

INCH-POUND

MIL-PRF-1/1485H
11 June 2013
SUPERSEDING
MIL-PRF-1/1485G
12 June 2012

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, THYRATRON
TYPE 7665 AND 7665A

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: Hydrogen, ceramic-metal.
See figures 1 and 1A.
Mounting position: Any.
Weight: 10 ounces nominal.

ABSOLUTE RATINGS:

Parameter:	Ef	epy	epx	Ebb	egy	egx	ib	Ecc	Ip	Ib
Unit:	V ac	kv	kv	V dc	v	v	a	V dc	A ac	A dc
Maximum:	6.8	16.0 <u>1/</u>	16.0 <u>2/</u>	---	600 <u>3/</u>	200	350	150	6.5	0.50
Minimum:	5.8	2.0	5% epy	1,000	200	---	---	---	---	---
Test conditions:	6.3	16.0	---	---	150	---	---	0	---	---

ABSOLUTE RATINGS:

Parameter:	pr	Eres	Pb	tk	dik/dt	TA	tj	Cooling
Unit:	pps	V ac	---	sec	a/ μ s	$^{\circ}$ C	μ s <u>7/</u>	<u>5/</u>
Maximum:	<u>4/</u>	6.8	5.0×10^9 <u>4/</u>	---	2,000	+150	0.005	---
Minimum:	---	5.8	---	180	---	-55	---	---
Test conditions:	1,000	6.3 <u>6/</u>	---	180	---	---	---	---

See footnotes at end of table I.

GENERAL:

Qualification - Required.

This specification sheet uses accept on zero defect sampling in accordance with MIL-PRF-1, table III.

Service-life guarantee – 500 hours minimum tube operating time.

Marking – Tubes sold under service-life guarantee shall be marked with the contract number and with the number of tube operating hours guaranteed.

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TABLE I. Testing and inspection.

Inspection	Method MIL-STD-1311	Condition	Symbol	Limits		Unit
				Min	Max	
<u>Conformance inspection, part 1</u>						
Instantaneous starting	3267	epy = 16 kv (min); <u>10/</u> Ef = Eres = 6.8 V	---	---	---	---
Operation (1)	3246	epy = 18 kv; <u>9/</u> Ef = Eres = 5.8 V; t = 10 minutes	egy	---	150	v
DC anode voltage for conduction	3247	Ef = Eres = 5.8 V	Ebb	---	1,000	V dc
Heater current (cathode)	3241		If	3.5	8.0	A ac
Heater current (reservoir)	3241		Ires	1.0	4.0	A ac
Pulse emission (method A)	3251	ik = 350 a; tp = 5.0 μs ± 10 percent; pr = 60 ± 10 percent; tr = 0.5 μs (max); starting time of pulse = 2.5 μs; specified time interval = 4.0 μs	egk	---	200	v
<u>Conformance inspection, part 2</u>						
Operation (1A)	3246	Operation (1); t = 10 minutes tk = 5 minutes Ef = Eres = 6.8 V	egy	---	150	V
Anode delay time	3256	Operation (1); t = 120 seconds	tad	---	0.4	μs
Anode delay time drift	3256	Anode delay time <u>11/</u>	Δtad	---	0.10	μs
Time jitter	3261	Operation (1), <u>9/</u> <u>12/</u> except epy = 8 kv	tj	---	0.005	μs
<u>Conformance inspection, part 3</u>						
Life test (1)	---	Group C; t = 96 hours "on" and 1 hour "off" (tube mounted horizontally); t = 500 hours <u>9/</u> , <u>14/</u>	---	---	---	---

See footnotes at end of table.

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TABLE I. Testing and inspection - Continued.

Inspection	Method MIL-STD-1311	Condition	Symbol	Limits		Unit
				Min	Max	
<u>Conformance inspection, part 3</u> - Continued						
Life-test (1) end points:		<u>14/</u>				
Operation (1) and (1A) DC anode voltage for conduction	3246 3247	egy = 150 v	egy Ebb	---	150 1,000	v V dc
Time jitter	3261	egy = 150 v	tj	---	0.005	μs
Shock	1041	100 G at 11 ms; no voltage applied	---	---	---	---
Variable-frequency vibration	1031	No voltage applied <u>8/</u>	---	---	---	---
Shock and variable- frequency vibration end points:						
Operation (1) Time jitter	3246 3261		egy tj	---	160 0.005	v μs
Operation at elevated ambient temperature	3246	TA = 150°C; <u>9/</u> <u>13/</u> t = 5 hours	egy	---	150	v

1/ Instantaneous starting is permissible. The maximum permissible egy is 16 kv and shall not be attained in less than 0.04 second.

