



ELECTRONIC TUBE REFERENCE

17EW8

Voltage - Dual Triode (similar high frequency) electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

TRIODE-TRIODE

Twin triode intended for FM and AM receiver front ends, with service including RF amplification and oscillator-mixer operation in high-frequency tuner circuits.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	9
NOMINAL HEATER	17.5 V / 160 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Triode	
PLATE RESISTANCE	15000 Ω
TRANSCONDUCTANCE	0.0058 S
AMPLIFICATION FACTOR	48
MAXIMUM PLATE VOLTAGE	250 V
MAXIMUM PLATE DISSIPATION	2.5 W
MAXIMUM CATHODE CURRENT	15 mA

Published ratings and characteristics promoted from the supplied Rogers/Rogers Majestic source.

SECTION2 Triode	
PLATE RESISTANCE	15000 Ω
TRANSCONDUCTANCE	0.0058 S
AMPLIFICATION FACTOR	48
MAXIMUM PLATE VOLTAGE	250 V
MAXIMUM PLATE DISSIPATION	2.5 W
MAXIMUM CATHODE CURRENT	15 mA
Physical section restored under current one-row-per-physical-section policy.	

17EW8 — High-Mu Twin Triode Vacuum Tube

The **17EW8**, also designated as the **HCC85**, is a miniature high-mu twin triode vacuum tube. It is designed primarily for use in radio-frequency (RF) amplifier and self-oscillating mixer-oscillator circuits within frequency modulation (FM) and amplitude modulation (AM) receivers. The device integrates two independent triode systems and an internal electrostatic shield within a single compact envelope.

Mechanical Construction and Heater Design

The 17EW8 is constructed in a miniature T 6 1/2 glass envelope with an E 9-1 nine-pin miniature base. It features coated, unipotential cathodes that are electrically independent, allowing the two triode sections to be operated in different circuit configurations. The tube can be mounted in any physical position.

The heater is designed for series-string or dedicated power supplies, requiring a nominal heater voltage of **17.5 V** and a heater current of **0.15 A** (150 mA). To ensure reliable operation and prevent insulation breakdown, the voltage between the heater and cathode must not exceed a peak value of **90 V**. Additionally, the maximum permissible circuit resistance between the heater and cathode is **20,000 Ω** .

Pinout Configurations (9AJ Basing)

The 17EW8 utilizes the **9AJ** basing arrangement. However, different technical documentation sources outline conflicting pin connections for this designation. When designing or servicing equipment using the 17EW8, these variations must be carefully reconciled:

Pinout Configuration A

In this configuration, the triode units are mapped with Unit 1 on the left side of the base and Unit 2 on the right, with the internal shield on Pin 9:

- **Pin 1:** Plate (Unit No. 1)
- **Pin 2:** Grid (Unit No. 1)
- **Pin 3:** Cathode (Unit No. 2)
- **Pin 4:** Heater

- **Pin 5:** Heater
- **Pin 6:** Plate (Unit No. 2)
- **Pin 7:** Grid (Unit No. 2)
- **Pin 8:** Cathode (Unit No. 1)
- **Pin 9:** Internal Shield

Pinout Configuration B

In this configuration, the triode numbering is reversed, mapping Triode 2 to the lower pin numbers and Triode 1 to the higher pin numbers, while keeping the shield on Pin 9:

- **Pin 1:** Plate (Triode No. 2)
- **Pin 2:** Grid (Triode No. 2)
- **Pin 3:** Cathode (Triode No. 2)
- **Pin 4:** Heater
- **Pin 5:** Heater
- **Pin 6:** Plate (Triode No. 1)
- **Pin 7:** Grid (Triode No. 1)
- **Pin 8:** Cathode (Triode No. 1)
- **Pin 9:** Internal Shield

Pinout Configuration C

In this alternative mapping, the internal shield is located on Pin 1, and the plates are assigned to Pins 6 and 9:

- **Pin 1:** Internal Shield
- **Pin 2:** Grid (Unit No. 2)
- **Pin 3:** Cathode (Unit No. 2)
- **Pin 4:** Heater
- **Pin 5:** Heater
- **Pin 6:** Plate (Unit No. 1)
- **Pin 7:** Grid (Unit No. 1)
- **Pin 8:** Cathode (Unit No. 1)
- **Pin 9:** Plate (Unit No. 2)

