



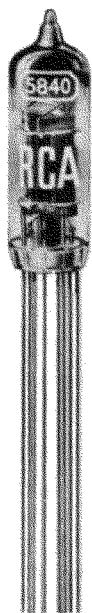
5840

SHARP-CUTOFF PENTODE

"Premium" Subminiature Type
For RF and IF Broad-Band Applications

TENTATIVE DATA

RCA-5840 is a sharp-cutoff subminiature pentode of the heater-cathode type designed primarily for use as an rf or if amplifier in high-frequency broad-band circuits of mobile and aircraft receivers where dependable performance under shock and vibration is a prime consideration. As an rf amplifier, the 5840 can be used at frequencies up to about 400 Mc.



Actual Size

The 5840 features a pure-tungsten heater to give long life under conditions of frequent "on-off" switching, three leads to the cathode to permit isolation of the input and output circuit returns, and a compact design in which special attention has been given to structural details that provide increased mount strength to resist shock and vibration. In addition, each 5840 is manufactured under rigid controls and

undergoes rigorous tests to insure its "premium" quality.

The 5840 supersedes the 5901.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:

Voltage (AC or DC)	6.3 ± 5%	volts
Current	0.150	ampere

Direct Interelectrode Capacitances:

	With External Shield ⁰	Without External Shield	
Grid No.1 to Plate	0.015 max.	0.03 max.	μmf
Input	4.2	4.0	μmf
Output	3.4	1.9	μmf

⁰ Having inside diameter of 0.405" and connected to cathode.

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

AMPLIFIER - Class A₁

Maximum Ratings, Absolute Values:

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

Characteristics:

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

Typical Operation as Resistance-Coupled Amplifier:

See Chart on Page 2

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	μmf
Input Capacitance	2	3.5	4.9	μmf
Output Capacitance	2	2.9	3.9	μmf
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



CHARACTERISTICS RANGE VALUES (Cont'd)

	Note	Min.	Max.
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

* 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.

- 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.

three positions to 2.5 g vibrational acceleration at 60 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.

High-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- μ 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 μ f, and vibrational acceleration of 15 g at 40 cps.

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.

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

OPERATING NOTES

The *maximum ratings* in the tabulated data for the 5840 are limiting values above which the serviceability of the 5840 may be impaired from the viewpoint of life and satisfactory performance. Therefore, in order not to exceed these absolute ratings, the equipment designer has the responsibility of determining an average design value for each rating below the absolute value of that

OPERATING CONDITIONS AS RESISTANCE-COUPLED AMPLIFIER

	100						150						volts
Plate-Supply Voltage													
Plate Load Resistor	0.10	0.10	0.27	0.27	0.47	0.47	0.10	0.10	0.27	0.27	0.47	0.47	megohm
Grid-No.2 Resistor	0.22	0.22	0.68	0.68	1.2	1.2	0.27	0.27	0.82	0.82	1.5	1.5	megohm
Grid-No.1 Resistor (of following stage)	0.27	0.47	0.47	1.0	0.47	1.0	0.27	0.47	0.47	1.0	0.47	1.0	megohm
cathode Resistor	820	820	2200	2200	3300	3300	560	560	1500	1500	2200	2200	ohms
Signal input voltage (rms)	0.1	0.1	0.1	0.1	0.1	0.1	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	11.5	12.5	13.2	15.5	13	16.7	volts
Voltage Gain [▲]	82	90	95	118	92	117	115	125	132	155	130	167	
Distortion	2.8	3.8	2.5	3.0	3.1	2.3	1.5	2.2	2.4	2.4	3.7	3.0	per cent
Signal input voltage (rms) [*]	0.23	0.22	0.15	0.16	0.12	0.14	0.20	0.18	0.16	0.16	0.11	0.14	volt
Output voltage	17.7	18.6	13.6	17	11	16	21.7	21.7	20.5	24	14	22.2	volts
Voltage Gain [▲]	77	85	91	106	92	114	109	120	128	150	127	159	
Distortion	4.9	4.8	4.7	4.4	4.8	5.0	4.8	5.0	4.9	4.8	4.2	4.8	per cent

Note 1: Coupling capacitors should be selected to give desired frequency response. Cathode resistor should be adequately bypassed.

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

▲ Ratio of signal output to signal input.