2/ In pulsed operation, the peak inverse voltage, exclusive of a spike of 0.05 μs (maximum) duration, shall not exceed 5.0 kv during the first 25 μs following the pulse.

3/ The driver pulse, measured at the tube socket with the thyatron grid disconnected: 200 volts minimum, 600 volts maximum; tr = 0.35 maximum; grid pulse duration 2.0 μs minimum. Impedance of drive circuit: 50 to 500 ohms. At -55°C, a minimum of 250 volts is required.

4/ The tube is capable of operation at more than 50,000 pps within the limitations of the Pb factor and the Ib current ratings. With a saturable reactor, Pb equal to 7×10^9 is permissible for certain applications.

5/ It may be desirable to employ forced-air cooling under conditions of high Pb number operations. A cooling air-blast of 5 cfm may be directed into the anode cup.

6/ The optimum reservoir voltage for operation in accordance with operation (1) conditions is 6.3 V ac and shall be held within ± 7.5 percent. Applications involving other operating conditions may necessitate the re-determination of the optimum reservoir voltage.

7/ Appreciably less jitter than 0.005 μs can be realized using an anode voltage of 8 kv or more, a grid drive amplitude near the maximum and a grid drive impedance near the minimum values.

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TABLE I. Testing and inspection - Continued.

- 8/ There shall be no pronounced resonance in the range from 0 to 2,000 pps.
- 9/ The circuit constants shall be so chosen, that at $e_{py} = 16$ kv under resonant charging conditions; $dik/dt = 1,500$ a/ μ s (min); $i_b = 175$ a (min); $t_p = 1.0 \pm 10$ percent μ s; $prr = 1,000$ (min). The grid pulse characteristics shall be: $t_p = 2.0$ μ s (max); $t_r = 0.35$ μ s (min); and $Z_s = 500$ ohms (min).
- 10/ The tube shall operate satisfactorily on push-button starting within three attempts when the anode voltage (e_{py}) is applied to the tube under test (TUT) in such a manner as to rise from 0 kv to 16 kv minimum within .03 second. (The filter in the rectifier shall be so designed that the e_{py} reaches at least 7 kv within .015 second.) Any tube failing to start within three attempts will be considered a failure.
- 11/ This test shall be performed simultaneously with the operation (1) test. An anode delay time measurement shall be made at the end of 2 minutes and at the end of 10 minutes of that test. The change in anode delay time (with respect to the 2 minute reading) shall not exceed the specified value.
- 12/ The tube shall be tested by applying a peak forward anode voltage not to exceed the value specified in the test conditions for the time jitter test immediately after the cathode warm-up period (t_k). After 60 seconds of operation, the variation in firing time (t_j), measured at 50 percent of the cathode current pulse, shall be not greater than the amount specified.
- 13/ This test shall be conducted for a total of 5 hours with no more than three kick outs. The tube shall be started with 107.5 percent Eres and operate at this value for 4 hours. At the start of the fifth hour, and while the tube is still operating, the voltage shall be lowered to Eres = 92.5 percent and remain there for the final one hour of operation.
- 14/ With qualifying activity approval the manufacturer may provide, in accordance with MIL-PRF-1, service-life guarantee, in lieu of performing life testing. Life test endpoints specified shall apply to service-life guarantee conformance as well as life test conformance. The number of hours of system-deployed, accumulated tube-operating time shall be approved by the qualifying activity and shall be a minimum of 500 hours. Service-life guarantee shall define tube operating time and not time from purchase or delivery. Tubes sold under service-life guarantee shall be marked with contract number and with the number of tube operating hours guaranteed. The qualifying activity may restore life testing requirements when service performance or tube reliability indicate it is justified.

