

PERFORMANCE SPECIFICATION SHEET
 ELECTRON TUBE, NEGATIVE GRID (MICROWAVE)
 TYPE 8980 1/

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: Triode, planar, ceramic and metal.
 See figure 1.
 Mounting position: Any.
 Weight: 0.5 ounce (14 grams) nominal.

ABSOLUTE RATINGS:

Parameter: Unit:	F GHz	E _f V	E _b V dc	E _c V dc	I _k mA dc	I _b mA dc	I _c mA dc
Maximum: CW Osc or Amplifier:	3.0	6.0 ± 2%	500	-50	35	35	5
Test conditions:	----	6.0	180	Adj	----	----	----

ABSOLUTE RATINGS:

Parameter: Unit:	P _p W	P _g W	t _k sec (min)	T (Anode shank) °C <u>2/</u>	Cooling <u>2/</u>
Maximum: CW Osc or Amplifier:	10	0.5	300	250	----
Test conditions:	----	----	300	----	<u>3/</u>

- 1/ Replaces EIMAC Y-638A and 6503.
- 2/ Sufficient conduction, convection, or forced-air cooling must be provided for the anode, cathode shank, and all seals to limit the maximum temperature to the specified value under all operating conditions. Where emphasis is placed on long life and consistent performance cooling in excess of minimum requirements is normally beneficial.
- 3/ During all electrical testing involving application of heater voltage sufficient cooling may be used to assure operation within the specified maximum temperature rating.

GENERAL:

Qualification - Required.
 Vaporization shields - Required - Internal vaporization shields are required and shall be arranged so that no vaporization on critical areas of the inner surface of the ceramic envelope.

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TABLE I. Testing and Inspection.

Inspection	Method	Conditions	Symbol	Limits		Unit
				Min	Max	
<u>Conformance inspection, part 1 1/</u>						
Heater current	1301		If	530	590	mA
Constant grid voltage 2/	----		----	----	----	----
<u>Conformance inspection, part 2</u>						
Electrode current (1) (anode)	1256	Ec = -6.0 V dc	Ib	6.0	40.0	mA dc
Electrode current (2) (anode)	1256	Eb = 75 V dc; Ec = Ek = 0 V dc	Ib	10.0	40.0	mA dc
Electrode voltage (grid)	1261	Eb = 150 V dc; Ec/Ib = 15 mA dc	Ec	-2.0	-7.5	V dc
Amplification factor	1316	Eb = 75 V dc; Ec = 0 V dc	Mu	14.0	28.0	----
Transconductance	1306	Eb = 75 V dc; Ec = 0 V dc	Sm	2,500	10,000	μmhos
Direct-interelectrode 3/ 6/ capacitance (grounded cathode connection)	1331		Cgk	1.30	1.70	pF
			Cgp	1.95	2.35	pF
			Cpk	----	0.04	pF
Power oscillation 4/	1236	Ebb = 150 V dc; Rk/lk = 25 mA dc	Po	20.0	----	mW
Cold resonance 5/ 6/	----		----	----	----	----
<u>Conformance inspection, part 3</u>						
Life test	----	Group C; heater standby; Ef = 6.0 V; no other voltages applied; t = 500 hours	----	----	----	----
Life-test end point :						
Power oscillation	1236		Po	15.0	----	mW

1/ All tests listed under conformance inspection, part 1, shall be performed at the conclusion of the holding period. Acceptance is based upon zero failures.

2/ Constant grid voltage tests will be performed by means of a curve tracer. Anode voltage (eb) shall vary between 0 and 180 V. Limits for constant grid voltages are defined as follows:

eb	Grid voltage = 0 V		Grid voltage = -6 V	
	ib = ma (min)	ib = ma (max)	ib = ma (min)	ib = ma (max)
75 V	10.0	40.0	----	----
150 V	----	----	2.0	33.0
180 V	30.0	80.0	6.0	40.0

TABLE I. Testing and Inspection.

- 3/ Measure in test fixture in accordance with DSCC Drawing D76025.
- 4/ Measure in stalo cavity (magnitostriiction resonator Raytheon part number 401509-1, or equivalent) in accordance with figure 2. The output coupling loops (2) shall be set and locked at the 45° position. Anode supply shall be a well regulated 150 V dc (±5 percent) supply and heater supply shall be a well regulated 6.0 V dc (±0.1 V) supply. The anode current shall be adjusted to be within 20 to 30 mA dc by adjustment of an external cathode bias resistor. Output from one of two coupling loops of the stalo assembly shall be 20.0 mW minimum. All tuning adjustments are to be used to the fullest extent to make the tubes operate in accordance with the requirements. With the AFC control set in the electrical center of its range, and with all tuning rods locked in the position, the power will be measured at 2.67, 2.80, and 2.93 GHz, observing that throughout the tuning range between the limit frequencies the power shall not drop below 20 mW. The maximum cathode current shall not at any time exceed 40 mA dc.
- 5/ Grid-anode resonance. Test in cavity in accordance with DSCC Drawing D76024. Cavity shall resonate at $2,022 \pm 2.0$ MHz with tuning slug in accordance with DSCC Drawing C76022 at $TA = 25 \pm 5^\circ C$.

