



5840

# SHARP-CUTOFF PENTODE

SUBMINIATURE TYPE

5840  
PREMIUM TYPE

Intended for applications where dependable performance under shock and vibration is paramount.

### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathode:

Voltage . . . . .	6.3 ± 5%	. . . . .	ac or dc volts
Current . . . . .	0.150	. . . . .	amp

Direct Interelectrode Capacitances:

	With Exter- nal Shield <sup>o</sup>	Without Exter- nal Shield	
Grid No.1 to Plate . .	0.015 max.	0.03 max.	μf
Input . . . . .	4.2	4.0	μf
Output . . . . .	3.4	1.9	μf

<sup>o</sup> Having inside diameter of 0.405" and connected to cathode.

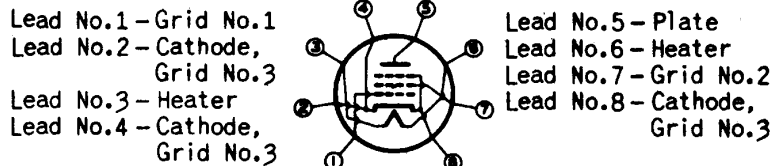
#### Characteristics, Class A<sub>1</sub> Amplifier:

Plate Supply Voltage . . . . .	100	volts
Grid-No.2 Supply Voltage . . . . .	100	volts
Cathode Resistor . . . . .	150	ohms
Plate Resistance . . . . .	260000	ohms
Transconductance . . . . .	5000	μmhos
Plate Current . . . . .	7.5	ma
Grid-No.2 Current . . . . .	2.4	ma
Grid-No.1 Volts (Approx.) for plate current of 10 μamp . . . . .	-9	volts

#### Mechanical:

Operating Position . . . . .	Any
Maximum Bulb Length . . . . .	1-3/8"
Length from Button Seal to Bulb Top (Excluding tip) . . . . .	1.075" ± 0.060"
Diameter . . . . .	0.383" ± 0.017"
Bulb . . . . .	T-3
Leads, Flexible . . . . .	8
Length . . . . .	1-1/2" to 1-3/4"
Orientation and Diameter . . . . .	See Dimensional Outline in GENERAL SECTION

#### BOTTOM VIEW



#### AMPLIFIER - Class A<sub>1</sub>

#### Maximum Ratings, Absolute Values:

DC PLATE VOLTAGE . . . . .	165 max.	volts
GRID-No.2 (SCREEN) VOLTAGE . . . . .	155 max.	volts

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GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative bias value . . . . .	55 max.	volts
PLATE DISSIPATION . . . . .	1.1 max.	watts
GRID-No.2 INPUT . . . . .	0.55 max.	watt
DC CATHODE CURRENT . . . . .	16.5 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode . . . . .	200 max.	volts
Heater positive with respect to cathode . . . . .	200 max.	volts
BULB TEMPERATURE (At hottest point on bulb surface) . . . . .	250 max.	°C

## Typical Operation as Resistance-Coupled Amplifier:

See RESISTANCE-COUPLED AMPLIFIER CHART  
at end of tabulated data for this type

## Maximum Circuit Values:

Grid-No.1-Circuit Resistance:		
For cathode-bias operation . . . . .	1.2 max.	megohms
For fixed-bias operation . . . . .	Not recommended	

## CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN\*

	Note	Min.	Max.	
Heater Current . . . . .	1	0.138	0.162	amp
Grid-No.1-to-Plate Capacitance . . . . .	2	-	0.015	μf
Input Capacitance . . . . .	2	3.5	4.9	μf
Output Capacitance . . . . .	2	2.9	3.9	μf
Plate Current . . . . .	1,3	5.5	9.5	ma
Plate Current . . . . .	1,4	-	50	μamp
Transconductance . . . . .	1,3	4100	5900	μmhos
Transconductance . . . . .	5,3	3750	-	μmhos
Grid-No.1 Current . . . . .	1,6	-	±0.3	μamp
Grid-No.2 Current . . . . .	1,3	0.5	3.5	ma
Plate Resistance . . . . .	1,7	0.175	-	megohm
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode . . . . .	1,8	-	7.0	μamp
Heater positive with respect to cathode . . . . .	1,8	-	7.0	μamp
Leakage Resistance:				
Between Grid No.1 and All Other Electrodes Tied Together . . . . .	1,9	100	-	megohms
Between Plate and All Other Electrodes Tied Together . . . . .	1,10	100	-	megohms

\* See next page.

