ADMIRALTY SIGNAL AND RADAR ESTABLISHMENT

VALVE ELECTRONIC **C.V.2386.**

Specification AD/CV2386 Issue No.1 dated 26.4.56. To be read in conjunction with K1001	SECURITY Specification: Unclassified Valve: Unclassified

TYPE OF VALVE: Grid-controlled Mercury Pool Modulator.
CATHODE: Mercury Pool.
ENVELOPE: Steel
PROTOTYPE: VX9022

MARKING
K1001/4

RATINGS			Note
Ignition Solenoid Supply	(V)	110 ± 5% D.C. or 230 ± 15% A.C. at 50 to 60 c/s.	A
	(A)	5.0 (nominal)	
Excitation and Ignition anodes supply voltage	(V)	100 ± 20 D.C.	B
Excitation current	(A)	7.5 to 8.5	
Ignition current	(A)	4 to 8	
GRID SUPPLY:-			
Bias voltage	(V)	-400 to -450	
Drive pulse (5 to 10 /usecs duration	(V)	800 to 1000	C
Normal grid-stopper resistance	(ohms)	2000	
LOW VOLTAGE ANODES:-			
Max. Hold-off voltage	(V)	1700	
Max. Inverse voltage	(V)	650	
Max. peak current per anode (for 2.5 /usecs.pulse in HV anode.	(A)	250	D
Pulse duration	(/uS)	650	H
Max.mean input power	(kW)	30	
Max.pulse repetition rate at 30 kW mean input power	(pps)	500	
HIGH VOLTAGE ANODE:-			
Max. Hold-off voltage	(kV)	28	
Max. Inverse voltage	(kV)	4	E
Peak current	(A)	1400	F,H
OPERATING TEMPERATURES			
Mercury pool	(°C)	15 to 50	G
Base of steel tank	(°C)	55 max.	

CONNECTIONS AND DIMENSIONS
See Drawings

MOUNTING:
(i) The valve must be mounted vertically and, while operating, its major axis must always be within 15° of the vertical.
(ii) The steel envelope of the valve must be insulated from earth and must be connected to the cathode through a 1000 ohm resistor.

NOTES

A. The solenoid supply shall be applied momentarily (for not less than 0.6 secs) to leads 1 and 3 (See drawing on Page 6) and then, with 100 ohms in series, momentarily (for not less than 0.05 secs) to leads 1 and 2.

B. The excitation current ripple shall not exceed ± 5%. The excitation anode series stabilising choke shall be not less than 0.05 Henry.

C. Source impedance for drive pulse shall not exceed 1000 ohms.

D. The low voltage pulse current shall be equally shared between two LV anodes.

E. The inverse voltage shall not exceed 500 volts for at least 10 μsecs. after the HV current pulse.

F. Maximum rate of increase of anode current = 8000A/μsec. The HV grid pulse must be applied when the LV anode current is falling and has reached a value between 60% and 33% of its maximum value.

G. The temperature of the base of the steel tank shall be measured at point 'X' shown on drawing on page 5. The temperature at this point must not be below 18°C when HT is first applied to the valve. The valve shall be cooled by an air stream at 15° to 25°C directed vertically upwards on to its base. The air stream and the size of the opening through which it emerges to impinge on the valve shall be such that 450 to 500 cubic feet of air shall emerge per minute and the velocity of the emerging air shall be 4500 to 5000 feet per minute.

H. These figures refer to a typical application in a D.C. transformation circuit with output pulses of Tp = 2.5 μsecs. and PRF = 400 pps.

