**5636**

**SHARP-CUTOFF PENTODE**

**SUBMINIATURE TYPE**

Intended for applications at altitudes up to 60,000 feet where dependable performance under shock and vibration is paramount

### GENERAL DATA

**Electrical:**

Heater, Pure Tungsten, for Unipotential Cathode:
- **Voltage** ............... 6.3 ............... ac or dc volts
- **Current** ................. 0.150 ............... amp

Direct Interelectrode Capacitances:

<table>
<thead>
<tr>
<th></th>
<th>Without External Shield</th>
<th>With External Shield*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grid No.1 to plate</td>
<td>0.034 max.</td>
<td>0.02 max.</td>
</tr>
<tr>
<td>Grid No.1 to all other electrodes</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Grid No.3 to all other electrodes</td>
<td>3.8</td>
<td>4</td>
</tr>
<tr>
<td>Plate to all other electrodes</td>
<td>1.9</td>
<td>3.4</td>
</tr>
<tr>
<td>Grid No.1 to grid No.3</td>
<td>0.17 max.</td>
<td>0.15 max.</td>
</tr>
<tr>
<td>Grid No.3 to plate</td>
<td>1.1 max.</td>
<td>1.1 max.</td>
</tr>
</tbody>
</table>

**Characteristics, Class A Amplifier:**

- **Plate-Supply Voltage** ............... 100 100 volts
- **Grid No.3** ............... –
- **Grid-No.3 Supply Voltage** ............... – 1 volt
- **Grid-No.2 Supply Voltage** ............... 100 100 volts
- **Cathode Resistor** ............... 150 150 ohms
- **Plate Resistance (Approx.)** ............... 0.11 0.05 megohm

**Transconductance:**

- **Grid No.1 to plate** ............... 3200 1950 \(\mu\)hos
- **Grid No.3 to plate** ............... 500 950 \(\mu\)hos
- **Plate Current** ............... 5.6 4 ma
- **Grid-No.2 Current** ............... 4 5.8 ma
- **Grid-No.1 Voltage (Approx.) for plate current of 10 \(\mu\)a** ............... –7.5 – volts
- **Grid-No.3 Voltage (Approx.) for plate current of 10 \(\mu\)a** ............... – –8 volts

**Mechanical:**

- **Mounting Position** ............... Any
- **Maximum Length (Excluding flexible leads)** ............... 1-3/8" 1-3/8" 1"
- **Length, Bulb Seat to Bulb Top (Excluding tip)** ............... 1.075" ± 0.060" 1.075" ± 0.060"
- **Diameter** ............... 0.366" to 0.400" 0.366" to 0.400"
- **Dimensional Outline** ............... See General Section
- **Bulb** ............... See General Section
- **Leads, Flexible** ............... T3
- **Length** ............... 1-1/2" to 1-3/4" 8
- **Orientation and diameter** ............... See Dimensional Outline

*With external shield having inside diameter of 0.405" connected to lead 8.

**Tentative Data 1**
AMPLIFIER - Class A1

Maximum Ratings, Absolute Values:
For Operation at Altitudes up to 60,000 Feet

- PLATE VOLTAGE ............... 165 max. volts
- GRID-No.3 (SUPPRESSOR-GRID) VOLTAGE:
  - Positive bias value ........... 30 max. volts
- GRID-No.2 (SCREEN-GRID) VOLTAGE .... 155 max. volts
- GRID-No.1 (CONTROL-GRID) VOLTAGE:
  - Negative bias value ........... 55 max. volts
  - Positive bias value ........... 0 max. volts
- PLATE CURRENT ............... 11 max. ma
- GRID-No.2 CURRENT .......... 7 max. ma
- GRID-No.2 INPUT ............. 0.7 max. watts
- PLATE DISSIPATION ........... 1.1 max. watts
- 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 as Mixer:

- Plate-Supply Voltage ........ 100 volts
- Grid-No.3 Supply Voltage (RMS) .... 15 volts
- Grid-No.2 Supply Voltage .... 100 volts
- Cathode Resistor .......... 150 ohms
- Plate Resistance (Approx.) .... 0.32 megohms
- Conversion Transconductance ... 1280 µmhos
- Plate Current ............... 3.5 ma
- Grid-No.2 Current .......... 5.7 ma

