

MECHANICAL DATA

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

RATINGS¹ (Absolute Maximum)

Impact Acceleration	450 G
Uniform Acceleration	1000 G
Fatigue (Vibrational Acceleration for Extended Periods)	2.5 G
Bulb Temperature	220° C
Altitude ²	60000 Ft.

ELECTRICAL DATA

HEATER CHARACTERISTICS

	Min.	Bogey	Max.
Heater Voltage ³	25.2	26.5	27.8 V
Heater Current		75	mA

DIRECT INTERELECTRODE CAPACITANCES (Shielded)⁴

Plate to Plate: (1p to 2p)	0.026 μ f	Max.
Plate to Section No. 1: 1p to (h+1k+i.s.+e.s.)	3.0 μ f	
Plate to Section No. 2: 2p to (h+2k+i.s.+e.s.)	3.0 μ f	
Cathode to Section No. 1: 1k to (h+1p+i.s.+e.s.)	4.2 μ f	
Cathode to Section No. 2: 2k to (h+2p+i.s.+e.s.)	4.2 μ f	

RATINGS^{1,5} (Absolute Maximum)

Plate Supply Voltage (Each Plate)	165 Vac
Peak Inverse Plate Voltage ⁶	460 v
Steady State Peak Plate Current (Each Plate)	60 ma
Transient Peak Plate Current	350 ma
Output Current (Each Plate)	10 mAdc
Heater-Cathode Voltage ⁶	
Heater Positive with Respect to Cathode	360 V
Heater Negative with Respect to Cathode	360 V

CHARACTERISTICS

Tube Voltage Drop for Ib=18 mAdc (Each Plate)	4.5 Vdc
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TYPICAL OPERATION

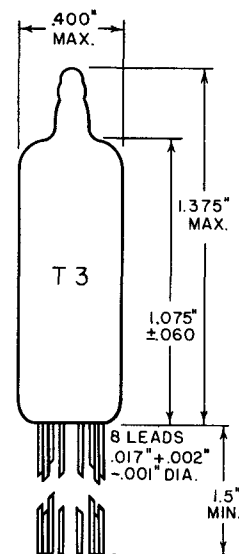
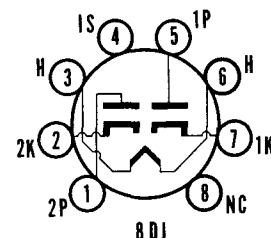
Full-Wave Rectifier—Capacitor Input	
Plate Supply Voltage (rms per plate)	165 Vac
Total Plate Supply Impedance (per plate)	300 Ohms
Load Resistance	11000 Ohms
Output Current (full-wave)	18 mAdc
Filter Input Capacitor	8 μ f

NOTES:

1. Limitations beyond which normal tube performance and tube life may be impaired.
2. If altitude rating is exceeded, reduction of instantaneous voltage (Ef excluded) may be required.
3. 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.
4. External shield of 0.405 inch diameter connected to heater.
5. Values shown are as registered with RETMA.
6. The maximum voltage appearing between any pair of leads shall be no greater than the maximum peak inverse plate voltage.

QUICK REFERENCE DATA

The Premium Subminiature Type 5903 is a high perveance double diode having separate cathode connections for each section and a 26.5 volt, 75 ma heater. Electrically this type is otherwise identical to the Type 5896. It is designed for use in detector applications at UHF as well as low frequencies. This type is intended for operation under conditions of severe shock, vibration, high temperature and high altitude. The Sylvania Type 5903 is manufactured and inspected to meet the applicable specifications for reliable operation.



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ACCEPTANCE CRITERIA

Test Conditions

Heater Voltage 26.5 V
 Plate Supply Voltage Per Plate 165 Vac

Load Resistance 11000 Ohms
 Load Capacitance 8 μ f

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

MIL-E-1 Ref.	Tests	Limits			Units
		Min.	Bogey	Max.	
Production Tests					
4.10.8	Heater Current:.....	70	75	80	mA
4.10.1.1	Emission; Diode No. 1: E1b = 10 Vdc.....	30	—	—	mA _{dc}
4.10.1.1	Emission; Diode No. 2: E2b = 10 Vdc.....	30	—	—	mA _{dc}
4.10.4.1	Plate Current; Diode No. 1: Ebb = 0 V; R _p = 40,000 Ohms.....	5	—	25	μA _{dc}
4.10.4.1	Plate Current; Diode No. 2: Ebb = 0 V; R _p = 40,000 Ohms.....	5	—	25	μA _{dc}
----	Plate Current Difference Between Diodes:.....	0	—	5	μA _{dc}
4.10.13	Operation: Note 2 Ehk = E _o + 117 Vac; So phased that Ef and 117 Vac Subtract.....	16	—	—	mA _{dc}
Special Design Tests					
4.9.5.3	Subminiature Lead Fatigue:.....	4	—	—	Arcs
4.10.15	Heater-Cathode Leakage; Diode No. 1: Ehk = +360 Vdc.....	0	—	40	μA _{dc}
	Ehk = — 360 Vdc.....	0	—	40	μA _{dc}
4.10.15	Heater-Cathode Leakage; Diode No. 2: Ehk = +360 Vdc.....	0	—	40	μA _{dc}
	Ehk = —360 Vdc.....	0	—	40	μA _{dc}
4.8	Insulation of Electrodes: Ef = 26.5 V.....	100	—	—	Meg
Design Tests					
4.10.14	Capacitance: Tests made with 0.405 in. dia. shield tied to heater.				
	1p to 2p.....	—	—	0.026	μμf
	1p to h + 1k + sd.....	2.5	—	3.5	μμf
	2p to h + 2k + sd.....	2.5	—	3.5	μμf
	1k to h + 1p + sd.....	3.5	—	4.9	μμf
	2k to h + 2p + sd.....	3.5	—	4.9	μμf
Degradation Tests					
4.9.20.5	Shock: Note 1 Hammer Angle = 30°				
4.9.20.6	Fatigue: Note 1				
----	Post Shock and Fatigue Test End Points				
	Heater-Cathode Leakage.....	0	—	80	μA _{dc}
	Operation.....	14	—	—	mA _{dc}

