

INCH-POUND

MIL-PRF-1/1392D
22 July 1999
SUPERSEDING
MIL-E-1/1392C
2 November 1970

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBES, CATHODE RAY
TYPES 5FP7A, 5FP14A, AND 5FP25

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: Magnetic deflection and focus.

DIMENSIONS AND PIN CONNECTIONS: See figure 1.

ABSOLUTE RATINGS:

Parameter:	Ef	Ec1	Ec2	Eb1	Ehk	Rg1	Alt
Unit:	V	V dc	V dc	V dc	V dc	Meg	ft
Maximum:	6.9	0, -180	770	8,800	±125	1/	60,000
Minimum:	5.7	---	---	4,000	---	---	---
Test condition:	6.3	Adjust	250	4,000	---	---	---

See footnotes at end of table I.

GENERAL:

Qualification - Required. 2/

TABLE I. Testing and inspection.

Inspection	Method	Type	Conditions	Acceptance level	Inspection level or code	Symbol	Limits		Unit
							Min	Max	
<u>Qualification inspection</u>									
Pressure (implosion)	1141	All		---	---	---	---	---	---
Barometric pressure, reduced	1002	All	Pressure = 54 mmHg	---	---	---	---	---	---
Vibration	5111	All	<u>4/</u>	---	---	Width	---	2.0	mm
Direct-interelectrode capacitance	1331	All	k to all	---	---	Ck	---	10.0	pF
			g1 to all	---	---	Cg1	---	11.0	pF
			g2 to all	---	---	Cg2	---	12.0	pF
Blue/orange light ratio	---	P14A	<u>5/</u>	---	---	Ratio	1.0	1.5	---
Electrode currents (grid No. 2)	5201	All	Ec1 = 0	---	---	Ic2	---	50	μA dc
Face tilt	5101	All		---	---	---	---	---	---
Neck and bulb alignment (magnetic types)	5101	All		---	---	---	---	---	---
Cathode illumination	5216	All		---	---	---	---	---	---
Base material insulating quality	1216	All		---	---	---	---	---	---
<u>Conformance inspection, part 1</u>									
Bulb, screen, and faceplate quality	5106	All		---	---	---	---	---	---
Voltage breakdown	5201	All		---	---	---	---	---	---
Voltage breakdown (magnetic types)	5201	All		---	---	---	---	---	---
Modulation	5223	All	Ib = 200 μA dc	---	---	ΔEc1	---	38	V dc
Gas ratio	5206	All	<u>3/</u>	---	---	Gr	---	0.25	---
Neck straightness	5101	All		---	---	---	---	---	---
Neck shadow	---	P7A P14A	Ib = 50 μA dc <u>Z/</u>	---	---	---	3.82	---	inch
Spot position (magnetic deflection)	5231	All		---	---	---	---	9.0	mm
Zero-bias anode current (magnetic deflection)	5236	All		---	---	---	---	---	---

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

Inspection	Method	Type	Conditions	Acceptance level	Inspection level or code	Symbol	Limits		Unit
							Min	Max	
<u>Conformance inspection, part 2</u> - Continued									
Grid cutoff voltage	5241	All		---	---	Ec1	-25	-70	V dc
Grid No. 1 leakage current	5251	All		---	---	Ic1	---	3	μA dc
Aperture alignment	---	All	g/	---	---	Distance	---	5	mm
Secureness of base, cap, or insert	1101	All		---	---	---	---	---	---
Heater or filament current	1301	All		---	---	If	540	660	mA
Side terminal and base alignment	5101	All		---	---	---	---	---	---
Stray light emission (conventional type)	5216	All	Eb = 8,800 V dc P14A Ec2 = 330 V dc P7A Ec2 = 770 V dc P25 Ec2 = 770 V dc	---	---	---	---	---	---
Screens	5221	All		---	---	---	---	---	---
Line width "A" (magnetic deflection)	5226	P7A	Ib = 200 μA dc	---	---	Width	---	0.50	mm
		P14A	Ib = 200 μA dc	---	---	Width	---	0.25	mm
		P25	Ib = 25 μA dc	---	---	Width	---	0.20	mm
Line width "C" (magnetic deflection)	5226	P7A	Ib = 200 μA dc	---	---	Width	---	0.60	mm
		P14A	Ib = 200 μA dc	---	---	Width	---	0.35	mm
		P25	Ib = 25 μA dc	---	---	Width	---	0.30	mm
Focusing ampere turns	5246	All	Ib = 200 μA dc; D = 2.75 inch	---	---	---	369	495	---
Heater-cathode leakage current	5251	All		---	---	---	---	---	---
Grid No. 2 leakage current	5251	All		---	---	---	---	---	---
Permanence of marking	1105	All		---	---	---	---	---	---

