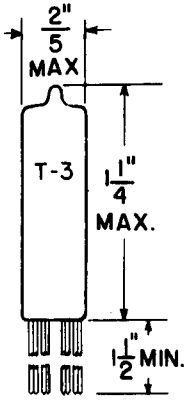
**TUNG-SOL**

# PENTODE

SUBMINIATURE TYPE




GLASS BULB

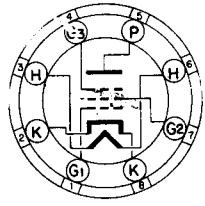
COATED UNIPOTENTIAL CATHODE

HEATER

6.3 VOLTS 0.175 AMP.

AC OR DC

ANY MOUNTING POSITION




**BOTTOM VIEW**
SUBMINIATURE BUTTON

8DC

THE 6943 IS A SUBMINIATURE SHARP CUTOFF PENTODE DESIGNED FOR RADIO FREQUENCY AMPLIFIER SERVICE. THIS TYPE IS CHARACTERIZED BY EXTRAORDINARY FREEDOM FROM INTERELEMENT SHORT CIRCUITS OF SHORT TERM DURATION, BY HIGH RESISTANCE TO INTERELEMENT LEAKAGE, AND BY STABLE PERFORMANCE. IN ADDITION, VIBRATIONAL OUTPUT WHEN THE TUBE IS SUBJECTED TO WIDE BAND (WHITE NOISE) VIBRATION IS HELD TO A VERY LOW VALUE. IT IS SUITABLE FOR SERVICE AT HIGH ALTITUDES AND WHERE SEVERE CONDITIONS OF MECHANICAL SHOCK, VIBRATION AND HIGH TEMPERATURE ARE ENCOUNTERED. THESE CHARACTERISTICS GIVE THE TYPE SPECIAL VALUE IN GUIDED MISSILE APPLICATIONS.

## DIRECT INTERELECTRODE CAPACITANCES[12]

| | | |
|---|---|---|
| GRID #1 TO PLATE (MAX.) | 0.015 | μμf |
| INPUT: G1 TO (H+K+G2+G3+I.S.+E.S.) | 3.0 | μμf |
| OUTPUT: P TO (H+K+G2+G3+I.S.+E.S.) | 3.0 | μμf |

## RATINGS[1]

ABSOLUTE VALUES

| | | |
|---|---|---|
| HEATER VOLTAGE | 6.3 | VOLTS |
| HEATER VOLTAGE VARIATION | 6.3±10% | VOLTS |
| INSTANTANEOUS PLATE VOLTAGE | 360 | VOLTS |
| PLATE VOLTAGE | 250 | VDC |
| GRID #2 VOLTAGE | 150 | VDC |
| PLATE DISSIPATION | 1.0 | W |
| GRID #2 DISSIPATION | 0.33 | W |
| POSITIVE GRID #1 VOLTAGE | 0 | VDC |
| NEGATIVE GRID #1 VOLTAGE | 55 | VDC |
| EXTERNAL GRID #1 CIRCUIT RESISTANCE | 1.0 | MEG. |
| AVERAGE CATHODE CURRENT | 15 | mAdc |
| HEATER-CATHODE VOLTAGE | 200 | VOLTS |
| BULB TEMPERATURE (AT HOTTEST POINT) | 250 | °C |
| OPERATIONAL ALTITUDE | 80,000 | FT. |

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## TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

### AVERAGE CHARACTERISTICS

| | | |
|---|---|---|
| HEATER VOLTAGE | 6.3 | VOLTS |
| HEATER CURRENT | 0.175 | AMP. |
| CONDITIONS: | | |
| HEATER VOLTAGE | 6.3 | VOLTS |
| PLATE VOLTAGE | 100 | VDC |
| GRID #2 VOLTAGE | 100 | VDC |
| GRID #3 VOLTAGE | 0 | |
| CATHODE BIAS RESISTOR | 150 | OHMS |
| PLATE CURRENT | 8.0 | mAdc |
| GRID #2 CURRENT | 2.3 | mAdc |
| TRANSCONDUCTANCE | 3600 | μMHOS |
| PLATE RESISTANCE | 300,000 | OHMS |
| GRID #1 VOLTAGE FOR Ib = 10 μA | −7.5 | VDC |
| GRID #1 VOLTAGE FOR Ib = 200 μA | −5.5 | VDC |
| OPERATION TIME (MAX.)[13] | 20 | SECS. |