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- Note 1: With 6.3 volts ac or dc on heater.
- Note 2: With external shield having inside diameter of 0.405" and connected to cathode.
- Note 3: With plate supply voltage of 100 volts, grid-No.2 supply voltage of 100 volts, cathode resistor of 150 ohms, and cathode bypass capacitor of 1000 microfarads.
- Note 4: With dc plate voltage of 100 volts, dc grid-No.2 voltage of 100 volts, and dc grid-No.1 voltage of -9 volts.
- Note 5: With 5.7 volts ac or dc on heater.
- Note 6: With plate supply voltage of 100 volts, grid-No.2 supply voltage of 100 volts, cathode resistor of 150 ohms, cathode bypass capacitor of 1000 microfarads, and grid-No.1 resistor of 0.1 megohm.
- Note 7: With plate supply voltage of 100 volts, grid-No.2 supply voltage of 100 volts, cathode resistor of 150 ohms bypassed by capacitor having a maximum reactance of 3 ohms.
- Note 8: With 100 volts dc between heater and cathode.
- Note 9: With grid No.1 100 volts negative with respect to all other electrodes tied together.
- Note 10: With plate 300 volts negative with respect to all other electrodes tied together.

\* Each tube is stabilized before characteristics testing by continuous operation for at least 45 hours at room temperature and with dissipation values equivalent to life test conditions.

#### SPECIAL RATINGS & PERFORMANCE DATA

##### Shock Rating:

Impact Acceleration . . . . . 450 max. g  
 Tubes are held rigid in three different positions in a Navy Type, High Impact (flyweight) Shock Machine and are subjected to 450 g impact acceleration.

##### Fatigue Rating:

Vibrational Acceleration . . . . . 2.5 max. g  
 Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 25 cycles per second for 32 hours.

##### Uniform Acceleration Rating . . . . . 1000 max. g

Tubes are subjected in each of three positions to a gradually applied uniform acceleration up to 1000 g.

##### Low-Frequency Vibration Performance:

RMS Output Voltage . . . . . 60 max. mv  
 Under the following conditions: A 100-volt plate and grid-No.2 voltage supply having an impedance not exceeding that of a 40- $\mu$ f capacitor, plate load resistance of 10000 ohms, grid-No.1 resistor of 0.1 megohm, cathode resistor of 150 ohms, cathode bypass capacitor of 1000  $\mu$ f, and vibrational acceleration of 15 g at 40 cps.

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### Heater-Cycling Life Performance:

Cycles of Intermittent Operation . . . 2500 min.      cycles  
Under the following conditions: With heater voltage of 7.0 volts cycled 1 minute on and 4 minutes off, heater-cathode voltage of 140 volts (rms), and plate, grid-No.2, and grid-No.1 voltage = 0 volts.

### Average Life Performance:

The average life performance based on a 500-hour test at 175°C ambient temperature is not less than 450 hours. This life test is made on sample lot of tubes with heater voltage of 6.3 volts; plate supply voltage of 100 volts; grid-No.2 supply voltage of 100 volts; dc heater-cathode voltage (heater positive with respect to cathode) of 200 volts; cathode resistor of 150 ohms; and grid-No.1 resistor of 1 megohm.

The 500-hour end-point limits for the 5840 with heater voltage of 6.3 volts, plate supply voltage of 100 volts, grid-No.2 supply voltage of 100 volts, cathode resistor of 150 ohms bypassed by capacitor having a maximum reactance of 3 ohms, and dc heater-cathode voltage of 100 volts with heater either positive or negative with respect to cathode are: transconductance, 3250 micromhos minimum; heater-cathode leakage current, 20 microamperes maximum; and grid-No.1 current, +0.9 microampere maximum or -0.9 microampere maximum.

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#### OPERATING CONDITIONS AS RESISTANCE-COUPLED AMPLIFIER

Plate-Supply Voltage	100						volts
Plate Load Resistor	0.10	0.10	0.27	0.27	0.47	0.47	meg
Grid-No.2 Resistor	0.22	0.22	0.68	0.68	1.2	1.2	meg
Grid-No.1 Resistor <sup>o</sup>	0.27	0.47	0.47	1.0	0.47	1.0	meg
Cathode Resistor	820	820	2200	2200	3300	3300	ohms
Sig. Input Volt. (rms)	0.1	0.1	0.1	0.1	0.1	0.1	volt
Output Voltage (rms)	8.2	9.0	9.5	11.8	9.2	11.7	volts
Voltage Gain <sup>▲</sup>	82	90	95	118	92	117	
Distortion	2.8	3.8	2.5	3.0	3.1	2.3	%
Sig. Input Volt. (rms)*	0.23	0.22	0.15	0.16	0.12	0.14	volt
Output Voltage (rms)	17.7	18.6	13.6	17	11	16	volts
Voltage Gain <sup>▲</sup>	77	85	91	106	92	114	
Distortion	4.9	4.8	4.7	4.4	4.8	5.0	%

