

PERFORMANCE SPECIFICATION SHEET
ELECTRON TUBE, CATHODE RAY
TYPES 5LP1A, 5LP5A, 5LP7A, AND 5LP11A

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.

DIMENSIONS AND PIN CONNECTIONS: See figure 1.

ABSOLUTE RATINGS:

Parameter:	Ef	Ec1	ed	Eb1	Eb2	Eb3
Unit:	V	V dc	v	V dc	V dc	V dc
Maximum:	6.9	0	550	1,100	2,200	4,400
Minimum:	5.7	-125	---	---	1,100	1,100

Parameter:	Rg	Zd	Eb3/Eb2	Alt
Unit:	Meg	Meg	Ratio	ft
Maximum:	1.5	1.0	2	10,000
Minimum:	---	---	---	---

Test conditions:						
Parameter:	Ef	Ec1	ed	Eb1	Eb2	Eb3
Unit:	V	V dc	v	V dc	V dc	V dc
P1A, P5A, P11A:	6.3	Adj	---	Focus	1,500	3,000
P7A:	6.3	Adj	---	Focus	2,000	4,000

GENERAL:

Qualification - Required.

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TABLE I. Testing and inspection.

Inspection	Method MIL-STD- 1311	Type	Notes	Conditions	Symbol	Limits Min	Limits Max	Unit
<u>Conformance inspection, part 1</u>								
Bulb, screen, and faceplate quality	5106	All	---		---	---	---	---
Voltage breakdown	5201	All	---		---	---	---	---
Voltage breakdown (electrostatic types)	5201	All	---		---	---	---	---
Light output	5221	P1A	---		Light	4.0	---	fL
		P5A	3		Light	0.65	---	fL
		P11A	3		Light	2.0	---	fL
Spot position (electrostatic deflection)	5231	All	---		---	---	20	mm
Spot displacement (leakage)	5231	All	---		Displ	---	5	mm
Modulation	5223	P1A	---	Light = 4.0 fL	$\Delta Ec1$	---	35	V dc
		P5A	3	Light = 0.65 fL	$\Delta Ec1$	---	35	V dc
		P7A	---	Ib3 = 10 μ A dc	$\Delta Ec1$	---	45	V dc
		P11A	3	Light = 2.0 fL	$\Delta Ec1$	---	35	V dc
Grid cutoff voltage	5241	P1A, P5A, P11A	---		Ec1	-22.5	-67.5	V dc
Grid No. 1 leakage current	5251	All	---		---	---	---	---
Anode No. 2 leakage current	5251	All	---		---	---	---	---
Gas "cross"	5206	P1A	---	Light = 4.0 fL	---	---	---	---
		P5A	3	Light = 0.65 fL	---	---	---	---
		P7A	---	Ib3 = 10 μ A dc	---	---	---	---
		P11A	3	Light = 2.0 fL	---	---	---	---
<u>Conformance inspection, part 2</u>								
Side terminal and base alignment	5101	All	---		---	---	---	---
Base alignment (electrostatic types)	5101	All	---	4D3; pin no. 6	---	---	---	---
Neck and base alignment (electrostatic types)	5101	All	---		---	---	---	---

See notes at end of table.

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TABLE I. Testing and inspection - Continued.

Inspection	Method MIL-STD- 1311	Type	Notes	Conditions	Symbol	Limits Min	Limits Max	Unit
<u>Conformance inspection, part 2, continued</u>								
Side terminal alignment (electrostatic types)	5101	All	---	3D4	---	---	---	---
Heater current	1301	All	---		If	540	660	mA
Angle between traces	5101	All	---		---	---	---	---
Heater-cathode leakage current	5251	All	---		---	---	---	---
Electrode current (anode No. 1)	5201	All	---	Ec1 = 0	Ib1	-50	10	μA dc
Electrode current (cathode)	5201	P1A	---	Light = 4.0 fL	Ik	---	1,000	μA dc
		P5A	3	Light = 0.65 fL	Ik	---	1,000	μA dc
		P7A	---	Ib3 = μA dc	Ik	---	1,000	μA dc
		P11A	3	Light = 2.0 fL	Ik	---	1,000	μA dc
Stray light emission (conventional types)	5216	All	---	Eb2 = 2,200 V dc Eb3 = 4,400 V dc	---	---	---	---
Line width "A" (electrostatic deflection)	5226	P1A	1	Light = 4.0 fL	Width	---	0.6	mm
		P5A	3	Light = 0.65 fL	Width	---	0.6	mm
		P7A	---	Ib3 = 10 μA dc	Width	---	0.6	mm
		P11A	3	Light = 2.0 fL	Width	---	0.6	mm
Line with "B" (electrostatic deflection)	5226	P1A	2	Light = 4.0 fL	Width	---	0.7	mm
		P5A	3	Light = 0.65 fL	Width	---	0.7	mm
		P7A	---	Ib3 = 10 μA dc	Width	---	0.7	mm
		P11A	3	Light = 2.0 fL	Width	---	0.7	mm
Deflection factor (1D2)	5248	P1A, P5A, P11A P7A	---		DF	62	93	V dc/in.
					DF	82	124	V dc/in.
Deflection factor (3D4)	5248	P1A, P5A, P11A P7A	---		DF	54	81	V dc/in.
					DF	73	109	V dc/in.
Focusing voltage at modulation condition	5246	P1A, P5A, P11A P7A	---		Eb1	282	475	V dc
					Eb1	375	632	V dc
Focusing voltage at cutoff	5246	P1A, P5A, P11A P7A	---		Eb1	300	450	V dc
					Eb1	400	600	V dc
Screens	5221	P7A	---		---	---	---	---
Secureness of base, cap, or insert	1101	All	---		---	---	---	---
Base pin solder depth	1111	All	---		---	---	---	---
Permanence of marking	1105	All	---		---	---	---	---

