SYLVANIA GUIDED MISSILE TUBES

6945

MECHANICAL DATA

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

RATINGS[1] (Absolute Maximum)

Bulb Temperature	250 C°
Altitude[2]	80,000 Ft.
Radiation	
Total Dosage (*S* neutrons/sq. cm/sec.)	10^{16} nvt
Dose Rate (neutrons/sq. cm/sec.)	10^{12} nv

DURABILITY CHARACTERISTICS

Impact Acceleration (¾ msec Duration)	450 G	Max.
Fatigue (Vibrational Acceleration for Extended Periods)	10 G	Max.

FAILURE RATE RATING

Class (1) — Inoperatives	1.3%/200 Hours
Class (2) — All end points	5.4%/200 Hours
Class (3) — All end points	2.7%/200 Hours

ELECTRICAL DATA

HEATER CHARACTERISTICS

Heater Voltage[3]	6.3 V
Heater Current	350 mA

DIRECT INTERELECTRODE CAPACITANCES (Shielded)[4]

Grid No. 1 to Plate	0.13 μμf	Max.
Input	5.0 μμf	
Output	5.5 μμf	

RATINGS[1] (Absolute Maximum)

Heater Voltage[3]	6.3 (−12, + 10%) V
Plate Voltage	250 Vdc
Peak-Plate Forward Voltage[5]	360 v
Grid No. 2 Voltage	150 Vdc
Plate Dissipation	3.0 W
Grid No. 2 Dissipation	0.33 W
Cathode Current	40 mAdc
DC Grid No. 1 Voltage	
Positive Value	0 Vdc
Negative Value	55 Vdc
Heater-Cathode Voltage	
Heater Positive with Respect to Cathode	200 v
Heater Negative with Respect to Cathode	200 v
Grid No. 1 Circuit Resistance	0.5 Meg

AVERAGE CHARACTERISTICS

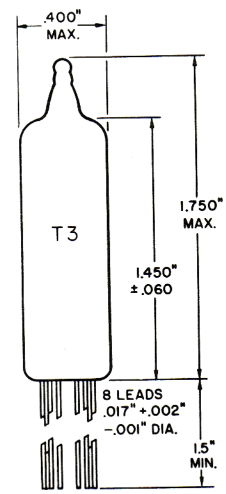
	Triode Connected	Pentode Connected
Plate Voltage	100	100 Vdc
Grid No. 2 Voltage	100	100 Vdc
Cathode Bias Resistor	270	270 Ohms
Plate Current	26	25 mAdc
Grid No. 2 Current	—	1.5 mAdc
Transconductance	3700	3500 μmhos
Amplification Factor	5.0	—
Plate Resistance (Approx.)	1500	20,000 Ohms
Ec1 for Ib = 35 μa Max.		−40 Vdc

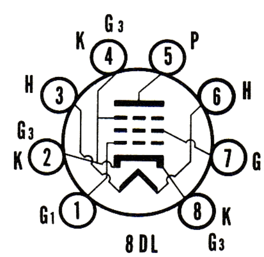
QUICK REFERENCE DATA

The Sylvania Premium Subminiature Type 6945 is a beam power pentode designed specifically for guided missile service.

This type is characterized by extraordinary freedom from interelement short circuits of short term duration, by high resistance to interelement leakage, and by stable performance. It is designed for service at high altitudes and where severe conditions of mechanical shock, vibration and high temperature are encountered.

The 6945 is manufactured and inspected to meet the applicable specification for reliable operation.





sylvania electronic tubes

A Division of Sylvania Electric Products Inc.

CHARACTERISTICS AND TYPICAL OPERATION

Class A1 Amplifier (Single Tube)

	Triode Connected		Pentode Connected	
Plate Voltage	150	250	150	Volts
Grid No. 2 Voltage	—	—	110	Volts
Cathode Resistor	680	2700	470	Ohms
Peak AF Grid No. 1 Voltage	16.3	38.2	10.6	Volts
Zero-Signal Plate Current	23.8	14.2	21.5	Ma
Max.-Signal Plate Current	25.3	15.5	20.5	Ma
Zero-Signal Grid No. 2 Current	—	—	0.8	Ma
Max.-Signal Grid No. 2 Current	—	—	3.23	Ma
Load Resistance	2200	6000	7000	Ohms
Max.-Signal Power Output	0.43	0.94	1.22	Watts
Total Harmonic Distortion (Approx.)	11.0	16.7	11.0	Percent

TWO TUBES IN PUSH-PULL

	Class A1		Class AB2	
Plate Voltage	150	200	185	Volts
Grid No. 2 Voltage	110	125	110	Volts
Grid No. 1 Voltage	—	—	−15	Volts
Cathode Resistor	270	560	—	Ohms
Peak AF Grid to Grid Voltage	21.2	39.6	31.2	Volts
Zero-Signal Plate Current	37.5	27.0	26.7	Ma
Max.-Signal Plate Current	38.0	31.6	46.0	Ma
Zero-Signal Grid No. 2 Current	1.35	0.8	0.67	Ma
Max.-Signal Grid No. 2 Current	4.67	4.30	5.90	Ma
Load Resistance (Plate to Plate)	12,000	13,000	10,000	Ohms
Max.-Signal Power Output	2.42	3.41	4.76	Watts
Total Harmonic Distortion (Approx.)	4.1	4.9	1.02	Percent

NOTES:

1. *Limitations beyond which normal tube performance and tube life may be impaired.*
2. *If altitude rating is exceeded, reduction of instantaneous voltages (Ef excluded) may be required.*
3. *Tube life and reliability of performance are directly related to the degree of regulations of the heater voltage to its center rated value of 6.3 volts. The Min. and Max. values are 5.5 and 6.9 volts respectively.*
4. *External shield No. 318 connected to cathode.*
5. *MIL-E-1D Par. 6.5.1.1 does not apply. Peak voltage shown should not be exceeded.*

ACCEPTANCE CRITERIA

Test Conditions

Heater Voltage	6.3 V	Grid No. 2 Voltage	100 Vdc
Plate Voltage	100 Vdc	Heater-Cathode Voltage MIL-E-1 Par. 3.2.26.1	0 V
Grid No. 1 Voltage	0 V	Cathode Resistor MIL-E-1 Par. 3.2.26.1	270 Ohms

For the purposes of inspection, use applicable reliable paragraphs of MIL-E-1.

