**SUPER-POWER BEAM TRIODE**  
WATER COOLED

### GENERAL DATA

**Electrical:**
- Filament, Multistrand Thoriated Tungsten:
  - Voltage (Single-Phase): 6 ac volts
  - Current: 2220 amp
  - Starting Current: Must never exceed 3550 amperes, even momentarily
  - Cold Resistance: 0.0005 ohm
  - Minimum Heating Time: 60 seconds
  - Amplification Factor: 25

**Direct Inter-electrode Capacitances:**
- Grid to Plate: 150 μμf
- Grid to Filament: 600 μμf
- Plate to Filament: 8 μμf

### Mechanical:

**Terminal Connections:**
- FC - Filament
- Cylindrical Terminal
- FF - Filament
- Flange Terminal
- KR - Cathode Flange
- Terminal For Circuit Returns
- G - Grid Flange
- Terminal
- P - Plate Flange
- Terminal

**Mounting Position:** Vertical, plate end up

**Maximum Overall Length:** 38-3/4"

**Maximum Diameter:** 9-17/32"

**Water Cooling:**
Water cooling of the beam-forming cylinder, the grid-terminal flange, and the plate is required. The water flow must start before application of any voltages and preferably should continue for several seconds after removal of all voltages. Interlocking of the water flow for each of the cooled elements with all power supplies is recommended to prevent tube damage in case of failure of adequate water flow. The use of distilled or deionized water is essential.

**Water Flow:**

<table>
<thead>
<tr>
<th>Min. Pressure Flow</th>
<th>Drop @ 40 gpm</th>
<th>Max. Gauge Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>psi</td>
<td>psi</td>
<td>psi</td>
</tr>
</tbody>
</table>

**To Plate:**
- For plate dissipation less than 135 kw: 40 10 100
- For plate dissipation from 135 to 150 kw: 60 20 100
- To Grid Connector: 1
- To Beam-Forming Cylinder: 6 20
- Outlet Water Temperature (Any outlet): 70 max. °C

*Approximate pressure drop directly across cooled element for the indicated minimum flow.*

*At tube inlets.*

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TUBE DEPARTMENT  
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
SUPER-POWER BEAM TRIODE

Seal Temperature (Plate, grid, or filament) .... 165 max. °C
Bulb Temperature (At hottest point) .... 180 max. °C

Fittings:
Fittings for the plate and beam-forming-cylinder water connections may be obtained from B-R Engineering Company, 309 East Saratoga Street, Baltimore 2, Maryland, U.S.A.

AF POWER AMPLIFIER and MODULATOR—Class B

Maximum CCS® Ratings, Absolute Values:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC PLATE VOLTAGE</td>
<td>10500 max. volts</td>
</tr>
<tr>
<td>MAX.-SIGNAL DC PLATE CURRENT**</td>
<td>30 max. amp</td>
</tr>
<tr>
<td>MAX.-SIGNAL PLATE INPUT**</td>
<td>300 max. kw</td>
</tr>
<tr>
<td>PLATE DISSIPATION**</td>
<td>135 max. kw</td>
</tr>
</tbody>
</table>

Typical Operation:

Values are for 2 tubes

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Plate Voltage</td>
<td>10000 volts</td>
</tr>
<tr>
<td>DC Grid Voltage</td>
<td>-390 volts</td>
</tr>
<tr>
<td>Peak AF Grid-to-Grid Voltage</td>
<td>1900 volts</td>
</tr>
<tr>
<td>Zero-Signal DC Plate Current</td>
<td>6 amp</td>
</tr>
<tr>
<td>Max.-Signal DC Plate Current</td>
<td>57 amp</td>
</tr>
<tr>
<td>Effective Load Resistance (Plate-to-plate)</td>
<td>425 ohms</td>
</tr>
<tr>
<td>Max.-Signal Driving Power (Approx.)*</td>
<td>800 watts</td>
</tr>
<tr>
<td>Max.-Signal Power Output (Approx.)</td>
<td>370 kw</td>
</tr>
</tbody>
</table>

PLATE-MODULATED RF POWER AMPLIFIER—Class C Telephony

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

Maximum CCS® Ratings, Absolute Values:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC PLATE VOLTAGE</td>
<td>10500 max. volts</td>
</tr>
<tr>
<td>DC GRID VOLTAGE</td>
<td>-2000 max. volts</td>
</tr>
<tr>
<td>DC PLATE CURRENT</td>
<td>25 max. amp</td>
</tr>
<tr>
<td>DC GRID CURRENT</td>
<td>5 max. amp</td>
</tr>
<tr>
<td>PLATE INPUT</td>
<td>250 max. kw</td>
</tr>
<tr>
<td>PLATE DISSIPATION</td>
<td>135 max. kw</td>
</tr>
</tbody>
</table>

Typical Operation:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Plate Voltage</td>
<td>10000 volts</td>
</tr>
<tr>
<td>DC Grid Voltage#</td>
<td>-1350 volts</td>
</tr>
<tr>
<td>Peak RF Grid Voltage</td>
<td>2000 volts</td>
</tr>
<tr>
<td>DC Plate Current</td>
<td>21.9 amp</td>
</tr>
</tbody>
</table>

** averaged over any audio-frequency cycle of sine-wave form.

* the driving stage should have good regulation and should be capable of supplying considerably more than the indicated value which is the power absorbed by the grid and grid-bias source and does not include circuit losses.

