VALVE ELECTRONIC

ADMIRALTY SIGNAL AND RADAR ESTABLISHMENT

CV2520

Specification AD/CV2520, incorporating MIL-E-1/115B Issue No. 3 dated 4.1.56. To be read in conjunction with K1006	SECURITY Specification: Unclassified Valve: Unclassified

→ Indicates a change

TYPE OF VALVE: Hydrogen Thyratron Modulator

CATHODE: Indirectly heated

ENVELOPE: Glass

PROTOTYPE: 5C22/HT-415

MARKING
K1001/4
Add:- 5C22/HT-415
Serial No. ....

BASE
B4D
(Super Jumbo 4-Pin with Bayonet)

RATINGS

		Note
Heater Voltage (V)	6.3	
Heater Current (A)	10.6	
Max, Peak Anode Voltage (kV)	16.0	B
Min. D.C. Anode Supply Voltage (kV)	4.5	
Max. Peak Inverse Voltage (kV)	16.0	C
Max. Peak Anode Current (A)	325	
Min. Trigger Voltage (V)	200	D
Max. Negative Grid Voltage (V)	200	
Max. Mean Anode Current (A)	0.2	
Max. Rate of rise of Anode Current (A/ /us)	1500	
Max. Value of product of peak Anode Voltage, Peak Anode Current, and Pulse Repetition Rate (V x A x pps)	3.2×10^9	
Min. Cathode Heating Time (Mins.)	5	
Ambient Temperature Range (°C)	-50 to +90	

CONNECTIONS

Pin	Electrode
1	g
2	h,k
3	h
4	k
T.C.	a

TOP CAP
CT3
B.S. 448

DIMENSIONS (Inches)

Dimension	Min.	Max.
Length(Overall)	8¼	8¾
Diameter	2	2-9/16

MOUNTING POSITION
Any
See Note F.

NOTES

A. All limiting values are absolute.

B. See Note 1 on Sheet 2 of the attached Specification MIL-E1/115B.

C. See Note 2 on Sheet 2 of the attached Specification MIL-E1/115B.

D. See Note 3 on Sheet 2 of the attached Specification MIL-E1/115B.

E. Cooling of Anode lead is permissible but there shall be no air blast directly on the bulb.

F. For clamping directions See Note 5 on Sheet 2 of attached Specification MIL-E-1/115B.

Z.11085.R.

MIL-E-1/115B
18 April 1955
Superseding
MIL-E-1/115A
26 October 1954

INDIVIDUAL MILITARY SPECIFICATION SHEET

ELECTRON TUBE, THYRATRON, HYDROGEN, WITH OR WITHOUT HYDROGEN RESERVOIR

JAN-5C22/HT-415

This specification sheet forms a part of the latest issue of Military Specification MIL-E-1.

Ratings:	Ef	epy	epx	Ebb	Ecc	egx	egy	ib	Alt
Absolute	V	kv	kv	Vdc	Vdc	v	v	a	ft
Maximum:	6.3±7.5%	16.0(Note 1)	16.0(Note 2)	---	---	200	---	325	10,000
Minimum:	---	---	5% epy	4500	---	---	Note 3	---	---
Test Cond.:	---	16.0	---	---	0	---	150	---	---

Ratings:	tk	dik dt	Ib	epy x ib x prr	TA	Cooling	prr
Absolute	sec.	a/us	mAdc	---	°C	---	pps
Maximum:	---	1500	200	3.2×10^9	±90	Note 4	---
Minimum:	300	---	---	---	-50		---
Test Cond.:	300	---	---	---	---	---	1000

*Height: 8-1/4 in. Min. 8-3/4 in. Max.
**Base: Super Jumbo 4-Pin with Bayonet, A4-18 with ceramic insert

*Diameter: 2 in. Min. 2-9/16 in. Max.
**Cap: Diameter .566±.007 in. Length 3/8 in. min. straight side

Mounting Position: Any

Clamping: Note 5

**Pin No.:	1	2	3	4	Cap
Element:	g	h k	h	k	p Note 17

**Cathode: Coated Unipotential
**Envelope: T-20

For miscellaneous requirements see paragraph 3.3, Inspection Instructions for Electron Tubes.

