## MEDIUM-MU TRIODE

### CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Note</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater Current</td>
<td>1</td>
<td>0.138</td>
<td>0.162</td>
</tr>
<tr>
<td>Grid-to-Plate Capacitance</td>
<td>2</td>
<td>1.1</td>
<td>1.8</td>
</tr>
<tr>
<td>Input Capacitance</td>
<td>2</td>
<td>1.6</td>
<td>2.8</td>
</tr>
<tr>
<td>Output Capacitance</td>
<td>2</td>
<td>0.5</td>
<td>0.9</td>
</tr>
<tr>
<td>Amplification Factor</td>
<td>1,3</td>
<td>23</td>
<td>31</td>
</tr>
<tr>
<td>Plate Current</td>
<td>1,3</td>
<td>6.0</td>
<td>11.0</td>
</tr>
<tr>
<td>Plate Current</td>
<td>1,4</td>
<td>100</td>
<td>µamp</td>
</tr>
<tr>
<td>Transconductance</td>
<td>1,3</td>
<td>4800</td>
<td>6800</td>
</tr>
<tr>
<td>Transconductance</td>
<td>5,3</td>
<td>4500</td>
<td>µmhos</td>
</tr>
<tr>
<td>Grid Current</td>
<td>1,6</td>
<td>±0.4</td>
<td>µamp</td>
</tr>
</tbody>
</table>

**Heater-Cathode Leakage Current:**
- Heater negative with respect to cathode: 1,7, 7.0 µamp
- Heater positive with respect to cathode: 1,7, 7.0 µamp

**Leakage Resistance:**
- Between Grid and All Other Electrodes Tied: 1,8, 100 meghoms
- Between Plate and All Other Electrodes Tied: 1,9, 100 meghoms

**Useful Power Output:** 1,10, 600 mw

*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.
**Note 3:** With dc plate 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, and dc grid voltage of -7 volts.
**Note 5:** With 5.5 volts ac or dc on heater.
**Note 6:** With dc plate supply voltage of 100 volts, cathode resistor of 150 ohms, and grid resistor of 0.5 meghoms.
**Note 7:** With 100 volts dc between heater and cathode.
**Note 8:** With grid 100 volts negative with respect to all other electrodes tied together.
**Note 9:** With plate 300 volts negative with respect to all other electrodes tied together.
**Note 10:** In self-excited oscillator with dc plate voltage of 150 volts, grid resistor and feedback optimized to give useful power output at a plate current of 20 ma, and frequency of 500 Mc.

### 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.
MEDIUM-MU TRIODE

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.

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-μf 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 μf, and vibrational acceleration of 15 g at 40 cps.

Heater-Cycling Life Performance:
Cycles of Intermittent Operation . . 2500 max. 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 1750°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.
MEDIUM-MU TRIODE
SUBMINIATURE 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:

<table>
<thead>
<tr>
<th></th>
<th>With External Shield</th>
<th>Without External Shield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grid to Plate</td>
<td>1.3</td>
<td>1.4 µf</td>
</tr>
<tr>
<td>Input</td>
<td>2.4</td>
<td>2.2 µf</td>
</tr>
<tr>
<td>Output</td>
<td>2.4</td>
<td>0.7 µf</td>
</tr>
</tbody>
</table>

 0 Having inside diameter of 0.405" and connected to lead No.5.

Characteristics, Class A1 Amplifier:
Plate Supply Voltage ...  100     150 volts
Cathode Resistor .........  150     180 ohms
Amplification Factor .....  27      27
Plate Resistance .......... 4650    4150 ohms
Transconductance ......... 5800    6500 µmhos
Plate Current ............ 8.5      13.0 ma
Grid Volts (Approx.) for plate current of 10 µamp: -7 -11 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

BOTTOM VIEW

AMPLIFIER - Class A1

Maximum Ratings, Absolute Values:
DC PLATE VOLTAGE ........... 165 max. volts

APRIL 1, 1953
PLATE DISSIPATION ............... 3.3 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

Typical Operation as Resistance-Coupled Amplifier:

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

Maximum Circuit Values:

Grid–Circuit Resistance:
  For cathode–bias operation ........ 1.2 max. megohms
  For fixed–bias operation .......... Not recommended

Cathode–Bias Resistance—An adequate value of cathode–bias 
resistor should be used to protect the tube in event of 
temporary failure of excitation and resultant loss in de- 
veloped bias.

