

INCH POUND

MIL-PRF-1/594B
16 February 1999
SUPERSEDING
MIL-E-1/594A
14 January 1975

PERFORMANCE SPECIFICATION SHEET
ELECTRON TUBE, CATHODE RAY
TYPE 3BP1A

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	Light output	Rg	Zd	Ehk	Alt
Unit:	V	V dc	v	V dc	V dc	fL	Meg	Meg	V dc	ft
Maximum:	6.9	0	550	1,100	2,200	---	1.5	1.0	-125	10,000
Minimum:	5.7	-200	---	---	1,200	5.0	---	---	---	---
Test conditions:	6.3	Adj	---	---	1,500	---	---	---	---	---

GENERAL:

Qualification - Required.

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TABLE I. Testing and inspection.

Inspection	Method	Notes	Conditions	Symbol	Limits Min	Limits Max	Units
<u>Qualification inspection</u>							
Neck and bulb alignment (electrostatic types)	5101	---		Diam	---	2.25	Inch
Cathode illumination	5216	---		---	---	---	---
Base material insulating quality	1216	---	Zone 5 (minimum)	---	---	---	---
Deflection factor uniformity	5248	---		---	---	---	---
Direct-interelectrode capacitance	1331	---	Control grid to all cathode	Cg1	---	10.5	pF
			Cathode to all	Ck	---	10.5	pF
			D1 to D2	C1D2	---	4	pF
			D3 to D4	C3D4	---	2.8	pF
			D1 to all	CD1	---	15	pF
			D3 to all	CD3	---	12	pF
			D1 to all except D2	CD1	---	13	pF
			D2 to all except D1	CD2	---	13	pF
			D3 to all except D4	CD3	---	8	pF
D4 to all except D3	CD4	---	8.3	pF			
Pressure (implosion)	1141	---		---	---	---	---
Vibration	5111	---		Width	---	1.0	mm
<u>Conformance inspection, part 1</u>							
Voltage breakdown	5201	---		---	---	---	---
Voltage breakdown (electrostatic types)	5201	---		---	---	---	---
Gas "cross"	5206	1	Light = 5 fL	---	---	---	---
Bulb, screen and faceplate quality	5106	---		---	---	---	---
Light output	5221	1		Light	5.0	---	fL
Modulation	5223	---	Light = 5 fL	ΔE_c	---	40	V dc
Spot position (electrostatic deflection)	5231	---		---	---	15	mm
Spot displacement	5231	---		---	---	7	mm
Grid cutoff voltage	5241	---		E_{c1}	-22.5	-67.5	V dc
Grid No. 1 leakage current	5251	---		---	---	---	---
Anode No. 2 leakage current	5251	---		---	---	---	---

See footnotes at end of table.

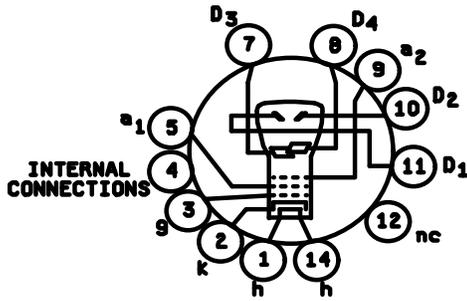
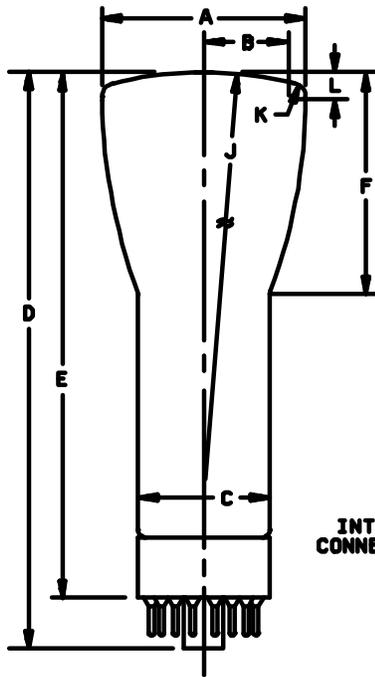
TABLE I. Testing and Inspection -Continued.

Inspection	Method	Notes	Conditions	Symbol	Limits Min	Limits Max	Units
<u>Conformance inspection, part 2</u>							
Heater current	1301	---		If	540	660	mA
Electrode current (anode No. 1)	5201	---	Ec1 = 0	Ib1	-50	10	μA dc
Electrode current (cathode)	5201	---	Light = 5 fL	Ik	---	1,000	μA dc
Base alignment (electrostatic types)	5101	---	+1D2, pin No. 5	---	---	---	---
Angle between traces	5101	---		---	---	---	---
Neck and base alignment (electrostatic types)	5101	---		---	---	---	---
Stray light emission	5216	---	Eb2 = 2,200 V dc	---	---	---	---
Line width "A"	5226	2	Light = 5 fL	Width	---	0.55	mm
Line width "B"	5226	3	Light = 5 fL	Width	---	0.70	mm
Focusing voltage at cutoff	5246	---		Eb1	345	515	V dc
Focusing voltage (zero bias)	5246	---		Eb1	280	515	V dc
Deflection factor	5248	---	1D2	DF	127	173	V dc/in.
Deflection factor	5248	---	3D4	DF	94	128	V dc/in.
Heater-cathode leakage current	5251	---		---	---	---	---
Secureness of base, cap or insert	1101	---		---	---	---	---
Base pin solder depth	1111	---		---	---	---	---
Permanence of marking	1105	---		---	---	---	---
<u>Conformance inspection, part 3</u>							
Life test	---	---	Group B; Light = 5 fL; Eb2 = 2,200 V dc; t = 500 hours (minimum)	---	---	---	---
Life-test end points:	---	---					
Line width "A"	5226	---	Light = 5 fL	Width	---	0.60	mm
Line width "B"	5226	---	Light = 5 fL	Width	---	0.75	mm
Modulation	5223	---	Light = 5 fL	Width	---	45	V dc

See footnotes at end of table.

NOTES:

1. This test to be performed at the conclusion of the holding period.
2. The deflecting plates shall be returned to anode No. 2 through a minimum of 2.5 megohm resistors. The light output shall be set at 5 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 high frequency scanning. Readjustment may be made for best overall focus.
 - (a) 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.
 - (b) This test for focus is to be made in addition to the line width measurements.
3. The same conditions shall be set up as described in note 2 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 2 conditions. An examination for defocusing, astigmatism or spot ellipticity shall be made as in note 2.



Dimensions				
Ltr	Inches		Millimeter	
	Min	Max	Min	Max
Conformance inspection, part 2				
A	2.937	3.063	74.60	77.80
B	See note 1			
C	1.937	2.063	49.20	52.40
D	9.750	10.250	247.65	260.35
Reference dimensions (see note 4)				
E	9.250		234.95	
F	3.875		98.43	
J	8.000 R		203.20 R	
K	.250 R		6.35 R	
L	.350		8.89	

NOTES:

1. The minimum useful screen radius shall not be less than 1.375 inches (34.93 mm).
2. The base shall be a medium shell DIHEPTAL 12-pin (B12-37) type.
3. The bulb shall be a J24G type.
4. Reference dimensions are for information only and are not required for inspection purposes.

FIGURE 1. Outline drawing for electron tube type 3BP1A.

Custodian:
 Army - CR
 Navy - EC
 Air Force - 85

Preparing activity:
 DLA - CC
 (Project 5960-3473-02)

Review activities:
 Army - MI
 Navy - MC
 Air Force - 17, 99