

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, RECEIVING

TYPE 5R4WGB

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

Inactive for new design after 21 July 1997
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The requirements for acquiring the electron tube described herein shall consist of this document and MIL-PRF-1.

DESCRIPTION: Full-wave rectifier, high vacuum.  
Outline --- See figure 1.  
Envelope --- T14.  
Cathode --- Coated filament.  
Base connections:

Pin No.	---	1	2	4	6	8
Element	---	nc	f	2a	1a	f

ABSOLUTE RATINGS:

Parameter:	Ef	Epp/a	epx	R1	C1
Unit:	V ac	V ac	V (Note 1)	Ohms	µf
Maximum:	5.0 ±10%	---	1,850	---	4
	5.0 ±10%	---	2,150	---	---
	5.0 ±10%	---	2,300	---	---
	5.0 ±10%	---	2,800	---	4
	5.0 ±10%	---	2,900	---	---
Minimum:	---	---	---	---	---
Test conditions:	5.0	850	---	3,500	4

ABSOLUTE RATINGS:

Parameter:	Io	ib/a	tk	TE	Alt
Unit:	mA dc	mA	sec	°C	ft
					(Notes 4 and 5)
Maximum:	275	---	10	260	60,000
	275	700	10	260	40,000
	275	Note 2	10	260	40,000
	165	---	10	260	40,000
	190	Note 3	10	260	35,000
Minimum:	---	---	---	---	---
Test conditions:	---	---	---	---	---

GENERAL:

Qualification: Not required.

Reliable tube.

AMSC N/A

FSC 5960

TABLE I. Testing and inspection

Requirement or Test	Method MIL-STD-1311	Conditions	Acceptance level note16	Symbol	Limits		Unit
					Min	Max	
<u>Conformance inspection, part 1</u>							
Stabilization	---	See note 6	---	---	---	---	---
Short and discontinuity detection	1201		0.4	---	---	---	---
Emission (1)	1231	Eb = 75 V dc See note 7	0.65	Is	240	400	mA dc
Filament current	1301		0.65	If	1.95	2.2	A
Operation of rectifiers (1)	1353	Full wave; tk = 10 See notes 8 and 9	0.65	Io	245	260 (bogey)	mA dc
<u>Conformance inspection, part 2</u>							
Barometric pressure, reduced (1)	1002	Pressure = 140 ±10 mmHg; Ef = 5.0 V ac; Epp/a = 1,050 V ac; full wave; R1/Io = 165 mA dc; tk = 10; C1 = 4 µF; Zp/a = 500 ohms; including transformer; See note 10	6.5	---	---	---	---
Barometric pressure, reduced (2)	1002	Pressure = 55 ±5 mmHg; Ef=5.0 V ac; epx = 1,850v; C1 = 4 µF; tk = 10; R1/Io = 275 mA dc; Zp/a = 200 ohms; including transformer See note 10	6.5	---	---	---	---
Low-frequency vibration	1031	No voltages	6.5	---	---	---	---
Emission (2)	1231	Ef = 4.5 V ac; Ep = 75 V dc See notes 7 and 11	2.5	ΔIs Ef	---	15	%
Operation of rectifiers (2)	1353	epx = 2,800 Vac; full wave; Zp/a = 500 ohms; c1 = 4µF; tk = 10; R1 = 7,000 ohms	---	Io	140	---	mA dc
Alinement	---	See note 12	---	---	---	---	---
Shock	1041	900G; Ef = 5.0 V ac (only voltage applied)	---	---	---	---	---
Vibration fatigue	1031	2.5 G; fixed frequency; F = 25 Hz (min), 60 Hz (max) See note 10	6.5	---	---	---	---
Post-shock and vibration fatigue test end point: Operation of rectifiers (1)	1353		---	Io	240	---	mAdc

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TABLE I. Testing and inspection - Continued.

