VALVE ELECTRONIC

ADMIRALTY SURFACE WEAPONS ESTABLISHMENT

CV 6141

Specification AD/CV6141 Issue 1 dated 1.2.65 To be read in conjunction with K1001	SECURITY Specification: Unclassified Valve: Unclassified

TYPE OF VALVE Quick warm-up, rugged Pulse Modulator Tetrode

CATHODE Directly heated

ENVELOPE Ceramic

PROTOTYPE VX3353

RATING

All limiting values are absolute

		NOTE
Max. Heater Voltage (V)	1.15	
Min. Heater Voltage (V)	1.05	
Max. Heater Current (A)	11	
Min. Heater Current (A)	9	
Max. Anode Voltage (Continuous) (kV)	5	
Max. Anode Voltage (Pulse) (kV)	5	
Max. Screen Voltage (Continuous) (V)	650	
Max. Anode Dissipation (W)	7.5	
Max. Screen Dissipation (W)	1.75	
Max. Anode Current (A)	4	
Max. Cathode Current (Continuous) (mA)	70	
Max. Grid-Cathode Voltage (V)	+150 -200	
Max. Grid Dissipation (W)	0.4	
Max. Mounting Flange Temperature (^{o}C)	85	
Min. Mounting Flange Temperature (^{o}C)	-40	
Max. Shock (12 mS duration) (g)	50	
Max. Acceleration (Constant) (g)	100	
Max. Acceleration (Swept vibration) (g)	30	
Warm-up time (Sec)	10	

CAPACITANCES

C in (pf)	23
Ca, g1 (pf)	0.5
C out (pf)	10

MARKING

See K1001/4
Add:- Serial No. ...

BASE

See drawing on page 9.

CONNECTIONS

Pin	Electrode	
1	Anode	a
2	Heater	h
3	Heater (Cathode)	h, k
4	No Connection	
5	Control grid	g1
6	Screen grid	g2
7	No Connection	

DIMENSIONS

See drawing on page 9.

MOUNTING POSITION

Any

NOTES

A. The Joint Services Catalogue No. is 5960-99-037-4043

To be performed in addition to those applicable in K1001

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

Test conditions - unless otherwise stated:-

Heater voltage 1.1V 50 c/s a.c.

K1001 Issue 6 Ref.	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	Limits Max.	Units
	Group A			100%				
5.2.1	Insulation	Vg-g2 = 500V			R	100		M ohm
		Vg2-a = 500V			R	100		M ohm
		Vg1-k = 20V			R	50		M ohm
		pins 4 and 7 to all others and mounting flange, V = 500V			R	200		M ohm
	Heater current	V_h only			Ih	10	10.6	A
	Negative grid current	$V_a = V_{g2}$ = 150V I_a = 50 mA R_{g1} = 5 k ohm max.			I_{g1}		3.0	/uA
	Shock	V_h only. Note 1.						
	Vibration (Missed Pulses)	I_a = 3.5A Notes 2, 3, 5.						
	Missed Pulses (Warm Up)	I_a = 3.5A Notes 2, 3, 4.						
	Anode-Cathode Voltage Drop	I_a = 3.5A Note 3.			V_a		400	V

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	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	Limits Max.	Units
	Group B Note 6			10% (20)				
	Negative Grid Voltage	$V_a = V_{g2} = 150V$ $I_a = 50$ mA			V_{g1}	4	7	V
	Screen Current	$V_a = V_{g2} = 150V$ $I_a = 50$ mA			I_{g2}		20	mA
	Tail Test (1)	$V_a = 150V$ = $V_{g2} = 150V$ = $I_a = 0.5$ mA			$-V_{g1}$		25	V
	Tail Test (2)	$V_a = 3.5$ kV $V_{g2} = 600V$ $V_{g1} = -110V$			I_a		150	/uA
	Cathode Current	g_1 and g_2 strapped to Anode V_a pk = 250V, 2 /uS pulses, 50 p.p.s.			I_k pk	6		A
	Group C Note 6			2% (2)				
	High Temperature	$V_h = 1.15V$ I_a pk = 4.0A Notes 3, 7						
	End Point Tests							
	Anode-Cathode Voltage Drop	$I_a = 3.5A$ Note 3			V_a		400	V
	Tail Test (2)	As in Group B			I_a		200	/uA
	Group D			QA				
	Capacitances	C in C out C a-g_1 Note 8					24 11 0.6	pF pF pF

