12AY7
TWIN TRIODE
FOR LOW-LEVEL AMPLIFIER APPLICATIONS

DESCRIPTION AND RATING

The 12AY7 is a miniature medium-mu twin triode designed primarily for use in low-level stages of high-gain audio-frequency amplifiers. The tube is specially designed to exhibit low noise and low microphonic output. In addition, hiss and hum output voltages are controlled to limits consistent with the requirements of low-level amplifier applications.

GENERAL

ELECTRICAL
Cathode—Coated Unipotential
Heater Voltage, AC or DC .................................. 12.6 6.3 Volts
Heater Current ............................................... 0.15 0.3 Amperes
Direct Interelectrode Capacitances*
  Grid to Plate: (g to p), Each Section .................. 1.3 pf
  Input: g to (h+k), Each Section ....................... 1.3 pf
  Output: p to (h+k), Each Section ..................... 0.6 pf

MECHANICAL
Mounting Position—Any
Envelope—T-6 1/2, Glass
Base—E9-1, Small Button 9-Pin

MAXIMUM RATINGS

DESIGN-CENTER VALUES, Each Section
Plate Voltage ................................................ 300 Volts
Plate Dissipation .......................................... 1.5 Watts
DC Cathode Current ...................................... 10 Milliamperes
Heater-Cathode Voltage
  Heater Positive with Respect to Cathode ............ 90 Volts
  Heater Negative with Respect to Cathode .......... 90 Volts

Design-Center ratings are limiting values of operating and environmental conditions applicable to a bogy electron tube of a specified type as defined by its published data and should not be exceeded under normal conditions.

The tube manufacturer chooses these values to provide acceptable serviceability of the tube in average applications, making allowance for normal changes in operating conditions due to rated supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of the tube under consideration and of all other electron devices in the equipment.

The equipment manufacturer should design so that initially no design-center value for the intended service is exceeded with a bogy tube under normal operating conditions at the stated normal supply voltage.

BASING DIAGRAM

TERMINAL CONNECTIONS
Pin 1—Plate (Section 2)
Pin 2—Grid (Section 2)
Pin 3—Cathode (Section 2)
Pin 4—Heater
Pin 5—Heater
Pin 6—Plate (Section 1)
Pin 7—Grid (Section 1)
Pin 8—Cathode (Section 1)
Pin 9—Heater Center Tap

PHYSICAL DIMENSIONS

EIA 6-2
CHARACTERISTICS AND TYPICAL OPERATION

CLASS A₁ AMPLIFIER, Each Section
Plate Voltage ............................................................... 250 Volts
Grid Voltage ................................................................. -4.0 Volts
Amplification Factor ....................................................... 44
Plate Resistance, approximate ........................................ 25,000 Ohms
Transconductance ......................................................... 1.750 Micromhos
Plate Current ............................................................... 3.0 Milliamperes
Grid Voltage, approximate
\[ I_{b} = 10 \text{ Microamperes} \] ........................................ -8 Volts

LOW-LEVEL-AMPLIFIER SERVICE, Each Section
Heater Voltage† .............................................................. 6.3 Volts
Plate-Supply Voltage ...................................................... 150 Volts
Plate Load Resistor ....................................................... 20,000 Ohms
Grid Resistor ............................................................... 0.1 Megohms
Cathode Resistor .......................................................... 2700 Ohms
Cathode Capacitor ......................................................... 40 Microfarads
Voltage Gain ................................................................. 12.5

* Without external shield.
† Pin 9 connected to negative B supply.

CLASS A RESISTANCE-COUPLED AMPLIFIER

LOW IMPEDANCE DRIVE (APPROXIMATELY 200 OHMS)

<table>
<thead>
<tr>
<th>R_L</th>
<th>R_gf</th>
<th>E_{bb} = 90 Volts</th>
<th>E_{bb} = 180 Volts</th>
<th>E_{bb} = 300 Volts</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>R_k E_o Gain</td>
<td>R_k E_o Gain</td>
<td>R_k E_o Gain</td>
</tr>
<tr>
<td>0.10</td>
<td>0.10</td>
<td>1900 6.9 22</td>
<td>1300 18 25</td>
<td>1000 34 27</td>
</tr>
<tr>
<td>0.10</td>
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<td>1300 45 29</td>
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<tr>
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<td>0.24</td>
<td>4200 8.2 26</td>
<td>2700 20 28</td>
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<td>4800 11 27</td>
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<td>1.0</td>
<td>10000 11 27</td>
<td>7200 25 29</td>
<td>6000 45 31</td>
</tr>
</tbody>
</table>

Notes:
1. E_o is maximum RMS voltage output for approximately five percent total harmonic distortion.
2. Gain is measured for an output voltage of two volts RMS.
3. R_k is in ohms; R_L and R_gf are in megohms.
4. Coupling capacitors (C) should be selected to give desired frequency response. R_k should be adequately by-passed.

HIGH IMPEDANCE DRIVE (APPROXIMATELY 100K OHMS)

<table>
<thead>
<tr>
<th>R_L</th>
<th>R_gf</th>
<th>E_{bb} = 90 Volts</th>
<th>E_{bb} = 180 Volts</th>
<th>E_{bb} = 300 Volts</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>R_k E_o Gain</td>
<td>R_k E_o Gain</td>
<td>R_k E_o Gain</td>
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<td>0.10</td>
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<td>1600 20 24</td>
<td>1300 36 26</td>
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<td>3000 12 23</td>
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JANUARY 4, 1954