MINISTRY OF ~~AVIATION~~ TECHNOLOGY - DLRD/R.R.E.

VALVE ELECTRONIC **CV6131**

Specification Mintech MOA/CV6131 Issue 1A, Dated 28th February, 1964 To be read in conjunction with K1006	SECURITY Specification: Unclassified Valve: Unclassified

→ Indicates change

TYPE OF VALVE - Tetrode Pulse Amplifier
CATHODE - Indirectly-heated
ENVELOPE - Glass
PROTOTYPE - C1149-1

MARKING
K1001/4

BASE
Ceramic Wafer
See drawing. Page 7

RATING

		Note
Heater Voltage (V)	26.0±10%	
Heater Current (A)	2.15	
Max. Peak Forward Anode Voltage (kV)	25.0	
Max. Anode Supply Voltage (kV)	20.0	
Max. Peak Anode Current (A)	18	B
Max. Peak Forward Grid Voltage (V)	300	
Max. Grid Reverse Voltage (V)	-1000	
Max. Screen Grid Voltage (kV)	1.5	
Max. Anode Dissipation (W)	60	
Max. Screen Grid Dissipation (W)	8.0	
Min. Cathode Heating-time (secs)	180	
Max. Seal Temperature (°C)	200	

CONNECTIONS

Pin	Electrode
1	Heater
2	Screen Grid
3	Control Grid
4	Heater and Cathode
TC	Anode

CAPACITANCES (pF)

Cag (max.)	2.0
Cin (nom.)	42.5
Cout (nom.)	8.5

TOP CAP
See drawing. Page 7

DIMENSIONS
Per Outline on Page 7

Dimension(ins)	Min.	Max.
Seated height	5 11/32	5 19/32
Diameter	-	3 1/16 ←
Overall length	5 3/4	6 ←

MOUNTING POSITION
Any

NOTES

A. All limiting values are absolute.

B. The Duty Cycle should not exceed 0.001. For peak currents exceeding 5.0A the product of peak current in amperes and pulse duration in microseconds should not exceed 40 and the valve should not be operated for longer than 5 μsecs in any 100- μsec. interval. For peak currents not exceeding 5.0A the anode

dissipation of 60W shall determine the permissible pulse length. At higher duty cycles the peak current must be reduced in proportion. In applications where the peak current drawn is less than the maximum rating, the heating-time may be reduced proportionately. In no circumstances however, should it be less than 60 secs.

The screen grid decoupling series resistance shall be 20,000 ohms min.

C. JOINT SERVICES CATALOGUE NUMBER - 5960-99-037-3584.

TESTS

To be carried out in addition to these applicable in K1006.

K1006 Ref.	Test or Operation	Conditions	LIMITS Min.	LIMITS Max.	Units
	GROUP A The tests in this group to be carried out in the order stated.	Tests in this group to be carried out on all valves.			
4.5	Holding period	No voltages	168	-	hours
4.10.23	Pulse Operation (1)	Notes 1 and 2			
		iL	15	-	Amp
		ΔiL	-	0.75	Amp
		Ig 1	Never negative		
4.10.23	Pulse Operation (2)	Notes 1 and 3			
		iL	15	-	Amps
		ΔiL	-	0.75	Amps
4.10.23	Pulse Operation (3)	Notes 1 and 4			
		iL	20	-	Amps
		ΔiL	-	1.25	Amps
4.10.23	Pulse Operation (4)	Notes 1 and 5			
		iL	20	-	
		ΔiL	-	1.5	Amps
4.10.23	Pulse Operation (5)	Notes 1 and 6 Screen grid current Ig2 Control grid current Ig1	Never negative Never negative		
4.10.6.1	Total Grid 1 Current (1)	Adjust grid 1 voltage to give anode current of 50 mAdc Notes 7, 8	0	-20	μAdc
4.10.6.2	Total Grid 1 Current (2)	Grid 1 = -500 volts dc w.r.t. Cathode Note 8	0	-40	μAdc
4.10.5.2	Grid 1 voltage	Adjust grid 1 voltage to give anode current of 50 mAdc. Note 8.	-190	-250	Volts dc

TESTS (Cont'd)

