



ELECTRONIC TUBE REFERENCE

19DE7

Power - TV Vertical Output electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

TRIODE-TRIODE

Dissimilar television twin triode combining a vertical-deflection oscillator with a low-mu, high-current vertical-deflection amplifier; the output section carries a high positive-pulse plate-voltage rating.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	9
NOMINAL HEATER	19.4 V / 300 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

SECTION RATINGS

SECTION1 Triode	
PLATE RESISTANCE	8750 Ω
TRANSCONDUCTANCE	0.002 S
AMPLIFICATION FACTOR	17.5
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM PLATE DISSIPATION	1.5 W
MAXIMUM CATHODE CURRENT	22 mA
Vertical-deflection oscillator triode.	

SECTION2 Triode	
PLATE RESISTANCE	925 Ω
TRANSCONDUCTANCE	0.0065 S
AMPLIFICATION FACTOR	6
MAXIMUM PLATE VOLTAGE	275 V
MAXIMUM PLATE DISSIPATION	7 W
MAXIMUM CATHODE CURRENT	50 mA
<i>Low-mu vertical-deflection amplifier triode; 1500 V absolute-maximum positive plate pulse rating and 175 mA peak cathode current.</i>	

19DE7 — Dissimilar Double Triode Vacuum Tube

A miniature, dissimilar double triode designed for television receiver applications, combining a medium-mu oscillator section and a high-dissipation, low-mu power amplifier section in a single envelope.

Overview

The **19DE7** is a miniature double triode of the glass-bulb type, featuring two highly dissimilar triode sections within a single T-6 1/2 envelope. It is specifically designed for service in television receivers, where Section 1 (Triode #1) operates as a medium-mu vertical deflection oscillator, and Section 2 (Triode #2) operates as a low-mu vertical deflection amplifier.

The tube is constructed with coated unipotential cathodes and is designed to be mounted in any position. In terms of electrical characteristics, the 19DE7 is identical to the [**6DE7**](#) except for its heater ratings, which are tailored for series-string heater circuits.

Mechanical Specifications and Physical Dimensions

The 19DE7 is housed in a standard T-6 1/2 glass bulb with a miniature button 9-pin base (designated as 9HF or E9-1). The physical dimensions of the tube are documented with slight variations in maximum seated height:

- **Maximum Diameter:** 7/8 inches (0.875 inches)
- **Maximum Overall Length / Height:** 2 5/8 inches (2.625 inches)
- **Maximum Seated Height:** 2 1/8 inches (2.125 inches) to 2.375 inches (2 3/8 inches)
- **Mounting Position:** Any

Heater Ratings

The heater of the 19DE7 is designed for series-string operation with a controlled warm-up time. The heater-to-cathode insulation is rated to withstand significant potential differences, which is critical in television deflection circuits where the cathode voltage of the vertical amplifier can swing substantially.

Using the nominal heater voltage of 19.4 V and the nominal heater current of 0.30 A, the calculated heater power is $19.4 \text{ V} \times 0.30 \text{ A} = 5.82 \text{ W}$.

Parameter	Value
Heater Voltage (AC or DC)	19.4 V
Heater Current	0.30 A (300 mA)
Heater Warm-up Time (Approximate)	11.0 seconds
Max. Heater-Cathode Voltage (Heater Negative to Cathode, DC and Peak)	200 V
Max. Heater-Cathode Voltage (Heater Positive to Cathode, DC)	100 V
Max. Heater-Cathode Voltage (Heater Positive to Cathode, DC and Peak)	200 V

Pinout and Basing Configurations

The 19DE7 utilizes a 9-pin miniature button base (9HF). The technical records document two distinct pinout configurations for this designation. Designers must verify the specific layout of the device in use:

Configuration A

- **Pin 1:** Plate (Triode #1) [P1]
- **Pin 2:** Grid (Triode #2) [[G2](#)]
- **Pin 3:** Grid (Triode #2) [[G2](#)]
- **Pin 4:** Heater [H]
- **Pin 5:** Heater [H]
- **Pin 6:** Grid (Triode #1) [G1]
- **Pin 7:** Cathode (Triode #1) [K1]
- **Pin 8:** Plate (Triode #2) [[P2](#)]
- **Pin 9:** Cathode (Triode #2) [K2]

Configuration B

- **Pin 1:** Grid (Triode #2) [[G2](#)]
- **Pin 2:** Cathode (Triode #2) [K2]

- **Pin 3:** Grid (Triode #2) [G2]
- **Pin 4:** Heater [H]
- **Pin 5:** Heater [H]
- **Pin 6:** Plate (Triode #1) [P1]
- **Pin 7:** Grid (Triode #1) [G1]
- **Pin 8:** Cathode (Triode #1) [K1]
- **Pin 9:** Plate (Triode #2) [P2]

In both configurations, the heater connections are assigned to Pins 4 and 5, and the grid of the second triode (G2) is connected to multiple pins (Pins 2 and 3 in Configuration A, or Pins 1 and 3 in Configuration B) to facilitate circuit layout and heat dissipation.

Direct Interelectrode Capacitances

The direct interelectrode capacitances are measured without an external shield. Because the two triode sections are highly dissimilar, their capacitances differ significantly:

Capacitance Parameter	Triode #1 (Oscillator)	Triode #2 (Amplifier)
Grid to Plate (G to P)	4.0 pF	8.5 pF
Input: G to (H+K)	2.2 pF	5.5 pF
Output: P to (H+K)	0.52 pF	1.0 pF

Electrical Characteristics and Typical Operating Points

The 19DE7 contains two electrically distinct triode systems. Triode #1 is a medium-mu, high-resistance triode optimized for low-power oscillator service, while Triode #2 is a low-mu, low-resistance power triode optimized for driving the vertical deflection coils.

