SYLVANIA

engineering data service

5904

MECHANICAL DATA

Bulb	T-3
Base	E8-10, Subminiature Button Flexible Leads
Outline	JETEC 3-1
Basing	8DK
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 (Unshielded)

Grid to Plate	1.8 μμf
Input	2.2 μμf
Output	0.8 μμf

RATINGS[1 & 3] (Absolute Maximum)

Plate Voltage	55 Vdc
Grid Current	8.5 mAdc
Plate Current	22 mAdc
Heater-Cathode Voltage	
Heater Positive with Respect to Cathode	100 v
Heater Negative with Respect to Cathode	100 v

CHARACTERISTICS

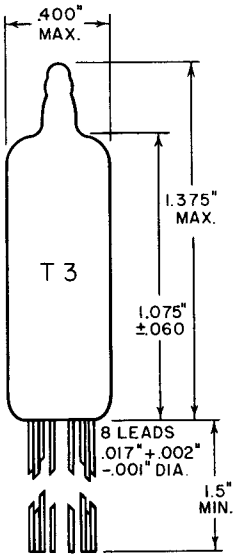
Plate Voltage	26.5 Vdc
Grid Resistor	2.2 Meg
Plate Current	3.0 mAdc
Amplification Factor	20
Transconductance	5000 μmhos
Grid Voltage for Ib = 50 μAdc Max.	-3.5 Vdc

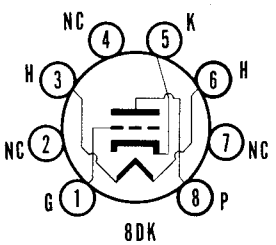
NOTES:

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. *Values shown are as registered with RETMA.*

QUICK REFERENCE DATA

The Premium Subminiature Type 5904 is a medium-mu, high perveance triode designed for use as an amplifier or oscillator, with 26.5 volts on both the plate and the heater. It is intended for operation under conditions of severe shock, vibration, high temperature and high altitude. The Sylvania Type 5904 is manufactured and inspected to meet the applicable MIL-E-1 specification for reliable operation.





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
Plate Voltage . . . . . 26.5 Vdc
Grid 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 = 50 Vdc; Ec = −1.5 Vdc; Rg = 0.1 Meg	0	—	−0.5	μAdc
4.10.4.1	Plate Current (1):	1.5	3.0	4.5	mAdc
4.10.9	Transconductance (1): Cg = 1 μf	3500	5000	6500	μmhos
Special Design Tests					
4.9.5.3	Subminiature Lead Fatigue:	4	—	—	arcs
4.9.19.2	Vibration: Ep F = 40 cps; G = 15; Rp = 10,000 Ohms; Cg = 1 μf	—	—	50	mVac
4.10.15	Heater-Cathode Leakage: Ehk = +100 Vdc	0		10	μAdc
	Ehk = −100 Vdc	0		10	μAdc
4.8	Insulation of Electrodes: Eg to All = −100 Vdc; Ef = 26.5 V	100	—	—	Meg
4.10.3.2	AF Noise: Ebb = 50 Vdc; Rg = 2.2 Meg; Rp = 10,000 Ohms; Esig = 50 mVac	—	—	16	VU
Design Tests					
4.10.4.1	Plate Current (2): Ec = −3.5 Vdc; Rg = 0 Ohms	—	—	50	μAdc
4.10.11.1	Amplification Factor: Cg = 1 μf	16	20	24	
4.10.9	Transconductance (2): Ef = 24.0 V; Cg = 1 μf	3250	—	—	μmhos
4.10.14	Capacitance: No Shield Cgp	1.2	—	2.4	μμf
	No Shield Cin	1.6	—	2.8	μμf
	No Shield Cout	0.6	—	1.0	μμf
4.10.2.2	Power Oscillation: Po F = 400 Mc; Eb = 26.5 Vdc; Rg/Ib = 20 mAdc	50	—	—	mW
Degradation Tests					
4.9.20.5	Shock: Note 1 Hammer Angle = 30°	—	—	—	
4.9.20.6	Fatigue: Note 1	—	—	—	
-----	Post Shock Test End Points: Vibration	—	—	200	mVac
-----	Post Fatigue Test End Points: Vibration	—	—	100	mVac
-----	Post Shock and Fatigue Test End Points Heater-Cathode Leakage	0	—	20	μAdc
	Transconductance	3300	—	—	μmhos

