VALVE ELECTRONIC **CV2412.**

ADMIRALTY SIGNAL AND RADAR ESTABLISHMENT

Specification AD/CV2412 Issue No. 1 dated 1.1.57 To be read in conjunction with K1006	SECURITY	
	Specification	Valve
	Unclassified	Unclassified

TYPE OF VALVE: Magnetron, Pulse Type.

PROTOTYPE: 4J50 but with different frequency range.

MARKING

See K1001/4.
Additional Marking:-
Serial No. .....

RATINGS

(All limiting values are absolute.)

Heater Voltage (V)				13.75	A
Heater Current (A)				3.375	A
Peak Anode Current (A)	27.5	18.0	14.5	9.5	B,C
Max. Mean Power Input (W)	635	380	635	380	B,C
Max. Peak Power Input (kW)	635	380	320	190	B,C
Max. Duty Cycle	.001	.001	.002	.002	B,C
Max. Pulse Duration (µS)	0.3 to 1.2	6.0	0.3 to 1.2	6.0	B,C
Max. Voltage Rate of Rise (kV/µS)				110	
Min. Voltage Rate of Rise (kV/µS)				70	
Min. Cathode Heating Time (Secs.)				240	
Max. Anode Temperature (°C)				150	D
Nominal Operating Frequency (Mc/s)				9642	

CONNECTIONS AND DIMENSIONS

See drawings on Pages 6 & 7

NOTES

A. For input powers greater than 100W, it is essential to reduce the heater voltage according to the following formula:

$$Vh = 14\left(1 - \frac{W\ input}{1120}\right)$$

The heater current surge shall be limited to 4 times normal operating current.

B. The maximum values of peak power input, mean power input and peak anode current for pulse lengths between 1.2 and 6.0 µS are to be determined by linear interpolation.

C. Maximum values of peak power input between 0.001 and 0.002 are to be determined by linear interpolation.
For values of Duty Cycle less than 0.001, the value of peak power input shall not exceed the rating determined at 0.001 duty cycle for the applicable value of pulse width.

D. Forced air cooling shall be provided to maintain the cathode terminal temperature below 165°C.

E. The product of pulse length in seconds and PRF in cycles per second must not exceed 0.002 at maximum input power. The valve shall not be operated longer than 6 µS in any 100 µS interval.

F. The valve shall not be operated at maximum peak input power at pressure less than 600 mms Hg.

G. No technical information shall appear on the valve or packaging.

Description: Magnetron, Pulse Type, Integral Magnet
Ratings: Simultaneous Operating Conditions

	Ef	ib	pi	Pi	Du	tp	rrv	Anode T	tk
Absolute	V	a	kw	W	—	us	kv/us	°C	sec
Maximum:	Note 1e	27.5	635	635	.001	.3-1.2	110	150	—
Maximum:		18	380	380	.001	6.0	110	150	—
Maximum:		14.5	320	635	.002	.3-1.2	110	150	—
Maximum:		9.5	190	380	.002	6.0	110	150	—
Minimum:		—	—	—	—	—	70	—	240

Notes: (a) Maximum values of pi, Pi and ib for pulse durations between 1.2 and 6.0 us are to be determined by linear interpolation.
(b) Maximum values of pi for duty cycle between .001 and .002 are to be determined by linear interpolation. For values of duty cycle less than .001, the value of pi shall not exceed the rating determined at .001 duty cycle for the applicable value of pulse width.

Pulsing Service: Notes 1 and 2

Ref.	Test	Conditions	Min.	Max.
D-2	Qualification Approval:	Required for JAN Marking		
F-5h	**Salt Spray Corrosion:	Omit		
F-2	Electrode Insulation:	Omit		
F-3	Holding Period:	t=168 hours		
F-6a	Drop:	Note 7		
F-6b(1)	*Vibration:	No voltages; t=60; F=25; Note 7		
F-6b(2)	**Vibration:	No voltage; t=60; F=50; G=10		
F-5d	Dimensions:	Per Outline		
E-7c	Marking:			
F-5n	Pressurizing	40 to 45 lbs/sq. in. abs.; input & output assemblies		
F-6i	Heater Current:	Ef=13.75V	If: 3.00	3.75 A

Ref.	Test	Conditions		Min.	Max.	
F-10e	Oscillation (1)	Note 3, 4				
F-10e(2)	Heater:	tk=240(max.);Note 1e				
F-10e(3)	Pulse Characteristics:	tp=0.9 to 1.1uus rrv=110kv/us(min.) Du=.001				
F-10e(4)	Average Anode Current:	Ib=27.5 mAdc				
F-10e(5)	Pulse Voltage:		epy:	20.0	23.0	kv
F-10e(6)	Power Output (A):	t=300(max.)	Po:	225	—	w
F-6h(3)	Frequency:	T of anode block Approx. 100°C.	F:	9580	9705	Mc
F-10e(8)	R.F. Bandwidth:		Bandwidth:	—	3.0	Mc
F-10k	Pulling Factor:		ΔF:	—	15	Mc
—	Stability:	Note 5	Area:	—	0.25	%
F-5p	**Thermal Factor		ΔF/ΔT:	—	.25	mc/°C
F-10e	Oscillation (2)	Note 3,4				
F-10e(2)	Heater:	tk=240(max.);Note 1e				

