RECEIVING TUBES

JEDEC DATA
JOINT ELECTRON DEVICE ENGINEERING COUNCIL
COMMITTEE ON RECEIVING TUBES

JEDEC TYPE 6GK7

PENTODE

The 6GK7 is a new type of high gain pentode, developed for application in the video intermediate frequency amplifying stages of television receivers. The dual control feature of the tube permits operation as a sharp cut off pentode with a 135 volt or a 270 volt B supply, a semi-remote cut off pentode with a 135 volt B supply or a remote cut off pentode with a 270 volt B supply.

For semi-remote and remote cut off operation the automatic gain control voltage is applied to the number 3 grid. A fully bypassed cathode resistor is used to increase gain through the elimination of cathode degeneration. Neutralization is unnecessary because of the very low control grid to plate capacitance.

Many unique circuit advantages can be realized through utilization of the dual control feature of this new type of pentode.

MECHANICAL DATA

Cathode ........................................ Coated unipotential
Outline ........................................ see drawing Bulb ............ T 6½
Base .............................................. 59-1, Small button 9-Pin
Basing ............................................. 9AQ
Maximum diameter ................................................................. 7/8"
Maximum overall length .......................................................... 2 13/32"
Maximum seated height ............................................................ 2 5/32"
Pin Connections:
  Pin #1 - Cathode
  Pin #2 - Grid #1
  Pin #3 - Cathode
  Pin #4 - Heater
  Pin #5 - Heater
  Pin #6 - Internal Shield
  Pin #7 - Plate
  Pin #8 - Grid #2 and Grid #2 Shield
  Pin #9 - Grid #3

Mounting Position ......................................................... Any

from JEDEC release #3990, Nov. 26, 1962
ELECTRICAL DATA

Heater Characteristics
Heater Voltage (ac or dc) 6.3±10% Volts
Heater Current 300 ma

Direct Interelectrode Capacitances
Grid #1 to plate (#1 to p) max. 0.005 μuf
Grid #1 to cathode, internal shield, grid #3, grid #2 and heater 8.5 μuf
Plate to cathode, internal shield, grid #3, grid #2 and heater 3.3 μuf

Ratings (Design Maximum Rating System)
Maximum plate voltage 330 Volts
Maximum grid #2 voltage See JT-04-2
Maximum grid #2 supply voltage 330 Volts
Maximum plate dissipation 2.8 Watts
Maximum grid #2 and grid #2 shield dissipation 1.1 Watts
Maximum positive D.C. grid #1 voltage 0 Volts
Maximum Grid #3 circuit resistance 0.5 Megohms
Maximum Heater-cathode voltage
Heater negative with respect to cathode: Total DC and peak 200 Volts
Heater positive with respect to cathode: DC 100 Volts
Total DC and peak 200 Volts

TYPICAL OPERATING CONDITIONS

<table>
<thead>
<tr>
<th></th>
<th>SHARP CUT OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate Voltage</td>
<td>135</td>
</tr>
<tr>
<td>Grid #2 Supply Voltage</td>
<td>135</td>
</tr>
<tr>
<td>Grid #2 Series Resistor</td>
<td>0</td>
</tr>
<tr>
<td>Cathode Bias Resistor</td>
<td>82</td>
</tr>
<tr>
<td>Grid #1 Voltage</td>
<td>0</td>
</tr>
<tr>
<td>Grid #3 Voltage</td>
<td>+15</td>
</tr>
<tr>
<td>Plate Resistance(approx.)</td>
<td>275</td>
</tr>
<tr>
<td>Transconductance</td>
<td>9500</td>
</tr>
<tr>
<td>Plate Current</td>
<td>7.0</td>
</tr>
<tr>
<td>Grid #2 Current</td>
<td>3.5</td>
</tr>
<tr>
<td>Grid #3 Current</td>
<td>400</td>
</tr>
<tr>
<td>Grid #1 Voltage for Ip = 20 μAmps</td>
<td>-3.25</td>
</tr>
<tr>
<td>Input Grid #1 Capacitance at 40 m.c.</td>
<td>13</td>
</tr>
<tr>
<td>Input Grid #1 Resistance at 40 m.c.</td>
<td>55</td>
</tr>
</tbody>
</table>
### Typical Operating Conditions -- Cont'd