Typical Class A operating conditions and characteristics for each section are as follows:

Parameter	Triode #1 (Oscillator)	Triode #2 (Amplifier)
Plate Voltage	250 V	150 V
Grid No. 1 Voltage	-11 V	-17.5 V
Plate Current	5.5 mA	35 mA
Transconductance	2000 umhos	6500 umhos
Amplification Factor (mu)	17.5	6.0
Plate Resistance (Approximate)	8750 ohms	925 ohms
Grid Voltage for Cutoff (approx.)	-20 V (at Ib = 10 uA)	-44 V (at Ib = 50 uA)

Additional Operating Points (Triode #2)

- **Plate Current at $E_c = -24$ V DC:** 10 mA
- **Instantaneous Zero-Bias Plate Current ($E_b = 60$ V, $E_c = 0$):** 80 mA

Maximum Ratings

The 19DE7 is rated under the Design-Center and Design-Maximum systems for vertical deflection service. The maximum ratings reflect the distinct roles and power handling capabilities of the two sections.

Rating	Triode #1 (Oscillator)	Triode #2 (Amplifier)
Max. DC Plate Voltage	330 V	275 V
Max. Peak Positive Pulse Plate Voltage (Absolute Max.)	—	1500 V
Max. Peak Negative Pulse Grid Voltage	400 V	250 V
Max. Plate Dissipation	1.5 W	7.0 W
Max. Average Cathode Current	22 mA	50 mA
Max. Peak Cathode Current	77 mA	175 mA
Max. Grid Circuit Resistance (Self Bias)	2.2 Megohms	2.2 Megohms

Special Rating Conditions

- **Peak Positive Pulse Plate Voltage (Triode #2):** The absolute maximum rating of 1500 V is specified for operation in a 525-line, 30-frame television system. The duty cycle of the voltage pulse must not exceed 15% of one scanning cycle (or one horizontal scanning cycle, depending on the rating standard applied).
- **Plate Dissipation Protection:** In stages operating with grid leak bias, an adequate cathode bias resistor or other suitable protective means is required to safeguard the tube against excessive dissipation in the event that excitation is lost.

Qualitative Curve Observations

The published characteristic curves for the 19DE7 illustrate the distinct behaviors of the two triode sections:

- **Section One (Triode #1) Plate Characteristics:** Plotted up to a plate voltage (E_b) of 400 V and a plate current (I_b) of 40 mA. The grid voltage (E_c) curves range from 0 V to -20 V in steps of 2 V, demonstrating a linear and evenly spaced characteristic suitable for stable oscillator operation.

- **Section Two (Triode #2) Plate Characteristics:** Plotted up to a plate voltage (E_b) of 400 V and a plate current (I_b) of 150 mA. The grid voltage curves range from 0 V to -60 V in steps of 5 V. The curves show high current capability at low plate voltages (e.g., reaching 80 mA at zero bias and 60 V plate potential), which is essential for delivering the high peak currents required by vertical deflection output stages.

Technical Summary

The **19DE7** is a specialized, miniature **dissimilar double triode** designed for television vertical deflection circuits. It features a **19.4 V, 0.30 A** series-string heater with a controlled 11-second warm-up time.

The tube combines a **medium-mu oscillator section** (Section 1: $\mu = 17.5$, r_p approx. 8750 ohms, $P_d = 1.5$ W) and a **low-mu, high-dissipation power amplifier section** (Section 2: $\mu = 6.0$, r_p approx. 925 ohms, $P_d = 7.0$ W) in a single 9-pin miniature envelope. This dissimilar design allows a single tube to perform both the timing generation and the power amplification functions of the vertical deflection system, minimizing component count and space in television chassis design.



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
Service	Vertical deflection oscillator	—
Heater Warmup Time	11 s	—

1961 TUNG SOL

Section 2 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Service	Vertical deflection amplifier	—
Peak Positive Pulse Plate Voltage	1500 V	—



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 · Triode

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-to-plate capacitance	4 pF	WholeTube
Input capacitance	2.2 pF	WholeTube
Output capacitance	0.52 pF	WholeTube

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum DC plate voltage	330 V	WholeTube
Maximum plate dissipation	1.5 W	WholeTube
Maximum average cathode current	22 mA	WholeTube
Plate voltage	250 V	TypicalOperation
Plate current	5.5 mA	TypicalOperation
Transconductance	2000 μ S	TypicalOperation
Amplification factor	17.5	TypicalOperation

1966 TUNG SOL ELECTRONIC TUBES 3 OF 4

Section 2 · Triode

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-to-plate capacitance	8.5 pF	WholeTube
Input capacitance	5.5 pF	WholeTube
Output capacitance	1 pF	WholeTube

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum DC plate voltage	275 V	WholeTube
Maximum positive pulse plate voltage	1500 V	WholeTube
Maximum plate dissipation	7 W	WholeTube
Maximum average cathode current	50 mA	WholeTube
Maximum peak cathode current	175 mA	WholeTube
Plate voltage	150 V	TypicalOperation
Plate current	35 mA	TypicalOperation
Transconductance	6500 μ S	TypicalOperation
Amplification factor	6	TypicalOperation

TUBE TINKER

An independent reference for electronic tubes, vacuum tubes, and their source documents.