Plate-Supply Voltage	150						volts
Plate Load Resistor	0.10	0.10	0.27	0.27	0.47	0.47	meg
Grid-No.2 Resistor	0.27	0.27	0.82	0.82	1.5	1.5	meg
Grid-No.1 Resistor <sup>o</sup>	0.27	0.47	0.47	1.0	0.47	1.0	meg
Cathode Resistor	560	560	1500	1500	2200	2200	ohms
Sig. Input Volts. (rms)	0.1	0.1	0.1	0.1	0.1	0.1	volt
Output Voltage (rms)	11.5	12.5	13.2	15.5	13	16.7	volts
Voltage Gain <sup>▲</sup>	115	125	132	155	130	167	
Distortion	1.5	2.2	2.4	2.4	3.7	3.0	%
Sig. Input Volt. (rms)*	0.20	0.18	0.16	0.16	0.11	0.14	volt
Output Voltage (rms)	21.7	21.7	20.5	24	14	22.2	volts
Voltage Gain <sup>▲</sup>	109	120	128	150	127	159	
Distortion	4.8	5.0	4.9	4.8	4.2	4.8	%

<sup>o</sup> of following stage.

<sup>▲</sup> Ratio of signal output to signal input.

\* Maximum value to swing the grid of resistance-coupled amplifier tube to the point where its grid No.1 starts to draw current.

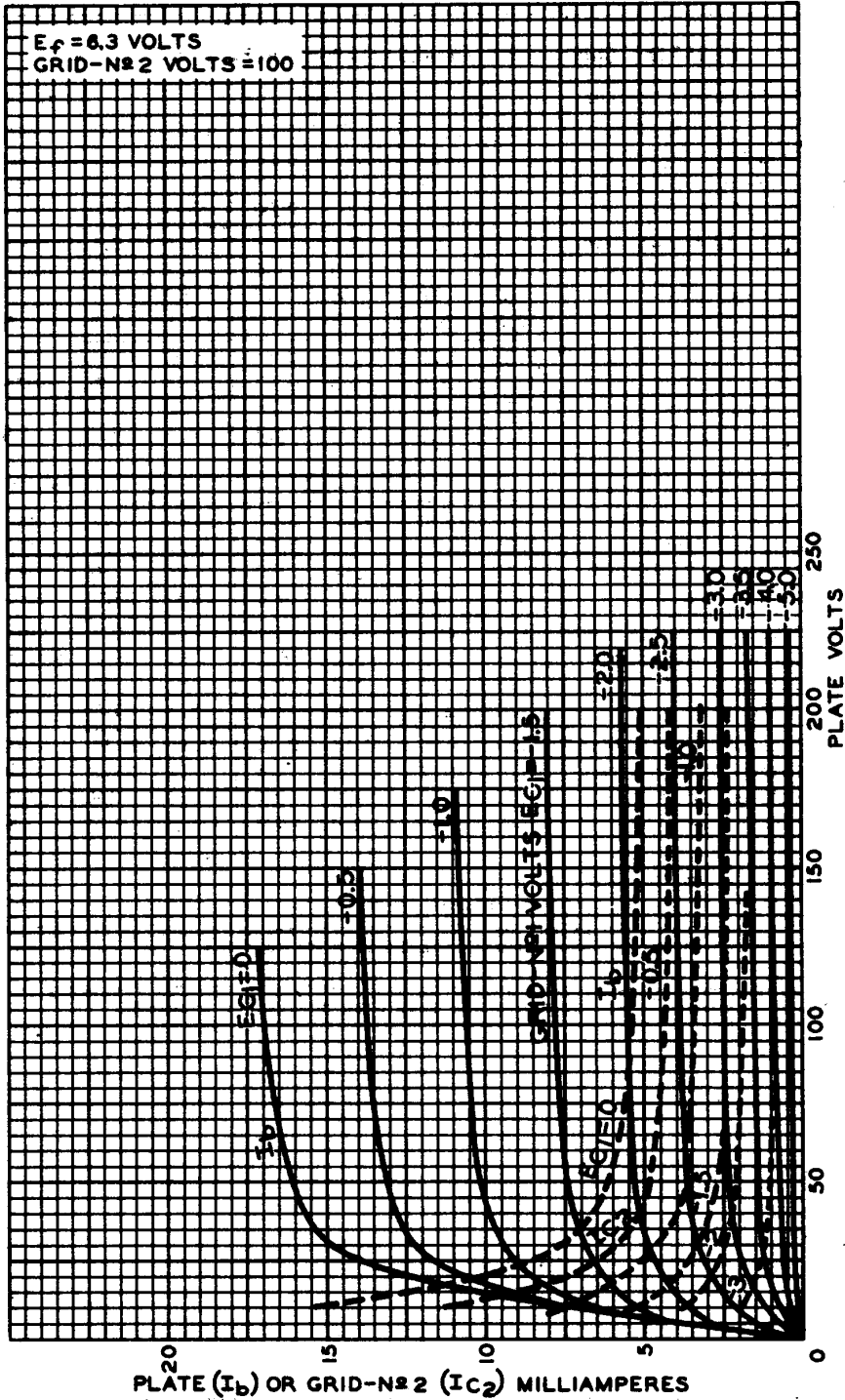
Note: Coupling capacitors should be selected to give desired frequency response. Cathode resistors should be adequately bypassed.

