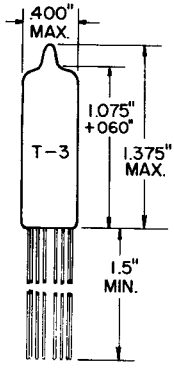
**TUNG-SOL**

# TRIODE

SUBMINIATURE TYPE




**GLASS BULB**

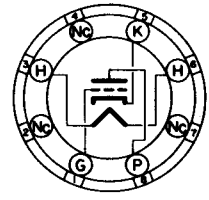
COATED UNIPOTENTIAL CATHODE

HEATER

6.3±5% VOLTS 0.15 AMP.

AC OR DC

ANY MOUNTING POSITION




**BOTTOM VIEW**
SUBMINIATURE BUTTON
8 LEAD BASE

8DK

THE 5719 IS A SUBMINIATURE HIGH-MU TRIODE DESIGNED FOR USE AS AN AUDIO-FREQUENCY VOLTAGE AMPLIFIER. BECAUSE OF ITS LOW MICROPHONIC CHARACTERISTICS, THE TUBE CAN BE EMPLOYED AT RELATIVELY LOW SIGNAL LEVELS.

## DIRECT INTERELECTRODE CAPACITANCES

| | WITH SHIELD[A] | WITHOUT SHIELD | |
|---|---|---|---|
| GRID TO PLATE | 0.8 | 0.8 | μμf |
| INPUT | 1.9 | 1.7 | μμf |
| OUTPUT | 2.2 | 0.6 | μμf |

[A] 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 NEGATIVE DC GRID VOLTAGE | 55 | VOLTS |
| MAXIMUM PLATE DISSIPATION | 0.1 | WATTS |
| MAXIMUM DC PLATE CURRENT | 3.3 | MA. |
| MAXIMUM HEATER-CATHODE VOLTAGE: | | |
| HEATER POSITIVE WITH RESPECT TO CATHODE | 200 | VOLTS |
| HEATER NEGATIVE WITH RESPECT TO CATHODE | 200 | VOLTS |
| MAXIMUM GRID CIRCUIT RESISTANCE | 1.2 | MEGOHMS |
| MAXIMUM BULB TEMPERATURE AT HOTTEST POINT | 220 | C |

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## TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS $A_1$ AMPLIFIER

| | | |
|---|---|---|
| HEATER VOLTAGE | 6.3±5% | VOLTS |
| HEATER CURRENT | 0.15 | AMP |
| PLATE VOLTAGE | 100 | VOLTS |
| CATHODE-BIAS RESISTOR | 1500 | OHMS |
| AMPLIFICATION FACTOR | 70 | |
| PLATE RESISTANCE (APPROX.) | 41,000 | OHMS |
| TRANSCONDUCTANCE | 1700 | μMHOS |
| PLATE CURRENT | 0.73 | MA. |
| GRID VOLTAGE (APPROX.) Ib = 10 μAMPS. | −2.5 | 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 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | $R_k$ | $E_o$ | GAIN | $R_k$ | $E_o$ | GAIN | $R_k$ | $E_o$ | GAIN |
| 0.10 | 0.10 | 2000 | 3.5 | 30 | 1200 | 11 | 38 | 1000 | 22 | 41 |
| 0.10 | 0.24 | 2300 | 5.3 | 35 | 1400 | 14 | 43 | 1100 | 27 | 46 |
| 0.24 | 0.24 | 4700 | 5.1 | 36 | 2900 | 12 | 44 | 2100 | 24 | 49 |
| 0.24 | 0.51 | 5100 | 6.6 | 39 | 3300 | 16 | 47 | 2500 | 30 | 51 |
| 0.51 | 0.51 | 9000 | 5.8 | 38 | 5800 | 13 | 46 | 4600 | 25 | 49 |
| 0.51 | 1.0 | 10000 | 7.6 | 42 | 6800 | 17 | 48 | 5600 | 31 | 51 |

