

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBES, CATHODE RAY
TYPES 3JP1, 3JP2, 3JP7, 3JP11, AND 3JP12

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 MIL-PRF-1.

DESCRIPTION: Electrostatic deflection and focus.

DIMENSIONS AND PIN CONNECTIONS: See figure 1.

ABSOLUTE RATINGS:

Parameter:	Type	EF	EC1	ed	Eb1	Eb2	Eb3	Rg	Zd	Ehk	Eb3/Eb2	Alt
Unit:		V	V dc	v	V dc	V dc	V dc	MegΩ	MegΩ	V dc	Ratio	ft
Maximum:	P1	6.9	0	550	1,100	2,200	4,400	1.5	1.5	-125	2.3	50,000
	P2	6.9	0	550	1,100	2,200	4,400	1.5	1.5	-125	2.3	50,000
	P11	6.9	0	550	1,100	2,200	4,400	1.5	1.5	-125	2.3	50,000
	P7	6.9	0	550	1,100	2,200	4,400	1.5	1.0	-125	2.3	50,000
	P12	6.9	0	550	1,100	2,200	4,400	1.5	1.0	-125	2.3	50,000
Minimum:	All:	5.7	-200	---	---	1,500	3,000	---	---	---	---	---
Test Conditions:												
	P1	6.3	Adj	---	Focus	1,500	3,000	---	---	---	---	---
	P2	6.3	Adj	---	Focus	1,500	3,000	---	---	---	---	---
	P11	6.3	Adj	---	Focus	1,500	3,000	---	---	---	---	---
	P12	6.3	Adj	---	Focus	1,500	3,000	---	---	---	---	---
	P7	6.3	Adj	---	Focus	2,000	4,000	---	---	---	---	---

GENERAL:

Qualification - Required.

This specification sheet uses accept on zero defect sampling in accordance with MIL-PRF-1, table III.

TABLE I. Testing and Inspection.

Requirement or test	MIL-STD-1311 method	Type	Conditions	Symbol	Limits		Unit
					Min	Max	
<u>Qualification inspection</u>							
Barometric pressure, reduced	1002	All	87.0 mm Hg		---	---	---
Neck and bulb alignment (electrostatic types)	5101	All		dia	---	2.25	inch
Focusing voltage, zero bias	5246	P1, P2, P11		Eb1	300	515	V dc
		P7		Eb1	400	690	V dc
		P12		Eb1	302	517	V dc
Deflection factor (1D2)	5248	P1, P2, P11	Eb3= Eb2=1,500 V dc	DF	102	138	V dc/in.
		P7	Eb3= Eb2=2,000 V dc	DF	136	184	V dc/in.
		P12	Eb3= Eb2=1,500 V dc	DF	96	144	V dc/in.
Deflection factor (3D4)	5248	P1, P2, P11	Eb3= Eb2=1,500 V dc	DF	76	102	V dc/in.
		P7	Eb3= Eb2=2,000 V dc	DF	100	138	V dc/in.
		P12	Eb3= Eb2=1,500 V dc	DF	71	107	V dc/in.
Deflection factor uniformity	5248	All		---	---	---	---
Cathode illumination	5216	All		---	---	---	---
Direct inter-electrode capacitance	1331	All	gl to all	Cgl	---	10.5	pF
			k to all	Ck	---	10.5	pF
			D1 to D2	C1D2	---	4.0	pF
			D3 to D4	C3D4	---	3.5	pF
			D1 to all	CD1	---	15.0	pF
			D2 to all	CD2	---	15.0	pF
			D3 to all	CD3	---	12.0	pF
			D4 to all	CD4	---	12.0	pF
Pressure (implosion)	1141	All		---	---	---	---
Vibration	5111	All		Width	---	1.0	mm
<u>Conformance inspection, part 1</u>							
Voltage breakdown	5201	All		---	---	---	---
Voltage breakdown (electrostatic types)	5201	All		---	---	---	---
Gas "cross"	5206	P1, P2, P11	lb3 = 100 μ A dc (see note 7)	---	---	---	---
		P7	lb3 = 200 μ A dc (see note 7)	---	---	---	---
		P12	lb3 = 30 μ A dc (see note 7)	---	---	---	---
Bulb, screen, and faceplate quality	5106	All		---	---	---	---
Deflection plate cutoff	---	P1, P2, P7, P11	lb3 = 10 μ A dc (max) (see note 3)	---	---	---	---
		P12	lb3 = 5 μ A dc(max) (see note 3 and 4)	---	---	---	---

TABLE I. Testing and Inspection - Continued.