### DURABILITY CHARACTERISTICS[2]

| | | |
|---|---|---|
| IMPACT ACCELERATION [3] | 100 | G |
| VIBRATIONAL ACCELERATION FOR AN EXTENDED PERIOD[4] | 10 | G |
| ON-OFF HEATER CYCLES [5] | 2000 | |

### CONTROLLED DETRIMENTS

| | | |
|---|---|---|
| INTERELECTRODE INSULATION (MIN) [6] | 250 | MEG. |
| TOTAL GRID CURRENT (MAX.)[7] | −0.1 | μAdc |
| GRID EMISSION[8] (MAX.) | −0.5 | μAdc |
| HUM OUTPUT[9] (MAX.) | 15 | MV, pk-pk |
| WHITE NOISE VIBRATION OUTPUT[10] (MAX.) | 350 | MV. pk-pk |
| | 50 | MV rms |
| HEATER-CATHODE LEAKAGE[11] (MAX.) | 5.0 | μAdc |

NOTES:

1. LIMITING VALUES BEYOND WHICH NORMAL TUBE LIFE AND NORMAL TUBE PERFORMANCE MAY BE IMPAIRED.
2. TESTS PERFORMED AS A MEASURE OF THE MECHANICAL DURABILITY OF THE TUBE STRUCTURE.
3. FORCE AS APPLIED IN ANY DIRECTION BY THE NAVY TYPE HIGH IMPACT ( FLYWEIGHT ) SHOCK MACHINE FOR ELECTRONIC DEVICES. SHOCK DURATION = 4 MILLISECONDS.
4. VIBRATIONAL FORCES APPLIED IN ANY DIRECTION FOR A PERIOD OF SIX HOURS REPEATEDLY SWEEPING THE RANGE FROM 30 CPS TO 3000 CPS AND BACK, WITH THE PERIOD OF THE SWEEP CYCLE BEING THREE MINUTES.
5. ONE CYCLE CONSISTS OF THE APPLICATION OF Ef = 7.0 V FOR ONE MINUTE AND INTERRUPTION OF THE FILAMENT VOLTAGE FOR FOUR MINUTES. A VOLTAGE OF Ehk = 140 Vac IS APPLIED CONTINUOUSLY.
6. MEASURED WITH Ef = 6.3 V, Ep-all = -300 Vdc; Eg2-all = -200 Vdc; Eg1-all = -100 Vdc; CATHODE IS POSITIVE SO THAT NO CATHODE EMISSION OCCURS.
7. MEASURED WITH Ef = 6.3 V; Eb = Ec2 = 100 Vdc; Rk = 150 OHMS; Rg1 = 1.0 MEG.
8. PREHEATED FOR FIVE MINUTES WITH Ef = 7.5 V; Eb = 250 Vdc; Ec2 = 150 Vdc; Rk = 1000 OHMS; Rg1 = 1.0 MEG; THEN TESTED WITH Ef = 7.5 V; Eb = Ec2 = 100 Vdc; Ec1 = -7.5 Vdc; Rg1 = 1.0 MEG. THIS IS A DESTRUCTIVE TEST AND THEREFORE MUST BE CONDUCTED ON A SAMPLE BASIS.

9. TEST WITH Ef = 6.3 V (400 CPS), Eb = Ec2 = 100 Vdc; Rk = 150 OHMS; Rg2 = 30,000 OHMS; RL = 10,000 OHMS; MEASURE THE HUM OUTPUT ACROSS R1 IN THE FREQUENCY BAND FROM 20 CPS TO 5,000 CPS.