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K1006 Ref.	Test or Operation	Conditions	LIMITS Min.	LIMITS Max.	Units
	GROUP A Cont'd				
4.10.5.2	Grid 1 cut-off	Adjust grid 1 voltage to give anode current of 1.0 mAdc. Note 8	-	-350	Volts dc
4.10.6.6	Primary screen-grid emission	Applied circuit voltage 750V rms. 50-60 c/s. Grid voltage = 0. Screen grid mean forward current 100mA. Note 9.	-	250	µAdc
4.10.6.6	Primary grid 1 emission	Applied circuit voltage 110V rms 50-60 c/s. Screen grid voltage = 0. Grid 1 mean forward current 65mA. Note 9.	-	100	µAdc
4.10.1.3	Peak emission	Grid 1 screen grid and anode connected together to 1000 volts. Heater voltage = 27 volts rms.	70	-	Amps
4.10.8	Heater Current	Heater voltage = 27 volts rms.	1.95	2.35	Amps
	Groups B, C, D	No tests			
	GROUP E	Mechanical tests.			
4.1.1.2		Each test to be carried out at a sample inspection level IA with an ACL = 6.5%			
	Torque	No voltages. Note 12			
	Shock	Heater = 27 volts rms Hammer angle = 13°			
	Post Torque & Shock	Tube must pass all Group A tests, same limits			
	Vibration	Note 11	See Note 10		
	GROUP F	Life tests			
4.11	Pulse life test (1)	Group B I.I.E.T. Notes 1, 13, 14.	500		Hours
	Pulse life test end point	Pulse operation tests (3) and (4) iL	19		Amps
		Δ iL	-	1.5	Amps
		Peak emission	70	-	Amps
		Total grid 1 current (1)	-	400	µAdc
		Primary screen grid emission.	-	250	µAdc

K1006 Ref.	Test or Operation	Conditions	LIMITS Min.	LIMITS Max.	Units
	GROUP H	Qualification Approval Tests			
4.10.14	Capacitances	Cgp	-	2	µµf
		Cin	35	50	µµf
		Cout	6	11	µµf
4.9.20.3	Vibration	Notes 15, 10 Microphony		1.5 total	Volts

NOTES

1. The tube shall be tested in the circuit of figure 1, at a recurrence frequency of 300-500 pps, the exact frequency at the discretion of the manufacturer.

   The grid 1 driver pulse shall have a duration of 2 µs minimum, measured at the 95% level of the maximum amplitude. The time of rise shall be less than 0.2 µsec, and the time of fall shall be less than 0.4 µsecs. The variation in amplitude over 80% of the top portion of the pulse shall not exceed 5% total.

   The control grid shall be driven positive to 225 ± 25 volts.

   A suitable relay shall be shunted to operate at 200mA and used in conjunction with an AC contactor to break the AC supply to the anode voltage power unit approximately 20 milliseconds after the relay has operated. A device shall be incorporated into the relay circuit which will delay the reapplication of anode voltage for a minimum period of 15 seconds after each kick-out, and shall count the number of kick-outs.

2. This shall be the first test after the holding period. Heater voltage = 26 volts rms, tube heating time = 180 secs minimum, anode supply voltage = 20 kVdc, screen grid supply voltage = 1.25 kVdc.

3. With the valve running for pulse operation (1), reduce heater to 24 volts rms and observe test parameters after two minutes.

4. With the valve running for pulse operation (2) test, increase heater to 26 volts rms, anode supply voltage to 25 kVdc, screen grid supply voltage to 1.35 kVdc, allow 120 seconds to reach equilibrium before observing test parameters.

5. With valve running for pulse operation (3) test decrease heater to 24 volts r.m.s. and allow 120 seconds minimum to reach equilibrium before observing test parameters. After restoring the heater voltage to 26 volts and allowing 120 seconds to again reach equilibrium the valve shall run for any two consecutive minutes during a further test period of five minutes maximum without sparking.

6. With valve running as at end of pulse operation (4) test decrease anode supply voltage to 20 kVdc and screen grid voltage to 1.25 kVdc.

7. Tube to operate with constant or decreasing grid current for two minutes. If the tube should operate with a rise of grid current, the grid current shall become constant or decrease within five minutes.

8. With anode voltage = 1.2 kVdc, screen grid voltage = 1.0 kVdc, with respect to cathode. Heater voltage = 27 volts rms, tube heating time 300 secs min.

