TWIN-UNIT BEAM POWER TUBE

Unless Otherwise Specified, Values are on a Per Tube Basis

GENERAL DATA

Electrical:
Heater, for Unipotential Cathodes:

<table>
<thead>
<tr>
<th>Parallel</th>
<th>Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage (AC or DC)</td>
<td>6.3</td>
</tr>
<tr>
<td>Current at 6.3 volts</td>
<td>2.25</td>
</tr>
<tr>
<td>Transconductance (Each Unit):</td>
<td></td>
</tr>
<tr>
<td>With plate volts = 250, grid-No.2 volts = 175, and plate</td>
<td>ma. = 60</td>
</tr>
<tr>
<td>Mu-Factor, Grid No.2 to Grid No.1</td>
<td></td>
</tr>
<tr>
<td>(Each Unit):</td>
<td>ma. = 60</td>
</tr>
<tr>
<td>Direct Interelectrode Capacitances (Each Unit):</td>
<td></td>
</tr>
<tr>
<td>Grid No.1 to plate (with external shield)</td>
<td>0.12 max. ( \mu )f</td>
</tr>
<tr>
<td>Input</td>
<td>14 ( \mu )f</td>
</tr>
<tr>
<td>Output</td>
<td>7 ( \mu )f</td>
</tr>
</tbody>
</table>

Mechanical:
Mounting Position: Vertical, base up or down; Horizontal, plane of each plate vertical

| Overall Length | 4–1/8" ± 3/16" |
| Seated Length | 3–11/16" ± 3/16" |
| Maximum Diameter | 2–3/8" |
| Bulb | T-16 |
| Bulb Terminals (Two) | See Dimensional Outline |
| Weight (Approx.) | 3.5 oz. |
| Base | Medium Molded-Flare Septar 7-Pin (JETEC No.E7-2) |

BOTTOM VIEW

Pin 1–Heater
Pin 2–Grid No.1 of Unit No.2
Pin 3–Grid No.2 of Both Units
Pin 4–Cathode, Grid No.3 of Both Units
Pin 5–Heater Center-Tap

Pin 6–Grid No.1 of Unit No.1
Pin 7–Heater
PU1–Plate Terminal of Unit No.1
PU2–Plate Terminal of Unit No.2

PLACE OF ELECTRODES OF EACH UNIT IS PARALLEL TO PLANE THROUGH AXIS OF TUBE AND A-A'

O: See next page.

MAY 3, 1954
TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY
TWIN-UNIT BEAM POWER TUBE

MODULATOR—Rectangular-Wave Modulation

Values are for Units in Parallel

Maximum CCS\* Ratings, Absolute Values:

For Duty Factor* between 0.0001 and 1.0
and Maximum Averaging Time of 1200 \( \mu \text{sec} \) in Any Interval

\begin{align*}
\text{DC PLATE SUPPLY VOLTAGE} & \cdots \cdots \cdots \cdots \cdots 5000 \text{ max. volts} \\
\text{INSTANTANEOUS PLATE VOLTAGE} & \cdots \cdots \cdots \cdots \cdots 5750 \text{ max. volts} \\
\text{DC GRID-No.2 (SCREEN) SUPPLY VOLTAGE} & \cdots \cdots \cdots \cdots \cdots 850 \text{ max. volts} \\
\text{DC GRID-No.1 (CONTROL-GRID) SUPPLY VOLTAGE} & \cdots \cdots \cdots \cdots \cdots -225 \text{ max. volts} \\
\text{INSTANTANEOUS GRID-No.1 VOLTAGE} & \cdots \cdots \cdots \cdots \cdots -600 \text{ max. volts} \\
\text{PEAK POSITIVE GRID-No.1 VOLTAGE} & \cdots \cdots \cdots \cdots \cdots 250 \text{ max. volts} \\
\text{PEAK PLATE CURRENT} & \cdots \cdots \cdots \cdots \cdots \text{See Rating Chart} \\
\text{PEAK GRID-No.2 CURRENT} & \cdots \cdots \cdots \cdots \cdots 3.5 \text{ max. amp} \\
\text{PEAK GRID-No.1 CURRENT} & \cdots \cdots \cdots \cdots \cdots 4 \text{ max. amp} \\
\text{PLATE INPUT} & \cdots \cdots \cdots \cdots \cdots 85 \text{ max. watts} \\
\text{GRID-No.2 INPUT} & \cdots \cdots \cdots \cdots \cdots 3 \text{ max. watts} \\
\text{GRID-No.1 INPUT} & \cdots \cdots \cdots \cdots \cdots 1 \text{ max. watt} \\
\text{PLATE DISSIPATION} & \cdots \cdots \cdots \cdots \cdots 15 \text{ max. watts} \\
\text{PEAK HEATER-CATHODE VOLTAGE:} & \\
\text{Heater negative with respect to cathode} & 100 \text{ max. volts} \\
\text{Heater positive with respect to cathode} & 100 \text{ max. volts}
\end{align*}