<table>
<thead>
<tr>
<th></th>
<th>Semi-Remote Cutoff</th>
<th>Remote Cutoff</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate Voltage</td>
<td>135</td>
<td></td>
<td>270 Volts</td>
</tr>
<tr>
<td>Grid #2 Supply</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>135</td>
<td></td>
<td>270 Volts</td>
</tr>
<tr>
<td>Grid #2 Series</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resistor</td>
<td>3.3</td>
<td></td>
<td>27 Kohms</td>
</tr>
<tr>
<td>Cathode Bias</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resistor</td>
<td>22</td>
<td></td>
<td>47 ohms</td>
</tr>
<tr>
<td>Grid #1 Voltage</td>
<td>Note 1</td>
<td></td>
<td>Note 1</td>
</tr>
<tr>
<td>Grid #3 Voltage</td>
<td>(Note 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>+5</td>
<td>0</td>
<td>-5</td>
</tr>
<tr>
<td></td>
<td>-10</td>
<td>+5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>-7.5</td>
<td>-17.5</td>
<td>Volts</td>
</tr>
<tr>
<td>Plate Current</td>
<td>9.25</td>
<td>6.5</td>
<td>3.0</td>
</tr>
<tr>
<td>Grid #2 Current</td>
<td>5.5</td>
<td>6.5</td>
<td>7.5</td>
</tr>
<tr>
<td>Transconductance</td>
<td>10500</td>
<td>8000</td>
<td>3500</td>
</tr>
<tr>
<td>Plate Resistance</td>
<td>140</td>
<td>65</td>
<td>40</td>
</tr>
<tr>
<td>Grid #3 Transconductance</td>
<td>120</td>
<td>450</td>
<td>590</td>
</tr>
<tr>
<td>Grid #3 Current</td>
<td>550</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Notes:**

1. Approximately 6% of the #3 Grid voltage is applied to the #1 grid through a feedback resistor network consisting of a 330 Kohm resistor connected between Grid 3 and Grid 1 and a 22 Kohm resistor connected between Grid 1 and ground.

2. When 6GK7 is used as a video I.F. amplifier operating at 45 Mc/sec., approximately 3.5 db increase in gain over that with grid three grounded can be obtained by placing an inductor between the A.C. ground and the suppressor grid, and tuning it to resonate with grid three to ground capacitance at approximately 60 Mc/sec.

---

**Design Maximum Ratings** are the limiting values expressed with respect to bogie tubes at which satisfactory tube life can be expected to occur in the types of service for which the tube is rated. Therefore, the equipment designer must establish the circuit design so that initially and throughout equipment life no design maximum value is exceeded with a bogie tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation and environmental conditions.

---

**OUTLINE DRAWING**
INPUT CAPACITANCE (PF)

GRID 3 VOLTAGE IN VOLTS

PARALLEL CATHODE TABS, F = 40 MC.
R2 — SEE NOTE 1.

INPUT RESISTANCE (KILOHMS)

SEMIREMOTE AT Eb = 135 VOLTS
R2 = 0

INPUT PARAMETERS
AVERAGE TRANSFER CHARACTERISTICS

SHARP CUTOFF

$E_F = \text{RATED VALUE}$
$E_B = 270 \text{ VOLTS}$
$E_{C3} = 15 \text{ VOLTS}$

$\text{CURRENT, MILLIAMPERES.}$

$\text{GRID 1 VOLTAGE, VOLTS.}$

$I_B$

$E_{C2} = 200 \text{ VOLTS}$
$E_{C2} = 175 \text{ VOLTS}$
$E_{C2} = 150 \text{ VOLTS}$
$E_{C2} = 125 \text{ VOLTS}$
$E_{C2} = 100 \text{ VOLTS}$
AVERAGE TRANSFER CHARACTERISTICS
SHARP CUTOFF

$E_F = \text{RATED VALUE}$
$E_B = 135 \text{ VOLTS}$
$E_{C3} = 15 \text{ VOLTS}$

$I_B$

$IC2$

CURRENT, MILLIAMPERES.

GRID 1 VOLTAGE, VOLTS.
AVERAGE TRANSFER CHARACTERISTICS

SHARP CUTOFF

\[ E_F = \text{RATED VALUE} \]
\[ E_B = 135 \text{ VOLTS} \]

GRID 1 VOLTAGE IN VOLTS

PLATE CURRENT IN MILLIAMPERES

\[ E_{C3} = +15 \text{ VOLTS} \]
\[ -10 \]
\[ -7.5 \]
\[ -5 \]
\[ 0 \]
AVERAGE TRANSFER CHARACTERISTICS

SHARP CUTOFF

$E_F = \text{RATED VALUE}$

$E_B = 270 \text{ VOLTS}$

- Graph showing the relationship between grid voltage and plate current for different grid voltages.
- Grid voltage ranges from $-5$ to $0$ volts.
- Plate current ranges from $0$ to $14$ milliamperes.
- Different curves represent different grid voltages: $E_{G3} = +15$ volts, $-5$, and $-7.5$ volts.