

ADMIRALTY SIGNAL AND RADAR ESTABLISHMENT

Specification AD/CV1787 incorporating MIL-E-1/113B Issue No. 3 dated 2.1.56. To be read in conjunction with K1006.	<u>SECURITY</u>	
	<u>Specification</u> Unclassified	<u>Valve</u> Unclassified

—————> Indicates a change

<u>TYPE OF VALVE:</u> Hydrogen Thyatron Modulator <u>CATHODE:</u> Indirectly heated <u>ENVELOPE:</u> Glass <u>PROTOTYPE:</u> 4C35	<u>MARKING</u> K1001/4 Add:- 4C35 Serial No.
	<u>BASE</u> B4D (Super Jumbo 4-Pin with Bayonet)

<u>RATINGS</u>		Note	<u>CONNECTIONS</u>	
			Pin	Electrode
Heater Voltage (V)	6.3		1	g
Heater Current (A)	6.0		2	h,k
Max. Peak Anode Voltage (kV)	8.0	B	3	h
Min. D.C. Anode Supply Voltage (kV)	2.5		4	k
Max. Peak Inverse Voltage (kV)	8.0	C	T.C.	a
Max. Peak Anode Current (A)	90			
Min. Trigger Voltage (V)	175	D		
Max. Negative Grid Voltage (V)	200			
Max. Mean Anode Current (A)	0.1			
Max. Rate of rise of Anode Current (A/us)	1000			
Max. Value of product of Peak Anode Voltage, Peak Anode Current and Pulse Repetition Rate. (V x A x p.p.s)	2×10^9			
Min. Cathode Heating Time (Mins.)	3			
Ambient Temperature Range (°C)	-50 to +90			
			<u>TOP CAP</u> OT3 E.S.448	
			<u>DIMENSIONS (Inches)</u>	
			Dimension	Min. Max.
			Length(Overall)	$6\frac{1}{2}$ $6\frac{7}{8}$
			Diameter	2 2-9/16
			<u>MOUNTING POSITION</u> Any See Note F.	

- NOTES
- A. All limiting values are absolute.
 - B. See Note 3 on Sheet 2 of the attached Specification MIL-E-1/113B.
 - C. See Note 1 on Sheet 2 of the attached Specification MIL-E-1/113B.
 - D. See Note 2 on Sheet 2 of the attached Specification MIL-E-1/113B.
 - E. Cooling of anode lead is permissible but there shall be no air blast directly on the bulb.
 - F. For clamping directions see Note 17 of the Specification MIL-E-1/113B.

INDIVIDUAL MILITARY SPECIFICATION SHEET
 ELECTRON TUBE, THYRATRON, HYDROGEN

JAN-4C35

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:	6.3/5%	8.0	8.0	---	---	200	---	90	10,000
	-10%	Note 3	Note 1						
Minimum:	---	---	5%epy	2500	---	---	Note 2	---	---
Test Cond.:	6.30Vac	8.0	---	---	0	---	130	---	---
Ratings:	Ib	tk	dt	epy x prr x ib	TA	Cooling	prp		
Absolute	mAdc	sec	a/us	---	°C	---	pps		
Maximum:	100	---	1000	2.0 x 10 ⁹	-50	Note 16	---		
					/90				
Minimum:	---	180	---	---			---		
Test Cond.:	---	180	---	---			---		2800

*Height: 6-1/4 in. min. 6-7/8 in. max.
 **Base: Super Jumbo 4-Pin with Bayonet,
 A4-18 with ceramic insert.
 Clamping: Note 17
 Mounting Position: Any

*Diameter: 2 in. min. 2-9/16 in. max.
 **Cap: Medium Metal, Cl-5 with Ceramic
 Spacer or Solid Metal, Cl-5

**Pin No.: 1 2 3 4 Cap
 Element: g h h k p
 k Note 18

**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 P		
4.9.19.2	*Vibration (1):	No Voltages; Note 5		
4.9.20.3	**Vibration (2):	No Voltages; Notes 4 and 5		
4.9.19.3	*Bump:	Angle=20°; Note 5		
4.9.20.5	**Shock:	Angle = 24°; Note 20		
---	Shock Test End Points:	Operation (1) DC Anode Voltage Time Jitter	egy: --- Ebb: --- tj: ---	130 v 1500 Vdc 0.01 us
4.10.8	Heater Current:		If: 5.50	6.70 Aac
---	+ Instantaneous Starting:	epy=7000v(minimum); Notes 6 and 7		
4.10.17.2	DC Anode Voltage:	Notes 6 and 8	Ebb: ---	1500 Vdc
---	+ Operation (1):	epy=10.0kv(minimum); t=300; Notes 6, 9 & 19	egy: ---	130 v

