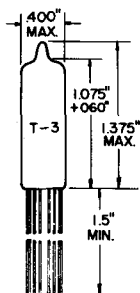


TUNG-SOL

PENTODE SUBMINIATURE TYPE



GLASS BULB

SUBMINIATURE BUTTON
 8 PIN LEAD $\pm 8-10$
 OUTLINE DRAWING
 JEDEC 3-1

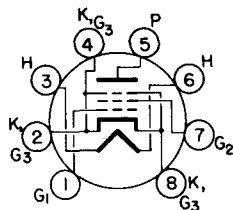
COATED UNIPOTENTIAL CATHODE

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 ^A SHIELD	WITHOUT SHIELD	
GRID #1 TO PLATE, MAXIMUM	0.015	0.03	pf
INPUT	4.2	4.0	pf
OUTPUT	3.4	1.9	pf

^A 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 A₁ 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. $i_b = 10 \mu\text{AMPS}$.	-9.0	VOLTS

CLASS A RESISTANCE COUPLED AMPLIFIER

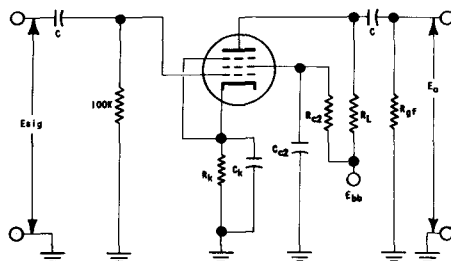
LOW IMPEDANCE DRIVE (APPROXIMATELY 200 OHMS)													
R_L	R_{gf}	Ebb = 90 Volts				Ebb = 150 Volts				Ebb = 225 Volts			
		R_k	R_{c2}	E_o	Gain	R_k	R_{c2}	E_o	Gain	R_k	R_{c2}	E_o	Gain
0.10	0.10	1000	0.2	13	50	500	0.3	19	83	400	0.3	29	110
0.10	0.24	1000	0.2	16	73	500	0.3	25	120	400	0.3	38	160
0.24	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

1. E_o 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_k IS IN OHMS; R_{c2} , R_L , AND R_{gf} ARE IN MEGOHMS.
4. COUPLING CAPACITORS (C) SHOULD BE SELECTED TO GIVE DESIRED FREQUENCY RESPONSE. R_k AND R_{c2} SHOULD BE ADEQUATELY BY-PASSED.

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TUNG-SOL

CONTINUED FROM PRECEDING PAGE



CHARACTERISTICS LIMITS

		MIN.	MAX.	
HEATER CURRENT				
Ef = 6.3 VOLTS	INITIAL	140	160	MA.
	500-HR.	138	164	MA.
PLATE CURRENT:				
Ef=6.3 VOLTS, Eb=100 VOLTS, Ec2=				
100 VOLTS, Rk=150 OHMS (BY-PASSED)	INITIAL	5.5	9.5	MA.
SCREEN CURRENT:				
Ef=6.3 VOLTS, Eb=100 VOLTS, Ec2=				
100 VOLTS, Rk=150 OHMS (BY-PASSED)	INITIAL	1.5	3.3	MA.
TRANSCONDUCTANCE (1):				
Ef=6.3 VOLTS, Eb=100 VOLTS, Ec2=				
100 VOLTS, Rk=150 OHMS (BY-PASSED)	INITIAL	4200	5800	μMHOS
TRANSCONDUCTANCE CHANGE WITH				
HEATER VOLTAGE:				
DIFFERENCE BETWEEN TRANSCONDUCTANCE				
(1) AND TRANSCONDUCTANCE AT Ef= 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:				
Ef=6.3 VOLTS, Eb=100 VOLTS, Ec2=				
100 VOLTS, Rk=150 OHMS (BY-PASSED)	INITIAL	0.175	---	MEGOHMS
PLATE CURRENT CUTOFF:				
Ef=6.3 VOLTS, Eb=100 VOLTS, Ec2=				
100 VOLTS, Ec1=-9.0 VOLTS	INITIAL	---	50	μAMPS.
INTERELECTRODE CAPACITANCES:				
GRID #1 TO PLATE (G1 TO P)	INITIAL	---	0.015	μf
INPUT (G1 TO H, K, G2 G3)	INITIAL	3.5	4.9	μf
OUTPUT (P TO H, K, G2 G3)	INITIAL	2.9	3.9	μf