10. TEST WITH Ef = 6.3 V; Eb = Ec2 = 100 Vdc; Rk = 150 OHMS; Rp = 10,000 OHMS. THE WHITE NOISE VOLTAGE ACROSS Rp IS FILTERED TO ROLL OFF APPROXIMATELY 35 db BETWEEN 10,000 CPS AND 13,000 CPS AND IS THEN MEASURED WITH BOTH A PEAK TO PEAK METER AND AN RMS READING METER. THE VIBRATIONAL FORCE APPLIED TO THE TUBE UNDER TEST IS SUCH THAT THE INSTANTANEOUS VALUES OF ACCELERATION FORM A WHITE NOISE SPECTRUM FROM 100 CPS TO 5000 CPS. ENERGY WITHIN THIS SPECTRUM IS DISTRIBUTED SUCH THAT EACH OCTAVE OF BAND-WIDTH DELIVERS 2.3 G'S RMS ACCELERATION. THE DEGREE OF CLIPPING IS SUCH THAT PEAK VALUES OF ACCELERATION EXCEED 15 G'S.

11. MEASURED WITH Ef = 6.3 V; Ehk = ± 100Vdc.

12. CAPACITANCES ARE MEASURED WITH AN EXTERNAL SHIELD OF 0.405"I.D.

13. OPERATION TIME IS THE TIME REQUIRED FOR A TUBE TO REACH A VALUE OF PLATE CURRENT EQUAL TO 85% OF THAT VALUE ATTAINED AFTER THREE MINUTES.

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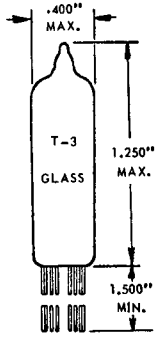
# TUNG-SOL

## PENTODE

**SUBMINIATURE**

OUTLINE DRAWING
JEDEC 3-11



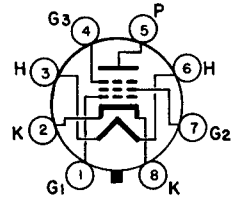

SUBMINIATURE BUTTON
8 FLEXIBLE LEADS
JEDEC E8-10

FOR
GUIDED MISSILE
SERVICE

COATED UNIPOTENTIAL CATHODE

ANY MOUNTING POSITION

BASING DIAGRAM
JEDEC 8DC




BOTTOM VIEW

THE 6943 IS A SHARP-CUTOFF RF PENTODE IN THE 8 PIN SUBMINIATURE CONSTRUCTION. IT IS DESIGNED SPECIFICALLY FOR GUIDED MISSILE SERVICE. THIS TYPE IS CHARACTERIZED BY STABLE PERFORMANCE FOR OPERATION AT HIGH ALTITUDES AND WHERE SEVERE CONDITIONS OF MECHANICAL SHOCK, VIBRATION AND HIGH TEMPERATURE ARE ENCOUNTERED.

### DIRECT INTERELECTRODE CAPACITANCES

WITH EXTERNAL SHIELD #318 CONNECTED TO CATHODE

| | | | |
|---|---|---|---|
| GRID 1 TO PLATE | MAX. | 0.015 | pf |
| INPUT | | 3.0 | pf |
| OUTPUT | | 3.0 | pf |

### HEATER CHARACTERISTICS AND RATINGS

ABSOLUTE MAXIMUM VALUES – SEE EIA STANDARD RS-239

| | | | | |
|---|---|---|---|---|
| AVERAGE CHARACTERISTICS | 6.3 | VOLTS | 175 | mA |
| LIMITS OF APPLIED VOLTAGE | | | 5.5 TO 6.9 | VOLTS |
| HEATER-CATHODE VOLTAGE | | | | |
| HEATER POSITIVE WITH RESPECT TO CATHODE | | | 200 | VOLTS |
| HEATER NEGATIVE WITH RESPECT TO CATHODE | | | 200 | VOLTS |

