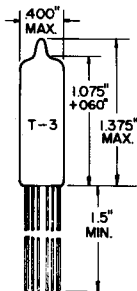


## TUNG-SOL

PENTODE  
SUBMINIATURE TYPE



## GLASS BULB

SUBMINIATURE BUTTON  
B PIN LEAD EB-10  
OUTLINE DRAWING  
JEDEC 3-1

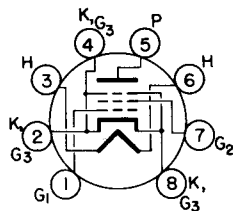
COATED UNIPOTENTIAL CATHODE

HEATER

6.3±0.3 VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



## BOTTOM VIEW

BASING DIAGRAM  
JEDEC 80L

THE 5840 IS A SHARP-CUTOFF PENTODE IN THE 8 PIN SUBMINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE IN HIGH-FREQUENCY CIRCUITS. IN ON-OFF CONTROL APPLICATIONS, THE TUBE WILL MAINTAIN ITS EMISSION CAPABILITIES AFTER LONG PERIODS OF OPERATION UNDER CUTOFF CONDITIONS. EXCEPT FOR THE INCORPORATION OF AN INTERNAL CONNECTION FOR THE SUPPRESSOR GRID, THE 5840 IS IDENTICAL TO THE 6205.

## DIRECT INTERELECTRODE CAPACITANCES

	WITH SHIELD <sup>A</sup>	WITHOUT SHIELD	
GRID #1 TO PLATE, MAXIMUM	0.015	0.03	pf
INPUT	4.2	4.0	pf
OUTPUT	3.4	1.9	pf

<sup>A</sup> WITH EXTERNAL SHIELD OF 0.405-INCH INSIDE DIAMETER CONNECTED TO CATHODE.

## RATINGS

## ABSOLUTE MAXIMUM VALUES

PLATE VOLTAGE	165	VOLTS
SCREEN VOLTAGE	155	VOLTS
NEGATIVE DC GRID #1 VOLTAGE	55	VOLTS
PLATE DISSIPATION	1.1	WATTS
SCREEN DISSIPATION	0.55	WATTS
DC CATHODE CURRENT	16.5	MA.
HEATER - CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
BULB TEMPERATURE AT HOTTEST POINT	220	°C

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## TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A<sub>1</sub> AMPLIFIER

HEATER VOLTAGE	6.3±5%	VOLTS
HEATER CURRENT	0.15	AMP.
PLATE VOLTAGE	100	VOLTS
SCREEN VOLTAGE	100	VOLTS
CATHODE BIAS RESISTOR	150	OHMS
PLATE RESISTANCE, APPROX.	0.26	MEGOHMS
TRANSCONDUCTANCE	5000	μMHOS
PLATE CURRENT	7.5	MA.
SCREEN CURRENT	2.4	MA.
GRID #1 VOLTAGE, APPROX. I <sub>b</sub> = 10 μAMPS.	-9.0	VOLTS

## CLASS A RESISTANCE-COUPLED AMPLIFIER

LOW IMPEDANCE DRIVE (APPROXIMATELY 200 OHMS)													
R <sub>L</sub>	R <sub>gf</sub>	E <sub>bb</sub> = 90 Volts				E <sub>bb</sub> = 150 Volts				E <sub>bb</sub> = 225 Volts			
		R <sub>k</sub>	R <sub>c2</sub>	E <sub>o</sub>	Gain	R <sub>k</sub>	R <sub>c2</sub>	E <sub>o</sub>	Gain	R <sub>k</sub>	R <sub>c2</sub>	E <sub>o</sub>	Gain
0.10	0.10	1000	0.2	13	50	500	0.3	19	83	400	0.3	29	110
0.10	0.24	1000	0.2	16	73	500	0.3	25	120	400	0.3	38	160
0.24	0.24	1700	0.5	13	72	1500	0.6	20	100	700	0.8	29	160
0.24	0.51	2000	0.6	15	89	1500	0.7	24	140	700	0.9	35	210
0.51	0.51	2500	1.3	11	93	2000	1.5	18	140	1000	1.7	28	200
0.51	1.0	3000	1.5	13	110	2000	1.7	20	180	1000	2.0	31	260

