Pentode—Beam Power Tube

DUODECAR TYPE

For Combined Limiter, Discriminator, and Audio Power Output Applications in FM Radio and TV Receivers

ELECTRICAL CHARACTERISTICS

Bogey Values

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater Voltage</td>
<td>6.3 V</td>
</tr>
<tr>
<td>Heater Current</td>
<td>0.950 A</td>
</tr>
</tbody>
</table>

Direct Interelectrode Capacitances

Without external shield

**Pentode Unit:**

- $G_{1p}$ to $G_{3p}$: $C_{g1-g3} = 0.009$ pF
- $G_{1p}$ to $(Kp+IS, Pp, G_{3p}, G_{2p}, H)$: $C_{g1-ai1} = 4.4$ pF
- $G_{3p}$ to $(Kp+IS, Pp, G_{2p}, G_{1p}, H)$: $C_{g3-ai1} = 3.2$ pF

**Beam Power Unit:**

- $G_{1B}$ to $P_B$: $C_{gl-p} = 0.22$ pF
- Input: $G_{1B}$ to $(Kp+G_{3B}, G_{2B}, H)$: $C_{j} = 11$ pF
- Output: $P_B$ to $(Kp+G_{3B}, G_{2B}, H)$: $C_{o} = 7.5$ pF

For the following characteristics, see Conditions

**Transconductance, Grid No.1 to Plate:**

- $g_m = 360 \ \mu$mho

**Transconductance, Grid No.3 to Plate:**

- $g_m(g_{3-p}) = 700 \ \mu$mho

**DC Plate Current:**

- $I_b = 5$ mA

**DC Grid-No.2 Current:**

- $I_{c2} = 4.5$ mA

**Cutoff DC Grid-No.1 Voltage for $I_b = 20 \ \mu$A:**

- $E_{cl(co)} = -4$ V

**Cutoff DC Grid-No.3 Voltage for $I_b = 20 \ \mu$A:**

- $E_{c3(co)} = -4$ V

**Heater Voltage:**

- $E_h$ Bogey value V

**DC Plate Voltage:**

- $E_b = 135$ V

**DC Grid-No.3 Voltage:**

- $E_{c3} = 4$ V

**DC Grid-No.2 Supply Voltage:**

- $E_{cc2} = 280$ V

**DC Grid-No.2 Voltage:**

- $E_{c2} = 75$ V

**DC Grid-No.1 Voltage:**

- $E_{c1} = 0$ V

**Grid-No.2 Resistor:**

- $R_{g2} = 33$ kΩ

**Beam Power Unit**

- $R_{p} = 100$ kΩ

**Transconductance:**

- $g_m = 6500 \ \mu$mho

**DC Plate Current:**

- $I_b = 35$ mA

**DC Grid-No.2 Current:**

- $I_{c2} = 3$ mA

**Conditions**

**Plate Resistance (Approx.):**

- $r_p = 250$ V

**DC Plate Voltage:**

- $E_b = 250$ V

**DC Grid-No.2 Voltage:**

- $E_{c2} = 250$ V

**DC Grid-No.1 Voltage:**

- $E_{cl} = -8$ V

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Electronic Components and Devices

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DATA 1

4-66
MECHANICAL CHARACTERISTICS

Operating Position .................................................. Any
Type of Cathodes .................................................. Coated Unipotential
Maximum Overall Length ........................................... 2.375 in
Maximum Seated Length ............................................. 2.000 in
Maximum Diameter .................................................. 1.188 in
Dimensional Outline (JEDEC 9-58) ............................... See General Section
Envelope ............................................................. JEDEC T9
Base ................................................................. Small-Button Duodecar 12-Pin (JEDEC E12-70)

TERMINAL DIAGRAM (Bottom View)

DESIGN-MAXIMUM RATINGS

Pentode Unit for FM and TV Limiter and Discriminator Service; Beam Power Unit for Audio Power Output Service

<table>
<thead>
<tr>
<th>Pentode Unit</th>
<th>Beam Power Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Plate Supply Voltage</td>
<td>E_{bb} 330 - V</td>
</tr>
<tr>
<td>DC Plate Voltage</td>
<td>E_{b} - 275 V</td>
</tr>
<tr>
<td>DC Grid-No.2 (Accelerator-Grid) Supply Voltage</td>
<td>E_{cc2} 330 - V</td>
</tr>
<tr>
<td>DC Grid-No.2 (Screen-Grid) Voltage</td>
<td>E_{c2} - 275 V</td>
</tr>
<tr>
<td>Peak Positive-Pulse Grid-No.1 (Limiter-Grid) Voltage</td>
<td>e_{clm} 60 - V</td>
</tr>
<tr>
<td>Heater-Cathode Voltage: Peak</td>
<td>E_{hk} 100 ±200 V</td>
</tr>
<tr>
<td>DC</td>
<td>100 ±200 V</td>
</tr>
<tr>
<td>Heater Voltage (AC or DC)</td>
<td>E_{h} 5.7 to 6.9 V</td>
</tr>
<tr>
<td>Average Cathode Current:</td>
<td>I_{k (av)} 13 mA</td>
</tr>
<tr>
<td>Grid-No.2 Input</td>
<td>P_{g2} - 2 W</td>
</tr>
<tr>
<td>Plate Dissipation</td>
<td>P_{b} - 10 W</td>
</tr>
</tbody>
</table>

MAXIMUM CIRCUIT VALUES

Beam Power Unit

Grid-No.1-Circuit Resistance: R_{gl (ckt)} 0.25 MΩ
For fixed-bias operation ........................................... 0.25 MΩ
For cathode-bias operation ..................................... 0.5 MΩ
## TYPICAL OPERATION

*Beam Power Unit*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater Voltage</td>
<td>(E_h)</td>
<td>250 V</td>
</tr>
<tr>
<td>DC Plate Voltage</td>
<td>(E_b)</td>
<td>250 V</td>
</tr>
<tr>
<td>DC Grid-No.2 Voltage</td>
<td>(E_{c1})</td>
<td>250 V</td>
</tr>
<tr>
<td>DC Grid-No.1 Voltage</td>
<td>(E_{c2})</td>
<td>-8 V</td>
</tr>
<tr>
<td>Peak AF Grid-No.1 Voltage</td>
<td>(e_{clm})</td>
<td>8 V</td>
</tr>
<tr>
<td>Plate Resistance (Approx.)</td>
<td>(r_p)</td>
<td>100 kΩ</td>
</tr>
<tr>
<td>Transconductance</td>
<td>(g_m)</td>
<td>6500 μmho</td>
</tr>
<tr>
<td>Zero-Signal Plate Current</td>
<td>(I_b)</td>
<td>35 mA</td>
</tr>
<tr>
<td>Maximum-Signal Plate Current</td>
<td>(I_b)</td>
<td>39 mA</td>
</tr>
<tr>
<td>Zero-Signal Grid-No.2 Current</td>
<td>(I_{c2})</td>
<td>3 mA</td>
</tr>
<tr>
<td>Maximum-Signal Grid-No.2 Current</td>
<td>(I_{c2})</td>
<td>13 mA</td>
</tr>
<tr>
<td>Load Resistance</td>
<td>(R_L)</td>
<td>5000 Ω</td>
</tr>
<tr>
<td>Total Harmonic Distortion</td>
<td></td>
<td>8.5 %</td>
</tr>
<tr>
<td>Maximum-Signal Power Output</td>
<td>(P_o)</td>
<td>4.2 W</td>
</tr>
</tbody>
</table>

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