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## MAXIMUM RATINGS

ABSOLUTE MAXIMUM VALUES – SEE EIA STANDARD RS-239

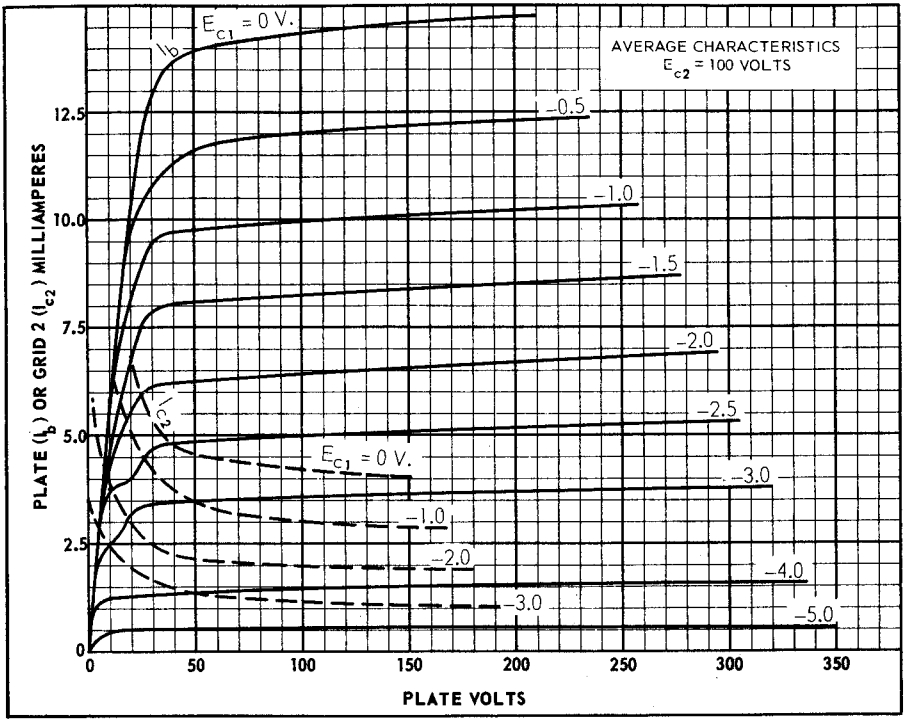
| | | |
|---|---|---|
| DC PLATE VOLTAGE | 250 | VOLTS |
| PEAK – PLATE FORWARD VOLTAGE | 360 | VOLTS |
| DC GRID 3 VOLTAGE | | |
| POSITIVE VALUE | 0 | VOLTS |
| NEGATIVE VALUE | 20 | VOLTS |
| DC GRID 2 VOLTAGE | 150 | VOLTS |
| DC GRID 1 VOLTAGE | | |
| POSITIVE VALUE | 0 | VOLTS |
| NEGATIVE VALUE | 55 | VOLTS |
| PLATE DISSIPATION | 1.0 | WATTS |
| GRID 2 DISSIPATION | 0.33 | WATTS |
| CATHODE CURRENT | 15 | mA |
| GRID 1 CIRCUIT RESISTANCE | 1.0 | MEGOHM |
| BULB TEMPERATURE | 250 | °C |