Ref.	Test	Conditions	Min.	Max.
---	*Anode Delay Time:	Operation (1); Note 10; t=L20	tad:	0.60 us
---	*Anode Delay Time Drift:	Anode Delay Time; Note 11	Δ tad:	0.10 us
---	*Time Jitter:	epy=3.0kv(maximum); Notes 6 & 12	tj:	0.01 us
---	**Operation (2):	TA=90°C; t=5.Ohrs; Notes 6, 9 & 19	egy:	130 v
---	Emission:	ik=90a(minimum); prr=60% \pm 10%; tp=5.0us \pm 10%; tr=0.5us(maximum); Note 13	egk:	150 v
4.11	Life Test:	Group B; Notes 6, 14 & 19	t:	500 hrs.
4.11.4	Life Test End Point:	Operation (1); DC Anode Voltage Time Jitter Anode Delay Time Anode Delay Time Drift Note 15	egy: Ebb: tj: tad: Δ tad:	140 v 2000 Vdc 0.02 us 0.70 us 0.10 us

Note 1: In pulsed operation, the peak inverse voltage, exclusive of spike of .05 us maximum duration, shall not exceed 2.5kv during the first 25us after the pulse.

Note 2: Driver pulse, measured at tube socket with thyatron grid disconnected; egy=175v(minimum), time of rise=0.5us(maximum), grid pulse duration=2us(minimum): Impedance of drive circuit=1500 ohms (maximum).

Note 3: For instantaneous starting applications where plate voltage is applied instantaneously the maximum permissible egy is 7000v and shall not be attained in less than 0.04 seconds.

Note 4: There shall be no pronounced resonance in the specified range.

Note 5: There shall be no evidence of shorts of any kind resulting from this test.

Note 6: The circuit used for this test is shown in the attached drawing (Fig. 1). The anode circuit constants shall be chosen so that at egy=8.0kv under resonant charging conditions dik/dt=1000a/us(minimum); ib=90a; tp=0.5 us \pm 10%; prr=3000 pps.

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); driver impedance=1500 ohms (minimum).

Note 7: 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 (egy) is applied to the tube under test in such a manner as to rise from 0 to 7000v within 0.03 sec. (The filter in the rectifier shall be designed so that the egy reaches at least 3500v within 0.015sec). 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 8: This test shall be conducted within 60 seconds after the Operation (1) test.

Note 9: The tube shall operate continuously without evidence of arc-back.

Note 10: 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 11: During the interval between 2 minutes and 7 minutes of the Anode Delay Time test, the change in anode delay time (Δt_{ad}) relative to the t_{ad} value observed on the Anode Delay Time test shall not exceed the specified value.
- Note 12: The variation in firing time (t_j) shall be measured at 50% of pulse amplitude and shall not be greater than the amount specified.
- Note 13: The positive pulse shall be applied to the grid of the tube. Measure the voltage between grid and cathode 2.5 μ s (maximum) after the beginning of the current pulse. The average voltage shall not rise during the last four microseconds. Plate floating.
- Note 14: Life test shall shut down every ninety-six (96) hours for a sixty (60) minute interval. Life test shall be conducted with the tube in a horizontal position.
- Note 15: Each tube on life test shall be measured at the end of one-hundred (100) hours of life for emission. If the emission reading exceeds 110v at this time, the tube shall be considered as a life test failure at one-hundred (100) hours.
- Note 16: Cooling of the anode lead is permissible but there shall be no air blast directly on the bulb.
- Note 17: Clamping is permissible by the base and/or by the bulb in the area up to 2 1/2 inches above the top of the base only.
- Note 18: 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 19: There shall be no evidence of anode heating during this test.
- Note 20: Use clamp as per 243-JAN drawing.
- Note 21: Reference specification shall be of the issue in effect on the date of invitation for bid.

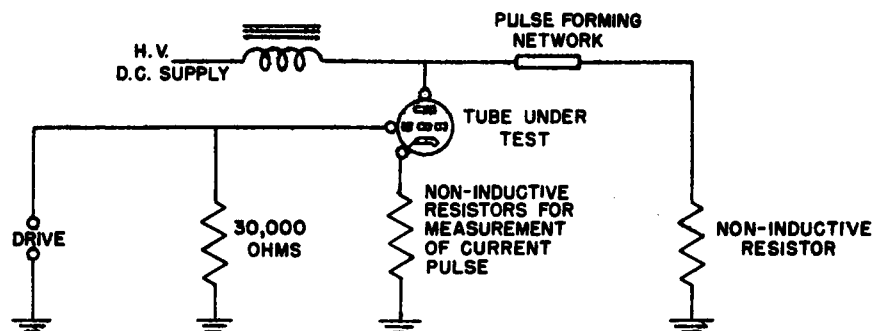


Fig. 1