# obtained by grid resistor or by partial self-bias methods.
SUPER-POWER BEAM TRIODE

DC Grid Current (Approx.)... 0.5 amp
Driving Power (Approx.)... 900 watts
Power Output (Approx.)... 175 kw

RF POWER AMPLIFIER and OSCILLATOR—Class C Telegraphy
Key-down conditions per tube without amplitude modulation

Maximum CCS Ratings, Absolute Values:

DC PLATE VOLTAGE... 16000 max. volts
DC GRID VOLTAGE... -2000 max. volts
DC PLATE CURRENT... 41 max. amp
DC GRID CURRENT... 1.5 max. amp
PLATE INPUT... 650 max. kw
PLATE DISSIPATION... 150 max. kw

Typical Operation:
DC Plate Voltage... 11500 16000 volts
DC Grid Voltage... -1000 -1200 volts
Peak RF Grid Voltage... 1650 2000 volts
DC Plate Current... 33 39 amp
DC Grid Current (Approx.)... 0.65 0.5 amp
Driving Power (Approx.)... 1200 900 watts
Power Output (Approx.)... 300 500 kw

- Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 15% of the carrier conditions.
- Obtained from fixed supply for amplifier service, or from adjustable grid resistor for oscillator service.
- For effect of load resistance on grid current and driving power, refer to TUBE RATINGS—Grid Current and Driving Power in the General Section.
- Continuous Commercial Service.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

<table>
<thead>
<tr>
<th>Note</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filament Current...</td>
<td>1</td>
<td>2090</td>
</tr>
<tr>
<td>Amplification Factor...</td>
<td>1,2</td>
<td>20</td>
</tr>
<tr>
<td>Grid-Plate Capacitance...</td>
<td>-</td>
<td>125</td>
</tr>
<tr>
<td>Grid-Filament Capacitance...</td>
<td>-</td>
<td>500</td>
</tr>
<tr>
<td>Plate-Filament Capacitance...</td>
<td>-</td>
<td>4</td>
</tr>
</tbody>
</table>

Note 1: With 6.0 volts ac on filament.
Note 2: With dc grid voltage of +25 volts, and with plate voltage adjusted to give dc plate current of 10 amperes.

The 5831 may be operated with maximum rated plate voltage and plate input at frequencies up through the "Standard Broadcast Band" and much higher. The limitations for operation at the

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higher frequencies have not yet been determined. If operation of the 5831 is contemplated at a higher frequency, write for operating recommendations to Commercial Engineering, RCA, Harrison, N.J., giving complete details as to the proposed service.
Super-Power Beam Triode

Notes:

Note 2 - Do not tamper with bolts.
Note 3 - Plug No. 4T-25, Hansen Mfg. Co. (See Note 1)
Note 4 - Direction of water flow through tube should be in direction indicated by markings at water connections.
Note 5 - Use for filament power only. Circuit returns should be made to cathode terminal flange.

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Tube Department
Radio Corporation of America, Harrison, New Jersey
SUPER-POWER BEAM TRIODE

DETAILS OF WATER-COOLED GRID-FLANGE CONNECTOR

1/16" WIDE 32-SLOTS EQUALLY SPACED

13"

12.250"

3/4"

9/32" DIA 32-HOLES EQUALLY SPACED FOR BOLTS

TOP VIEW

3/8" CUPPER

0.260"

1/32"

9/32" GRID FLANGE DIA

10.750" DIA

ENLARGED SECTION

A-A

1/4"-28 TAP 32-HOLES EQUALLY SPACED (16 HOLES EACH SECTION)

1/4" OD CUPPER TUBING WATER CONNECTION

BOTTOM VIEW SHOWING REMOVABLE SECTIONS

NOTE 1 - CUT CIRCULAR GROOVE, 1/8" RADIUS, 1/32" DEEP FOR TUBING

NOTE 2 - END MILL 1/32" DEEP FOR TUBING BEND

92CL-7443

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TUBE DEPARTMENT

RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
AVERAGE CONSTANT - CURRENT CHARACTERISTICS

$E_f = 6.0$ VOLTS AC
$I_C = GRID AMPERES
$I_B = PLATE AMPERES