RCA-7558 is a beam power tube of the 9-pin miniature type designed for use primarily in fixed-station communications equipment. In such equipment, the 7558 is particularly useful in class C radio-frequency amplifier, oscillator, and frequency-multiplier service at frequencies up to 175 Mc. It may also be used in modulator and audio-frequency power amplifier applications.

Features which contribute to the efficient performance of the 7558 at high frequencies are low lead inductance, small interelectrode capacitances, and low rf losses. Low lead inductance for both cathode and grid No. 2 is achieved by the use of two pin connections for each of these electrodes. The use of two cathode base pins provide two separate cathode returns thereby minimizing the possibility of degeneration. The two base-pin connections for grid No. 2 facilitates rf bypassing. The low rf losses and high input resistance of the 7558 permit use of relatively high values of grid-No. 1-circuit resistance, thus minimizing loading of the driver stage.

**GENERAL DATA**

**Electrical:**
- Heater for Unipotential Cathode:
  - Voltage (AC or DC) .............. 6.3 ± 5% volts
  - Current ....................... 0.8 amp
- Direct Interelectrode Capacitances (Without external shield):
  - Grid No. 1 to plate ............ 0.15 max. μuf
  - Grid No. 1 to cathode, grid No. 3, grid No. 2, and heater ....... 10 μuf
  - Plate to cathode, grid No. 3, grid No. 2, and heater .......... 5.5 μuf
- Characteristics, Class A4 Amplifier:
  - Plate Voltage ................. 250 volts
  - Grid No. 3 (Suppressor Grid) .... Connected to cathode
  - Grid-No. 2 (Screen-Grid) Voltage ...... 250 volts
  - Grid-No. 1 (Control-Grid) Voltage .... -18 volts
  - Mu-Factor, Grid No. 2 to Grid No. 1 .... 8.7
  - Transconductance .............. 5300 μhos
  - Plate Current .................. 40 ma
  - Grid-No. 2 Current ............. 3 ma

**Mechanical:**
- Operating Position ............ Any
- Maximum Overall Length ........ 2-5/8"
- Maximum Seated Length ........ 2-3/8" Diameter:
  - Maximum ...................... 0.875"
  - Minimum ...................... 0.850"
- Bulb ............... 1-5/16" Base .... Small-Button Noval 9-Pin (JEDEC No. E9-1)

**AF POWER AMPLIFIER & MODULATOR — Class A4†**
- Maximum CCS Ratings, Absolute-Maximum Values:
  - DC PLATE VOLTAGE .............. 900 max. volts
  - GRID-No. 3 VOLTAGE .......... 0 max. volts
  - DC GRID-No. 2 VOLTAGE ........ 250 max. volts
  - MAX.-SIGNAL DC PLATE CURRENT .... 70 max. ma
  - MAX.-SIGNAL PLATE INPUT ....... 21 max. watts
  - MAX.-SIGNAL GRID-No. 2 INPUT .... 3 max. watts
  - PLATE DISSIPATION ............. 10 max. watts
  - PEAK HEATER-CATHODE VOLTAGE:
    - Heater negative with respect to cathode ...... 100 max. volts
    - Heater positive with respect to cathode ...... 100 max. volts
  - BULB TEMPERATURE (At hottest point) .... 225 max. °C
- Typical CCS Operation:
  - Values are for 8 tubes
  - DC PLATE Voltage .............. 300 volts
  - Grid No. 3 .................... Connected to cathode
  - DC Grid-No. 2 Voltage ........ 250 volts
  - DC Grid-No. 1 Voltage ........ 250 volts
  - Peak AF Grid-No. 1 to Grid-No. 1 Voltage .......... 40 volts
  - Zero-Signal DC Grid Current .... 40 ma
  - Max.-Signal DC Grid Current ........ 125 ma
  - Zero-Signal DC Grid-No. 2 Current .......... 2 ma
  - Max.-Signal DC Grid-No. 2 Current .......... 14 ma
  - Effective Load Resistance (Plate to plate) ........ 5000 ohms
  - Max.-Signal Driving Power ........ 10 watts
  - Total Harmonic Distortion .......... 5 per cent
  - Max.-Signal Power Output (Approx.) ........ 20.5 watts
- Maximum Circuit Values:
  - Grid-No. 1-Circuit Resistance .......... 0.1 max. megohm

