

7665A 7

MIL-E-1/1485D  
17 January 1980  
SUPERSEDING  
MIL-E-1/1485C  
2 January 1973

MILITARY SPECIFICATION SHEET

ELECTRON TUBE, THYRATRON

TYPES 7665 AND 7665A

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The complete requirements for procuring the electron tube described herein shall consist of this document and the latest issue of Specification MIL-E-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:	Vac	kv	kv	Vdc	v	v	a	Vdc	Aac	Adc
Maximum:	6.8	16.0 (Note 1)	16.0 (Note 2)	---	600 (Note 3)	200	350	150	6.5	0 50
Minimum:	5 8	2.0	5% epy	1,000	200	---	---	---	---	---
<u>TEST CONDITIONS:</u>	6.3	16.0	---	---	150	---	---	0	---	---

ABSOLUTE-RATINGS:

Parameter:	prp	Eres	Pb °	tk	dik/dt	TA	tj	Cooling
Unit:	pps	Vac	---	sec	a/μs	°C	μs (Note 7)	(Note 5)
Maximum:	Note 4	6.8	5 0 x 10 <sup>9</sup> (Note 4)	---	2,000	+150	0 005	---
Minimum:	---	5 8	---	180	---	-55	---	---
<u>TEST CONDITIONS:</u>	1,000	6.3 (Note 6)	---	180	---	---	---	---

GENERAL.

Qualification - Required

Ⓧ denotes changes

METHOD	REQUIREMENT OR TEST	NOTES	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL OR CODE	SYMBOL	LIMITS		UNIT
							MIN	MAX	
<u>Quality conformance inspection, part 1</u>									
3267	Instantaneous starting	10	epy = 16 kv (min); Ef = Eres = 6.8 V	0.65	II	---	---	---	---
3246	Operation (1)	9	epy = 18 kv; Ef = Eres = 5.8 V t = 10 minutes	0.65	II	egy	---	150	v
3247	DC anode voltage for conduction	-	Ef = Eres = 5.8 V	0.65	II	Ebb	---	1,000	Vdc
3241	Heater current (cathode)	-		0.65	II	If	3.5	8.0	Aac
3241	Heater current (reservoir)	-		0.65	II	Ires	1.0	4.0	Aac
3251	Pulse emission (method A)	-	ik = 350 a, tp = 5.0 $\mu$ s $\pm$ 10%; pr = 60 $\pm$ 10%; tr = 0.5 $\mu$ s (max); starting time of pulse = 2.5 $\mu$ s; specified time interval = 4.0 $\mu$ s	0.65	II	egk	---	200	v
<u>Quality conformance inspection, part 2</u>									
3246	Operation (1A)	-	Operation (1); t = 10 minutes; tk = 5 minutes; Ef = Eres = 6.8 V	---	---	egy	---	150	V
3256	Anode delay time	-	Operation (1); t = 120 seconds	---	---	tad	---	0.4	$\mu$ s
3256	Anode delay time drift	11	Anode delay time	---	---	$\Delta$ tad	---	0.10	$\mu$ s
3261	Time jitter	9, 12	Operation (1), except epy = 8 kv	---	---	tj	---	0.005	$\mu$ s
3246	Operation (2)	13	pr = 300; epy = 6.6 kv; t = 20 minutes; Ef = Eres = 5.8 V	---	---	egy	---	150	v
<u>Quality conformance inspection, part 3</u>									
---	Life test (1)	9	Group C; t = 96 hours "on" and 1 hour "off" (tube mounted horizontally); t = 500 hours	---	---	---	---	---	---
---	Life-test (1) end points:								
3246	Operation (1) and (1A)	-		---	---	egy	---	150	v
3247	DC anode voltage for conduction	-	egy = 150 v	---	---	Ebb	---	1,000	Vdc
3261	Time jitter	-	egy = 150 v	---	---	tj	---	0.005	$\mu$ s

METHOD	REQUIREMENT OR TEST	NOTES	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL OR CODE	SYMBOL	LIMITS		UNIT
							MIN	MAX	
1041	Shock	15	100 G at 11 ms; no voltage applied	---	---	---	---	---	---
1031	Variable-frequency vibration	8, 15	No voltage applied	---	---	---	---	---	---
---	Shock and variable- frequency vibration end points:								
3246	Operation (1)	15		---	---	egy	---	160	v
3261	Time jitter	15		---	---	tj	---	0.005	$\mu$ s
3246	Operation at elevated ambient temperature	9, 14	TA = 150°C; t = 5 hours	---	---	egy	---	150	v
---	Life test (2)	15	epy = 6.0 kv; pr = 300; t = 500 hours	---	---	---	---	---	---
---	Life-test (2) end points:								
3246	Operation (2)	-		---	---	egy	---	160	v
3247	DC anode voltage for conduction	-	egy = 160 v	---	---	Ebb	---	1,000	Vdc