Requirement or Test	MIL-STD-1311 Method	Type	Conditions	Symbol	Limits		Unit
					Min	Max	
<u>Conformance inspection, part 1 - continued</u>							
Modulation	5223	P7	I _{b3} = 200 μ A dc	ΔE_c		55	V dc
		P12	I _{b3} = 100 μ A dc	ΔE_c		40	V dc
Spot position (electrostatic deflection)	5231	P1, P2, P11, P12		---	---	15	mm
		P7		---	---	12	mm
Spot displacement (leakage)	5231	All		Displ	---	7	mm
Grid-cutoff voltage	5241	P1, P2, P11, P12		E _{cl}	-22.5	-67.5	V dc
		P7		E _{cl}	-30	-90	V dc
Grid No. 1 leakage current	5251	All		---	---	---	---
Anode No. 2 leakage current	5251	All		---	---	---	---
Light output	5221	P1	E _{b2} = 1,500 V; E _{b3} = 3,000 V; I _{b3} = 100 μ A dc	Light	25	---	fL
		P11	E _{b2} = 1,500 V; E _{b3} = 3,000 V; I _{b3} = 100 μ A dc (see note 5)	Light	9	---	fL
<u>Conformance inspection, part 2</u>							
Heater current	1301	All		I _f	540	660	mA
Electrode current (anode No. 1)	5201	P1, P2, P11	I _{b3} = 100 μ A dc	I _{b1}	-50	10	μ A dc
		P7	I _{b3} = 200 μ A dc	I _{b1}	-50	10	μ A dc
		P12	I _{b3} = 5 μ A dc (see note 1)	I _{b1}	-50	10	μ A dc
Base alignment (electrostatic types)	5101	All	+1D2, pin No. 5	---	---	---	---
Side terminal alignment (electrostatic types)	5101	All	+1D2	---	---	---	---
Electrode current (anode No. 3)	5201	P1, P2, P11	See note 2	I _{b3}	150	---	μ A dc
Electrode current (cathode)	5201	P1, P2, P11	I _{b3} = 100 μ A dc	I _k	---	1,000	μ A dc
		P7	I _{b3} = 200 μ A dc	I _k	---	1,500	μ A dc
		P12	I _{b3} = 5 μ A dc (see note 1)	I _k	---	100	μ A dc

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TABLE I. Testing and Inspection -Continued.

Requirement or test	MIL-STD-1311 method	Type	Conditions	Symbol	Limits		Unit
					Min	Max	
<u>Conformance inspection, part 2 – continued</u>							
Angle between traces	5101	All		---	---	---	---
Neck and base alignment (electrostatic types)	5101	All		---	---	---	---
Stray light emission (conventional types)	5216	All	Eb2 = 2,200 V dc; Eb3 = 4,400 V dc	---	---	---	---
Screens	5221	P2		D1(1)	360	---	cB
		P7		D1(5)	400	---	cB
				G5 : 1	4	---	
				cbf			
		P12		D0.1 (E)	550	---	---
				D0.3 (E)	80	100	cB
Line width "A" (electrostatic deflection)	5226	P1, P2, P11	Ib3 = 100 μ A dc (see note 6)	Width	---	0.75	mm
		P7	Ib3 = 200 μ A dc (see note 6)	Width	---	0.80	mm
		P12	Ib3 = 5 μ A dc (see notes 1 and 6)	Width	---	0.35	mm
Line width "B" (electrostatic deflection)	5226	P1, P2, P11	Ib3 = 100 μ A dc (see note 8)	Width	---	0.90	mm
		P7	Ib3 = 200 μ A dc (see note 8)	Width	---	1.00	mm
		P12	Ib3 = 5 μ A dc (see notes 1 and 8)	Width	---	0.40	mm
Focusing-voltage at cutoff	5246	P1, P2,P11		Eb1	345	515	V dc
		P7		Eb1	460	690	V dc
		P12		Eb1	345	517	V dc
Deflection factor (1D2)	5248	P1, P2, P11,P12		DF	127	173	V dc/in.
		P7		DF	170	230	V dc/in.
Deflection factor (3D4)	5248	P1, P2, P11,P12		DF	94	128	V dc/in.
		P7		DF	125	170	V dc/in.
Heater-cathode leakage current	5251	All		---	---	---	---
Secureness of base, cap, or insert	1101	AI		---	---	---	---
Permanence of marking	1105			---	---	---	---
Base pin solder depth	1111			---	---	---	---

TABLE I. Testing and Inspection -Continued.

