Beam Tube

7-PIN MINIATURE TYPE
For Use in FM and TV Receivers As Combined Limiter, Discriminator, and Audio-Voltage-Amplifier Tube

GENERAL DATA

Electrical:
Heater, for Unipotential Cathode:
Voltage (AC or DC) ...................... 6.3 ± 10% volts
Current at 6.3 volts ...................... 0.3 amp
Direct Interelectrode Capacitances:
Grid No.1 to cathode & internal shields, plate, grid No.3, grid No.2, and heater ...................... 4.2 μf
Grid No.3 to cathode & internal shields, plate, grid No.2, grid No.1, and heater ...................... 3.3 μf
Grid No.1 to grid No.3 ...................... 0.004 max. μf

Mechanical:
Operating Position ...................... Any
Maximum Overall Length ...................... 2-5/8"
Maximum Seated Length ...................... 2-3/8"
Length, Base Seat to Bulb Top (Excluding tip) 2" ± 3/32"
Maximum Diameter ...................... 0.650" to 0.750"
Dimensional Outline ...................... See General Section
Bulb .................................... T5-1/2
Base .................................... Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW ...................... 7DF

Pin 1 - Cathode, Internal Shields
Pin 2 - Grid No.1
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Grid No.2
Pin 6 - Grid No.3
Pin 7 - Plate

LIMITER & DISCRIMINATOR SERVICE

Maximum Ratings, Design-Maximum Values:
PLATE SUPPLY VOLTAGE ...................... 330 max. volts
GRID-No.3 (QUADRATURE-GRID) VOLTAGE .. 110 max. volts
GRID-No.2 (ACCELERATOR-GRID) VOLTAGE ..
GRID-No.1 (LIMITER-GRID) VOLTAGE:
Positive-peak value ...................... 60 max. volts
CATHODE CURRENT ...................... 13 max. ma
PEAK HEATER-CATHODE VOLTAGE:
Heater negative with respect to cathode ...................... 200 max. volts
Heater positive with respect to cathode...................... 200 max. volts

→ indicates a change.
Typical Operation:

In accompanying typical quadrature-grid-fm-detector circuit

<table>
<thead>
<tr>
<th>Input-Signal</th>
<th>4.5</th>
<th>10.7</th>
<th>10.7</th>
<th>Nc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate Supply Voltage</td>
<td>270</td>
<td>85</td>
<td>285</td>
<td>volts</td>
</tr>
<tr>
<td>Plate Voltage</td>
<td>121</td>
<td>63</td>
<td>122</td>
<td>volts</td>
</tr>
<tr>
<td>Grid-No.3 Voltage</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grid-No.2 Voltage</td>
<td>100</td>
<td>55</td>
<td>100</td>
<td>volts</td>
</tr>
<tr>
<td>Cathode-Circuit Resistance*</td>
<td>200 to 400</td>
<td>200 to 400</td>
<td>200 to 400</td>
<td>ohms</td>
</tr>
<tr>
<td>Peak AF Output Voltage</td>
<td>16.8</td>
<td>6</td>
<td>16.6</td>
<td>volts</td>
</tr>
<tr>
<td>Minimum Grid-No.1 Signal Voltage (RMS)</td>
<td>2</td>
<td>1.25</td>
<td>2 volts</td>
<td></td>
</tr>
<tr>
<td>for AM rejection*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum Grid-No.1 Signal Voltage (RMS) for limiting action</td>
<td>1.25</td>
<td>1.25</td>
<td>1.25 volts</td>
<td></td>
</tr>
<tr>
<td>Plate Current</td>
<td>0.44</td>
<td>0.25</td>
<td>0.49</td>
<td>ma</td>
</tr>
<tr>
<td>Grid-No.2 Current</td>
<td>10</td>
<td>4.1</td>
<td>9.8</td>
<td>ma</td>
</tr>
<tr>
<td>Plate Load Resistor</td>
<td>0.33</td>
<td>0.085</td>
<td>0.33 meqohm</td>
<td></td>
</tr>
<tr>
<td>Linearity Resistor</td>
<td>1000</td>
<td>470</td>
<td>1500</td>
<td>ohms</td>
</tr>
<tr>
<td>Integrating Capacitor</td>
<td>0.001</td>
<td>0.002</td>
<td>0.001</td>
<td>uf</td>
</tr>
<tr>
<td>Coupling Capacitor</td>
<td>0.25</td>
<td>0.25</td>
<td>0.01</td>
<td>uf</td>
</tr>
<tr>
<td>Frequency Deviation</td>
<td>±25</td>
<td>±75</td>
<td>±75</td>
<td>kc</td>
</tr>
<tr>
<td>AM Rejection:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>For grid-No.1 signal volts RMS = 2</td>
<td>25</td>
<td>31</td>
<td>20</td>
<td>db</td>
</tr>
<tr>
<td>For grid-No.1 signal volts RMS = 3</td>
<td>30</td>
<td>30</td>
<td>29</td>
<td>db</td>
</tr>
<tr>
<td>Total Harmonic Distortion</td>
<td>1.8</td>
<td>2</td>
<td>1.6</td>
<td>%</td>
</tr>
</tbody>
</table>