ACCEPTANCE CRITERIA (Continued)

MIL-E-1 Ref.	Tests	Limits			Units
		Min.	Bogey	Max.	
Acceptance Life Tests					
4.11.7	Heater Cycling Life Test: Ef = 29.0 V; Eb = Ec = 0 V; Rg = 0 Ohms; Ehk = 140 Vac One min. On, four min. Off	2500	—	—	Cycles
4.11.5	Intermittent Life Test: Note 2 Rg = 2.2 Meg; Ehk = +200 Vdc; TA = 175°C	500	—	—	Hours
4.11.4	Intermittent Life Test End Points:				
	Transconductance (1)	2600	—	—	μmhos
	Heater-Cathode Leakage	0	—	30	μAdc
	Grid Current	—	—	-1.5	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 group 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 Par. 4.3.1.3 of the Inspection Instructions for Electron Tubes shall not apply.

APPLICATION DATA

The Premium Subminiature Type 5904 is a high gm, medium mu triode manufactured and inspected to meet the applicable MIL-E-1 specification and provide reliable operation under conditions of severe shock, vibration, high temperature, and high altitude.

The Type 5904 is particularly well suited to application as an oscillator at frequencies through 400 megacycles and is designed to operate with 26.5 volts applied to the heater and plate. The 5904 is also suited to many low frequency applications. Resistance coupled amplifier data is shown in the accompanying table and circuit.

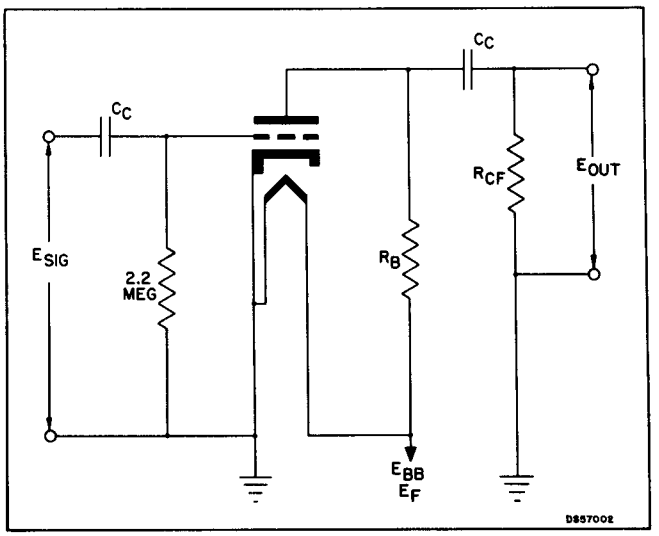
Life expectancy is described by the life tests, specified on the attached pages and/or individual MIL-E-1 specifications. The actual life expectancy of the tubes in an operating circuit is affected by both the operating and environmental conditions involved. Likewise, the life tests specified indicate 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 poor 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.

