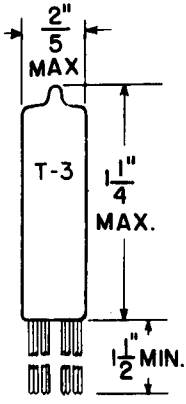
TUNG-SOL

PENTODE

SUBMINIATURE TYPE



GLASS BULB

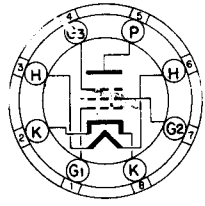
COATED UNIPOTENTIAL CATHODE

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.

CONTINUED ON FOLLOWING PAGE

PRINTED IN U.S.A.

CONTINUED FROM PRECEDING PAGE

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; Rgl = 1.0 MEG.
8. PREHEATED FOR FIVE MINUTES WITH Ef = 7.5 V; Eb = 250 Vdc; Ec2 = 150 Vdc; Rk = 1000 OHMS; Rgl = 1.0 MEG; THEN TESTED WITH Ef = 7.5 V; Eb = Ec2 = 100 Vdc; Ec1 = -7.5 Vdc; Rgl = 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.

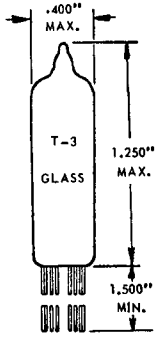
PRINTED IN U. S. A.

TUNG-SOL

PENTODE

SUBMINIATURE

OUTLINE DRAWING
JEDEC 3-11



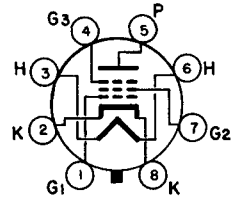
SUBMINIATURE BUTTON
8 FLEXIBLE LEADS
JEDEC E8-10

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

CONTINUED ON FOLLOWING PAGE

PRINTED IN U. S. A.

CONTINUED FROM PRECEDING PAGE

MAXIMUM RATINGS

ABSOLUTE MAXIMUM VALUES – SEE EIA STANDARD RS-239

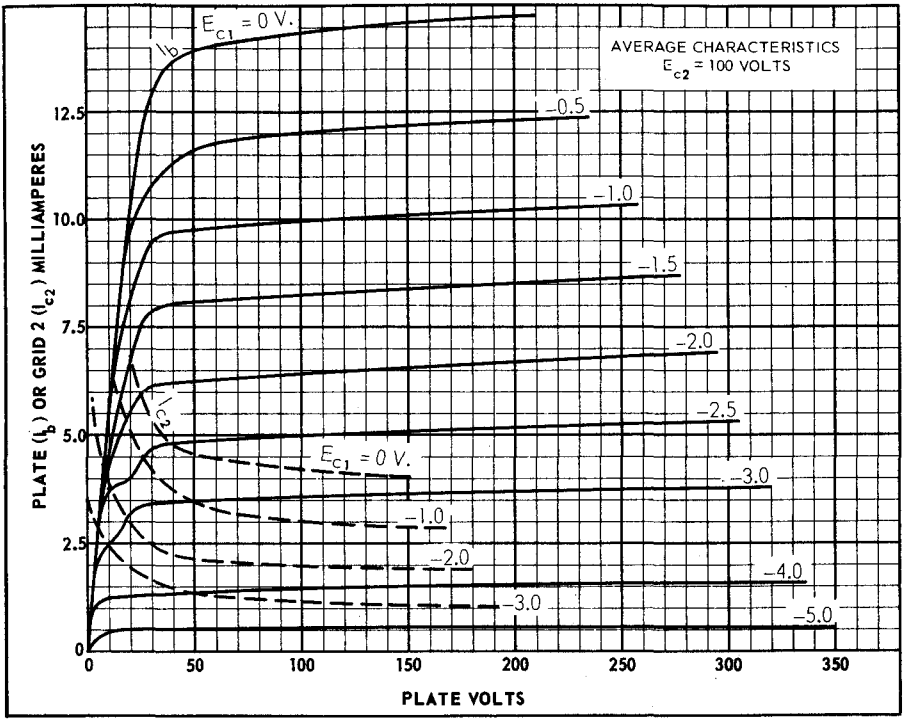
DC PLATE VOLTAGE	250	VOLTS
PEAK – PLATE FORWARD VOLTAGE	360	VOLTS
DC GRID 3 VOLTAGE		
POSITIVE VALUE	0	VOLTS
NEGATIVE VALUE	20	VOLTS
DC GRID 2 VOLTAGE	150	VOLTS
DC GRID 1 VOLTAGE		
POSITIVE VALUE	0	VOLTS
NEGATIVE VALUE	55	VOLTS
PLATE DISSIPATION	1.0	WATTS
GRID 2 DISSIPATION	0.33	WATTS
CATHODE CURRENT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