RF AMPLIFIER and OSCILLATOR — Class C

Operation with full input is permissible up to 1000 Wc.

Maximum Ratings, Absolute Values:

DC PLATE VOLTAGE ............... 165 max. volts
DC GRID VOLTAGE ............... -55 max. volts
DC PLATE CURRENT ............... 22 max. ma
DC GRID CURRENT ............... 5.5 max. ma
PLATE DISSIPATION ............... 3.3 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

Maximum Circuit Values:

Grid–Circuit Resistance:
  For cathode–bias operation ........ 1.2 max. megohms
  For fixed–bias operation .......... Not recommended

Cathode–Bias Resistance—An adequate value of cathode–bias 
resistor should be used to protect the tube in event of 
temporary failure of excitation and resultant loss in de- 
veloped bias.

APRIL 1, 1953
TUBE DEPARTMENT
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
# MEDIUM-MU TRIODE

## OPERATING CONDITIONS AS RESISTANCE-COUPLED AMPLIFIER

<table>
<thead>
<tr>
<th>Plate-Supply Voltage</th>
<th>100</th>
<th>200</th>
<th>volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate Load Resistor</td>
<td>0.047</td>
<td>0.047</td>
<td>0.10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grid-No.1 Resistor(^\circ)</th>
<th>0.10</th>
<th>0.27</th>
<th>0.27</th>
<th>0.47</th>
<th>0.27</th>
<th>0.47</th>
<th>0.27</th>
<th>0.47</th>
<th>0.27</th>
<th>0.47</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cathode Resistor</td>
<td>1000</td>
<td>1000</td>
<td>2000</td>
<td>2000</td>
<td>6000</td>
<td>6000</td>
<td>8200</td>
<td>8200</td>
<td>8200</td>
<td>8200</td>
</tr>
<tr>
<td>Sig. Input Volt. (rms)</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Output Voltage (rms)</td>
<td>8.2</td>
<td>8.2</td>
<td>8.2</td>
<td>8.2</td>
<td>7.3</td>
<td>7.3</td>
<td>7.4</td>
<td>7.4</td>
<td>7.4</td>
<td>7.4</td>
</tr>
<tr>
<td>Voltage Gain(^\Delta)</td>
<td>16.4</td>
<td>16.4</td>
<td>16.4</td>
<td>16.4</td>
<td>14.6</td>
<td>14.6</td>
<td>14.8</td>
<td>14.8</td>
<td>14.8</td>
<td>14.8</td>
</tr>
<tr>
<td>Distortion</td>
<td>3.9</td>
<td>3.2</td>
<td>3.0</td>
<td>2.71</td>
<td>3.4</td>
<td>2.8</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Sig. Input Volt. (rms)(^\star)</td>
<td>0.59</td>
<td>0.70</td>
<td>0.67</td>
<td>0.81</td>
<td>0.75</td>
<td>0.86</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Output Voltage (rms)</td>
<td>9.7</td>
<td>11.75</td>
<td>11.0</td>
<td>13.1</td>
<td>11.0</td>
<td>12.7</td>
<td>volt</td>
<td>volt</td>
<td>volt</td>
<td>volt</td>
</tr>
<tr>
<td>Voltage Gain(^\Delta)</td>
<td>16.4</td>
<td>16.8</td>
<td>16.4</td>
<td>16.2</td>
<td>14.6</td>
<td>14.8</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Distortion</td>
<td>4.5</td>
<td>4.7</td>
<td>4.1</td>
<td>4.6</td>
<td>5.0</td>
<td>5.0</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
</tbody>
</table>

\(^\circ\) of following stage.

\(^\Delta\) Ratio of signal output to signal input.

\(^\star\) 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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APRIL 1, 1953

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

TENTATIVE DATA 3
AVERAGE PLATE CHARACTERISTICS

$E_F = 6.3$ VOLTS

PLATE (I_b) OR GRID (I_c) MILLIAMPERES

0 5 10 15 20 25 30

0 50 100 150 200 250

PLATE VOLTS

SEPT. 23, 1952

TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-7848
AVERAGE CHARACTERISTICS

\[ E_F = 6.3 \text{ VOLTS} \]
\[ \text{PLATE VOLTS} = 150 \]

\( g_m \) - MICROMOS

\( I_P \) - MILLIAMPERES

\( R_P \) - MEGOHMS

GRID VOLTS

APRIL 22, 1955
TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-785IRI