F-10e(3)	Pulse Characteristics:	tp=5.0 to 6.0uus
		rrv=110kv/us(min.);
		tf=2.4us(max.);
		Du=.001				

F-10e(4)	Average Anode Current:	Ib=18 mAdc				
F-10e(6)	*Power Output (A):	t=300(max.)	Po:	140	—	W
F-10e(8)	*R.F. Bandwidth:		Bandwidth:	—	1.0	Mc
—	↑ Stability:	Note 5, 6	Area:	—	0.25	%
F-5q	*Low Temperature Operation:	tk=240(max.);				

Ref.	Test	Conditions		Min.	Max.	
F-10e	Oscillation(3)	Notes 3, 4				
F-10e(2)	Heater:	tk=240(max.);Note 1e				
F-10e(3)	Pulse Characteristics:	tp=2.7 to 3.3 us rrv=110kv/us(min.); Du=.001				
F-10e(4)	Average Anode Current:	Ib=23.5 mAdc				
F-10e(6)	*Power Output(A):	t=300(max.)	Po:	185	---	W
F-10e(8)	*R.F. Bandwidth:		Bandwidth:	---	1.0	Mc
---	*Stability:	Note 5	Arcs:	---	0.25%	
F-4	Life Test:	Oscillation (3); σ=1.50; Group D: Note 8	t:	250	---	hrs.
F-4b	Life Test End Point:	Oscillation (3)	Po:	140	---	W
			F:	9580	9705	Mc
			Bandwidth:	---	1.5	Mc
			Stability Arcs:	---	0.5%	

Note 1: (a) The tube shall not be operated at maximum peak input power at pressure less than 600 mmHg.

(b) The tube shall not be operated longer than 6 us in any 100 us interval.

(c) Adequate means shall be provided to limit the temperature of the cooling fins and to maintain the cathode terminal temperature below 165°C maximum as measured along dimension BH of the outline drawing.

(d) The product of pulse duration in seconds and the pulse recurrence rate in cycles per second must not exceed .002 at maximum peak input power.

(e) The pulse recurrence rate must be greater than 175 pps. During high voltage pulsed operation, it is essential to reduce the heater voltage according to the following schedule:

Average Power input 0-100 watts, Ef=13.75 Volts
For Pi greater than 100 watts, $Ef = 14\left(1 - \frac{Pi}{1120}\right)$

The filament voltage should be applied gradually when putting tube into operation, or some other equivalent means used to limit surge current to less than four times normal current.

Note 2: For conditions of operation not included in the maximum ratings, the equipment designer shall confer with manufacturer through the appropriate Service.

Note 3: The termination of the magnetron during this test shall be equivalent to a waveguide line with a VSWR not greater than 1.05 except where specifically noted.

Note 4: A pulser of the discharging network type shall be employed for this measurement.

Note 5: The tube shall be operated into a transmission line with a VSWR of 1.5 to 1 adjusted in phase to produce maximum instability. The tube shall be considered stable when it shows less than the maximum allowable percentage of arcs during the last five minute interval of a test period of fifteen minutes. The percentage of arcs is defined as the number of arcs in the five minute interval divided by the total number of magnetron pulses during that interval. Arcs shall be recorded by an electronic counter which is adjusted to respond to 10% above operating peak current.

Note 6: This measurement shall be performed as the first test following the holding period.

Note 7: On evidence of satisfactory quality, the inspector may limit this test to ten tubes per month when the tube is in continuous production.

Note 8: The load shall be a transmission line of VSWR 1.5 to 1 with the phase varying through 1 cycle of 360 electrical degrees each 15 minutes.