RESISTANCE COUPLED AMPLIFIER DATA
ZERO-BIAS OPERATION

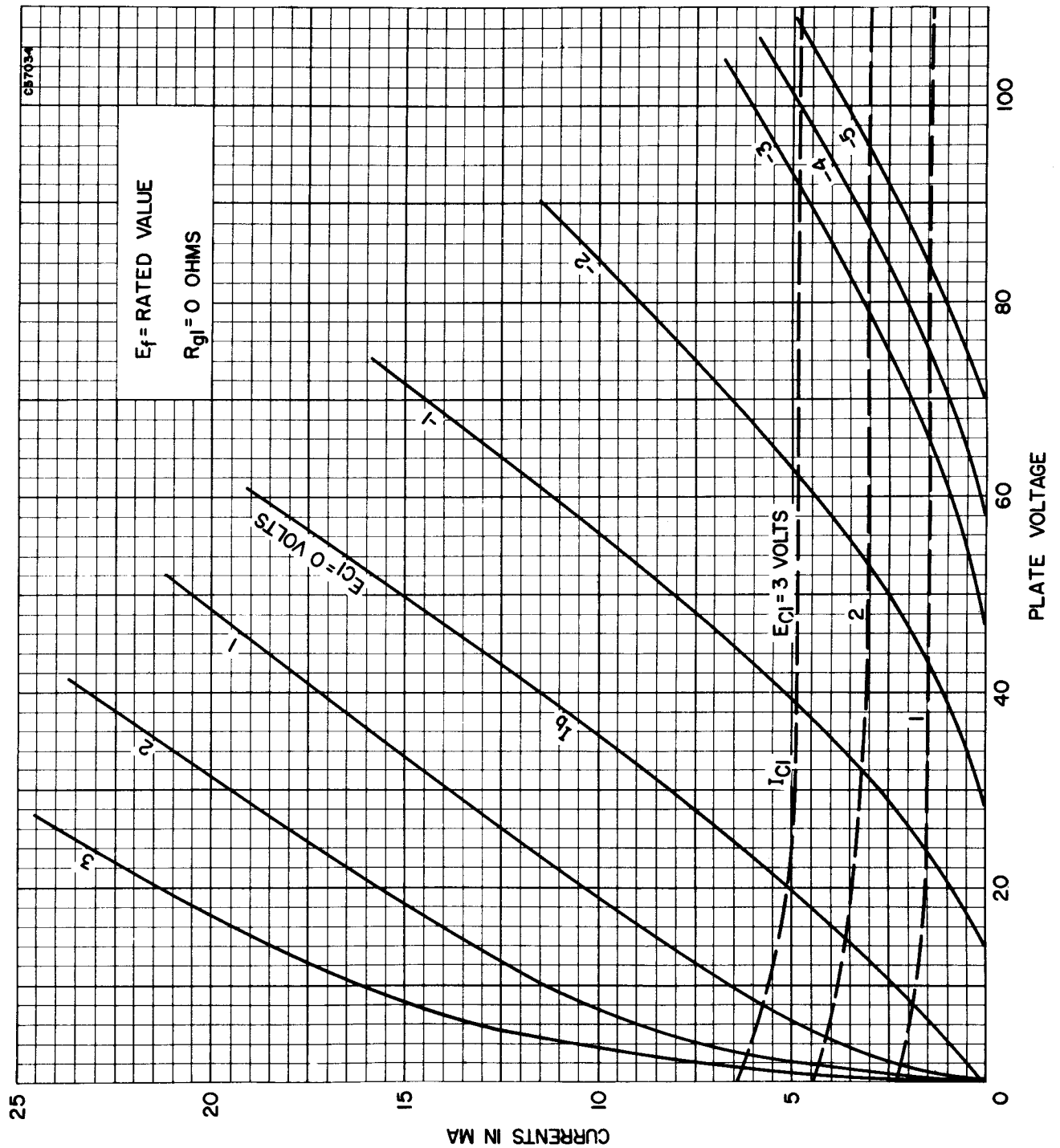
Ef = Ebb (volts)	21.0		26.5		30.0	
Rb (megohms)	0.022	0.1	0.022	0.1	0.022	0.1
Ib (ma)	0.380	0.124	0.580	0.174	0.700	0.206
Eb (volts	12.6	8.6	13.7	9.1	14.6	9.4
Rcf (megohms)	2.0	2.0	2.0	2.0	2.0	2.0
Esig (volts, rms)	0.1	0.1	0.1	0.1	0.1	0.1
Eout (volts, rms)	1.05	1.15	1.1	1.2	1.21	1.25
Gain	10.5	11.5	11.0	12.0	12.1	12.5
% Distortion	2.5	1.5	1.9	1.0	1.6	0.8
Esig* (volts, rms)	0.18	0.30	0.25	0.41	0.30	0.49
Eout (volts, rms)	1.75	3.15	2.6	4.5	3.32	5.5
Gain	9.7	10.5	10.4	11.0	11.1	11.2
% Distortion	4.8	4.8	4.8	4.8	4.9	5.0

*Maximum Signal for 5% Distortion.

