INCH-POUND

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SUPERSEDING
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PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, POWER
TYPE 8561

This specification is approved for use by the Electronic Support Flight (88LOG/LGME), Department of the Air Force, and is available 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, ceramic-metal.
Outline: See figure 1.
Mounting position: Any.
Weight: 4 ounces nominal.

ABSOLUTE RATINGS: F1 = 110 MHz

Parameter:	Ef	Eb	Ec1	Ec2	Ib	Ehk	Pg1	Pg2
Unit:	V ac 1/	V dc	V dc	V dc	mA dc	V dc	W	W
Maximum:								
C Teleg:	6.0 ±5%	2,000	-250	300	400	±150	1.0	8.0
C Telep:	6.0 ±5%	1,500	-250	300	300	±150	1.0	8.0
AB or A:	6.0 ±5%	2,000	---	400	400	±150	1.0	8.0
Test conditions:	6.0	1,000	Adj.	300	240	---	---	---

ABSOLUTE RATINGS:

Parameter:	Pp	tk	T(seals and anode core)	Cooling	Barometric pressure, reduced
Unit:	W	sec (min)	°C	---	mmHg
Maximum:				2/	
C Teleg:	400	30	250	---	141
C Telep:	250 3/	30	250	---	141
AB or A:	400	30	250	---	141
Test conditions:	---	120	---	4/	---

See footnotes at end of table I.

GENERAL:

Qualification: Required.

TABLE I. Testing and inspection.

Inspection	Method MIL-STD-1311	Conditions	Acceptance Level 16/	Symbol	Limits		Unit
					Min	Max	
Conformance inspection, part 1							
Electrode voltage (grid)	1261		0.65	Ec1	-32.0	-45.0	V dc
Total grid current	1266	Eb = 2,000 V dc; Ib = 150 mA dc 5/	0.65	Ic1	---	-15	µA dc
Electrode current (screen)	1256		0.65	Ic2	-7.0	+3.0	µA dc
Primary grid emission (control)	1266	Pg1 = 1 watt; t = 15; anode and screen grid floating	0.65	Isg1	---	-25	µA dc
Primary grid emission (screen)	1266	Ec1 = 0; t = 15; Pg2 = 8 watts; anode floating	0.65	Isg2	---	-250	µA dc

Pulse emission	2212	Eb = Ec2 = 250 V dc;
		Ec1 = -100 V dc;
		egk/ik = 2.4 a;
		prr = 11 ±1;
		tp = 4,500 µs (min);
		tr = tf = 25 µs;
		slope = 0.5 percent;
		ripple = 0.1 percent;
		Ef = 5.4 V ac 6/
			0.65	∆ik	---	200	ma

Current division (method A)	1372	Eb = Ec2 = 250 V dc; Ec1 = -100 V dc; egk/ib = 1.6 a; prr = 11 ±1; tp = 4,500 µs (min)	0.65	egk ic1 ic2	8.0 --- ---	18.0 300 320	V ma ma
Conformance inspection, part 2							
Heater current	1301		---	If	3.15	4.00	A ac
Direct-interelectrode capacitance (grounded cathode connection)	1331		---	Cgp Cin Cout	--- 30.0 3.9	0.07 38.0 5.0	pF pF pF
Heater-cathode leakage	1336	Ehk = +250 V dc Ehk = -250 V dc	---	Ihk Ihk	--- ---	150 150	µA dc µA dc