HIGH IMPEDANCE DRIVE (APPROXIMATELY 100K OHMS)

| $R_L$ | $R_{gf}$ | Ebb = 90 VOLTS | | | $E_{bb}$ = 150 VOLTS | | | Ebb = 225 VOLTS | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | $R_k$ | $E_b$ | GAIN | $R_k$ | $E_o$ | GAIN | $R_k$ | $E_o$ | GAIN |
| 0.10 | 0.10 | 2700 | 6.7 | 29 | 1700 | 14 | 37 | 1300 | 25 | 40 |
| 0.10 | 0.24 | 3200 | 9.1 | 34 | 2000 | 18 | 41 | 1500 | 32 | 45 |
| 0.24 | 0.24 | 5600 | 8.7 | 34 | 3600 | 17 | 42 | 2700 | 29 | 47 |
| 0.24 | 0.51 | 6300 | 11 | 38 | 4200 | 22 | 45 | 3200 | 37 | 49 |
| 0.51 | 0.51 | 11000 | 9.5 | 37 | 7000 | 19 | 44 | 5300 | 32 | 49 |
| 0.51 | 1.0 | 12000 | 12 | 40 | 8000 | 24 | 47 | 6300 | 40 | 51 |

1. $E_o$ IS MAXIMUM RMS VOLTAGE OUTPUT FOR APPROXIMATELY 5% TOTAL HARMONIC DISTORTION.

2. GAIN IS MEASURED FOR AN OUTPUT VOLTAGE OF TWO VOLTS RMS.

3. $R_k$ IS IN OHMS; $R_L$ AND $R_{gf}$ ARE IN MEGOHMS.

4. COUPLING CAPACITORS (C) SHOULD BE SELECTED TO GIVE DESIRED FREQUENCY RESPONSE. $R_k$ SHOULD BE ADEQUATELY BY-PASSED.

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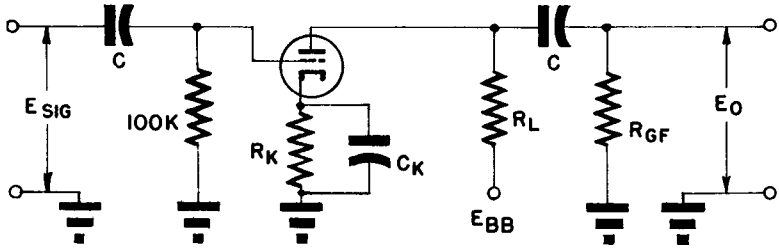


## CHARACTERISTICS LIMITS

| | | MIN. | MAX. | |
|---|---|---|---|---|
| HEATER CURRENT | INITIAL | 140 | 160 | MA. |
| Ef = 6.3 V. | 500 HR. | 138 | 164 | MA. |
| PLATE CURRENT | | | | |
| Ef=6.3 V., Eb =100 V., Rk = 1500 OHMS | | | | |
| (BY-PASSED) | INITIAL | 0.5 | 0.9 | MA. |
| TRANSCONDUCTANCE (1) | | | | |
| Ef =6.3 V., Eb =100 V., Rk = 1500 OHMS | | | | |
| (BY-PASSED) | INITIAL | 1400 | 2000 | μMHOS |
| TRANSCONDUCTANCE CHANGE WITH HEATER VOLTAGE: | | | | |
| DIFFERENCE BETWEEN TRANSCONDUCTANCE (1) AND TRANSCONDUCTANCE AT Ef =5.7 V., (OTHER CONDITIONS THE SAME) EXPRESSED AS A PERCENTAGE OF TRANSCONDUCTANCE (1) | INITIAL | --- | 10 | PERCENT |
| | 500HR. | --- | 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: | | | | |
| AVG. OF VALUES FOR 'TRANSCONDUCTANCE CHANGE WITH OPERATION' | 500 HR. | --- | 15 | PERCENT |
| AMPLIFICATION FACTOR: | | | | |
| Ef =6.3 V., Eb =100 V., Rk = 1500 OHMS | | | | |
| (BY-PASSED) | INITIAL | 60 | 80 | |
| PLATE CURRENT CUTOFF (1) | | | | |
| Ef = 6.3 V., Eb =100 V., Ec =-2.5 V., | INITIAL | --- | 50 | μAMPS. |
| PLATE CURRENT CUTOFF (2) | | | | |
| Ef =6.3 V., Eb =100 V., Ec =-1.8 V. | INITIAL | 5 | --- | μAMPS. |

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## CHARACTERISTICS LIMITS - cont'd.

