



ELECTRONIC TUBE REFERENCE

117L7M7GT

Power - Beam (NOT sweep) electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

BEAMPOWER-RECTIFIER

Line-operated multi-section tube combining rectification with beam-power audio amplification, using a high-voltage heater suitable for direct or series supply operation.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	8
NOMINAL HEATER	117 V / 90 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

SECTION RATINGS

SECTION1 Rectifier	
PEAK INVERSE VOLTAGE	350 V
NOMINAL OUTPUT CURRENT	76 mA
PEAK FORWARD CURRENT	450 mA
FORWARD VOLTAGE DROP	16 V
MAXIMUM HEATER-CATHODE VOLTAGE	175 V
<i>Half-wave rectifier unit.</i>	

SECTION2 Beam Power	
PLATE RESISTANCE	17000 Ω
TRANSCONDUCTANCE	0.0053 S
MAXIMUM PLATE VOLTAGE	117 V
MAXIMUM SCREEN VOLTAGE	117 V
MAXIMUM PLATE DISSIPATION	6 W
MAXIMUM SCREEN DISSIPATION	1 W
<i>Beam-power audio output unit.</i>	

117L7M7GT — Diode-Beam Pentode

An indirectly heated multi-unit vacuum tube combining a half-wave power rectifier and a beam power amplifier in a single envelope, designed for AC/DC line operation in portable receivers.

Overview

The **117L7M7GT** (also designated as 117L7/M7GT) is a multi-unit vacuum tube containing a diode unit and a beam power pentode unit within a single glass envelope. It is specifically designed for AC/DC service directly from a 117-volt power line, making it highly suitable for three-way portable receivers and various other compact electronic applications. By combining a half-wave rectifier and an audio output amplifier, the tube reduces the physical space and component count required in compact chassis designs.

Physical Construction, Basing, and Heater Ratings

The 117L7M7GT is constructed with a T-9 glass bulb and an intermediate-shell 8-pin octal base. Both the diode and pentode units utilize coated unipotential cathodes. The tube can be mounted in any operating position.

Physical Dimensions

- **Maximum overall length:** 3.438 inches
- **Maximum seated height:** 2.875 inches
- **Maximum diameter:** 1.188 inches
- **Base outline:** JEDEC 9-15 (8-pin octal, BB-6)

Basing Configuration

The tube utilizes the **JEDEC 8AO** basing diagram. Viewed from the bottom of the base, the pin connections are assigned as follows:

Pin Number	Electrode Connection
Pin 1	Grid 3 (Suppressor Grid) and Cathode (G_3, K) of the Pentode Unit
Pin 2	Heater (H)
Pin 3	Plate (P) of the Diode Unit
Pin 4	Grid 1 (Control Grid, G_1) of the Pentode Unit
Pin 5	Grid 2 (Screen Grid, G_2) of the Pentode Unit
Pin 6	Plate (P) of the Pentode Unit
Pin 7	Heater (H)
Pin 8	Cathode (K) of the Diode Unit

Heater Characteristics and Ratings

The heater is designed to operate directly across standard line voltages without a dropping resistor. The ratings are established under the Design Maximum system (EIA Standard RS-239):

- **Average heater voltage:** 117 Volts
- **Average heater current:** 90 mA
- **Limits of supplied voltage:** 117 ± 12 Volts
- **Maximum DC heater-cathode voltage:** 175 Volts

Maximum Ratings

The maximum ratings for the individual diode and pentode units are defined under Design Center values (EIA Standard RS-239):

Diode Unit

- **AC plate voltage (RMS):** 117 Volts
- **Peak inverse voltage:** 350 Volts
- **Steady-state peak plate current:** 450 mA

Pentode Unit

- **Plate voltage:** 117 Volts
- **Grid 2 (Screen Grid) voltage:** 117 Volts
- **Plate dissipation:** 6.0 Watts
- **Grid 2 dissipation:** 1.0 Watt

Electrical Characteristics and Operating Conditions

The 117L7M7GT operates with distinct electrical characteristics for its rectifier and amplifier sections.

Diode Unit (Half-Wave Power Rectifier)

The diode unit exhibits a low internal voltage drop and is rated for standard power rectification duties:

- **Tube voltage drop:** 16 Volts (measured with an applied DC at 150 mA plate current)
- **AC plate voltage (RMS):** 117 Volts
- **DC output current:** 75 mA
- **Minimum total effective plate supply impedance:** 15 Ohms

Pentode Unit (Class A1 Audio Power Amplifier)

When operated as a Class A1 audio amplifier, the pentode unit provides moderate power output from low supply voltages:

- **Plate voltage:** 105 Volts
- **Grid 2 voltage:** 105 Volts
- **Grid voltage:** -5.2 Volts
- **Peak AF grid voltage:** 5.2 Volts
- **Zero-signal plate current:** 43 mA
- **Maximum-signal plate current:** 43 mA
- **Zero-signal grid 2 current (nominal):** 4.0 mA
- **Maximum-signal grid 2 current (nominal):** 5.5 mA
- **Plate resistance (approximate):** 17,000 Ohms
- **Transconductance:** 5,300 μ mhos
- **Load resistance:** 4,000 Ohms
- **Total harmonic distortion:** 5.0%
- **Maximum-signal power output:** 0.85 Watt

Performance Curves and Analysis

Pentode Unit Characteristics

The plate characteristics of the pentode unit (at a heater voltage of 117 V and screen grid voltage E_{c2} of 105 V) show typical beam-power behavior. The plate current rises rapidly at low plate voltages and flattens into a knee, with the knee occurring around 15 to 25 plate volts depending on the control grid bias ($E_{c1}(/tubes/C1)$). The curves span from $E_{c1}(/tubes/C1) = 0$ V down to -12 V. At $E_{c1}(/tubes/C1) = 0$ V and a plate voltage of 100 V, the plate current reaches approximately 75 mA.

The load resistance curves (at $E_b = 105$ V, $E_{c2} = 105$ V, $E_{c1}(/tubes/C1) = -5.2$ V, and an input signal of 3.67 V RMS) illustrate the relationship between load resistance, power output, and distortion:

- **Power Output (P_o):** Peaks near 0.85 Watt at the rated load resistance of 4,000 Ohms.
- **Harmonic Distortion:** Total harmonic distortion is minimized near the 3,000 to 4,000 Ohm range, rising significantly at lower and higher load impedances. The second harmonic distortion rises steadily as load resistance increases, while the third harmonic distortion reaches a minimum near 3,500 Ohms before rising.
- **Currents:** Plate current (I_b) decreases slightly as load resistance increases, while screen grid current (I_{c2}) increases.

Diode Unit Characteristics

The diode unit's forward characteristics show a nearly linear relationship between DC plate voltage and plate current above 5 Volts. At 10 Volts DC, the plate current is approximately 80 mA, rising to 150 mA at 16 Volts DC (representing the rated 16 V tube drop).

Rectifier operation curves (at $E_{input} = 117$ V RMS) demonstrate the DC output voltage delivered to a load for different filter capacitance values:

- **8 μ F Capacitor:** Delivers approximately 115 Volts DC at 50 mA load, dropping to about 80 Volts DC at 100 mA load.
- **16 μ F Capacitor:** Delivers approximately 125 Volts DC at 50 mA load, dropping to about 105 Volts DC at 100 mA load.
- **32 μ F Capacitor:** Delivers approximately 130 Volts DC at 50 mA load, dropping to about 112 Volts DC at 100 mA load.

Technical Summary

The **117L7M7GT** is a versatile, space-saving **octal-base multi-unit tube** combining a **half-wave rectifier** and a **beam power pentode** in a single T-9 envelope. Operating directly from a **117 V** line with a **90 mA** heater, it eliminates the need for power transformers or dropping resistors in small line-powered equipment. The diode unit provides up to **75 mA** of rectified DC current, while the pentode unit delivers **0.85 Watt** of audio power into a **4,000 Ohm** load with **5.0%** total harmonic distortion. This combination makes it an efficient single-tube solution for the power supply and audio output stages of portable and compact receivers.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1966 Tung Sol Electronic Tubes 3 of 4

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

1966 TUNG SOL ELECTRONIC TUBES 3 OF 4

Section 1 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
AC plate voltage RMS	117 V	HalfWaveRectifier
DC output current	76 mA	HalfWaveRectifier
Minimum effective plate-supply impedance	15 ohm	HalfWaveRectifier

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Tube voltage drop at 150 mA	16 V	—

1966 TUNG SOL ELECTRONIC TUBES 3 OF 4

Section 2 · Beam Power

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	105 V	ClassA;AudioPowerAmplifier
Grid #2 voltage	105 V	ClassA;AudioPowerAmplifier
Grid voltage	-5.2 V	ClassA;AudioPowerAmplifier
Zero-signal plate current	43 mA	ClassA;AudioPowerAmplifier
Maximum-signal plate current	43 mA	ClassA;AudioPowerAmplifier
Zero-signal grid #2 current	4 mA	ClassA;AudioPowerAmplifier
Maximum-signal grid #2 current	5.5 mA	ClassA;AudioPowerAmplifier
Load resistance	4000 ohm	ClassA;AudioPowerAmplifier
Total harmonic distortion	5 %	ClassA;AudioPowerAmplifier
Maximum-signal power output	0.85 W	ClassA;AudioPowerAmplifier

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	17000 ohm	ClassA;AudioPowerAmplifier
Transconductance	5300 uS	ClassA;AudioPowerAmplifier

TUBE TINKER

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and their source documents.

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