MIL-E-1 Ref.	Test	AQL (%)	Limits — Note 2					Units
			Min.	LAL	Bogey	UAL	Max.	
Measurements Acceptance Tests, Part 1, Note 1								
4.10.8	Heater Current	0.65	330	—	350	—	370	mA
4.10.15	Heater-Cathode Leakage	0.65	—	—	—	—	—	
	Ehk = +100 Vdc	—	—	—	—	—	10	μAdc
	Ehk = −100 Vdc	—	—	—	—	—	10	μAdc
4.10.6.1	Grid Current:							
	Rg1 = 0.5 Meg	0.65	0	—	—	—	−1.0	μAdc
4.10.4.1	Plate Current (1): ALD = 5.2	—	—	22.8	25	27.2	—	mAdc
4.10.4.1	Plate Current (1):	0.65	19	—	—	—	31	mAdc
4.10.4.1	Plate Current (2):							
	Ec1 = −40 Vdc; Rk = 0 Ohms	0.65	—	—	—	—	35	μAdc
4.10.16.1	Power Output (1): Po							
	Esig = 6.4 Vac; Rp = 3000 Ohms; Ck = 1000 μf	0.65	0.50	—	0.80	—	—	W
4.7.5	Continuity and Shorts (Inoperatives):	0.4	—	—	—	—	—	
4.9.1.1	Mechanical:							
	Envelope JEDEC 3-3	—	—	—	—	—	—	

ACCEPTANCE CRITERIA (Continued)

MIL-E-1 Ref.	Test	AQL (%)	Limits — Note 2 Min.	LAL	Bogey	UAL	Max.	Units
Measurements Acceptance Tests, Part 2								
4.8.2	Insulation of Electrodes:	2.5	—	—	—	—	—	
	Eg1-all = –100 V	—	100	—	—	—	—	Meg
	Ep-all = –300 V	—	100	—	—	—	—	Meg
	Eg2-all = –200 V	—	100	—	—	—	—	Meg
4.10.9	Transconductance (1): ADL = 600 Sm	—	—	3240	3500	3760	—	μmhos
4.10.9	Transconductance (1):	2.5	2900	—	—	—	4100	μmhos
4.10.9	Transconductance (2):							
	Ef = 5.5 V	2.5	—	—	—	—	15	%
4.10.4.3	Screen Grid Current:	2.5	—	—	1.5	—	3.0	mAdc
4.10.6.2	Grid Emission (Ic1): Notes 3 and 4							
	Ef = 7.5 V; Ec1 = –40 Vdc; Rg1 = 0.5 Meg; RK = 0	2.5	0	—	—	—	–2.0	μAdc
4.10.3.2	AF Noise: Note 5							
	Esig. (Cal.) = 150 mVac; Ec1 = –7.2 Vdc; Rg1 = 0.5							
	Meg; Rg2 = 0.1 Meg; Rp = 2000 Ohms; Rk = 0;							
	Cg2 = 4 μf	2.5	—	—	—	—	—	
4.10.11.1	Amplification Factor: Note 6	6.5	4.0	—	5.0	—	6.0	
4.10.9	Transconductance (3): Note 6	6.5	3200	—	3700	—	4100	μmhos
4.10.4.1	Plate Current (3): Note 6	6.5	20	—	26	—	32	mAdc
- - - -	Hum: Note 7							
	Ef =6.3 Vac @ 400 cps;							
	Eb = Ec1 = Ec2 = 0; Rk = 1000 Ohms	2.5	—	—	—	—	15	mv pk-pk
- - - -	Operation Time: Note 8	6.5	—	—	—	—	25	Secs.
4.10.10	Plate Resistance	6.5	.013	—	.020	—	—	Meg
4.10.14	Capacitance: Shield No. 318	6.5	—	—	—	—	—	
	Cg1p	—	—	—	—	—	0.13	μμf
	Cin	—	3.8	—	5.0	—	6.2	μμf
	Cout	—	4.5	—	6.0	—	7.5	μμf
4.9.12.1	Low Pressure Voltage Breakdown: Note 9							
	Presure = 21 ±2 mm Hg; Voltage = 300 Vac	6.5	—	—	—	—	—	
4.9.19.1	Vibration (1):							
	Rp = 2,000 Ohms; Ck = 1000 μf;							
	F = 40 cps; G = 10	1.0	—	—	—	—	60	mVac
- - - -	White Noise Vibration: Notes 10 and 11							
	Rp = 2,000 Ohms; Ck = 1000 μf	2.5	—	—	—	300	550	mv pk-pk
	Peak Acceleration = 15 G	2.5	—	—	—	40	60	mVac
Degradation Rate Acceptance Tests, Note 4								
4.9.5.3	Subminiature Lead Fatigue	2.5	4	—	—	—	—	arcs
4.9.20.5	Shock: Note 12							
	Hammer Angle = 30°;	20	—	—	—	—	—	
4.9.20.6	Fatigue: Notes 9 and 13							
	G = 10; Variable Frequency;	6.5	6	—	—	—	—	Hours
- - - -	Post Shock and Fatigue Test End Points:							
	Vibration (1):	—	—	—	—	—	180	mVac
	Heater-Cathode Leakage							
	Ehk = +100 Vdc	—	—	—	—	—	15	μAdc
	Ehk = –100 Vdc	—	—	—	—	—	15	μAdc
	Change in Transconductance (1) of							
	Individual Tubes △ Sm	—	—	—	—	—	15	%
4.9.6.3	Glass Strain	4.0	—	—	—	—	—	
Acceptance Life Tests, Note 4								
4.11.7	Heater Cycling Life Test (1): (2000 Cycles Min.) Note 14							
	Ef = 7.0 v; 1 min. on, 4 min. off;							
	Ehk = 140 Vac; Ec1 = Ec2 = Eb = 0	2.5	—	—	—	—	—	
4.11.7	Heater Cycling Life Test (2): (300 Cycles Min.) Note 14							
	Ef = 10 V; Ehk = +200 Vdc; Rhk = 0;							
	10 secs. on, 4 min. off;	10.0	—	—	—	—	—	
4.11.3.1	Stability Life Test: Note 15							
	Eb = 250 Vdc; Ec2 = 150 Vdc; Ehk = +200 Vdc;							
	Rg1 = 0.5 Meg; TA = Room; Rk = 1700 Ohms	—	—	—	—	—	—	
4.11.4	Stability Life Test End Points:							
	Change in Transconductance (1) of							
	Individual Tubes △ Sm	1.0	—	—	—	—	15	%
4.11.3.1	Survival Rate Life Test: (100 Hours) Note 16							
	Ebb = 250 Vdc; Tie Grid No. 2 to Plate; Rk = 820							
	Ohms; Rp = 5100 Ohms; Rg1 = 0.5 Meg; TA = Room	—	—	—	—	—	—	
4.11.4	Survival Rate Life Test End Points:							
	Continuity and Shorts (Inoperatives)	0.65	—	—	—	—	—	
	Transconductance (1)	1.0	2600	—	—	—	—	μmhos
	Grid Current	2.5	0	—	—	—	–1.0	μAdc
	Heater-Cathode Current: Ihk	0.65	—	—	—	—	40	μAdc
	Electrode Insulation:	6.5	—	—	—	—	—	
	Rg1-all	—	200	—	—	—	—	Meg
	Rg2-all	—	200	—	—	—	—	Meg
	Rp-all	—	200	—	—	—	—	Meg

