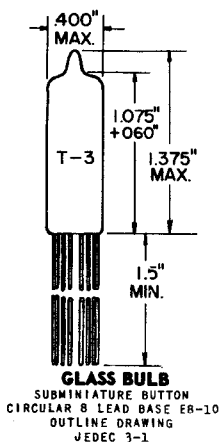


## TUNG-SOL

## PENTODE

## SUBMINIATURE TYPE



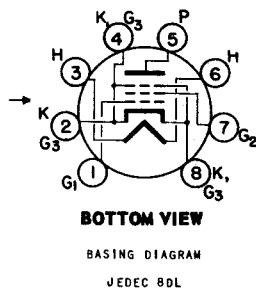
COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION



THE 5899 IS A SUBMINIATURE, SEMI-REMOTE-CUTOFF PENTODE DESIGNED FOR USE AS A WIDE-BAND, HIGH FREQUENCY AMPLIFIER. ITS SEMI-REMOTE CHARACTERISTIC MAKES IT SUITABLE FOR USE IN CIRCUITS TO WHICH IT IS DESIGNED TO APPLY AUTOMATIC-GAIN-CONTROL.

## DIRECT INTERELECTRODE CAPACITANCES

	WITH SHIELD <sup>A</sup>	WITHOUT SHIELD	
GRID #1 TO PLATE (MAX.)	0.015	0.03	$\mu\mu\text{f}$
INPUT	4.2	4.0	$\mu\mu\text{f}$
OUTPUT	3.4	1.9	$\mu\mu\text{f}$

<sup>A</sup>WITH EXTERNAL SHIELD #317.

## RATINGS

ABSOLUTE MAXIMUM VALUES

HEATER VOLTAGE	6.3	VOLTS
MAXIMUM PLATE VOLTAGE	165	VOLTS
MAXIMUM SCREEN VOLTAGE	155	VOLTS
MAXIMUM NEGATIVE DC GRID #1 VOLTAGE	55	VOLTS
MAXIMUM PLATE DISSIPATION	0.75	WATTS
MAXIMUM SCREEN DISSIPATION	0.35	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 BULB TEMPERATURE AT HOTTEST POINT	220	C

→ INDICATES A CHANGE.

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## TUNG-SOL

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## TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A<sub>1</sub> AMPLIFIER

PLATE VOLTAGE	100	VOLTS
SCREEN VOLTAGE	100	VOLTS
CATHODE-BIAS RESISTOR	120	OHMS
PLATE RESISTANCE (APPROX.)	0.26	MEGOHMS
TRANSCONDUCTANCE	4500	μMHOS
PLATE CURRENT	7.2	MA.
SCREEN CURRENT	2.0	MA.
GRID #1 VOLTAGE (APPROX.) $G_m = 25$ μMHOS	-14	VOLTS

## CHARACTERISTICS LIMITS

		MIN	MAX	
HEATER CURRENT				
E <sub>f</sub> = 6.3 VOLTS	INITIAL	140	160	MA.
	500-HR.	138	164	MA.
PLATE CURRENT:				
E <sub>f</sub> = 6.3 VOLTS, E <sub>b</sub> = 100 VOLTS, E <sub>c2</sub> = 100 VOLTS, R <sub>k</sub> = 120 OHMS (BY-PASSED)	INITIAL	5.2	9.2	MA.
SCREEN CURRENT:				
E <sub>f</sub> = 6.3 VOLTS, E <sub>b</sub> = 100 VOLTS, E <sub>c2</sub> = 100 VOLTS, R <sub>k</sub> = 120 OHMS (BY-PASSED)	INITIAL	1.0	3.0	MA.
TRANSCONDUCTANCE (1):				
E <sub>f</sub> = 6.3 VOLTS, E <sub>b</sub> = 100 VOLTS, E <sub>c2</sub> = 100 VOLTS, R <sub>k</sub> = 120 OHMS (BY-PASSED)	INITIAL	3800	5200	μMHOS
TRANSCONDUCTANCE CHANGE WITH HEATER VOLTAGE:				
DIFFERENCE BETWEEN TRANSCONDUCTANCE (1) AND TRANSCONDUCTANCE AT E <sub>f</sub> = 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 "TRANSCON- DUCTANCE CHANGE WITH OPERATION"	500-HR.	---	15	PERCENT
PLATE RESISTANCE:				
E <sub>f</sub> = 6.3 VOLTS, E <sub>b</sub> = 100 VOLTS, E <sub>c2</sub> = 100 VOLTS, R <sub>k</sub> = 120 OHMS (BY-PASSED)	INITIAL	0.175	---	MEGOHMS
TRANSCONDUCTANCE CUTOFF:				
E <sub>f</sub> = 6.3 VOLTS, E <sub>b</sub> = 100 VOLTS, E <sub>c2</sub> = 100 VOLTS, E <sub>c1</sub> = -14 VOLTS	INITIAL	1.0	75	μMHOS
INTERELECTRODE CAPACITANCES:				
GRID #1 TO PLATE (G1 TO P)	INITIAL	---	0.015	μμf
INPUT (G1 TO H, K, G2, G3)	INITIAL	3.8	4.8	μμf
OUTPUT (P TO H, K, G2, G3)	INITIAL	2.9	3.9	μμf
(MEASURED WITH EXTERNAL SHIELD OF 0.405 INCH DIAMETER CONNECTED TO CATHODE)				

