

INCH-POUND
 MIL-PRF-1/36G
 16 December 2002
 SUPERSEDING
 MIL-PRF-1/36F
 22 July 1997

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 procuring 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: | Type | EF | EC1 | ed | Eb1 | Eb2 | Eb3 | Rg | Zd | Ehk | Eb3/Eb2 | Alt |
|-------------------------|------|-----|------|-----|-------|-------|-------|-----|-----|------|---------|--------|
| Unit: | | V | V dc | v | V dc | V dc | V dc | Meg | Meg | 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 | --- | --- | --- | --- | --- |
| <u>Test Conditions:</u> | | | | | | | | | | | | |
| | 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

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Table 1. Testing and Inspection.

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

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Table 1. Testing and Inspection -Continued.

| Method | Requirement or Test | Type | Conditions | Symbol | Limits Min | Limits Max | Unit |
|--------|--|-----------------------------|--|----------------------------|-------------------|-----------------------|--|
| | <u>Conformance inspection, part 1</u> - continued | | | | | | |
| 5223 | Modulation | P7 P12 | lb3 = 200 μ A dc lb3 = 100 μ A dc | Δ Ec Δ Ec | | 55 40 | V dc V dc |
| 5231 | Spot position (electrostatic deflection) | P1, P2 P11,P12 P7 | | --- | --- | 15 | mm |
| 5231 | Spot displacement (leakage) | All | | Displ | --- | 7 | mm |
| 5241 | Grid-cutoff voltage | P1, P2 P11,P12 P7 | | Ecl | -22.5 | -67.5 | V dc |
| 5251 | Grid No. 1 leakage current | All | | --- | --- | --- | --- |
| 5251 | Anode No. 2 leakage current | All | | --- | --- | --- | --- |
| 5221 | Light output | P1 P11 | Eb2 = 1,500 V; Eb3 = 3,000 V; lb3 = 100 μ A dc Eb2 = 1,500 V; Eb3 = 3,000 V; lb3 = 100 μ A dc (see note 5) | Light Light | 25 9 | --- --- | ftL ftL |
| | <u>Conformance inspection, part 2</u> | | | | | | |
| 1301 | Heater current | All | | If | 540 | 660 | mA |
| 5201 | Electrode current (anode No. 1) | P1, P2, P11 P7 P12 | lb3 = 100 μ A dc lb3 = 200 μ A dc lb3 = 5 μ A dc (see note 1) | lb1 lb1 lb1 | -50 -50 -50 | 10 10 10 | μ A dc μ A dc μ A dc |
| 5101 | Base alignment (electrostatic types) | All | +1D2, pin No. 5 | --- | --- | --- | --- |
| 5101 | Side terminal alignment (electrostatic types) | All | +1D2 | --- | --- | --- | --- |
| 5201 | Electrode current (anode No. 3) | P1, P2, P11 | See note 2 | lb3 | 150 | --- | μ A dc |
| 5201 | Electrode current (cathode) | P1, P2, P11 P7 P12 | lb3 = 100 μ A dc lb3 = 200 μ A dc lb3 = 5 μ A dc (see note 1) | lk lk lk | --- --- --- | 1,000 1,500 100 | μ A dc μ A dc μ A dc |

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Table 1. Testing and Inspection -Continued.

| Method | Requirement or Test | Type | Conditions | Symbol | Limits Min | Limits Max | Unit |
|--------|---|---------------------------------|--|---|----------------------------------|-------------------------------------|---------------------------|
| | <u>Conformance inspection, part 2 - Continued</u> | | | | | | |
| 5101 | Angle between traces | All | | --- | --- | --- | --- |
| 5101 | Neck and base alignment (electrostatic types) | All | | --- | --- | --- | --- |
| 5216 | Stray light emission (conventional types) | All | Eb2 = 2,200 V dc; Eb3 = 4,400 V dc | --- | --- | --- | --- |
| 5221 | Screens | P2 P7 P12 | | D1(1) D1(5) G5 : 1 cbf D0.1 (E) D0.3 (E) | 360 400 4 550 80 | --- --- --- --- 100 | cB cB --- cB |
| 5226 | Line width "A" (electrostatic deflection) | P1, P2, P11 P7 P12 | lb3 = 100 μ A dc (see note 6) lb3 = 200 μ A dc (see note 6) lb3 = 5 μ A dc (see notes 1 and 6) | Width Width Width | --- --- --- | 0.75 0.80 0.35 | mm mm mm |
| 5226 | Line width "B" (electrostatic deflection) | P1, P2, P11 P7 P12 | lb3 = 100 μ A dc (see note 8) lb3 = 200 μ A dc (see note 8) lb3 = 5 μ A dc (see notes 1 and 8) | Width Width Width | --- --- --- | 0.90 1.00 0.40 | mm mm mm |
| 5246 | Focusing voltage at cutoff | P1, P2, P11 P7 P12 | | Eb1 Eb1 Eb1 | 345 460 345 | 515 690 517 | V dc V dc V dc |
| 5248 | Deflection factor (1D2) | P1, P2, P11,P12 P7 | | DF DF | 127 170 | 173 230 | V dc/in. V dc/in. |
| 5248 | Deflection factor (3D4) | P1, P2, P11,P12 P7 | | DF | 94 | 128 | V dc/in. |
| 5251 | Heater-cathode leakage current | All | | DF | 125 | 170 | V dc/in |
| 1101 | Secureness of base, cap, or insert | All | | --- | --- | --- | --- |
| 1105 | Permanence of marking | | | --- | --- | --- | --- |
| 1111 | Base pin solder depth | | | --- | --- | --- | --- |

