**TUNG-SOL**

**TWIN DIODE-TETRODE**

**MINIATURE TYPE**

![Diagram of the tube](image-url)

**UNIPOTENTIAL CATHODE**

**HEATER**

12.6 VOLTS 0.4 AMR

AC OR DC

ANY MOUNTING POSITION

SPACE CHARGE GRID TETRODE

**BOTTOM VIEW**

**BASING DIAGRAM**

JEDIC 9UU

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THE 12DS7 IS A TWIN DIODE-POWER TETRODE IN THE 9 PIN MINIATURE CONSTRUCTION. IT IS INTENDED FOR USE IN AUTOMOBILE RECEIVERS WHERE THE TUBE AND TRANSISTOR ELECTRODE VOLTAGES ARE OBTAINED DIRECTLY FROM A 12 VOLT BATTERY. IN THIS APPLICATION THE DIODE UNITS ARE USED FOR AM SIGNAL DETECTION AND AUTOMATIC VOLUME CONTROL. THE TETRODE UNIT IS USED AS THE DRIVER FOR THE TRANSISTORIZED AF POWER OUTPUT STAGE.

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**DIRECT INTERELECTRODE CAPACITANCES**

**WITHOUT EXTERNAL SHIELD**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value (pf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grid #2 to Plate</td>
<td>13</td>
</tr>
<tr>
<td>Grid #2 to Grid #1, Heater &amp; Cathode</td>
<td>15</td>
</tr>
<tr>
<td>Plate to Grid #1, Heater &amp; Cathode</td>
<td>2.4</td>
</tr>
</tbody>
</table>

**DIODE UNITS:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value (pf)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diode Plate #1 to Diode Cathode &amp; Heater</td>
<td>0.5</td>
</tr>
<tr>
<td>Diode Plate #2, to Diode Cathode &amp; Heater</td>
<td>0.5</td>
</tr>
<tr>
<td>Diode Plate #1, to Diode Plate #2</td>
<td>0.1</td>
</tr>
<tr>
<td>Tetrode Grid #2 to Diode Plate #1 (Max.)</td>
<td>0.3</td>
</tr>
<tr>
<td>Tetrode Grid #2 to Diode Plate #2 (Max.)</td>
<td>0.3</td>
</tr>
</tbody>
</table>

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**RATINGS**

**INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM**

**TETRODE UNIT - AUDIO DRIVER SERVICE**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater Voltage</td>
<td>12.6 VOLTS</td>
</tr>
<tr>
<td>Maximum Plate Voltage</td>
<td>16 VOLTS</td>
</tr>
<tr>
<td>Maximum Grid #2 (Control-Grid) Voltage</td>
<td>16 VOLTS</td>
</tr>
<tr>
<td>Negative Bias Value</td>
<td>16 VOLTS</td>
</tr>
<tr>
<td>Maximum Grid #1 (Space-Charge-Grid) Voltage</td>
<td>16 VOLTS</td>
</tr>
<tr>
<td>Maximum Peak Heater-Cathode Voltage: Heater Negative with Respect to Cathode</td>
<td>16 VOLTS</td>
</tr>
<tr>
<td>Heater Positive with Respect to Cathode</td>
<td>16 VOLTS</td>
</tr>
</tbody>
</table>

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*OVER INDICATES A CHANGE.*

**CONTINUED ON FOLLOWING PAGE**

*TUNG-SOL ELECTRIC INC. ELECTRON TUBE DIVISION, BLOOMFIELD, NEW JERSEY, U.S.A. OCTOBER 1, 1961 PLATE #5293*
CONTINUED FROM PRECEDING PAGE

RATINGS — CONT'D
INTERPRETED ACCORDING TO DESIGN MAXIMUM SYSTEM

DIODE UNITS — TWO
VALUES ARE FOR EACH UNIT

HEATER VOLTAGE
MAXIMUM PLATE CURRENT
MAXIMUM PEAK HEATER—CATHODE VOLTAGE:
HEATER NEGATIVE WITH RESPECT TO CATHODE
HEATER POSITIVE WITH RESPECT TO CATHODE

12.6 VOLTS
5 MA.
16 VOLTS
16 VOLTS

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS*
CLASS A\textsubscript{1} AMPLIFIER

HEATER VOLTAGE\textsuperscript{A}
HEATER CURRENT
PLATE VOLTAGE
GRID \#2 (CONTROL—GRID) VOLTAGE:
DEVELOPED ACROSS A 2.2 MEGOHM RESISTOR
GRID \#1 (SPACE-CHARGE—GRID) VOLTAGE
PLATE RESISTANCE (APPROX.)
AMPLIFICATION FACTOR, GRID \#2 TO PLATE
TRANSCONDUCTANCE, GRID \#2 TO PLATE
PLATE CURRENT
GRID \#1 CURRENT

12.6 VOLTS
0.4 AMP.
12.6 VOLTS
-0.5 VOLTS
12.6 VOLTS
500 OHMS
8 \text{\mu}M\text{HOMS}
16 000 \text{\mu}M\text{HOMS}
35 MA.
75 MA.