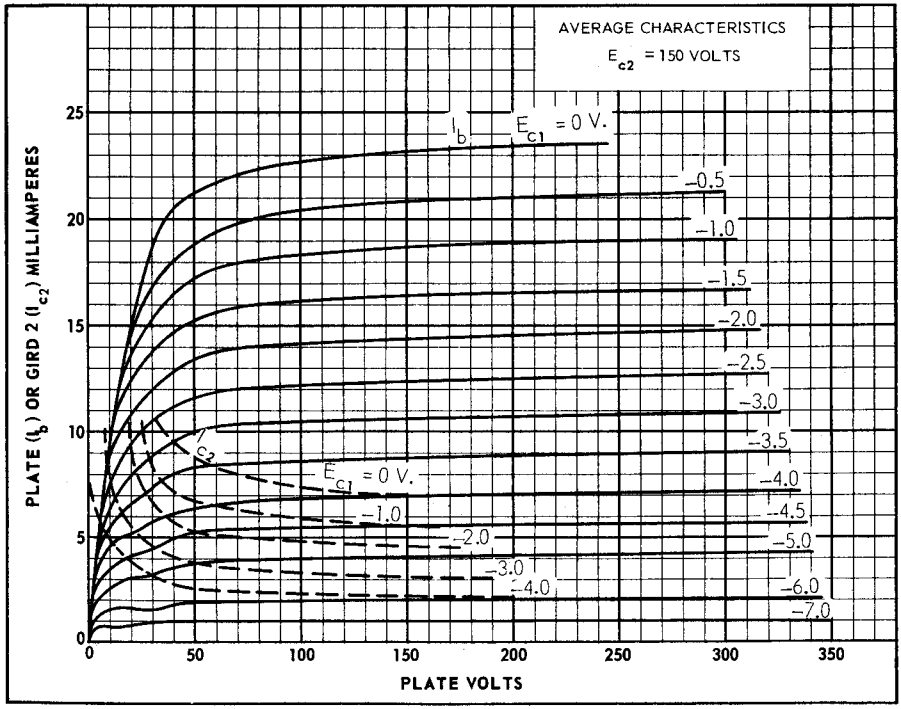
## CHARACTERISTICS

| | | |
|---|---|---|
| DC PLATE VOLTAGE | 100 | VOLTS |
| DC GRID 3 VOLTAGE | 0 | VOLTS |
| DC GRID 2 VOLTAGE | 100 | VOLTS |
| CATHODE RESISTOR | 150 | OHMS |
| DC PLATE CURRENT | 8.0 | mA |
| DC GRID 2 CURRENT | 2.3 | mA |
| TRANSCONDUCTANCE | 3,600 | μMHOS |
| PLATE RESISTANCE | 300,000 | OHMS |
| DC GRID 1 VOLTAGE FOR $I_b$ = 100 μADC MAX. | –7.5 | VOLTS |