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

Inspection	Method	Type	Conditions	Acceptance level	Inspection level or code	Symbol	Limits		Unit
							Min	Max	
<u>Conformance inspection, part 3</u>									
Life-test provisions	---	All	Group C; t = 500 hours (min)	---	---	---	---	---	---
		P14A		---	---	---	---	---	---
		P7A	Eb = 8,800 V dc; Ec2 = 330 V dc; Ib = 60 μ A dc	---	---	---	---	---	---
		P25	Eb = 8,800 V dc; Ec2 = 770 V dc Ib = 40 μ A dc	---	---	---	---	---	---
Life-test end points	---	P7A	Line width "A"	---	---	---	---	0.50	mm
			Line width "C"	---	---	---	---	0.60	mm
		P14A	Line width "A"	---	---	---	---	0.25	mm
			Line width "C"	---	---	---	---	0.35	mm
		P25	Line width "A"	---	---	---	---	0.20	mm
			Line width "C"	---	---	---	---	0.30	mm
		All	Modulation	---	---	Δ Ec1	---	38	V dc
		All	Heater-cathode leakage current	---	---	---	---	---	---
		All	Grid No. 1 leakage current	---	---	---	---	---	---
All	Grid No. 2 leakage current	---	---	---	---	---	---		
All	Stray light emission	---	---	---	---	---	---		

1/ When Ec2 is greater than 330 V dc, Rg1 shall not exceed 0.5 Meg. When Ec2 is less than 330 V dc, Rg1 shall not exceed 1.5 Meg.

2/ A limiting aperture type of gun shall be used. The amount of limiting permitted shall be between 15 and 45 percent when Ib = 200 μ A dc and the secondary electron current from the screen to the limiting aperture is zero. The following information and materials shall be made available to the government representative witnessing the qualification inspection measurements:

- (a) The electron gun drawing with significant dimensions.
- (b) A sample of the electron gun to be used in the manufacture of the tubes.
- (c) A sample tube with suitable connectors to enable measurement of the screen current separately from the limiting aperture current. This sample tube, at the option of the manufacturer, may be one of the four regular qualification inspection samples or a fifth tube. If the sample is one of the four regular qualification inspection samples, it shall pass all tests. If a fifth tube is submitted, it shall pass all electrical tests, but is not required to pass screen quality, and some of the dimensions.

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

4/ Displacement of the spot corresponding to the image of the final aperture shall not exceed the limit specified.

TABLE I. Testing and inspection - Continued.5/ Blue/orange light ratio.

- (a) Using tungsten standard luminant A, calibrate Weston Photronic Cell No. 594-R-R, or equivalent, with Corning 4-65 filter, or equivalent, at 10-foot candles. This combination approximates the normal eye response.
- (b) Set up a 7.1 cm by 7.1 cm defocused raster on the cathode-ray tube under test and adjust the grid potential for a brightness reading of 10-foot lamberts when viewed through a Wratten 15 filter, or equivalent, by the Photronic cell and filter previously standardized.
- (c) Without disturbing the Photronic cell, replace Wratten 15 and Corning 4-65 filters with Corning 5-59 filter, or equivalent, and again measure the indicated brightness in apparent foot lamberts. The thickness of the filters shall be 2.95 and 5.13 mm, respectively.
- (d) Calculate blue/orange light ratio as follows:

$$\text{Blue/orange light ratio} = \frac{\text{Apparent foot lamberts as measured with Corning 5-59 filter, or equivalent}}{10\text{-foot lamberts}}$$