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### AVERAGE PLATE CHARACTERISTICS



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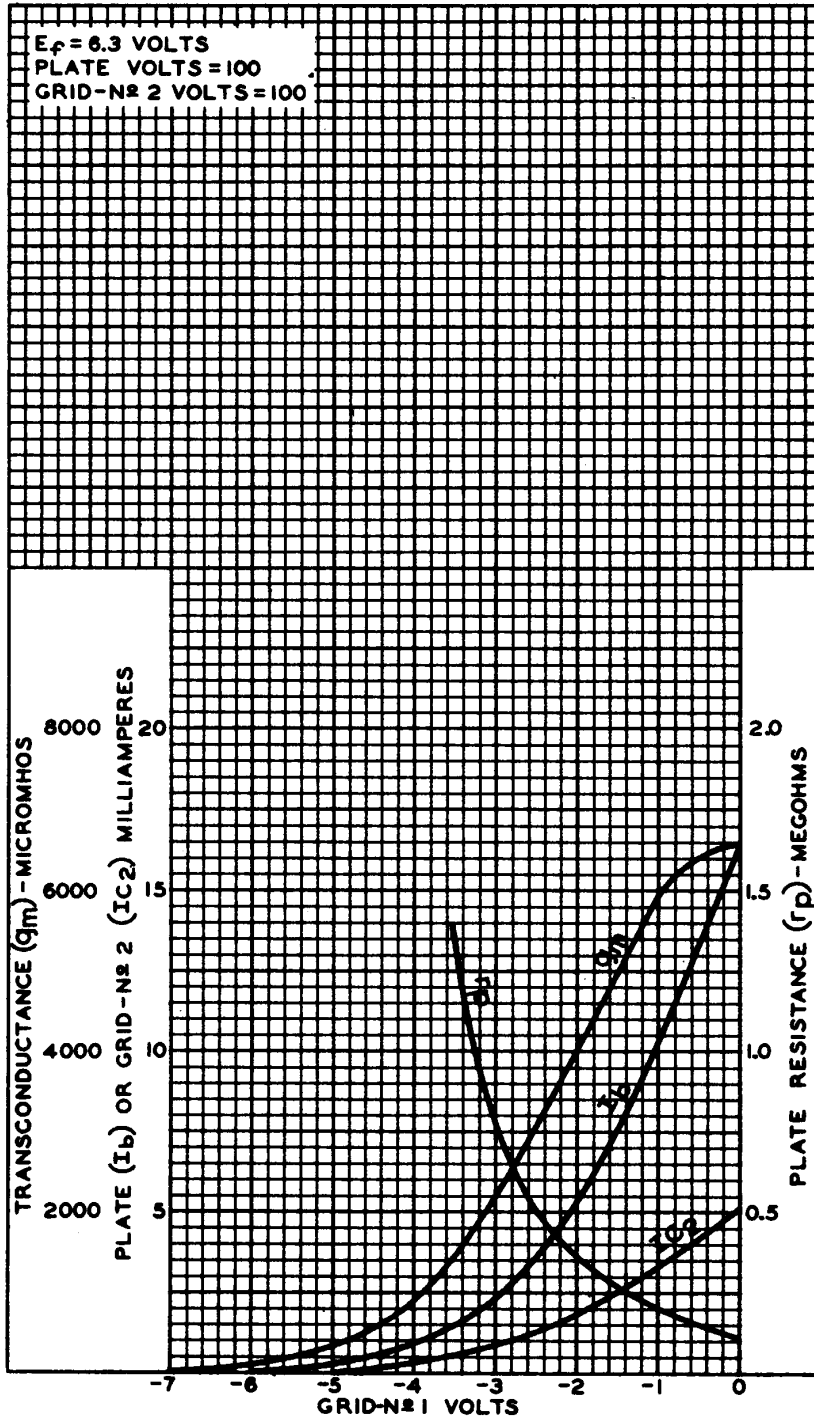
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