Grid-cathode resonance. Test in cavity in accordance with DSCC Drawing C76026. Cavity shall resonate at $4,420 \pm 5.0$ MHz with tuning slug in accordance with DSCC Drawing C76022.

When plotted on graphs of resonant frequency versus grid-anode capacitance and resonant frequency versus grid-cathode (input) capacitance, the tube under test shall be represented by a point within a parallelogram whose four corners are located by the following points:

Points	Capacitance (pF)		Frequency (MHz)	
	C-gp	C-gk	F-gp	F-gk
1	1.95	1.3	1,252	1,386
2	1.95	1.3	1,282	1,446
3	2.35	1.7	1,224	1,264
4	2.35	1.7	1,254	1,324

- 6/ All DSCC drawings are available from Defense Supply Center Columbus, DSCC-VAT, Columbus, Ohio 43216-5000.

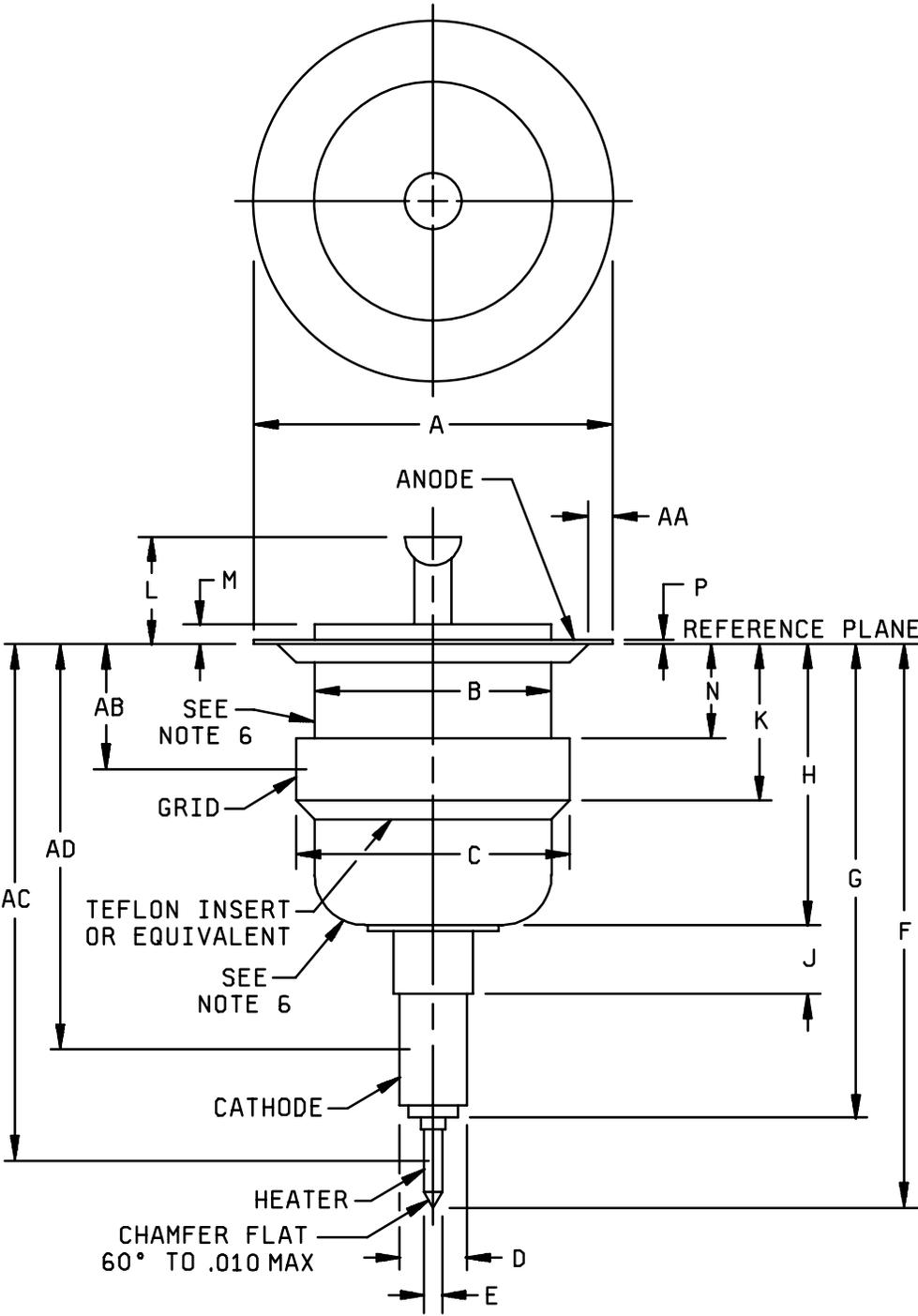


FIGURE 1. Outline drawing of electron tube type 8980.