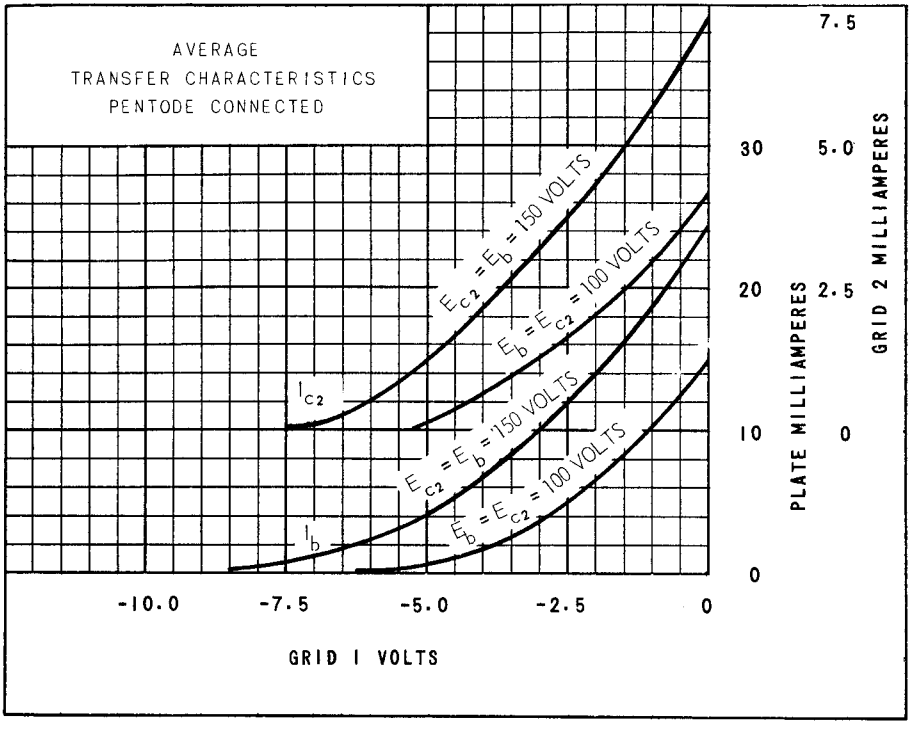
## SPECIAL TESTS AND RATINGS

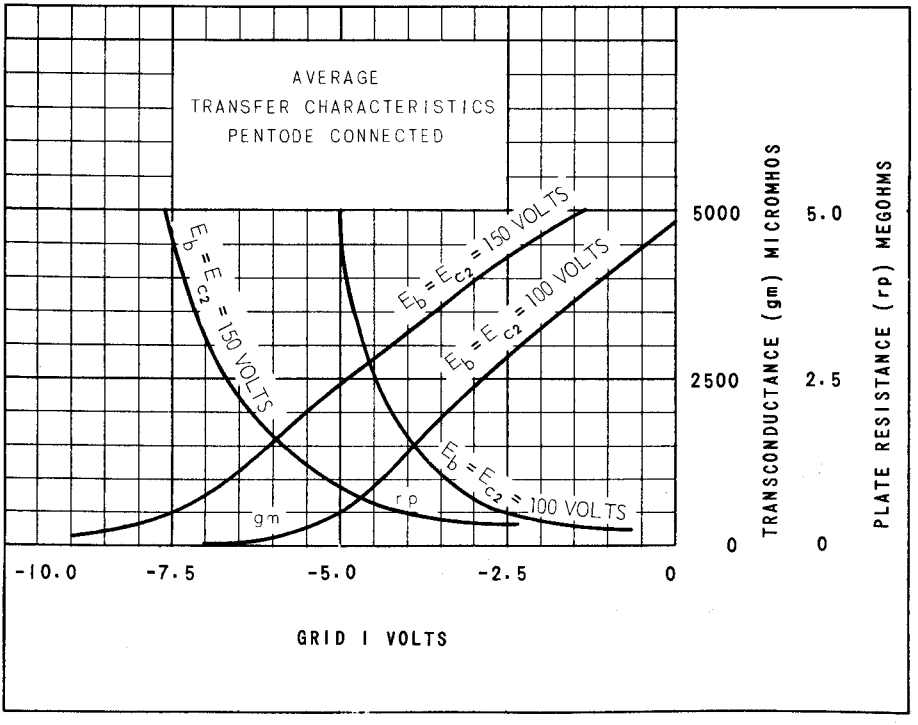
| | | |
|---|---|---|
| IMPACT ACCELERATION | | |
| FATIGUE | | |
| FAILURE RATE | | |
| ALTITUDE – ABSOLUTE MAXIMUM | 80,000 | FT. |
| RADIATION – ABSOLUTE MAXIMUM | | |
| TOTAL DOSAGE– NEUTRONS/SQ. CM | $10^{16}$ | NVT |
| DOSE RATE – NEUTRONS/SQ. CM/SEC | $10^{12}$ | NV |




TUNG-SOL ELECTRIC INC., ELECTRON TUBE DIVISION, BLOOMFIELD, NEW JERSEY, U.S.A., FEBRUARY 1, 1965 PLATE #6617


AVERAGE
TRANSFER CHARACTERISTICS
PENTODE CONNECTED
$E_{c2} = E_b = 150$ VOLTS
$E_b = E_{c2} = 100$ VOLTS
$E_{c2} = E_b = 150$ VOLTS
$E_b = E_{c2} = 100$ VOLTS
$I_{c2}$
$I_b$
-10.0
-7.5
-5.0
-2.5
0
GRID 1 VOLTS
7.5
30
5.0
20
2.5
10
0
0
PLATE MILLIAMPERES
GRID 2 MILLIAMPERES


AVERAGE
TRANSFER CHARACTERISTICS
PENTODE CONNECTED
$E_b = E_{c2} = 150$ VOLTS
$E_b = E_{c2} = 150$ VOLTS
$E_b = E_{c2} = 100$ VOLTS
$E_b = E_{c2} = 100$ VOLTS
gm
rp
-10.0
-7.5
-5.0
-2.5
0
GRID 1 VOLTS
5000
5.0
2500
2.5
0
0
TRANSCONDUCTANCE (gm) MICROMHOS
PLATE RESISTANCE (rp) MEGOHMS