CV6026

MINISTRY OF AVIATION - R.R.E.

VALVE ELECTRONIC

Specification MOA/CV6026
Issue 1A dated 14.7.61.
To be read in conjunction with K1001.

SECURITY

Specification	Valve
Unclassified	Unclassified

⟹ DENOTES A CHANGE

TYPE OF VALVE - Pulse hydrogen thyratron.
CATHODE - Unipotential, connected to mid point of heater.
ENVELOPE - Glass.
PROTOTYPE - VX3250.

MARKING

K1001/5
Serial No.

RATING

			Notes
Cathode heater voltage	(VRMS)	6.3 ± 7½%	B,M
Reservoir heater voltage	(VRMS)	5.0 ± 7½%	M
Cathode heater current, Vh = 12V	(A)	3.1	
Reservoir heater current, Vr = 5V.	(A)	4.15	
Max. peak anode voltage, (Va)	kV	25	H
Max. peak anode current, (Ia)	(A)	2000	P
Max. (½Va x Ia x PRF)	(MW.c/s)	10,000	G
Max. mean anode current	(A)	3	B
Max. rate of rise of anode current	A/us	7,500	C
Min. Grid trigger voltage	(V)	1000	F,R
Max. grid negative bias	(V)	110	R
Max. pulse length at max. peak Current	(us)	5	P
Max. pulse repetition frequency	(pps)	1500	Q
Min. heating time for cathode and reservoir heaters before application of anode voltage	(Minutes)	10	E

DATA

Typical anode delay time	(us)	0.45	R
Max. anode delay time	(us)	0.7	R
Typical anode delay time drift	(mus)	30	R,N
Max. anode delay time drift	(mus)	100	R,N
Approp imate jitter	(mus)	2	R,N

TOPCAP

See Fig 1 on page 6.

FLYING LEAD CONNECTIONS

COLOUR	ELECTRODE
Black	Cathode (HCT)
Yellow) Yellow)	Heaters for Cathode
Red) Brown)	Heater for reservoir
Blue	Baffle
White	Grid
TC	Anode. See Note D

DIMENSIONS (INCHES)

Max overall length excluding F/L) 17 5/16

Max glass dia excluding pip) 5½

Max mounting flange dia) 6 1/32
See fig 1 on page 6

MOUNTING POSITION

With anode uppermost, the axis of the valve shall be within 90° of the vertical

COOLING

See Note A

JOINT SERVICE CATALOGUE NO

5960-99-037-2142

NOTES

A. The temperature of the anode cooler one inch from the free end, as shown by the temperature indicating point shall not exceed 90° C to ensure that the glass-to-metal seal does not exceed 140°C.

As an indication, when the valve is operating under the conditions specified for the tests on page 4, and when the inlet air temperature is 40°C the air flow required is about 12 cu. ft. per minute. Under these conditions the pressure is about 1½ inches head of water.

B. During the cathode warm up, the cathode heater voltage should be 12V ± 7½%. After application of anode voltage the cathode heater voltage should be adjusted to a value inside the dashed lines in fig.2 on page 7, corresponding to the mean power supply current. This adjustment should be made not less than 5 minutes and not more than 15 minutes after reaching the required mean power supply current.

C. Defined as the maximum instantaneous rate of rise of current, i.e. di/dt max. and measured with a mutual inductor in the anode lead.

D. No part of the attached anode lead shall be within 1" of the glass envelope.

E. For ambient temperatures in the range + 5°C to + 70°C. For ambient temperatures in the range of 0°C to + 5°C the time should be increased to 15 minutes and for ambient temperatures in the range - 5°C to 0°C the time should be increased to 20 minutes.

F. Refers to the unloaded trigger pulse measured with respect to cathode potential.

G. This rating applies, providing the inverse voltage during the first microsecond following the pulse does not exceed K x Ea, where K is a constant and has the value 0.18.

Superseded

H. The anode voltage must be raised gradually. The time taken to reach 18kV must be not less than 30 seconds and to reach 25kV not less than 120 seconds.

M. It is recommended that the cathode heater and reservoir heater be supplied from separate transformers.

N. At the expense of increasing the anode delay time, the unloaded trigger pulse may be reduced to a value within the range 500 - 1000V, as shown in fig.4 on page 8 The anode delay time drift, and jitter are both unaltered.

P. For Pulse lengths greater than 5 us the peak current rating is reduced in the proportion 5/tp where tp is the pulse length in microseconds.

