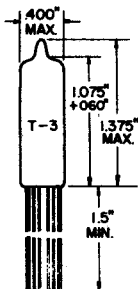


## TUNG-SOL

## PENTODE

## SUBMINIATURE TYPE



**GLASS BULB**  
SUBMINIATURE BUTTON  
8 LEAD BASE E8-10  
OUTLINE DRAWING  
JEDEC 3-1

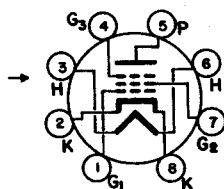
COATED UNIPOTENTIAL CATHODE

HEATER

6.3±5% VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION

**BOTTOM VIEW**

BASING DIAGRAM  
JEDEC 8DC

THE 6205 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 EXTERNAL CONNECTION FOR THE SUPPRESSOR GRID, THE 6205 IS IDENTICAL TO THE 5840.

## DIRECT INTERELECTRODE CAPACITANCES

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

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

**RATINGS**  
ABSOLUTE MAXIMUM VALUES

HEATER VOLTAGE	6.3±5%	VOLTS
MAXIMUM PLATE VOLTAGE	165	VOLTS
MAXIMUM SCREEN VOLTAGE	155	VOLTS
MAXIMUM SUPPRESSOR VOLTAGE	22	VOLTS
MAXIMUM POSITIVE DC GRID #1 VOLTAGE	0	VOLTS
MAXIMUM NEGATIVE DC GRID #1 VOLTAGE	55	VOLTS
MAXIMUM PLATE DISSIPATION	→ 1.1	WATTS
MAXIMUM SCREEN DISSIPATION	→ 0.55	WATTS
MAXIMUM DC CATHODE CURRENT	16.5	MA.
MAXIMUM HEATER=CATHODE VOLTAGE:		
HEATER POSITIVE WITH RESPECT TO CATHODE	200	VOLTS
HEATER NEGATIVE WITH RESPECT TO CATHODE	200	VOLTS
MAXIMUM GRID #1 CIRCUIT RESISTANCE	1.1	MEG OHMS
MAXIMUM BULB TEMPERATURE AT HOTTEST POINT	220	C

→ INDICATES A CHANGE.

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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
SUPPRESSOR, CONNECTED TO CATHODE AT SOCKET		
SCREEN VOLTAGE	100	VOLTS
CATHODE-BIAS RESISTOR	150	OHMS
PLATE RESISTANCE, APPROX.	0.26	MEG.
TRANSCONDUCTANCE	5000	μMHOS
PLATE CURRENT	7.5	MA.
SCREEN CURRENT	2.4	MA.
GRID #1 VOLTAGE, APPROX. $I_b = 10 \mu$ AMPS.	-9.0	VOLTS

## CLASS A RESISTANCE COUPLED AMPLIFIER

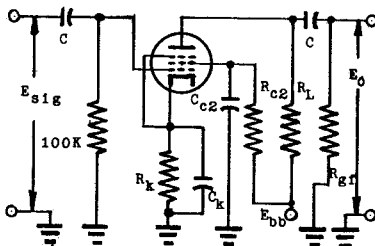
## LOW IMPEDANCE DRIVE (APPROXIMATELY 200 OHMS)

$R_L$	$R_{gf}$	Ebb = 90 VOLTS				Ebb = 150 VOLTS				Ebb = 225 VOLTS			
		$R_k$	$R_{c2}$	$E_o$	Gain	$R_k$	$R_{c2}$	$E_o$	Gain	$R_k$	$R_{c2}$	$E_o$	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)

$R_L$	$R_{gf}$	Ebb = 90 VOLTS				Ebb = 150 VOLTS				Ebb = 225 VOLTS			
		$R_k$	$R_{c2}$	$E_o$	Gain	$R_k$	$R_{c2}$	$E_o$	Gain	$R_k$	$R_{c2}$	$E_o$	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

- $E_o$  IS MAXIMUM RMS VOLTAGE OUTPUT FOR APPROXIMATELY 5% TOTAL HARMONIC DISTORTION.
- GAIN IS MEASURED FOR AN OUTPUT VOLTAGE OF TWO VOLTS RMS.
- $R_k$  IS IN OHMS;  $R_{c2}$ ,  $R_L$ , &  $R_{gf}$ , ARE IN MEGOHMS.
- COUPLING CAPACITORS (C) SHOULD BE SELECTED TO GIVE DESIRED FREQUENCY RESPONSE.  $R_k$  &  $R_{c2}$  SHOULD BE ADEQUATELY BY-PASSED.