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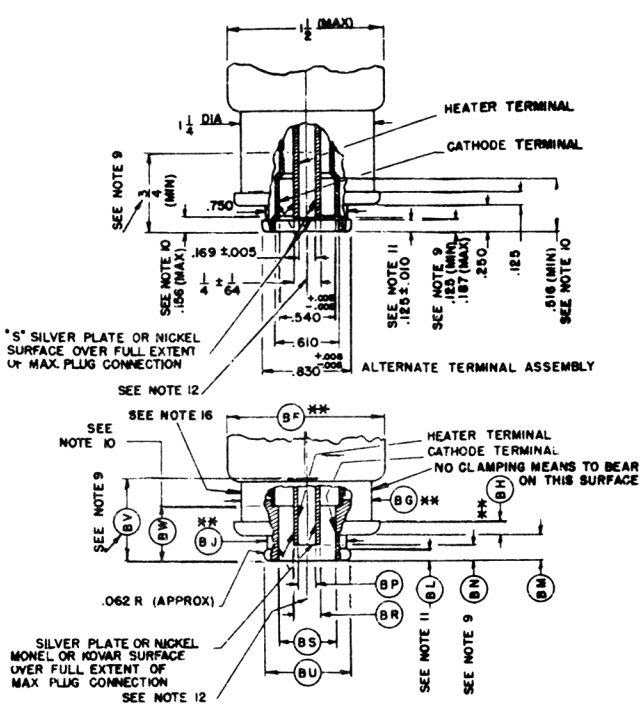

DIMENSION	DESIGN TEST	QUALIFICATION APPROVAL TEST	PRODUCTION TEST	REMARKS
A		4.000		
B		1 7/16		
C		1 5/16		
D		2 1/4		
E		1/4		FLANGE
F			1.230	
G		1/2		
H	3 1/8			MAX
J	7 11/16			
K	5 13/32			
L	2 19/32			
N		1.830		
P			1.474 ± .004	
R			737 ± .005	
S		1 5/32 R		
T		.497		
V		5/32 R		
W		1 3/16 R		
Y		3/64	-	
Z			1.250	
AB		1 1/2		MIN CLASS LENGTH
AC	3 1/32			MAX
AD			1.653 ±.020	
AE	5/8 ± 1/32			
AF			2 11/16 ± 1/16	
AG		1 9/64 ± 3/64		
AH		1 ± 3/64		
AJ		1.122		
AK			.676 ± .005	
AL			1.352 ± .004	
AM		1.830 ± .010		
AN			2.500 ± .010	
AP		13/32 R		
AR	.281 ± .005 DIA			
AU	3 15/32			MAX
AV			.907 ± .025	
AW	3 7/8			MAX
AX	3 27/64			
AY	27/64			
AZ			1.500	
BA	3.000			MAX
BC	2 7/8			
BD	1			
BE			3.000 ± .010	
BF		1 1/2		MAX
BG		1 1/4 DIA		
BH		.125		
BJ		750 DIA		
BL			.125 ± .010	
BM			.250	
BN			.125 .187	MIN MAX
BP			.169 ± .005	
BR			1/4 ± 1/64	
BS			.540 +.008 -.008	
BU			.630 +.008 -.008	
BV			3 1/2	MIN
BW			.516	MIN
BX	1 1/2 DIA			MAX

DIMENSIONS AND NOTES MARKED * ARE DESIGN TESTS. DIMENSIONS AND NOTES MARKED ** ARE QUALIFICATION APPROVAL TESTS. ALL OTHER DIMENSIONS AND NOTES ARE PRODUCTION TESTS.

NOTES:

** 1. ALL METAL SURFACES COVERED BY BLACK FINISH EXCEPT THOSE MARKED S & D. ("S" SHALL BE SILVER, NICKEL PLATED OR BRASS SURFACES)

2. HERMETIC CONNECTIONS CAN BE MADE TO SURFACE "D".

3. THE AXIS OF THE CATHODE TERMINAL SHALL BE WITHIN A RADIUS OF 1/64 OF THE SPECIFIED LOCATION. (NOTE 4 APPLIES)

4. THE LIMITS INCLUDE ANGULAR AS WELL AS LATERAL DEVIATIONS.

* 5. ALL POINTS ON THE MOUNTING SURFACE SHALL BE WITHIN .005 OF REFERENCE PLANE I

** 6. DIMENSIONS WITHOUT LIMITS ARE FOR EQUIPMENT DESIGN AND QUALIFICATION APPROVAL ONLY AND NEED NOT BE CHECKED.

* 7. WITH THE FLANGE ON A PLANE SURFACE, A .005 THICKNESS GAUGE 1/8 WIDE SHALL NOT ENTER.

8. ANY PORTION OF THE ASSEMBLY EXTENDING BELOW REFERENCE PLANE I SHALL BE WITHIN A 1/4 RADIUS OF THE SPECIFIED AXIS OF THE INPUT.

9. THESE DIMENSIONS DEFINE THE EXTREMITIES OF THE CYLINDRICAL SECTION GIVEN BY THE "BP" DIMENSION.

10. THESE DIMENSIONS DEFINE THE EXTREMITIES OF THE CYLINDRICAL SECTION GIVEN BY THE "BS" DIMENSION.

** 11. NO CLAMPING MEANS TO BEAR BEYOND THIS DIMENSION.

12. THE HEATER TERMINAL SHALL BE CONCENTRIC WITH THE CATHODE TERMINAL WITHIN .010

13. WARNING - MAINTAIN MINIMUM CLEARANCE 2 INCHES BETWEEN THIS MAGNET AND MAGNETIC MATERIAL (MAGNETS, STEEL TOOLS, PLATES, ETC.).