Direct Interelectrode Capacitances

The 17EW8 includes an internal shield (connected to Pin 9 or Pin 1 depending on the pinout configuration) to minimize capacitive coupling between the two triode sections. The interelectrode capacitances are documented both with and without an external shield (measuring 0.886 inches in internal diameter):

Single-Unit Capacitances (Each Section)

- **Plate to Grid:** 1.5 pF
- **Plate to Cathode:** 0.18 pF
- **Grid to Cathode, Heater, and Shield:** 3.0 pF
- **Plate to Cathode, Heater, and Shield (Without External Shield):** 1.2 pF
- **Plate to Cathode, Heater, and Shield (With External Shield):** 1.9 pF

Unit-to-Unit Capacitances

- **Plate of Unit 1 to Plate of Unit 2 (Without External Shield):** 0.04 pF max
- **Plate of Unit 1 to Plate of Unit 2 (With External Shield):** 0.008 pF max
- **Grid of Unit 1 to Grid of Unit 2:** 0.003 pF max
- **Plate of Unit 1 to Grid of Unit 2:** 0.008 pF max
- **Plate of Unit 2 to Grid of Unit 1:** 0.008 pF max
- **Plate of Unit 1 to Cathode of Unit 2:** 0.008 pF max
- **Plate of Unit 2 to Cathode of Unit 1:** 0.008 pF max
- **Grid of Unit 1 to Cathode/Triode of Unit 2:** 0.003 pF max
- **Grid of Unit 2 to Cathode/Triode of Unit 1:** 0.003 pF max

The significant reduction in plate-to-plate capacitance (from 0.04 pF to 0.008 pF) when using an external shield highlights the importance of shielding in high-frequency RF applications to prevent unwanted feedback and instability.

Maximum Ratings

The maximum ratings for each triode section of the 17EW8 are defined under design-maximum and design-center systems. These limits must not be exceeded under the worst-case operating conditions:

Parameter	Maximum Rating
Plate Voltage (Without Current)	550 V
Plate Voltage	250 V
Plate Dissipation (Per Section)	2.5 W
Plate Dissipation (Both Sections Combined)	4.5 W
Cathode Current	15 mA
Negative Grid Bias	100 V
Grid Circuit Resistance	1.0 MΩ

Typical Characteristics and Class A1 Operation

At standard Class A1 operating points, each triode section exhibits high amplification factors and moderate transconductance. The typical characteristics under three distinct plate voltage conditions are summarized below:

Parameter	Condition 1	Condition 2	Condition 3
Plate Voltage	100 V	170 V	200 V
Grid Voltage	-1.1 V*	-1.5 V	-2.1 V
Plate Current	4.5 mA	10.0 mA	10.0 mA
Transconductance	4,600 μ mhos	6,200 μ mhos	5,800 μ mhos
Amplification Factor (μ)	50	50	48
Plate Resistance (r_1)	—	—	15,000 Ω

*Note: The -1.1 V grid bias condition should not be utilized in applications where grid current is not permissible. If grid current must be avoided, a bias of -1.5 V is recommended.

RF Amplifier Operating Characteristics

When utilized as an RF amplifier (typically using Triode System No. 1), the 17EW8 is optimized for low noise and high input resistance at VHF frequencies. The operating characteristics under typical supply conditions are as follows:

Parameter	Case A	Case B	Case C
Supply Voltage	170 V	170 V	100 V
Plate Series Resistor	1,300 Ω	1,500 Ω	1,500 Ω
Plate Voltage	160 V	155 V	92 V
Cathode Resistor	330 Ω	160 Ω	160 Ω
Negative Grid Bias	-2.0 V	-1.4 V	-0.85 V
Plate Current	6.0 mA	8.7 mA	5.2 mA
Transconductance	4,700 μ mhos	6,000 μ mhos	5,200 μ mhos
Internal Resistance	10,500 Ω	8,400 Ω	10,000 Ω
Input Resistance (at 100 MHz)	8,000 Ω	6,000 Ω	7,000 Ω

Parameter	Case A	Case B	Case C
Equivalent Noise Resistance	650 Ω	500 Ω	580 Ω

These operating points demonstrate that higher plate currents (such as 8.7 mA in Case B) yield lower equivalent noise resistance (500 Ω) and higher transconductance (6,000 μ mhos), which are highly desirable for the input stages of FM receivers.

