

INCH-POUND

MIL-PRF-1/1458E  
 27 July 2009  
 SUPERSEDING  
 MIL-PRF-1/1458D  
 25 June 1999

# PERFORMANCE SPECIFICATION SHEET

## ELECTRON TUBE, RECEIVING TYPE 7788

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:** Pentode, miniature, RF, sharp cutoff, high transconductance  
 Outline --- 6-2 (EIA)  
 Base --- E9-1  
 Envelope --- T6-1/2  
 Cathode --- Coated unipotential

Base connections:

|         |   |    |   |   |   |    |   |    |    |
|---------|---|----|---|---|---|----|---|----|----|
| Pin No. | 1 | 2  | 3 | 4 | 5 | 6  | 7 | 8  | 9  |
| Element | k | g1 | k | h | h | g2 | a | g3 | g2 |

### ABSOLUTE RATINGS:

|                  |     |      |       |      |      |     |      |      |
|------------------|-----|------|-------|------|------|-----|------|------|
| Parameter:       | Ef  | Eb   | Ec1   | Ec2  | Ec3  | Ehk | egk  | Rg1  |
| Unit:            | V   | V dc | V dc  | V dc | V dc | v   | v    | MegΩ |
| Maximum:         | 6.6 | 250  | -25   | 165  | 0    | 100 | ± 50 | 1/   |
| Minimum:         | 6.0 | ---  | ---   | ---  | ---  | --- | ---  | ---  |
| Test conditions: | 6.3 | 135  | +12.5 | 165  | 0    | 0   | ---  | ---  |

### ABSOLUTE RATINGS:

|                  |       |      |     |     |      |      |     |
|------------------|-------|------|-----|-----|------|------|-----|
| Parameter:       | Ik    | Pg1  | Pp  | Pg2 | TE   | Rk   | Alt |
| Unit:            | mA dc | W    | W   | W   | °C   | Ohms | ft  |
| Maximum:         | 50    | 0.01 | 5.0 | 1.0 | +170 | ---  | 2/  |
| Minimum:         | ---   | ---  | --- | --- | ---  | ---  | --- |
| Test conditions: | ---   | ---  | --- | --- | ---  | 360  | --- |

See footnotes at end of table I.

GENERAL: Qualification – Not required

AMSC N/A

FSC 5960

TABLE I. Testing and inspection.

| Inspection                            | Method<br>MIL-STD-1311 | Conditions                                                                                                                       | Acceptance<br>Level<br>9/ | Symbol              | Limits |                      | Unit           |
|---------------------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------|--------|----------------------|----------------|
|                                       |                        |                                                                                                                                  |                           |                     | Min    | Max                  |                |
| <u>First Article Inspection</u>       |                        |                                                                                                                                  |                           |                     |        |                      |                |
| Sweep-frequency vibration             | 1031                   | Ebb = 155 V dc; Ec2 = 160 V dc;<br>Rp = 680 ohms; Ec1 = +7 V dc;<br>Rk = 220 ohms unbypassed                                     | ---                       | Ep                  | ---    | 500                  | mV dc          |
| <u>Conformance inspection, part 1</u> |                        |                                                                                                                                  |                           |                     |        |                      |                |
| Heater current                        | 1301                   |                                                                                                                                  | 0.65                      | If                  | 320    | 360                  | mA             |
| Heater-cathode leakage                | 1336                   |                                                                                                                                  | 0.65                      | Ihk                 | ---    | 13                   | μA dc          |
| Total grid current                    | 1266                   | 3/                                                                                                                               | 0.65                      | Ic1                 | 0      | -0.1                 | μA dc          |
| Electrode current (1) (anode)         | 1256                   | Ebb = 120 V dc; Ecc1 = 0;<br>Ecc2 = 150 V dc; Ecc3 = 0;<br>Rk = 47 ohms                                                          | 0.65                      | Ib                  | 29.0   | 41.0                 | mA dc          |
| Electrode current (2) (anode)         | 1256                   | Ebb = 120 V dc; Ec1 = -6.0 V dc;<br>Ecc3 = 0; Rk = 47 ohms;<br>Ecc2 = 150 V dc                                                   | 0.65                      | Ib                  | ---    | 150                  | μA dc          |
| Electrode current (screen grid)       | 1256                   |                                                                                                                                  | 0.65                      | Ic2                 | 4.2    | 5.8                  | mA dc          |
| Transconductance (1)                  | 1306                   |                                                                                                                                  | 0.65                      | Sm                  | 42,000 | 58,000               | μmhos          |
| Short and discontinuity detection     | 1201                   | egk = 50 v (max)                                                                                                                 | 0.65                      | ---                 | ---    | ---                  | ---            |
| <u>Conformance inspection, part 2</u> |                        |                                                                                                                                  |                           |                     |        |                      |                |
| Insulation of electrodes              | 1211                   | E (g1-all) = -50 V dc;<br>E (a-all) = -250 V dc                                                                                  | 2.5<br>2.5                | ---                 | ---    | ---                  | ---            |
| Transconductance (2)                  | 1306                   | Ef = 5.7 V                                                                                                                       | 2.5                       | ΔSm<br>Ef           | ---    | 10                   | %              |
| Electrode current (3) (anode)         | 1256                   |                                                                                                                                  | 2.5                       | Ib                  | 31     | 39                   | mA             |
| Noise and microphonics                | 2201                   | Ehk = 0; Ebb = Ecc2 = 200 Vdc;<br>Ec1 = 0; Ecal = 600 mV ac;<br>Rk = 1,000 ohms;<br>Rp = 0.1 MegΩ;<br>Rg2 = 0.5 MegΩ; Cg2 = 2 μF | 2.5                       | ---                 | ---    | ---                  | ---            |
| Direct-interelectrode capacitance     | 1331                   | Shield No. 315                                                                                                                   | 6.5                       | Cg1p<br>Cin<br>Cout | ---    | 0.036<br>17.0<br>4.5 | pF<br>pF<br>pF |