- 6/ The distance between the center of the unfocused, undeflected spot at low intensity (Ec1 near cutoff) and the center of the image of the masking aperture observed at high intensity of the unfocused, undeflected spot shall not exceed the limit specified. Ec1 should not be held at zero for more than approximately 30 seconds to prevent damage to the screen.
- 7/ The standard deflection yoke spacer (see figure 2) shall be placed on the tube neck so as to fit tightly between the cone of the glass envelope and the standard 70° deflection yoke, JEDEC-120. Focus coil No. 109 shall be located in the same position with respect to the deflection yoke as for other tests made without the spacer. The electron beam shall be deflected by means of horizontal and vertical deflection waveforms adjusted in magnitude to overscan the useful screen area; if there is no neck shadow the raster shall display 35 to 100 lines. Increase the focus current until the raster passes to a defocused condition with the raster lines overlapping while the ends of the lines become abruptly terminated producing a disk pattern approximately circular in shape having a circumference in sharp focus. Neck shadow will be evident as an outer annular ring or shadow where the electron beam does not reach the screen. The focus coil shall be oriented to make the annular ring symmetrical with the tube face. The minimum diameter of the disk pattern shall be equal to or greater than the specified limit.

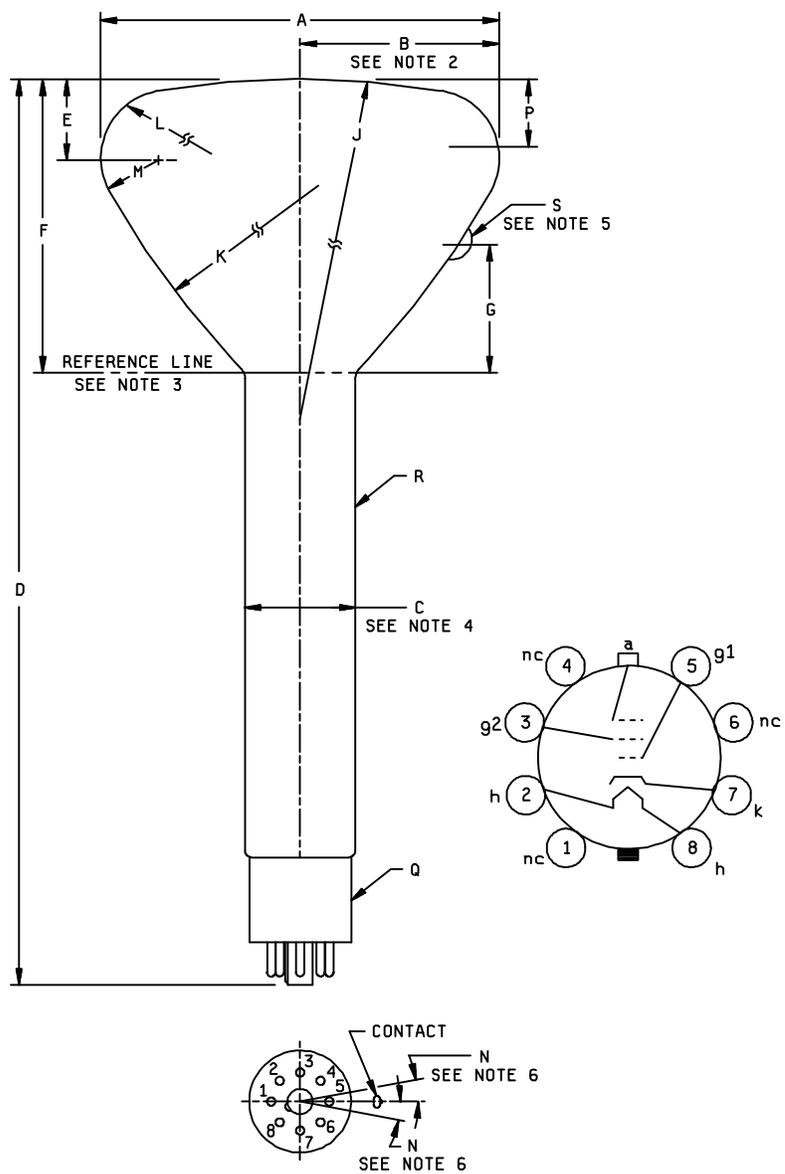


FIGURE 1. Outline drawing of electron tube types 5FP7A, 5FP14A, and 5FP25.