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

Inspection	Method MIL-STD-1311	Conditions	Acceptance Level 16/	Symbol	Limits		Unit
					Min	Max	
Conformance inspection, part 3		7/					
Vibration (noise)	---	Ef = 6.0 (ac or dc); Ebb = 2,500 V dc; Ec2 = 400 V dc; Rp = 4,900 ohms; Ec1/Ib = 100 mA dc; Accel = 10 G peak (min); F = 28 to 500 Hz, ascending only; X and Y axes only 8/	---	Ep	---	30	V ac
Vibration (noise) end-points:	---						
Electrode voltage (grid)	1261		---	Ec1	-32.0	-45.0	V dc
Total grid current	1266		---	Ic1	---	-20	µA dc
Shock, specified pulse, condition A	1042	Eb = 2,000 V dc; Ec2 = 350 V dc; Ec1 = -150 V dc 9/	---	---	---	---	---
Shock, specified pulse end-points:							
Electrode voltage (grid)	1261		---	Ec1	-32.0	-45.0	V dc
Total grid current	1266		---	Ic1	---	-20	µA dc
Life-test (1) provisions	---	Group C; Ef = 6.6 V ac; Ec1 = Ec2 = Eb = 0; t = 500 hours	---	---	---	---	---
Life-test (1) end-points:	---						
Interelement leakage resistance, cold	1366	Rs = 2.5 Meg;					
		E = 100 V dc (g1 neg)	---	Rg1k	100	---	MegΩ
		E = 500 V dc (g2 pos) 10/	---	Rg1g2	100	---	MegΩ
Life-test (3) provisions	---	Group C; Heater cycling; 120 sec. (approx.) on 240 sec. (approx.) off g2 and anode floating t = 200 hours 11/	---	---	---	---	---
Life-test (3) end-points:	---						
Heater current	1301		---	If	3.15	4.00	A ac
Heater cathode leakage	1136	Ehk = +250 V dc	---	Ihk	---	150	µA dc
		Ehk = -250 V dc	---	Ihk	---	150	µA dc

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

Inspection	Method MIL-STD-1311	Conditions	Acceptance Level 16/	Symbol	Limits		Unit
					Min	Max	
Conformance inspection, part 3 - Continued		7/					
Cooling and pressure drop	---	Eb = 2,000 V dc; Ec1/Ib = 200 mA dc; Air flow = 7.4 cfm 12/ 14/	---	Press: T anode core	--- ---	0.8 250	In.H_20 °C
Life-test (2) provisions	---	Ebb = 1,000 V dc; Ec2 = 250 V dc; Ec1/Ib = 50 mA dc; Rp = 1,000 ohms; TA = 200°C minimum; Eg1/Ib = 100 mA dc; F = 1 kHz minimum; t = 100 hours 13/ 14/	---	---	---	---	---
Life-test (2) end points:	---						
Pulse emission	2212	Except Ef = 6.0 V ac	---	Δik	---	100	ma
Total grid current	1266		---	Ic1	---	-20	µA dc
Barometric pressure reduced	1002	E = 2,500 V ac; p to g2; no other voltages applied, no socket; pressure = 141 ± 5 mmHg absolute (max)	---	t	30	---	Sec

1/ When long life and consistent performance are factors, the applied heater voltage should be maintained within plus or minus five percent of nominal. Heater voltage should be measured directly at the tube or socket terminals with an accurate meter, preferably an rms-responding type.

2/ When the tube is operated at 100 percent of the maximum rated anode dissipation at an incoming air temperature of 25°C maximum, a minimum air flow of 7.4 cfm at sea level shall pass through the anode cooler. If the EIMAC socket SK-700, or equivalent, is used, an incoming air flow of 7.4 cfm to the lower end of the socket is required. An air director (chimney) such as the EIMAC SK-606, or equivalent, should also be used. At this flow of 7.4 cfm, the static pressure drop across the tube/socket/chimney combination is approximately 0.7 inch of water. This pressure drop varies with the amount of escaping air and with the shape and construction of the air director. Air cooling of the tube should be increased with increased incoming air temperature, higher altitude operation, or a combination. In all cases of operation, a socket which provides forced-air cooling of the base shall be used. Air flow must be applied before or simultaneously with the application of electrode voltages (including heater) and may be removed simultaneously with them. In all cases of operation, sufficient cooling must be provided to prevent seal and anode core temperatures in excess of the specified maximum value, and in cases where long life and consistent performance are factors, cooling in excess of minimum requirements is normally beneficial.

3/ Applies to carrier-only conditions.

4/ Unless otherwise specified, in all electrical tests involving application of heater voltage, forced-air cooling of the tube is allowable at the rate of 5.0 cfm maximum for the base and anode. A separate source may be used for the base and anode but neither shall exceed 5.0 cfm. The tube may be operated in an air-system socket (EIMAC SK-700 family, with SK606 chimney, or equivalent). The cooling air shall not have a temperature of less than 20°C nor an absolute pressure greater than 32 inches of mercury. If testing is performed at an altitude significantly above sea level, air flow may be corrected for comparable mass flow rate.