ACCEPTANCE CRITERIA (Continued)

MIL-E-I Ref.	Tests	Limits			Units
		Min.	Bogey	Max.	
Acceptance Life Tests					
4.11.7	Heater Cycling Life Test: Ef = 29.0 V, E1b = E2b = 0 V; Ehk = 140 Vac; One min. On, four min. Off.....	2500	—	—	Cycles
4.11.5	Intermittent Life Test (1); Notes 3 & 4 TA = 175° C; Ehk = Eo + 117 Vac.....	500	—	—	Hours
4.11.4	Intermittent Life Test End Points (1): Operation Heater-Cathode Leakage; Diode No. 1 Heater-Cathode Leakage; Diode No. 2	14 0 0	— — —	— 120 120	mAdc μAdc μAdc
Qualification Test					
4.10.7.4	Resonant Frequency: Length	14.65	—	—	cm

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: In a full-wave circuit, adjust Zp such that a tube having Etd = 10 Vdc at 50 mAdc per plate gives Io equal to 18 mAdc.
- 3: 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.
- 4: Full-wave circuit. In life test operation, the values of RL and CL given in the test conditions shall be considered as approximate and shall be adjusted initially to give Io equal to or greater than 18 mAdc with Ib equal to or greater than 50 milliamperes.

Life test sample size shall be five 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 5903 is a high performance subminiature double diode employing a 26.5 volt, 75 ma heater. The 5903 is otherwise identical to the Type 5896. Separate cathode connections permit independent operation of each section. It is particularly useful in a variety of detector applications including discriminators or ratio detectors at uhf as well as low frequencies.

The resonant frequency of each diode section is greater than 900 megacycles, making the type applicable to use in automatic frequency control discriminator circuits in the uhf region. The line length in push-pull applications of this nature is plotted against frequency in Figure 1.

In critical detector applications, a reduction in hum output and contact potential voltage may be realized by lowering the operating heater voltage. Such a reduction will, however, result in a plate characteristic curve which departs from that obtained with rated heater voltage, Figure 2. With practical values of reduced heater voltage, hum output may be lowered by as much as 60% and contact potential by 20 to 30%. Operation under these conditions is satisfactory, providing the current requirements are consistent with values normally encountered in low level detection. An alternative method

of lowering hum output and contact potential is to bias the heater with respect to the cathode.

The 5903 is also useful in clamping and gating applications.

The 5903 is intended for operation under conditions of severe shock, vibration, high altitude and high temperature and is manufactured and inspected to meet the applicable MIL-E-1 specification 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.