** 14. THE OPENING IN THE WAVEGUIDE SHALL BE ENCLOSED BY A DUST COVER WHEN TUBE IS NOT IN USE.

15. MEANS OTHER THAN SOFT SOLDER SHALL BE USED FOR MECHANICAL STRENGTH.

16. THE INCLUSION OF A CYLINDRICAL RIB 1/8 WIDE, 1.312 ± .010 DIAMETER WITH CENTER LOCATED 1/32 FROM THE BOTTOM EDGE OF THE FLANGE MAY BE USED AS AN ALTERNATE DESIGN.

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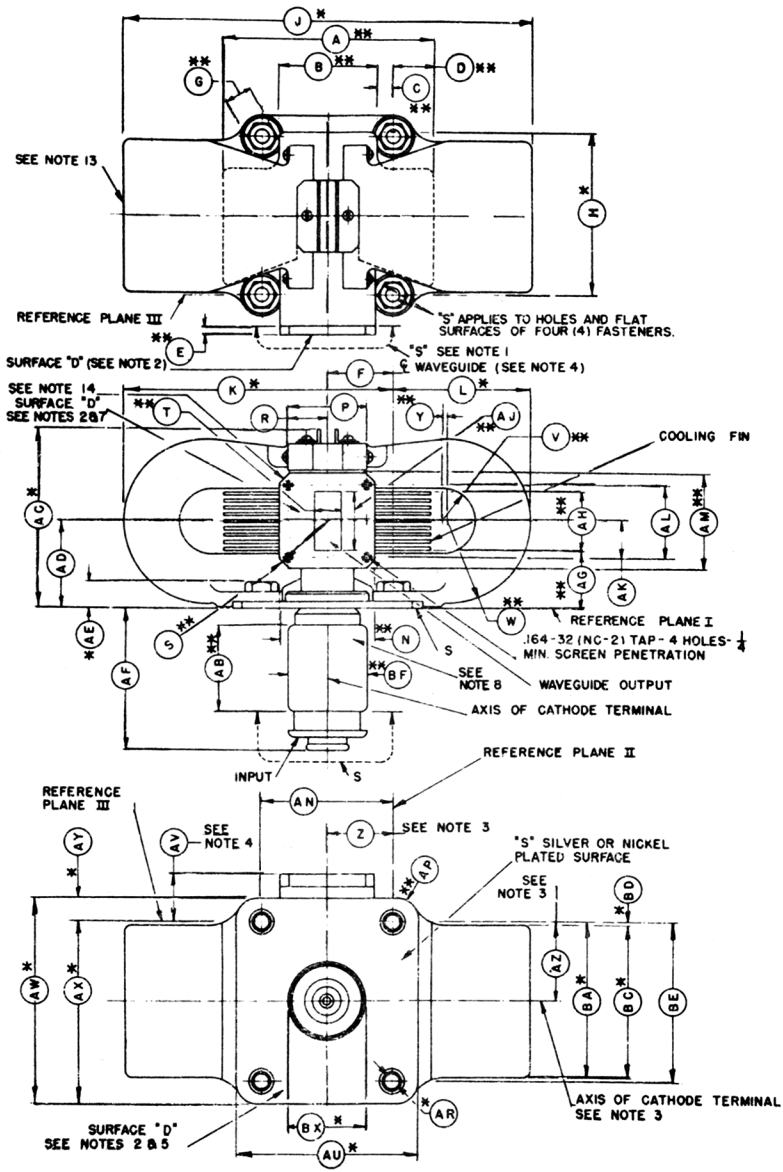
SEE NOTE 13
REFERENCE PLANE III
SURFACE "D" (SEE NOTE 2)
"S" APPLIES TO HOLES AND FLAT SURFACES OF FOUR (4) FASTENERS.
"S" SEE NOTE 1
℄ WAVEGUIDE (SEE NOTE 4)
SEE NOTE 14
SURFACE "D"
SEE NOTES 2&7
COOLING FIN
REFERENCE PLANE I
.164-32 (NC-2) TAP - 4 HOLES - 1/4 MIN. SCREEN PENETRATION
SEE NOTE 8
WAVEGUIDE OUTPUT
AXIS OF CATHODE TERMINAL
INPUT
REFERENCE PLANE II
REFERENCE PLANE III
SEE NOTE 4
SEE NOTE 3
"S" SILVER OR NICKEL PLATED SURFACE
SEE NOTE 3
AXIS OF CATHODE TERMINAL SEE NOTE 3
SURFACE "D" SEE NOTES 2&5