See notes at end of table.

TABLE I. Testing and inspection - Continued.

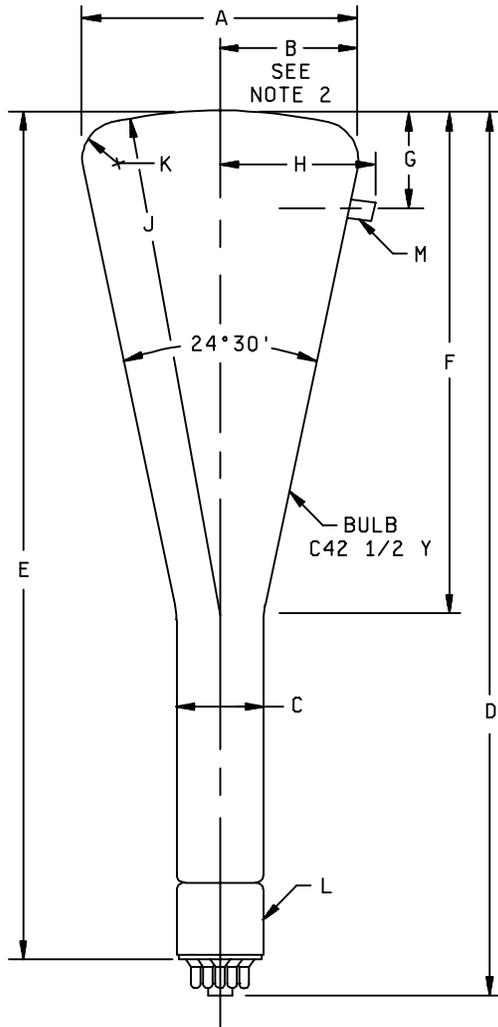
Inspection	Method MIL-STD- 1311	Type	Notes	Conditions	Symbol	Limits Min	Limits Max	Unit
<u>Conformance inspection, part 3</u>								
Life test	---	All	---	Group C; Eb2 = 2,200 V dc Eb3 = 4,400 V dc t = 500 hours (min)	---	---	---	---
		P1A	---	Light = 4.0 fL	---	---	---	---
		P5A	3	Light = .065 fL	---	---	---	---
		P7A	---	Ib3 = 10 μ A dc	---	---	---	---
		P11A	3	Light = 2.0 fL	---	---	---	---
Life-test end points:	---							
Heater-cathode leakage current	5251	All	---		---	---	---	---
Grid No. 1 leakage current	5251	All	---		---	---	---	---
Anode No. 2 leakage current	5251	All	---		---	---	---	---
Stray light emission (conven-types)	5216	All	---		---	---	---	---
Line width "A"	5226	P1A	---	Light = 3.0 fL	Width	---	0.6	mm
Line width "B"	5226	P1A	---	Light = 3.0 fL	Width	---	0.7	mm
Modulation	5223	P1A	---	Light = 3.0 fL	Δ Ec1	---	35	V dc
Line width "A"	5226	P5A	3	Light = 0.5 fL	Width	---	0.6	mm
Line width "B"	5226	P5A	3	Light = 0.5 fL	Width	---	0.7	mm
Modulation	5223	P5A	3	Light = 0.5 fL	Δ Ec1	---	35	V dc
Line width "A"	5226	P7A	---	Ib3 = 7.5 μ A dc	Width	---	0.6	mm
Line width "B"	5226	P7A	---	Ib3 = 7.5 μ A dc	Width	---	0.7	mm
Modulation	5223	P7A	---	Ib3 = 7.5 μ A dc	Δ Ec1	---	45	V dc
Line width "A"	5226	P11A	3	Light = 1.5 fL	Width	---	0.6	mm
Line width "B"	5226	P11A	3	Light = 1.5 fL	Width	---	0.7	mm
Modulation	5223	P11A	3	Light = 1.5 fL	Δ Ec1	---	35	V dc
Base material insulating quality	1216	All	4	Zone 5 (min)	---	---	---	---
Cathode illumination	5216	All	4		---	---	---	---
Pressure (implosion)	1141	All	4		---	---	---	---
Deflection-factor uniformity	5248	All	4		---	---	---	---
Direct-interelectrode capacitance	1331	All	4	g1 to all D1 to D2 D3 to D4 D1 to all D2 to all D3 to all D4 to all	Cg1 C1D2 C3D4 CD1 CD2 CD3 CD4	---	13.0 3.0 2.5 14.0 14.0 9.0 9.0	pF pF pF pF pF pF pF
Neck and bulb alignment (electrostatic types)	5101	All	4		Dia	---	1.87	inch
Vibration	5111	All	4		Width	---	1.0	mm
Deflection factor (1D2)	5248	P1A, P5A, P11A P7A	4	Eb3 = Eb2 = 1,500 V dc	DF	50	76	V dc/in.
			4	Eb3 = Eb2 = 2,000 V dc	DF	67	101	V dc/in.
Deflection factor (3D4)	5248	P1A, P5A, P11A P7A	4	Eb3 = Eb2 = 1,500 V dc	DF	46	68	V dc/in.
			4	Eb3 = Eb2 = 2,000 V dc	DF	61	91	V dc/in.