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## TUNG-SOL

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## CHARACTERISTICS LIMITS

		MIN.	MAX.	
<b>HEATER CURRENT:</b>				
$E_f = 6.3$ VOLTS	INITIAL	140	160	MA.
	500-HR.	138	164	MA.
<b>PLATE CURRENT:</b>				
$E_f = 6.3$ VOLTS, $E_b = 100$ VOLTS, $E_{c2} = 100$ VOLTS, $R_k = 150$ OHMS (BYPASSED), $g_3$ TIED TO $k$	INITIAL	5.5	9.5	MA.
<b>SCREEN CURRENT:</b>				
$E_f = 6.3$ VOLTS, $E_b = 100$ VOLTS, $E_{c2} = 100$ VOLTS, $R_k = 150$ OHMS (BYPASSED), $g_3$ TIED TO $k$	INITIAL	1.5	3.3	MA.
<b>TRANSCONDUCTANCE (1):</b>				
$E_f = 6.3$ VOLTS, $E_b = 100$ VOLTS, $E_{c2} = 100$ VOLTS, $R_k = 150$ OHMS (BYPASSED), $g_3$ TIED TO $k$	INITIAL	4200	5800	$\mu$ MHOS
<b>TRANSCONDUCTANCE CHANGE WITH HEATER VOLTAGE</b>				
DIFFERENCE BETWEEN TRANSCONDUCTANCE (1) AND TRANSCONDUCTANCE AT $E_f = 5.7$ VOLTS (OTHER CONDITIONS THE SAME) EXPRESSED AS A PERCENTAGE OF TRANS-CONDUCTANCE (1)				
	INITIAL	---	10	PERCENT
	500-HR.	---	15	PERCENT
<b>TRANSCONDUCTANCE CHANGE WITH OPERATION:</b>				
DIFFERENCE BETWEEN TRANSCONDUCTANCE (1) INITIALLY AND AFTER OPERATION EXPRESSED AS A PERCENTAGE OF INITIAL VALUE				
	500-HR.	---	20	PERCENT
<b>AVERAGE TRANSCONDUCTANCE CHANGE WITH OPERATION:</b>				
AVERAGE OF VALUES FOR "TRANSCONDUCTANCE CHANGE WITH OPERATION"				
	500-HR.	---	15	PERCENT
<b>PLATE RESISTANCE:</b>				
$E_f = 6.3$ VOLTS, $E_b = 100$ VOLTS, $E_{c2} = 100$ VOLTS, $R_k = 150$ OHMS (BYPASSED), $g_3$ TIED TO $k$	INITIAL	0.175	---	MEGOHMS
<b>PLATE CURRENT CUTOFF:</b>				
$E_f = 6.3$ VOLTS, $E_b = 100$ VOLTS, $E_{c2} = 100$ VOLTS, $E_{c1} = 9.0$ VOLTS, $g_3$ TIED TO $k$	INITIAL	---	50	$\mu$ AMPS.
<b>INTERELECTRODE CAPACITANCES:</b>				
GRID #1 TO PLATE (G1 TO P)	INITIAL	---	0.015	$\mu\mu$ f
INPUT (G1 TO H, K, G2, G3)	INITIAL	3.5	4.9	$\mu\mu$ f
OUTPUT (P TO H, K, G2, G3)	INITIAL	2.9	3.9	$\mu\mu$ f
(MEASURED WITH EXTERNAL SHIELD OF 0.405-INCH INSIDE DIAMETER CONNECTED TO CATHODE.)				
<b>NEGATIVE GRID #1 CURRENT:</b>				
$E_f = 6.3$ VOLTS, $E_b = 100$ VOLTS, $E_{c2} = 100$ VOLTS, $R_k = 150$ OHMS (BYPASSED), $R_{g1} = 1.0$ MEG., $g_3$ TIED TO $k$	INITIAL	0	0.3	$\mu$ AMPS.
	500-HR.	0	0.8	$\mu$ AMPS.

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## TUNG-SOL

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## CHARACTERISTICS LIMITS - cont'd.