	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	Limits Max.	Units
	Group E Note 9			1% (1)				
	Low Temperature Operation. Missed Pulses (Warm Up)	I_a = 3.5A. Note 10						
	Thermal Shock	No Voltages. Note 11						
	Vibration and Fatigue	I_a = 3.5A, Notes 3, 12.						
	Interim Electrical Tests							
	(a) Heater Current	As in Group A			I_h	10	10.6	A
	(b) Negative Grid Voltage	As in Group B			V_{g1}	4	7	V
	(c) Negative Grid Current	As in Group A			I_{g1}		3.5	/uA
	(d) Peak Anode Current	V_a-k = 400V. Note 3			I_a	3.25		A
	(e) Tail Test (2)	As in Group B			I_a		150	/uA
	Shock	No voltages. Note 13						
	Constant Acceleration	Note 14		Q.A. only				
	Vibration (Missed Pulses)	As in Group A						
	Low Air Pressure	I_a = 3.5A Notes 2, 3, 15						
	Climatic (Humidity)	No voltages. Note 16		Q.A. only				

	Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits Min.	Limits Max.	Units
	Final Electrical Tests							
	(a) Insulation	Vg1-g2 = 500V Vg2-a = 500V Vg1-k = 20V			R R R	50 50 25		M ohm M ohm M ohm
	(b) Missed Pulses (Warm Up)	As in Group A						
	(c) Peak Anode Current	V_{a-k} = 400V. Note 3			I_a	3.25		A
	(d) Tail Test (2)	As in Group B			I_a		200	µA
	(e) Negative Grid Voltage	As in Group B			V_{g1}	3.5	7.5	V
	(f) Negative Grid Current	As in Group A			I_{g1}		3.5	µA
	Group F Note 9			1% (1)				
	Life	Mounting flange temperature 75-85°C Notes 3, 17						
	Final Test Point	Note 18						
	Group G			100%				
	Holding Period ~~28 days~~ 14 days Negative Grid Current	As in Group A			I_{g1}		3	µA

Amdt. 1

NOTES

1. The valve shall be subjected to one shock of 50g, 12 mS duration with rise time less than 1.0 mS in a direction perpendicular to the major axis. This test is not regarded as destructive and K1001/5.15 does not apply.

2. A pulse is considered missing if on the application of an input pulse the output pulse is less than 90% of the normal value for that valve.

3. The valve shall be driven with a 0.4 μS pulse at 1500 p.p.s. so that the grid voltage rises to not more than 125V in the circuit shown on page 8. For life test, Group F, a 250 pF capacitor shall be connected in parallel with the 750 ohm load resistance. For 'Fatigue Test', the modulator voltage (600V) may be regarded as nominal.

4. The valve shall not have been operated during the two hours immediately before this test. During the period 10 secs to 20 secs after the heater is switched on the missed pulses shall not exceed 5%. There shall not be more than 5 missed pulses in each 10 sec. period in the following 60 seconds.

5. The valve shall be mounted in a jig as shown on the drawing on page 10 and subjected to swept frequency sinusoidal vibration having a peak acceleration of not less than 3g at 10 c/s rising to 30g at 100 c/s and remaining at 30g up to 5 kc/s at a sweep rate of approximately one octave per minute. The valve shall be vibrated in a direction perpendicular to the major axes and to the mounting flange flats.

   The frequency shall be swept once upwards and once downwards. There shall not be more than 5 missed pulses in each 10 seconds period but the valve may be revibrated over a range of ± 10% centred on any frequency at which more missed pulses are noted and regarded as acceptable if the limit of missed pulses is not again exceeded.

   The valve shall be allowed to operate before commencing the vibration test.

6. The sample for test is to be taken from the quantity manufactured in one month. If this is less than the minimum number of samples stated all valves shall be tested. If any failure occurs in a sample the whole batch shall be subjected to the relevant test and all failures rejected.

7. The valve shall be placed in a chamber and the temperature, measured at the mounting flange, shall be raised to 85°C ± 2°C at which it shall be held for 20 minutes. The valve shall then be operated for 30 minutes.