Maximum Circuit Values:

- Grid-No.1-Circuit Resistance:
  - For cathode-bias operation ........ 1.1 max. megohms

*With local oscillator injection to grid No.3. DC grid-No.3-circuit resistance should be kept as low as possible at high frequencies.
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Note</th>
<th>Min.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater Current</td>
<td>1</td>
<td>0.140</td>
<td>0.160</td>
<td>amp</td>
</tr>
<tr>
<td>Direct Interelectrode</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Capacitances:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grid No.1 to all other electrodes</td>
<td>2</td>
<td>3.5</td>
<td>4.5</td>
<td>μf</td>
</tr>
<tr>
<td>Grid No.3 to all other electrodes</td>
<td>2</td>
<td>3.5</td>
<td>4.5</td>
<td>μf</td>
</tr>
<tr>
<td>Plate to all other electrodes</td>
<td>2</td>
<td>2.9</td>
<td>3.9</td>
<td>μf</td>
</tr>
<tr>
<td>Plate Current 1</td>
<td>1.3</td>
<td>3.7</td>
<td>6.9</td>
<td>mA</td>
</tr>
<tr>
<td>Plate Current 2</td>
<td>1.4</td>
<td>–</td>
<td>100</td>
<td>μA</td>
</tr>
<tr>
<td>Plate Current 3</td>
<td>1.5</td>
<td>–</td>
<td>100</td>
<td>μA</td>
</tr>
<tr>
<td>Grid No.2 Current</td>
<td>1.3</td>
<td>2.8</td>
<td>5.4</td>
<td>mA</td>
</tr>
<tr>
<td>Transconductance, Grid No.1 to Plate:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range with heater volts</td>
<td>3</td>
<td>2700</td>
<td>4000</td>
<td>μmhos</td>
</tr>
<tr>
<td>Change with heater volts</td>
<td>3</td>
<td>–</td>
<td>15</td>
<td>%</td>
</tr>
<tr>
<td>Change at end of 500 hours with heater volts</td>
<td>3</td>
<td>–</td>
<td>20</td>
<td>%</td>
</tr>
<tr>
<td>Change at end of 500 hours with heater volts</td>
<td>3</td>
<td>–</td>
<td>15</td>
<td>%</td>
</tr>
<tr>
<td>Difference between average transconductance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>initially, and average after 500 hours, expressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>as a percentage of the initial average</td>
<td>1.3</td>
<td>–</td>
<td>15</td>
<td>%</td>
</tr>
<tr>
<td>Transconductance, Grid No.3 to Plate</td>
<td>1.6</td>
<td>500</td>
<td>1800</td>
<td>μmhos</td>
</tr>
<tr>
<td>Reverse Grid-No.1 Current</td>
<td>1.7</td>
<td>–</td>
<td>0.3</td>
<td>μA</td>
</tr>
<tr>
<td>Reverse Grid-No.1 Current at 500 hours</td>
<td>1.7</td>
<td>–</td>
<td>0.9</td>
<td>μA</td>
</tr>
<tr>
<td>Grid-No.1 Emission Current</td>
<td>8</td>
<td>–</td>
<td>0.5</td>
<td>μA</td>
</tr>
<tr>
<td>Heater-Cathode Leakage Current:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heater 100 volts negative with respect to cathode</td>
<td>1.3</td>
<td>–</td>
<td>5</td>
<td>μA</td>
</tr>
<tr>
<td>Heater 100 volts positive with respect to cathode</td>
<td>1.3</td>
<td>–</td>
<td>5</td>
<td>μA</td>
</tr>
<tr>
<td>Heater-Cathode Leakage Current at 500 hours:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heater 100 volts negative with respect to cathode</td>
<td>1.3</td>
<td>–</td>
<td>10</td>
<td>μA</td>
</tr>
</tbody>
</table>

*Notes 1 to 8: See next page.*

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ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA 2
SHARP-CUTOFF PENTODE