**RF POWER AMPLIFIER & OSC. — Class C Telegraphy†** and **RF POWER AMPLIFIER — Class C FM Telephony**

**Maximum Ratings, Absolute-Maximum Values up to 175 Mc:**
- CCS .... 10CA
- DC PLATE VOLTAGE .............. 300 max. volts
- GRID No. 3 .................... Connected to cathode
- DC GRID-No. 2 VOLTAGE ........ 250 max. volts

**ELECTRON TUBE DIVISION**

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

7558 10-59
Printed in U.S.A.
PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1.0

Maximum Ratings, Absolute-Maximum Values Up to 175 Mc:

<table>
<thead>
<tr>
<th>Current Source</th>
<th>CCS</th>
<th>ICAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC PLATE VOLTAGE</td>
<td>250 max.</td>
<td>250 max.</td>
</tr>
<tr>
<td>DC GRID-No.3 VOLTAGE</td>
<td>0 max.</td>
<td>0 max.</td>
</tr>
<tr>
<td>DC GRID-No.2 VOLTAGE</td>
<td>250 max.</td>
<td>250 max.</td>
</tr>
<tr>
<td>DC GRID-No.1 VOLTAGE</td>
<td>125 max.</td>
<td>125 max.</td>
</tr>
<tr>
<td>DC PLATE CURRENT</td>
<td>60 max.</td>
<td>70 max.</td>
</tr>
<tr>
<td>DC GRID-No.2 CURRENT</td>
<td>10 max.</td>
<td>10 max.</td>
</tr>
<tr>
<td>DC GRID-No.1 CURRENT</td>
<td>5 max.</td>
<td>5 max.</td>
</tr>
<tr>
<td>PLATE INPUT</td>
<td>15 max.</td>
<td>15 max.</td>
</tr>
<tr>
<td>GRID-No.2 INPUT</td>
<td>2 max.</td>
<td>2 max.</td>
</tr>
<tr>
<td>PLATE DISSIPATION</td>
<td>7 max.</td>
<td>8 max.</td>
</tr>
<tr>
<td>PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode</td>
<td>100 max.</td>
<td>100 max.</td>
</tr>
<tr>
<td>Heater positive with respect to cathode</td>
<td>100 max.</td>
<td>100 max.</td>
</tr>
<tr>
<td>BULB TEMPERATURE (At hottest point)</td>
<td>225 max.</td>
<td>225 max.</td>
</tr>
</tbody>
</table>

Typical Operation at 175 Mc:

<table>
<thead>
<tr>
<th>Current Source</th>
<th>CCS</th>
<th>ICAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC PLATE VOLTAGE</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>DC GRID-No.3 VOLTAGE</td>
<td>Connected to cathode</td>
<td>Connected to cathode</td>
</tr>
<tr>
<td>DC GRID-No.2 VOLTAGE</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>DC GRID-No.1 VOLTAGE</td>
<td>125</td>
<td>125</td>
</tr>
<tr>
<td>DC PLATE CURRENT</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>DC GRID-No.2 CURRENT</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>DC GRID-No.1 CURRENT</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>PLATE INPUT</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>GRID-No.2 INPUT</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>PLATE DISSIPATION</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>PEAK HEATER-CATHODE VOLTAGE: Heater negative with respect to cathode</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Heater positive with respect to cathode</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>BULB TEMPERATURE (At hottest point)</td>
<td>225</td>
<td>225</td>
</tr>
</tbody>
</table>

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony
permit obtaining the desired operating plate current after initial tuning adjustments are completed.

- Obtained from a grid-No.1 resistor, or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor.

- Driver stage is required to supply tube losses and rf circuit losses. The driver stage should be designed to provide for the power delivered to the indicated values of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

- Measured at load.

- Obtained preferably from a separate source modulated along with the plate supply from the modulated plate supply through a series resistor. It is recommended that this resistor be adjustable to permit obtaining the desired operating plate current after initial tuning adjustments are made.

- Obtained from a grid-No.1 resistor or from a combination of grid-No.1 resistor with either fixed supply or cathode resistor. The combination of grid resistor and fixed supply has the advantage of not only protecting the tube from damage through loss of excitation but also of minimizing distortion by bias-supply compensation.

**CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater Current</td>
<td>1.0</td>
<td>0.745</td>
</tr>
<tr>
<td>Transconductance</td>
<td>1.2</td>
<td>4200</td>
</tr>
<tr>
<td>Plate Current</td>
<td>1.2</td>
<td>30</td>
</tr>
<tr>
<td>Plate Current</td>
<td>1.3</td>
<td>50</td>
</tr>
<tr>
<td>Grid-No.2 Current</td>
<td>1.2</td>
<td>7.5</td>
</tr>
<tr>
<td>Reverse Grid-No.1 Current</td>
<td>1.4</td>
<td>2</td>
</tr>
<tr>
<td>Heater-Cathode Leakage Current</td>
<td>1.5</td>
<td>20</td>
</tr>
<tr>
<td>Leakage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between grid and all other</td>
<td>1.6</td>
<td>100</td>
</tr>
<tr>
<td>electrodes tied together</td>
<td>1.7</td>
<td>100</td>
</tr>
</tbody>
</table>

**Note:**
- With 6.3 volts ac or dc on heater.
- With plate voltage of 250 volts, grid-No.3 connected to cathode, grid-No.2 voltage of 250 volts, grid-No.1 voltage of -18 volts.
- With plate voltage of 180 volts, grid-No.3 connected to cathode, grid-No.2 voltage of 250 volts, grid-No.1 voltage of -18 volts.
- With plate voltage of 250 volts, grid-No.2 connected to cathode, grid-No.2 voltage of 250 volts, grid-No.1 resistor of 0.1 meqohms, and cathode resistor of 170 meqohms.
- With 100 volts dc between heater and cathode.
- With grid No.1 100 volts negative.
- With plate 300 volts negative.

**OPERATING CONSIDERATIONS**

The maximum ratings in the tabulated data are established in accordance with the following definition of the Absolute-Maximum Rating System for rating electronic devices:

Absolute-Maximum ratings are limiting values of operating and environmental conditions applicable to any electronic device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.

The device manufacturer chooses these values to provide acceptable serviceability of the device, taking no responsibility for equipment variations, environment variations, and the effects of changes in operating conditions due to variations in device characteristics.

The equipment manufacturer should design so that initially and throughout life no absolute-maximum value for the intended service is exceeded with any device under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in device characteristics.

The maximum bulb temperature of 225°C is a tube rating and is to be observed in the same manner as other ratings. The temperature should be measured at the hottest point on the bulb with the tube operating in the completely assembled equipment with all covers in place, and delivering the maximum output under the highest ambient-temperature conditions and the most severe operating cycle for which the equipment is designed. The temperature may be measured with a temperature-sensitive paint, such as Tempilaq. The latter is made by the Tempil Corporation, 132 W. 22nd Street, New York 11, N.Y., in the form of liquid and stick.

Shielding of the 7558 in "straight-through" rf amplifier service is required for stable operation. To minimize external feedback from the plate to grid No.1, a grounded shield crossing the terminal end of the tube socket through the space between pins 2 and 3 and the space between pins 8 and 9, is generally adequate for this purpose.

The heater may be effectively bypassed by grounding one heater pin at the tube socket and bypassing the other heater pin to ground with a low inductance capacitor. To reduce degeneration in the cathode circuit, two base-pin connections (pins 1 and 9) are provided. The cathode circuit should be arranged so that the input ac current flows through the cathode connection and the output ac current flows through the other. This circuit arrangement will reduce the effect of the cathode lead inductance. Both cathode circuit returns should be grounded through the shortest possible connection.

The rf impedance between grid No.2 and the cathode must be kept low, usually by means of a suitable bypass capacitor. In telephony service when grid No.2 is modulated, a smaller bypass capacitor than is used for telegraphy service may be required in order to avoid excessive af bypassing. However, if the capacitance value is too small, rf feedback may occur between plate and grid No.1, depending on the circuit layout, operating frequency, and power gain of the stage. AF bypassing difficulties can usually be eliminated if the grid-No.2 bypass capacitor is replaced by a series-resonant circuit which is tuned to resonate at the operating frequency. This circuit presents a high impedance to audio frequencies but a very low impedance to its resonant frequency.
Average Characteristics of Type 7558.
Average Characteristics of Type 7558.
Average Constant-Current Characteristics of Type 7558.
DIMENSIONAL OUTLINE

SMALL-BUTTON NOVAL
9-PIN BASE
JEDEC IN4 E8-1

* APPLIES IN ZONE STARTING 0.375" FROM BASE SEAT.
□ MEASURED FROM BASE SEAT TO BULB-TOP LINE AS DETERMINED
BY RING GAUGE OF 7/16" I.D.

SOCKET CONNECTIONS
Bottom View

PIN 1: CATHODE
PIN 2: GRID NO. 1
PIN 3: GRID NO. 2
PIN 4: HEATER
PIN 5: HEATER
PIN 6: PLATE
PIN 7: GRID NO. 3
PIN 8: GRID NO. 2
PIN 9: CATHODE

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