9. With the specified voltage applied to a suitable rectifier circuit, adjust a variable series resistor to give the specified mean forward current. Heater voltage = 27 volts rms., anode floating. Reverse current must not exceed the stated limit after 15 seconds.

10. There shall be no short circuits between the electrodes. A short circuit is defined for this purpose as a current in grid 1 exceeding 0.3 mA, or a current in the screen grid exceeding 1.7 mA. The circuit in fig. 2 may be used for this purpose, a short circuit is indicated by a flash from either of the neons which should be preset to ignite at these levels.

11. Heater = 26 volts rms, grid 1 voltage = 700 volts dc negative, screen grid voltage = 700 volts dc positive, anode not connected. Valve mounted vertically in valve holder. Vibrate once up and down at 5g acceleration between 30 and 1500 c/s at a sweep rate of 5 octaves per minute maximum. Check for short circuits with a neon or other approved sensitive detector. A suitable circuit is shown in fig. 2.

12. The base shall be subjected to a gradually applied torque of 12.0 pound-inches max. This test shall not cause broken leads, broken welds, broken soldered joints, broken or cracked glass.

13. Heater voltage = 25 volts rms, tube heating time = 180 secs maximum, anode supply voltage = 20 kVdc, screen supply voltage = 1.25 kVdc.

14. During the life test, any tube which will kick out the overcurrent relay more than 24 times in a 24 hour period shall be considered a failure.

15. Heater voltage = 24 volts dc, anode supply voltage = 250 volts dc, anode lead 2500 ± 5% ohms screen grid voltage = 90 volts dc. Adjust grid 1 voltage to give anode current of 5 mAdc. Microphony observed as a variation in potential at the anode shall not exceed the stated limit.

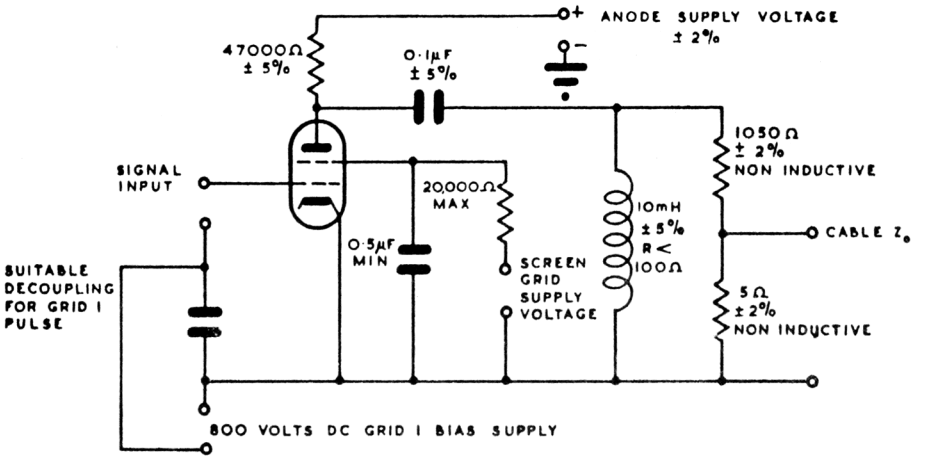
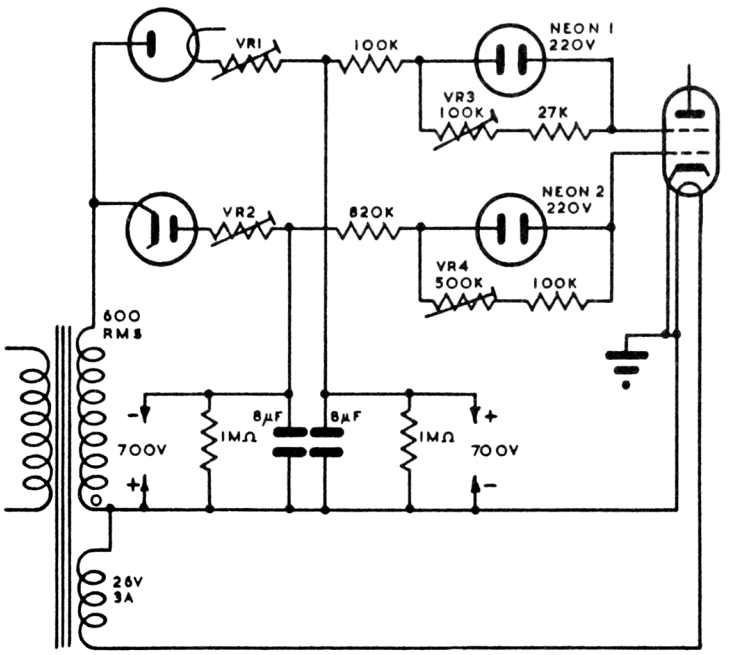