See footnotes at top of next page.

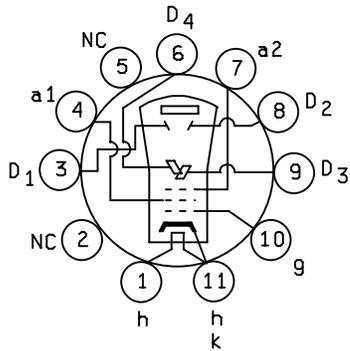
TABLE I. Testing and inspection - Continued.

NOTES:

1. The deflection plates shall be returned to No. 2 anode through a minimum of 2.5 M Ω resistors. The light output shall be set at 2 fL. The high-frequency scanning shall be applied to the deflecting plates nearest the screen and the amplitude shall be adjusted to give a line length of approximately 90 percent of the maximum tube diameter. The low-frequency scanning amplitude shall be expanded to approximately 90 percent of the maximum tube diameter in the direction perpendicular to the direction of the high-frequency scanning. Readjustment may be made for best overall focus. The tubes shall be observed for deflection defocusing, astigmatism, or spot ellipticity observable to the eye as evidenced by fuzziness due to lack of sharpness of trace (usually around edges), bow-tying (irregular widths of any single line when observed at different points), bowing of trace other than that normally caused by curvature of bulb. This test for focus is to be made in addition to the line width measurements.
2. The same conditions shall be set up as described in note 1 except that the connection of deflecting elements to the low- and high-frequency scanning supplies shall be interchanged and the amplitudes adjusted to 90 percent of the maximum tube diameter in both directions without any adjustment of focus from note 1 conditions. An examination for defocusing, astigmatism, or spot ellipticity shall be made as in note 1.
3. As measured with a 2x2 inch raster using a type 3 Photronic cell without eye correction, calibrated in foot candles of illumination from a light source having a color temperature of 2,700 °K.
4. This test shall be performed during the initial production and once each succeeding 12-calender months in which there is production. An accept on zero defect sampling plan shall be used, with sample of three tubes with an acceptance number of zero. In the event of failure, the test will be made as a part of conformance inspection, part 2, with an acceptance level of 6.5 (see note 5). The "12-calender month" sampling plan shall be reinstated after three consecutive samples have been accepted.
5. This specification sheet uses accept on zero defect sampling in accordance with MIL-PRF-1, table III.



Dimensions (See note 1)				
Ltr	Inches		Millimeter	
	Min	Max	Min	Max
Conformance inspection, part 2				
A	5.250	5.375	133.35	136.53
B	2.250		57.15	
C	1.562	1.688	39.67	42.88
D	16.375	17.125	415.93	434.98
F		9.500		241.30
G	1.500	2.000	38.10	50.80
H		3.375		85.73
Conformance inspection, part 3 (See note 4)				
L	Base: B11-66			
M	Bulb contact: C1-1			
Reference dimensions (See note 3)				
E	16.220		411.99	
J	10.000		254.00	
K	.750 R		19.05 R	



NOTES:

1. Metric equivalents (to the nearest .01 mm) are given for general information only.
2. Useful screen radius.
3. Reference dimensions are provided for information only and are not required for inspection purposes.

FIGURE 1. Outline drawing of electron tube types 5LP1A, 5LP5A, 5LP7A, AND 5LP11A .

NOTES

Referenced documents. In addition to MIL-PRF-1, this specification sheet references MIL-STD-1311.

Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the previous issue.

Custodians:

Army - CR
Navy - EC
Air Force - 11
DLA-CC

Preparing activity:
DLA - CC

(Project 5960-3710)

Review activities:

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

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