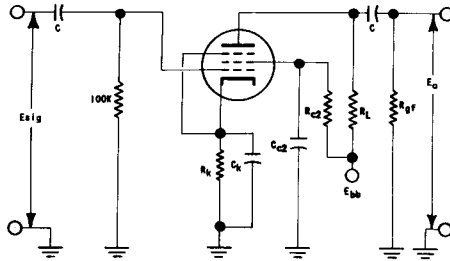
HIGH IMPEDANCE DRIVE (APPROXIMATELY 100 K OHMS)													
R <sub>L</sub>	R <sub>gf</sub>	E <sub>bb</sub> = 90 Volts				E <sub>bb</sub> = 150 Volts				E <sub>bb</sub> = 225 Volts			
		R <sub>k</sub>	R <sub>c2</sub>	E <sub>o</sub>	Gain	R <sub>k</sub>	R <sub>c2</sub>	E <sub>o</sub>	Gain	R <sub>k</sub>	R <sub>c2</sub>	E <sub>o</sub>	Gain
0.10	0.10	1200	0.2	13	48	700	0.2	18	77	500	0.3	28	110
0.10	0.24	1300	0.2	16	70	800	0.3	24	110	500	0.3	37	150
0.24	0.24	2800	0.4	12	68	1700	0.6	20	100	1200	0.8	29	150
0.24	0.51	3000	0.5	15	82	1800	0.7	24	140	1300	0.8	35	190
0.51	0.51	5500	1.0	11	76	3500	1.3	18	120	2400	1.6	26	180
0.51	1.0	6200	1.2	12	92	3800	1.6	19	160	2500	1.8	31	230

1. E<sub>o</sub> IS MAXIMUM RMS VOLTAGE OUTPUT FOR APPROXIMATELY FIVE PERCENT TOTAL HARMONIC DISTORTION.
2. GAIN IS MEASURED FOR AN OUTPUT VOLTAGE OF TWO VOLTS RMS.
3. R<sub>k</sub> IS IN OHMS; R<sub>c2</sub>, R<sub>L</sub>, AND R<sub>gf</sub> ARE IN MEGOHMS.
4. COUPLING CAPACITORS (C) SHOULD BE SELECTED TO GIVE DESIRED FREQUENCY RESPONSE. R<sub>k</sub> AND R<sub>c2</sub> SHOULD BE ADEQUATELY BY-PASSED.

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**TUNG-SOL**

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**CHARACTERISTICS LIMITS**

		MIN.	MAX.	
HEATER CURRENT				
$E_f = 6.3$ VOLTS	INITIAL	140	160	MA.
	500-HR.	138	164	MA.
PLATE CURRENT:				
$E_f=6.3$ VOLTS, $E_b=100$ VOLTS, $E_{c2}=100$ VOLTS, $R_k=150$ OHMS (BY-PASSED)	INITIAL	5.5	9.5	MA.
SCREEN CURRENT:				
$E_f=6.3$ VOLTS, $E_b=100$ VOLTS, $E_{c2}=100$ VOLTS, $R_k=150$ OHMS (BY-PASSED)	INITIAL	1.5	3.3	MA.
TRANSCONDUCTANCE (1):				
$E_f=6.3$ VOLTS, $E_b=100$ VOLTS, $E_{c2}=100$ VOLTS, $R_k=150$ OHMS (BY-PASSED)	INITIAL	4200	5800	$\mu$ MHOS
TRANSCONDUCTANCE CHANGE WITH HEATER VOLTAGE:				
DIFFERENCE BETWEEN TRANSCONDUCTANCE (1) AND TRANSCONDUCTANCE AT $E_f=5.7$ VOLTS (OTHER CONDITIONS THE SAME) EXPRESSED AS A PERCENTAGE OF TRANSCONDUCTANCE (1)	INITIAL	---	10	PERCENT
	500-HR.	---	15	PERCENT
TRANSCONDUCTANCE CHANGE WITH OPERATION:				
DIFFERENCE BETWEEN TRANSCONDUCTANCE (1) INITIALLY AND AFTER OPERATION EXPRESSED AS A PERCENTAGE OF INITIAL VALUE	500-HR.	---	20	PERCENT
AVERAGE TRANSCONDUCTANCE CHANGE WITH OPERATION:				
AVERAGE OF VALUES FOR 'TRANS-CONDUCTANCE CHANGE WITH OPERATION'	500-HR.	---	15	PERCENT
PLATE RESISTANCE:				
$E_f=6.3$ VOLTS, $E_b=100$ VOLTS, $E_{c2}=100$ VOLTS, $R_k=150$ OHMS (BY-PASSED)	INITIAL	0.175	---	MEGOHMS
PLATE CURRENT CUTOFF:				
$E_f=6.3$ VOLTS, $E_b=100$ VOLTS, $E_{c2}=100$ VOLTS, $E_{c1}=-9.0$ VOLTS	INITIAL	---	50	$\mu$ AMPS.
INTERELECTRODE CAPACITANCES:				
GRID #1 TO PLATE (G1 TO P)	INITIAL	---	0.015	$\mu$ IF
INPUT (G1 TO H, K, G2 G3)	INITIAL	3.5	4.9	$\mu$ IF
OUTPUT (P TO H, K, G2 G3)	INITIAL	2.9	3.9	$\mu$ IF