<table>
<thead>
<tr>
<th>Note</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater 100 volts positive with respect to cathode</td>
<td>1.3</td>
<td>10</td>
</tr>
<tr>
<td>Leakage Resistance: Grid No.1 to all other electrodes</td>
<td>1.9</td>
<td>100</td>
</tr>
<tr>
<td>Plate to all other electrodes</td>
<td>1.10</td>
<td>100</td>
</tr>
<tr>
<td>Leakage Resistance at 500 hours: Grid No.1 to all other electrodes</td>
<td>1.9</td>
<td>50</td>
</tr>
<tr>
<td>Plate to all other electrodes</td>
<td>1.10</td>
<td>50</td>
</tr>
</tbody>
</table>

Note 1: With 6.3 volts ac or dc on heater.

Note 2: With external shield having inside diameter of 0.405" connected to lead B.

Note 3: With plate-supply volts = 100, grid No.3 connected to cathode, grid-No.2 supply volts = 100, and cathode resistor (ohms) = 150.

Note 4: With plate volts = 100, grid No.3 connected to cathode, grid-No.2 volts = 100, and grid-No.1 volts = -7.5.

Note 5: With plate-supply volts = 100, grid-No.3 supply volts = -8, grid-No.2 supply volts = 100, and cathode resistor (ohms) = 150.

Note 6: With plate-supply volts = 100, grid-No.3 supply volts = -1, grid-No.2 supply volts = 100, and cathode resistor (ohms) = 150.

Note 7: With plate-supply volts = 100, grid No.3 connected to cathode, grid-No.2 supply volts = 100, cathode resistor (ohms) = 150, and grid-No.1-circuit resistance (megohms) = 1.

Note 8: With ac or dc heater volts = 7.5, plate volts = 100, grid-No.3 volts = 0, grid-No.2 volts = 100, grid-No.1 volts = -7.5, and grid-No.1-circuit resistance (megohms) = 1.

Note 9: With grid No.1 100 volts negative with respect to all other electrodes connected together.

Note 10: With plate 300 volts negative with respect to all other electrodes connected 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

This test is performed on a sample lot of tubes from each production run. Tubes are held rigid and are tested in four different positions. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for low-frequency vibration, heater-cathode leakage current, and transconductance change.
Fatigue Rating:

Vibrational Acceleration . . . . . . . 2.5 max. g
This test is performed on a sample lot of tubes from each production run. Tubes are rigidly mounted and subjected in each of three positions to 2.5 g vibrational acceleration at 60 cycles per second for 32 hours. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for low-frequency vibration, heater-cathode leakage current, and transconductance change.

Low-Frequency Vibration Performance:

RMS Output Voltage . . . . . . . . . . 60 max. mv
This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 6.3, plate-supply volts = 100, grid No.3 connected to cathode, grid-No.2 supply volts = 100, cathode resistor (ohms) = 150, cathode-bypass capacitor (µf) = 1000, plate-load resistance (ohms) = 10,000, and vibrational acceleration of 15 g at 40 cycles per second.

Heater-Cycling Life Performance:

Cycles of Intermittent Operation . . . 2000 min. cycles
Under the following conditions: heater volts = 7 cycled one minute on and one minute off, heater 140 volts rms with respect to cathode, and all other electrodes connected to ground.

Audio-Frequency Noise and Microphonic Performance:

RMS Output Voltage . . . . . . . . . . 70 max. mv
This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 6.3, plate-supply volts = 100, grid No.3 connected to cathode, grid-No.2 supply volts = 19, cathode resistor (ohms) = 150, grid-No.1-circuit resistance (megohms) = 0.1, grid-No.2-circuit resistance (ohms) = 1000, plate-load resistance (megohms) = 0.2, and cathode-bypass capacitor (µf) = 1000. The output voltage of a tube, when tapped, will not cause a reading on a vu meter greater than that produced when a calibrating signal of 70 millivolts rms is applied to the plate of the tube.