ACCEPTANCE CRITERIA (Continued)

MIL-E-1 Ref.	Test	LOT ACCEPTANCE LIMITS (1) MIN.	MAX.	FAILURE RATE CLASS (3) LIMITS MIN.	MAX.	Units
Acceptance Life Tests, Note 4 (Cont'd.)						
4.11.5	Intermittent Life Test: Notes 17 and 18					
	Survival Rate Life conditions; T Envelope = 250°C Min.	—	—	—	—	
4.11.4	Intermittent Life Test End Points: (200 Hours)					
	Inoperatives: Note 19	—	—	—	—	
	Grid Current:	0	-1.0	0	-1.5	μAdc
	Heater Current	330	380	320	390	mA
	Change in Transconductance (1) of Individual Tubes; △ Sm/t	—	20	—	25	%
	Transconductance (2): △ Sm/Ef	—	15	—	25	%
	Heater-Cathode Leakage Ehk = ±100 Vdc	—	40	—	60	μAdc
	Insulation of Electrodes					
	g1-all	200	—	25	—	Megohms
	p-all	200	—	25	—	Megohms
	g2-all	200	—	25	—	Megohms
	Transconductance (1) Average Change Avg. △ Sm/t					

MIL-E-1 Ref.	Test	ALLOWABLE DEFECTIVES
----	Individual Lot Acceptance	
	Total Inoperatives	2
	Total Defectives	5
----	Failure Rate Tests: Note 18	
	Failure Rates Class 1	
	Inoperatives:	5
	Failure Rate Class 2	
	Combined defectives to Limits (1) Including Inoperatives:	16
	Failure Rate Class 3	
	Combined defectives to F.R. 3 Limits Including Inoperatives:	8

ACCEPTANCE CRITERIA NOTES:

1: The AQL for the combined defectives for attributes in Measurements Acceptance Tests, Part 1, excluding Inoperatives and Mechanical shall be one (1) percent. A tube having one (1) or more defects shall be counted as one (1) defective.

2: For Variables Sampling Procedure, see MIL-E-1, Appendix C, Paragraph 20.2.4.

3: Prior to this test, tubes shall be preheated for 5 minutes at the conditions indicated below. Test within three seconds after preheating. Three minute test is not permitted. Grid Emission is a destructive test so tubes subjected to it are not to be accepted under this specification, nor are subsequent tests to be performed on the same tubes.

Ef	Eb	Ec1	Ec2	Rk/k	Rg1
V	Vdc	Vdc	Vdc	ohms	Meg
7.5	250	0	150	1700	0.5

4. Destructive Tests: Tubes subjected to the following destructive tests are not to be accepted under this specification.

4.9.5.3	Subminiature Lead Fatigue
4.9.20.5	Shock
4.9.20.6	Fatigue
4.11.7	Heater Cycling Life Tests (1) & (2)
4.11.5	Intermittent Life Test
4.10.6.2	Grid Emission

5: The rejection level shall be set at the VU meter reading obtained during calibration.

6: Triode connection — Tie grid #2 to plate.

7. Maximum total distortion of the filament supply voltage shall be 5%. The frequency response of the peak-to-peak measuring device from 20 cps to 5000 cps must be within 0.5 db of its response at 400 cps. Ground all leads except those for the cathodes and heater lead #3. Measure Hum voltage across specified Rk in each cathode separately.

8: Insert a cold tube into the test socket having all Plate Current (1) conditions applied and record Ib continuously for three minutes. Plate Current must reach 85% of the three minute figure within the time indicated.

9: This test shall be conducted on the initial lot and thereafter on a lot approximately every 30 days. In the event of lot failure, the lot shall be rejected and the succeeding lot shall be subjected to this test. Once a lot has passed, the 30-day rule shall apply. MIL-STD-105, Sample Size Code Letter F shall apply.