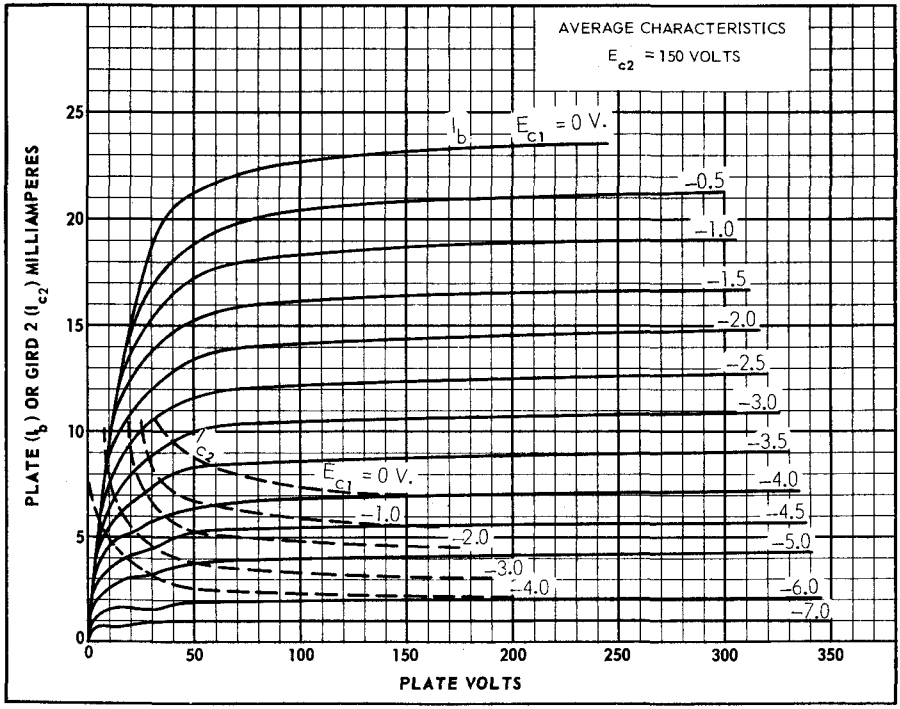
CHARACTERISTICS

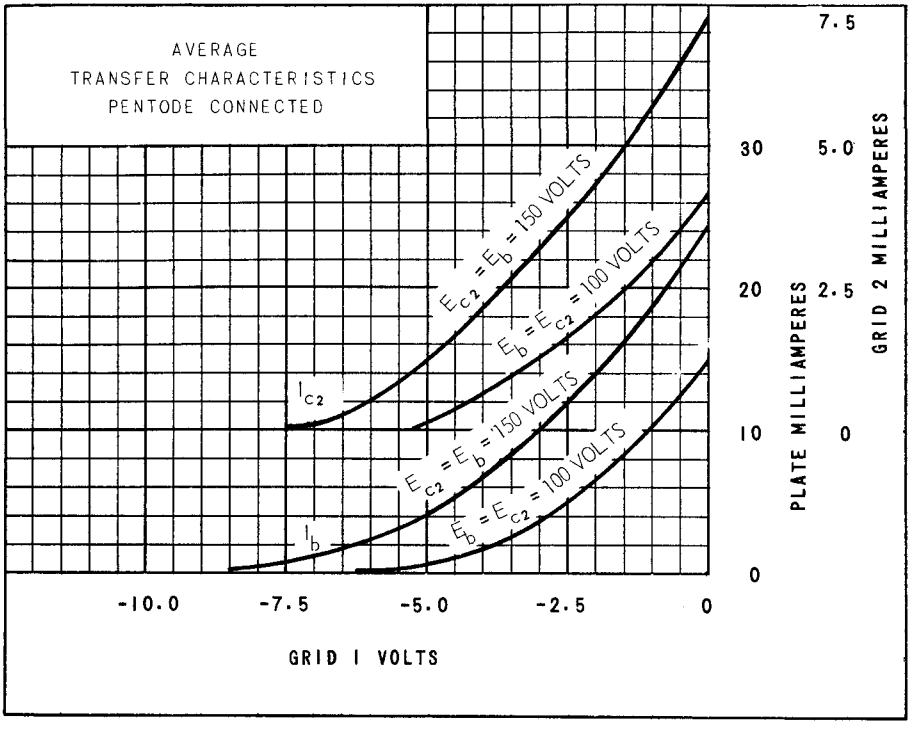
DC PLATE VOLTAGE	100	VOLTS
DC GRID 3 VOLTAGE	0	VOLTS
DC GRID 2 VOLTAGE	100	VOLTS
CATHODE RESISTOR	150	OHMS
DC PLATE CURRENT	8.0	mA
DC GRID 2 CURRENT	2.3	mA
TRANSCONDUCTANCE	3,600	μMHOS
PLATE RESISTANCE	300,000	OHMS
DC GRID 1 VOLTAGE FOR I_b = 100 μADC MAX.	–7.5	VOLTS