(MEASURED WITH EXTERNAL SHIELD OF 0.405-INCH INSIDE DIAMETER CONNECTED TO CATHODE)

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## TUNG-SOL

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## CHARACTERISTICS LIMITS - cont'd.

	MIN.		MAX.	
<b>NEGATIVE GRID #1 CURRENT:</b>				
Ef=6.3 VOLTS, Eb=100 VOLTS, Ec2=100 VOLTS, Rk=150 OHMS (BY-PASSED), Rg1=1.0 MEG.				
INITIAL	---		0.3	μAMPS.
500-HR.	---		0.8	μAMPS.
<b>HEATER-CATHODE LEAKAGE CURRENT:</b>				
Ef=6.3 VOLTS, Ebk=100 VOLTS, HEATER POSITIVE WITH RESPECT TO CATHODE				
INITIAL	---		5.0	μAMPS.
500-HR.	---		10	μAMPS.
HEATER NEGATIVE WITH RESPECT TO CATHODE				
INITIAL	---		5.0	μAMPS.
500-HR.	---		10	μAMPS.
<b>INTERELECTRODE LEAKAGE RESISTANCE:</b>				
Ef=6.3 VOLTS. POLARITY OF APPLIED DC INTERELECTRODE VOLTAGE IS SUCH THAT NO CATHODE EMISSION RESULTS				
GRID #1 TO ALL AT 100 VOLTS DC				
INITIAL	100	---		MEG.
500-HR.	50	---		MEG.
PLATE TO ALL AT 300 VOLTS DC				
INITIAL	100	---		MEG.
500-HR.	50	---		MEG.
<b>VIBRATIONAL NOISE OUTPUT VOLTAGE RMS</b>				
Ef=6.3 VOLTS, Ebb=100 VOLTS, Ec2=100 VOLTS, Rk=150 OHMS (BY-PASSED), RL=10,000 OHMS. VIBRATIONAL ACCELERATION=15 G AT 40 CPS				
INITIAL	---		60	MV.
<b>GRID #1 EMISSION CURRENT:</b>				
Ef=7.5 VOLTS, Eb=100 VOLTS, Ec2=100 VOLTS, Ecc1=-9.0 VOLTS, Rg1=1.0 MEG.				
INITIAL	---		0.5	μAMPS.

THE INDICATED 500-HOUR VALUES ARE LIFE-TEST END POINTS FOR THE FOLLOWING CONDITIONS OF OPERATION: Ef=6.3 VOLTS, Eb=100 VOLTS, Ec2=100 VOLTS, Rk=150 OHMS, Rg1=1.0 MEG, Ebk=200 VOLTS WITH HEATER POSITIVE WITH RESPECT TO CATHODE, AND BULB TEMPERATURE=220 C MINIMUM.

## SPECIAL TESTS AND RATINGS

## STABILITY LIFE TEST

STATISTICAL SAMPLE OPERATED FOR ONE HOUR TO EVALUATE AND CONTROL INITIAL VARIATIONS IN TRANSCONDUCTANCE.

## SURVIVAL RATE LIFE TEST

STATISTICAL SAMPLE OPERATED FOR ONE HUNDRED HOURS TO EVALUATE AND CONTROL EARLY-LIFE ELECTRICAL AND MECHANICAL INOPERATIVES.