10: The tube shall be rigidly mounted on a table vibrating such that the instantaneous values of acceleration shall constitute approximately a "WHITE NOISE" spectrum which is free from discontinuities from 100 cps to 5000 cps and such that the RMS value of acceleration for frequencies outside this band shall constitute no more than five percent of the total RMS acceleration. The spectrum of instantaneous acceleration shall be such that each octave of bandwidth delivers 2.3 ± 0.2 G's RMS acceleration. With this the case, the RMS value of acceleration for any bandwidth within the specified spectrum is equal to:

$$G_{rms} = 2.3 \sqrt{3.32 \log_{10} (f2/f1)}$$

where f2 and f1 are the upper and lower frequencies respectively of the band under consideration. The degree of clipping of the peak accelerations shall be such that the peak value of acceleration is at least 15 G's.

Half the tubes in the sample shall be vibrated in position X1, the other half in position X2.

The voltage (ep) produced across the resistor (Rp) as a result of vibration shall be coupled through a compensating amplifier to a low pass filter. The compensating amplifier shall have a high input impedance (250 Kohms or more) and shall be adjusted to compensate for any insertion losses in the filter. The combined frequency response of amplifier and filter shall

ACCEPTANCE CRITERIA NOTES (Continued)

be flat within ±0.5 db from 50 cps to 8000 cps, shall be down no more than 5 db at 10,000 cps and at 20 cps, and down at least 30 db at 13,000 cps. For reading the peak-to-peak value of output voltage, the filter output shall be fed directly to the input of a Ballantine Model 305 peak-to-peak electronic voltmeter or equal, while the RMS value shall be measured with a Hewlett Packard Model 400 C or equal. The impedance of the plate and screen voltage supplies shall not exceed that of a 40 μf capacitor at 10 cps.

11: For variables sampling procedure, use MIL-E-1, Appendix C, par. 20.2.4.2.2.

12: A grid resistor of 0.1 meg shall be added; however, this resistor will not be used when a thyratron type short indicator is employed.

13: The tubes shall be rigidly mounted on a table vibrating at a constant acceleration level of 10 G. The frequency of vibration shall be varied from 30 cps to 3000 cps and back to 30 cps, with the period of the sweep cycle being three minutes. The rate of change of frequency with time shall be such that the frequency varies logarithmically with time. The tubes shall be vibrated for a total of six hours, that is, two hours in each of the three positions X1, X2, and Y1. Filament voltage only shall be applied to the tube under test.

14: The no load to steady state full load regulation of the heater voltage supply shall be not more than 3.0%.

15: The sampling and testing procedure for the Stability Life Test shall be in accordance with MIL-E-1, Appendix C, Section 20.2.5.1.

16: For Survival Rate Life Test, the sampling and testing procedure shall be as defined in Sections 20.2.5.2 to 20.2.5.2.5 inclusive of MIL-E-1, Appendix C.

17: Envelope temperature is defined as the highest temperature indicated when using a thermocouple of No. 40B and S, or small diameter elements welded to a ring of 0.025-inch diameter phosphor bronze placed in contact with the envelope. The envelope temperature requirement will be satisfied if a tube, having bogey Ib (±5 percent) under normal conditions, is determined to operate at or above the minimum specified temperature in any socket of the life-test rack.

18: **1.0 Intermittent Life Test Evaluation:** The life test conducted in accordance with this specification shall be evaluated in two separate procedures. The first will be an evaluation on an individual lot basis in a similar manner to the one normally specified for reliable tubes. The second evaluation is the determination of a failure rate and its compliance to this specification.

The life test will be conducted in accordance with MIL-E-1 procedures for reliable tubes except that the sampling plan will be changed from the presently specified double sampling plan to a single sampling plan with n = 40. Individual lot acceptance will be based on this sample size and the conformance of the lot to the maximum allowable defectives for inoperatives and also for combined defectives as specified.

2.0 The Failure Rate Control:

a. Purpose: It is the purpose of this specification to establish a means by which the Military may monitor and evaluate the failure rate of this tube type in order to provide a statistically valid description of this parameter that may be utilized in computing the reliability of equipments in which this type is used.

b. Description: The failure rates on this type shall be evaluated using the life test information gathered on individual lots. Only those lots that pass the life test criteria for individual lots shall be used in the calculations for failure rates. The failure rate shall be based on a 5 lot moving average with the cumulative number of failures for each failure rate class plotted on their respective failure rate charts (See Charts 1, 2 and 3). Non-conformance of a tube to the 200 hour end points shall be considered a failure.

The Failure rate charts consist of a plot of consecutive lots manufactured with each point indicating the cumulative number of failures in the last five lots as evaluated against the specified criteria. In the operation of this procedure, each time a new lot is added, the number of defects from the earliest lot is dropped from the accumulation of defectives so that each plotted point on the chart will represent a total sample size of 200 tubes.

Any lot which fails the individual lot acceptance criteria shall not be included in the cumulations for failure rate charts. However, the number of defectives for such a failing lot should be plotted on the failure rate chart in its chronological order with the other lots. This point is plotted for information only.

c. Qualification: In order to become a qualified source to this specification, it is mandatory that the manufacturer supply data on charts 1, 2 and 3 indicating that his failure rate is within the acceptable limits. A total quantity of 200 tubes life tested for 200 hours is required and this should be representative of two or more consecutively manufactured lots (e.g., 100 tubes from each of 2 lots or 40 from each of 5 lots). In the event more than 40 tubes per lot are used in the life test sample in order to accelerate qualification for failure rate, only the first 40 tubes life tested per lot shall be evaluated for the individual lot acceptance criteria.

d. Maintenance of Failure Rate: When the manufacturer has become a qualified source to this specification and has received proper approval from the Military, those lots utilized for qualification and subsequent lots where the 5 lot moving evaluation failure rate continues within the specification, are to be considered acceptable to this specification and may be marked and shipped accordingly.

e. Non-conformance of Failure Rate: The failure rate will be considered non-conforming when the total number of defectives (for the particular failure rate under evaluation) accumulated from the past 5 lot life test exceeds the number permissible as contained in the specification and on the failure rate chart. The lot of tubes which caused the failure rate limit to be violated shall be considered as acceptable and can be marked and shipped in accordance with this specification. When a failure rate criteria has been violated, the manufacturer has lost qualification to this specification and cannot mark and ship any subsequent lots to this specification without being requalified.

f. Requalification for Failure Rate: Since all three failure rates specified in this specification are computed from the same life test data, a violation of 1 failure rate requires requalification for all three failure rates. Requalification shall follow the same procedure as for original qualification. Starting after the last lot which rendered disqualification, a life test sample of 200 tubes from the next two new consecutive lots will be required to conform to this specification before qualification is reinstated to the manufacturer.

g. Charts: Each manufacturer intending or planning to supply tubes to this specification must forward his qualification data in the form of the three failure rate charts to the Military. These charts must be duly approved and signed by the Resident Government Inspector as representing the factual results of the life tests which were conducted in complete accordance with MIL-E-1 and this specification.

