VALVE ELECTRONIC

SERVICES VALVE TEST LABORATORY

CV 3987

SPECIFICATION AD/CV.3987 incorporating MIL-E-1/181C

ISSUE NO. 3 DATED 1.11.63.

To be read in conjunction with K.1006.

SECURITY	
SPECN.	VALVE
Unclassified	Unclassified

TYPE OF VALVE	Reliable Gas-filled voltage Stabiliser with flexible leads.
CATHODE	Cold
ENVELOPE	Glass
PROTOTYPE	5644

MARKING

See K.1001/4

Additional marking 5644

BASE

B8D/F

RATINGS

Absolute, unless otherwise stated

			NOTE
Min. Striking Voltage			
in light	(V)	130	
in total darkness	(V)	175	
Nominal stabilising voltage	(V)	95	
Max. Anode current	(mA)	25	
Min. anode current	(mA)	5	
Voltage regulation over current range	(V)	5	
Max. bulb temperature	(°C)	220	
Min. ambient temperature	(°C)	-55	
Max. altitude	(ft)	60,000	

CONNECTIONS

Lead	Electrode
1	Anode
2	Cathode
3	Internal connection.
4	Cathode
5) 6) 7)	Internal connection.
8	Cathode

DIMENSIONS (ins.)

	Min.	Max.
Height	-	2.0
Diameter	-	0.4

MOUNTING POSITION

Any

(204356)

CV 3987

MIL-E-1/181C
6 October 1961
SUPERSEDING
MIL-E-1/181B
28 June 1956

MILITARY SPECIFICATION SHEET

ELECTRON TUBE, RECEIVING

JAN-5644

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

DESCRIPTION: Voltage regulator, subminiature

PIN CONNECTIONS AND DIMENSIONS: See tables I and II

ABSOLUTE-MAXIMUM RATINGS:

Parameter:	Ez (total darkness)	Ez (ambient light)	Operating voltage	Operating current	TA	TE	Alt
Unit:	Vdc	Vdc	Vdc	mAdc	°C	°C	ft
Maximum:	---	---	110	25	---	≠220	60,000
Minimum:	175	130	80	5	-55	---	---
TEST CONDITIONS:	---	---	---	---	---	---	---

PAR. NO.	TEST	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL OR CODE	SYMBOL	LIMITS		UNIT
						Min	Max	
	General							
3.1	Qualification	Required for JAN marking	---	---	---	---	---	---
3.2.28	Reliable tubes	(See note 1)	---	---	---	---	---	---
3.6	Performance	(See note 2)	---	---	---	---	---	---
	Qualification inspection (see note 3)							
---	Cathode	Glow discharge	---	---	---	---	---	---
3.4.3	Base connection	(See table I)	---	---	---	---	---	---
	Acceptance inspection, part 1 (production)							
4.7.5	Continuity and shorts tests (for reliable tubes)		0.4	II	---	---	---	---
4.9.1.1	Mechanical-production tests for reliable subminiature tubes	(See table II)	---	---	---	---	---	---
4.13.1	†Ionization voltage (1)	Ebb/Ib = 5 to 25 mAdc; illumination = 5 to 50 foot-candles	0.65	II	Ez	---	120	Vdc
4.13.2	Tube voltage drop (1)	Ebb/Ib = 25 mAdc	0.65	II	Etd	85	105	Vdc
4.13.2	Tube voltage drop (2)	Ebb/Ib = 5 mAdc	0.65	II	Etd	85	105	Vdc
4.13.2.1	Regulation	Etd (1) minus Etd (2)	0.65	II	Reg	---	≠5.0	Vdc

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PAR. NO.	TEST	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL OR CODE	SYMBOL	LIMITS Min	LIMITS Max	UNIT
	Acceptance inspection, part 2 (design)							
4.9.20.3	Variable-frequency vibration	No voltages; post shock and fatigue test end points apply	10.0	(See note 4)	---	---	---	---
4.13.1	Ionization voltage (2)	Ebb/Ib = 5 to 25 mAdc (see note 6)	6.5	Code F	Ex	---	175	Vdc
4.13.3	Leakage current	Eb = 50 Vdc	6.5	Code F	Lib	---	10	uAdc
4.13.4.2	Oscillation test	Esig = 15 mVac; Ebb/Ib = 5 to 25 mAdc	2.5	I	---	---	---	---
4.13.4.3	Noise test	Ebb/Ib = 25 mAdc	2.5	I	Eb	---	15	mVac
	Acceptance inspection, part 3(degradation) (see note 7)							
4.9.5.3	Subminiature lead fatigue	(See note 8)	2.5	Code G	---	4	---	arcs
4.9.6.3	Glass strain (miniature and subminiature receiving tubes)		2.5	I	---	---	---	---
4.9.20.5	Shock test	Hammer angle = 30°	---	---	---	---	---	---
4.9.20.6	Fatigue test	G = 2.5; fixed frequency; F = 25 min, 60 max	6.5	(See note 4)	---	---	---	---
---	Post shock and fatigue test end points	Ionization voltage (1)	---	---	Ex	---	130	Vdc
		Regulation	---	---	Reg	---	∠5.0	Vdc
		Tube voltage drop (1)	---	---	Etd	82	108	Vdc
		Tube voltage drop (2)	---	---	Etd	82	108	Vdc