* Without external shield.

For proper operation of this electron tube in the accompanying Typical Quadrature-Grid-FM Detector Circuit, the Q of the quadrature-grid tuned circuit (L1, C6) should be sufficiently high to assure that a 4-volt rms signal is developed at the quadrature grid when a 2-volt rms signal at the center frequency is applied to grid No.1.

It is recommended that L1 be shunted by a capacitance of at least 10 μuf. This capacitance may be composed of tube capacitance, stray capacitance, the distributed capacitance of L1, and a fixed capacitor.

The dc component must not exceed 100 volts.

The cathode-circuit resistance should be adjusted for maximum AM rejection at the AF output of the circuit at the specified grid-No.1 signal voltage. AM rejection is measured with an applied signal containing 30 per cent amplitude modulation and 30 per cent frequency modulation.

At signal levels above specified value, limiting is within ±2 decibels.

OPERATING CONSIDERATIONS

To insure proper phasing of the signal voltage developed at the quadrature grid, the components of the quadrature-grid circuit should be shielded from those of the control-grid circuit.

To obtain a symmetrical discriminator-response curve, the plate currents for no input signal and for unmodulated

→ Indicates a change.
input signal should be equal. To assure this equality, it is necessary that the plate voltage and grid-No.2 voltage have the proper values.

The proper plate voltage for any grid-No.2 voltage may be determined from the accompanying Operation Characteristics curve. This curve may also be used to determine the average dynamic plate current for any combination of grid-No.2 voltage and plate voltage.

**TYPICAL QUADRATURE-GRID-FM-DETECTOR CIRCUIT**

For proper operation of this electron tube in the accompanying Typical Quadrature-Grid-FM Detector Circuit, the Q of the quadrature-grid tuned circuit \((L_1, C_6)\) should be sufficiently high to assure that a 4-volt rms signal is developed at the quadrature grid when a 2-volt rms signal at the center frequency is applied to grid No.1.

It is recommended that \(L_1\) be shunted by a capacitance of at least 10 \(\mu\)F. This capacitance may be composed of tube capacitance, stray capacitance, the distributed capacitance of \(L_1\), and a fixed capacitor.

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**RADIO CORPORATION OF AMERICA**

Electron Tube Division

Harrison, N. J.

DATA 2

8-60
AVERAGE CHARACTERISTICS

$E_F = 6.3 \text{ VOLTS}$

$\text{PLATE VOLTS} = 60$

$\text{GRID-N\#2 VOLTS} = 60$

PLATE MILLIAMPERES

GRID-N\#3 VOLTS

92CM-10320
AVERAGE CHARACTERISTICS

$E_g = 6.3$ VOLTS
PLATE VOLTS = 60
GRID-N#2 VOLTS = 60

PLATE MILLIAMPERES

GRID-VOLTAGE: 3.33

92CM-10322