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## TUNG-SOL

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## CHARACTERISTICS LIMITS - cont'd.

## NEGATIVE GRID #1 CURRENT:

Ef = 6.3 VOLTS, Eb = 100 VOLTS, Ec2 =  
100 VOLTS, Rk = 120 OHMS (BY-PASSED),  
Rg1 = 1.0 MEG.

INITIAL	---	0.3	μAMPS.
500-HR.	---	0.8	μAMPS.

## HEATER-CATHODE LEAKAGE CURRENT:

Ef = 6.3 VOLTS, Ehk = 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.

## 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	---	MEGOHMS
500-HR.	50	---	MEGOHMS

PLATE TO ALL AT 300 VOLTS DC

INITIAL	100	---	MEGOHMS
500-HR.	50	---	MEGOHMS

## VIBRATIONAL NOISE OUTPUT VOLTAGE, RMS

Ef = 6.3 VOLTS, Ebb = 100 VOLTS, Ec2 =  
100 VOLTS, Rk = 120 OHMS (BY-PASSED),  
RL = 10,000 OHMS, VIBRATIONAL  
ACCELERATION = 15 G AT 40 cps.

INITIAL	---	60	MV.
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## GRID #1 EMISSION CURRENT:

Ef = 7.5 VOLTS, Eb = 100 VOLTS, Ec2 =  
100 VOLTS, Ecc1 = 14 VOLTS,  
Rg1 = 1.0 MEG.

INITIAL	---	0.5	μAMPS.
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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 = 120 OHMS, Rg1 = 1.0 MEG, Ehk = 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 Ehk = 140 VOLTS RMS.

