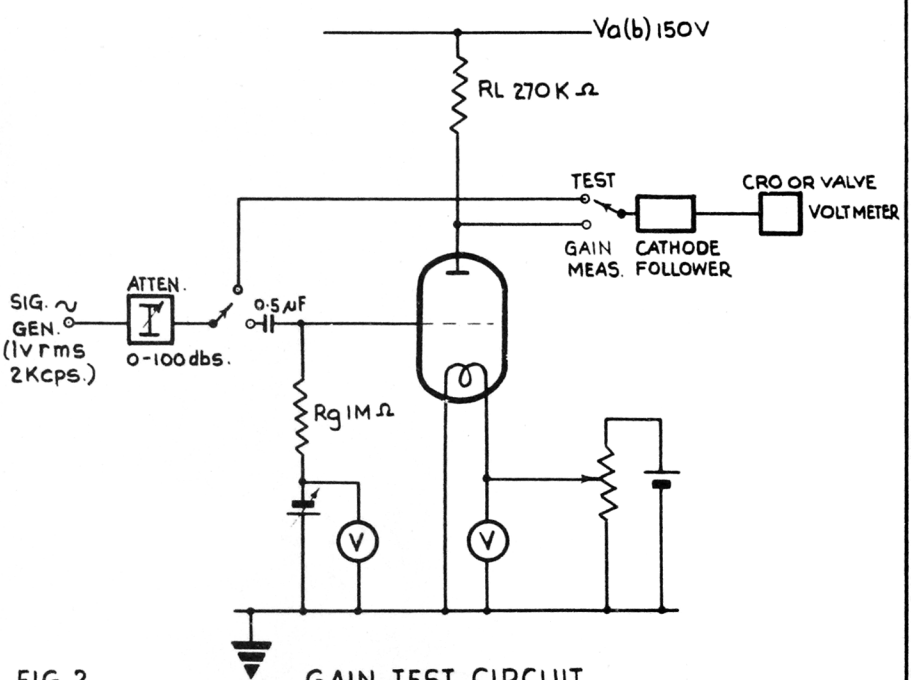

FIG.2. GAIN TEST CIRCUIT.