Self-Oscillating Mixer Operating Characteristics

The second triode section (typically Triode System No. 2) is frequently configured as a self-oscillating mixer. In this mode, the stage simultaneously generates the local oscillator signal and performs frequency conversion. Typical operating parameters are detailed below:

Parameter	Case X	Case Y	Case Z
Supply Voltage	100 V	170 V	200 V
Plate Series Resistor	4,700 Ω	4,700 Ω	8,200 Ω
Grid Leak Resistor	1.0 M Ω	1.0 M Ω	1.0 M Ω
Oscillator Voltage (RMS)	1.8 V	2.8 V	2.8 V
Plate Current	2.2 mA	4.8 mA	5.2 mA
Conversion Conductance	1,700 μ mhos	2,200 μ mhos	2,300 μ mhos
Internal Resistance	20,000 Ω	16,000 Ω	15,000 Ω
Input Resistance (at 100 MHz)	—	15,000 Ω	—

In these self-oscillating mixer circuits, squegging (unwanted low-frequency self-modulation) is prevented by applying feedback, which is normally designed to compensate for the tube's internal resistance.

Qualitative Curve Observations and Parameter Variations

Analysis of the characteristic curves for the 17EW8 reveals several key behaviors:

- Transfer Characteristics:** The plate current versus grid voltage curves demonstrate a sharp cutoff characteristic. Cutoff occurs between -5 V and -7 V, depending on the applied plate voltage (ranging from 100 V to 200 V).

- **Plate Characteristics:** The curves follow standard triode behavior, with a clearly defined 2.5 W plate dissipation boundary line that restricts the safe operating region.
- **Parameter Variations:** Transconductance and the amplification factor increase as plate current rises. Conversely, the internal plate resistance drops sharply as plate current increases from 0 to 5 mA, after which it flattens out.
- **Mixer Performance:** The conversion conductance of the self-oscillating mixer peaks when the oscillator voltage is between 2 V and 3 V RMS. At higher oscillator injection levels, the conversion conductance slowly decreases.

Technical Summary

The **17EW8** (or **HCC85**) is a versatile, high-mu twin triode housed in a 9-pin miniature envelope. Featuring a **17.5 V, 0.15 A** heater, it is optimized for series-string heater circuits in AM/FM receivers. With an amplification factor of approximately **48 to 50** and transconductance up to **6,200 μmhos** , the tube provides excellent gain and low noise in VHF RF amplifier stages. Its dual-unit construction, combined with an internal electrostatic shield, allows one section to serve as a low-noise RF amplifier while the other operates as an efficient self-oscillating mixer, making it a highly integrated solution for front-end radio receiver designs.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1959 Rogers

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

1959 ROGERS

Section 1 · Triode

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
HeaterOrFilamentVoltage	17.5 V	—
HeaterOrFilamentCurrent	150 mA	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1963 Amperex Condensed

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

1963 AMPEREX CONDENSED

Section 1 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	200 V	RF amplifier / self-oscillating mixer; EachUnit
Grid voltage	-2.1 V	EachUnit
Plate current	10 mA	EachUnit

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Transconductance	5800 μ S	EachUnit
Plate resistance	15 k Ω	EachUnit



1975 RCA RC30

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

1975 RCA RC30
Section 1 · Triode

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage	17.5 volts	Published value from supplied target entry
Heater Current	0.16 ampere	Published value from supplied target entry
Plate Voltage	250 volts	Published value from supplied target entry
Grid- Voltage, Negative-bias Value	100 volts	Published value from supplied target entry
Cathode Current	15 mA	Published value from supplied target entry
Plate Dissipation	2.5 watts	Published value from supplied target entry
Plate Voltage	200 volts	Published value from supplied target entry
Grid Voltage	-2.1 volts	Published value from supplied target entry
Amplification Factor	48	Published value from supplied target entry
Transconductance	5800	Published value from supplied target entry
Plate Current	10 mA	Published value from supplied target entry

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak Heater-Cathode Voltage ±	90 volts	Published value from supplied target entry

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate to Grid (Each Unit)	1.5 PF	Published value from supplied target entry
Plate to Cathode (Each Unit)	0.18 PF	Published value from supplied target entry
Plate to Cathode, Heater, and Internal Shield (Each Unit)	1.2 PF	Published value from supplied target entry
Grid to Cathode, Heater, and Internal Shield (Each Unit)	3 PF	Published value from supplied target entry



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