## NOTES:

- Instantaneous starting is permissible. The maximum permissible epy is 16 kv and shall not be attained in less than 0.04 second.
- In pulsed operation, the peak inverse voltage, exclusive of a spike of 0.05  $\mu$ s (maximum) duration, shall not exceed 50 kv during the first 25  $\mu$ s following the pulse.
- The driver pulse, measured at the tube socket with thyatron grid disconnected: 200 volts minimum, 600 volts maximum, tr = 0.35 maximum; grid pulse duration 2.0  $\mu$ s minimum. Impedance of drive circuit: 50 to 500 ohms. At -55°C, a minimum of 250 volts is required.
- 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  $7 \times 10^9$  is permissible for certain application.
- 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.
- The optimum reservoir voltage for operation in accordance with operation (1) conditions is 6.3 Vac and shall be held within  $\pm 7\frac{1}{2}$  percent. Applications involving other operating conditions may necessitate the redetermination of the optimum reservoir voltage.
- Appreciably less jitter than 0.005  $\mu$ s can be realized using an anode voltage of 8 kv or more, a grid drive amplifier near the maximum and a grid drive impedance near the minimum values.
- There shall be no pronounced resonance in the range from 0 to 2,000 pps.
- The circuit constants shall be so chosen, that at epy = 16 kv under resonant charging conditions;  $di/dt = 1,500$  a/ $\mu$ s (min);  $i_b = 175$  a (min);  $t_p = 1.0 \pm 10$  percent  $\mu$ s; pr = 1,000 (min). The grid pulse characteristics shall be:  $t_p = 2.0$   $\mu$ s (max); tr = 0.35  $\mu$ s (min); and Zs = 500 ohms (min).
- The tube shall operate satisfactorily on push-button starting within three attempts when the anode voltage (epy) is applied to the tube under test in such a manner as to rise from 0 to 16 kv minimum within 0.03 second. (The filter in the rectifier shall be so designed that the epy reaches at least 7 kv within 0.015 second.) Any tube failing to start within three attempts will be considered a failure.

## NOTES: -Continued

- 11 This test shall be performed simultaneously with the operation (1) test. An anode delay measurement shall be made at the end of 2 and 10 minutes of that test. The change in a 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 warmup period (tk). After 60 seconds of operation the variation in firing time (tj), measured at 50 percent of the cathode current pulse, shall be not greater than the amount specified.
13. The circuit constants shall be so chosen that under resonant charging conditions at epy 6.0 kv; ib = 12.0 a minimum, di/dt = 150 a/ $\mu$ s minimum; tp = 66  $\mu$ s  $\pm$  10 percent; pri 400; inverse voltage due to mismatch = 10 percent epy. The grid pulse characteristics be: tp = 2.0  $\mu$ s (max); tr = 0.35  $\mu$ s (min); internal driver impedance 500 ohms (min)
- 14 This test shall be conducted for a total of 5 hours with no more than three kickouts. T shall be started with 107.5 percent Eres and operate at this value for 4 hours. At the end of the fifth hour, and while the tube is still operating, the voltage shall be lowered to 92-1/2 percent and remain there for the final 1 hour of operation.
15. 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 two. In the event of a failure, the test will be made as a part of quality conformance inspection, part 2, code level D, with an AQL of 0.5. The regular "12-calendar month" double sampling plan shall be reinstated after three consecutive samples have been accepted.