| | | MIN. | MAX. | |
|---|---|---|---|---|
| AC AMPLIFICATION: | | | | |
| (RMS OUTPUT VOLTAGE FROM FIXED INPUT SIGNAL) | | | | |
| Ef =6.3 V., Ebb=100 V., Ecc=0 V | | | | |
| Esig = 0.2 V., RMS | INITIAL | 8.0 | --- | VOLTS |
| INTERELECTRODE CAPACITANCES: | | | | |
| GRID TO PLATE (G TO P) | INITIAL | 0.6 | 1.0 | μμf |
| INPUT ( G TO K+H) | INITIAL | 1.2 | 2.2 | μμf |
| OUTPUT (P TO K+H) | INITIAL | 0.4 | 0.8 | μμf |
| (MEASURED WITHOUT EXTERNAL SHIELD) | | | | |
| NEGATIVE GRID CURRENT | | | | |
| Ef =6.3 V., Eb =150 V., Rk= 2700 OHMS | | | | |
| (BY-PASSED), Rg = 1.0 MEG. | INITIAL | --- | 0.3 | μAMPS. |
| | 500 HR. | --- | 0.6 | μAMPS. |
| HEATER-CATHODE LEAKAGE CURRENT: | | | | |
| Ef =6.3 V., Ehk =100 V., | | | | |
| 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 V., POLARITY OF APPLIED DC | | | | |
| INTERELECTRODE VOLTAGE IS SUCH THAT | | | | |
| NO CATHODE EMISSION RESULTS | | | | |
| GRID TO ALL AT 100 VOLTS DC | INITIAL | 100 | --- | MEGOHMS |
| | 500 HR. | 25 | --- | MEGOHMS |
| PLATE TO ALL AT 300 VOLTS DC | INITIAL | 100 | --- | MEGOHMS |
| | 500 HR. | 25 | --- | MEGOHMS |
| VIBRATIONAL NOISE OUTPUT VOLTAGE, RMS: | | | | |
| Ef =6.3 V., Ebb = 100 V., Rk = 1500 OHMS | | | | |
| (BY-PASSED), $R_L$ = 10,000 OHMS, | | | | |
| VIBRATIONAL ACCELERATION =15 G AT 40cps | INITIAL | --- | 25 | MV. |
| GRID EMISSION CURRENT: | | | | |
| Ef = 7.5 V., Eb =100 V., Ecc =-2.5 V., | | | | |
| Rg =1.0 MEG. | INITIAL | --- | 0.3 | μAMPS. |

THE INDICATED 500-HOUR VALUES ARE LIFE-TEST END POINTS FOR THE FOLLOWING CONDITIONS OF OPERATION: Ef=6.3 VOLTS, Eb=150 VOLTS, Rk=680 OHMS, Rg=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=Ec=0 VOLTS, AND Ehk=140 VOLTS RMS.

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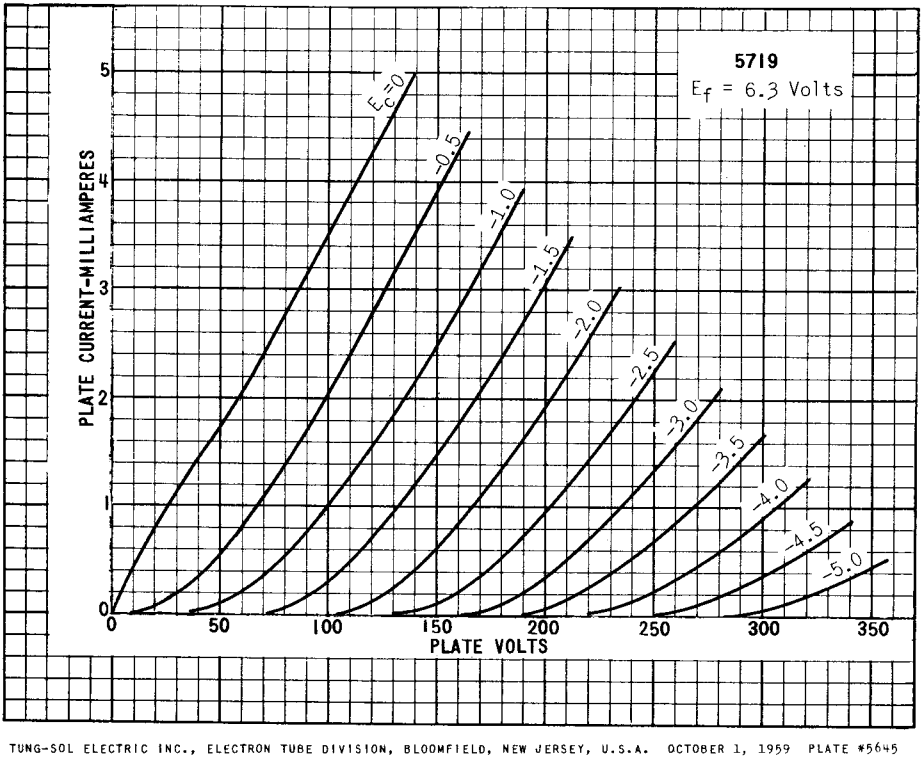
## SPECIAL TESTS AND RATINGS - cont'd.

