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engineering data service

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5907

MECHANICAL DATA

Bulb	T-3
Base	E8-10, Subminiature Button Flexible Leads
Outline	JETEC 3-1
Basing	8DL
Cathode	Coated Unipotential
Mounting Position	Any

RATINGS[1] (Absolute Maximum)

Impact Acceleration	450 G
Uniform Acceleration	1000 G
Fatigue (Vibrational Acceleration for Extended Periods)	2.5 G
Bulb Temperature	220° C
Altitude	80000 Ft.

ELECTRICAL DATA

HEATER CHARACTERISTICS

	Min.	Bogey	Max.
Heater Voltage[2]	25.2	26.5	27.8 V
Heater Current		45	mA

DIRECT INTERELECTRODE CAPACITANCES

	Shielded[3]	Unshielded
Grid No. 1 to Plate	0.015 Max.	0.03 μμf
Input	4.0	4.0 μμf
Output	3.4	1.9 μμf

RATINGS[1 & 4] (Absolute Maximum)

Plate Voltage	55 Vdc
Grid No. 2 Voltage	55 Vdc
Cathode Current	10.0 mAdc
Grid No. 1 Voltage	
Positive Value	0 Vdc
Negative Value	55 Vdc
Heater-Cathode Voltage	
Heater Positive with Respect to Cathode	100 v
Heater Negative with Respect to Cathode	100 v
Grid No. 1 Circuit Resistance	2.4 Meg

CHARACTERISTICS

Plate Voltage	26.5 Vdc
Grid No. 2 Voltage	26.5 Vdc
Grid No. 1 Resistor	2.2 Meg
Plate Current	2.7 mAdc
Grid No. 2 Current	1.1 mAdc
Transconductance	3000 μmhos
Plate Resistance	100,000 Ohms
Grid No. 1 Voltage for Transconductance = 50 μmhos Max.	-4.5 Vdc

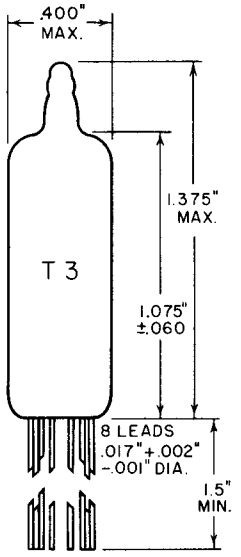
NOTES:

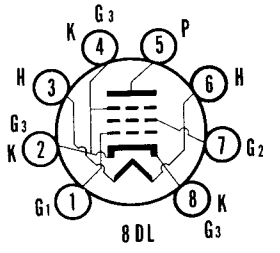
1. *Limitations beyond which normal tube performance and tube life may be impaired.*
2. *Tube life and reliability of performance are directly related to the degree of regulation of the heater voltage to its center rated value of 26.5 volts.*
3. *External shield of 0.405 inch diameter connected to cathode.*
4. *Values shown are as registered with RETMA.*

QUICK REFERENCE DATA

The Premium Subminiature Type 5907 is a remote cutoff pentode designed to operate at a heater, plate and Grid No. 2 voltage of 26.5 volts. It is intended for use as an rf amplifier at frequencies up to 400 mc, as well as many low frequency applications.

The 5907 is designed for dependable operation under conditions of severe shock, vibration, high temperature and high altitude, and is manufactured and inspected to meet the applicable MIL-E-1 specification.





SYLVANIA ELECTRIC PRODUCTS INC.

RADIO TUBE DIVISION
EMPORIUM, PA.

Prepared and Released By The TECHNICAL PUBLICATIONS SECTION EMPORIUM, PENNSYLVANIA

AUGUST, 1957

ACCEPTANCE CRITERIA

Test Conditions

Heater Voltage	26.5 V	Grid No. 2 Voltage	26.5 Vdc
Plate Voltage	26.5 Vdc	Grid No. 1 Resistor	2.2 Meg

For the purposes of inspection, use applicable reliable paragraphs of MIL-E-1 and Inspection Instructions for Electron Tubes.

