INCH-POUND

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SUPERSEDING
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PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, POWER
TYPE 7843

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: Tetrode, UHF, ceramic-metal.
See figure 1.
Mounting position: Any.
Weight: 2 ounces (56.7 grams) nominal.

ABSOLUTE RATINGS: F = 400 MHz

Parameter:	Ef	Eb	Ec1	Ec2	Ib	Ic1	Pg1	Pg2	Pp
Unit:	V 1/	V dc	V dc	V dc	mA dc	mA dc	W	W	W
Maximum:									
AB audio:	26.5 ± 10 %	1,000	---	300	180	30	1.0	7.0	115
AB SSBSC:	26.5 ± 10 %	1,000	---	300	250 2/	30	1.0	7.0	115
C telep:	26.5 ± 10 %	800	-100	300	150	30	1.0	4.6	75
C teleg:	26.5 ± 10 %	1,000	-100	300	180	30	1.0	7.0	115
Test conditions:	26.5	1,000	Adj	300	---	---	---	---	---

ABSOLUTE RATINGS: F = 400 MHz

Parameter:	Pi	T(seal)	tk	Cooling	Barometric pressure, reduced
Unit:	W	°C 3/	sec (min)	--- 4/	mmHg
Maximum:					
AB audio:	180	250	60	---	141.2
AB SSBSC:	180	250	60	---	141.2
C telep:	120	250	60	---	141.2
C teleg:	180	250	60	---	141.2
Test conditions:	---	---	60	5/	---

See footnotes at end of table I.

GENERAL:
Qualification - Not required.
This specification sheet uses accept on zero defect sampling in accordance with MIL-PRF-1, table III.

TABLE I. Testing and inspection.

Inspection	Method MIL-STD-1311	Notes	Condition	Symbol	Limits		Unit
					Min	Max	
Conformance inspection, part 1							
Total grid current	1266	6/ 7/	Ec1/Ib = 115 mA dc	Ic1	---	-8.0	μA dc
Electrode current (screen)	1256	---	Ec1/Ib = 115 mA dc	Ic2	-4.7	2.0	mA dc
Electrode voltage (1) (grid)	1261	---	Ec1/Ib = 115 mA dc	Ec1	-9.0	-18.0	V dc
Electrode voltage (2) (grid)	1261	---	Ec1/Ib = 1.0 mA dc	Eco	---	-48	V dc
Pulsing emission	1231	8/	etd/ik = 10 a	etd	---	300	v
Zero-bias anode current	---	9/	Ef = 21.5 V; Eb = 400 V dc; Ec2 = 200 V dc; Ec1 = 0; tk = 120; t = 60 (max)	Ibo	170	---	mA dc
Heater current	1301	---		If	0.48	0.60	A
Conformance inspection, part 2							
Primary grid emission (control)	1266	---	Eg1/g1 input = 2W; t = 30; anode and g2 grounded	Isg1	---	-2.0	μA dc
Primary grid emission (screen)	1266	---	Eg2/g2 input = 7 W; t = 30; anode and g1 grounded	Isg2	---	-3.0	μA dc
Interelement leakage resistance, cold	1366	10/	Supply voltage = 200 V dc	R	1.0	---	MegΩ
Power output	2214	11/	F = 400 ± 20 MHz; Ib = 180 mA dc (max); Ic1 = 30 mA dc (max); t = 120; Pd = 3.3 W (max); Ef = 24.0 V	Po	85	---	W
Direct-interelectrode capacitance	1331	---	Use capacitance fixture in accordance with 289-JAN	Cg1k Cg1g2 Cg2p Cg1p Cpk Cg2k	11.0 15.0 4.2 --- --- 0.20	15.0 20.0 5.2 0.065 0.013 0.45	pF pF pF pF pF pF
Power oscillation	1236	---	F = 15 MHz; Ef = 21.5 V; Eb = 850 V dc; Ec2 = 300 V dc (max); Ib = 150 mA dc; Rg1 = 4,000 ohms (max); Ic1 = 30 mA dc; t = 120	Po	80	---	W (useful)

Current division, long pulse (method A)	1372	---	Eb = 350 V dc;
			Ec1 = -100 V dc;
			egk/ib = 0.6 a;
			prr = 10 to 12;
			tp = 4,500 to 5,000 μs
				egk
				ic1
				ic2
					-3.0
					0
					10
						+17
						130
						70
							v
							ma
							ma