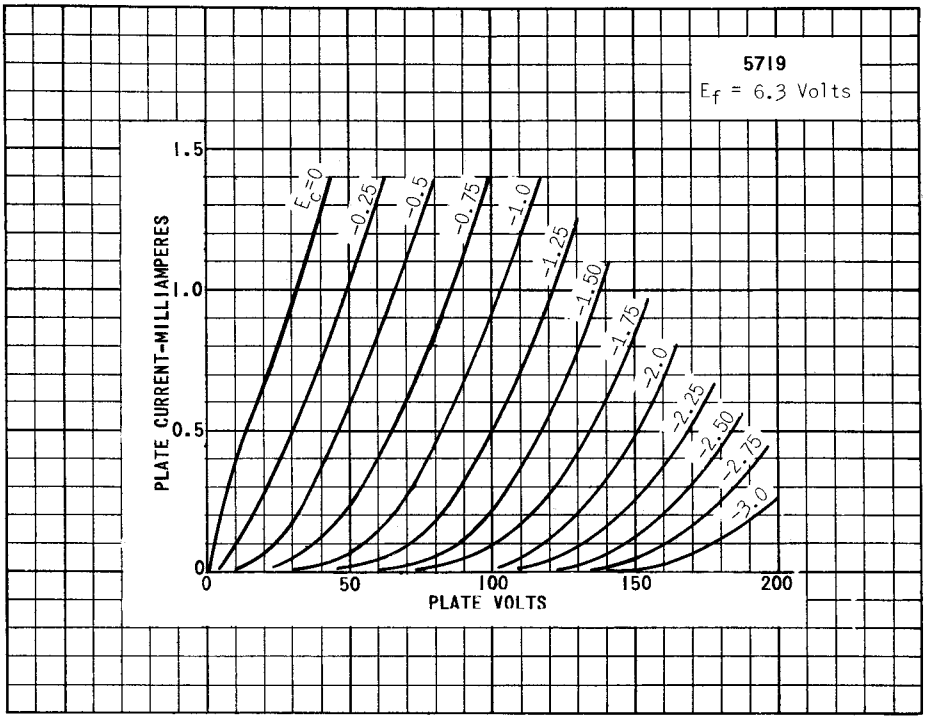
SHOCK RATING--450 G
STATISTICAL SAMPLE SUBJECTED TO FIVE IMPACT ACCELERATIONS OF 450 G IN EACH OF FOUR DIFFERENT POSITIONS. THE ACCELERATING FORCES ARE APPLIED BY THE NAVY-TYPE, HIGH IMPACT (FLYWEIGHT) SHOCK MACHINE FOR ELECTRONIC DEVICES OR ITS EQUIVALENT.

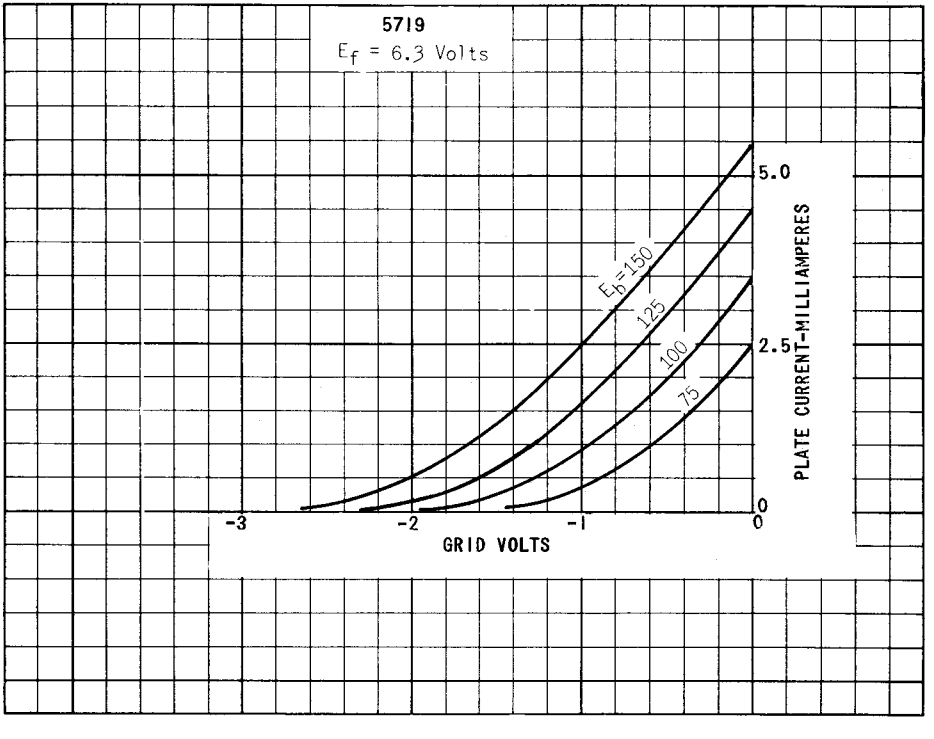
FATIGUE RATING--2.5 G
STATISTICAL SAMPLE SUBJECTED TO VIBRATIONAL ACCELERATION OF 2.5 G FOR 32 HOURS MINIMUM IN EACH OF THREE DIFFERENT POSITIONS. THE SINUSOIDAL VIBRATION IS APPLIED AT A FIXED FREQUENCY BETWEEN 25 AND 60 CYCLES PER SECOND.