Q. Higher PRFs may be used at suitably reduced anode voltages.

R. The pulse generator must have the following characteristics:-

Unloaded trigger pulse:- 1000 volts, minimum
Rate of rise of unloaded trigger pulse:- 2 - 4 kV/us.
Unloaded trigger pulse duration:- 2 - 4 us.
Source impedance of trigger:- 200 ohms, maximum
DC resistance:- 500 ohms, maximum.

With the tube operating under equipment condition, the DC bias, measured across the decoupling capacitor C2 shall be 100 ± 10V negative.

The pulse generator must be connected to the valve through the resistance condenser network shown in fig.3 on page 7.

NOTES continued

The valve will operate at full voltage with zero bias in circuits where the recovery time requirements are not stringent.

S. In the event of an arc-over in the thyratron for any reason, the grid will remain at cathode potential whilst any substantial anode current is flowing. The grid bias circuit should therefore be designed to withstand the consequent current drain without damage.

Superseded

TESTS

To be performed in addition to those applicable in K1001, and to be carried out after a holding period of 96 hours, see Note 9

Tests, note 2.	Test conditions, notes 1,3.				Units	Limits		Notes
	T	Vh	VR	Va		Min	Max.	
GROUP A, 100% inspection								
(a) HT run up time.	0	12	5.0	-		-	-	4,7.
	10	12	5.0	Raise to 18	Secs	-	30	
	10+	12	5.0	Raise to 25	Secs	-	120	
(b) Anode delay time (1)	15	12	5.0	25	us	-	0.70	4,5,7.
(c) Run (1)	17	7.5	5.0	25	-	-	-	4,7.
(d) Jitter	25 - 30	7.5	5.0	25	mus	-	5	4,7.
(e) Run (2)	30	7.5	5.4	25	-	-	-	4,7
(f) Anode delay time(2)	35	7.5	5.4	25	us	Record		4,5,7
(g) Run (3)	36	7.5	4.6	25	-	-	-	4,7
(h) Maximum di/dt	41	7.5	4.6	25	A/us	6000	-	4,7,8
(j) Anode delay time (3)	42	7.5	4.6	25	us	Record		4,5,7
(k) - - -	43	12	5.0	0	-	-	-	-
(l) Cathode heater current	53	12	5.0	0	A	28	34	-
(m) Reservoir heater current	54	12	5.0	0	A	3.7	4.6	-
(n) Anode delay time drift	-	-	-	-	mus	-	100	10
GROUP B,C,D,E no tests								
GROUP F								
(p) Life, information.	-	7.5	5	25	hours	2000	-	4,6

Superseded

CV 6026

NOTES

1. The units for the test conditions are, T in minutes, Vh and VR in RMS volts, and Va in peak kilvolts. The commencement of test (a) shall be at time T = o.

2. The tests a - n shall be performed continuously and in the sequence shown.

3. The cathode heater and reservoir heater voltages should be measured at the tag ends of the appropriate leads.

4. The valve must be tested in the circuit shown in fig.5.
The pulse generator shall have the following characteristics:-
Unloaded trigger pulse:- 1000 volts maximum
Rate of rise of unloaded trigger pulse:- 2 - 4 Kv/us.
Unloaded trigger pulse duration:- 2us maximum.
Source impedance: 200 ohms minimum.
DC resistance: 500 ohms minimum.
With the tube operating, the DC bias measured across the bias decoupling capacitor C2 shall be 100 ± 10V negative.

The anode circuit constants shall be chosen so that at Va peak = 25 kV, Peak Anode Current = 2,000 Amps Minimum, Mean Power Supply Current = 2.5 Amps Minimum, Pulse Length = 3.1 ± 0.2 usec, Pulse Recurrence Rate = 400 ± 10%. In addition L4 shall be adjusted to give 7,500 ± 5% amps. per microsecond rate of rise of peak anode current. The adjustment shall be made using a CV6026 valve in which the gas pressure can be varied. The rate of rise of current is measured as a function of gas pressure. Above a certain pressure the rate of rise is determined predominantly by the circuit inductance. L4 should be adjusted to give 7,500 ± 5% A/usec at this pressure.

The value of L5 shall be such as to give resonant charging.

The circuit constants shall be adjusted so that the inverse voltage is at least K x Va for a period of ½ microsecond (min) in the first microsecond following the pulse, where K = 0.18.