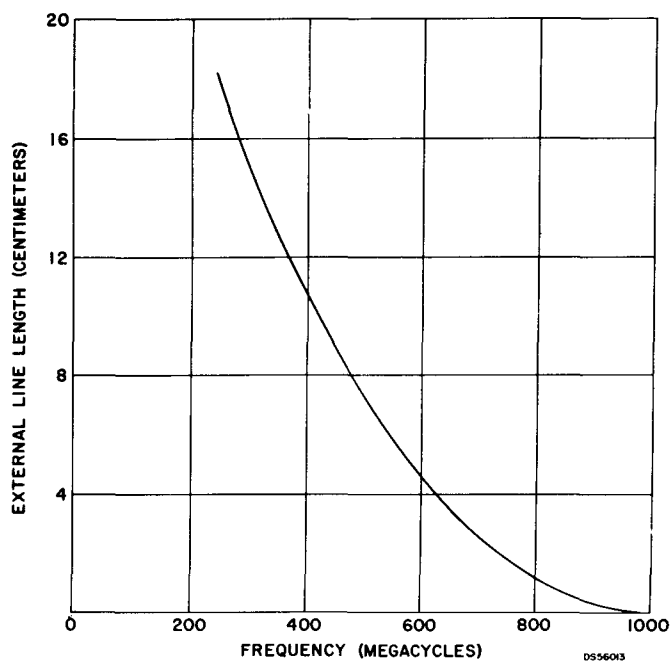


Figure 1—Approximate resonant-line length vs frequency

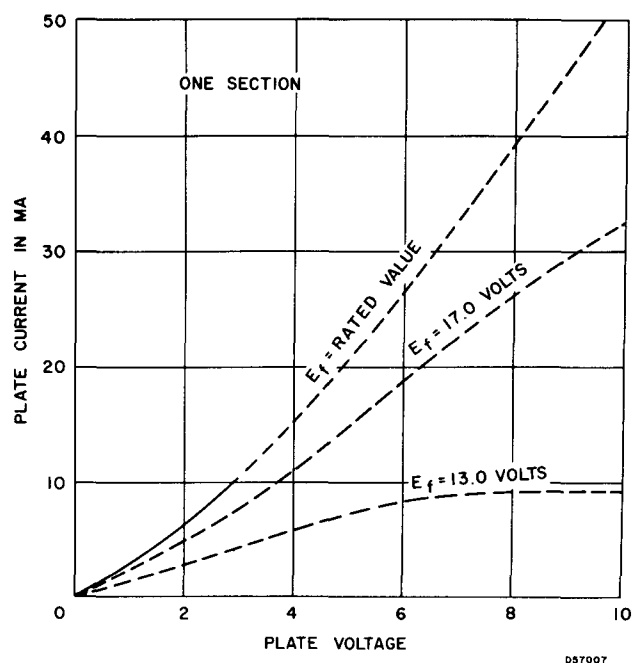
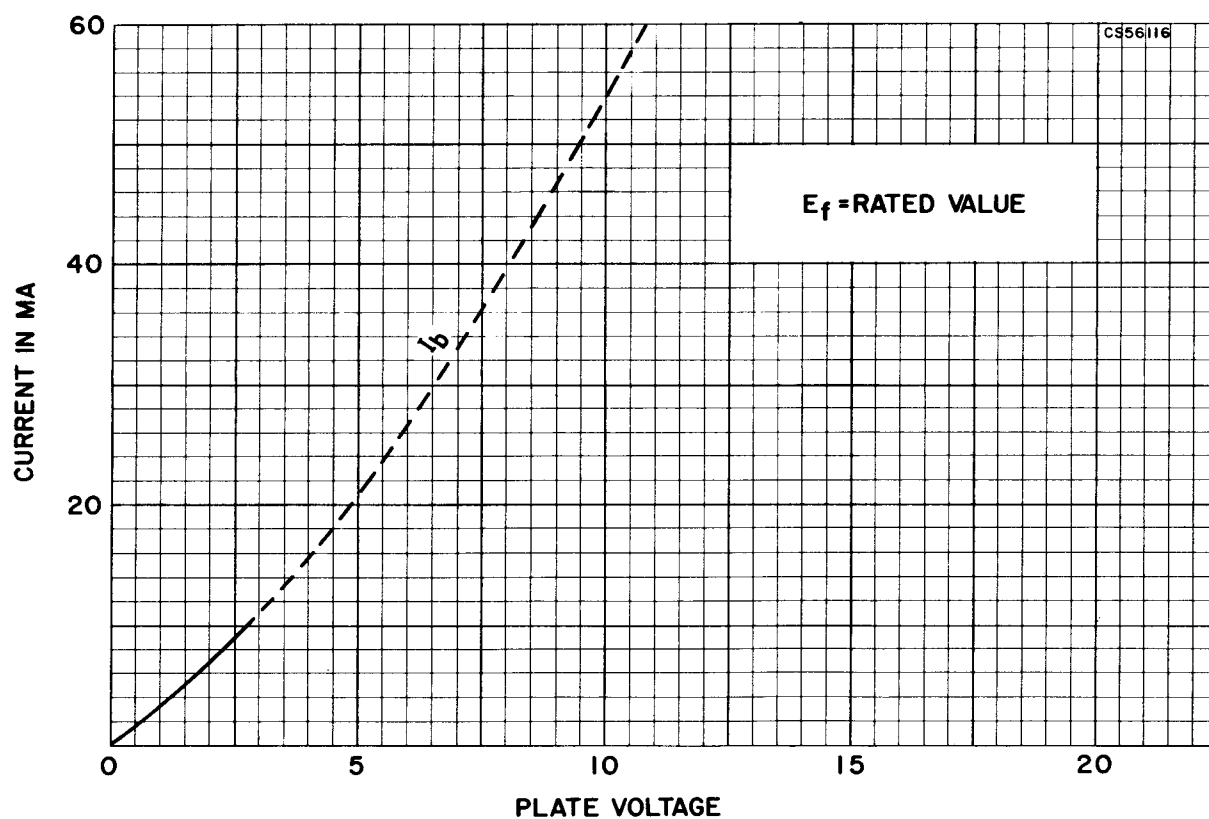


Figure 2—Approximate plate characteristics at reduced heater voltage

AVERAGE PLATE CHARACTERISTICS
(EACH SECTION)



AVERAGE CHARACTERISTICS
(EACH SECTION)