Typical Operation with Rectangular-Wave Shapes in

Accompanying Test Circuit:

\begin{align*}
\text{With Duty Factor* of 0.002} & \quad 0.001 \\
\text{DC Plate Supply Voltage} & \cdots \cdots \cdots \cdots \cdots 2000 \quad 5000 \text{ volts} \\
\text{DC Grid-No.2 Supply Voltage} & \cdots \cdots \cdots \cdots \cdots 650 \quad 850 \text{ volts} \\
\text{DC Grid-No.1 Supply Voltage} & \cdots \cdots \cdots \cdots \cdots -175 \quad -200 \text{ volts} \\
\text{Peak Positive Grid-No.1 Voltage} & \cdots \cdots \cdots \cdots \cdots 50 \quad 150 \text{ volts}
\end{align*}

- Having length of 3/4" and inside diameter of 2-3/8". Shield is placed around base end of tube and is connected to cathode.
- Continuous Commercial Service.
- For tube protection, it is essential that sufficient dc resistance be used in the plate supply circuit, the grid-No.2 supply circuit, and the grid-No.1 supply circuit so that the short-circuit current is limited to 0.5 ampere in each circuit.
- Duty Factor for the 3E29 is defined as the "on" time in microseconds divided by 1200 microseconds.
- "On" Rise is defined as the sum of the durations of all the individual pulses which occur during any 1200-microsecond interval.
- Pulse Duration is defined as the time interval between the two points on the pulse at which the instantaneous value is 70\% of the peak value. The peak value is defined as the maximum value of a smooth curve through the average of the fluctuations over the top portion of the pulse.
- Averaged over any interval not exceeding 1200 microseconds. Care should be used in determining the plate dissipation. A calculated value based on rectangular pulses can be considerably in error when the actual pulses have a finite rise and fall time. Plate dissipation should preferably be determined by measuring the bulb temperature under actual operating conditions; then, with the tube in the same socket and under the same ambient-temperature conditions, apply to the tube sufficient dc input to obtain the same bulb temperature. This value of dc input is a measure of the plate dissipation.

MAY 3, 1954

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\( \rightarrow \) indicates a change
RATING CHART

\[ E_f = \begin{cases} 
6.3 \text{ VOLTS (PARALLEL-HEATER ARRANGEMENT)} \\
2.6 \text{ VOLTS (SERIES-HEATER ARRANGEMENT)} 
\end{cases} \\
\text{AVERAGING TIME (\mu SEC) = 1200 MAXIMUM}

AVERAGE CHARACTERISTICS
UNITS IN PARALLEL IN TEST CIRCUIT *

\[ E_f = 12.6 \text{ VOLTS} \\
\text{(SERIES-HEATER ARRANGEMENT)} \\
\text{GRID-N82 SUPPLY VOLTS = 850} \\
\text{GRID-N81 VOLTS = EC1} \\
* \text{TEST CIRCUIT SHOWN ON PRECEDING SHEET.}