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

| Inspection                                               | Method<br>MIL-STD-1311 | Conditions                                                                                  | Acceptance<br>Level<br>/9 | Symbol   | Limits |      | Unit  |
|----------------------------------------------------------|------------------------|---------------------------------------------------------------------------------------------|---------------------------|----------|--------|------|-------|
|                                                          |                        |                                                                                             |                           |          | Min    | Max  |       |
| <u>Conformance inspection,<br/>part 2 - Continued</u>    |                        |                                                                                             |                           |          |        |      |       |
| High-frequency vibration                                 | 1031                   | Rp = 680 ohms; Eb = 155 V dc;<br>Ec2 = 160 V dc; Ec1 = +7 V dc;<br>Rk = 220 ohms unbypassed | 6.5                       | Ep       | ---    | 50   | mV ac |
| Shock                                                    | 1041                   | 450 G <u>4/</u>                                                                             | 6.5                       | ---      | ---    | ---  | ---   |
| Vibration-fatigue                                        | 1031                   |                                                                                             | 6.5                       | ---      | ---    | ---  | ---   |
| Shock and vibration-fatigue<br>test end points:          | ---                    |                                                                                             | ---                       | ---      | ---    | ---  | ---   |
| High-frequency vibration                                 | 1031                   | Rp = 680 ohms; Eb = 155 V dc;<br>Ec2 = 160 V dc; Ec1 = +7 V dc;<br>Rk = 220 ohms unbypassed | ---                       | Ep       | ---    | 80   | mV ac |
| Heater-cathode leakage                                   | 1336                   |                                                                                             | ---                       | lhk      | ---    | 25   | μA dc |
| Transconductance (1)                                     | 1306                   |                                                                                             | ---                       | Sm       | 40,000 | ---  | μmhos |
| Total grid current                                       | 1266                   |                                                                                             | ---                       | lc1      | ---    | -0.2 | μA dc |
| Base strain                                              | 1121                   | <u>6/</u>                                                                                   | ---                       | ---      | ---    | ---  | ---   |
| Envelope strain                                          | 2126                   |                                                                                             | 2.5                       | ---      | ---    | ---  | ---   |
| Permanence of marking                                    | 1105                   |                                                                                             | ---                       | ---      | ---    | ---  | ---   |
| <u>Conformance inspection,<br/>part 3</u>                |                        |                                                                                             |                           |          |        |      |       |
| Heater-cycling life                                      | 1506                   | Ef = 7.5 V;<br>Ehk = 60 V dc;<br>Eb = Ec1 = Ec2 = 0                                         | ---                       | ---      | ---    | ---  | ---   |
| Heater-cycling life-test<br>end point::                  | ---                    |                                                                                             | ---                       | ---      | ---    | ---  | ---   |
| Heater-cathode leakage                                   | 1336                   |                                                                                             | ---                       | lhk      | ---    | 25   | μA dc |
| Stability life                                           | 1516                   | Rk = 360 ohms;<br>Rg1 = 0.47 MegΩ;<br>TA = room                                             | ---                       | ---      | ---    | ---  | ---   |
| Stability life-test end point:                           | ---                    |                                                                                             | ---                       | ---      | ---    | ---  | ---   |
| Change in<br>transconductance (1)<br>of individual tubes | 1306                   |                                                                                             | ---                       | ΔSm<br>t | ---    | 15   | %     |
| Intermittent life                                        | 1501                   | Rk = 360 ohms;<br>Rg1 = 0.47 MegΩ<br><u>7/ 8/</u>                                           | ---                       | ---      | ---    | ---  | ---   |
| Intermittent life-test<br>end points (500 hours)         | ---                    | <u>9/</u>                                                                                   | ---                       | ---      | ---    | ---  | ---   |