MIL-E-1 Ref.	Tests	Limits Min.	Limits Bogey	Limits Max.	Units
Production Tests					
4.10.8	Heater Current:	40	45	50	mA
4.10.6.1	Grid Current: Eb = Ec2 = 50 Vdc; Ec1 = −1.5 Vdc; Rg = 0.1 Meg	0	—	−0.3	μAdc
4.10.4.1	Plate Current:	1.7	2.7	3.7	mAdc
4.10.4.3	Grid No. 2 Current:	0	1.1	1.9	mAdc
4.10.9	Transconductance (1): Cg1 = 1 μf	2400	3000	3600	μmhos
Special Design Tests					
4.9.5.3	Subminiature Lead Fatigue:	4	—	—	Arcs
4.9.19.2	Vibration: F = 40 cps; G = 15; Rp = 10,000 Ohms; Cg1 = 1 μf	—	—	30	mVac
4.10.15	Heater-Cathode Leakage: Ehk = +100 Vdc Ehk = −100 Vdc	— —	— —	10 10	μAdc μAdc
4.8	Insulation of Electrodes: Eg1 — All; Ef = 26.5 V	100	—	—	Meg
4.10.3.2	AF Noise: Ebb = 100 Vdc; Ecc2 = 19 Vdc; Rg1 = 2.2 Meg; Rg2 = 1000 Ohms; Rp = 0.2 Meg; Esig = 70 mVac	—	—	17	VU
Design Tests					
4.10.9	Transconductance (2): Ef = 24.0 V; Cg1 = 1 μf	2200	—	—	μmhos
4.10.9	Transconductance (3): Ec1 = −4.5 Vdc; Cg1 = 1 μf	0.1	—	50	μmhos
4.10.10	Plate Resistance: Cg1 = 1 μf	0.065	0.1	—	Meg
4.10.14	Capacitance: 0.405 In. Dia. Shield Tied to Cathode Cg1p Cin Cout	— 3.5 2.9	— 4.0 3.4	0.015 4.5 3.9	μμf μμf μμf

ACCEPTANCE CRITERIA (Continued)

MIL-E-1 Ref.	Tests	Limits Min.	Limits Bogey	Limits Max.	Units
Acceptance Life Tests					
4.9.20.5	Shock: Note 1 Hammer Angle = 30°	—	—	—	
4.9.20.6	Fatigue: Note 1	—	—	—	
- - - - -	Post Shock Test End Points: Vibration	—	—	100	mVac
- - - - -	Post Fatigue Test End Points: Vibration	—	—	75	mVac
- - - - -	Post Shock and Post Fatigue Test End Points: Heater-Cathode Leakage	0	—	20	μAdc
	Transconductance (1)	2100	—	—	μmhos
Degradation Tests					
4.11.7	Heater Cycling Life Test: Ef = 29.0 V; 1 min. on, 4 min. off; Ehk = 140 Vac; Eb = Ec2 = Ec1 = 0; Rg1 = 0	2500	—	—	Cycles
4.11.5	Intermittent Life Test: Note 2 Rg1 = 2.2 Meg; Ehk = +200 Vdc; TA = 175°C	500	—	—	Hours
	Intermittent Life Test End Points: Note 2				
	Transconductance (1)	1500	—	—	μmhos
	Heater-Cathode Leakage	0	—	30	μAdc
	Grid Current	—	—	-0.9	μAdc

ACCEPTANCE CRITERIA NOTES:

1: Acceptance sampling procedure shall be in accordance with the shock test sampling procedure of the Inspection Instructions for Electron Tubes.

2: At the conclusion of the five hundred hour life test, the average life of the life test sample shall be not less than four hundred fifty hours. Life test sample size shall be ten tubes. Provision for release of tubes prior to completion of life test on a reduced basis as specified in 4.3.1.3 Inspection Instructions for Electron Tubes shall not apply.