8. Measured on a 1 Mc/s bridge in an approved holder.

9. The sample for test is to be taken from the quantity manufactured in one month. If one failure occurs in a sample a further sample may be taken and submitted to the relevant test. If any failure occurs in the second sample or more than one failure was recorded in the original sample no valves from the batch shall be delivered without the agreement of the Qualification Authority.

10. The temperature of the mounting flange shall be reduced to -45°C ± 5°C at which it shall be held for 10 minutes. The valve shall then be subjected to the Missed Pulses (Warm Up) test, Group A. This test shall be repeated three times. The holding period of two hours (Note 4) does not apply to this test.

11. The valves shall be subjected to the following cycle three times:-

(a) Hold at ambient temperature of $-45^{\circ}C \pm 5^{\circ}C$ for not less than 15 minutes.

(b) Hold at an ambient temperature of $100^{\circ}C \pm 5^{\circ}C$ for not less than 15 minutes.

The time of changing from one temperature condition to the other shall not exceed five minutes.

12. The valve shall be subjected to a swept frequency sinusoidal vibration having a peak acceleration of not less than 1_g at 10 c/s rising to 10_g at 100 c/s and remaining at 10_g up to 2 kc/s at a sweep rate of approximately one octave per minute for 100 hours divided into at least 30 hours in each of three mutually perpendicular directions. One direction of vibration shall be along the major axis. The operating voltages shall be continuously switched, 15 minutes on, 30 minutes off.

13. The valve shall be subjected to three shocks of 50_g, 12 mS duration with rise time less than 1 mS in each of three mutually perpendicular directions one of which shall be along the major axis.

14. The valve shall be subjected to a constant acceleration of 100_g for a period of five minutes in each of three mutually perpendicular directions one of which shall be along the major axis.

15. The valve shall be placed in a chamber and operated for not less than 60 seconds. The pressure shall then be reduced to 35 mm Hg and held for a period of three minutes during which the number of missed pulses shall not exceed five in each period of ten seconds.

16. The valve shall be placed in a chamber with an ambient temperature maintained at $55^{\circ}C \pm 2^{\circ}C$ and a relative humidity of not less than 95%. The duration of the test shall be seven days. The valve shall then remain under standard atmosphere conditions for 24 hours before testing is continued.

17. The valve shall be subjected to the following cycle 60 times:-

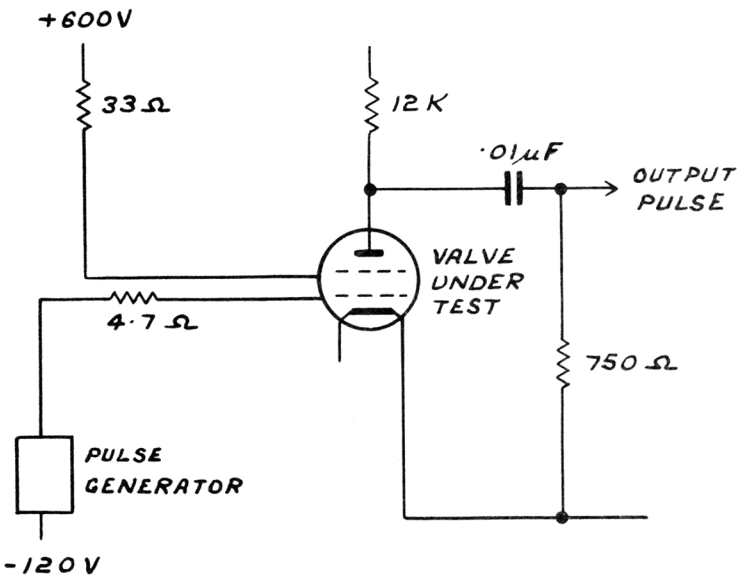
(a) Heater and h.t. on simultaneously and maintained for two hours. During this period the mounting flange temperature shall be allowed to rise to $85^{\circ}C$.

(b) Heater only on for eight hours.

(c) All voltages off for one hour.

18. The valve shall be re-tested in accordance with Final Electrical Tests in Group E except that the minimum limit for Peak Anode Current shall be 3.0A and the maximum limit for Tail Test (2) shall be 250 uA. Marginal failures in these tests should be reported to the Qualification Authority.