Custodians:  
 Army - ER  
 Navy - EC  
 Air Force - 85

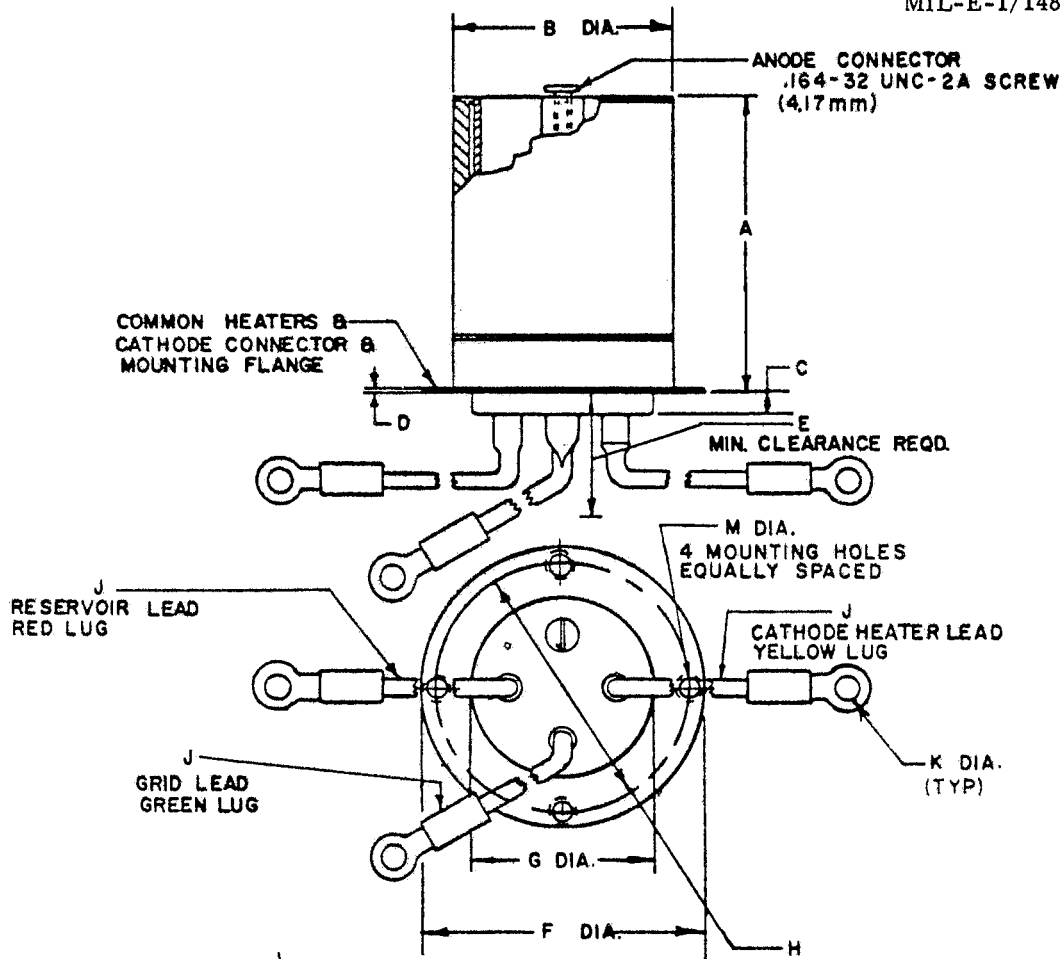
Preparing activity: Navy - EC

Agent: DLA - ES

(Project 5960-3217)