## TUNG-SOL

CONTINUED FROM PRECEDING PAGE

## 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.

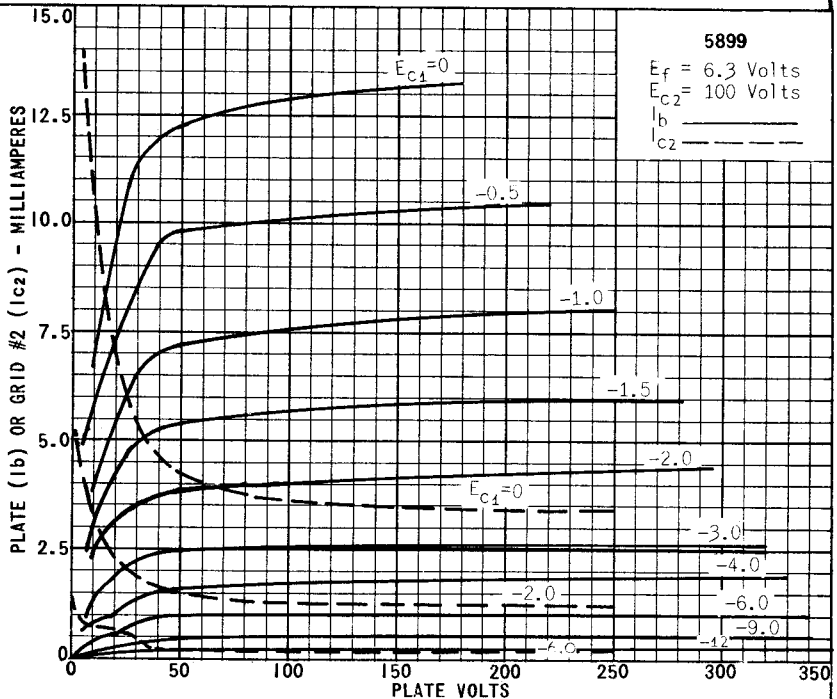
## ALTITUDE RATING--60,000 FEET

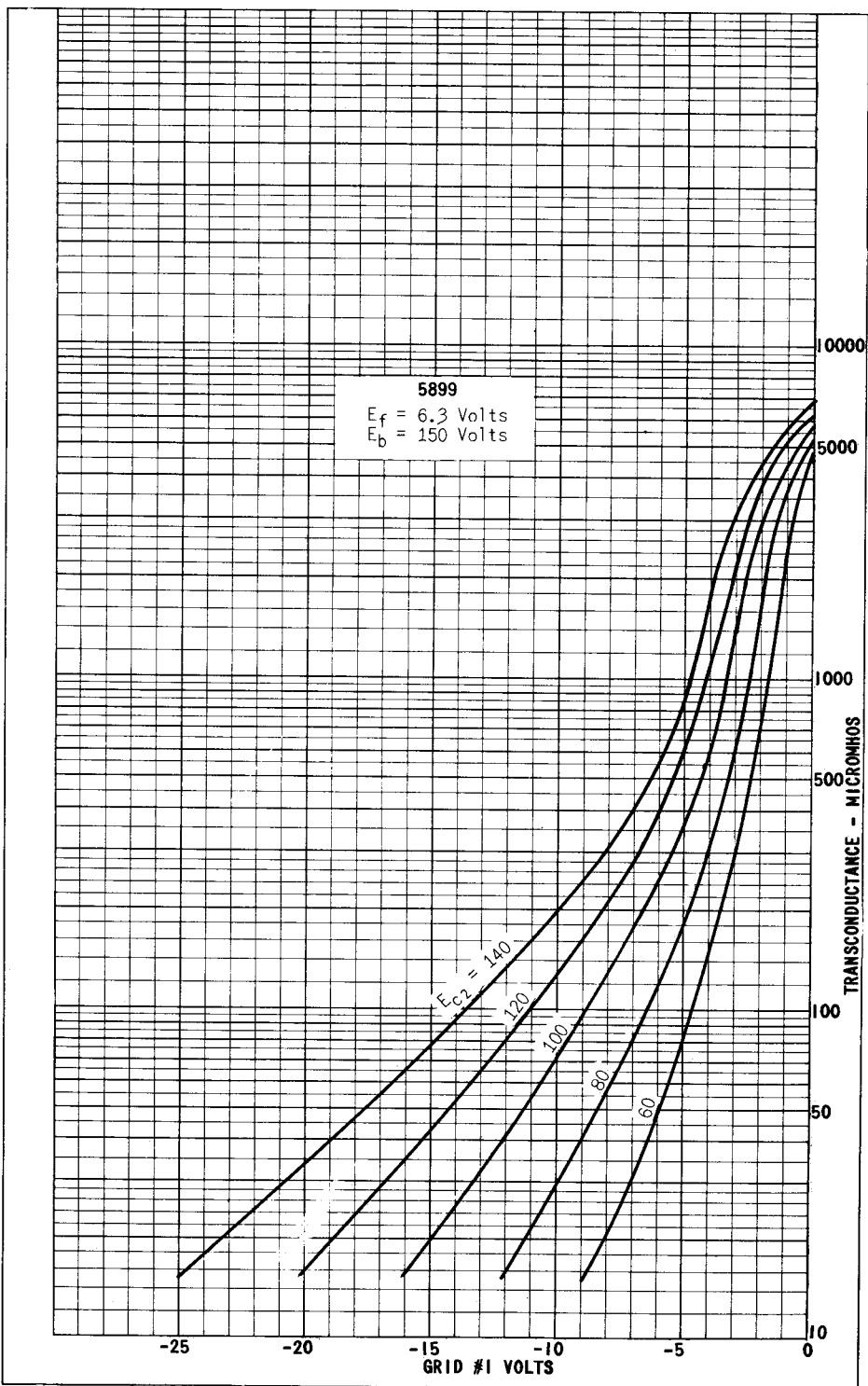
STATISTICAL SAMPLE SUBJECTED TO PRESSURE OF 55 MILLIMETERS OF MERCURY TO EVALUATE AND CONTROL ARCING AND CORONA.

## NOTE:

THE CONDITIONS FOR SOME OF THE INDICATED TESTS HAVE 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.





PRINTED IN U. S. A.

