

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, RECEIVING
 TYPE 6939

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: Twin power pentode, miniature, neutralized, rf amplifier, F1 = 500 MHz.
 Outline --- 6-3 (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	2g1	k, g3	1g1	h	h	2a	g2	1a	hct

ABSOLUTE RATINGS:

Parameter: Unit:	Ef V	Eb V dc	Ec1 V dc	Ec2 V dc	Ehk v	Ib/a mA dc	Ic1/g mA dc
Maximum:							
Class C, telep: (intermittent)	6.9 or 13.9	200	-50	200	100	40	4
Class C, telep: (continuous)	6.9 or 13.9	200	-50	200	100	32	3
Class C, teleg: (intermittent)	6.9 or 13.9	250	-50	200	100	50	4
Class C, teleg: (continuous)	6.9 or 13.9	250	-50	200	100	45	3
Minimum:	5.7 or 11.3	---	---	---	---	---	---
Test conditions:	6.3 or 12.6	150	-3	150	---	---	---

ABSOLUTE RATINGS:

Parameter: Unit:	Pg1/g W	Pg2 W	Pp/a W	Pi/a W	TE °C	Alt ft
Maximum:						
Class C, telep: (intermittent)	0.12	2x1.15	2.5	5.0	225	1/
Class C, telep: (continuous)	0.1	2x1.0	2.0	4.0	225	1/
Class C, teleg: (intermittent)	0.12	2x1.75	3.75	7.0	225	1/
Class C, teleg: (continuous)	0.1	2x1.5	3.0	6.0	225	1/
Minimum:	---	---	---	---	---	---
Test conditions:	---	---	---	---	---	---

See footnotes at end of table I.

GENERAL: Qualification - Not required.

TABLE I. Testing and inspection.

Inspection	Method MIL-STD- 1311	Conditions	Acceptance level 11/	Symbol	Limits		Unit
					Min	Max	
<u>Conformance inspection, part 1</u>							
Heater current	1301	$E_f = 6.3$	0.65	lf	575	625	mA
Electrode current (1) (anode)	1256	$E_{c1} = 0$ 2/ 3/	0.65	lb	33	82	mA dc
Electrode current (2) (anode)	1256	2/	0.65	lb	7.5	31	mA dc
Electrode current (3) (anode)	1256	$E_{c1} = -11.0$ V dc 2/	0.65	lb	---	125	μ A dc
Total grid current	1266	$R_{c1} = 0.1$ Meg Ω 2/ 4/	0.65	lc1	---	-1.0	μ A dc
Electrode current (screen)	1256	2/	0.65	lc2	1.5	7.5	mA dc
Pulse cathode current	---	$E_b = E_{c2} = 200$ V dc; $D_u = 0.04$; $E_f = 5.3$ V; $e_{gk} = +25$ v; $R_k = 1$ ohm; $R_1 = 0$; $t_p = 800$ μ s 5/	0.65	ik	650	---	ma
Short and discontinuity detection	1201		0.4	---	---	---	---
<u>Conformance inspection, part 2</u>							
Insulation of electrodes	1211	6/ 7/	2.5	---	---	---	---
Heater-cathode leakage	1336		---	lhk	---	40	μ A dc
Transconductance	1306	$E_{c1}/I_b = 25$ mA dc 2/	---	S_m	7,800	13,200	μ mhos
Direct-interelectrode capacitance	1331	6/	6.5	{ C _{gp} C _{in} C _{out}	{ --- 5.1 1.4	{ 0.2 7.7 1.8	{ pF pF pF
Primary grid emission (control)	1266	$E_f = 7.0$ V ac; $P_{g1} = 0.15$ W; $E_b = E_{c2} = 0$ 6/ 8/	---	lsg1	---	-10	μ A dc
Primary grid emission (screen)	1266	$E_f = 7.0$ V ac; $P_{g2} = 3.5$ W; $E_b = E_{c1} = 0$ 8/	---	lsg2	---	-200	μ A dc
Power oscillation (1)	1236	Push-pull class C amplifier; $F = 470$ to 500 MHz; $E_b = E_{c2} = 180$ V dc; $I_{c1} = 0.75$ mA dc/grid; $R_{c1} = 27,000$ ohms/grid; $R_{c2} = 100$ ohms; $I_b = 65$ mA dc (max); $I_{c2} = 15$ mA dc (max)	---	Po	4.1	---	W (useful)

See footnotes at end of table.