Ref.	Test	Conditions		Min.	Max.	
3.1	Qualification Approval:	Required for JAN Marking				
4.5	Holding Period:	t=96 hours				
4.9.18.1.6	Carton Drop:	(d) Package Group 1; Carton Size T				
4.9.19.2	*Vibration (1):	No voltages; Note 7				
4.9.20.3	**Vibration (2):	No voltages; Notes 6 and 7				
4.9.19.3	*Bump:	Angle=20°; Note 7				
4.9.20.5	**Shock:	Angle=13°; Note 23		---	---	←
---	Post Shock Test End Points:	Operation (1) DC Anode Voltage Time Jitter	egy: Ebb: tj:	--- --- ---	150 2500 0.005	v ← Vdc us
4.10.8	Heater Current:	Ef=6.30Vac	If:	9.60	11.60	Aac ←
---	† Instantaneous Starting:	epy=13.5kv (min.) Notes 8,9 & 19		---	---	←
---	† Operation (1)	epy=18.0kv (min.); prr=800pps; t=300 Notes 8,11,18 & 19	egy:	---	150	v ←
4.10.17.2	D. C. Anode Voltage:	Notes 8, 10 & 20	Ebb:	---	2500	Vdc ←

Ref.	Test	Conditions		Min.	Max.	
---	*Operation (1A)	Operation (1); Note 21	egy:	---	150	v
---	*Anode Delay Time:	Operation (1);t=120; Ef=6.30Vac	tad:	---	0.65	us
---	*Anode Delay Time Drift:	Anode Delay Time; Note 13	Δtad:	---	0.10	us
---	*Time Jitter:	Ef=6.30Vac;epy=5.0kv (maximum); Notes 8 & 14	tj:	---	0.005	us
---	Emission:	Ef=6.30Vac;ik=325a(minimum) prr=60pps ≤ 10%;tp=5≤10% us;tr=0.5us(maximum);Note 15	egk:	---	175	v
---	**Operation (2):	TA=90°C;t=5.0hrs;Ef=6.30 ≤0.50Vac;Notes 8, 11, & 18	egy:	---	150	v
4.11	Life Test:	Group C;Ef=6.30Vac;Notes 8,16 and 18	t:	500	---	hrs.
4.11.4	Life Test End Points:	Operation (1) and Operation (1A) Note 22	egy:	---	160	v
		DC Anode Voltage	Ebb:	---	4000	Vdc
		Time Jitter	tj:	---	0.010	us
		Anode Delay Time:	tad:	---	0.70	us
		Anode Delay Time Drift	Δtad:	---	0.10	us

Note 1: For instantaneous starting applications where plate voltage is applied instantaneously, the maximum permissible epy is 13.5kv and shall not be attained in less than 0.04 seconds.

Note 2: In pulsed operation, the peak inverse voltage, exclusive of a spike of 0.05 us maximum duration, shall not exceed 5.0kv during the first 25us after the pulse.

Note 3: Driver pulse measured at tube socket with thyratron grid disconnected; egy=200v(minimum), time of rise=0.5us(maximum); grid pulse duration=2us(minimum); impedance of driver circuit=500 ohms(maximum).

Note 4: Cooling of the anode lead is permissible, but there shall be no air blast directly on the bulb.

Note 5: Clamping is permissible by the base and/or by the bulb in the area up to 4-1/4 inches above the top of the base only.

Note 6: There shall be no pronounced resonance in the specified range.

Note 7: There shall be no evidence of shorts of any kind resulting from this test.

Note 8: The circuit used for this test is shown in the attached drawing (Fig. 1). The anode circuit constants shall be chosen so that at epy=16.0kv under resonant charging conditions, dik/dt=1500a/us(minimum); ib=175a; tp=1.0us≤10%; prr=1000pps.