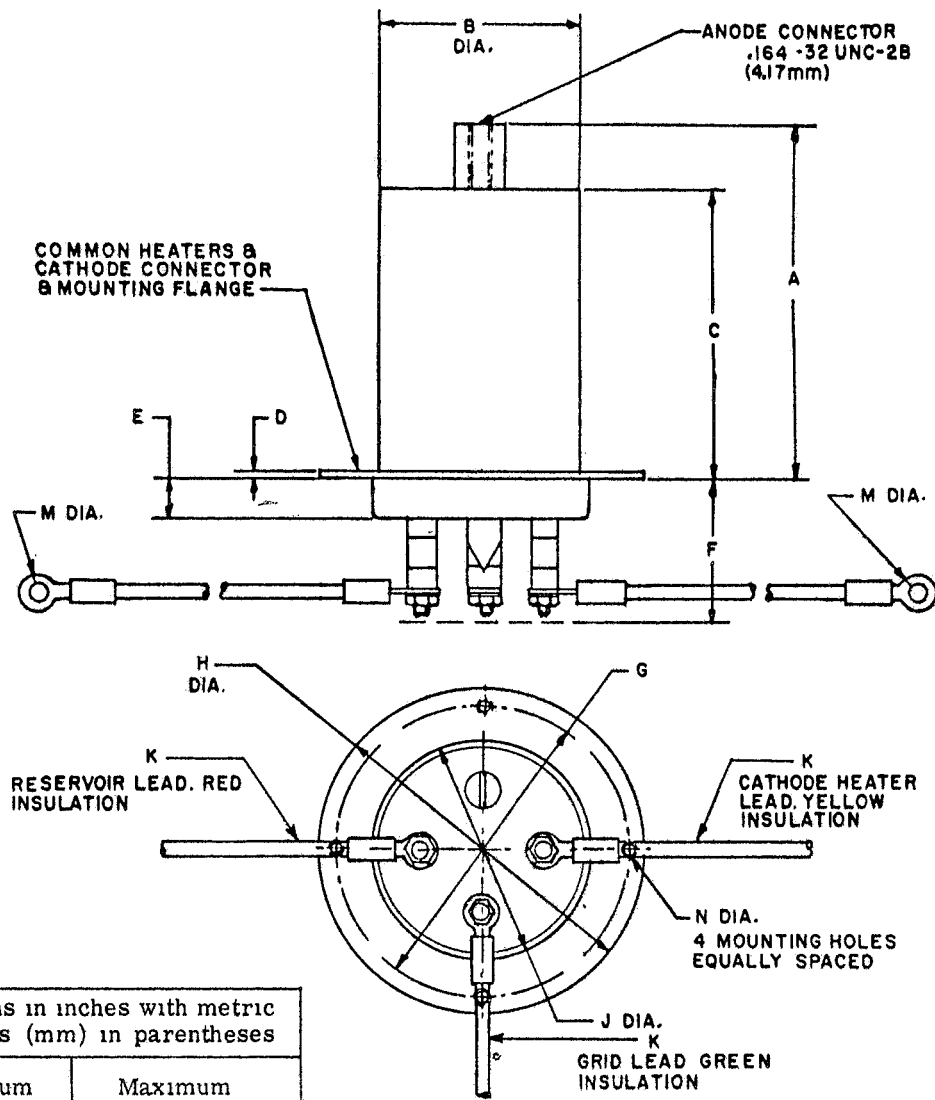
Review activities:  
 Army - MI  
 Air Force - 11, 80  
 DLA - ES

User activities:  
 Army - AR  
 Navy - AS, OS, CG, SH



Ltr	Dimensions in inches with metric equivalents (mm) in parentheses.	
	Minimum	Maximum
Quality conformance inspection, part 2		
A	2.43 (61.72)	2.47 (62.74)
Ⓚ B	1.740 (44.20)	1.760 (44.70)
C		.28 (7.11)
E	1.25 (31.75)	
Ⓚ F	2.245 (57.02)	2.255 (57.28)
G		1.50 (38.10)
Reference dimensions		
D	.030 ( .76)	
H	2.031 (51.59)	
J	6.00 (152.40)	
K	.203 (5.16)	
M	1.47 (3.73)	

FIGURE 1. Outline drawing of electron tube type 7665.



Ltr	Dimensions in inches with metric equivalents (mm) in parentheses	
	Minimum	Maximum
Quality conformance inspection, part 2		
A	2.377 (60.38)	2.497 (63.42)
B	1.365 (34.67)	1.385 (35.18)
C	1.877 (47.68)	1.997 (50.22)
E		.279 (7.04)
F		1.00 (25.40)
H		2.250 (57.15)
J		1.50 (38.10)
Reference dimensions		
D	.030 (.76)	
G	2.031 (51.59)	
K	6.00 (152.40)	
M	.203 (5.16)	
N	.147 (3.73)	

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

MILITARY SPECIFICATION SHEET

ELECTRON TUBE, THYRATRON

TYPES 7665 AND 7665A

This amendment forms a part of Military Specification Sheet MIL-E-1/1485C, dated 2 January 1973, and is approved for use by all Departments and Agencies of the Department of Defense.

Page 3

Quality conformance inspection, part 3, Requirement or test column. Delete title heading "Periodic-check tests"

Quality conformance inspection, part 3, under NOTES column, add note "15" to the following test methods:

1041	Shock
1031	Variable-frequency vibration
3246	Operation (1)
3261	Time jitter

Page 4

NOTE 15, delete and substitute new note 15 as follows.

"15. 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 two. In the event of failure, the test will be made as a part of quality conformance inspection, part 2, code level D, with an AQL of 6.5. The regular "12-calendar month" double sampling plan shall be reinstated after three consecutive samples have been accepted."

Page 5

FIGURE 1, dimension "C" Delete " 24 (6.10) from the minimum column.

FIGURE 1, dimension "G" Delete "1.50 (38.10) minimum and add to maximum column.