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TESTS

To be performed in addition to those applicable in K1001

	Test Conditions	Test	Limits Min.	Limits Max.	No. Tested	Note
a	The excitation arc shall be formed in accordance with the circuits and information given on Page 6. The supply voltage to the ignition and excitation anodes shall be 80V D.C. on open circuit and have less than ± 5% ripple. The resistance in the excitation anode circuit shall be adjusted to limit the excitation arc current to 7A. The ignition solenoid supply voltage shall be 195V A.C.	Excitation Arc Formation The excitation arc forming procedure shall be repeated 20 times at approximately one-minute intervals. Number of failures to form arc:-	-	1	100%	1
b	The excitation arc shall be formed as in test (a) and the arc current shall be 7A.	Excitation Anode Voltage. (V)	16	26	100%	1
c	50V, RMS three-phase, 50 c/s A.C. supply applied, relative to the cathode to two of the LV anodes and the HV anode. The current to each of these anodes shall be limited by resistors to between 7A and 10A. The LV and HV grids shall be connected to their respective anodes through 100-ohm resistors. Excitation arc 7A formed as in test (a),	"Pick-up" on LV and HV anodes Each time the excitation arc is formed, arc current shall be "picked-up" on the LV and HV anodes. This test shall be repeated 5 times at approximately one-minute intervals. No. of failures to "pick-up" on LV and HV anodes:-	-	0	100%	

TESTS

To be performed in addition to those applicable in K1001.

	Test Conditions	Test	Limits Min.	Limits Max.	No. Tested	Note
d	As in test (c) but with LV and HV grids biased to -100V with respect to cathode.	"Cut-off" on LV and HV anodes Each time the excitation arc is formed, there shall be no "pick-up" of arc current on LV and HV anodes. This test shall be repeated 5 times at approximately one-minute intervals. No. of times LV or HV anodes "pick-up" arc current:-	-	0	100%	1
e	Each electrode (except ignition electrode) "meggered" at 1 kV to envelope.	Insulation (megohms)	20	-	100%	1
f	Apply 2 kV, RMS, 50 c/s A.C. (relative to the envelope) to each electrode in turn except the ignition electrode. Electrodes not under test to be left unconnected.	"Flashover" No. of internal or external "Flashovers"	-	0	100%	1
g	Apply 20 kV, RMS, 50 c/s A.C. between the HV anode and all the other electrodes except the ignition anode. The electrodes shall be connected together and to the envelope, but the ignition anode shall be left unconnected.	Vacuum After a "cleaning up" period lasting 10 minutes the number of breakdowns occurring in the next two minutes shall be:-	-	0	100%	1
h	As in circuit shown on drawing on page 7. The mean input power to the modulator shall be 30 kW and the PRR shall be 400 pps.	Life Test Hours of satisfactory operation.	1000	-	T.A.	1

NOTES

1. All the tests shall be done after a holding period of not less than one month, and the first of the tests to be done shall be the Vacuum Test of test clause (g). The tests shall be done at any ambient temperature between 15° and 25°C.