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

Inspection	Method MIL-STD-1311	Notes	Condition	Symbol	Limits		Unit
					Min	Max	
Conformance inspection, part 3							
Life test	---	7/ 11/	Group C; Ef = 26.0 V; Ib = 180 mA dc; F = 400 ±20 MHz; Ic1 = 30 mA dc (max); Ec1 = value obtained for Eco in electrode voltage (2) grid test in accordance with part 1 herein; t = 500 hours	---	---	---	---
Life-test end points:	---						
Pulsing emission	1231	---	etd/ik = 7.5 a	etd	---	400	v
Primary grid emission (control)	1266	---		Isg1	---	-4.0	μA dc
Primary grid emission (screen)	1266	---		Isg2	---	-4.0	μA dc
Power output	2214	---		Po	75	---	W
Power oscillation	1236	---		Po	65	---	W (useful)
Heater-cycling life	1506	---	Group C; Ef = 35.0 V; accelerated heater-cycling 2.5 minutes "on", 5 minutes "off"	---	384	---	Cycles
Heater-cycling life-test end point:	---						
Heater current	1301	---		If	0.4	0.7	A
Low-frequency vibration	1031	12/	Ebb = 300 V dc; Ec2 = 250 V dc; Ec1/Ib = 10 mA dc; Rp = 2,000 ohms	Ep	---	300	mV ac
High-frequency vibration	1031	12/	No voltages	---	---	---	---
Shock, specified pulse	1042	12/	15 G, 11 ms, half-sine; no voltages	---	---	---	---
Vibration and shock-test end points:	---						
Total grid current	1266	7/	Ec1/Ib = 115 mA dc	Ic1	---	-8.0	μA dc
Electrode voltage (1) (grid)	1261	---	Ec1/Ib = 115 mA dc	Ec1	-9.0	-18.0	V dc
Barometric pressure, reduced	1002	12/	Pressure = 141.2 mmHg; voltage = 1,300 V dc applied between p and k, with k, g1, and g2 tied together.	---	---	---	---

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

1/ Because the cathode is subjected to considerable back bombardment as the frequency is increased, with resultant increase in temperature, the heater voltage shall be decreased depending on operating conditions and frequency to prevent overheating the cathode and resultant short life.

2/ The maximum dc anode current at the peak of the current curve is 250 mA dc for a signal having a minimum peak-to-average power ratio of 2.0. The maximum rating for a signal having a minimum peak-to-average power ratio of less than 2.0, such as is obtained in single-tone operation, is 180 mA dc. During short periods of circuit adjustment under single-tone conditions, the average anode current may also reach the level of 250 mA dc.

3/ Unless otherwise specified, sufficient cooling shall be supplied to maintain anode core and seal temperatures below the maximum rating.

4/ In all applications, sufficient cooling shall be supplied to make effective the requirements in 3/ above, including sufficient conduction cooling for the base contacts. In applications where reliable performance and long life are factors, operation at temperatures below the absolute maximum rating is normally beneficial.

5/ Unless otherwise specified in the test conditions, in all electrical tests, involving application of heater voltage, a dummy radiator or heat-sink may be attached to the anode of the tube under test (TUT). When this is used, forced-air cooling of the anode is permissible in order to maintain the anode core temperature below 250°C. Base seals may be cooled by conduction, or by other means where required, in order to maintain seal temperatures below the maximum ratings.

6/ This test shall be the first test performed after the specified holding period.

7/ Cooling shall be set up to maintain the tube temperature at the hottest point on the tube envelope at 225°C ±25°C. (This setup should be permanent and needs to be verified only as often as required to maintain equipment accuracy.)

8/ With anode, grid 1, and grid 2 tied together, apply a pulse voltage source between anode and cathode. Adjust the pulse amplitude until the specified peak cathode current is obtained. Test shall be made at the end of 1 minute or when stability is reached, whichever occurs first. The pulse voltage shall meet the following requirements:
   a. Pulse duration: 2 μs.
   b. Pulse repetition rate: 60 pps.
   c. Duty factor: 0.00012.

9/ Before subjection to this test, the tube shall be cooled to room ambient temperature for 30 minutes minimum, then preheated at Ef = 21.5 volts for 120 seconds prior to the application of other voltages. During this test, grid No. 1 shall be connected to the cathode.