TABLE I. Testing and inspection - Continued.

5/ This test is to be the first test performed at the conclusion of the holding period.

6/ For the basic test circuit, see test method 1372, figure 1372-1.

7/ The vibration and shock tests listed under conformance inspection, part 3, shall be performed quarterly (every 3 months), with sample sizes as follows, employing an accept on zero failure plan.

Sample size

$N_1 = 4$

$N_2 = 4$

These tests shall not be considered destructive except in case of failure. Tubes meeting the post-test end points shall be considered to be in acceptable physical condition. In case of a sample failure, that test shall become conformance inspection, part 2, acceptance level 6.5 (see 16/), for three consecutive successful submissions, at which time the test will revert to the quarterly basis.

8/ The fixtures described in Drawing 284-JAN shall be used to hold the tube during the test. The test circuit shown on figure 3 shall be used, but tubes found to electrically oscillate for causes other than vibration shall not be tested nor rejected on this test. Each tube under test shall be subjected to one sweep cycle in each of the two axes X and Y. One sweep cycle (28 to 500 Hz, ascending only) shall be covered in 6 to 12 minutes. Each tube shall be vibrated for 60 seconds at the frequency which gives the maximum vibration output voltage in each of the two axes. If at the end of 60 seconds the vibration output is still increasing, the vibration shall be continued until there is no further increase for 60 seconds.

The tubes shall not show noise voltage in excess of the maximum limit specified, except one intermittent short per tube shall be allowable during this test. In addition to reading noise voltage output with the VTVM, such as the HP 400 D, or equivalent, a permanent recording shall be made using a good quality recorder to produce a plot of noise voltage versus frequency. Noise voltage amplifiers used with the recorder shall have a ± dB frequency response over the range to be measured (28-500 Hz) and the overall recording equipment shall be capable of fast response in order to show sharp noise voltage spikes resulting from internal tube resonances or other phenomenon. Prominent noise peaks indicated on the recording shall be individually investigated by fixed-frequency operation, and the 60-second operation specified above shall be made at the frequency of highest noise as so selected. The frequency at the extremes of the sweep shall be read with an accuracy of ± 1 percent above 100 Hz and ± 1 Hz below 100 Hz.

9/ The fixture described in Drawing 284-JAN, shall be used to hold the tube under test. The tubes shall be subjected to the specified acceleration in X, Y, and Z axes, with 6 shocks in each axis. Tubes showing any permanent shorts, or more than one temporary short during this test, shall be rejected.

10/ This test shall be made at least 30 minutes after Ef is turned off. Rated air flow shall be maintained during the 30-minute interval. Use General Radio Megohmeter Model 1862C, or equivalent. Tube elements not under test should be left floating.

11/ No grid-cathode shorts are permitted during or after life test.

12/ An infinite baffle system as shown in figure 2, or equivalent, shall be used. The tube shall be mounted in an air-system socket (EIMAC SK-700, SK-710, or equivalent, with an SK-606 or equivalent chimney), so arranged that the entire air flow passes through the anode cooler, in a base-to-anode direction. If the test is not performed at sea level, an equivalent mass flow shall be used. Static pressure drop is measured across the tube/socket/chimney combination. Temperature shall be measured by means of a thermocouple, located as follows: the thermocouple shall be embedded in the top of the anode core, adjacent to the cooler fins, by means of drilling a small hole, shallow enough so that the tube vacuum shall not be lost, placing the welded thermocouple firmly in place. Good electrical continuity between the thermocouple and the metal area in close proximity shall be demonstrated before the cooling part of the test is performed.