		MIN.	MAX.	
<b>HEATER-CATHODE LEAKAGE CURRENT:</b>				
Ef=6.3 VOLTS, E <sub>hk</sub> =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, E <sub>bb</sub> =100 VOLTS, E <sub>c2</sub> =100 VOLTS, R <sub>k</sub> =150 OHMS (BYPASSED) R <sub>L</sub> =10,000 OHMS, g <sub>3</sub> TIED TO k, VIBRATION ACCELERATION = 15 G AT 40 cps				
	INITIAL	---	60	MV.
<b>GRID #1 EMISSION CURRENT:</b>				
Ef=7.5 VOLTS, E <sub>b</sub> =100 VOLTS, E <sub>c2</sub> =100 VOLTS, E <sub>c1</sub> =-9.0 VOLTS, R <sub>g1</sub> =1.0 MEG., g <sub>3</sub> TIED TO k				
	INITIAL	0	0.5	μAMPS.

THE INDICATED 500-HOUR VALUES ARE LIFE-TEST END POINTS FOR THE FOLLOWING CONDITIONS OF OPERATION: Ef=6.3 VOLTS, E<sub>b</sub>=100 VOLTS, E<sub>c2</sub>=100 VOLTS, R<sub>k</sub>=150 OHMS, g<sub>3</sub> TIED TO k, R<sub>g1</sub>=1.0 MEG., E<sub>hk</sub>=200 VOLTS WITH HEATER POSITIVE WITH RESPECT TO CATHODE, AND BULB TEMPERATURE=220 C.

## 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 MINIMUM TO EVALUATE AND CONTROL HEATER-CATHODE DEFECTS. CONDITIONS OF TEST INCLUDE Ef=7.0 VOLTS CYCLED FOR ONE MINUTE ON AND FOUR MINUTES OFF, E<sub>b</sub>=E<sub>c3</sub>=E<sub>c2</sub>=E<sub>c1</sub>=0 VOLTS, AND E<sub>hk</sub>=140 VOLTS RMS.

## 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.

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**TUNG-SOL**

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**SPECIAL TESTS AND RATINGS**

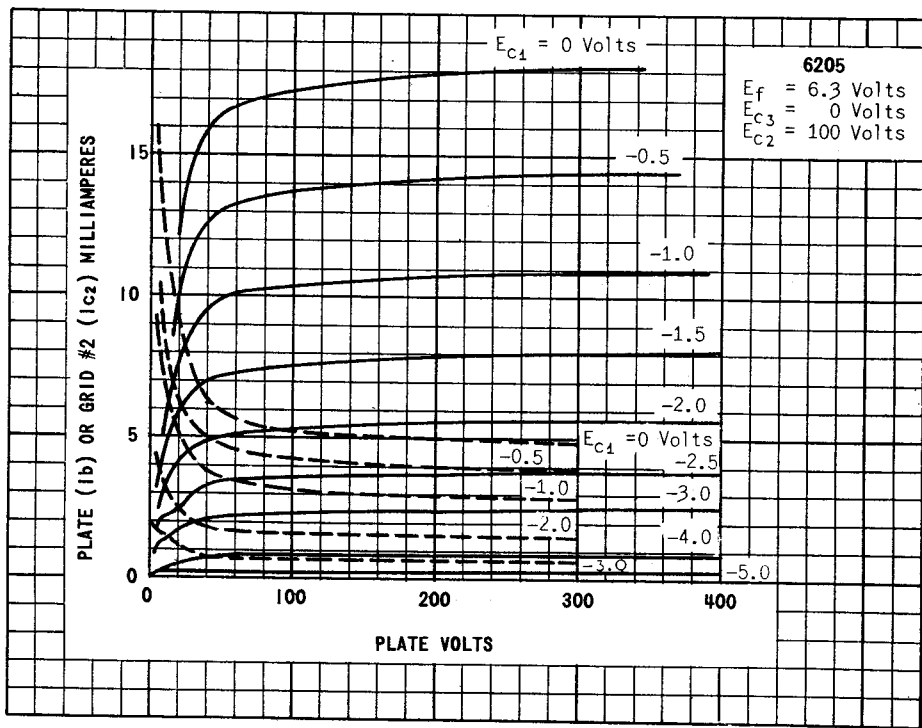
**FATIGUE RATING-2.5 G**

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.