10/ Before subjection to this test, the tube shall be cooled to room ambient temperature for 30 minutes. Using the test circuit shown on the figure of method 1366, measure the resistance, in both directions, between any two adjacent electrodes (except across the heater terminals). If the resistance value is below that required, repeat this test after a 10-minute interval. If the tube fails again, the tube shall be rejected.

11/ Tube shall be tested in a grid-driven amplifier circuit. Adjust Ec1 bias supply and tune circuit for maximum useful power output. The specified driver power (Pd) output shall be measured with a Bird Thru-line Wattmeter, or equivalent. Driving power output = forward power minus reflected power. Grid voltage supply shall have an effective impedance of 500 ohms maximum.

12/ This test shall be performed during the initial production and once each succeeding 12-calendar months in which there is production. A regular double sampling plan shall be used, with the first sample of three tubes with an acceptance number of zero, and a second sample of three tubes with a combined acceptance number of one. In the event of failure, the test will be made as a part of conformance inspection, part 2, code level D, with an acceptance level of 6.5. The regular "12-calendar month" double sampling plan shall be reinstated after three consecutive samples have been accepted.

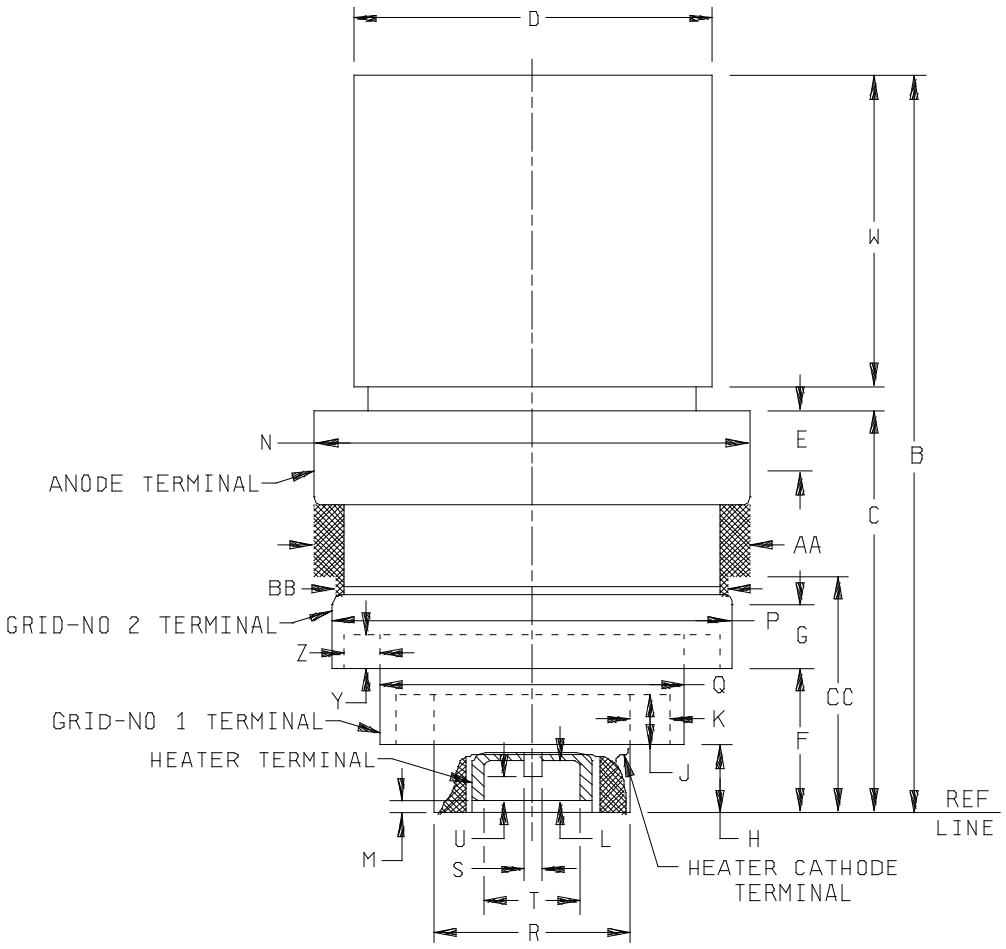
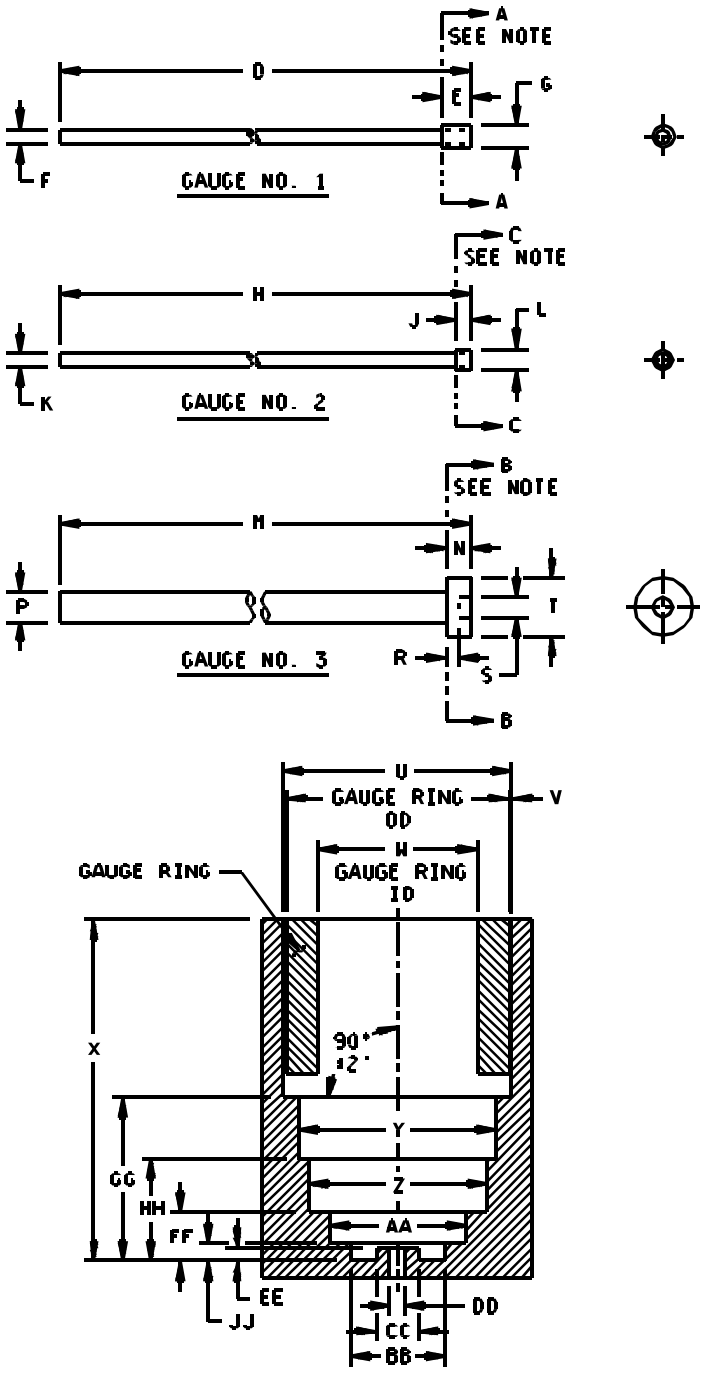