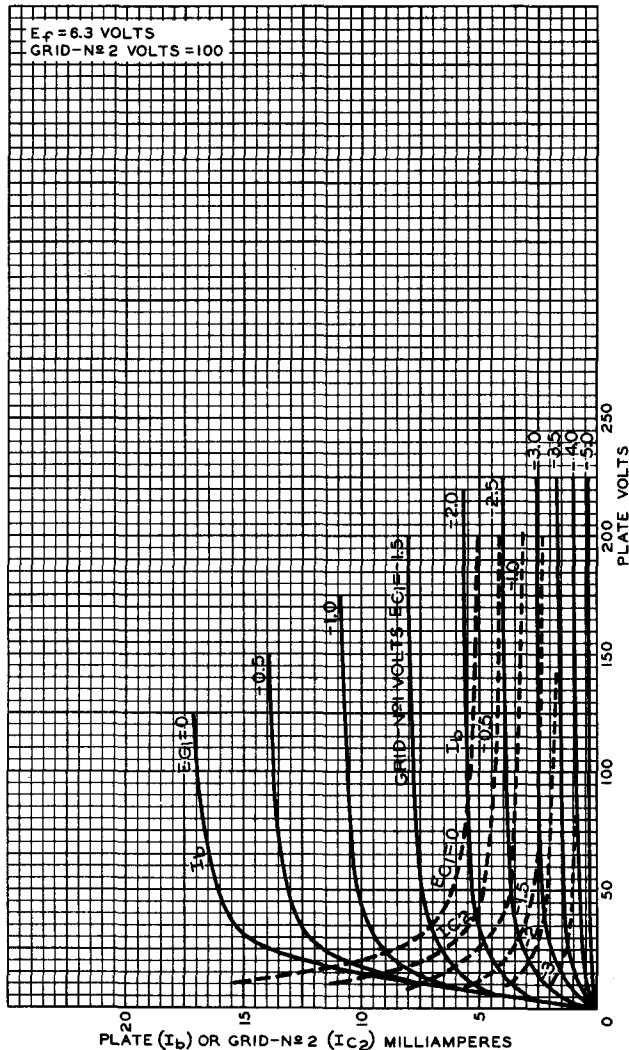


rating by an amount such that the absolute values will never be exceeded under any usual condition of supply-voltage variation, load variation, or manufacturing variation in the equipment itself.

The heater supply should be well regulated because life and reliability of the 5840 are adversely

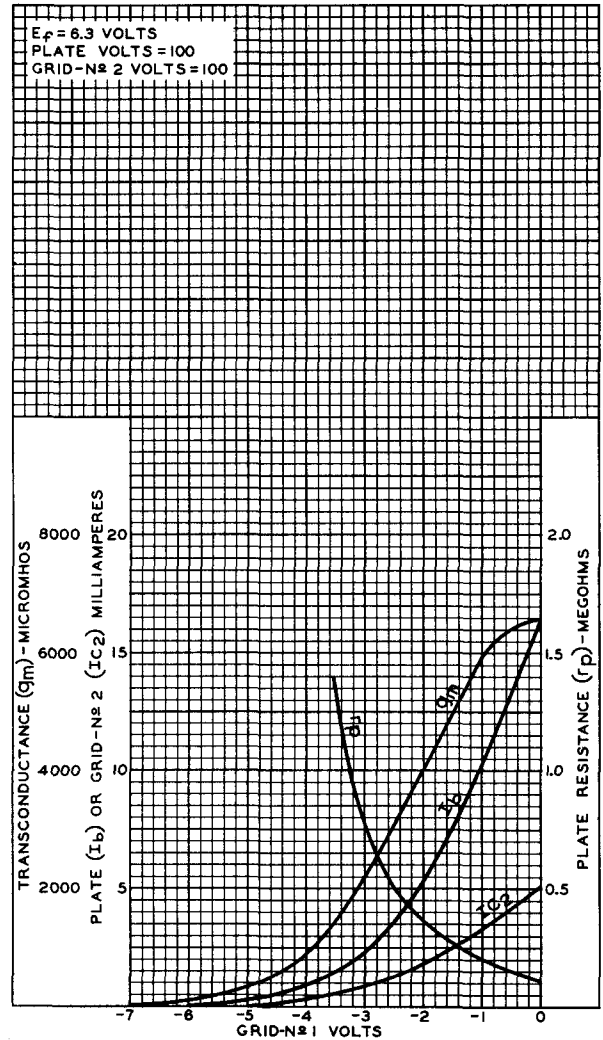
put circuit return and that lead 4 be used for the output circuit return. This practice reduces the portion of input loading due to cathode lead inductance and reduces feedback effects.

The flexible leads of the 5840 are usually soldered to the circuit elements. Soldering of



92CM-7893

Average Plate Characteristics of Type 5840.



92CM-7892

Average Characteristics of Type 5840.

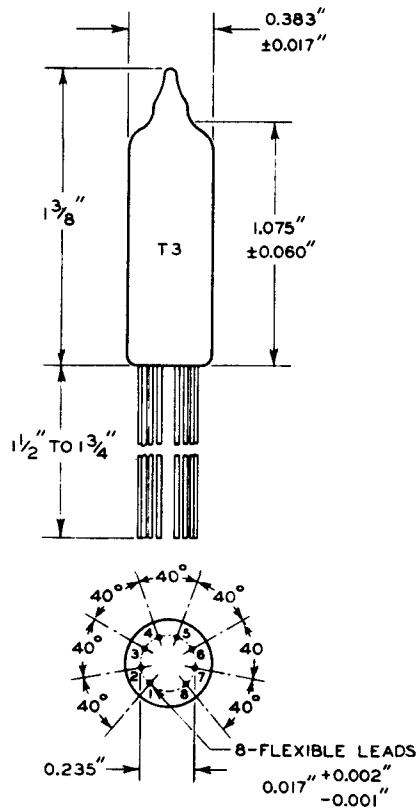
affected by departures from the 6.3-volt value. The extent to which life is affected is a function of the amounts of these departures and their durations.

The cathode is provided with 3 leads. It is suggested that leads 2 and 8 be used for the in-

the connections should be made as far as possible from the glass button. If this precaution is not followed, the heat of the soldering operation may crack the glass seals of the leads and damage the tube.

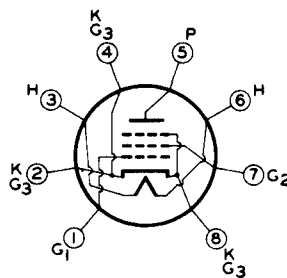


DIMENSIONAL OUTLINE



FLEXIBLE LEAD CONNECTIONS

LEAD NO.1: GRID NO.1
 LEAD NO.2: CATHODE, GRID NO.3
 LEAD NO.3: HEATER
 LEAD NO.4: CATHODE, GRID NO.3



LEAD NO.5: PLATE
 LEAD NO.6: HEATER
 LEAD NO.7: GRID NO.2
 LEAD NO.8: CATHODE, GRID NO.3

8DL

Devices and arrangements shown or described herein may use patents of RCA or others. Information contained herein is furnished without responsibility by RCA for its use and without prejudice to RCA's patent rights.