

INCH-POUND

MIL-PRF-1/689F
6 July 1999
SUPERSEDING
MIL-E-1/689E
21 January 1971

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBES, CATHODE RAY
TYPES 5ADP1, 5ADP2, 5ADP7 AND 5ADP14

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the electron tube described herein shall consist of this document and the latest issue of MIL-PRF-1.

DESCRIPTION: Electrostatic deflection and focus with post accelerator.

DIMENSIONS AND PIN CONNECTIONS: See figure 1.

ABSOLUTE RATINGS:

Parameter:		Ef	Ec1	ed	Eb1	Eb2	Eb3	Rg	Zd	Eb3 Eb2	Ehk	Alt
Unit:		V	V dc	v	V dc	V dc	V dc	Meg	Meg	Ratio	V dc	ft
Maximum:	All	6.9	0, -200	550	1,100	2,850	6,600	1.5	1.0	2.3	±180	50,000
Minimum:	P1	5.7	---	---	---	1,500	1,500	---	---	---	---	---
	P2, P7, P14	5.7	---	---	---	1,500	3,000	---	---	---	---	---
Test conditions:	P1	6.3	Adjust	---	Focus	1,500	3,000	---	---	---	---	---
	P2, P7 P14	6.3	Adjust	---	Focus	2,000	4,000	---	---	---	---	---

GENERAL:

Qualification - Required.

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TABLE 1. Testing and inspection.

Requirement or Test	Method	Type	Conditions	Symbol	Limits Min	Limits Max	Units
<u>Qualification inspection</u>							
Pressure (implosion)	1141	All		---	---	---	---
Barometric pressure, reduced	1002	All	87 ± 4 mmHg	---	---	---	---
Vibration	5111	All		Width	---	1	mm
Direct-interelectrode capacitance	1331	All	g1 to all	Cg1	---	7.9	pF
			k to all	Ck	---	5.8	pF
			D1 to D2	C1D2	---	3.1	pF
			D3 to D4	C3D4	---	1.3	pF
			D1 to all except D2	CD1	---	6.1	pF
			D2 to all except D1	CD2	---	6.1	pF
			D3 to all except D4	CD3	---	5.0	pF
			D4 to all except D3	CD4	---	5.0	pF
Neck and bulb alignment (electrostatic types)	5101	All		dia	---	2.25	inch
Cathode illumination	5216	All		---	---	---	---
Focusing voltage at modulation condition	5246	P1		Eb1	300	515	V dc
		P2, P7, P14		Eb1	400	690	V dc
Deflection factor	5248	P1	1D2; Eb2 = Eb3 = 1,500 V dc	DF	32.5	39.5	V dc/in.
		P2, P7, P14	1D2; Eb2 = Eb3 = 2,000 V dc	DF	43	53	V dc/in.
Deflection factor	5248	P1	3D4; Eb2 = Eb3 = 1,500 V dc	DF	24.5	30.5	V dc/in.
		P2, P7, P14	3D4; Eb2 = Eb3 = 2,000 V dc	DF	32.5	40.5	V dc/in.
Deflection-factor uniformity	5248	All		---	---	2.0	%
Base material insulation quality	1216	All		---	---	---	---
<u>Conformance inspection, part 1</u>							
Bulb, screen and faceplate quality	5106	All		---	---	---	---
Voltage breakdown	5201	All		---	---	---	---
Voltage breakdown (electrostatic types)	5201	All		---	---	---	---
Gas "cross"	5206	P1 P2, P7, P14	Light = 15 fL Ib3 = 50 µA dc (See note 1)				

See notes at end of table.

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TABLE 1. Testing and inspection -Continued.

