LINE OUTPUT PENTODE

Output pentode intended for colour TV line deflection circuits.

<table>
<thead>
<tr>
<th>QUICK REFERENCE DATA</th>
<th></th>
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<tbody>
<tr>
<td>Anode peak voltage</td>
<td>$V_a$</td>
</tr>
<tr>
<td>Cathode current</td>
<td>$I_k$</td>
</tr>
<tr>
<td>max.</td>
<td>500 mA</td>
</tr>
<tr>
<td>Anode dissipation</td>
<td>$W_a$</td>
</tr>
<tr>
<td>max.</td>
<td>30 W</td>
</tr>
</tbody>
</table>

HEATING: Indirect by A.C. or D.C.; series supply

Heater current

Heater voltage

$$I_f = 300 \text{ mA}$$

$$V_f = 40 \text{ V}$$

DIMENSIONS AND CONNECTIONS

Base: Magnoval
Top cap: Type 1
Mounting: Additional supporting of the tube at the top is required.

Dimensions in mm

CAPACITANCES

Grid No.1 to filament
Anode to grid No.1

$C_{g_1f}$ max. 0.2 pF
$C_{ag_1}$ max. 3.0 pF
$C_{ag_1}$ 2.5 pF

November 1969
TYPICAL CHARACTERISTICS (measured under pulse conditions)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Anode voltage $V_a$</td>
<td>160 V</td>
</tr>
<tr>
<td>Grid No.3 voltage $V_{g3}$</td>
<td>0 V</td>
</tr>
<tr>
<td>Grid No.2 voltage $V_{g2}$</td>
<td>160 V</td>
</tr>
<tr>
<td>Grid No.1 voltage $V_{g1}$</td>
<td>0 V</td>
</tr>
<tr>
<td>Anode current $I_a$</td>
<td>1400 mA</td>
</tr>
<tr>
<td>Grid No.2 current $I_{g2}$</td>
<td>45 mA</td>
</tr>
</tbody>
</table>

OPERATING CONDITIONS (D.C. feedback)

Cut-off voltage

The minimum required cut-off voltage ($-V_{g1}$) during flyback at $V_a = 7000$ V and at line frequency is at:

$$V_{g2} = 150 \text{ V} : V_{g1} = -175 \text{ V}$$
$$V_{g2} = 200 \text{ V} : V_{g1} = -195 \text{ V}$$
$$V_{g2} = 250 \text{ V} : V_{g1} = -215 \text{ V}$$

Supply voltages: See pages 4-5-6

Minimum required anode voltage: $V_a \min$

In order to prevent Barkhausen interference and loss of stabilization, care should be taken that the anode voltage never drops below the specified $V_a \min$ during the scanning period.

If low values of $V_a \min$ are required, the $V_a \min$ 1-line can be shifted over 10 V to $V_a \min$ 2, provided a D.C. voltage of at least +20 V is applied to the beamplate (g3). To compensate for the influence of mains voltage variations, the specified values of $V_a \min$ have to be increased with 10% of the anode supply voltage.

Minimum required values of the screen grid voltage: $V_{g2} \min$

The graph refers to nominal mains voltage. The specified values of $I_{ap}$ will be available throughout life of the tube at supply voltages 10% below nominal.

Maximum permissible screen grid series resistance: $R_{g2} \max$. See pages 4-5-6

Decoupling-capacitors in the grid no 2 and/or grid no 3 circuit

In circuits where decoupling capacitors in the grid no 2 or the grid no 3 circuits are applied, incidental flashover in the tube may give rise to excessive discharge currents and component or tube failure. Therefore it is recommended to limit the discharge currents to these capacitors by means of an 100 Ohm resistance between g2 and the g2-bypass capacitance.

The 1000 Ohms resistance should be protected by a spark-gap connected between g3 and earth.