5. Anode delay time is defined as the time interval between the rising portion of the grid pulse which is not more than 26% of the maximum unloaded pulse amplitude and the point where anode conduction takes place.

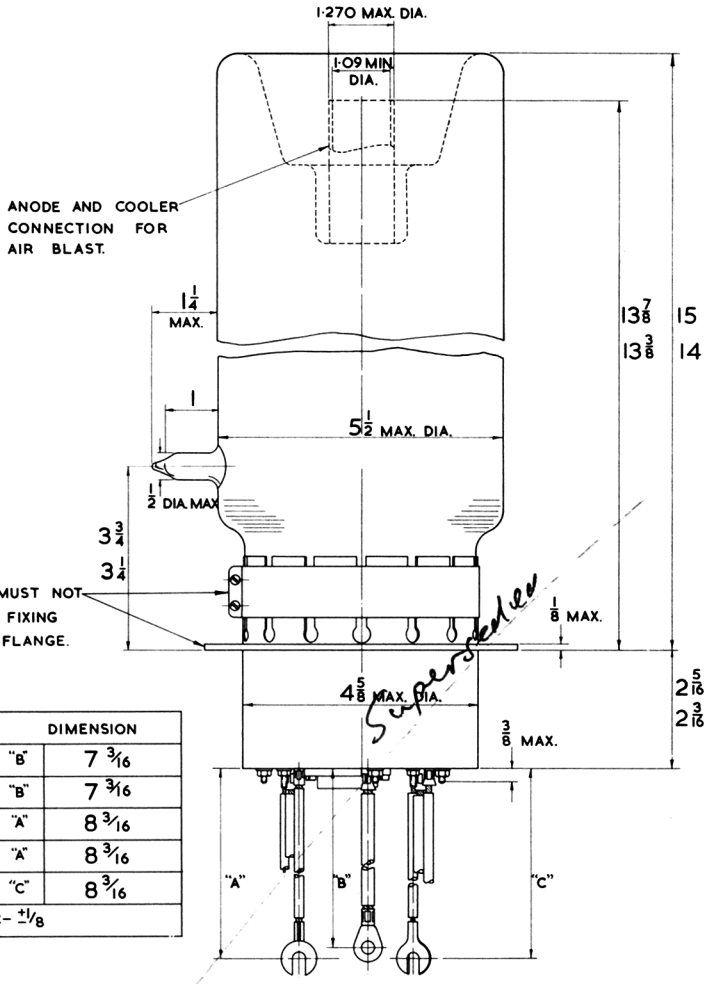
6. The valve shall be deemed to have reached the end of life when it fails to meet any of the requirements of tests a to n inclusive. Tests shall be made at intervals not exceeding 250 hours.

7. During HT run up time (test a), tripping is permissible. Subsequently the valve is not allowed to trip more than once. Should one trip occur, the HT must be re-applied at 25 kV within three seconds and the tests continued in sequence.

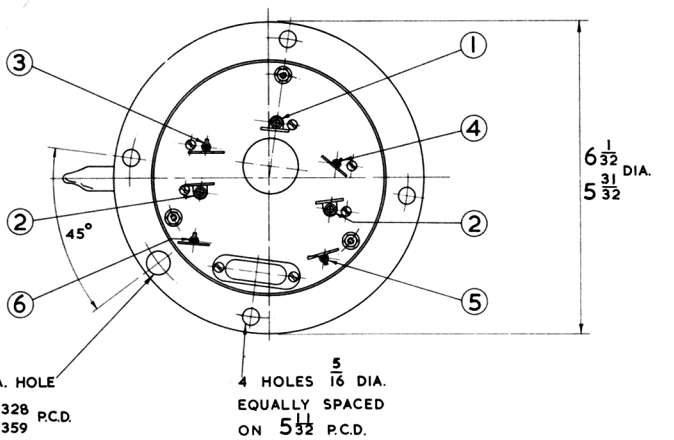
8. The rate of rise of anode current dia/dt shall be measured by means of a mutual inductor in the anode lead of the thyratron.