Page 6

FIGURE 1A. Delete and substitute new figure 1A as printed on page 2 of this amendment.

Custodians.

Army - EL  
Navy - EC  
Air Force - 85

Preparing activity

Navy - EC

Agent

DSA - ES

Review activities.

Army - MI  
Air Force - 11, 80  
DSA - ES

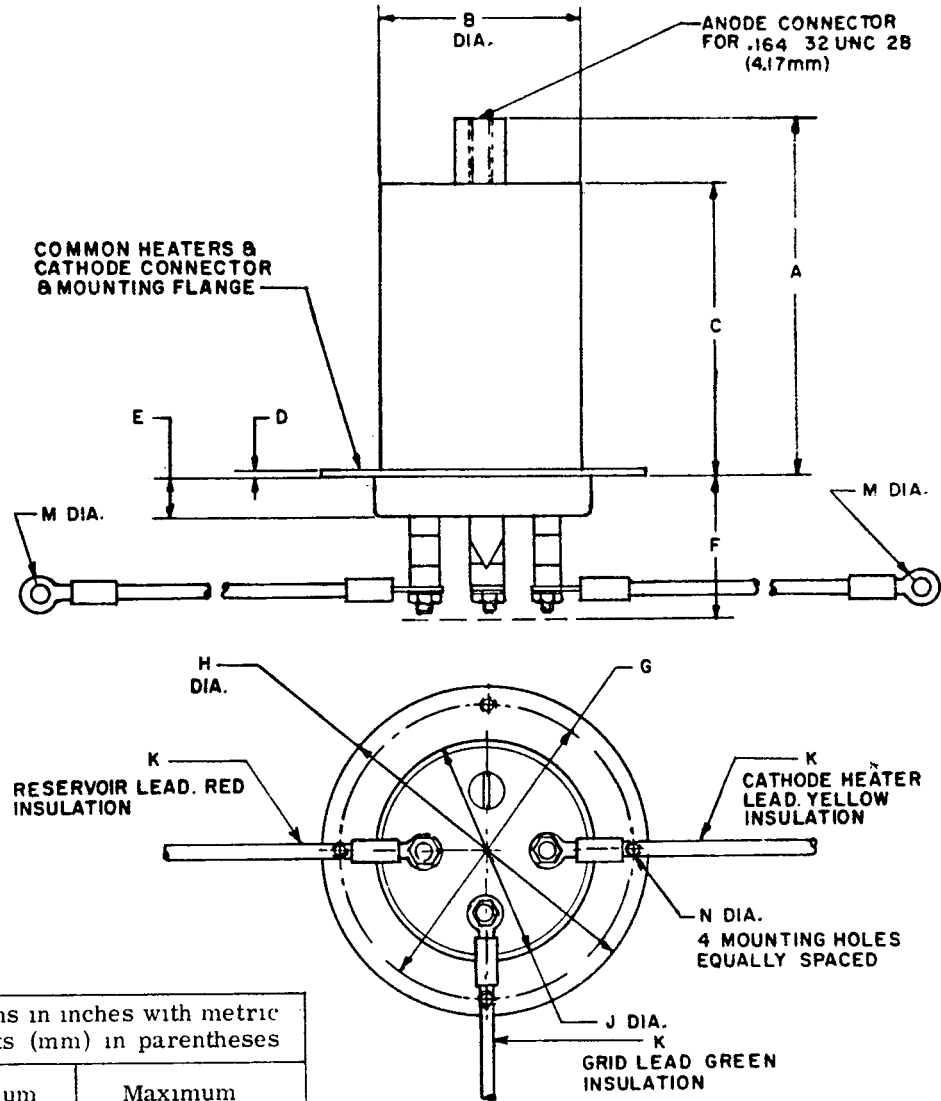
(Project 5960-2916)

User activities

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

7665, 7665A

FSC 5960



Ltr	Dimensions in inches with metric equivalents (mm) in parentheses	
	Minimum	Maximum
Quality conformance inspection, part 2		
A	2.377 (60.38)	2.497 (63.42)
B	1.365 (34.67)	1.385 (35.18)
C	1.877 (47.68)	1.997 (50.22)
E		.279 (7.04)
F		1.00 (25.40)
H		2.250 (57.15)
J		1.50 (38.10)
Reference dimensions		
D	.030 (.76)	
G	2.031 (51.59)	
K	6.00 (152.40)	
M	.203 (5.16)	
N	.147 (3.73)	

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