



TETRODE AMPLIFIER

7150

Intended for use in broadband amplifiers from audio frequencies up to about 300 Mc. Pentodelike characteristics render the 7150 very useful in output stages. When triode-connected it is very suitable as a low-noise amplifier in input stages. Low capacitance between plate and cathode make it particularly useful in grounded grid circuits.

The frame grid, described in Section A, with lateral wire diameter of only .0065 mm provides high broadband qualities and freedom from microphonics. The figure of merit is outstanding, especially at intermediate frequencies owing to the low output capacitance.

Compact construction and triple cathode leads provide small transit time loading and low cathode lead inductance. Because of this input conductance is low — approximately 1100 μ mhos at 70 Mc.

ABSOLUTE MAXIMUM RATINGS

Plate Voltage	165	volts
Grid No 2 Voltage	165	volts
Grid No 1 Voltage, positive value	+ 0	volts
Grid No 1 Voltage, negative value	— 25	volts
Cathode Current	55	ma
Plate Dissipation	4.5	watts
Grid No 2 Dissipation (see Section A)	1.65	watts
[Plate + Grid No 2] Dissipation (Grid No 2 connected to Plate) . . .	5.5	watts
Heater — Cathode Voltage	55	volts
Bulb Temperature, at hottest point	140	°C
Grid No 1 Circuit Resistance		
with fixed bias	.05	Mohm
with cathode bias	.1	Mohm

MECHANICAL DATA

Base: 9-pin, as per drawing

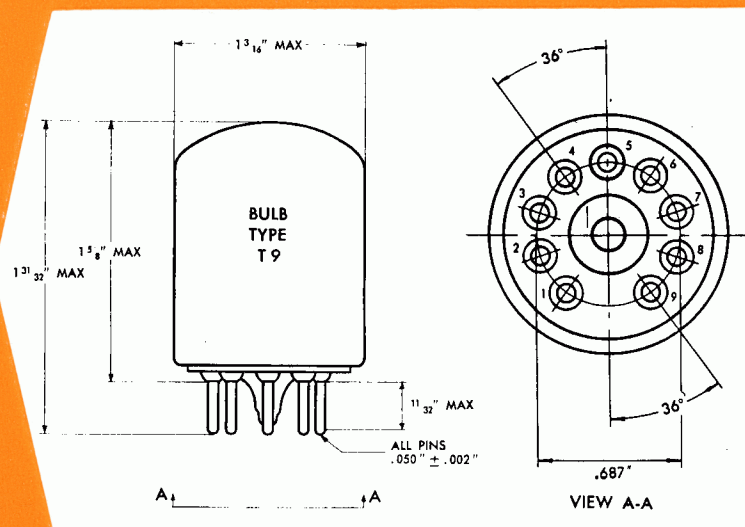
Bulb: EIA T 9

Mounting Position: Any

PIN NO. CONNECTED TO

1. Plate
2. Heater
3. Cathode
4. Grid No 1
5. Heater, Internal Shield*
6. Cathode
7. Cathode
8. No Connection
9. Grid No 2

* The internal shield connected to Pin No 5 should be grounded as there is a direct flow of electrons from the cathode to the shield when the latter is positive in relation to the cathode.



TETRODE CHARACTERISTICS

COLD CAPACITANCES (without external shield)

Grid No 1 to Plate	.03	$\mu\mu\text{F}$
Input	16	$\mu\mu\text{F}$
Output	2	$\mu\mu\text{F}$

TYPICAL OPERATION. CLASS A₁

Heater Voltage	6.3	6.3	volts
Heater Current	.45	.45	amp
Plate Supply Voltage	135	125	volts
Grid No 2 Supply Voltage	135	125	volts
Grid No 1 Supply Voltage	+ 8		volts
Cathode Bias Resistor	260	45	ohms
Plate Current	27.5	24	ma
Grid No 2 Current	8.5	7.5	ma
Transconductance	35,800	34,000	μmhos
Plate Resistance, approx.	.03	.03	Mohm
Equivalent Noise Resistance	160	160	ohms
Transit Time Loading at 100 Mc	200	200	μmhos
Input Conductance at 100 Mc	2200	2200	μmhos

FIGURE OF MERIT

		Tube Cold	Typical operation*
At LF without external shield	$\frac{g_m}{C_{in} + C_{out}}$	1.9—2.0	1.0—1.1
At IF without external shield	$\frac{g_m}{\sqrt{C_{in} \cdot C_{out}}}$	6.0—6.3	2.9—3.0

* The following additions have been made for tube sockets and wiring capacitances to get total circuit capacitances under typical operating conditions:

At LF — 8 $\mu\mu\text{F}$. At IF — 5 $\mu\mu\text{F}$ for input circuit and 3 $\mu\mu\text{F}$ for output circuit.