(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.	
NEGATIVE GRID #1 CURRENT:					
Ef=6.3 VOLTS, Eb=100 VOLTS, Ec2=100 VOLTS, Rk=150 OHMS (BY-PASSED), Rg1=1.0 MEG.					
	INITIAL	---	0.3		μ AMPS.
	500-HR.	---	0.8		μ AMPS.
HEATER-CATHODE LEAKAGE CURRENT:					
Ef=6.3 VOLTS, Ehb=100 VOLTS, HEATER POSITIVE WITH RESPECT TO CATHODE					
	INITIAL	---	5.0		μ AMPS.
	500-HR.	---	10		μ AMPS.
HEATER NEGATIVE WITH RESPECT TO CATHODE					
	INITIAL	---	5.0		μ AMPS.
	500-HR.	---	10		μ AMPS.
INTERELECTRODE LEAKAGE RESISTANCE:					
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.
VIBRATIONAL NOISE OUTPUT VOLTAGE RMS					
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.
GRID #1 EMISSION CURRENT:					
Ef=7.5 VOLTS, Eb=100 VOLTS, Ec2=100 VOLTS, Ecc1=-9.0 VOLTS, Rg1=1.0 MEG.					
	INITIAL	---	0.5		μ AMPS.

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, Ehb=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 Ehb=140 VOLTS RMS.

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TUNG-SOL

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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.