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Table 1. Testing and Inspection -Continued.

| Method | Requirement or Test | Type | Conditions | Symbol | Limits Min | Limits Max | Unit |
|--------|--|--------------------------|--|---|---------------|--|--|
| | <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: | | | | | | |
| 5223 | Modulation | P1, P2, P11, P12 P7 | Ib3 = 100 μ A dc | ΔE_c | --- | 40 | V dc |
| | | | Ib3 = 150 μ A dc | ΔE_c | --- | 55 | V dc |
| 5226 | Line width "A" (electrostatic deflection) | P1, P2, P11 P7 P12 | Ib3 = 100 μ A dc | Width | --- | 0.75 | mm |
| | | | Ib3 = 150 μ A dc | Width | --- | 0.86 | mm |
| | | | Ib3 = 5 μ A dc | Width | --- | 0.35 | mm |
| 5226 | Line width "B" (electrostatic deflection) | P1, P2, P11 P7 P12 | Ib3 = 100 μ A dc | Width | --- | 0.90 | mm |
| | | | Ib3 = 150 μ A dc | Width | --- | 1.12 | mm |
| | | | Ib3 = 5 μ A dc | Width | --- | 0.40 | mm |
| 1331 | Direct-interelectrode capacitance | 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) | Cgl 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.

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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 megohm 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.

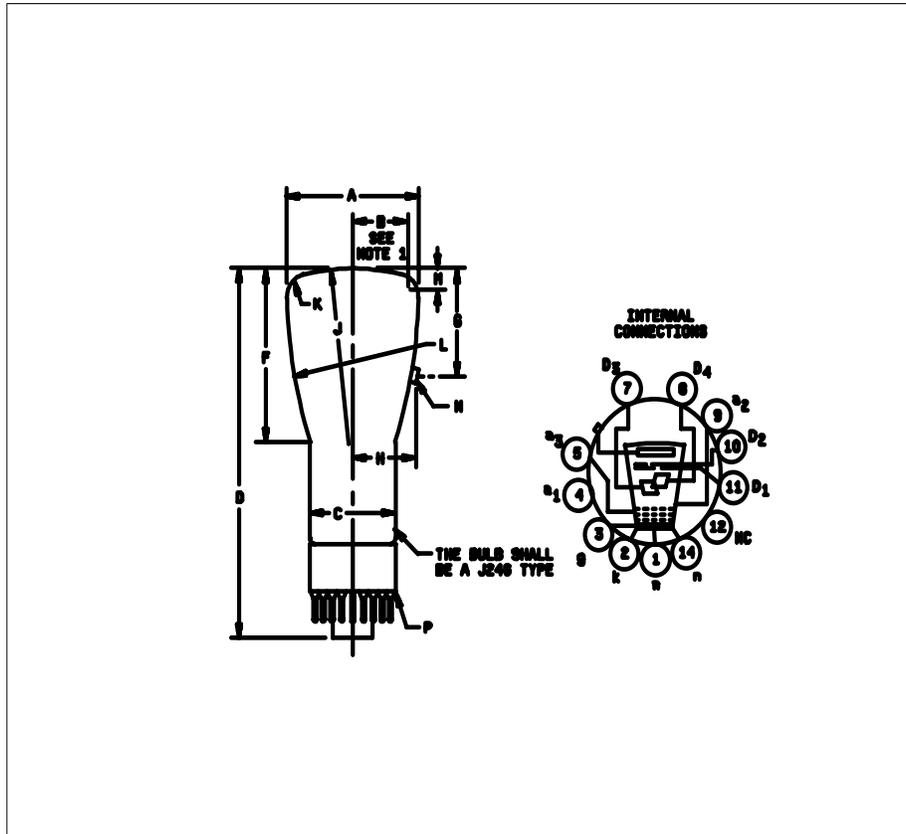
7/ This test to be performed at the conclusion of the holding period.

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/ Revision letters are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

10/ 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-calender month" sampling plan shall be reinstated after three consecutive samples have been accepted.



| Dimensions in inches with metric equivalents (mm) in parentheses (see note b/) | | |
|--|--------------|---------------|
| Ltr | Minimum | Maximum |
| 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) |

| Table 1 continued. | |
|---|---------------------|
| Conformance inspection, part 3 (See note 10/) | |
| N | Bulb contact: J1-22 |
| P | Base: B12-37 |
| Reference dimensions (see note c/) | |
| H | 1.62 (41.1) |
| J | 8.00 (203.2) R |
| K | .25 (6.4) R |
| L | 12.44 (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.

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Custodians:

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

Preparing activity:

DLA - CC

(Project 5960-3621)

Review activities:

Army - AR, AV, CR4
Navy - AS, CG, OS
Air Force - 99