APPLICATION DATA

The Premium Subminiature Type 5907 is an ultra high frequency pentode designed for operation with 26.5 volts on heater, plate and Grid No. 2. This type may be used with grid-resistor bias to avoid the loss of plate voltage associated with cathode-biasing systems. The tube impedances are lower than those encountered in higher voltage tubes, but this is a natural result of the very low voltages employed. Input and output resistance are plotted as a function of frequency in Figure 1.

These input and output loading effects must be considered in uhf circuit design. As in any uhf pentode, the grid-plate feedback is not primarily dependent on grid-plate capacitance. At uhf the inductances of tube leads will go into resonance with the grid-plate capacitance, thereby effecting complete neutralization within the tube at some frequency. This self-neutralization point in the 5907 is approximately 200 megacycles. At higher frequencies the feedback is inductive, and takes place primarily through the tube leads.

The importance of short leads cannot be overemphasized in the application of the Type 5907 to uhf. The careful reduction of coupling effects within the tube may be nullified if sufficient capacitance and mutual inductance exist in wiring external to the tube.

The three cathode leads provided in the 5907 allow isolation of the input and output circuit returns. Two of the three leads can be used to best advantage in the input circuit return, to provide the high input impedance shown in Figure 1.

A power gain of approximately 2 can be obtained in a proper circuit at 400 megacycles. Progressively better performance can be obtained at lower frequencies. In a single stage with matched input and output, the power gain can be expressed as

$$\text{Power Gain} = \left[\frac{gm\sqrt{Rinput \times Routput}}{2}\right]^2$$

This applies only to the higher frequency ranges, where circuit impedances are relatively high in comparison with tube impedances and can be neglected.

APPLICATION DATA (Continued)

The 5907 is manufactured and inspected to meet the applicable MIL-E-1 specifications for reliability.

Life expectancy is described by the life tests, specified on the attached pages and/or individual MIL-E-1 specifications. The actual life expectancy of the tubes in an operating circuit is affected by both the operating and environmental conditions involved. Likewise, the life tests specified indicate performance under certain operating criteria to a set of specified end points. Performance at conditions other than those specified can usually be estimated only roughly as giving better or poorer life expectancy.

When operated under conditions common to on-off control applications the tube exhibits freedom from the development of interface resistance. The heater-cathode construction is designed to withstand intermittent operation.

