



ELECTRONIC TUBE REFERENCE

18A5

Power - Beam Single (NOT sweep) (under 10W) electronic tube

CONSOLIDATED TECHNICAL
DATA

1 SECTION
CONSTRUCTION
BEAMPOWER

Beam-power output tube with a 9-watt maximum plate-dissipation rating; the available manufacturer documentation provides electrical data but little explicit application description.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	18.5 V / 300 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Beam Power	
PLATE RESISTANCE	27000 Ω
TRANSCONDUCTANCE	0.0048 S
MAXIMUM PLATE VOLTAGE	350 V
MAXIMUM SCREEN VOLTAGE	160 V
MAXIMUM PLATE DISSIPATION	9 W
MAXIMUM SCREEN DISSIPATION	2.5 W
MAXIMUM CATHODE CURRENT	90 mA

18A5 — Beam-Power Pentode

The **18A5** is a beam-power pentode designed primarily for use as a horizontal-deflection amplifier in compact, 300-milliampere series-string television receivers. It is characterized by its small physical size,

low power requirements, high performance when operating at low d-c supply voltages, and a controlled heater warm-up characteristic.

Mechanical Specifications and Pinout

The 18A5 is constructed with a T-9 glass envelope and can be mounted in any position. It utilizes either a B6-8 (Intermediate Shell Octal 6-Pin) or a B6-60 (Short Intermediate Shell Octal 6-Pin) base.

The physical dimensions of the tube conform to RETMA 9-15 or 9-43 standards, with a maximum overall length of 3-7/16 inches and a maximum diameter of 1-9/32 inches.

The electrical connections are arranged according to the RETMA 6CK basing diagram, which provides the following pinout configuration:

Pin	Connection
Pin 1	Grid Number 1 (Control Grid)
Pin 2	Heater
Pin 3	Cathode and Beam Plates
Pin 5	Plate
Pin 7	Heater
Pin 8	Grid Number 2 (Screen Grid)

Heater Ratings

The heater of the 18A5 is designed for series-string operation and features a controlled warm-up characteristic to ensure reliable performance in series-connected heater chains.

Heater Parameter	Value
Heater Voltage (AC or DC)	18.5 V
Heater Current	0.3 ± 6% A
Heater Warm-up Time	11 Seconds

Direct Interelectrode Capacitances

Measured approximately without an external shield, the direct interelectrode capacitances of the 18A5 are:

- **Grid-Number 1 to Plate:** 0.7 µpf
- **Input:** 13 µpf
- **Output:** 7.0 µpf

Electrical Characteristics and Operating Points

The 18A5 can be operated either in its standard pentode configuration or as a triode by connecting the screen grid directly to the plate.

Pentode Operation

The tube's characteristics under pentode operation are documented for two distinct conditions. Condition A represents a short-interval measurement designed to evaluate peak performance without damaging the tube, while Condition B represents a typical operating point.

Parameter	Condition A (Short Interval*)	Condition B
Plate Voltage	60 V	200 V
Screen Voltage (Grid-Number 2)	125 V	125 V
Grid-Number 1 Voltage	0 V	-17 V
Plate Resistance (approx.)	—	27,000 Ω
Transconductance	—	4,800 μmhos
Plate Current	165 mA	40 mA
Screen Current	15 mA	1.1 mA
Grid-Number 1 Voltage for $I_b = 1.0 \text{ mA}$ (approx.)	—	-36 V

**Note: Condition A parameters must only be applied for a short interval of two seconds maximum to prevent thermal damage to the tube.*

Triode-Connected Operation

When the screen grid (Grid-Number 2) is tied directly to the plate, the 18A5 exhibits the following characteristics:

- **Plate Voltage (E_b):** 125 V
- **Screen Voltage (E_{c2}):** 125 V
- **Grid-Number 1 Voltage (E_{c1})(/tubes/C1):** -17 V
- **Triode Amplification Factor (μ):** 4.6

Maximum Ratings

The maximum ratings of the 18A5 are established under the Design-Maximum system for horizontal-deflection amplifier service in 525-line, 30-frame television systems. The ratings assume a pulse duty cycle of 15% or less of one scanning cycle.

- **DC Plate-Supply Voltage (Boost DC Power Supply):** 350 V
- **Peak Positive Pulse Plate Voltage:** 3,000 V
- **Peak Negative Pulse Plate Voltage:** 600 V
- **Screen Voltage (Grid-Number 2):** 160 V
- **Peak Negative Grid-Number 1 Voltage:** 250 V
- **Plate Dissipation:** 9.0 W
- **Screen Dissipation:** 2.5 W
- **DC Cathode Current:** 90 mA
- **Peak Cathode Current:** 310 mA
- **Grid-Number 1 Circuit Resistance:** 1.0 MΩ
- **Bulb Temperature (at hottest point):** 190 °C

Heater-Cathode Voltage Limits

The potential difference between the heater and the cathode must be kept within the following limits:

- **Heater Positive with Respect to Cathode:**
 - DC Component: 100 V
 - Total DC and Peak: 200 V
- **Heater Negative with Respect to Cathode:**
 - Total DC and Peak: 200 V

Qualitative Curve Observations

The operating behavior of the 18A5 is illustrated by its characteristic curves, which reveal several key performance traits:

- **Average Plate Characteristics at Zero Bias ($E_{c1}(\text{/tubes/C1}) = 0$ V):** When plate current (I_b) and screen current (I_{c2}) are plotted against plate voltage (from 0 to 500 V) across screen voltages (E_{c2}) of 50, 75, 100, 125, and 150 V, the plate current curves exhibit a sharp knee. This knee occurs consistently between 30 V and 50 V, indicating efficient operation and low knee voltage, which is highly desirable for deflection amplifier service.
- **Average Plate Characteristics at Nominal Screen Voltage ($E_{c2} = 125$ V):** The family of plate current curves plotted for grid-1 voltages ranging from 0 V to -35 V shows the control grid's influence over plate current. A boundary line representing the 9.0-Watt plate dissipation limit is typically marked on these curves to define the safe operating envelope.
- **Average Transfer Characteristics ($E_b = 200$ V):** Plots of plate current (I_b) and screen current (I_{c2}) against grid-1 voltage (from 0 to -50 V) for screen voltages (E_{c2}) of 50, 75, 100, 125, and 150 V demonstrate the transconductance behavior and cutoff characteristics of the tube.

Technical Summary

The **18A5** is a specialized, octal-based beam-power pentode designed for horizontal-deflection amplifier service in series-string television receivers. Operating with an 18.5 V, 0.3 A heater with an 11-second

warm-up time, it is optimized for high-performance operation at low DC supply voltages. It features a maximum plate dissipation of 9.0 Watts, a peak positive pulse plate voltage rating of 3,000 Volts, and a sharp plate current knee between 30 V and 50 V. These characteristics, combined with its compact T-9 envelope, make it highly suited for its intended television receiver applications.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1968 General Electric Co

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

1968 GENERAL ELECTRIC CO

Section 1 · Beam Power

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Warmup Time	11 s	—
Peak Plate Voltage	3000 V	—
Peak Cathode Current	310 mA	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
TriodeAmplificationFactor	4.6	TriodeConnection