Requirement or Test	Method MIL-STD-1311	Conditions	Acceptance level note 16	Symbol	Limits		Unit
					Min	Max	
<u>Conformance inspection, part 3</u>							
Heater-cycling life	1506	Ef = 5.5 V ac	---	---	---	---	---
Heater-cycling life test end point:	---						
Intermittent life	1501	Ef = 5.0 V ac; Epp = 750 V ac; C1 = 4 $\mu$ F; adjust R1 to obtain lo = 275 mA dc; tk = 10; TE = 260°C See notes 13 and 14	---	---	---	---	---
Intermittent life test end points (100 hours):	---						
Inoperatives	---		---	---	---	---	---
Operation of rectifiers (1)	1353		---	lo	245	---	mA dc
Blown fuses	---	See note 15	---	---	---	---	---
	---		---	---	---	---	---
Intermittent life test end points (500 hours):	---						
Inoperatives	---		---	---	---	---	---
Operation of rectifiers (1)	1353		---	lo	240	---	mA dc
Blown fuses	---	See note 15	---	---	---	---	---
	---		---	---	---	---	---
Intermittent life test end points (1,000 hours):	---						
Inoperatives	---		---	---	---	---	---
Operation of rectifiers (1)	1353		---	lo	240	---	mA dc
Blown fuses	---	See note 5	---	---	---	---	---
	---		---	---	---	---	---

## NOTES:

1. The maximum voltage appearing between any pair of pins shall be no greater than the peak inverse anode voltage rating.
2. Input choke filter 5-Henries minimum required for 60 Hz power supply.
3. Input choke filter 10-Henries minimum required for 60 Hz power supply.
4. The tube shall be operated in a vertical position. If mounted in a horizontal position, pins no. 1 and no. 4 shall be in a vertical plane.
5. Satisfactory operation of this tube under conditions falling within area I may be obtained without preheating the filament. For satisfactory operation under the conditions falling within area II, preheat the filament for 10 seconds before the anode voltage is applied. (See figure 2.)
6. Inoperatives shall be defined in accordance with the requirements of method 1201. The product shall be stabilized 100 percent at the following conditions for 6 hours as a full-wave rectifier:  $E_f = 5.0$  V ac;  $E_{pp/a} = 800$  V ac;  $Z_{p/a} = 100$ -ohms maximum;  $R_1 = 2,700$ ;  $t_k = 0$ ;  $C_1 = 4$   $\mu$ F. (Under these conditions  $I_o$  should equal approximately 300 milliamperes dc). Inoperative control is a triple sampling plan performed on all tubes in the lot. The procedure is: All tubes shall be stabilized as explained herein. The lot shall then be tested 100 percent for inoperatives. If the percent inoperative during and immediately following the stabilization period is not more than the acceptance requirements, the lot shall be subjected to the remaining tests. Otherwise, the stabilization operation shall be repeated. The acceptance requirements for the three stabilization operations are 3 percent, 2-1/2 percent, and 2 percent inoperatives, respectively. If the lot does not meet the acceptance requirements after the third test it shall be scrapped. The 6-hour stabilization period includes the "off" time accumulated during cycling of approximately 15 minutes "on" and 5 minutes "off." Both filament and anode voltages shall be applied simultaneously at the end of the "off" period.
7. Test each unit section separately.
8. This test to be performed at the conclusion of the holding period.
9. In a full-wave circuit, adjust  $Z_{p/a}$  so that a bogey tube gives an  $I_o$  equal to 260 mA dc and  $I_b$  not less than 630 mA per anode. A bogey tube is defined as a tube with a voltage drop of  $E_{td} = 75$  V dc at  $I_s = 320$  mA dc per anode.
10. This test shall be conducted on the initial lot and thereafter on a lot approximately every 6 months. When one lot has passed, the 6-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.
11. Preheat tubes with  $E_f = 5.0$  V for 5 minutes minimum prior to testing for  $I_s$  at  $E_f = 5.0$  V. Preheat tubes with  $E_f = 4.5$  V for 5 minutes minimum prior to testing for  $I_s$  at  $E_f = 4.5$  V.
12. The plane of the filament shall be parallel to the plane passing through the centerline of pins no. 1 and No. 4 within  $\pm 22\text{-}1/2$  degrees.
13. Envelope temperature (TE) requirements, when measured in accordance with the temperature by conduction-band measurement (MIL-STD-1311 method 1226), will be satisfied if a tube having bogey  $E_{td}$  ( $\pm 10$  percent) under normal test conditions, is determined to operate at or above minimum specified temperature at any position in the life-test rack.
14. Intermittent life test.
  - (a) The intermittent life-test sample shall consist of 20 tubes. At the completion of 500 hours (+48, -24 hours), the first 10 serially marked operative tubes shall continue on for the 1,000-hour life test. The 1,000-hour life test shall be conducted on a minimum of 1 sample of 10 tubes each month of production.
  - (b) In the event of failure of the first sample on intermittent life test, a completely fresh sample of 40 tubes shall be selected. At the completion of 500 hours (+48 hours, -24 hours), the first 20 serially marked operative tubes shall continue on for the 1,000-hour test.
  - (c) Life-test samples shall be selected from a lot at random in such a manner as to be representative of the lot. If such selection results in a sample containing tubes which are outside the initial limits of this specification sheet for the relevant life-test end point characteristics, such as tubes shall be replaced by randomly selected acceptable tubes.
  - (d) Serially mark all tubes from the sample.