OPERATION RANGE VALUES

Heater Voltage		6.3		volts
Plate Supply Voltage		125		volts
Grid No 2 Supply Voltage		125		volts
Cathode Bias Resistor		45		ohms
	MIN	AVE	MAX	
Heater Current	410	450	490	ma
Plate Current	20	24	30	ma
Grid No 2 Current		7.5	13	ma
Transconductance	28,000	34,000	40,000	μmhos
Transconductance, End of Life Point	22,000			μmhos
I_{hk} at $E_{hk} = \pm 100$ volts			20	μa
Grid No 1 Current			-.2	μa
Cutoff Plate Current at $E_{c1} = -5$ volts			100	μa



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TRIODE CHARACTERISTICS*
(Grounded Grid Operation)

COLD CAPACITANCES (without external shield)

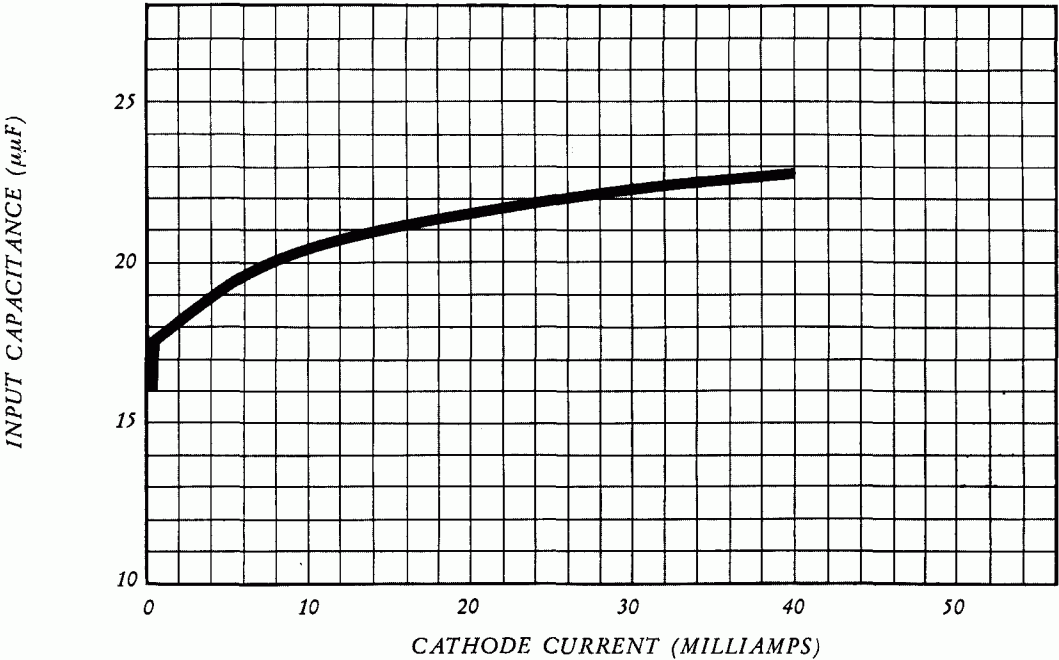
Plate and Grid No 2 to Cathode	.6	$\mu\mu\text{F}$
Input (Cathode to Grid, Heater, Int. Shield)	18	$\mu\mu\text{F}$
Output (Plate and Grid No 2 to Grid, Heater, Int. Shield)	7	$\mu\mu\text{F}$

TYPICAL OPERATION. CLASS A₁

Heater Voltage	6.3	volts
Heater Current	.45	amp
Plate Supply Voltage	125	volts
Cathode Bias Resistor	33	ohms
Plate Current	35	ma
Transconductance	47,000	μmhos
Amplification Factor	35	
Equivalent Noise Resistance	60	ohms

* Grid No 2 connected to Plate.