ALL RESISTORS ± 10%



TEST CIRCUIT

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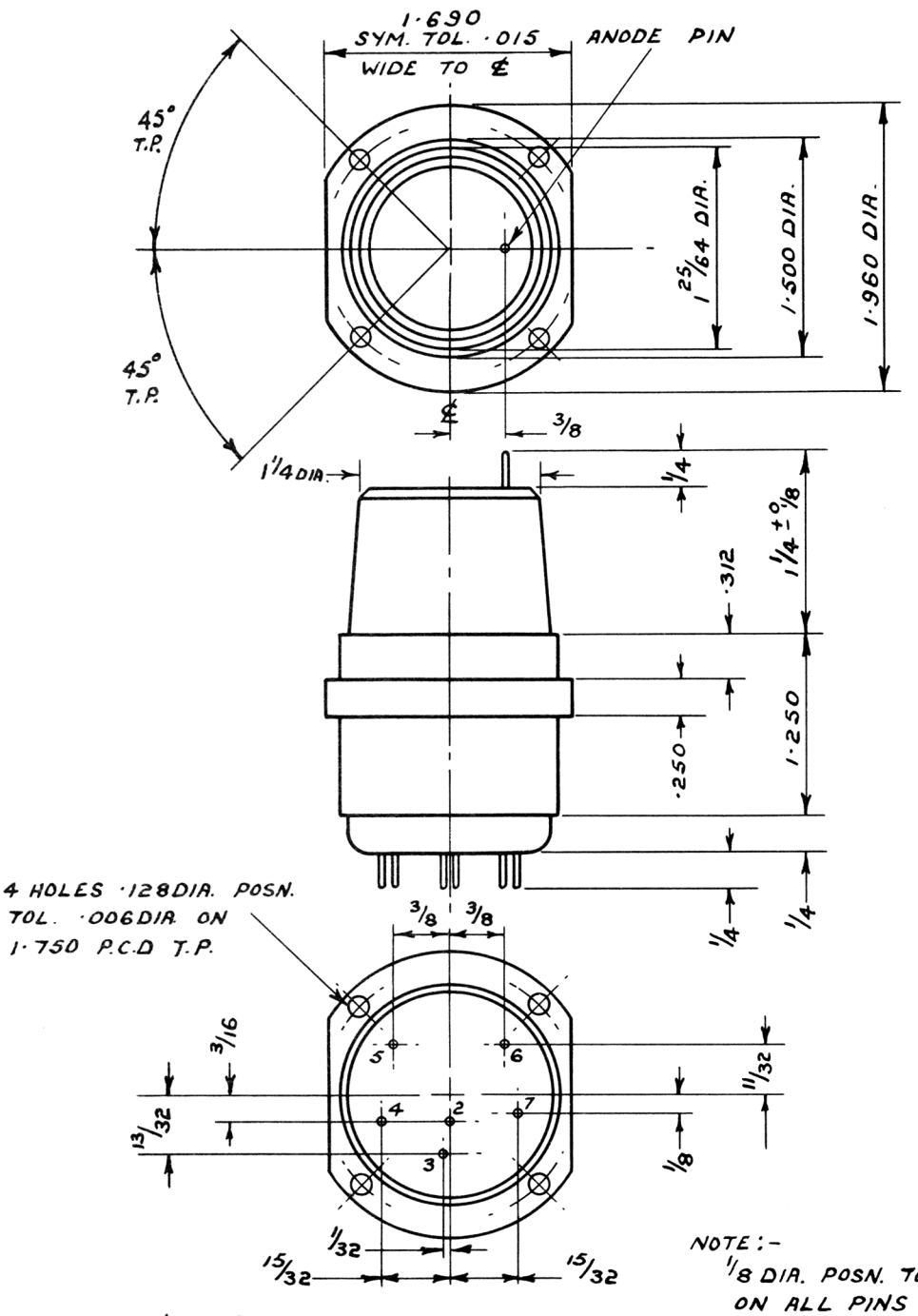
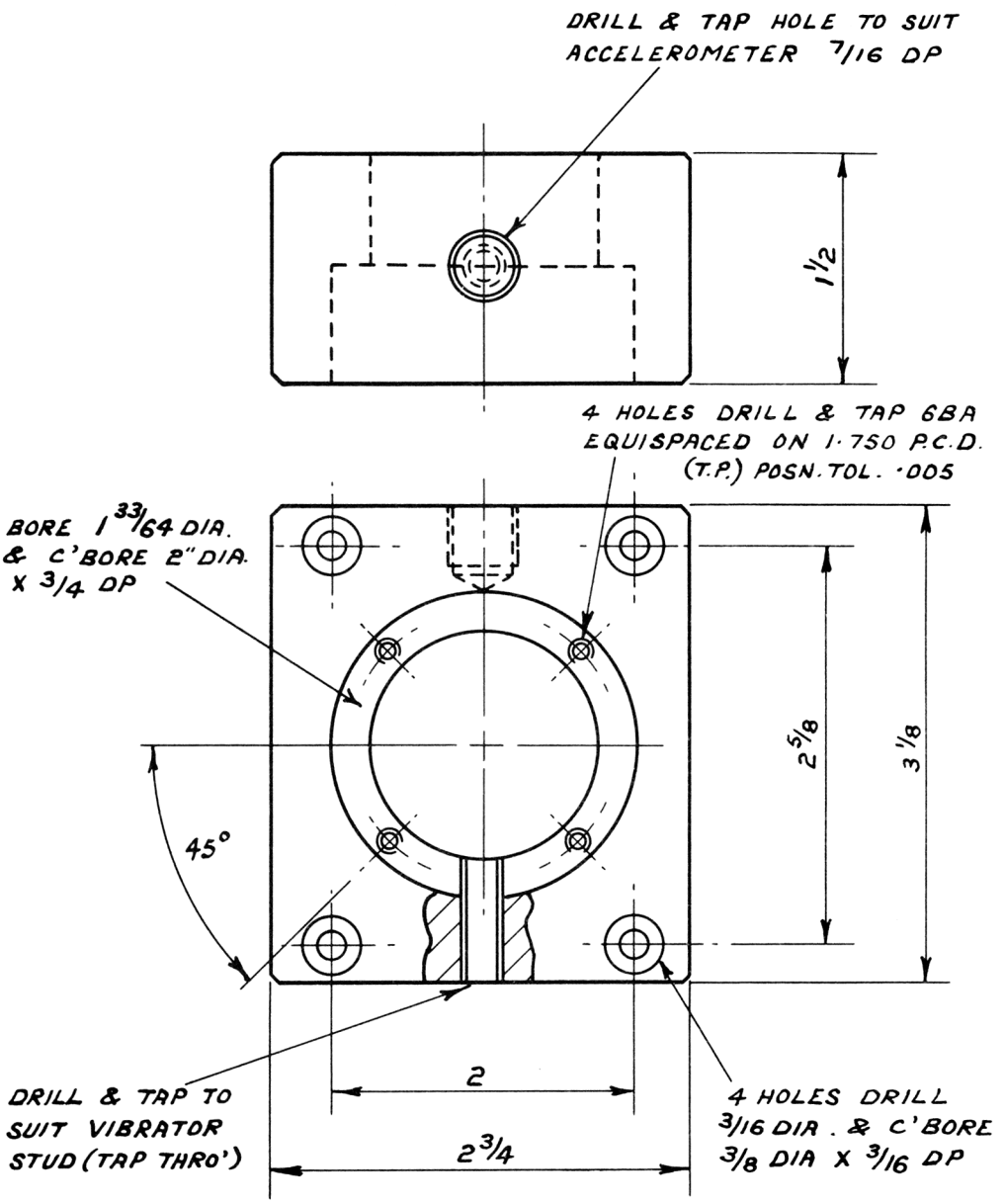


NOTE :-
1/8 DIA. POSN. TOL.
ON ALL PINS

DEC. DIMS. ± ·005
FRAC. DIMS. ± 1/32 UNLESS OTHERWISE STATED

DIMENSIONS IN INCHES



VIBRATION JIG.

DEC. DIMS. ±
FRAC. DIMS ± 1/64 UNLESS OTHERWISE STATED

DIMENSIONS IN INCHES MATERIAL :- MAGNESIUM

ELECTRONIC VALVE SPECIFICATIONS
SPECIFICATION AD/CV6141 ISSUE NO. 1
DATED 1st FEBRUARY, 1965

AMENDMENT NO. 1

Page 5 - Group G

Holding period - delete 28 days
insert 14 days

Admiralty Surface Weapons
Establishment

February, 1969

JAAS 3/4/69