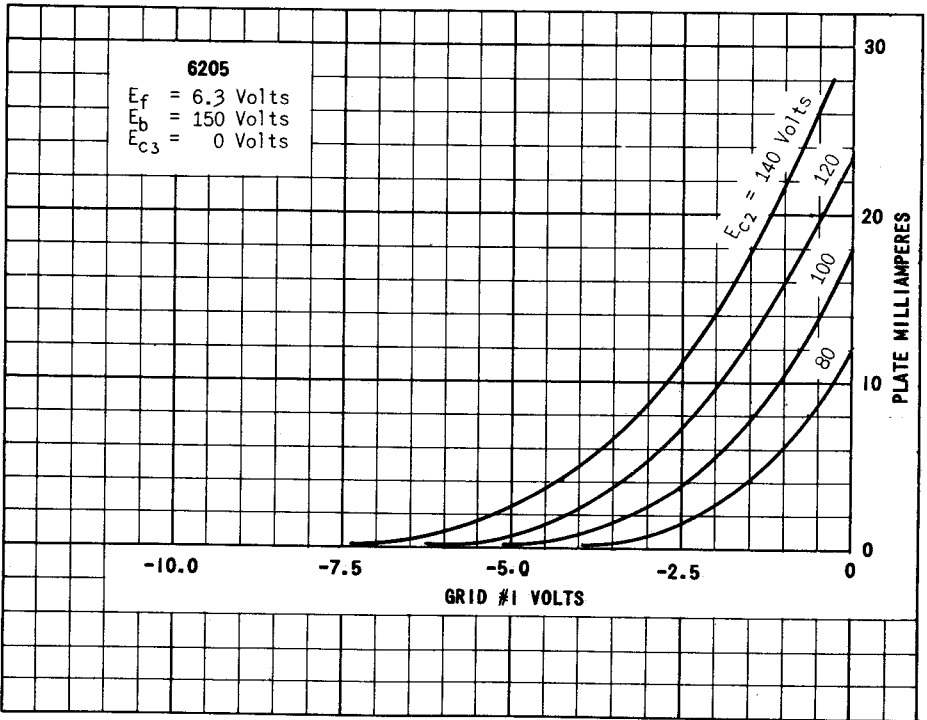
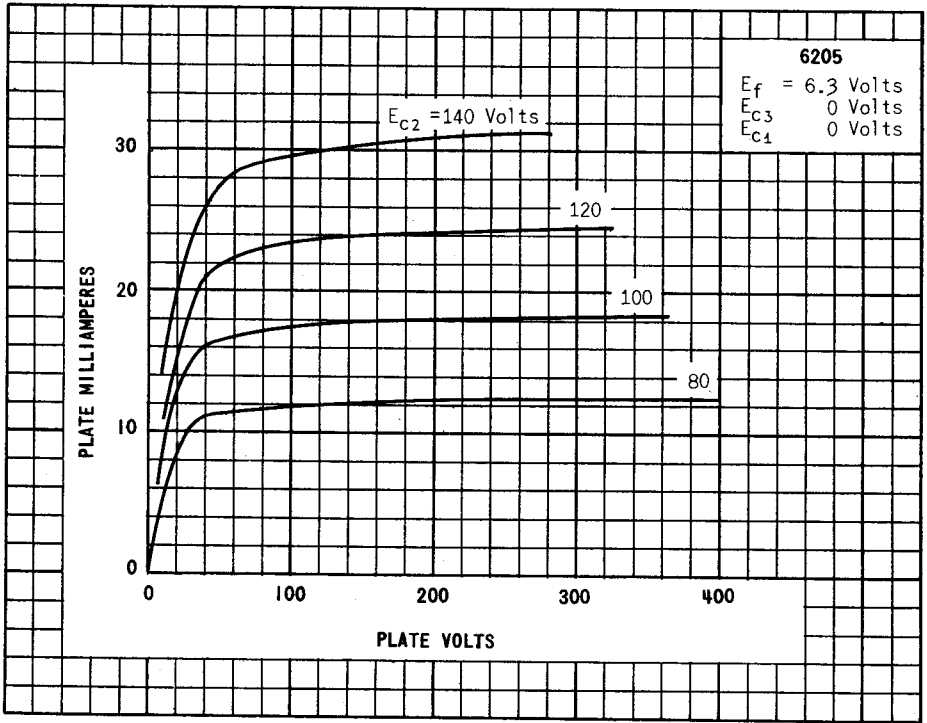
**ALTITUDE RATING-60,000 FEET**