Hum

At $Z_{g1} = 200$ k ($f = 50$ Hz), $V_{k/f} = 220$ V RMS and without wiring and socket capacitance, the equivalent grid hum voltage is less than 5 mV.
LIMITING VALUES

Anode voltage in cold condition
Anode peak voltage
Anode dissipation
Anode + grid No. 2 dissipation (triode-connected)
Grid No. 3 voltage
Grid No. 2 voltage in cold condition
Grid No. 2 voltage
Grid No. 2 dissipation
Cathode current
Cathode peak current
Cathode-to-heater voltage
Grid No. 1 resistor: fixed bias stabilized circuits
Grid No. 3 circuit resistance
Bulb temperature

Design centre rating system

\[
\begin{align*}
V_{ao} & \quad \text{max.} \quad 700 \ \text{V} \\
V_{ap} & \quad \text{max.} \quad 7000 \ \text{V} \\
W_a & \quad \text{max.} \quad 30 \ \text{W} \\
W_a + W_{g2} & \quad \text{max.} \quad 31 \ \text{W} \\
V_{g3} & \quad \text{max.} \quad 50 \ \text{V} \\
V_{s2o} & \quad \text{max.} \quad 700 \ \text{V} \\
V_{g2} & \quad \text{max.} \quad 275 \ \text{V} \\
W_{g2} & \quad \text{max.} \quad 7 \ \text{W} \\
I_k & \quad \text{max.} \quad 500 \ \text{mA} \\
I_{kp} & \quad \text{max.} \quad 1200 \ \text{mA} \\
V_{kf} & \quad \text{max.} \quad 250 \ \text{V} \\
R_{g1} & \quad \text{max.} \quad 0.5 \ \text{M}\Omega \\
R_{g1} & \quad \text{max.} \quad 2.2 \ \text{M}\Omega \\
R_{g3} & \quad \text{max.} \quad 10 \ \text{k}\Omega \\
t_{bulb} & \quad \text{max.} \quad 300 \ ^\circ\text{C}
\end{align*}
\]

Design max. rating system

\[
\begin{align*}
W_a & \quad \text{max.} \quad 40 \ \text{W} \\
W_a + W_{g2} & \quad \text{max.} \quad 42 \ \text{W} \\
W_{g2} & \quad \text{max.} \quad 9 \ \text{W} \\
V_{ap} & \quad \text{max.} \quad 8000 \ \text{V} \\
-V_{g1p} & \quad \text{max.} \quad 550 \ \text{V}
\end{align*}
\]

1. Max. pulse duration is 22% of a cycle and max. 18 \mu s.
2. To prevent an excessive value of \( W_{g2} \) the minimum \( R_{g2} \) values are given in the graph below.

![Graph showing \( R_{g2} \) vs. \( V_{g2} \)]

3. The circuit design has to be such that negative control grid currents up to 5 micro-ampere do not have any detrimental effect upon tube adjustment or circuit performance.

4. Care should be taken that with 5 micro-ampere grid current the limiting values for \( I_k, W_a \) and \( W_{g2} \) are not exceeded.

5. With \( R_{g3} \leq 10 \ \text{k}\Omega \) capacitive decoupling of \( g_3 \) is not required.

6. The design maximum limits should not be exceeded with a nominal tube under the worst probable operating conditions at a normal picture width.
Min. required anode voltage.

$R_{g2\ max}$: max. permissible screen grid series resistance for 400 V screen grid supply.

The specified values of $I_{ap}$ are available at supply voltages 10% below nominal and throughout the tube life.

Remark: $R_{g2\ min}$ for 400 V screen grid supply is 2.9 kΩ. (See page 3)
Min. required anode voltage.

$R_{g2 \text{ max}}$ : max. permissible screen grid series resistance for 350 V screen grid supply.

The specified values of $I_{ap}$ are available at supply voltages 10% below nominal and throughout the tube life.

Remark: $R_{g2 \text{ min}}$ for 350 V screen grid supply is 2.2 kΩ. (See page 3)
Min. required anode voltage.

$R_{g2 \text{ max.}}$: max. permissible screen grid series resistance for 280 V screen grid supply.

The specified values of $I_{ap}$ are available at supply voltages 10% below nominal and throughout the tube life.

Remark: $R_{g2 \text{ min}}$ for 280 V screen grid supply is 1.4 kΩ. (See page 3)
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