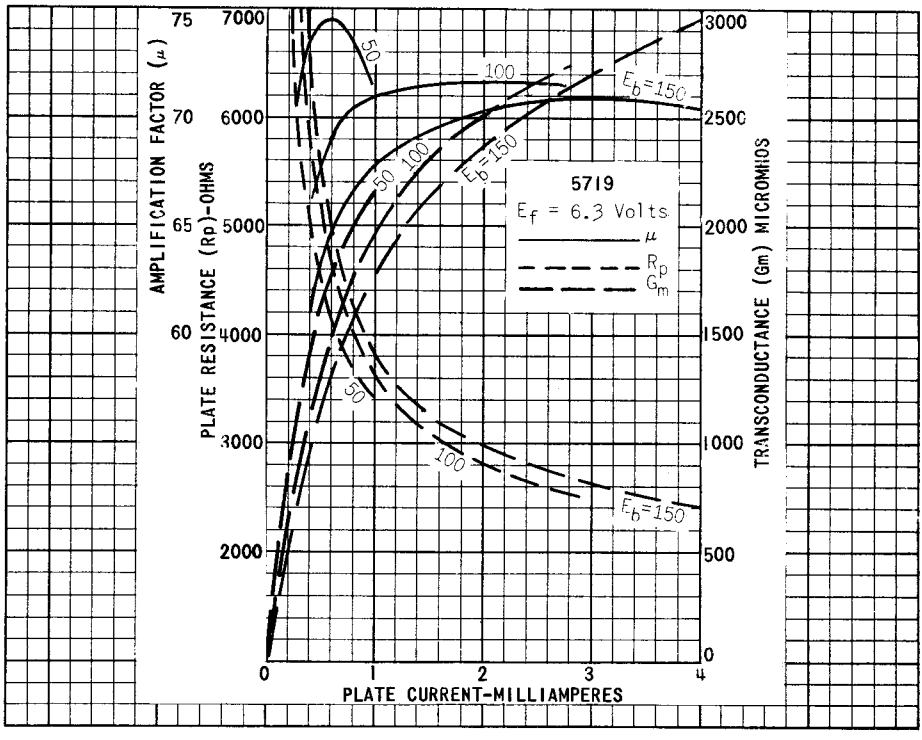
ALTITUDE RATING--60,000 FEET
STATISTICAL SAMPLE SUBJECTED TO PRESSURE OF 55 MILLIMETERS OF MERCURY TO EVALUATE AND CONTROL ARCING AND CORONA.

NOTE;
THE CONDITIONS FOR SOME OF THE INDICATED TESTS HAVE 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.




5719
$E_f$ = 6.3 Volts
PLATE CURRENT-MILLIAMPERES
1.5
1.0
0.5
0
$E_c$=0
-0.25
-0.5
-0.75
-1.0
-1.25
-1.50
-1.75
-2.0
-2.25
-2.50
-2.75
-3.0
0
50
100
150
200
PLATE VOLTS


5719
$E_f$ = 6.3 Volts
$E_b$=150
125
100
75
5.0
2.5
0
PLATE CURRENT-MILLIAMPERES
-3
-2
-1
0
GRID VOLTS


AMPLIFICATION FACTOR (μ)
PLATE RESISTANCE (Rp)-OHMS
TRANSCONDUCTANCE (Gm) MICROMHOS
PLATE CURRENT-MILLIAMPERES
5719
Ef = 6.3 Volts
μ
Rp
Gm
50
100
Eb=150
75
70
65
60
7000
6000
5000
4000
3000
2000
3000
2500
2000
1500
1000
500
0
0
1
2
3
4