THE 12BA7 IS A CATHODE TYPE HIGH GAIN PENTAGRID CONVERTER IN THE SMALL 9-PIN BUTTON CONSTRUCTION. IT IS DESIGNED FOR SERVICE AS A COMBINED LOCAL OSCILLATOR AND MIXER AT HIGH FREQUENCIES, ESPECIALLY IN THE FM BROADCAST BAND.

DIRECT INTERELECTRODE CAPACITANCES

WITH NO EXTERNAL SHIELD

GRID #3 TO PLATE: \((G_3 \text{ TO } P)\) MAX. 0.19 \(\mu\)f
GRID #1 TO GRID #3: \((G_4 \text{ TO } G_3)\) MAX. 0.1  \(\mu\)f
GRID #1 TO PLATE: \((G_4 \text{ TO } P)\) MAX. 0.05 \(\mu\)f
GRID #1 TO CATHODE: \((G_4 \text{ TO } K)\) 3.3 \(\mu\)f
GRID #4 TO ALL EXCEPT CATHODE: \(G_4 \text{ TO } (H+G_2+G_4+G_3+G_5+P+IS)\) 3.4 \(\mu\)f
CATHODE TO ALL EXCEPT GRID #1: \(K \text{ TO } (H+G_2+G_4+G_3+G_5+P+IS)\) 4 \(\mu\)f
RF INPUT: \(G_3 \text{ TO } (H+K+G_4+G_2+G_3+G_5+P+IS)\) 9.5 \(\mu\)f
OSCILLATOR INPUT: \(G_4 \text{ TO } (H+K+G_2+G_4+G_3+G_5+P+IS)\) 6.7 \(\mu\)f
MIXER OUTPUT: \(P \text{ TO } (H+K+G_2+G_4+G_3+G_5+P+IS)\) 8.3 \(\mu\)f

RATINGS

INTERPRETED ACCORDING TO RCA STANDARD MB-210

HEATER VOLTAGE 12.6 VOLTS
MAXIMUM HEATER-CATHODE VOLTAGE 90 VOLTS
MAXIMUM PLATE VOLTAGE 300 VOLTS
MAXIMUM GRIDS #2 & #4 VOLTAGE 100 VOLTS
MAXIMUM GRIDS #2 & #4 SUPPLY VOLTAGE 300 VOLTS
MAXIMUM NEGATIVE GRID #3 VOLTAGE 100 VOLTS
MAXIMUM POSITIVE GRID #3 VOLTAGE 0 VOLTS
MAXIMUM GRID #5 & INTERNAL SHIELD VOLTAGE\(^A\) 0 VOLTS
MAXIMUM PLATE DISSIPATION 2 WATTS
MAXIMUM GRIDS #2 & #4 DISSIPATION 1.5 WATTS
MAXIMUM CATHODE CURRENT 22 MA.

\(^A\) INTERNAL SHIELD (PINS #5 AND #6) CORRECTED DIRECTLY TO GROUND.

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CONVERTER SERVICE - SEPARATE EXCITATION

*THE CHARACTERISTICS SHOWN WITH SEPARATE EXCITATION CORRESPOND VERY CLOSELY WITH THOSE OBTAINED IN A SELF-EXCITED OSCILLATOR CIRCUIT OPERATING WITH ZERO BIAS.*

| HEATER VOLTAGE | 12.6 | 12.6 | VOLTS |
| HEATER CURRENT | 150  | 150  | MA.   |
| PLATE VOLTAGE  | 100  | 250  | VOLTS |
| GRIDS #2 & #4 VOLTAGE | 100  | 100  | VOLTS |
| GRID #3 VOLTAGE | -1   | -1   | VOLTS |
| GRID #5 AND INTERNAL SHIELD^ | CONNECTED DIRECTLY TO GROUND |
| GRID #4 RESISTOR | 20000 | 20000 | OHMS |
| PLATE RESISTANCE (APPROX.) | 0.5  | 1    | MEGOHM |
| CONVERSION TRANSCONDUCTANCE | 900  | 950  | MICROHOS |
| PLATE CURRENT | 3.6  | 3.8  | MA.   |
| GRIDS #2 & #4 CURRENT | 10.2 | 10   | MA.   |
| GRID #3 CURRENT | 0.35 | 0.35 | MA.   |
| TOTAL CATHODE CURRENT | 14.2 | 14.2 | MA.   |
| CONVERSION TRANSCONDUCTANCE WITH $E_{C3} = -20$ VOLTS | 3.5  | 3.5  | MICROHOS |

^INTERNAL SHIELD (PINS #6 AND #8) CONNECTED DIRECTLY TO GROUND.

OSCILLATOR TRANSCONDUCTANCE

NOT OSCILLATING

| GRID #3 VOLTAGE | 0    | VOLTS |
| GRID #1 VOLTAGE | 0    | VOLTS |
| GRIDS #2 & #4 CONNECTED TO PLATE | 100  | VOLTS |
| PLATE CURRENT | 32   | MA.   |
| TRANSCONDUCTANCE BETWEEN GRID #1 & GRIDS #2 & #4 CONNECTED TO PLATE | 8000 | MICROHOS |
| AMPLIFICATION FACTOR | 16.5 |

SIMILAR TYPE REFERENCE: Except for heater ratings similar to 6SS7T.
12BA7

$E_f = 12.6 \text{ Volts}$
$E_b = 250 \text{ Volts}$
$E_{C2} \& E_{C4} = 100 \text{ Volts}$
$E_{C5} = 0 \text{ Volts}$
$R_{04} = 20,000 \text{ Ohms}$

Oscillator Voltage Adjusted to give Grid #1 current of 0.35 mA.
SELF-EXCITATION

\[ E_k = 0 \text{ Volts RMS} \]

\[ P = 2.5 \]

\[ P = 2.0 \]

\[ P = 0.4 \]

\[ P = 0.3 \]

\[ P = 0.2 \]

\[ P = 0.1 \]

\[ E_f = 12.6 \text{ Volts} \]

\[ E_b = 250 \text{ Volts} \]

\[ E_{C2} \& E_{C4} = 100 \text{ Volts} \]

\[ E_c = -1 \text{ Volt} \]

\[ E_{C5} = 0 \text{ Volts} \]

\[ R_{g1} = 20,000 \text{ Ohms} \]

\[ P = \text{Percentage Ratio of} \]

\[ E_k \text{ to } E_k + E_g \text{ where} \]

\[ E_k = \text{Voltage across Oscillator-coil Section between Ground and Cathode} \]

\[ E_g = \text{Oscillator Voltage between Cathode and Grid.} \]

\[ g_C \text{ for values of } E_k \]

\[ g_C \text{ for values percent } P \]
Recommended Min. \( I_{c4} = 0.1 \) Ma.

**12BA7**

**SEPARATE EXCITATION**

- \( E_f = 12.6 \) Volts
- \( E_b = 250 \) Volts
- \( E_{c2} \) & \( E_{c4} = 100 \) Volts
- \( E_{c3} = -1 \) Volt
- \( E_{c5} = 0 \) Volts
- \( R_{g4} = 20,000 \) Ohms

Grid #4 Current Varied by Adjustment of Oscillator Voltage.

\[ \begin{align*}
I_a & \quad \cdots \cdots \cdots \\
I_b & \quad \cdots \cdots \cdots \\
I_{c2} & \quad \cdots \cdots \cdots \\
9c & \quad \cdots \cdots \cdots 
\end{align*} \]