PAR. NO.	TEST	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL OR CODE	ALLOWABLE DEFECTIVES PER CHARACTERISTIC First sample	ALLOWABLE DEFECTIVES PER CHARACTERISTIC Combined samples	SYMBOL	LIMITS Min	LIMITS Max	UNIT
	Acceptance inspection, part 3 (life) (see note 7)									
4.11.3.1(b)	Survival-rate life test	Intermittent life-test conditions, or equivalent; TA = room (see note 9)	---	II	---	---	---	---	---	---
4.11.4	Life-test end point (survival rate)	Continuity and shorts (inoperatives)	0.65	---	---	---	---	---	---	---
4.11.5	Intermittent life-test operation	Ebb/Ib = 25 mAdc; TE = ∠220° C min (see notes 10 and 11)	---	---	---	---	---	---	---	---
4.11.4	Life-test end points (intermittent) (500 hours)	(See note 12)								
		Inoperatives (see note 13)	---	---	1	3	---	---	---	---
		Regulation	---	---	1	3	Reg	---	∠5.0	Vdc
		Tube voltage drop (1)	---	---	1	3	Etd	82	108	Vdc
		Tube voltage drop (2)	---	---	1	3	Etd	82	108	Vdc
		Ionization voltage (1)	---	---	1	3	Ex	---	125	Vdc
		Total defectives	---	---	3	6	---	---	---	---

PAR. NO.	TEST	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL OR CODE	ALLOWABLE DEFECTIVES PER CHARACTERISTIC		SYMBOL	LIMITS		UNIT
					First sample	Combined samples		Min	Max	
	Acceptance inspection, part 3 (life) (see note note 7) - Contd.									
4.11.4	Life-test end points (intermittent) (1, 000 hours)	(See note 12)								
		Inoperatives (see note 13)	---	---	1	3	---	---	---	---
		Regulation	---	---	1	3	Reg	---	6.0	Vdc
		Tube voltage drop (1)	---	---	1	3	Etd	80	110	Vdc
		Tube voltage drop (2)	---	---	1	3	Etd	80	110	Vdc
		Ionization voltage (1)	---	---	1	3	Es	---	130	Vdc
		Total defectives	---	---	4	8	---	---	---	---
4.9.18 and 4.9.18.1.1	Container drop	Required								
5.	Preparation for delivery	(See note 14)								

NOTES:

1. For purposes of acceptance inspection, use applicable reliable paragraphs.
2. The following paragraphs listed in 3.6 apply: 3.3, 3.3.1, 3.4.1, 3.4.2, 3.4.3, 3.7, 3.7.7, 3.8, 4.1, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9.1, 4.9.2, 4.9.8, 4.9.20.1, 4.9.20.2, and 4.9.21.
3. All tests listed hereon shall be performed during qualification inspection; however, these two tests are normally performed during qualification inspection only.
4. This test shall be conducted on the initial lot and thereafter on a lot approximately every 30 days. When one lot has passed, the 30-day rule shall apply. In the event of lot failure, the lot shall be rejected and the succeeding lots shall be subjected to this test until a lot passes. Standard MIL-STD-105, sample size code letter F, shall apply.
5. The AQL for the combined defectives for attributes in acceptance inspection, part 1 (production), excluding inoperatives and mechanical, shall be 1 percent. Standard MIL-STD-105, inspection level II, shall apply.
6. Conditions for this test shall be those of ionization voltage (1) except testing shall be done in total darkness and the tube shall not have conducted or have been exposed to light for at least 24 hours prior to testing.
7. Destructive tests. Tubes subjected to the following destructive tests are not to be delivered on the contract or order:

   4.9.5.3 Subminiature lead fatigue.
   4.9.20.5 Shock test.
   4.9.20.6 Fatigue test.
   4.11.5 Intermittent life-test operation.

8. When a manufacturer submits tubes for qualification approval, five extra tubes shall be submitted for lead fatigue testing.
9. Survival-rate live test. See 20.2.5.2 to 20.2.5.2.4, inclusive, of appendix C.
10. Intermittent life test. See 20.2.5.3 of appendix C.
11. Envelope temperature is defined as the highest temperature indicated when using a thermocouple of No. 40 B & S or smaller diameter elements welded to a ring of 0.025-inch diameter phosphor bronze in contact with the envelope.
12. Order for evaluation of life-test defects. See 4.11.3.1.2.
13. An inoperative as referenced in life test is defined as a tube having one or more of the following defects: discontinuity, permanent shorts, or air leaks. (See 4.7.5.)
14. Tubes shall be prepared for domestic and overseas shipment, as specified in the contract or order, in accordance with Specification MIL-E-75 and appendix thereto.
15. Referenced documents shall be of the issue in effect on the date of invitation for bids.

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NOTES:

Table I. Pin connections.

PIN NO.	1	2	3	4	5	6	7	8	9
Element	p	k	int. con.	k	int. con.	int. con.	int. con.	k	---

Table II. Dimensions.

OVERALL HEIGHT	DIAMETER	OUTLINE	BASE	ENVELOPE	CAP
2.0 max	0.400 max	MIL-E-1 8-5	JEDEC E8-10	JEDEC T-3	---

Custodians:
Army - SigC
Navy - Ships
Air Force - WADD

Preparing activity:
Navy - Ships
(Project 5960-1099)