19: An inoperative as referenced in Life Tests shall be defined as a tube having one (1) or more of the following defects: Discontinuity (Ref. 4.7.1), Permanent Shorts (Ref. 4.7.2), Air Leaks (Ref. 4.7.6).

APPLICATION DATA

The Premium Subminiature Type 6945 is a subminiature beam power audio pentode having a relatively high power sensitivity. It is capable of efficient operation at low supply voltages. It is useful as an audio output, servo-driver or series passing tube in voltage regulator circuits.

The 6945 is also useful in many pulse applications including Class C service at low radio frequencies.

Triode connected the 6945 displays the low mu, high perseverance qualities desirable in servo control circuits. In this application, when utilizing an ac plate supply, precautions should be taken to insure against poor tube and circuit reliability.

Since conduction occurs for only one-half cycle high plate supply voltage is often deemed necessary in order to realize sufficient output. Excessive positive plate voltage, however, causes an appreciable increase in secondary emission. In addition, presence of the negative half-cycle of plate encourages primary emission by the plate and grids.

The effects of back emission can be minimized by (1) employing a low value grid resistor, (2) inserting series diodes, such as the Sylvania 5641, in the plate circuits, (3) operate the tubes conservatively with respect to supply voltage, peak currents, element dissipation and bulb temperature. Back emission approximates an exponential curve with increasing plate voltage swing and plate disc dissipation. For further discussion the reader is referred to the frontal section of this manual or "Effects of AC Plate Voltages on Tube Performance," Sylvania Engineering Information Service, Vol. 1, No. 10, May 1954.

This type is characterized by extraordinary freedom from interelement short circuits of short term duration, by high resistance to interelement leakage, and by stable performance. In addition, vibrational output when the tube is subjected to wide band (White Noise) vibration is held to a very low value. It is designed for service at high altitudes and where severe conditions of mechanical shock, vibration and high temperature are encountered. These characteristics give the type special value in guided missile applications.

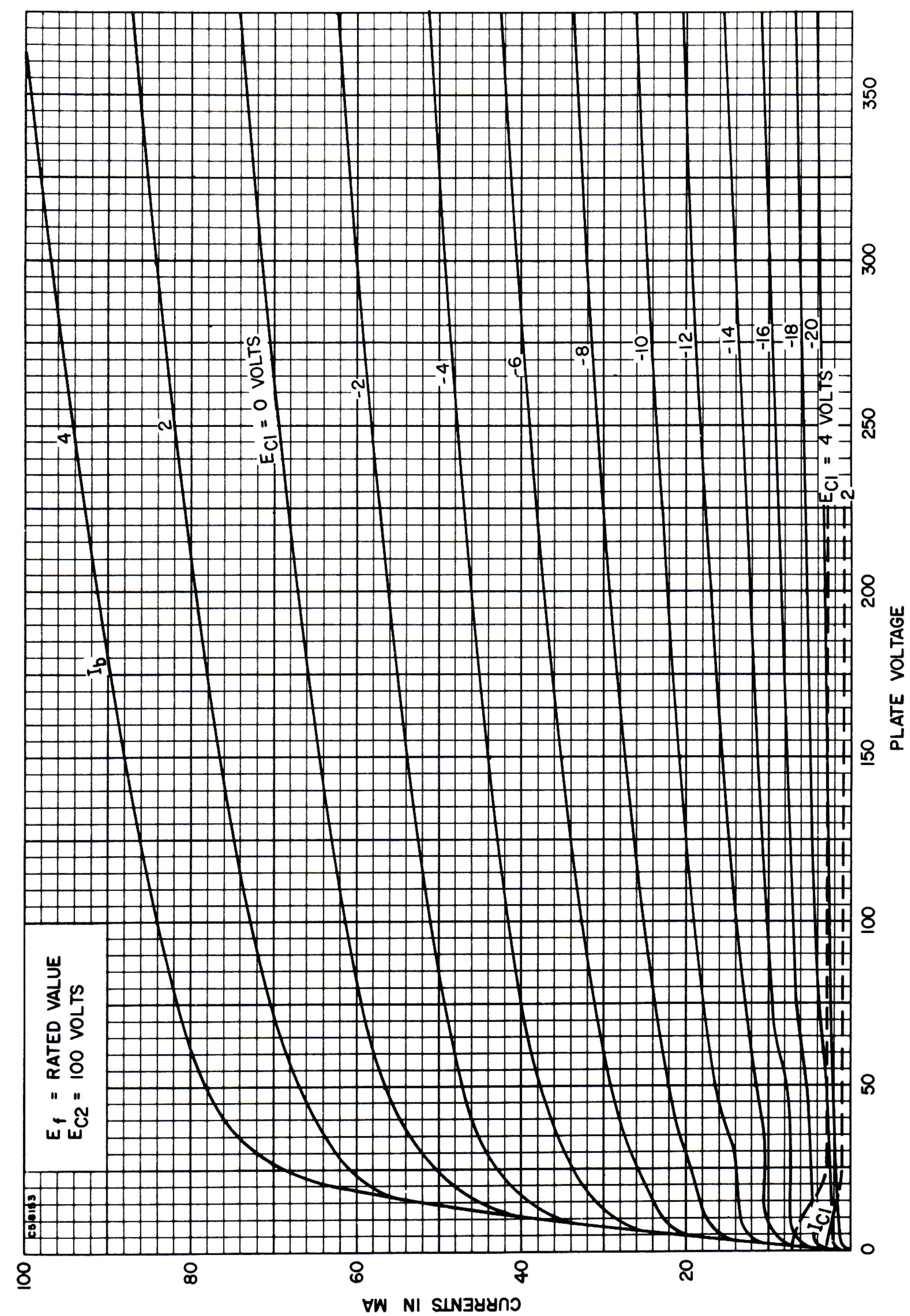
Tube durability under extreme vibration for extended periods is assured by more stringent fatigue testing techniques. Excitation for the fatigue test varies in frequency from 30 cps to 3,000 cps and back to 30 cps. Three minutes are required to sweep through one complete cycle. The sweep-frequency vibration has a constant acceleration level of 10 G in contrast to the 2.5 G level formerly used on most reliable receiving tube types. The sweep-frequency cycle is repeated continuously for two hours in each of three positions, totalling six hours.