FIG. 1
CIRCUIT FOR OPERATION TEST

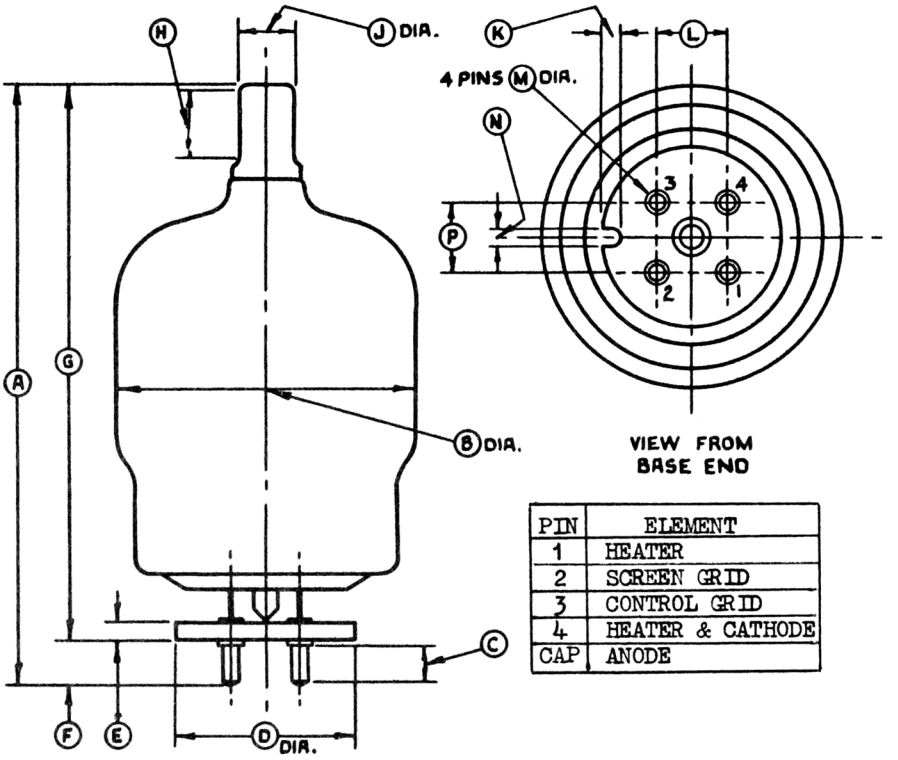


VR1 & VR2 ADJUSTED TO GIVE ±700V AS INDICATED
VR3 ADJUSTED TO IGNITE NEON 1 AT Ig2 1·7mA
VR4 ADJUSTED TO IGNITE NEON 2 AT Ig1 300μA

FIG.2
SHORT CIRCUIT INDICATOR

CV6131

FIG 3



PIN	ELEMENT
1	HEATER
2	SCREEN GRID
3	CONTROL GRID
4	HEATER & CATHODE
CAP	ANODE

REF	DIMENSIONS IN INCHES
A	5·875 ±0·125
B	3·062 MAX
C	0·328 MIN
D	1·813 MAX
E	0·187
F	0·500 MAX
G	5·469 ± 0·125

REF	DIMENSIONS IN INCHES
H	0·437 MIN
J	0·567
K	0·187
L	0·687
M	0·187 ± 0·004
N	0·187
P	0·687

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION MOA/CV6131, Issue 1A, Dated 28th February 1967

AMENDMENT No. 1

1. Page 1.

   (i) Specification Authority.

   Amend "MINISTRY OF AVIATION - DLRD/RRE" to read "MINISTRY OF TECHNOLOGY - DLRD/RRE".

   (ii) Specification Title.

   Amend "Specification MOA/CV6131" to read "Specification Mintech./CV6131".

2. Page 3, Group F, Pulse Life Test.

   In column headed "Conditions", amend "Group C" to read "Group D".

October 1967 T.V.C. for R.R.E. 6/3/67