

INCH-POUND

MIL-PRF-1/590C  
30 September 2009  
SUPERSEDING  
MIL-PRF-1/590B  
9 February 1999

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, CATHODE RAY  
TYPE 3FP7A

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	Rg	Zd	Ehk	Eb3/Eb2	Alt
Unit:	V	V dc	v	V dc	V dc	V dc	Meg $\Omega$	Meg $\Omega$	V dc	ratio	ft
Maximum	6.9	0	550	1,100	2,000	4,400	1.5	1.0	-125	2.3	10,000
Minimum	5.7	-125	---	---	1,500	3,000	---	---	---	---	---
Test conditions:	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	Notes	Conditions	Symbol	Limits		Units
					Min	Max	
<u>Qualification inspection</u>							
Neck and bulb alignment (electrostatic types)	5101	---		Dia.	---	2.25	Inch
Cathode illumination	5216	---		---	---	---	---
Focusing voltage	5246	---		Eb1	400	690	V dc
Deflection factor (1D2)	5248	---	Eb3=Eb2=2,000 V dc	DF	170	230	V dc/in.
Deflection factor (3D4)	5248	---	Eb3=Eb2=2,000 V dc	DF	126	170	V dc/in.
Deflection factor uniformity	5248	---		---	---	---	---
Direct-interelectrode capacitance	1331	---	Control grid to all	Cg1	---	10.5	pF
			Cathode to all	Ck	---	10.5	pF
			D1 to D2	C1D2	---	4.0	pF
			D3 to D4	C3D4	---	4.0	pF
			D1 to all	CD1	---	15.0	pF
			D3 to all	CD3	---	12.0	pF
			D1 to all, except D2	CD1	---	13.0	pF
			D2 to all, except D1	CD2	---	13.0	pF
D3 to all, except D4	CD3	---	12.0	pF			
D4 to all, except D3	CD4	---	12.0	pF			
Pressure (implosion)	1141	---		---	---	---	---
Vibration	5111	---		Width	---	1.0	mm
Base material insulating quality	1216	---		---	---	---	---
<u>Conformance inspection, part 1</u>							
Voltage breakdown	5201	---		---	---	---	---
Voltage breakdown (electrostatic types)	5201	---		---	---	---	---
Gas "cross"	5206	1	Ib3=150 $\mu$ A dc	---	---	---	---
Bulb, screen and faceplate quality	5106	---		---	---	---	---
Modulation	5223	---	Ib3=150 $\mu$ A dc	$\Delta$ Ec	---	50	V dc
Spot position (electrostatic deflection)	5231	---		---	---	12	mm
Spot displacement (leakage)	5231	---		Displ	---	7	mm
Grid cutoff voltage	5241	---		Eco	-30	-90	V dc
Grid No 1. leakage current	5251	---		---	---	---	---
Anode No. 2 leakage current	5251	---		---	---	---	---

See footnotes at end of table.

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TABLE I. Testing and inspection - Continued.

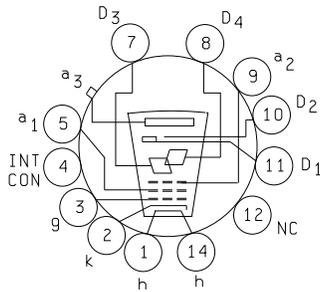
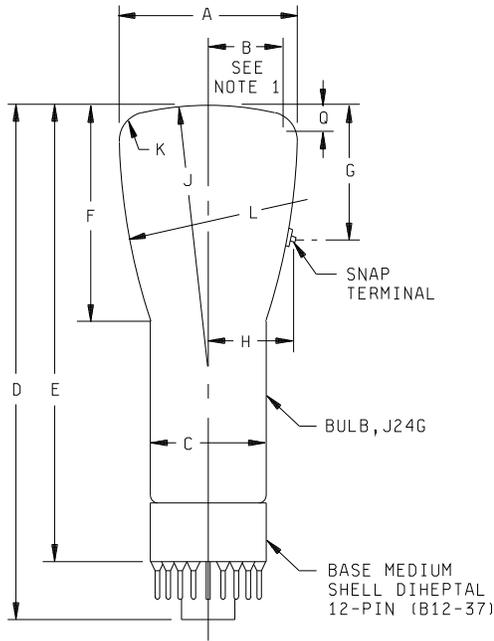
Inspection	Method MIL-STD-1311	Notes	Conditions	Symbol	Limits		Units
					Min	Max	
<u>Conformance inspection, part 2</u>							
Heater current	1301	---		If	540	660	mA
Electrode current (anode 1)	5201	--	Ec1 = 0	lb1	-50	10	μA dc
Electrode current (cathode)	5201	---	1b3=150 μA dc	lk	---	1,500	μA dc
Base alignment (electrostatic types)	5101	---	+ 1D2, pin No. 5	---	---	---	---
Side terminal alignment (electrostatic types)	5101	---	+1D2	---	---	---	---
Angle between traces	5101	---		---	---	---	---
Neck and base alignment (electrostatic types)	5101	---		---	---	---	---
Stray light emission (conventional types)	5216	---	Eb2=2,200 V dc Eb3=4,400 V dc	---	---	---	---
Screens	5221	---		---	---	---	---
Line width "A" (electrostatic deflection)	5226	2	1b3=150 μA dc	Width	---	0.75	mm
Line width "B" (electrostatic deflection)	5226	3	1b3=150 μA dc	Width	---	0.90	mm
Focusing voltage at cutoff	5246	---		Eb1	460	690	V dc
Deflection factor	5248	---	1D2	DF	212	288	V dc/in.
Deflection factor	5248	---	3D4	DF	153	207	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 C; Eb3 = 4,400 V dc; Eb2=2,200 V dc; lb3-30 μA dc t = 500 hours	---	---	---	---
Life-test end points:							
Modulation	5223	---	lb3=112 μA dc	ΔEc	---	50	V dc
Line width "A"	5226	---	lb3=112 μA dc	Width	---	0.8	mm
Line width "B"	5226	---	lb3=112 μA dc	Width	---	0.95	mm

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TABLE I. Testing and inspection - Continued.

NOTES:

- 1/ This test to be performed at the conclusion of the holding period.
- 2/ The deflecting plates shall be returned to anode number 2 through a minimum of 2.5 megohm resistors. I<sub>b3</sub> the beam current shall be set at 150  $\mu$ A dc. 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 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.



Ltr	Dimensions			
	Inches		Millimeter	
	Min	Max	Min	Max
Conformance inspection, part 2				
A	2.937 dia.	3.063 dia.	74.60 dia.	77.80 dia.
B	1.375		34.93	
C	1.937 dia.	2.063 dia.	49.20 dia.	52.40 dia.
D	9.720	10.250	247.65	260.35
G	1.500	2.000	38.10	50.80
Reference dimensions (see note 2)				
E	9.250		234.95	
F	3.875		98.43	
H	1.625		41.28	
J	8.000 Rad		203.20 Rad	
K	.250 Rad		6.35 Rad	
L	12.438 Rad		315.93 Rad	
Q	.350		8.89	

NOTES:

1. Minimum useful screen radius.
2. These dimensions are for information only and are not required for inspection purposes.

FIGURE 1. Outline drawing for electron tube 3FP7A.

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Referenced documents. In addition to MIL-PRF-1, this document references the following:  
MIL-STD-1311

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 last previous issue.

Custodians:

Army - CR  
Navy - EC  
Air Force - 85  
DLA - CC

Preparing activity:

DLA - CC

(Project 5960-2009-037)

Review activities:

Army - CR4  
Navy - AS, CG, MC, OS, SH  
Air Force - 19, 99

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