## HEATER-CYCLING LIFE TEST

STATISTICAL SAMPLE OPERATED FOR 2000 CYCLES TO EVALUATE AND CONTROL HEATER-CATHODE DEFECTS. CONDITIONS OF TEST INCLUDE Ef=7.0 VOLTS CYCLED FOR ONE MINUTE ON AND FOUR MINUTES OFF, Eb=Ec2=Ec1=0 VOLTS, AND Ebk=140 VOLTS RMS.

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**SPECIAL TESTS AND RATINGS - cont'd.**

**SHOCK RATING-450 G**

STATISTICAL SAMPLE SUBJECTED TO FIVE IMPACT ACCELERATIONS OF 450 G IN EACH OF FOUR DIFFERENT POSITIONS. THE ACCELERATING FORCES ARE APPLIED BY THE NAVY-TYPE, HIGH IMPACT (FLYWEIGHT) SHOCK MACHINE FOR ELECTRONIC DEVICES OR ITS EQUIVALENT.

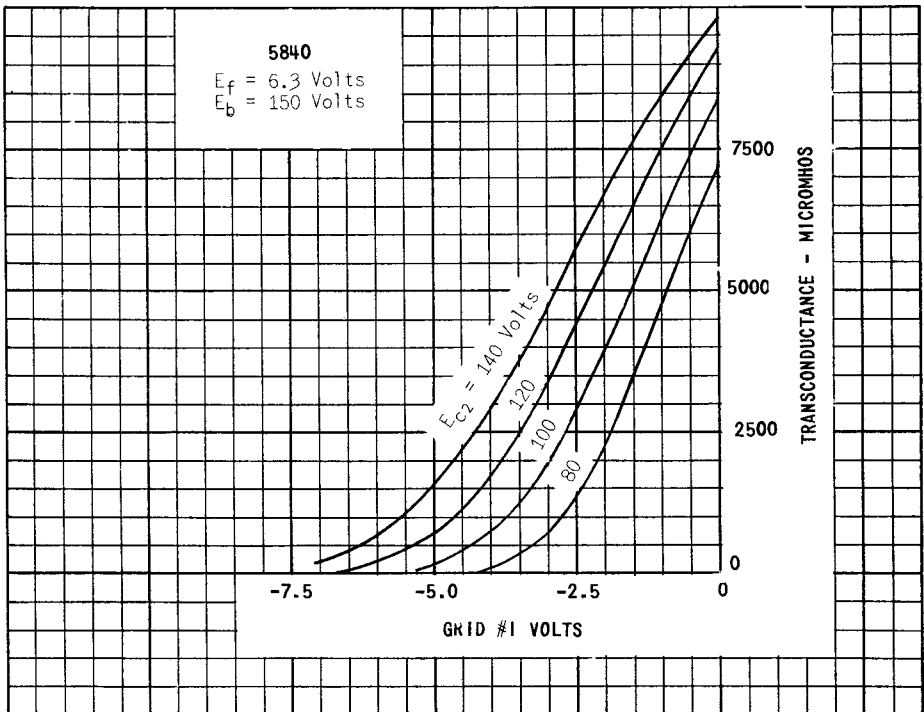
**FATIGUE RATING-2.5 G**

STATISTICAL SAMPLE SUBJECTED TO VIBRATIONAL ACCELERATION OF 2.5 G FOR 32 HOURS MINIMUM IN EACH OF THREE DIFFERENT POSITIONS. THE SINUSOIDAL VIBRATION IS APPLIED AT A FIXED FREQUENCY BETWEEN 25 AND 60 CYCLES PER SECOND.