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

| Inspection                                               | Method<br>MIL-STD-1311 | Conditions                                     | Acceptance<br>Level<br>/9 | Symbol          | Limits |      | Unit  |
|----------------------------------------------------------|------------------------|------------------------------------------------|---------------------------|-----------------|--------|------|-------|
|                                                          |                        |                                                |                           |                 | Min    | Max  |       |
| <u>Conformance inspection,<br/>part 3 - Continued</u>    |                        |                                                |                           |                 |        |      |       |
| Total grid current                                       | 1266                   |                                                | ---                       | Ic1             | ---    | -0.9 | μA dc |
| Change in<br>transconductance (1)<br>of individual tubes | 1306                   |                                                | ---                       | ΔSm<br>t        | ---    | 20   | %     |
| Transconductance (2)                                     | 1306                   | Ef = 5.7 V                                     | ---                       | ΔSm<br>Ef       | ---    | 15   | %     |
| Heater-cathode leakage                                   | 1336                   |                                                | ---                       | Ihk             | ---    | 25   | μA dc |
| Insulation of electrodes                                 | 1211                   | E (g1-all) = -50 V dc<br>E (a-all) = -250 V dc | ---                       | ---             | ---    | ---  | ---   |
| Transconductance (1),<br>average change                  | 1306                   |                                                | ---                       | Avg<br>ΔSm<br>t | ---    | 15   | %     |
| Intermittent life-test<br>End points (1,000 hours)       | ---                    | 9/                                             | ---                       | ---             | ---    | ---  | ---   |
| Total grid current                                       | 1266                   |                                                | ---                       | Ic1             | ---    | -0.9 | μA dc |
| Change in<br>transconductance (1)<br>of individual tubes | 1306                   |                                                | ---                       | ΔSm<br>t        | ***    | 25   | %     |
| Heater-cathode leakage                                   | 1336                   |                                                | ---                       | Ihk             | ---    | 25   | μA dc |
| Insulation of electrodes                                 | 1211                   | E (g1-all) = -50 V dc<br>E (a-all) = -250 V dc | ---                       | ---             | ---    | ---  | ---   |

1/ Rg1 shall be 0.2 MegΩ for fixed bias, 0.6 MegΩ if Rk = 47 ohms, or 3.5 MegΩ if Rk = 360 ohms.

2/ See "Reduced pressure (altitude) rating", and altitude, maximum peak voltage in the basic document.

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

4/ A grid resistor of 0.1 MegΩ shall be added, except when a thyratron-type short indicator is used.

5/ This test shall be conducted on the initial lot and thereafter on a lot approximately every 12 months. When one lot has passed, the 12-month rule shall apply. In the event of lot failure, the lot shall be rejected and the succeeding lots shall be subjected to this test until a lot passes.

6/ Acceptance sampling procedure shall be in accordance with method 1121, except that acceptance and rejection criteria shall be modified as follows:

- a Accepted if not more than one defective for class, A, B, or C defects, respectively, or if not more than a total of two defectives are found in the sample
- b. Rejected if two or more defectives for class A, B, or C defects, respectively, or if a total of three or more defectives are found in the sample

7/ Envelope temperature (TE) requirements, when measured in accordance with the temperature by conduction-band measurement (method 1226), will be satisfied if a TUT having bogey Ib (±5 percent) under normal test conditions, is determined to operate at or above minimum specified temperature at any position in the life-test rack.

TABLE I. Testing and inspection - Continued.

- 8/ The life-test sample shall consist of 20 tubes per lot and not 1 tube failure shall be permitted. In the event of rejection of the first sample, a second sample of 40 tubes shall be selected from the lot. Acceptance shall then be based on the combined first and second samples and shall not exceed a total of one tube failure.
- 9/ This specification sheet uses accept on zero defect sampling plan in accordance with MIL-PRF-1, table III.

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

Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodians:

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

Preparing activity:  
DLA - CC

(Project 5960-2009-023)

Review activities:

Army - MI  
Navy - AS, CG, MC, OS, SH

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://assist.daps.dla.mil/>.