



ELECTRONIC TUBE REFERENCE

12E5GT

Tuning Indicator electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

TRIODE-TUNING INDICATOR

Electron-ray visual indicator for receiver tuning or electrical level indication, using a fluorescent display whose pattern changes with control voltage.

GENERAL CHARACTERISTICS

BASE DESIGNATION	60	BASE PINS	8
NOMINAL HEATER	12.6 V / 150 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Triode	
PLATE RESISTANCE	9500 Ω
TRANSCONDUCTANCE	0.00145 S
AMPLIFICATION FACTOR	13.8
MAXIMUM PLATE VOLTAGE	250 V
<i>Published ratings/characteristics promoted where semantically applicable.</i>	

SECTION 2 Tuning Indicator	
<i>No fixed ratings recorded.</i>	

12E5GT — Medium-Mu Triode Vacuum Tube

An indirectly heated, general-purpose single-triode receiving tube designed for service as an oscillator, detector, or amplifier.

Overview

The **12E5GT** (also written as **12E5-GT**) is a medium-mu triode vacuum tube housed in a glass envelope. It is designed for versatile application in radio receivers and electronic equipment, serving as an oscillator, detector, or Class A voltage amplifier. The tube features an indirectly heated, unipotential cathode and operates with a nominal heater voltage of **12.6 V**.

With the exception of its heater ratings, the electrical characteristics of the 12E5GT are identical to those of the **76** and the **6P5GT** triodes. It is characterized by moderate amplification capability, a maximum plate voltage rating of **250 V**, and a standard octal base configuration.

Construction, Physical Dimensions, and Base Pinout

The 12E5GT is constructed with a T-9 glass bulb and utilizes a small wafer 6-pin octal base with a metal shell. The physical dimensions of the tube are as follows:

- **Maximum overall length:** 3-5/16 inches
- **Maximum seated height:** 2-3/4 inches
- **Maximum diameter:** 1-5/16 inches

The tube features an indirectly heated, coated unipotential cathode. The heater is designed to operate from either an AC or DC supply.

Heater Parameter	Value
Nominal Heater Voltage	12.6 V
Nominal Heater Current	0.15 A
Heating Method	Indirect
Cathode Type	Unipotential

Pin Connections (6Q Basing)

The 12E5GT uses the **6Q** basing arrangement. Viewed from the underside of the base, the pin connections are assigned as follows:

- **Pin 1:** Metal Shell (S)
- **Pin 2:** Heater (H)
- **Pin 3:** Plate (P)
- **Pin 5:** Grid (G)
- **Pin 7:** Heater (H)
- **Pin 8:** Cathode (K)

Note: Pins 4 and 6 are omitted from the small wafer 6-pin octal base.

Electrical Characteristics and Class A1 Operation

The 12E5GT operates as a Class A1 amplifier with a maximum plate voltage limit of **250 V**. Under typical operating conditions, the tube provides an amplification factor of **13.8**. The specific characteristics vary depending on the applied plate and grid voltages:

Parameter	Operating Point A	Operating Point B
Plate Voltage	100 V	250 V (Max)
Grid Voltage	-5 V	-13.5 V (or -13 V)
Plate Current	2.5 mA	5.0 mA
Plate Resistance	12,000 Ω	9,500 Ω
Transconductance	1,150 μmhos	1,450 μmhos
Amplification Factor	13.8	13.8
Maximum Grid Circuit Resistance	1.0 M Ω	1.0 M Ω

Detector Service

The 12E5GT is highly suited for detector applications, where it can be configured either as a biased detector or as a grid-leak detector.

Biased Detector Operation

In biased detector service, the grid is biased near cutoff, and the plate current is adjusted to a low quiescent value. Typical operating parameters are:

- **Plate Voltage:** 100 V or 250 V
- **Grid Voltage:** -8 V (at 100 V plate) or -20 V (at 250 V plate)
- **Plate Current:** Adjusted to **0.2 mA** with no input signal

Grid-Leak Detector Operation

In grid-leak detector service, the grid bias is self-developed across a grid resistor-capacitor network, with the grid return connected directly to the cathode. Typical operating parameters are:

- **Plate Voltage:** 45 V
- **Grid Voltage:** Return to cathode
- **Grid Leak Resistor:** 1 to 5 M Ω
- **Grid Condenser (Capacitor):** 250 μpF

Resistance-Coupled Amplifier Service

When used as a resistance-coupled voltage amplifier, the 12E5GT provides stable voltage gain. The performance of the stage depends on the selected plate supply voltage, plate load resistance, and cathode bias resistance:

Plate Supply Voltage	Plate Load Resistor	Cathode Resistor	Voltage Gain
100 V	0.05 MΩ	3,800 Ω	8.5
100 V	0.25 MΩ	15,000 Ω	10.0
250 V	0.05 MΩ	3,800 Ω	9.0
250 V	0.25 MΩ	15,000 Ω	10.0

These operating points demonstrate that higher plate load resistors (0.25 MΩ) yield a voltage gain of 10.0 at both 100 V and 250 V supply levels, while lower load resistors (0.05 MΩ) result in slightly lower gains of 8.5 to 9.0.