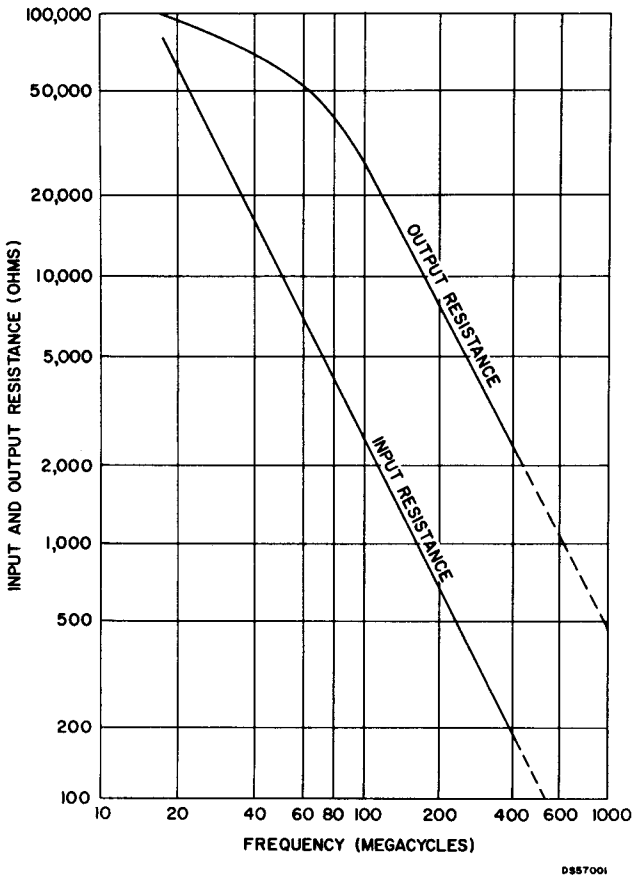
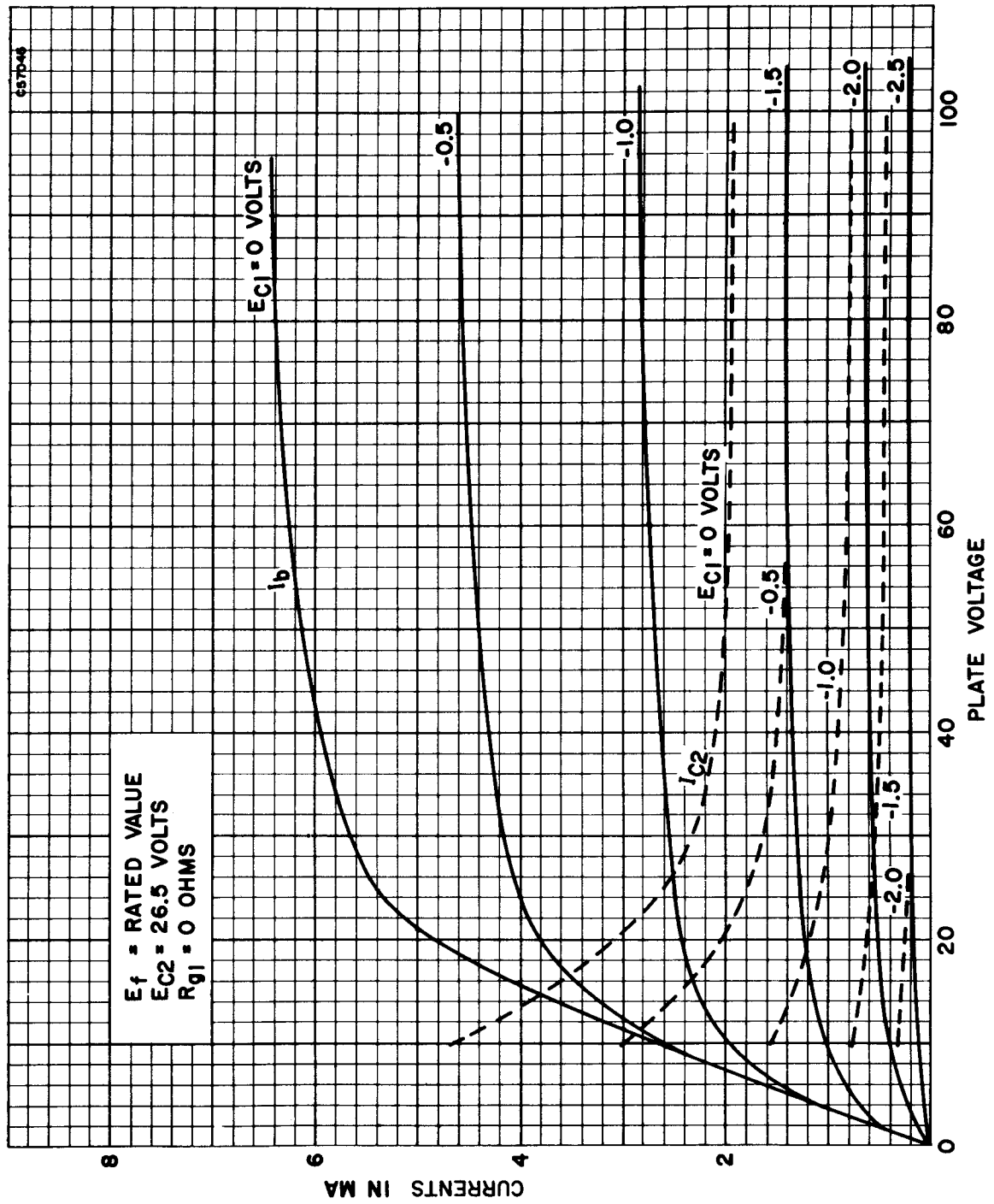


Figure 1—Input and output resistance vs frequency

AVERAGE PLATE CHARACTERISTICS



AVERAGE TRANSFER CHARACTERISTICS