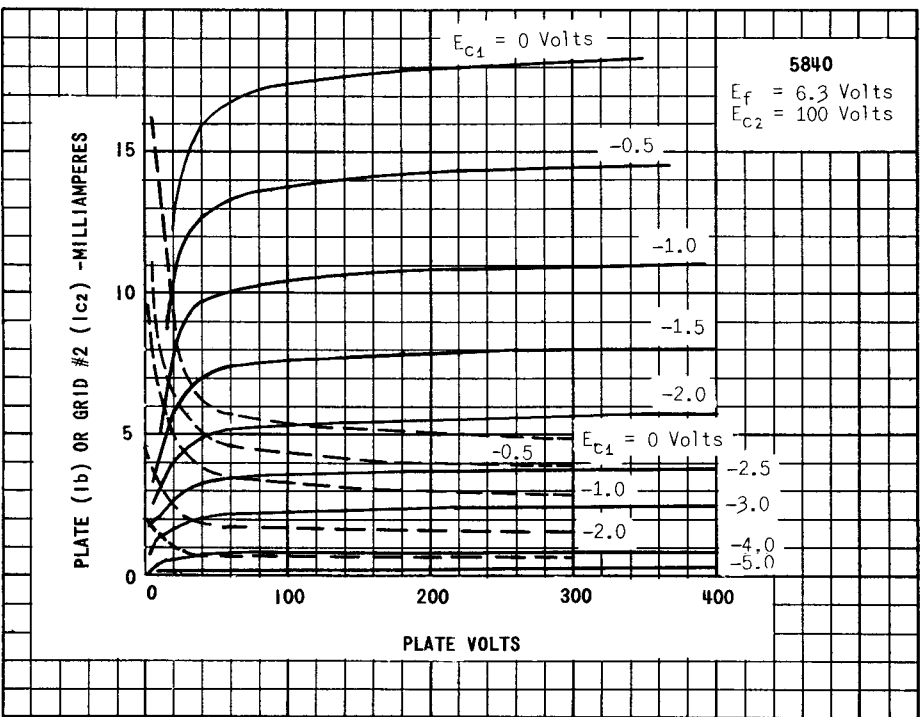
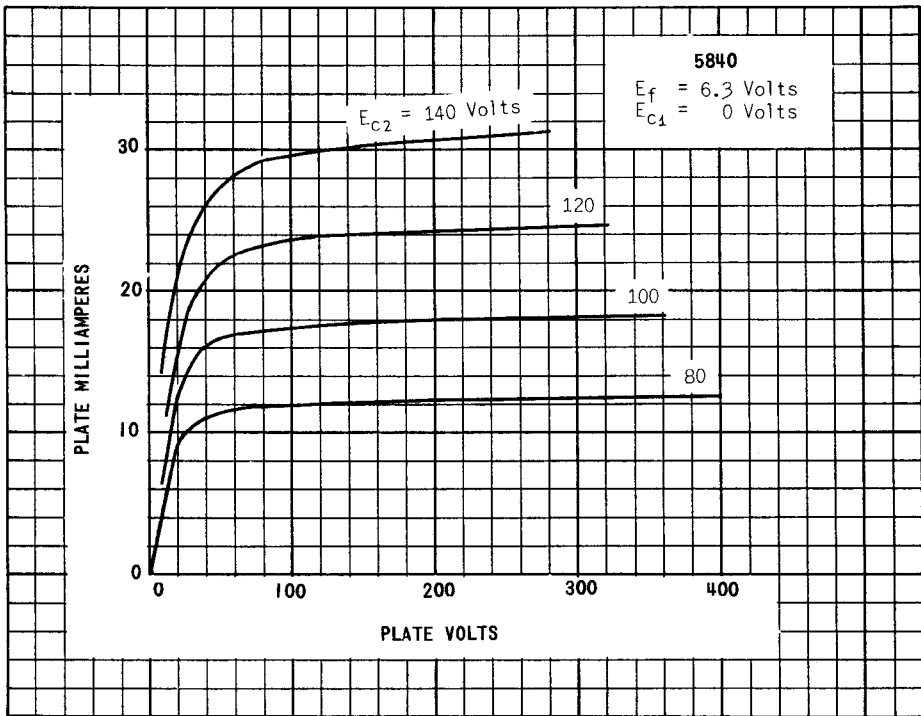
**ALTITUDE RATING-60,000 FEET**