To insure correlation with actual field conditions and thereby enhance equipment reliability, vibrational noise output is controlled by the "white noise test" as shown in the acceptance criteria. Briefly, this test consists of subjecting the tube to a white noise vibration spectrum covering the frequency band of 100 to 5000 cps at a rms level of 2.3 g's per octave and a peak level of 15 g's. Limits are shown for both peak and rms output. A further discussion of the white noise vibrational test is included in the frontal section of this manual.

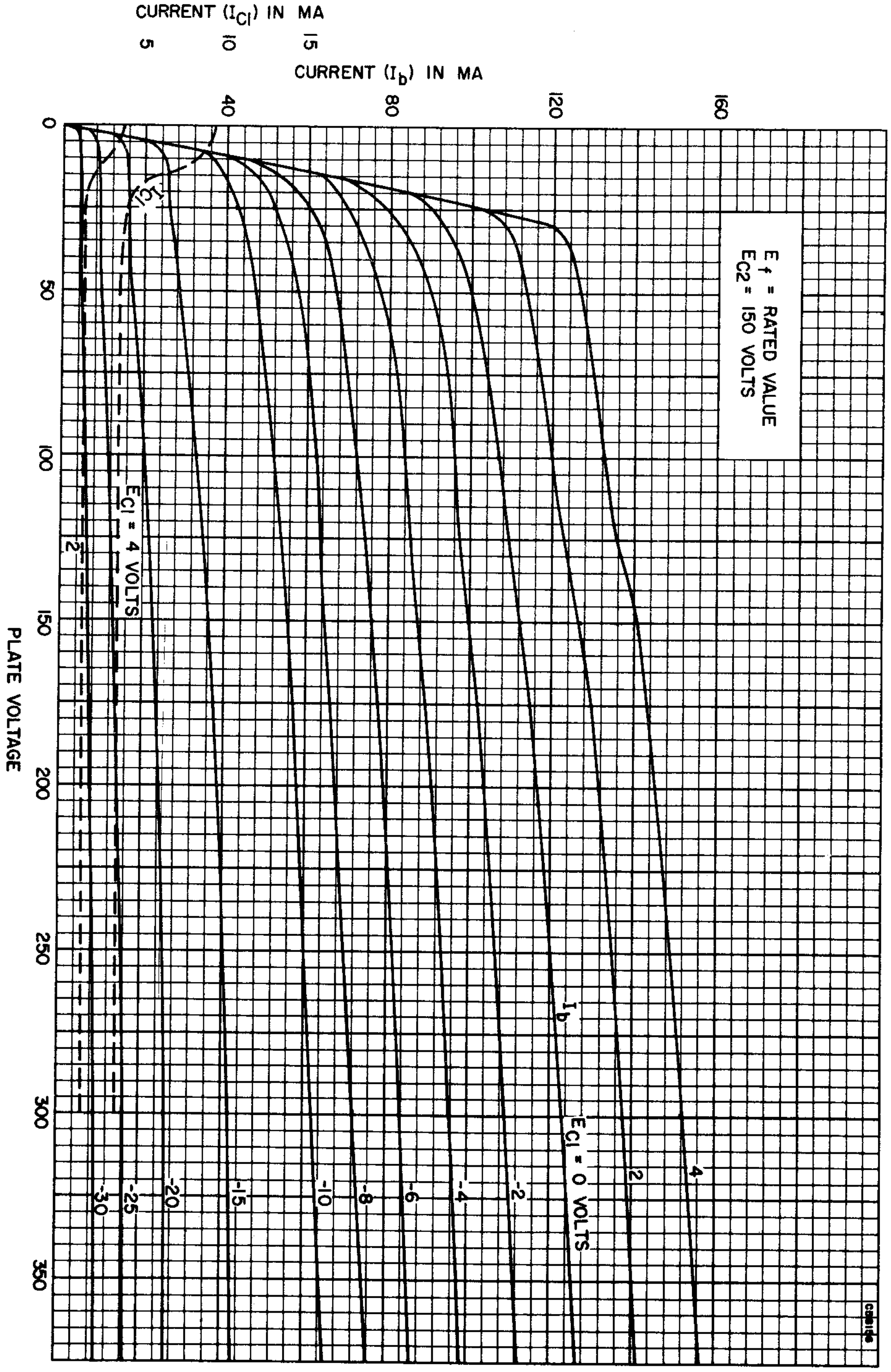
The 6945 is manufactured and inspected to meet the applicable specification for reliability. Life expectance is described by the life tests, specified on the attached pages. The actual life expectancy of the tubes in an operating circuit is affected by both the operating and environmental conditions 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. For further discussion of life expectancy, reference should be made to the frontal section of this manual.

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.