TYPICAL OPERATION
TETRODE UNIT — AUDIO DRIVER SERVICE

PLATE SUPPLY VOLTAGE
PLATE VOLTAGE\textsuperscript{B}
GRID \#1 SUPPLY VOLTAGE
GRID \#2 SUPPLY VOLTAGE
GRID \#2 RESISTOR
CATHODE RESISTOR
PEAK AF GRID \#2 SUPPLY VOLTAGE (APPROX.):
FROM 3.3 MEGOHM SIGNAL SOURCE
PLATE CURRENT:
ZERO SIGNAL (APPROX.)
INDICATED SIGNAL
GRID \#1 CURRENT
LOAD RESISTANCE
TOTAL HARMONIC DISTORTION (AT POWER OUTPUT OF 2.5 KW)
INDICATED—SIGNAL POWER OUTPUT

11.2 VOLTS
11.2 VOLTS
0 VOLTS
1.8 MEGOHMS
18 OHMS
4.25 VOLTS
20 MA.
7 MA.
58 MA.
1250 OHMS
5 PERCENT
8 KW.

\*WITH 12.6 VOLTS ON HEATER AND GRID \#2 VOLTAGE OBTAINED BY A GRID \#2 RESISTOR.

\(\text{A}\)

THIS TUBE IS INTENDED TO BE USED IN AUTOMOTIVE SERVICE FROM A NOMINAL 12 VOLT BATTERY SOURCE.
The heater is therefore designed to operate over the 10.0 TO 15.9 VOLTAGE RANGE ENCOUNTERED IN THIS SERVICE. THE MAXIMUM RATINGS OF THE TUBE PROVIDE FOR AN ADEQUATE SAFETY FACTOR SUCH THAT THE TUBE WILL WITHSTAND THE WIDE VARIATION IN SUPPLY VOLTAGES.

\(\text{B}\)

OBTAINED FROM INDICATED PLATE SUPPLY THROUGH SERIES 100 HENRY CHOKE HAVING DC RESISTANCE OF 150 OHMS.

\(\rightarrow\) INDICATES A CHANGE CONTINUED ON FOLLOWING PAGE
TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - CONT'D.

TYPICAL OPERATION

PLATE VOLTAGE 12.6 VOLTS
GRID #1 VOLTAGE 12.6 VOLTS
GRID #2 VOLTAGE:
  OBTAINED BY RECTIFICATION THROUGH A
  2.2 MEGOHM RESISTOR ➔ -1.6 VOLTS
PEAK AF GRID #2 SUPPLY VOLTAGE (APPROX.):
  FROM 0.22 MEGOHM SIGNAL SOURCE ➔ 2.5 VOLTS
PLATE CURRENT:
  ZERO SIGNAL (APPROX.) ➔ 35 MA.
  MAXIMUM SIGNAL ➔ 15 MA.
GRID #1 CURRENT ➔ 80 MA.
LOAD RESISTANCE ➔ 700 OHMS
TOTAL HARMONIC DISTORTION ➔ 10 PERCENT
MAX. SIGNAL POWER OUTPUT ➔ 35 KW.
MAXIMUM CIRCUIT VALUES:
  GRID #2 CIRCUIT RESISTANCE 10 MEGOHMS

CHARACTERISTICS

DIODE UNITS - TWO
VALUES ARE FOR EACH UNIT

PLATE CURRENT FOR PLATE VOLTS = 10 3 MA.

➔ INDICATES A CHANGE.

12DS7A
TETRODE UNIT

$E_F = 12.6$ Volts
$E_{C1}$ (Space-Charge-Grid) = 12.6 Volts

$E_{C2}$ (Control Grid) = 0 Volts

PLATE MILLIAMPERES

PLATE VOLTS
12DS7 TETRODE UNIT

$E_f = 12.6$ Volts
$E_b = 12.6$ Volts
$E_{c1}$ (Space-Charge-Grid) = 12.6 Volts

$\text{Grid } #2 \text{ Volts}$

$\text{Plate (} I_p \text{) or Grid } #1 (I_{c1}) \text{ milliamperes}$

$\text{Transconductance (} G_m \text{) microhms}$