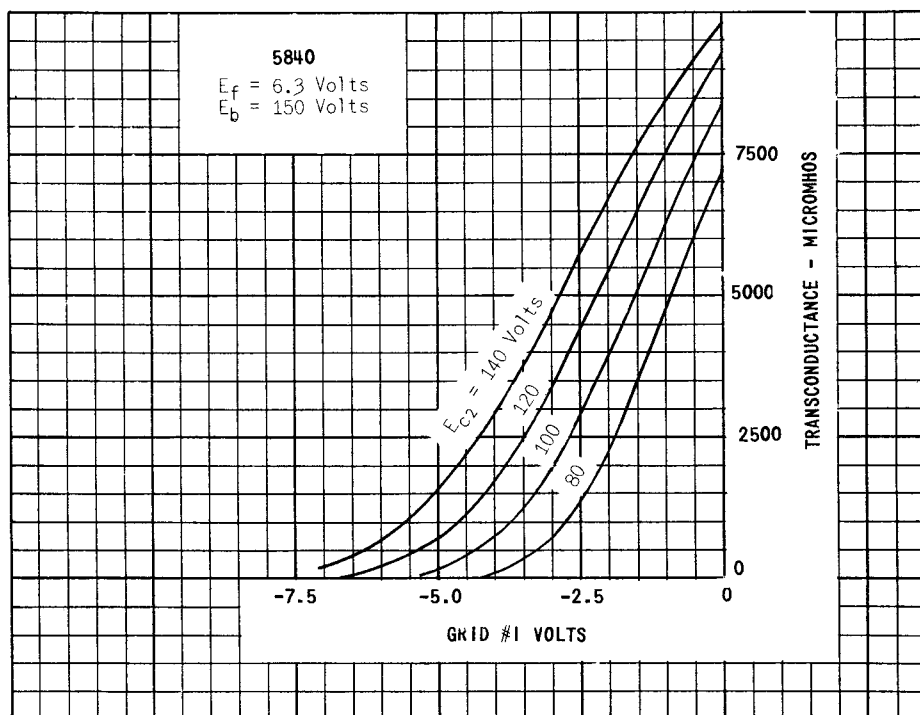
FATIGUE RATING-2.5 G

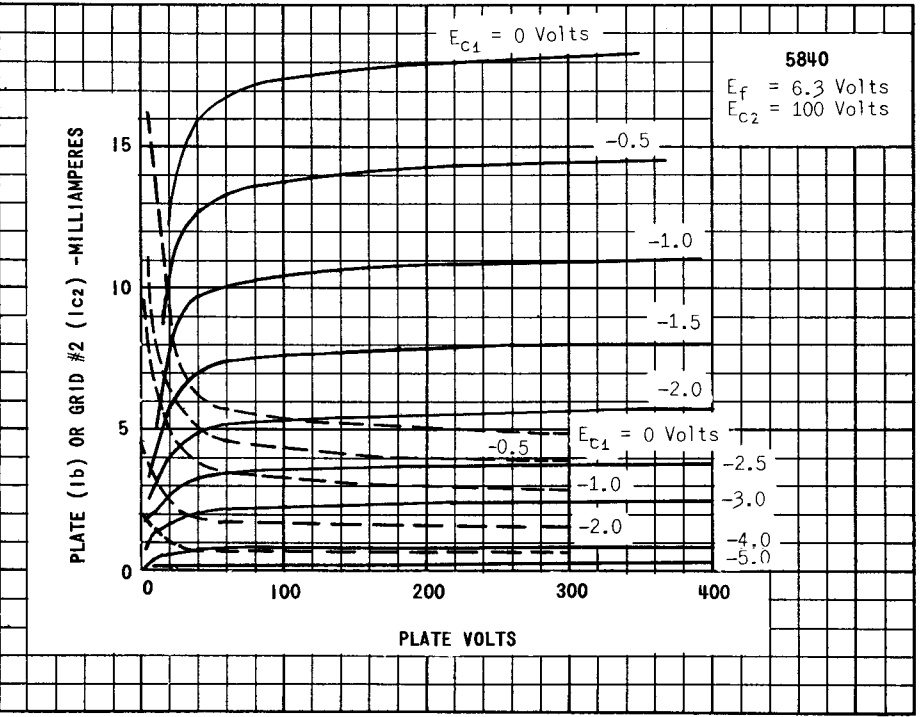
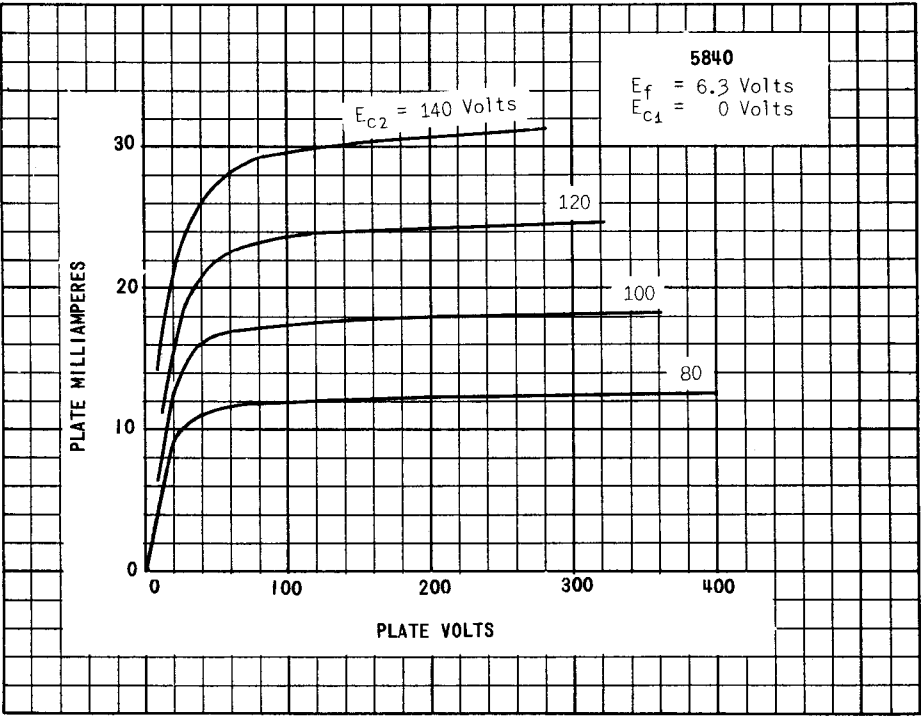
STATISTICAL SAMPLE SUBJECTED TO VIBRATIONAL ACCELERATION OF 2.5 G FOR 32 HOURS MINIMUM IN EACH OF THREE DIFFERENT POSITIONS. THE SINUSOIDAL VIBRATION IS APPLIED AT A FIXED FREQUENCY BETWEEN 25 AND 60 CYCLES PER SECOND.