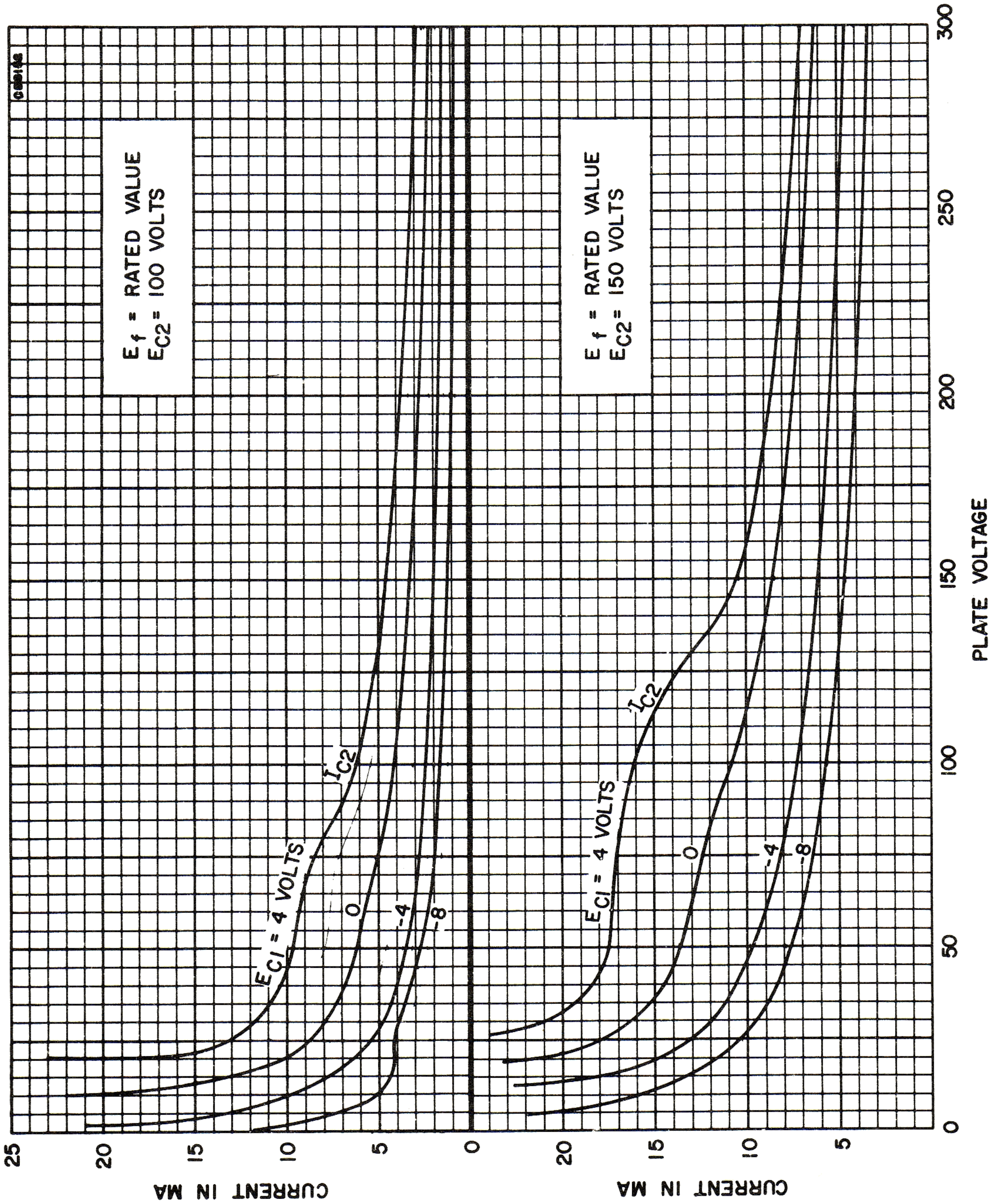
AVERAGE PLATE CHARACTERISTICS



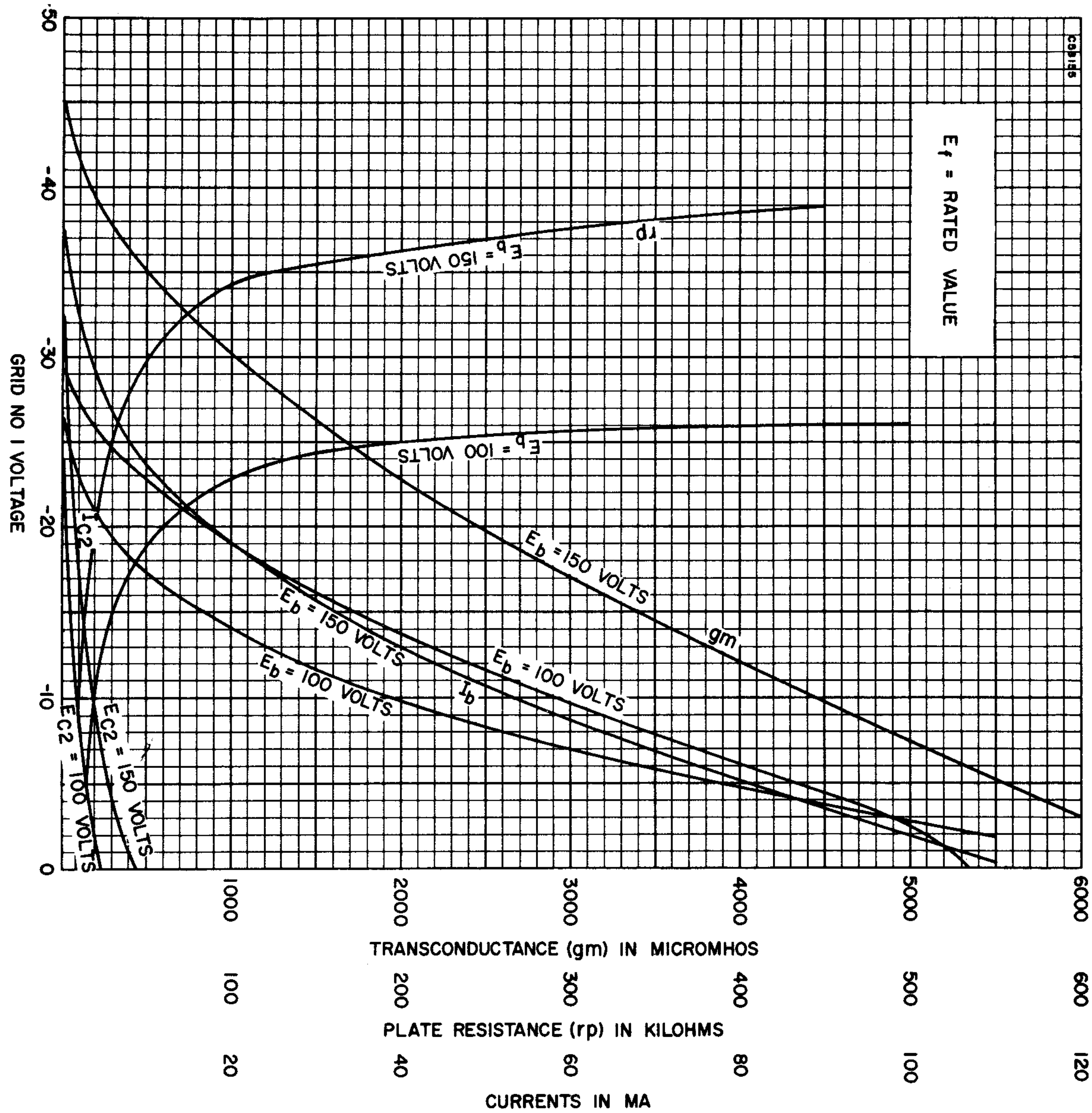
AVERAGE PLATE CHARACTERISTICS



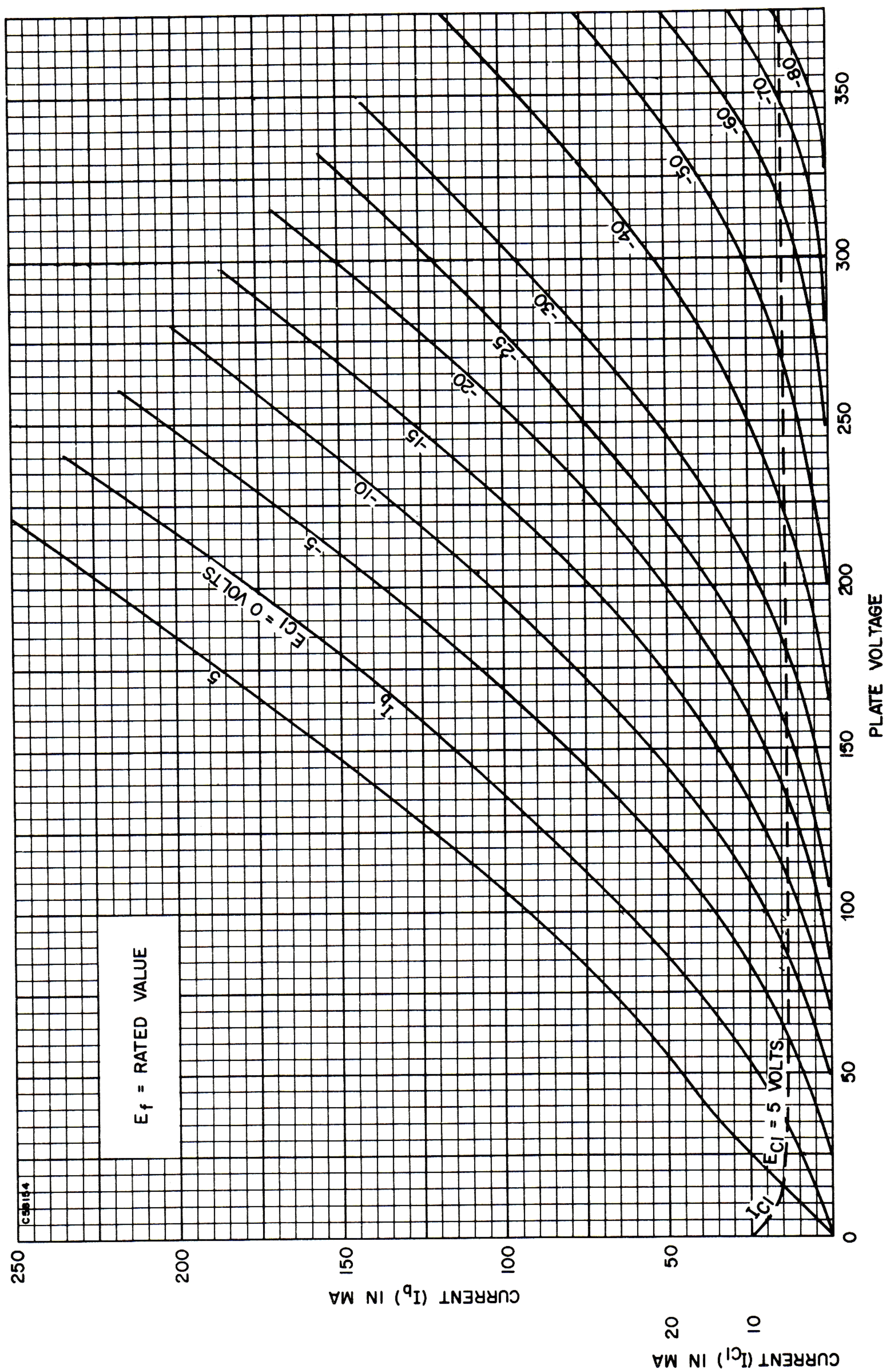
AVERAGE SCREEN CHARACTERISTICS



AVERAGE TRANSFER CHARACTERISTICS



AVERAGE PLATE CHARACTERISTICS
(TRIODE CONNECTED)



AVERAGE TRANSFER CHARACTERISTICS
(TRIODE CONNECTED)