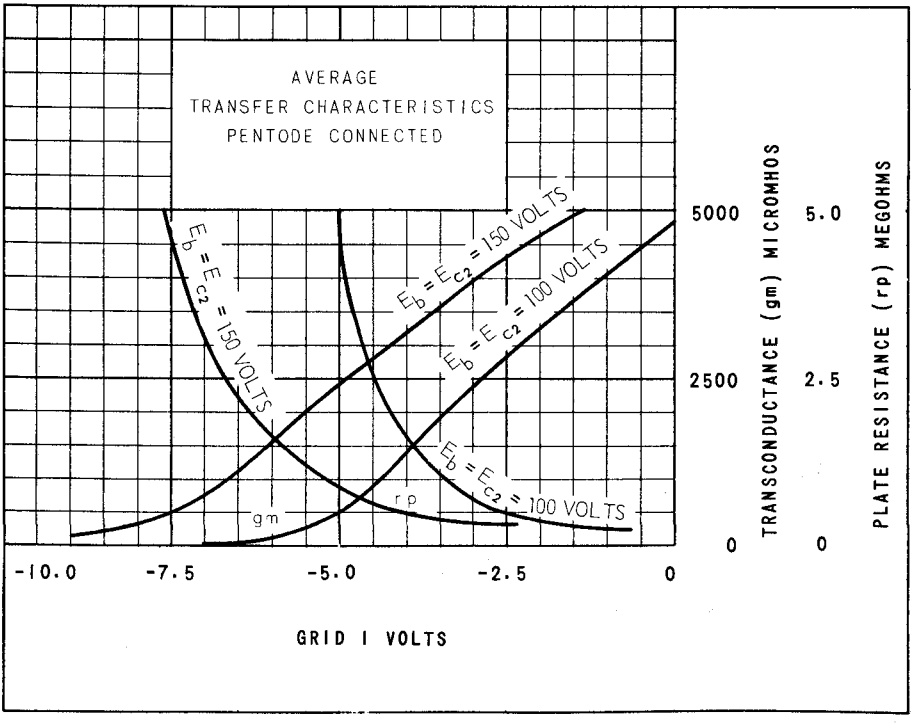
SPECIAL TESTS AND RATINGS

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


AVERAGE CHARACTERISTICS
E_{c2} = 100 VOLTS
PLATE (I_b) OR GRID 2 (I_{c2}) MILLIAMPERES
PLATE VOLTS
I_b
I_{c2}
E_{c1} = 0 V.
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-4.0
-5.0
0
2.5
5.0
7.5
10.0
12.5
0
50
100
150
200
250
300
350


AVERAGE CHARACTERISTICS
E_{c2} = 150 VOLTS
PLATE (I_b) OR GRID 2 (I_{c2}) MILLIAMPERES
PLATE VOLTS
I_b
I_{c2}
E_{c1} = 0 V.
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
-4.5
-5.0
-6.0
-7.0
0
5
10
15
20
25
0
50
100
150
200
250
300
350


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