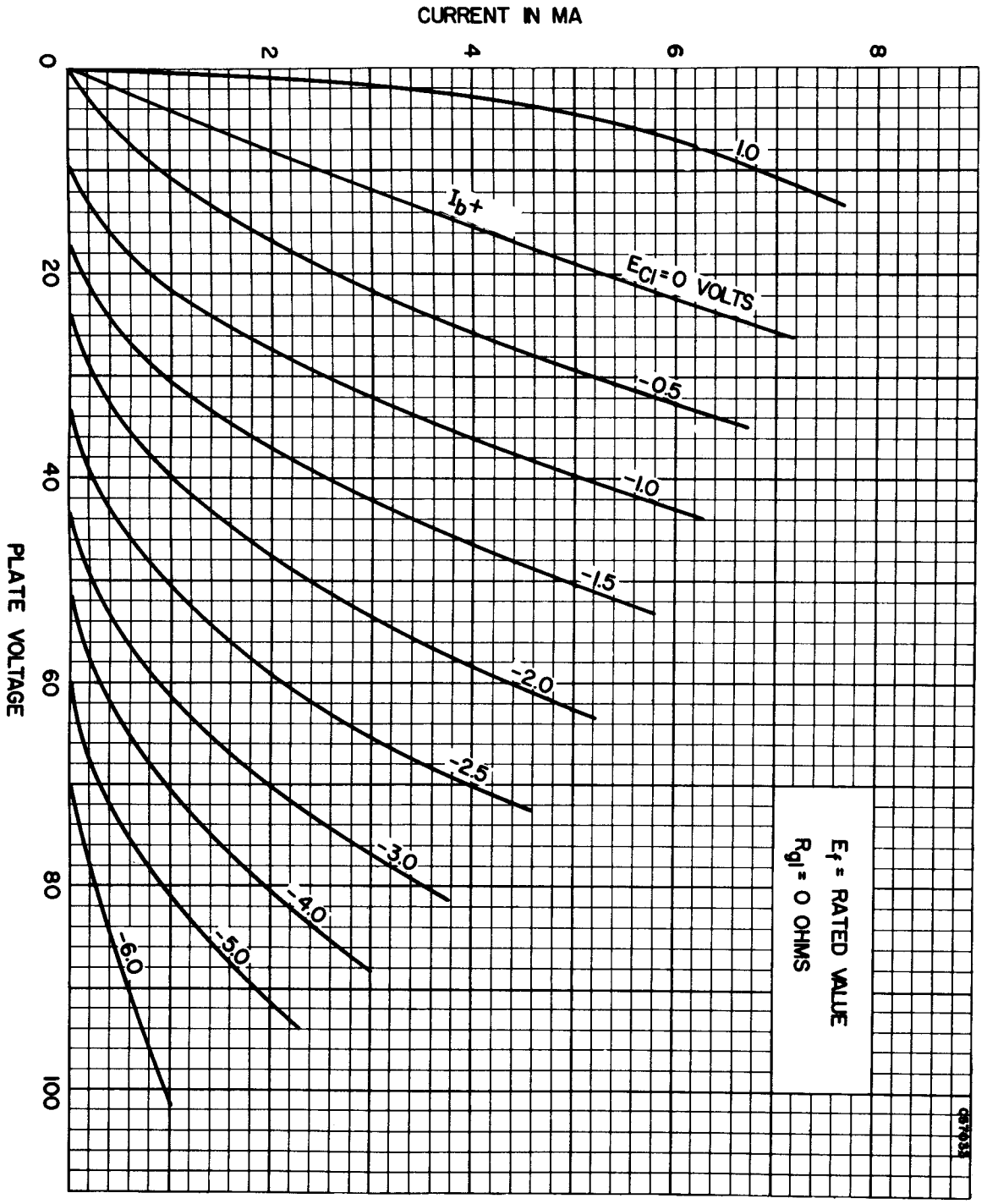


Resistance coupled amplifier circuit

AVERAGE PLATE CHARACTERISTICS



AVERAGE PLATE CHARACTERISTICS



AVERAGE TRANSFER CHARACTERISTICS