9. All valves shall be stored for at least 96 hours, during which no voltages shall be applied.

10. Anode delay time drift is the greatest difference between the anode delay times measured in tests (b),(f),(j).



LEAD	DIMENSION	
CATHODE	"B"	7 3/16
HEATERS	"B"	7 3/16
GRID	"A"	8 3/16
BAFFLE	"A"	8 3/16
RESERVOIRS	"C"	8 3/16
TOL:- ±1/8		



LEADS TABLE		
1	CATHODE	BLACK
2	HEATERS	YELLOW
3	BAFFLE	BLUE
4	GRID	WHITE
5	RESERVOIR	RED
6	RESERVOIR	BROWN

ALL DIMENSIONS IN INCHES

FIG. 2

CATHODE HEATER VOLTS AGAINST MEAN POWER SUPPLY CURRENT (SEE NOTE B)

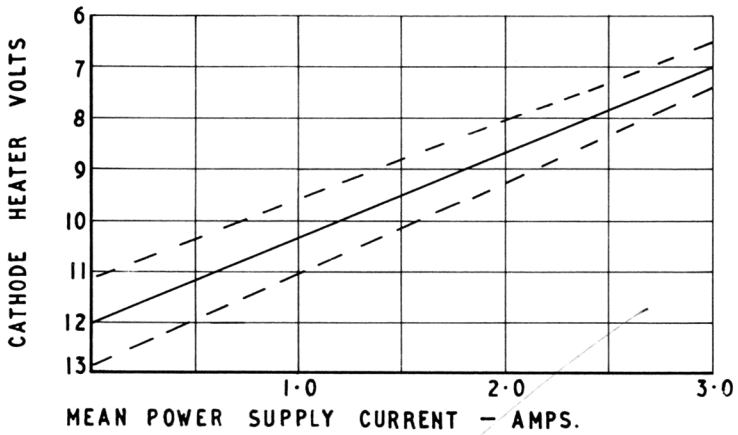
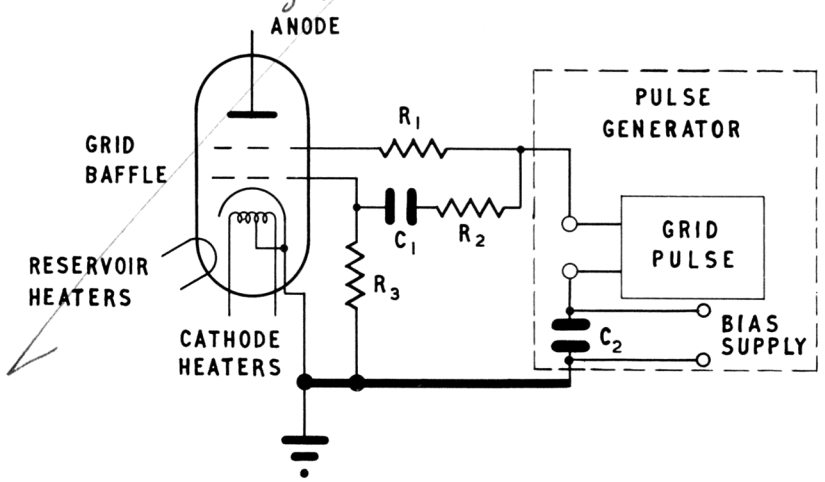


FIG. 3

TRIGGERING CIRCUIT (SEE NOTE R)



C_1 = ·005 μF ± 10 %, WORKING VOLTAGE 1000 V.

$R_1 = R_2 = R_3 = 500\,\Omega$ ± 10 %.

FIG. 4.
TYPICAL ANODE DELAY TIME AGAINST UNLOADED TRIGGER VOLTS.
(200 OHMS SOURCE IMPEDANCE, 0·5 μsec RISE TIME).

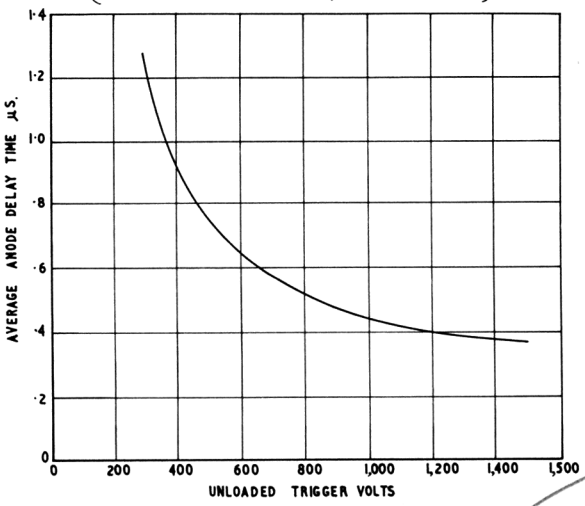


FIG. 5.
OPERATION TEST CIRCUIT (SEE NOTE 4.)