EC1 = \pm 150

\begin{array}{c|c|c|c|c|c}
\hline
\text{PLATE VOLTS} & 0 & 500 & 1000 & 1500 & 2000 \\
\hline
\text{GRID-N81 AMPERES} & \pm 25 & \pm 100 & \pm 75 & \pm 50 & \pm 25 \\
\hline
\end{array}

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AVERAGE CHARACTERISTICS
UNITS IN PARALLEL IN TEST CIRCUIT*

\( E_e = 12.6 \text{ VOLTS (SERIES-HEATER ARRANGEMENT)} \)
GRID-\\#2 SUPPLY VOLTS = 850
GRID-\\#1 VOLTS = \( E_c \)

*TEST CIRCUIT SHOWN ON PRECEDING SHEET.

GRID-\\#2 AMPERES (I_{C2})

PLATE AMPERES (I_B)

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RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

92CM-10403
Plate Current:
- Peak: 5 to 10 amp
- DC: 0.010 to 0.010 amp
- DC Grid-No.2 Current: 0.0011 to 0.002 amp
- DC Grid-No.1 Current: 0.001 to 0.001 am
- Load Resistance: 300 to 400 ohms

| CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN |
|---------------------------------|----------|---------|
| Note | Min. | Max. |
| Heater Current (Parallel connection) | 1 | 2.00 | 2.50 amp |
| Heater Current (Series connection) | 2 | 1.00 | 1.25 amp |
| Grid-No.1-to-Plate Capacitance (Each unit) | 3 | - | 0.12 μF |
| Input Capacitance (Each unit) | - | 12.8 | 16.2 μF |
| Output Capacitance (Each unit) | - | 5.25 | 8.75 μF |
| Plate Current (Each unit) | 1,4 | 38 | 82 ma |
| Grid-No.1 Voltage | 1,5 | - | -55 volts |
| Grid-No.2 Current (Each unit) | 1,4 | - | 10 ma |
| Peak Plate Current | 1,6 | 9 | - amp |

Note 1: With 6.3 volts on heater.
Note 2: With 12.6 volts on heater.
Note 3: With external shield having length of 3/4" and inside diameter of 2-3/8". Shield is placed around base end of tube and is connected to cathode.
Note 4: With dc plate voltage of 250 volts, dc grid-No.2 voltage of 175 volts, and dc grid-No.1 voltage of -11 volts. Grid No.1 of unit not under test is biased -100 volts with respect to its cathode.
Note 5: With units in parallel, dc plate voltage of 800 volts, dc grid-No.2 voltage of 225 volts, and dc grid-No.1 voltage adjusted to give dc plate current of 200 microamperes.
Note 6: With the units in parallel in the accompanying test circuit under the following conditions: rectangular-wave modulation applied to grid No.1; pulse duration of 1 microsecond approx; pulse repetition rate of 1500 cps approx; dc plate-supply voltage of 5000 volts; dc grid-No.2 voltage of 850 volts; dc grid-No.1 voltage of -225 volts; peak positive grid-No.1 swing of 150 volts; and dc plate current of 15 ma. Minimum obtained by adjusting the pulse repetition rate.

DIMENSIONAL OUTLINE
shown under Type 829B also applies to the 3E29

← Indicates a change.
TEST CIRCUIT

R1 R2: 20 ohms, 1 watt non-inductive
R3: 15000 ohms, 1 watt
R4: 25 ohms, 1 watt, non-inductive
R5: 10000 ohms, 1 watt
R6 R7: 10 ohms, 5 watts, non-inductive
R8: 10000 ohms, 50 watts
R9: 400 ± 5% ohms, 50 watts non-inductive
R10: 10 ± 1% ohms, 5 watts
C1: 0.1 μf, 600 v dc
C2: 0.1 μf, 1000 v dc
C3: 0.1 μf, 5000 v dc
Ecc1: Grid-No.1 Supply Voltage
Ecc2: Grid-No.2 Supply Voltage
Ebb: Plate Supply Voltage
Egl: Signal Voltage

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