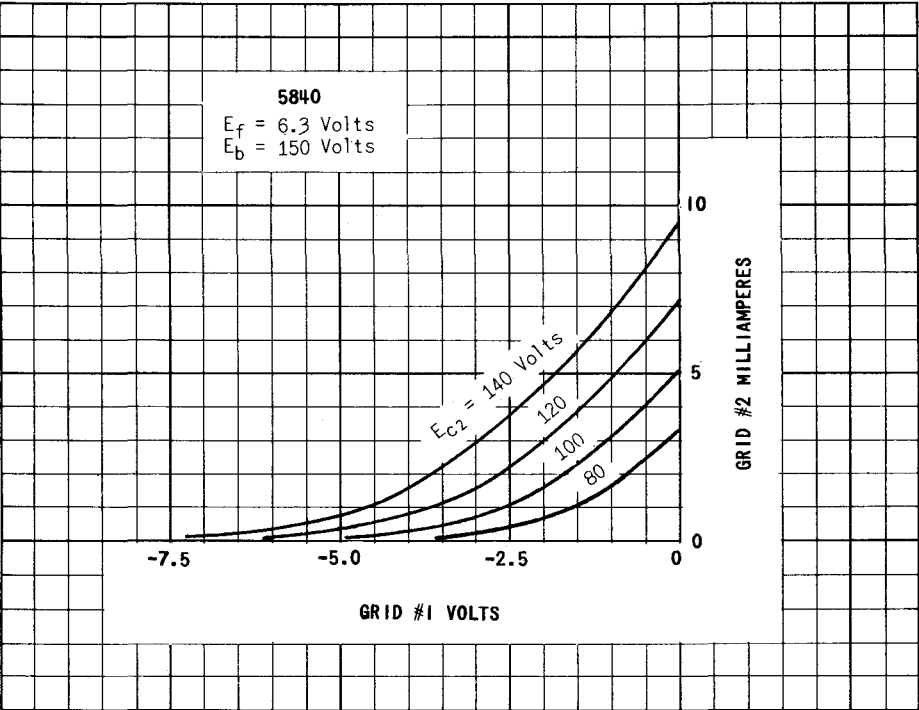
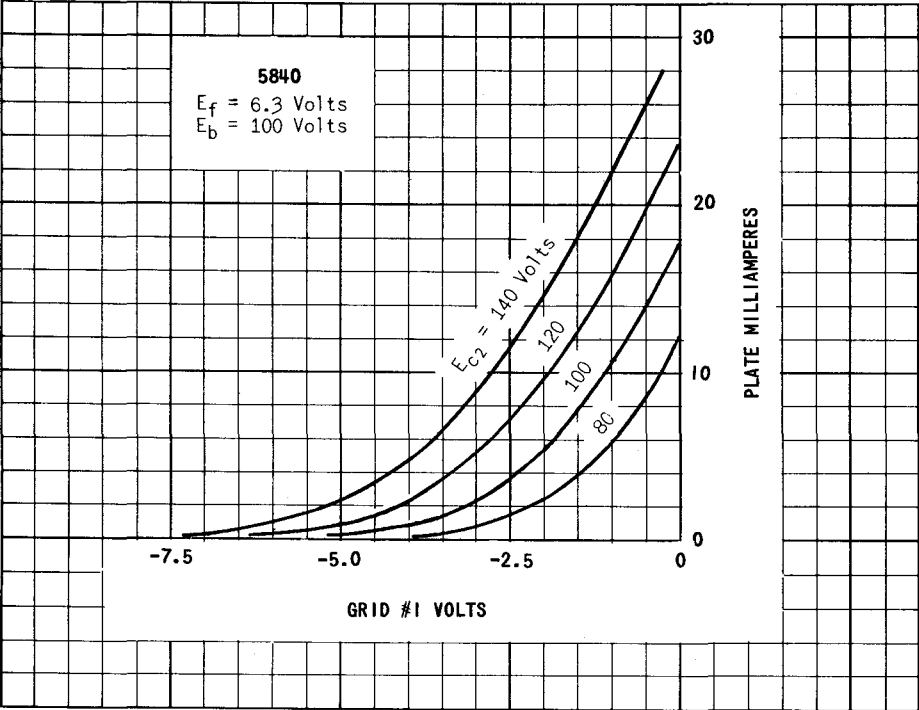
ALTITUDE RATING-60,000 FEET

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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