Requirement or test	MIL-STD-1311 method	Type	Conditions	Symbol	Limits		Unit
					Min	Max	
<u>Conformance inspection, part 3</u>							
Life-test provisions	---	P1, P2, P7, P11	Group C; t = 500 hours (min) Eb3 = 4,400 V dc; Eb2 = 2,200 V dc; Ib3 = 30 μ A dc	---	---	---	---
		P12	Group C; t = 500 hours (min) Eb3 = 4,400 V dc Eb2 = 2,200 V dc Ib3 = 5 μ A dc	---	---	---	---
Life-test end points:	---						
Modulation	5223	P1, P2, P11, P12	Ib3 = 100 μ A dc	ΔE_c	---	40	V dc
		P7	Ib3 = 150 μ A dc	ΔE_c	---	55	V dc
Line width "A" (electrostatic deflection)	5226	P1, P2, P11	Ib3 = 100 μ A dc	Width	---	0.75	mm
		P7	Ib3 = 150 μ A dc	Width	---	0.86	mm
		P12	Ib3 = 5 μ A dc	Width	---	0.35	mm
Line width "B" (electrostatic deflection)	5226	P1, P2, P11	Ib3 = 100 μ A dc	Width	---	0.90	mm
		P7	Ib3 = 150 μ A dc	Width	---	1.12	mm
		P12	Ib3 = 5 μ A dc	Width	---	0.40	mm
Direct-interelectrode capacitance	1331	All	g1 to all k to all D1 TO D2 D3 TO D4 D1 TO ALL D2 TO ALL D3 TO ALL D4 TO ALL (See Note 10)	Cg1 Ck C1D2 C3D4 CD1 CD2 CD3 CD4	---	10.5 10.5 4.0 3.5 15.0 15.0 12.0 12.0	pF pF pF pF pF pF pF pF

NOTES:

- 1/ The tube can be severely and permanently damaged if the current density on the screen is allowed to rise too high in static tests of this sort. For this reason, the length of time during which the screen is bombarded should be kept as short as possible compatible with the reading of specified current limits.
- 2/ Ib3 is to be measured with $\Delta E_c = 40$ V dc when cutoff is greater than -40 V dc and with $E_c = 0$ when cutoff is less than -40 V dc.
- 3/ At specified conditions there shall be no pattern cutoff with the useful screen area.
- 4/ To prevent burning of the screen, the beam current should not be allowed to exceed that amount necessary to just produce a visible trace.

NOTES - Continued:

5/ As measured by a 2 x 2 inch (50.80 x 50.80 mm) raster using a type 3 photronic cell without eye correction, calibrated in foot candles of illumination from a light source having color temperature of 2,700°K.

6/ The reflecting plates shall be returned to anode No. 2 through a 2.5 Meg Ω resistance. Ib3, the beam current, shall be set as follows:

P1	Ib3 = 100 μ A dc	P11	Ib3 = 100 μ A dc
P2	Ib3 = 100 μ A dc	P12	Ib3 = 5 μ A dc
P7	Ib3 = 200 μ A dc		

a/ 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 high-frequency scanning. Readjustment may be made for best overall focus. The tube shall be observed for deflection defocusing, astigmatism, or spot ellipticity observable to the eye as evidenced by fuzziness due to lack of sharpness of the trace (usually around the 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.