Requirement or test	Method	Type	Conditions	Symbol	Limits Min	Limits Max	Units
<u>Conformance inspection, part 1</u>							
<u>-Continued</u>							
Light output	5221	P1	(See note 1)	Light	15	---	fL
Modulation	5223	P1	Light = 15 fL (See note 1)	ΔE_c	---	45	V dc
Modulation	5223	P2, P7, P14	Ib3 = 50 μ A dc (See note 1)	ΔE_c	---	55	V dc
Spot position (electrostatic deflection)	5231	All		---	---	16	mm
Spot displacement (leakage)	5231	All		displ	---	10	mm
Grid-cutoff voltage	5241	P1 P2, P7, P14		Eco Eco	-34 -45	-56 -75	V dc V dc
Grid No. 1 leakage current	5251			---	---	---	---
Grid No. 2 leakage current	5251			---	---	---	---
Total scan	---	P1	Focused raster light = 15 fL (See note 2)	---	4.25	---	inch
		P2, P7, P14	Focused raster Ib3 = 50 μ A dc (See note 2)	---	4.25	---	inch
Pattern distortion	5103	All	(See note 4)	---	---	---	---
<u>Conformance inspection, part 2</u>							
Secureness of base, cap or insert	1101	All		---	---	---	---
Heater or filament current	1301	All		If	540	660	mA
Electrode currents (anode No. 1)	5201	All	$E_{c1} = 0$	Ib1	-15	10	μ A dc
Electrode currents (cathode)	5201	P1	Light = 15 fL	Ik	---	1,000	μ A dc
Electrode currents (cathode)	5201	P2, P7, P14	Ib3 = 50 μ A dc	Ik	---	1,000	μ A dc
Base alignment (electrostatic types)	5101	All	+ 1D2; pin No.5	---	---	---	---

See notes at end of table.

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TABLE 1. Testing and Inspection -Continued.

Requirement or test	Method	Type	Conditions	Symbol	Limits Min	Limits Max	Units
<u>Conformance inspection, part 2-Continued.</u>							
Side terminal alignment (electrostatic types)	5101	All	+ 1D2	---	---	---	---
Neck and base alignment (electrostatic types)	5101	All		---	---	---	---
Angle between traces	5101	All		---	89	91	Degrees
Stray light emission (conventional types)	5216	All	Eb2 = 2,850 V dc; Eb3 = 6,600 V dc	---	---	---	---
Screens	5221	P2, P7, P14	(See note 1)	---	---	---	---
Base pin solder depth	1111	All		---	---	---	---
Line width A (electrostatic deflection)	5226	P1 P2, P7, P14	Light = 15 fL Ib3 = 50 μ A dc	width width	--- ---	0.75 0.8	mm mm
Line width B (electrostatic deflection)	5226	P1 P2, P7, P14	Light = 15 fL (See note 3) Ib3 = 50 μ A dc	width width	--- ---	0.8 0.9	mm mm
Focusing voltage at cutoff	5246	P1 P2, P7, P14		Eb1 Eb1	345 460	515 690	V dc V dc
Deflection factor	5248	P1 P2, P7, P14	1D2 1D2	DF DF	40 54	50 66	V dc/in. V dc/in.
Deflection factor	5248	P1 P2, P7, P14	3D4 3D4	DF DF	30.5 40.5	37.5 50.0	V dc/in. V dc/in.
Heater-cathode leakage current	5251	All		---	---	---	---
Permanence of marking	1105	All		---	---	---	---

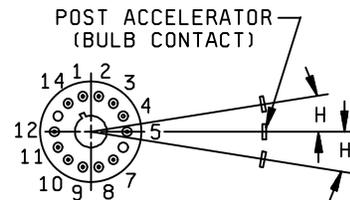
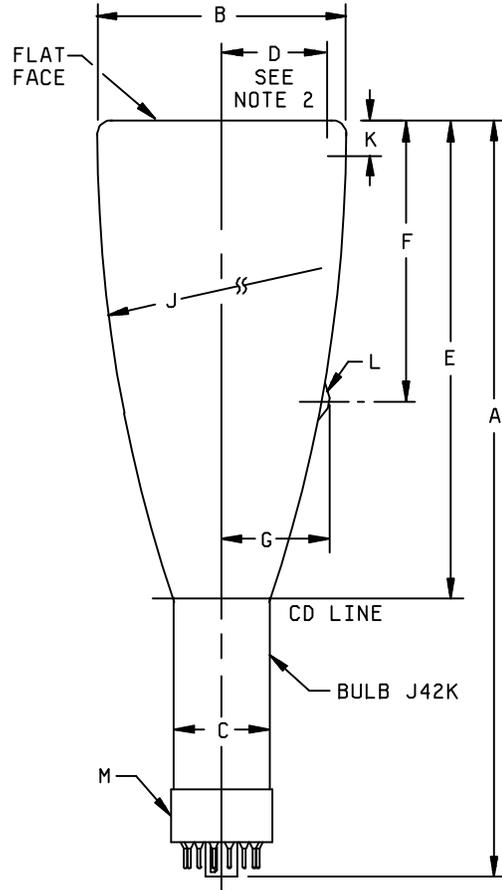
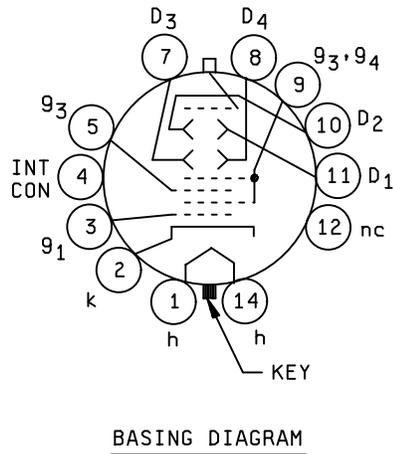
See notes at end of table.