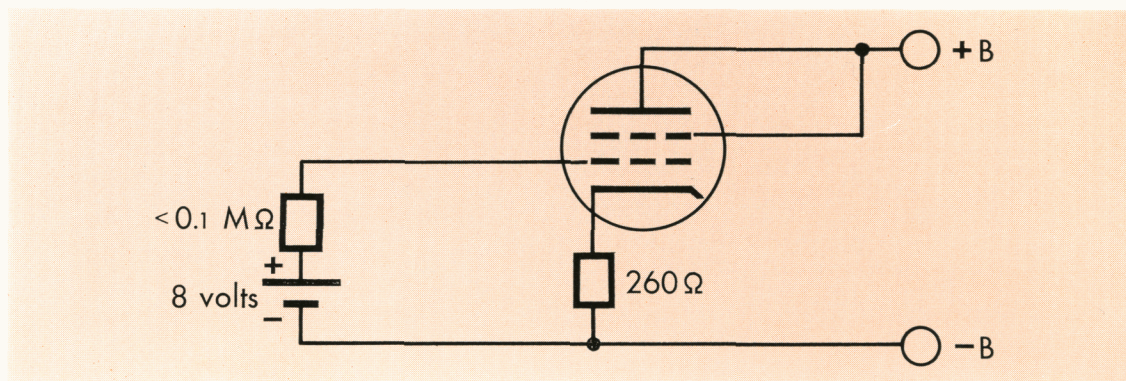
SPECIAL DATA



CAPACITANCES IN OPERATION:

Space-charge effects in electron current flow cause an increase in tube capacitances. Input capacitance as a function of cathode current is shown above.
For best value of figure of merit external shield should be excluded.

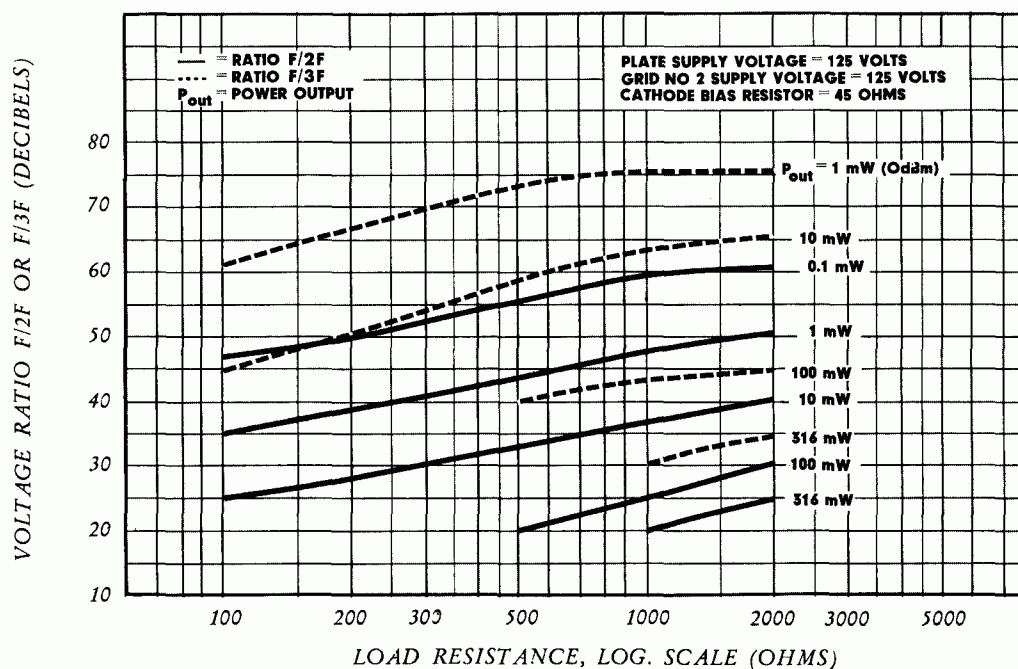
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BIAS CONSIDERATIONS:

The operating characteristics of high transconductance tubes are sensitive to variations in manufacture. Because of this the use of a 260 ohm cathode resistance, in conjunction with a DC control grid return to a + 8.0 volt supply, is recommended.

To prevent burning out grid wires by removal of plate voltage when the + 8.0 volt bias is still applied, a limiting resistor of 10,000 ohms in series with the bias supply is suggested. Where the use of such a resistor is not practical, care should be taken to see that the grid bias is not applied before the plate and grid No 2 voltages.



HARMONIC DISTORTION:

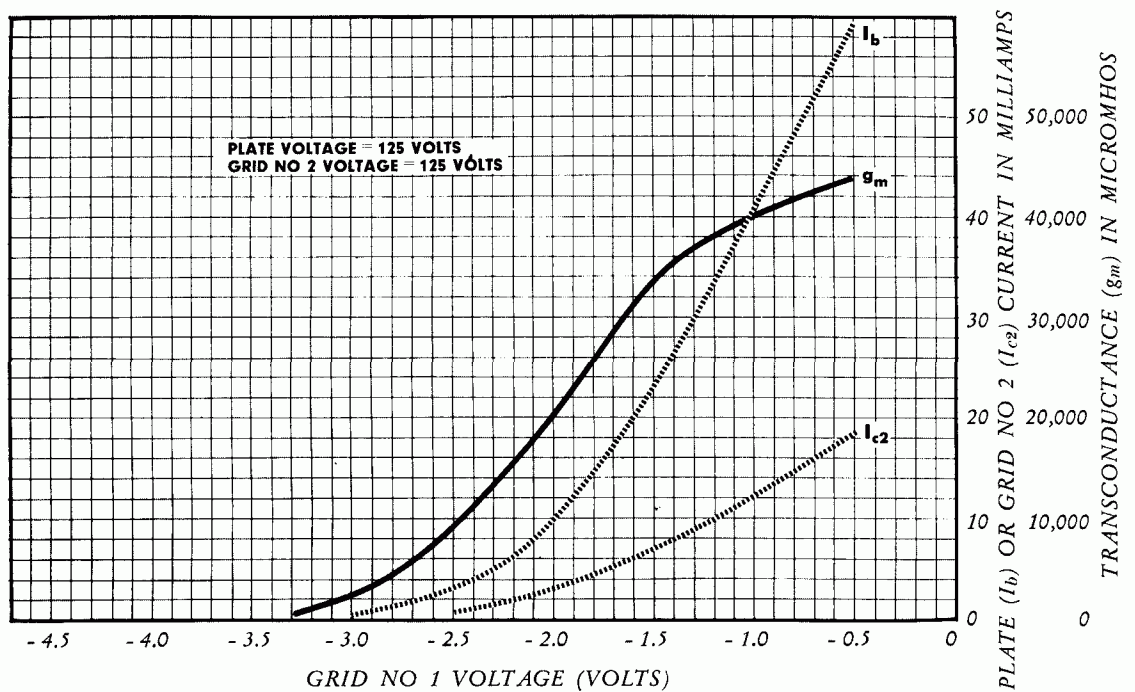
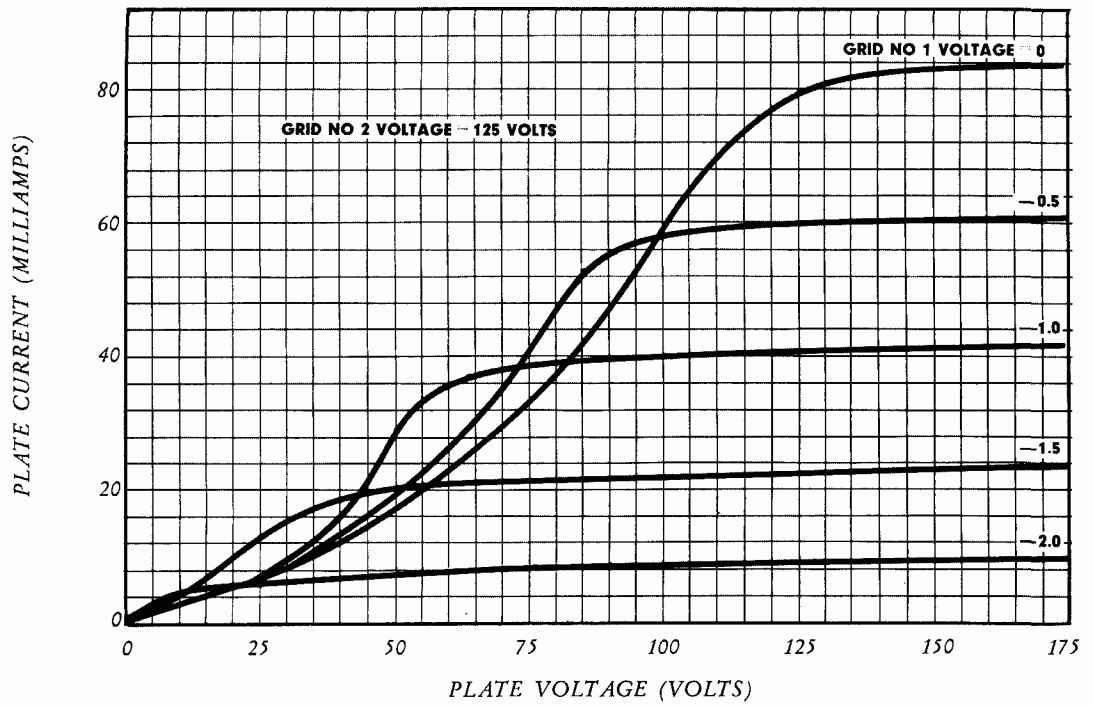
The voltage ratio between fundamental frequency (F), second harmonic (2F) and third harmonic (3F) as a function of the load resistance at different power outputs under typical operating conditions is shown.



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AVERAGE CHARACTERISTICS



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