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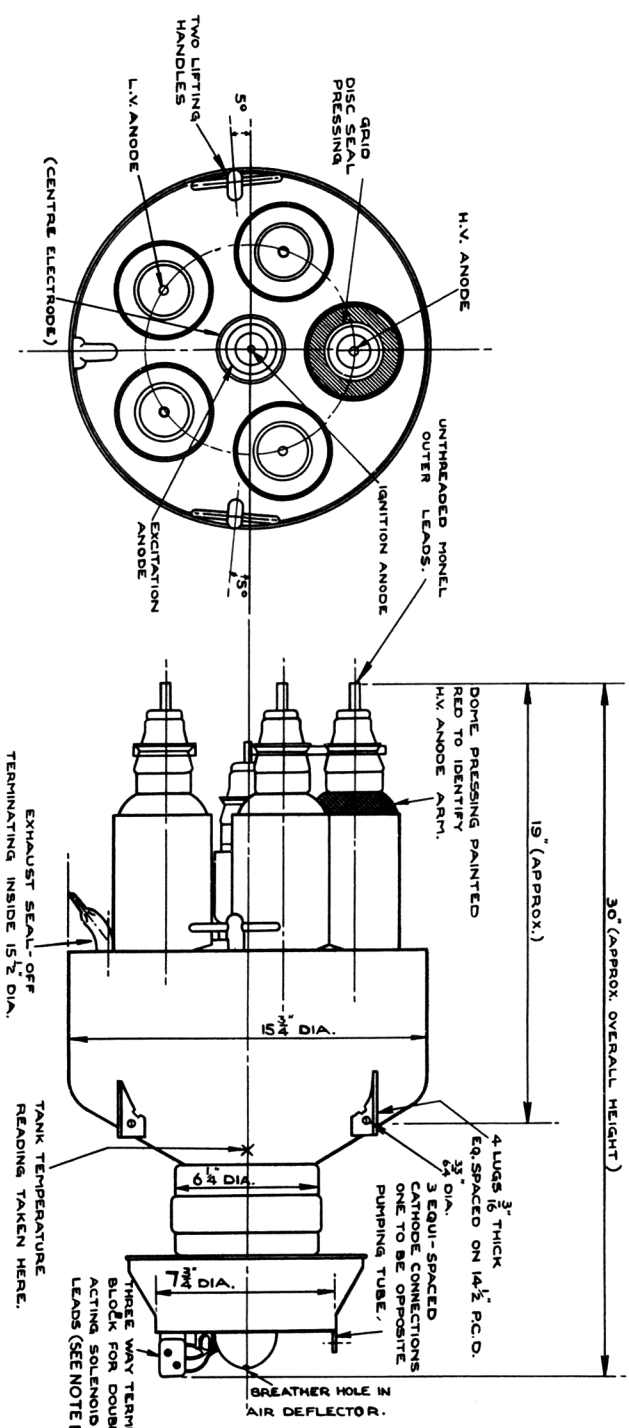
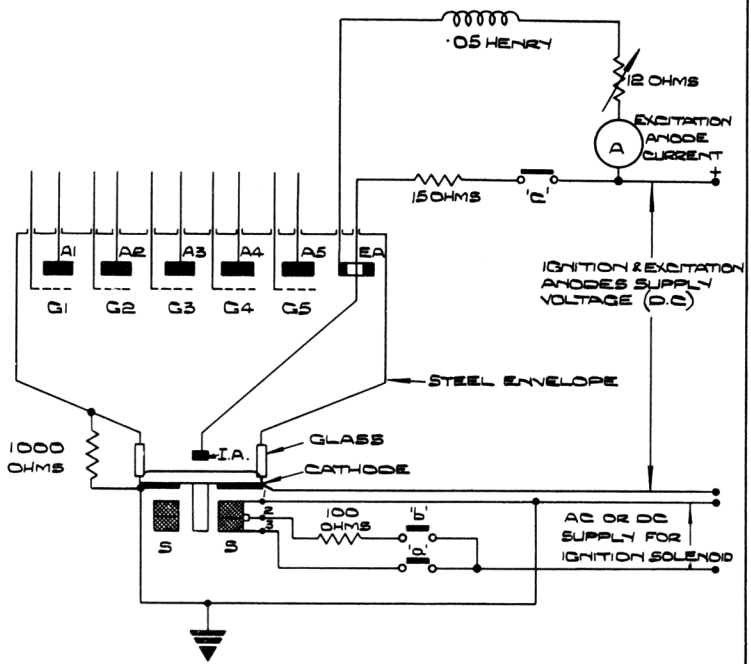


ITEM.	NOTE A/M NO.	CRABTREE PART NO.
TERMINAL BLOCK.	5H/2	50450
COVER.	5H/8	52361
SOCKET.	5H/125	52294
FERRULE.	5H/24	50925