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LTR	Dimensions				Notes
	Millimeters		Inches		
Conformance inspection, part 2					
	Min	Max	Min	Max	
A	25.15	25.65	0.990	1.010	2
C	18.80	19.05	0.740	0.750	2
D	1.19	1.35	0.047	0.053	2
E	5.00	5.26	0.197	0.207	2
F	34.80	36.32	1.370	1.430	
G	29.21	30.61	1.150	1.205	
K	9.27	11.05	0.365	0.435	
L	19.05	21.59	0.750	0.850	
Conformance inspection, part 3					1
B	16.26	16.76	0.640	0.660	
H	17.14	19.68	0.675	0.775	
J	3.18	4.95	0.125	0.195	
M	1.02	1.90	0.040	0.075	
N	5.08	6.86	0.200	0.270	
P	0.18	0.33	0.007	0.013	
Electrode contact dimensions					5
AA	2.03	----	0.080	----	3, 4
AB	6.98	9.14	0.275	0.360	3, 4
AC	31.24	34.04	1.230	1.340	4
AD	24.89	27.94	0.980	1.100	4

NOTES:

1. Use a sample of 4.
2. Gold plate (note a applies).
3. Eccentricity of contact surfaces shall be gaged from the center line of reference and shall be as follows (note a applies):

<u>Contact surface</u>	<u>TIR maximum</u>	<u>Reference</u>
Anode (A)	0.040 (1.02)	Cathode (E)
Grid (C)	0.020 (0.51)	Cathode (E)

4. Dimensions of contact surfaces shall apply throughout entire contact area.
5. Dimensions in electrode contact area table are for conformance inspection, part 2 purposes only, and are not intended for inspection purposes.
6. This surface shall not be used for clamping or locating.
7. Eccentricity of backup ceramic to anode (A) 0.031 (0.79 mm) maximum; to be measured with EIMAC gage G-2285, or equivalent.

FIGURE 1. Outline drawing of electron tube type 8980 - Continued.

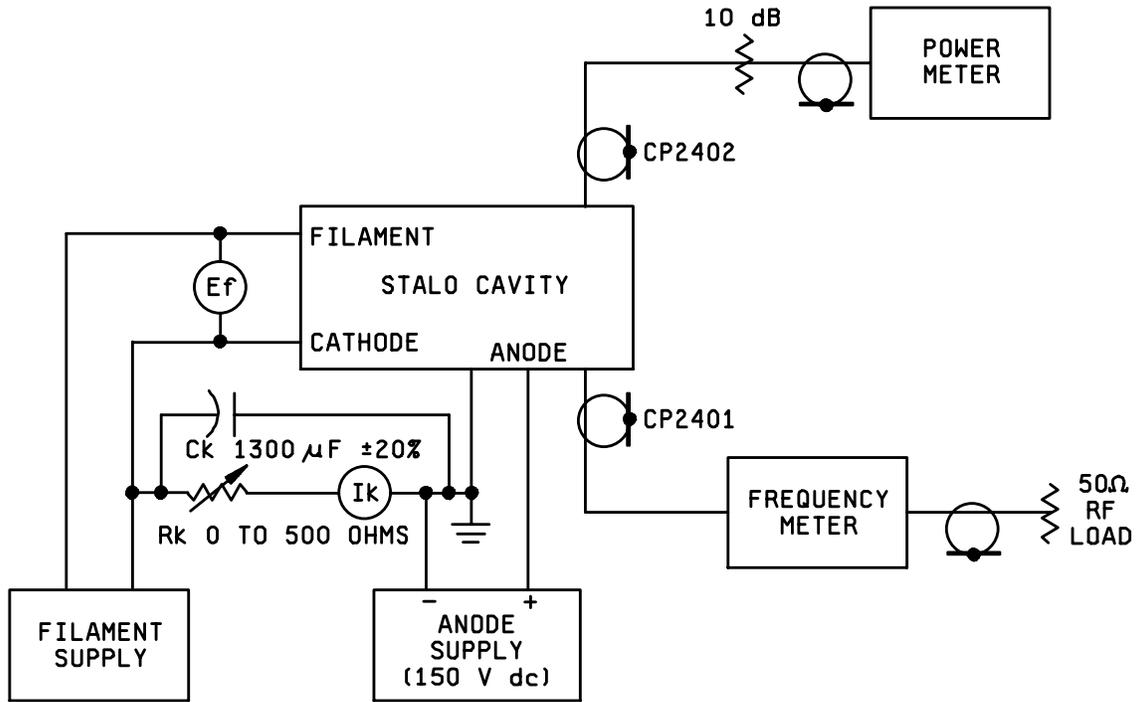


FIGURE 2. Power oscillation test circuit.

Custodians:
Navy - EC
DLA - CC

Preparing activity:
DLA - CC
(Project 5960-3598)