FIGURE 1. Outline drawing of electron tube type 7843.

Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
Conformance inspection, part 1					
	Gauge check				1
Conformance inspection, part 2					
B	1.805	1.955	45.85	49.66	
D	.895	.905	22.73	22.99	
Conformance inspection, part 3					11
C	.990	1.080	25.15	27.43	
E	.165	---	4.19	---	
F	.340	.410	8.64	10.41	
G	.140	---	3.56	---	
H	.150	.200	3.81	5.08	
J	.120	---	3.05	---	2
K	.095	---	2.41	---	2
L	.100	---	2.54	---	4
M	---	.050	---	1.27	
N	1.085	---	27.56	---	5
P	.985	---	25.02	---	6
Q	.735	---	18.67	---	7
R	.480	---	12.12	---	8
S	---	.072	---	1.83	
T	---	.260	---	6.60	
U	.054	---	1.37	---	4
W	.780	---	19.81	---	
Y	.060	---	1.52	---	3
Z	.090	---	2.29	---	3
AA	---	---	---	---	9
BB	---	---	---	---	10
CC	.600	---	15.24	---	

FIGURE 1. Outline drawing of electron tube type 7843 - Continued.



NOTE: The edge of the grid No. 1, No. 2, and No. 3 terminal shall be flush with or extend beyond the surface "AA", "BB", or "CC" on the gauge.

FIGURE 1. Outline drawing of electron tube type 7843 - Continued.

Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
Gauge No. 1				
D	---	2.50	---	63.5
E	.121	.123	3.07	3.12
F	---	.062 DIA	---	1.57 DIA
G	.096 DIA	.097 DIA	2.44 DIA	2.46 DIA
Gauge No. 2				
H	---	2.50	---	63.5
J	.061	.063	1.55	1.60
K	---	.062 DIA	---	1.57 DIA
L	.091 DIA	.092 DIA	2.31 DIA	2.34 DIA
Gauge No. 3				
M	---	2.50	---	63.5
N	.102	.104	2.59	2.64
P	.110 DIA	.140 DIA	2.79 DIA	3.56 DIA
R	.0545	.0555	1.384	1.410
S	.082 DIA	.088 DIA	2.08 DIA	2.23 DIA
T	.2445 DIA	.2450 DIA	6.210 DIA	6.223 DIA
Gauge No. 4				
U	---	1.315 (H_0)	---	33.40 (H_0)
V	---	.002	---	0.05
W	.951	.953	24.15	24.21
X	---	1.956	---	49.68
Y	---	1.120 (H_1) DIA	---	28.45 (H_1) DIA
Z	---	1.020 (H_2) DIA	---	25.91 (H_2) DIA
AA	---	.765 (H_3) DIA	---	19.43 (H_3) DIA
BB	---	.520 (H_4) DIA	---	13.21 (H_4) DIA
CC	.238 (P) DIA	---	6.05 (P) DIA	---
DD	---	.072 (H_5) DIA	---	1.83 (H_5) DIA
EE	.098	.100		
FF	---	.305	---	7.75
GG	---	.960	---	24.38
HH	---	.600	---	15.24
JJ	---	.130	---	3.30

FIGURE 1. Outline drawing of electron tube type 7843 - Continued.

NOTES:

1. With the cylindrical surfaces of the anode cap, anode terminal, screen grid terminal, control grid terminal, heater cathode terminal and heater terminal clean, smooth, and free of burrs, each tube will enter the gauge No. 4 to determine out of roundness, concentricity, and oversize. Gauge ring shall enter between gauge No. 4 and anode cap of tube until insert rests on anode flange of tube. The axes of the gauge ring I. D. and gauge ring O. D. are coincident within .001 inch. The axes of cylindrical holes H_0 through H_5 and the axis of post P shall be concentric within .001 inch. Proper seating is determined by failure of a .010 inch thickness gauge .125 inch wide to enter between heater cathode terminal and bottom surface of H_4. A slot is provided to permit this measurement to be made. The acceptance level for dimensions listed under conformance inspection, part 1 shall be 1.0, inspection level II.

2. This dimension to be checked by gauge No. 1 entering this area. The edge of the grid No. 1 terminal shall be flush with or extend beyond the surface "AA" on the gauge.

3. This dimension to be checked by gauge No. 2 entering this area. The edge of grid No. 2 terminal shall be flush with or extend beyond the surface "CC" on the gauge.

4. This dimension to be checked by gauge No. 3 entering this area. The edge of the heater terminal shall be flush with or extend beyond the surface "BB" on the gauge.

5. Dimension "N" applies over length "E" only.

6. Dimension "P" applies over length "G" only.

7. Dimension "Q" applies over length "F" minus "H" only.

8. Dimension "R" applies over length "H" only.

9. On any one tube, this dimension shall never be greater than "N".

10. On any one tube, this dimension shall never be greater than "P".

11. Perform test(s) every six months, with sampling as follows:
    n1 = 4 c1 = 0 where c2 represents the total failures for the
    n2 = 4 c2 = 1; first and second samples combined.
    In case of failure, the failing dimension(s) shall become conformance inspection, part 2, acceptance level 6.5, inspection level S3 for three successful successive submissions, at which time the testing may revert to the twice-yearly basis.

FIGURE 1. Outline drawing of electron tube type 7843 - Continued.

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

MIL-STD-1311
Drawing 289-JAN

NOTE: To obtain copies of JAN drawings, please send a request via email to TubesAmps@dla.mil.

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.

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