

ELECTRONIC TUBE REFERENCE

16A8

Power - TV Vertical Output electronic tube

CONSOLIDATED TECHNICAL DATA
2 SECTIONS
CONSTRUCTION
PENTODE-TRIODE

High-mu triode and power pentode combined for television vertical oscillator/amplifier and audio-output service. The triode provides control or voltage gain while the pentode supplies output power.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9EX	BASE PINS	9
NOMINAL HEATER	16 V / 300 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

9EX - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN1	B	G1 – Control Grid	CONNECTED
PIN2	A	G3 – Suppressor Grid	CONNECTED
PIN2	A	K – Cathode	CONNECTED
PIN3	A	G1 – Control Grid	CONNECTED
PIN4	–	H – Heater	CONNECTED
PIN5	–	H – Heater	CONNECTED
PIN6	A	P – Plate (Anode)	CONNECTED
PIN7	A	G2 – Screen Grid	CONNECTED
PIN8	B	K – Cathode	CONNECTED
PIN9	B	P – Plate (Anode)	CONNECTED

SECTION RATINGS

SECTION1 Triode	
TRANSCONDUCTANCE	0.0025 S
AMPLIFICATION FACTOR	70
MAXIMUM PLATE VOLTAGE	250 V
<i>Promoted from published ratings/characteristics where directly applicable; additional published values retained in TUBE_SECTION_PARAMETER.</i>	

SECTION2 Pentode	
PLATE RESISTANCE	20000 Ω
TRANSCONDUCTANCE	0.0064 S
MAXIMUM PLATE VOLTAGE	250 V
MAXIMUM SCREEN VOLTAGE	250 V
MAXIMUM PLATE DISSIPATION	7 W
MAXIMUM SCREEN DISSIPATION	1.8 W
MAXIMUM CATHODE CURRENT	50 mA
<i>Promoted from published ratings/characteristics where directly applicable; additional published values retained in TUBE_SECTION_PARAMETER.</i>	

16A8 — High-Mu Triode and Power Pentode

A miniature multi-unit vacuum tube containing a high-mu triode and a power pentode in a single envelope, designed for television receiver and audio amplifier applications.

Overview

The **16A8** (also designated as the **PCL82**) is a miniature, 9-pin vacuum tube combining a high-mu triode and a power pentode within a single glass envelope. The triode section is designed for service as a vertical deflection oscillator or as an audio-frequency (AF) voltage amplifier. The pentode section is optimized for use as a vertical deflection output stage (frame output) or as an audio power output amplifier.

The tube is designed with a miniature T-6 1/2 envelope and requires a standard miniature 9-contact socket. The 16A8 is electrically and structurally identical to the **8B8** and **11BM8** designations, differing only in its heater ratings.

Construction, Heater, and Physical Dimensions

The 16A8 features an indirectly heated, unipotential cathode system. The heater is designed for series-string or parallel operation depending on the specific designation. The heater characteristics for the

related family of tubes are as follows:

Parameter	16A8 / <u>PCL82</u>	<u>8B8</u>	<u>11BM8</u>
Heater Voltage	16 V	8 V	10.7 V
Heater Current	300 mA (0.3 A)	600 mA (0.6 A)	450 mA

The maximum allowable heater-cathode voltage is ± 200 V (both heater-negative and heater-positive with respect to the cathode). To ensure reliable operation, the maximum circuit resistance between the heater and cathode must not exceed **20,000 Ohms**.

Physically, the tube conforms to the 6-4 outline with the following maximum dimensions:

- **Maximum Diameter:** 0.875 inches
- **Maximum Seated Height:** 2.812 inches
- **Maximum Overall Height:** 3.062 inches

Basing and Pin Connections

The 16A8 utilizes the **9EX** basing arrangement (E9-1 button base). The pin assignments, viewed from the bottom of the tube, are:

- **Pin 1:** Grid No. 1, Pentode (G_{1p})
- **Pin 2:** Cathode, Grid No. 3, and Internal Shield, Pentode (K_p, G_{3p}, IS)
- **Pin 3:** Grid, Triode (G_t)
- **Pin 4:** Heater (H)
- **Pin 5:** Heater (H)
- **Pin 6:** Plate, Pentode (P_p)
- **Pin 7:** Grid No. 2 (Screen Grid), Pentode (G_{2p})
- **Pin 8:** Cathode, Triode (K_t)
- **Pin 9:** Plate, Triode (P_t)

Electrical Characteristics and Operating Points

The triode and pentode sections operate independently, each exhibiting distinct electrical properties optimized for their respective roles.