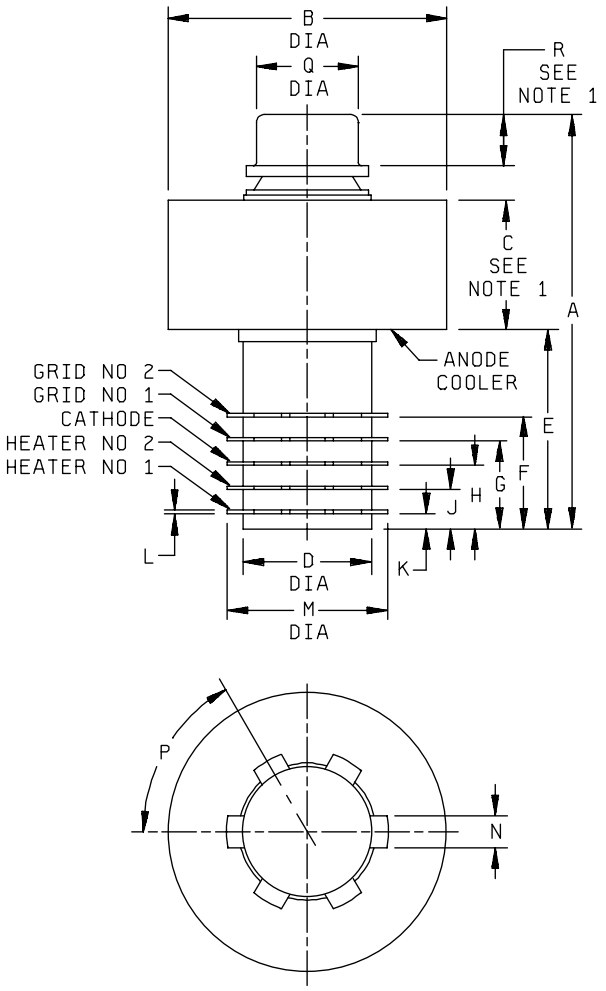
13/ Any suitable high-temperature socket may be used. 14/ shall apply except the quantity tested shall be one.

TABLE I. Testing and inspection - Continued.

14/ This test shall be performed during the initial production and once each succeeding 12-calendar months in which there is production. An accept on zero defect sampling plan shall be used, with sample of three tubes with an acceptance number of zero. In the event of failure, the test shall be made a part of conformance inspection, part 2, with an acceptance level of 6.5 (see 16/). The "12-calendar month" sampling plan shall be reinstated after three consecutive samples have been accepted.

15/ Reclaimed materials shall be utilized to the maximum extent possible as cited in MIL-STD-961 and MIL-STD-962 within the quality limits required by this document and to fulfill compliance with the Resource/Recovery Act of 1976 (Public Law 94-580 dated 21 Oct 76).

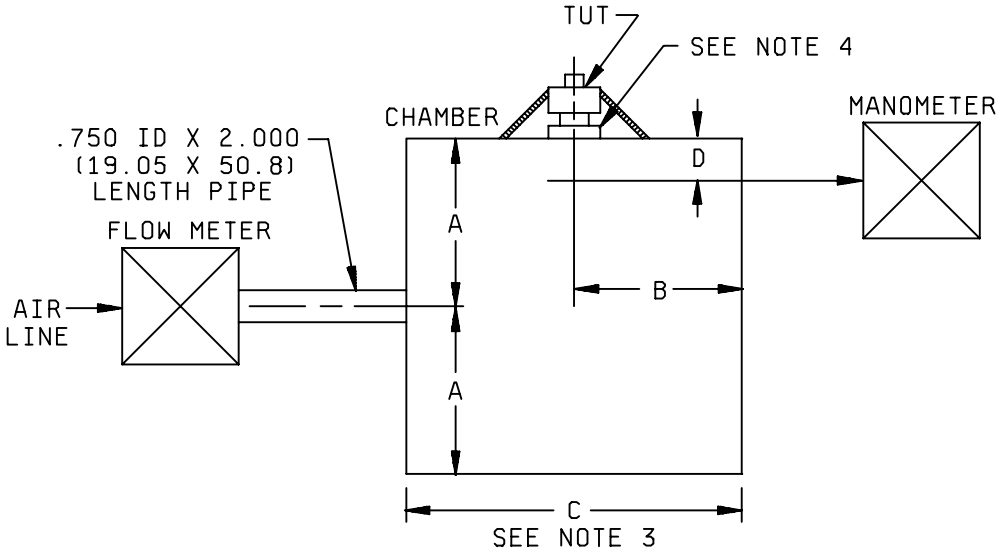
16/ This specification sheet uses accept on zero defect sampling in accordance with MIL-PRF-1, table III.