Warning: These conditions are specified only for the purpose of determining circuit constants. The actual operating voltage and repetition rates for each test is specified in the conventional manner under the particular conditions or under the general test conditions, as the case may be. Tests performed at repetition rates less than the resonant repetition rate shall be made with a hold-off diode in the charging circuit.

The grid pulse characteristic shall be tp=2.0us(maximum); tr=0.5us(minimum). Internal impedance of driver=500 ohms(minimum).

Note 9: This shall be the first test after the holding period. The tube shall operate satisfactorily on push-button starting within 3 attempts when the anode voltage (epy) is applied to the tube under test in such a manner as to rise from 0 to 13.5kv within 0.03 sec. (The filter in the rectifier shall be designed so that the epy reaches at least 7 kv within 0.015 sec.) The intervals between successive attempts to instantaneously start the tube shall not be less than 10 seconds nor more than 30 seconds. Any tube failing to start within 3 attempts will be considered a failure.

Note 10: This test shall be conducted within 60 sec. after the Operation (1) test.

Note 11: The tube shall operate continuously without evidence of arc-back.

Note 12: Anode Delay Time (tad) = a time interval between the point on the rising portion of the grid pulse which is 26% of the maximum unloaded pulse amplitude and the point where anode conduction takes place.

Note 13: During the interval between 2 minutes and 7 minutes of the Anode Delay Time test, the change in anode delay time (Δtad) relative to the tad value observed on the Anode Delay Time test shall not exceed the specified value.

Note 14: The variation in firing time (tj) shall be measured at 50% of pulse amplitude and shall not be greater than the amount specified.

Note 15: The positive pulse shall be applied to the grid of the tube. Measure the voltage between grid and cathode 2.5us(maximum) after the beginning of the current pulse. The average voltage shall not rise during the last four microseconds. Plate floating.

Note 16: Life test shall be run with the tube in a horizontal position and shall be shut down every ninety-six (96) hours for a sixty (60) minute interval.

Note 17: Where equipment is designed to withstand shock and vibration, it is recommended that the anode connector be of the spring clip type. (National Co. type 12 or equivalent).

Note 18: There shall be no evidence of anode heating during this test.

Note 19: For tubes WITH hydrogen reservoirs, this test shall be performed at Ef=6.80Vac.
For tubes WITHOUT hydrogen reservoirs, this test shall be performed at Ef=6.30Vac.

Note 20: For tubes WITH hydrogen reservoirs, this test shall be performed at Ef=5.80Vac.
For tubes WITHOUT hydrogen reservoirs, this test shall be performed at Ef=6.30Vac.

Note 21: Ef=5.80Vac. This test shall NOT be performed on tubes WITHOUT Hydrogen Reservoirs.

Note 22: For tubes WITH hydrogen reservoirs, anode heating shall NOT be cause for rejection on Operation (1) and Operation (1A) performed during periodic life test end point tests.

Note 23: Use clamp as per 243-JAN drawing.

Note 24: Reference specification shall be of the issue in effect on the date of invitation for bids.

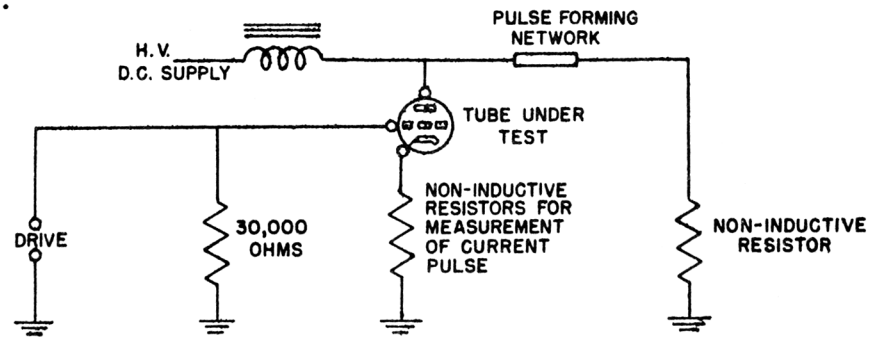

Fig.1

JAN-5C22/HT-415

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