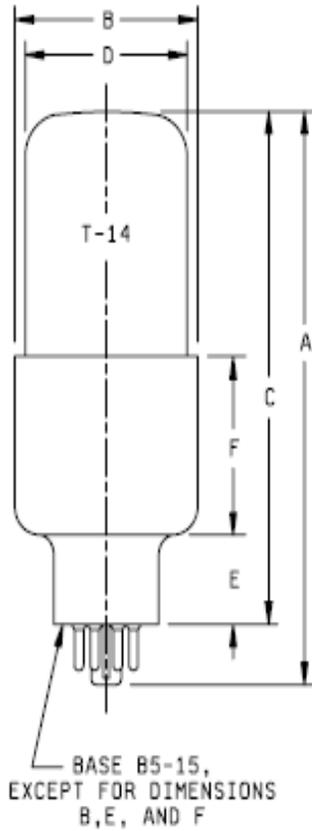
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- (e) Record referenced characteristic measurements after a maximum operation of 15 minutes under specified voltage and current conditions on the entire sample.
- (f) The life-test sample shall be read at the following times:

- 100 hours (+50, -10)
- 300 hours (+48, -24)
- 500 hours (+48, -24)
- 1,000 hours (+48, -24)

Additional reading periods may be used at the discretion of the electron tube manufacturer. Tubes which fail to meet the acceptance criteria at 100 hours may not be continued further on life test.

- (g) Acceptance. The lot shall be considered satisfactory for acceptance provided that there are no defectives.
  - (h) A resubmitted lot shall be subjected to all conformance inspection, part 1 tests, except visual and mechanical inspection criteria, vibration, and barometric pressure, reduced.
  - (i) Not more than one accidental breakage shall be allowed in the life-test sample. If one life-test tube is accidentally broken, acceptability of the life-test sample shall be based upon the remaining tube in the sample, provided that the broken tube was not known to be defective.
15. A separate SLO-BLO fuse that blows at 1.3 amperes shall be used in each anode circuit. A tube which blows fuses more frequently than once during the 500-hour life test, or twice during the 1,000-hour life test, shall be considered a life-test defect.
16. This specification sheet uses accept on zero defect sampling in accordance with MIL-PRF-1, table III.



Ltr	Dimensions in inches with metric equivalents (min) in parentheses	
	Minimum	Maximum
conformance inspection, part 1		
A		5.375 (136.53)
C		4.813 (122.25)
D	1.688 (42.88)	1.813 (46.05)
Conformance inspection, part 3 (See Note a)		
B		2.063 (52.40)
E	.875 (22.23)	
F		1.625 (41.28)

NOTE a: These dimensions shall be checked annually.

FIGURE 1. Outline drawing of electron tube type 5R4WGB.

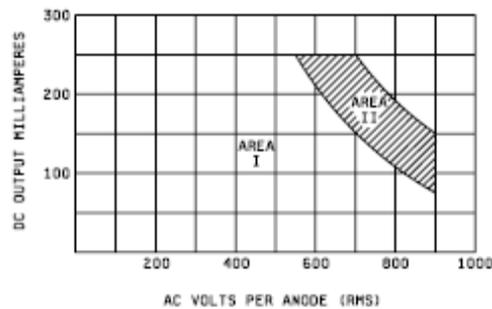


FIGURE 2. Rating chart.

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

Marginal notations are not used in the 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 5960-2008-057)

Review activities:

Army –AR, MI  
Navy – AS, CG, MC, OS, SH  
Air Force – 99

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/>