Triode Section

At a typical Class A1 operating point, the triode section exhibits the following characteristics:

- **Plate Voltage:** 100 V
- **Grid-No. 1 Voltage:** 0 V
- **Plate Current:** 3.5 mA
- **Transconductance:** 2500 μ mhos

- **Amplification Factor (μ):** 70

Pentode Section

The pentode section is characterized across several typical Class A1 operating points, reflecting its versatility in both low-voltage and high-voltage circuits:

Parameter	Point A	Point B	Point C	Point D
Plate Voltage	100 V	170 V	200 V	200 V
Grid-No. 2 Voltage	100 V	170 V	200 V	200 V
Grid-No. 1 Bias	-6 V	-11.5 V	-12.5 V	-16 V
Plate Current	26 mA	41 mA	35 mA	35 mA*
Grid-No. 2 Current	5.0 mA	8.0 mA	6.5 mA	7.0 mA*
Transconductance	6800 μ mhos	7500 μ mhos	6800 μ mhos	6400 μ mhos
Plate Resistance	15,000 Ω	16,000 Ω	20,500 Ω	20,000 Ω
Mu Factor (G_2 to G_1)	10	9.5	9.5	9.5

† *Note on Discrepancies:* In some published specifications, a typographical transposition occurs for Point D, listing the plate current as 7 mA and the Grid-No. 2 current as 35 mA. Corrected technical records resolve this to 35 mA of plate current and 7.0 mA of Grid-No. 2 current.

Maximum Ratings and Circuit Values

The 16A8 is rated under both the Design-Maximum and Design-Center rating systems. Designers must adhere to these limits to prevent premature tube failure.

Parameter	Triode Unit	Pentode Unit
Plate Supply Voltage (Max)	550 V	550 V
Plate Voltage (Max)	250 V	250 V
Peak Plate Voltage (Max)	600 V*	2500 V*
Peak Inverse Plate Voltage (Max)	—	500 V

Parameter	Triode Unit	Pentode Unit
Grid-No. 2 Supply Voltage (Max)	—	550 V
Grid-No. 2 Voltage (Max)	—	250 V
Cathode Current (Max)	15 mA	50 mA
Plate Dissipation (Frame Output)	—	5 W
Plate Dissipation (Audio Output / Max)	1 W	7 W (Peak) / 5 W (Continuous)
Grid-No. 2 Input (Max)	—	1.8 W
Peak Grid-No. 2 Input (Max)	—	3.2 W

† *Pulse Rating Conditions:* The peak plate voltage ratings of 600 V (triode) and 2500 V (pentode) are valid only under pulsed conditions, such as in vertical deflection service, with a maximum duty factor of 0.04 (or 4% of one cycle) and a maximum pulse duration of 0.8 milliseconds.

Maximum Circuit Resistance Values

To prevent thermal runaway and maintain bias stability, the control grid (Grid-No. 1) circuit resistance must be kept within the following limits:

- **Triode Section:**
 - Fixed-bias operation: Max 1 Megohm
 - Automatic/Cathode-bias operation: Max 3 Megohms
 - Grid Circuit Impedance (at 50 Hz): Max 0.5 Megohm
- **Pentode Section:**
 - Fixed-bias operation: Max 1 Megohm
 - Automatic/Cathode-bias operation: Max 2 Megohms

Interelectrode and Coupling Capacitances

Because the triode and pentode sections reside in close proximity within the same miniature envelope, interelectrode and cross-unit coupling capacitances are critical design considerations, particularly in high-gain or high-frequency applications. The following unshielded values are specified:

Triode Section Capacitances

- **Grid to Plate:** 4.2 pF
- **Grid to All Other Elements Except Plate:** 2.7 pF
- **Plate to All Other Elements Except Grid:** 4.3 pF

- **Grid to Heater (Max):** 0.02 pF

Pentode Section Capacitances

- **Grid No. 1 to All Other Elements Except Plate:** 9.3 pF
- **Plate to All Other Elements Except Grid No. 1:** 8.0 pF
- **Plate to Grid No. 1 (Max):** 0.3 pF
- **Grid No. 1 to Heater (Max):** 0.3 pF

Cross-Unit Coupling Capacitances

- **Triode Plate to Pentode Grid No. 1 (Max):** 0.02 pF
- **Triode Grid to Pentode Plate (Max):** 0.02 pF
- **Triode Grid to Pentode Grid No. 1 (Max):** 0.025 pF
- **Triode Plate to Pentode Plate (Max):** 0.25 pF

Technical Summary

The **16A8** ([PCL82](#)) is a highly integrated, space-saving miniature high-mu triode and power pentode designed for dual-role efficiency in television and audio systems. Operating with a **16 V, 300 mA** heater, it provides a high-gain triode ($\mu = 70$) suitable for voltage amplification or oscillation, alongside a robust power pentode capable of up to 5 W of continuous plate dissipation (7 W peak in audio service). Its 9EX pinout configuration and carefully specified interelectrode capacitances ensure stable operation when both sections are active, making it a classic choice for compact vertical deflection and audio output stages.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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
Plate voltage	100 V	—
Grid No.1 voltage	0 V	—
Plate current	3.5 mA	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate supply voltage	550 V	—
Peak plate voltage	600 V	—

1975 RCA RC30

Section 2 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	200 V	ClassA
Screen-grid voltage	200 V	ClassA
Grid No.1 voltage	-12.5 V	ClassA
Plate current	35 mA	ClassA
Screen-grid current	6.5 mA	ClassA
Plate supply voltage	550 V	—
Peak plate voltage	2500 V	VerticalDeflection
Plate dissipation	7 W	AudioOutput
Plate dissipation	5 W	FrameOutput
Screen-grid input	1.8 W	—

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