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TABLE I. Testing and inspection - Continued.

Inspection	Method MIL-STD- 1311	Conditions	Acceptance level 11/	Symbol	Limits		Unit
					Min	Max	
<u>Conformance inspection, part 2</u> - Continued							
Power oscillation (2)	1236	Power oscillation (1), except Ef = 5.3 V ac	---	ΔP_o Ef	---	15	%
Shock	1041	450 G; Ef = 6.3 V ac; no other voltages	15	---	---	---	---
Vibration fatigue	1031	Ef = 6.3 V ac; F = 50 Hz; no other voltages	6.5	---	---	---	---
Post-shock and vibration- fatigue test end points	---	Insulation of electrodes <u>6/ 7/</u>	---	R	10	---	Meg Ω
		Heater-cathode leakage	---	lhk	---	70	μA dc
		Power oscillation (1)	---	Po	4.0	---	W (useful)
Permanence of marking	1105	Pulse cathode current	---	ik	600	---	ma
			---	---	---	---	---
<u>Conformance inspection, part 3</u>							
Life test (1)	---	Group C; power oscillation (1); Ef = 7.8 V ac; Eb = 200 V dc <u>10/</u>	---	---	---	---	---
Life-test end points (1) (100 hours)	---	Power oscillation (1)	---	Po	3.5	---	W (useful)
		Power oscillation (2)	---	ΔP_o Ef	---	15	%
		Pulse cathode current	---	ik	450	---	ma
		Total grid current	---	lc1	---	-1	μA dc
		Primary grid emission (control)	---	lsg1	---	-50	μA dc
		Primary grid emission (screen)	---	lsg2	---	-200	μA dc
Life test (2)	---	Group C; power oscillation (1)	---	---	---	---	---
Life-test end points (2) (1,000 hours)	---	Power oscillation (1)	---	Po	3.5	---	W (useful)
		Power oscillation (2)	---	ΔP_o Ef	---	15	%
		Pulse cathode current	---	ik	450	---	ma
		Total grid current	---	lc1	---	-1	μA dc
		Primary grid emission (control)	---	lsg1	---	-50	μA dc
		Primary grid emission (screen)	---	lsg2	---	-200	μA dc

See footnotes at top of next page.

TABLE I. Testing and inspection - Continued.

- 1/ See "Reduced pressure (altitude) rating", and altitude, maximum peak voltage in the basic document.
- 2/ Each unit shall be read separately. Control grid of unit not under test shall be connected to -20 V dc.
- 3/ The duration of the test shall not exceed 5 seconds.
- 4/ This test to be performed at the conclusion of the holding period.
- 5/ Test both units in parallel. Ec1 shall be sufficient to cutoff the tube. The positive portion of the grid pulse shall be a rectangular wave meeting the pulse characteristic requirements of MIL-STD-1311 method 1296. In addition, the maximum amplitude shall occur within the first 20 percent of tp. The pulse shall be applied to the grid by means of a driving circuit which produces the specified peak pulse voltage directly at the grid terminal with respect to cathode. Grid resistance, not exceeding 50-ohms may be inserted to prevent oscillation, provided readjustment of grid drive is made to maintain the specified pulse amplitude directly at the grid terminal. Peak currents shall be measured by a high impedance oscilloscope, or equivalent device, connected across the 1-ohm \pm 1 percent cathode resistor. The specified limit refers to the maximum pulse amplitude.
- 6/ Each unit shall be tested separately.
- 7/ Voltage shall be applied in series with a 10 megohm \pm 10% resistor.
- 8/ Primary grid-emission tests shall be the last tests performed on the sample selected for conformance inspection, part 2. Primary grid emission (control) shall be read prior to primary grid emission (screen).
- 9/ The vibration-fatigue 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. Sample size of 13 shall apply.
- 10/ Anode and screen voltage shall be applied intermittently, 2 minutes "on", 8 minutes "off".
- 11/ This specification sheet uses accept on zero defect sampling in accordance with MIL-PRF-1, table III.

NOTES

Referenced documents. In addition to MIL-PRF-1, this specification sheet sheet references MIL-STD-1311.

Changes from previous issue. 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 previous issue.

Custodians:

Army - CR
Navy - EC
Air Force - 11
DLA - CC

Preparing activity:
DLA - CC

(Project 5960-3722)

Review activities:

Army - MI
Navy - AS, CG, MC
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 www.dodssp.daps.mil.