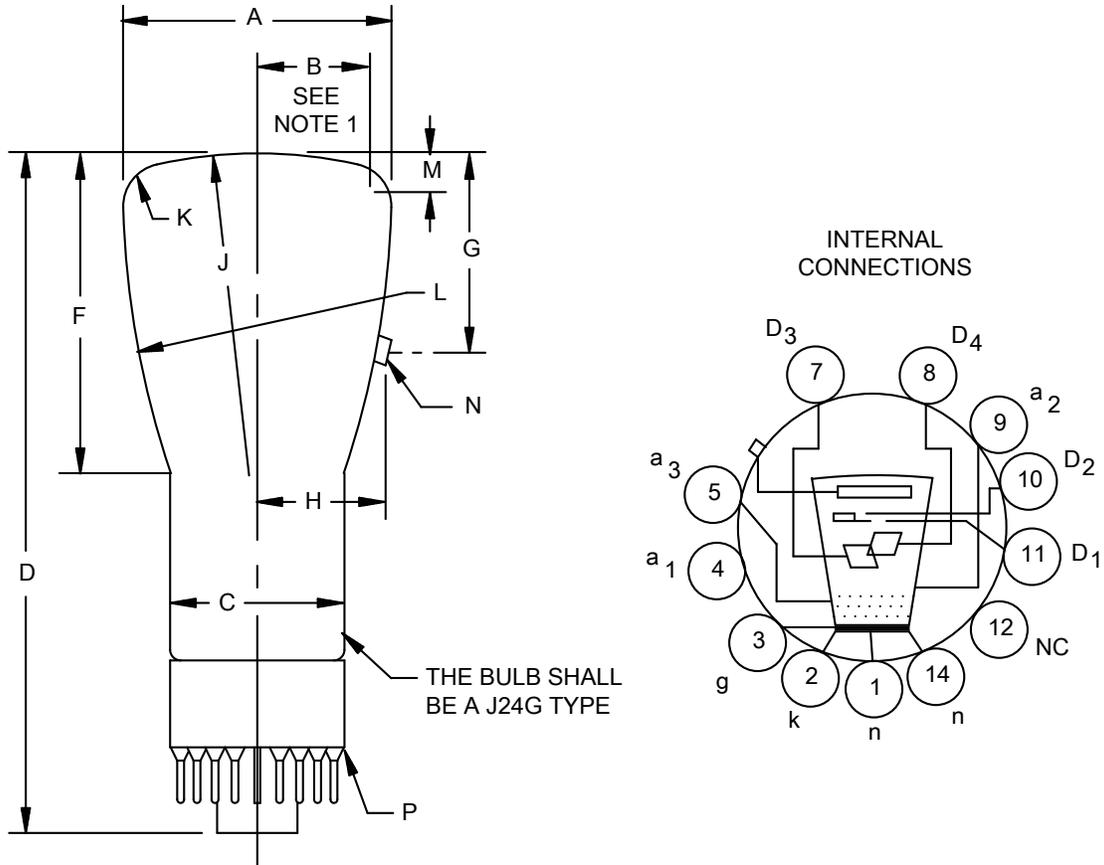
b/ This test for focus is to be made in addition to the line width measurements.

7/ This test to be performed at the conclusion of the holding period.

8/ The same conditions shall be set up as described in note 6 except that the connection of deflection 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 6 conditions.

An examination for defocusing, astigmatism, or spot ellipticity shall be made as in note 6.

9/ This test shall be performed during the initial production and once each succeeding 12-calendar months in which there is production. A sampling plan shall be used, with a sample of six tubes with an acceptance number of zero defects. The regular "12-calendar month" sampling plan shall be reinstated after three consecutive samples have been accepted.



Dimensions (see note b/)				
Ltr	Minimum		Maximum	
	in	mm	in	mm
Conformance inspection, part 2				
A	2.94	74.7	3.06	77.7
B	1.37	34.8		
C	1.94	49.3	2.06	52.3
D	9.75	247.6	10.25	260.4
F	3.75	95.2	4.00	101.6
G	1.50	38.1	2.00	50.8

Dimensions - continued.		
Conformance inspection, part 3 (See note 9/)		
N	Bulb contact: J1-22	
P	Base: B12-37	
Reference dimensions (see note c/)		
	in	mm
H	1.62	41.1
J	8.00 R	203.2 R
K	.25 R	6.4 R
L	12.44 R	316.0 R
M	.35	8.9

NOTES:

- a/ The minimum useful screen radius shall not be less than 1.375 inches (34.92 mm).
- b/ Metric equivalents are given for general information only and are based upon 1.00 inch = 25.4 mm.
- c/ Reference dimensions are for information only and are not required for inspection purposes.

FIGURE 1. Outline drawing of electron tube types 3JP1, 3JP2, 3JP7, 3JP11, and 3JP12.

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

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Navy - EC
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DLA - CC

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Review activities:

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