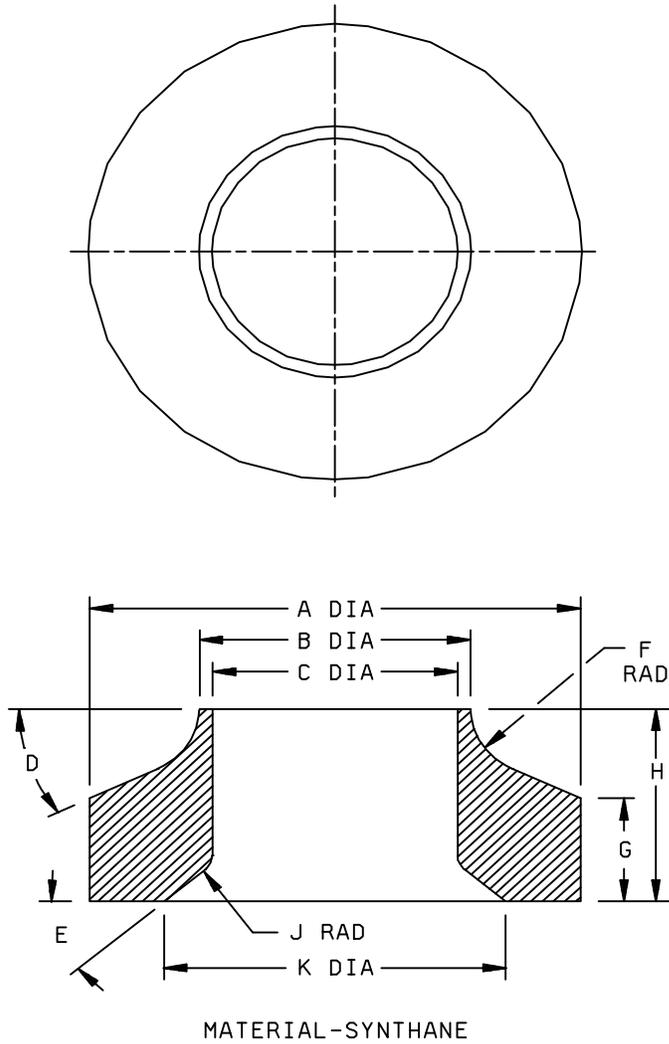
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Type	Ltr	Dimensions			
		Inches		Millimeters	
		Min	Max	Min	Max
Conformance inspection, part 2					
All	A	4.844	5.030	123.04	127.76
All	B	2.125	---	54.98	---
All	C	1.318	1.432	33.48	36.37
P14A	D	10.750	11.500	273.05	292.10
P7A, P25	D	10.750	11.125	273.05	282.58
All	F	3.625	3.749	92.08	95.22
All	G	1.188	1.562	30.18	39.67
All	N	°	10°	°	10°
Conformance inspection, part 3 (periodic check)					
P7A, P25	Q	Base: B8-11, B8-65, B8-26			
P14A	Q	Base: B8-11 or B8-65			
P7A, P25	R	Envelope: J39-½L, J39-½F			
P14A	R	Envelope: J39-½L			
All	S	Contact: J1-22			
Reference dimensions <i>Z/</i>					
All	E	1.000		25.40	
All	J	24.000 Rad		609.60 Rad	
All	K	10.000 Rad		254.00 Rad	
All	L	.125 Rad		3.18 Rad	
All	M	.906 Rad		23.01 Rad	
All	P	.812		20.62	

NOTES:

1. Unless otherwise specified, all dimensions are in inches.
2. Minimum useful screen radius.
3. Determined by point where gauge G124 will stop.
4. Applies to entire length of neck below reference line.
5. Axis of contact terminal shall be normal to bulb surface.
6. Allowable deviation from true position on center line.
7. Reference dimensions are for information only and are not required for inspection purposes.

FIGURE 1. Outline drawing of electron tube types 5FP7A, 5FP14A, and 5FP25 - Continued.



NOTE: All dimensions are in inches.

Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	2.873 DIA	2.877 DIA	72.97 DIA	73.07 DIA
B	1.539 DIA	1.549 DIA	39.09 DIA	39.34 DIA
C	1.432 DIA	1.442 DIA	36.37 DIA	36.63 DIA
D	25°15'	25°45'	25°15'	25°45'
E	40°15'	40°45'	40°15'	40°45'
F	.438 R	.562 R	11.12 R	14.27 R
G	.621	.625	15.77	15.87
H	1.186	1.190	30.12	30.23
J	.025 R	.087 R	0.63 R	2.21 R
K	1.998 DIA	2.002 DIA	50.75 DIA	50.85 DIA

FIGURE 2. Neck shadow test standard deflection yoke spacer (5FP14A and 5FP7A).

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Custodians:

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

Preparing activity:
DLA - CC

(Project 5960-3546-17)

Review activities:

Navy - AS, CG, OS
Air Force - 19, 99