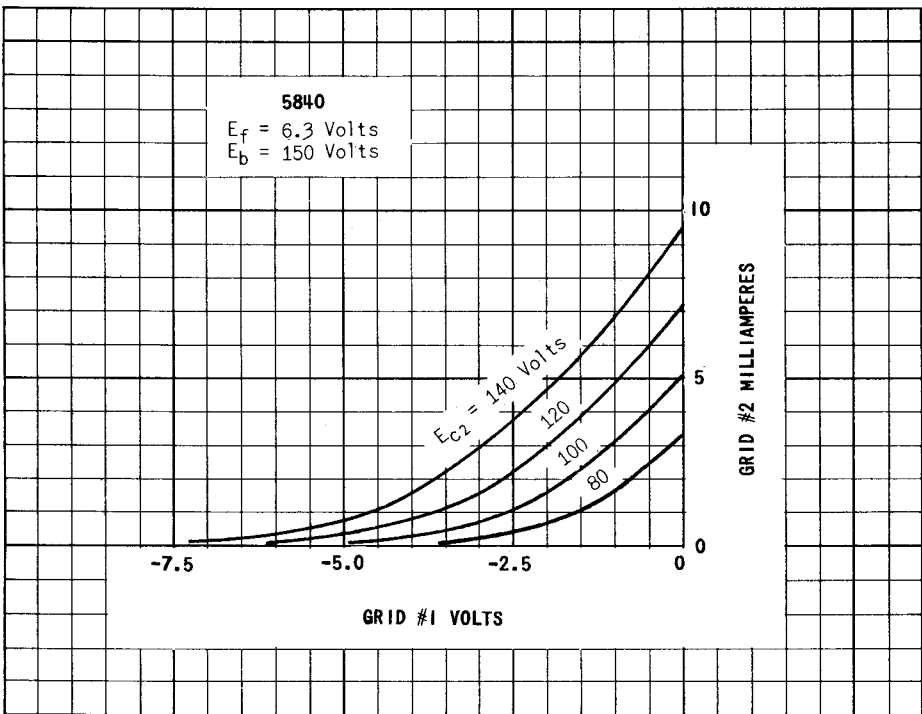
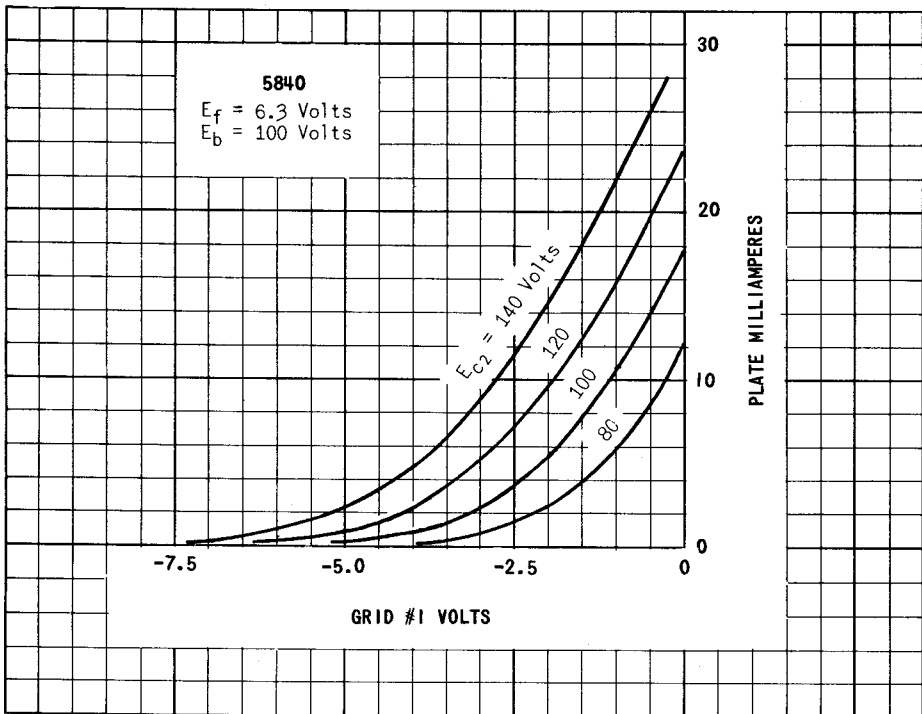
STATISTICAL SAMPLE SUBJECTED TO PRESSURE OF 55 MILLIMETERS OF MERCURY TO EVALUATE AND CONTROL ARCING AND CORONA.

NOTE: THE CONDITIONS FOR SOME OF THE INDICATED TESTS HAVE BEEN DELIBERATELY SELECTED TO AGGRAVATE TUBE FAILURES FOR TEST AND EVALUATION PURPOSES. IN NO SENSE SHOULD THESE CONDITIONS BE INTERPRETED AS SUITABLE CIRCUIT OPERATING CONDITIONS. IN THE DESIGN OF MILITARY EQUIPMENT EMPLOYING THIS TUBE, REFERENCE SHOULD BE MADE TO THE APPROPRIATE MIL-E-1 SPECIFICATION.



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