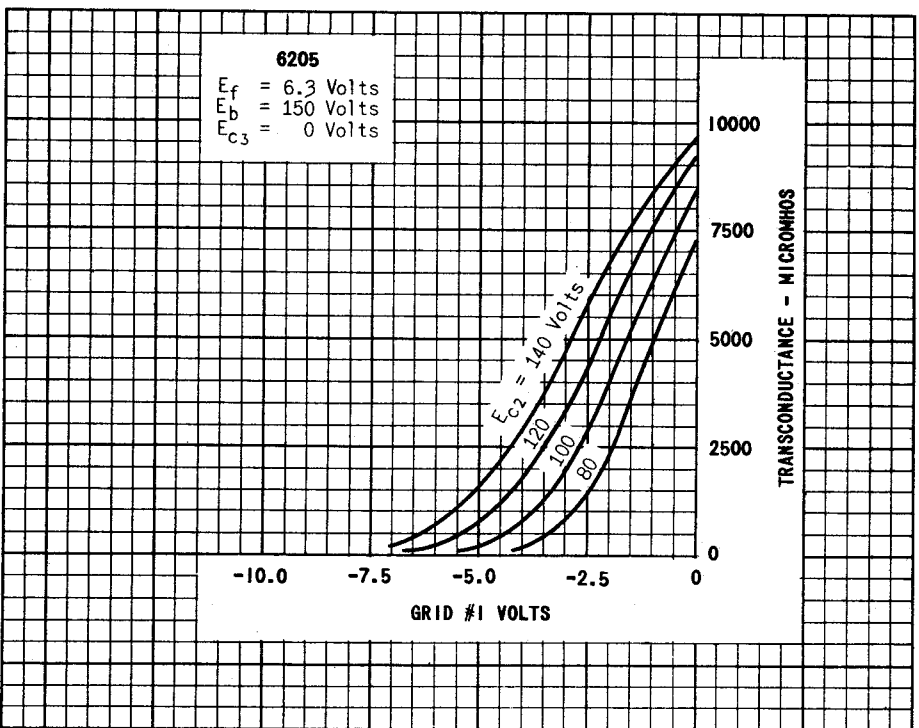
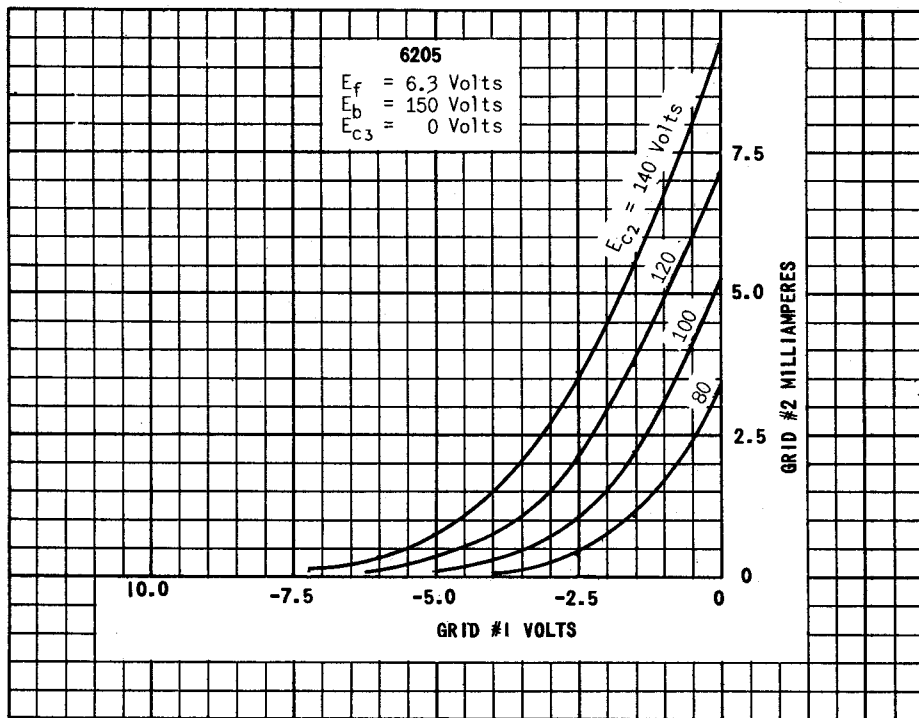
STATISTICAL SAMPLE SUBJECTED TO PRESSURE OF 55 MILLIMETERS OF MERCURY TO EVALUATE AND CONTROL ARCING AND CORONA.

NOTE: THE CONDITIONS FOR SOME OF THE INDICATED TESTS HAVE DELIBERATELY BEEN 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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