Interelectrode Capacitances

The interelectrode capacitances of the 12E5GT influence its high-frequency performance and input impedance. Two sets of capacitance measurements are documented, reflecting different testing conditions:

Direct Interelectrode Capacitances (Standard Configuration)

- **Grid to Cathode (C_{gk}):** 3.6 μpf
- **Plate to Cathode (C_{pk}):** 2.6 μpf
- **Grid to Plate (C_{gp}):** 2.8 μpf

Alternative Measurement Configuration

- **Input Capacitance:** 3.4 μpf
- **Output Capacitance:** 5.5 μpf
- **Grid-to-Plate Capacitance:** 2.6 μpf

Characteristic Curves and Design Interpretation

The operating behavior of the 12E5GT is illustrated by its characteristic curves, which detail the relationships between plate voltage, grid bias, plate current, and the primary tube parameters.

Plate Characteristics (I_b vs. E_b)

The plate current (I_b) versus plate voltage (E_b) curves, plotted for grid voltages (E_c) ranging from 0 V to -32 V, show a family of regular, evenly spaced triode curves. At a grid bias of 0 V, the plate current rises steeply with plate voltage, reflecting the tube's moderate plate resistance. As the grid bias is made progressively more negative, the curves shift to the right, demonstrating the effective control of the grid over electron flow.

Parameter Variations vs. Plate Current

At a constant plate voltage of 250 V and a heater voltage of 12.6 V, the tube parameters vary dynamically with plate current (I_b) from 0 to 10 mA:

- **Amplification Factor ($ext\mu$):** Remains remarkably stable across the operating range, rising only slightly from approximately 13.2 at 1.0 mA to 13.8 at 5.0 mA, and peaking near 14.0 at 10.0 mA.
- **Plate Resistance (r_p):** Decreases sharply as plate current increases. At very low currents (under 1.0 mA), the plate resistance exceeds 20 k Ω . It drops to 9,500 Ω at the typical Class A operating point of 5.0 mA, and continues to decline to approximately 7,500 Ω at 10.0 mA.
- **Transconductance (g_m):** Increases steadily with plate current. It starts at approximately 600 μ mhos at 1.0 mA, reaches 1,450 μ mhos at 5.0 mA, and rises to nearly 1,900 μ mhos at 10.0 mA.

These curves indicate that the 12E5GT achieves its most linear and lowest-distortion amplification when operated at higher plate currents (around 5.0 to 10.0 mA), where plate resistance is minimized and transconductance is maximized.

Related Designations and Comparisons

The 12E5GT is electrically identical to the **76** (a 5-pin base triode) and the **6P5GT** (a 6.3 V heater octal triode) in all characteristics except for its heater requirements. The 12E5GT requires a **12.6 V, 0.15 A** heater supply, whereas the **6P5GT** requires a **6.3 V, 0.3 A** heater supply. Although their electrical parameters are identical, they cannot be directly substituted without modifying the heater circuit voltage and current delivery.

Technical Summary

The **12E5GT** is an octal-based, indirectly heated medium-mu triode designed for general-purpose service as an oscillator, detector, or amplifier. Operating with a **12.6 V, 0.15 A** heater, it features a T-9 glass envelope and a 6-pin octal base with a metal shell. At its typical Class A1 operating point of 250 V, the tube exhibits an amplification factor of **13.8**, a plate resistance of **9,500 Ω** , and a transconductance of **1,450 μ mhos** with a plate current of **5.0 mA**. Its electrical characteristics are identical to those of the 76 and **6P5GT**, making it a reliable and predictable choice for low-frequency voltage amplification and detection circuits in 12-volt systems.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

195X General Electric Essential Characteristics

Published test conditions and operating points. Values on this page are preserved as reported by this source.

195X GENERAL ELECTRIC ESSENTIAL CHARACTERISTICS

Section 1 · Triode

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Input capacitance	3.4 pF	—
Output capacitance	5.5 pF	—
Grid-to-plate capacitance	2.6 pF	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	250 V	ClassA
Grid voltage	-13 V	ClassA
Plate current	5 mA	ClassA



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1961 Tung Sol

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1961 TUNG SOL

Section 1 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	12.6 V	Nominal
Heater current	150 mA	Nominal

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate current	2.55.0 mA	Typical operating conditions

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