Shorts and Continuity Test:

This test is performed on a sample lot of tubes from each production run. In this test, a tube is considered inoperative if it shows a permanent or temporary short or open circuit, or a value of reverse grid-No.1 current in excess of 1.0 microampere under the conditions specified in the CHARACTERISTICS RANGE VALUES for reverse grid-No.1 current.
1-Hour Stability Life Performance:
This test is performed on a sample lot of tubes from each production run to insure that the tubes have been properly stabilized. Tubes are checked for transconductance under conditions specified under 500-Hour Intermittent Life Performance. At the end of 1 hour, the value of transconductance is read. The variation in transconductance from the 0-hour reading will not exceed 15 per cent.

100-Hour Survival Life Performance:
This test is performed on a sample lot of tubes from each production run under conditions specified under 500-Hour Intermittent Life Performance to insure a low percentage of early inoperatives. At the end of 100 hours, a tube is considered inoperative if it shows a permanent or temporary short or open circuit or a grid-No.1-to-plate transconductance of less than 2350 microhms under the conditions specified in CHARACTERISTICS RANGE VALUES.

500-Hour Intermittent Life Performance:
This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures of any of the characteristics indicated below. Life testing is conducted under the following conditions: heater volts = 6.3, plate-supply volts = 100, grid No.3 connected to cathode, grid-No.2 supply volts = 100, heater 200 volts positive with respect to cathode, cathode resistor (ohms) = 150, grid-No.1-circuit resistance (megohms) = 1, and bulb temperature (°C) = 220. At the end of 500 hours, tube will not show permanent shorts or open circuits and will be criticized for the total number of defects in the sample lot and for the number of tubes failing to pass established initial limits of heater current, grid-No.1-to-plate transconductance change, grid-No.3-to-plate transconductance, and 500-hour limits for reverse grid-No.1 current, heater-cathode leakage current, leakage resistance, and the difference in the grid-No.1-to-plate transconductance between the initial value and the average value shown under CHARACTERISTICS RANGE VALUES.

OPERATING CONSIDERATIONS
The heater supply should be well regulated because life and reliability of the 5636 are adversely affected by departures from the 6.3-volt value. The extent to which life is affected is a function of the amount of these departures and their durations.

The flexible leads of the 5636 are usually soldered to the circuit elements. Soldering of 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.
$E_T = 6.3$ VOLTS
GRID-N$\#3$ VOLTS = 0
GRID-N$\#2$ VOLTS = 100

PLATE ($I_b$) OR GRID-N$\#2$ ($I_{c2}$) MILLIAMPERES

Electron Tube Division
Radio Corporation of America, Harrison, New Jersey
AVERAGE CHARACTERISTICS

\[ E_f = 6.3 \text{ VOLTS} \]
\[ \text{PLATE VOLTS} = 100 \]
\[ \text{GRID-N\#2 VOLTS} = 100 \]

<table>
<thead>
<tr>
<th>GRID-N#3 VOLTS</th>
<th>0</th>
<th>5</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>-5</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>-10</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>\text{GRID-N#1 VOLTS - EC1 = 0}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>\text{GRID-N#1 VOLTS - EC1 = -2}</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\text{PLATE(I_C) OR GRID-N\#2(I_C2) MILLIAMPERES}

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM - 9210
AVERAGE CHARACTERISTICS

E_F = 6.3 VOLTS
PLATE VOLTS = 100
GRID-N°2 VOLTS = 100

GRID-N°3 TO PLATE TRANS-CONDUCTANCE (gm) - MICROMOHMS
(SOLID-LINE CURVES)

GRID-N°3 TO PLATE TRANS-CONDUCTANCE (gm) - MICROMOHMS
(DASHED-LINE CURVES)

GRID-N°1 VOLTS = E_C1

E_C1 = -1
E_C1 = -2
E_C1 = -3
E_C1 = -4
E_C1 = -5

GRID-N°3 VOLTS

-10 -5 0 5 10

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM - 9214
AVERAGE CHARACTERISTICS

$E_C = 6.3$ VOLTS
PLATE VOLTS $= 100$
GRID-$N^\#3$ VOLTS (RMS) - WITH
DIRECT INPUT OR CAPACITOR
INPUT $= 15$
GRID-$N^\#2$ VOLTS $= 100$
$I_b, I_{C_1},$ & $r_p$ CURVES ARE FOR
DIRECT INPUT.

![Diagram](attachment:image.png)