TABLE 1. Testing and inspection -Continued.

Requirement or test	Method	Type	Conditions	Symbol	Limits Min	Limits Max	Units	
<u>Conformance inspection, part 3</u>								
Life-test provisions	---	All	Group C; Eb2 = 2,850 V dc; Eb3 = 6,600 V dc; t = 500 hours	---	---	---	---	
		P1	Light = 15 fL	---	---	---	---	
		P2, P7, P14	Ib3 = 30 μ A dc	---	---	---	---	
Life-test end points	---	P1	Light = 11 fL	---	---	---	---	
			Line width A	width	---	0.75	mm	
			Line width B	width	---	0.85	mm	
			Modulation	ΔE_c	---	45	V dc	
			Heater-cathode leakage current	---	---	---	---	
			Grid No. 1 leakage current	---	---	---	---	
			Grid No. 2 leakage current	---	---	---	---	
			Stray light emission	---	---	---	---	
			P2, P7, P14	Ib3 = 37.5 μ A dc	---	---	---	---
		Line width A		width	---	0.8	mm	
		Line width B		width	---	0.9	mm	
		Modulation		ΔE_c	---	55	V dc	
		Heater-cathode leakage current		---	---	---	---	
		Grid No. 1 leakage current		---	---	---	---	
		Grid No. 2 leakage current	---	---	---	---		
Stray light emission	---	---	---	---				

NOTES:

1. This test to be performed at the conclusion of the holding period.
2. The scan from the tube face center to the extinction points of focused raster shall be ± 2.125 inches (53.98 mm).
3. Measure line width B at a distance from the center of the screen equal to 33 percent of the maximum bulb diameter. The applied astigmatism voltage shall be equal to zero volt.
4. With a raster pattern the size of which is adjusted so that the widest points of the pattern just touch the sides of a square 3.075 inches (78.11 mm) on a side, no point on these pattern sides will lie within a square 2.925 inches (74.30 mm) on a side, and having the same center as the first square.



Dimensions				
Ltr	Inches		Millimeters	
	Min	Max	Min	Max
Qualification inspection				
L	Bulb contact: J1-22			
M	Base: B12-37			
Conformance inspection, part 2				
A	16.563	16.938	420.70	430.23
B	5.156	5.344	130.96	135.75
C	1.938	2.063	49.23	52.40
D	2.250 R		57.15	
F	6.000	6.500	152.40	165.10
G	2.063	2.563	52.40	65.10
H		10°		10°
Reference Dimensions (see note 3)				
E	10.281		261.14	
J	27.813R		706.14	
K	0.875		22.23	

NOTES:

1. Dimensions are in inches with metric equivalents (in mm) for comparison.
2. Useful screen radius.
3. Reference dimensions are for information only and are not required for inspection purposes.

FIGURE 1. Outline drawing of electron tube types 5ADP1, 5ADP2, 5ADP7 AND 5ADP14.

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Custodians:

Army - CR
Navy - EC
Air Force - 80
DLA - CC

Preparing activity:
DLA - CC

(Project 5960-3477-01)

Review activities:

Army - AR, CE
Navy - AS, CG, MC, OS
Air Force - 11, 99