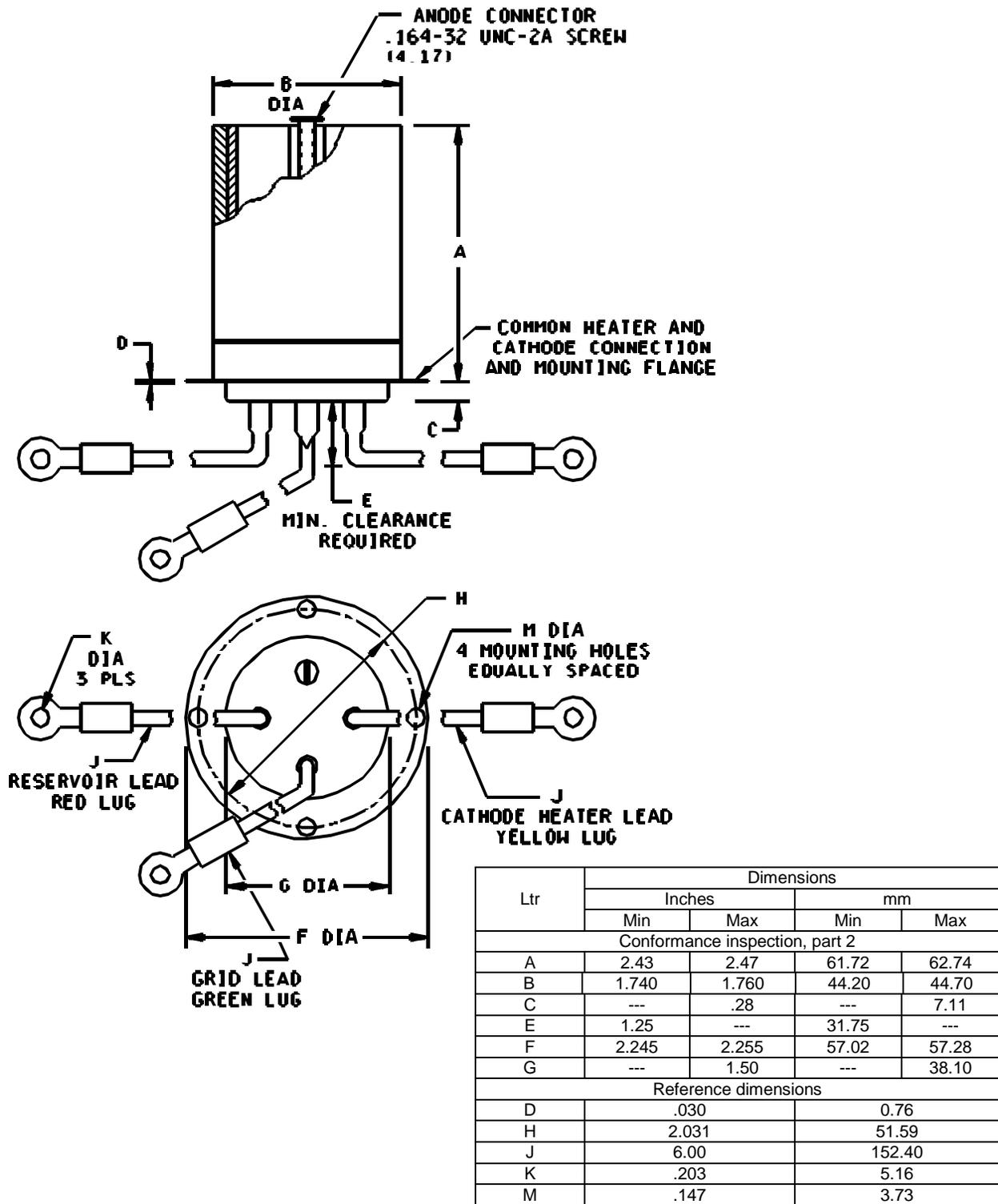
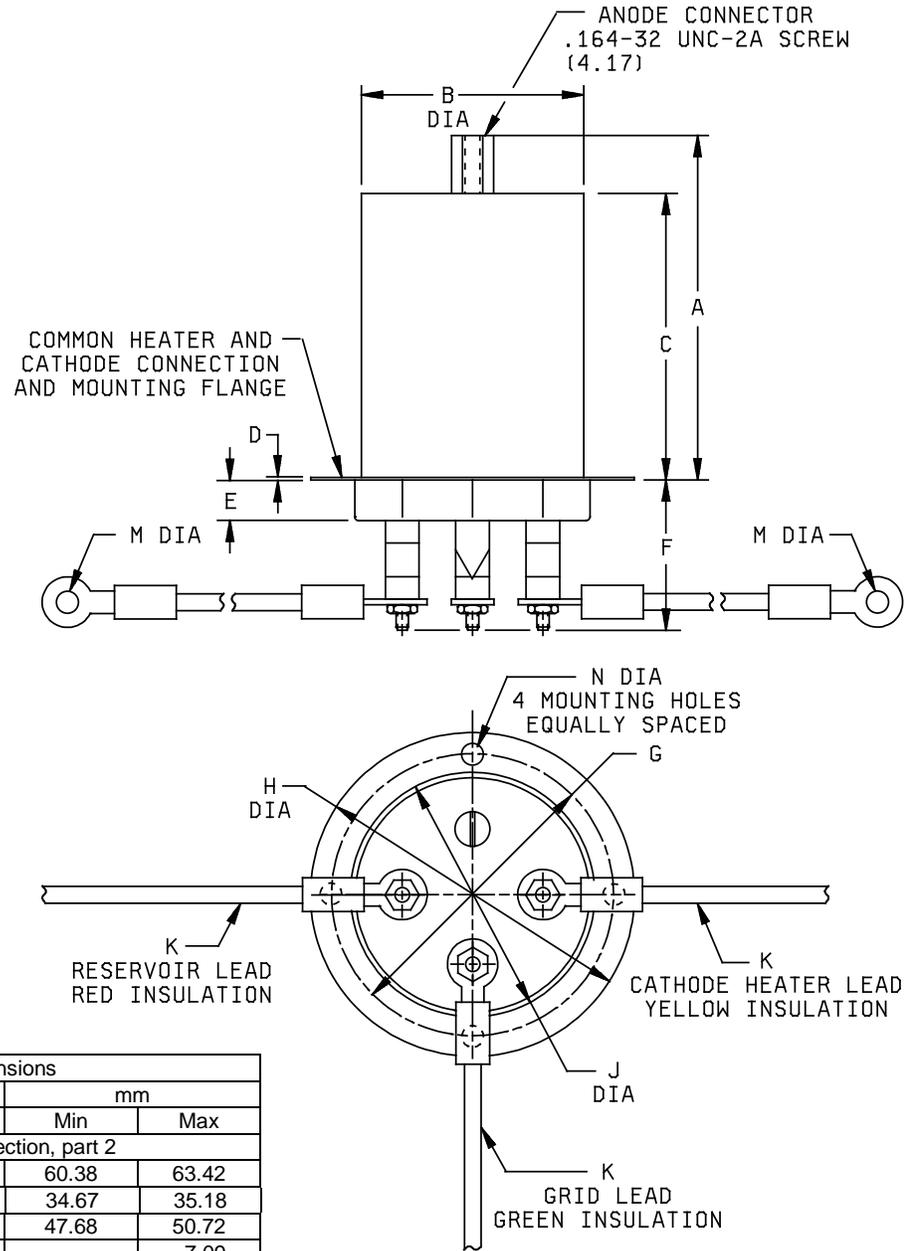


FIGURE 1. Outline drawing of electron tube type 7665.



Ltr	Dimensions			
	Inches		mm	
	Min	Max	Min	Max
Conformance inspection, part 2				
A	2.377	2.497	60.38	63.42
B	1.365	1.385	34.67	35.18
C	1.877	1.997	47.68	50.72
E	---	.279	---	7.09
F	---	1.00	---	25.40
H	---	2.250	---	57.15
J	---	1.50	---	38.10
Reference dimensions				
D	.030		0.76	
G	2.031		51.59	
K	6.00		152.40	
M	.203		5.16	
N	.147		3.73	

FIGURE 1A. Outline drawing of tube type 7665A.

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

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DLA - CC

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DLA - CC

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Review activities:
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