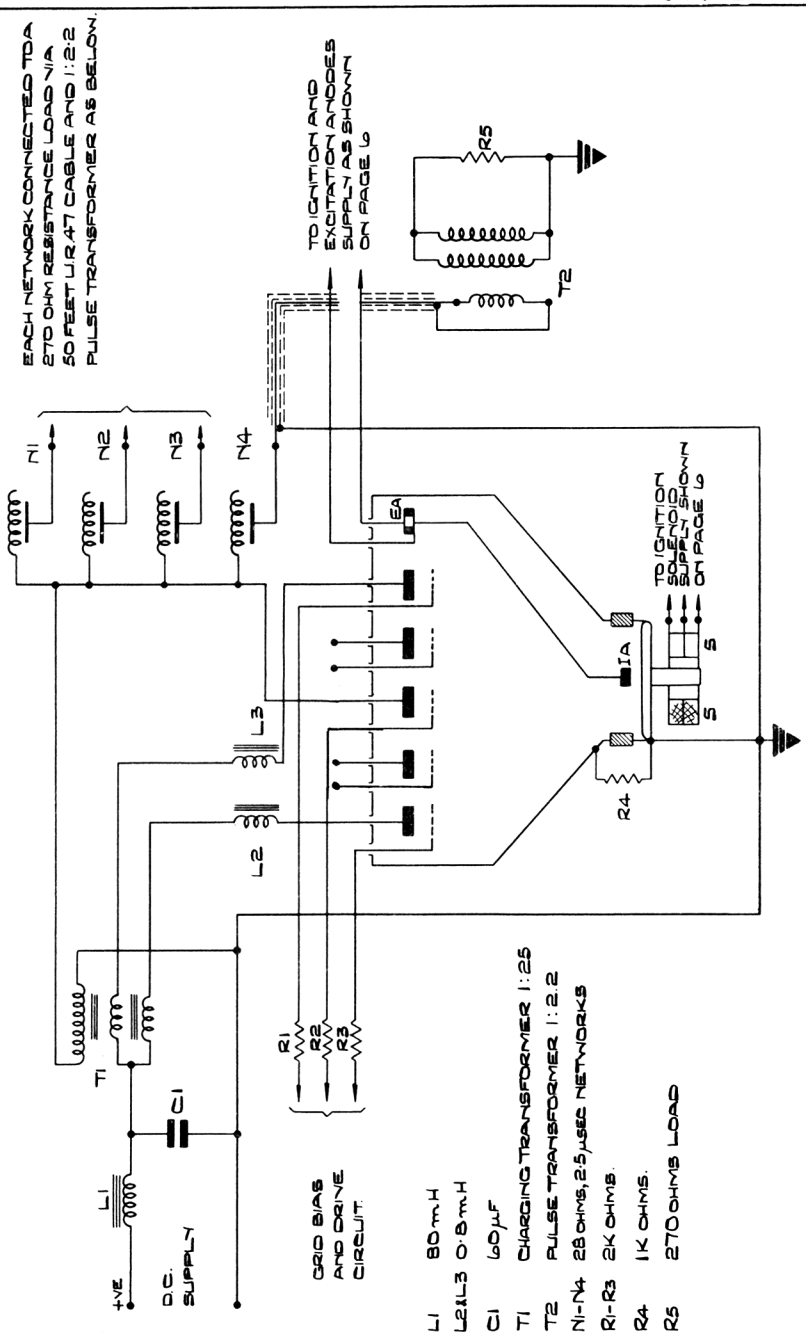
A1 A5	LOW VOLTAGE ANODES
G1 G5	LOW VOLTAGE GRIDS.
A3	HIGH VOLTAGE ANODE
G3	HIGH VOLTAGE GRID
EA	EXCITATION ANODE
IA	IGNITION ANODE
S	IGNITION SOLENOID COIL
A2 G2 A4 G4	LOW VOLTAGE ANODES AND GRIDS NOT NORMALLY USED.

NOTES:-

1. TO FORM THE EXCITATION ARC, CONTACTS 'a' AND 'c' ARE CLOSED MOMENTARILY (FOR NOT LESS THAN 0·6 SECS.) AFTER 'a' AND 'c' OPEN, CONTACT 'b' IS CLOSED MOMENTARILY (FOR NOT LESS THAN 0·05 SECS.) TO ASSIST THE RETURN OF THE PLUNGER TO ITS ORIGINAL POSITION.

2. THE STEEL ENVELOPE MUST BE INSULATED FROM EARTH AND CONNECTED TO CATHODE THROUGH 1000 OHMS.

MODULATOR SWITCH-ASSOCIATED SUPPLY CIRCUITS.



L1 80 m.H

L2&L3 0·8 m.H

C1 60 μF

T1 CHARGING TRANSFORMER 1:25

T2 PULSE TRANSFORMER 1:2.2

N1-N4 28 OHMS, 2·5 μSEC NETWORKS

R1-R3 2K OHMS.

R4 1K OHMS.

R5 270 OHMS LOAD

MODULATOR CIRCUIT FOR LIFE TESTING OF MERCURY POOL SWITCH.