Dimensions									
Ltr	Inches		Millimeters		Ltr	Inches		Millimeters	
	Min	Max	Min	Max		Min	Max	Min	Max
Conformance inspection, part 2					Conformance inspection, part 3 (see note 2)				
A	2.300	2.500	58.42	63.50	B	1.610	1.640	40.89	41.66
D	.740	.770	18.80	19.56	C	.710	.790	18.03	20.07
F	.602	.642	15.29	16.31	E	1.133	1.195	28.78	30.35
G	.470	.500	11.94	12.70	N	.170	.185	4.32	4.70
H	.329	.359	8.36	9.12	Q	.559	.573	14.20	14.55
J	.193	.213	4.90	5.41	R	.240	---	6.10	---
K	.050	.072	1.27	1.83					
L	.010	.020	0.25	0.51	Reference dimensions				
M	.936	.956	23.77	24.28	P	60°			

NOTES:
1. Available anode contact surfaces.
2. See 14/ in table I.

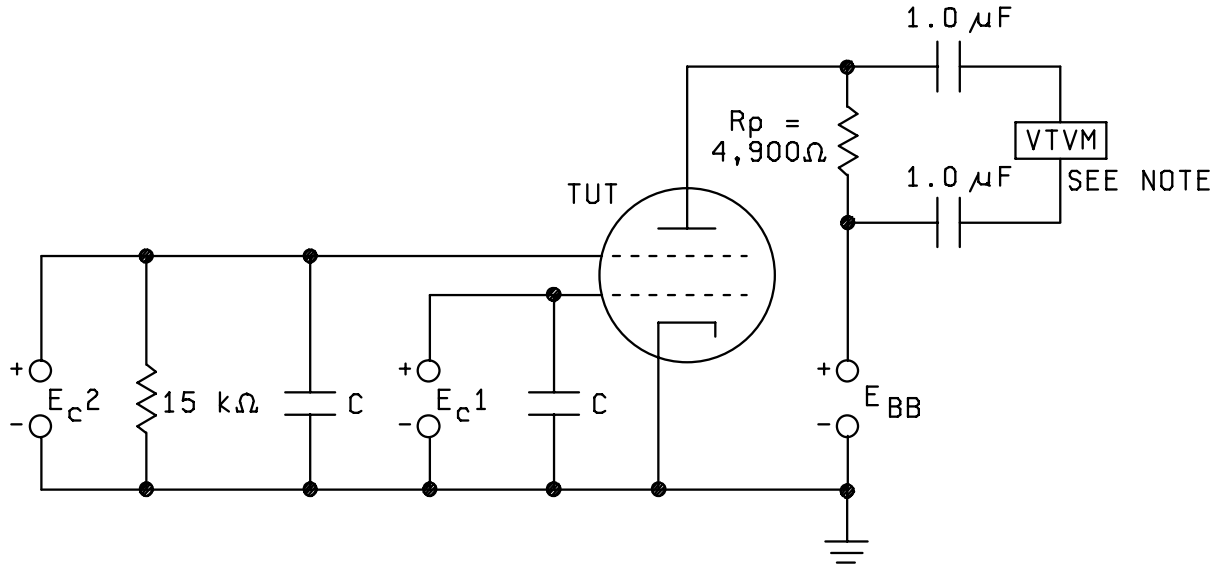
FIGURE 1. Outline drawing of electron tube type 8561.



Ltr	Dimensions	
	Inches	Millimeters
A	6	152.4
B	6	152.4
C	12	304.8
D	2	50.8

NOTES:
1. All dimensions are in inches.
2. Metric equivalents are shown for information only and are based upon 1 inch = 25.4 mm.
3. 12-inch (304.8 mm) cube inside dimensions (or equivalent) shall be free of air leaks.
4. Socket shall be EIMAC, SK-700, SK-710, or equivalent.

FIGURE 2. Baffle system.



NOTE: Hewlett-Packard type 400D or equivalent.

FIGURE 3. Basic test circuit for vibration (noise) test.

NOTES

Referenced documents. In addition to MIL-PRF-1, this specification sheet sheet references MIL-STD-1311, Drawing 284-JAN, MIL-STD-961 and MIL-STD-962.

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.

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