



ELECTRONIC TUBE REFERENCE

11HM7

Voltage - Pentode Sharp Cutoff (single) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
PENTODE

Miniature frame-grid sharp-cutoff pentode with series/parallel heater arrangement, designed as a color-television video-output amplifier. Its high-transconductance construction is optimized for wideband video drive.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9BF	BASE PINS	9
NOMINAL HEATER	11 V / 300 mA	PARALLEL HEATER	5.5 V / 600 mA
HEATING	Indirect	SERIES OPERATION	Capable
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

9BF - TERMINAL PINOUT

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

SECTION RATINGS

SECTION1 Pentode	
PLATE RESISTANCE	40000 Ω
TRANSCONDUCTANCE	0.03 S
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM SCREEN VOLTAGE	330 V
MAXIMUM PLATE DISSIPATION	7 W
MAXIMUM SCREEN DISSIPATION	1 W
<i>sharp-cutoff frame-grid</i>	

11HM7 — Sharp-Cutoff Frame-Grid Pentode

The **11HM7** is a miniature, sharp-cutoff pentode featuring frame-grid construction. It is designed primarily for use as a video output amplifier in color television receivers. The tube is characterized by its exceptionally high transconductance and robust thermal ratings, which are suited to the demanding requirements of wideband video amplification.

Mechanical Construction and Pinout

The 11HM7 is constructed in a JEDEC T6-1/2 glass envelope with a JEDEC E9-1 small-button noval 9-pin base. Its physical dimensions conform to the JEDEC 6-3 dimensional outline, with the following physical specifications:

- **Maximum Overall Length:** 2.625 inches (approx. 66.7 mm)
- **Maximum Seated Length:** 2.375 inches (approx. 60.3 mm)
- **Maximum Diameter:** 0.875 inches (approx. 22.2 mm)
- **Operating Position:** Any
- **Cathode Type:** Coated unipotential

The tube utilizes the **9BF** terminal arrangement. The pin connections, viewed from the bottom of the base, are assigned as follows:

Pin	Connection
1	Cathode
2	Grid No. 1 (Control Grid)
3	Grid No. 3 (Suppressor Grid), Internal Shield
4	Heater
5	Heater
6	Heater Tap

Pin	Connection
7	Plate
8	Grid No. 2 (Screen Grid)
9	Grid No. 3 (Suppressor Grid), Internal Shield

The internal shield and Grid No. 3 are internally tied and connected to both Pin 3 and Pin 9 to facilitate effective RF grounding and minimize parasitic coupling.

Heater Characteristics and Configurations

The 11HM7 features a tapped heater design, allowing for operation in either series or parallel heater chains. The electrical specifications for each configuration are as follows:

Series Configuration

- **Nominal Heater Voltage (AC or DC):** 11.0 V
- **Heater Voltage Range:** 9.9 V (minimum) to 12.1 V (maximum)
- **Nominal Heater Current:** 0.3 A (300 mA)

Parallel Configuration

- **Nominal Heater Voltage (AC or DC):** 5.50 V
- **Heater Voltage Range:** 4.95 V (minimum) to 6.05 V (maximum)
- **Nominal Heater Current:** 0.6 A (600 mA)

Heater-Cathode Voltage Ratings

To prevent insulation breakdown and minimize hum injection, the voltage differential between the heater and the cathode must be kept within the following design-maximum limits:

- **Heater Negative with Respect to Cathode:** 200 V maximum (total DC and peak)
- **Heater Positive with Respect to Cathode:** 100 V maximum DC, 200 V maximum (total DC and peak)
- **Average Value (General):** 100 V maximum

Electrical Characteristics and Typical Operating Point

Under typical Class A1 amplifier operating conditions, the 11HM7 exhibits high transconductance and moderate plate resistance. The standard operating point is defined by the following parameters:

- **Plate Supply Voltage:** 200 V
- **Grid No. 3 Voltage:** 0 V (connected to cathode or ground)
- **Grid No. 2 Supply Voltage:** 135 V
- **Grid No. 1 Supply Voltage:** 0 V

- **Cathode-Bias Resistor:** 47_Ω
- **Plate Resistance (Approximate):** 40,000_Ω (40 k_Ω)
- **Transconductance:** 30,000 μ mhos
- **DC Plate Current:** 30 mA
- **DC Grid No. 2 Current:** 5.2 mA
- **Cutoff DC Grid No. 1 Voltage (for plate current of 100 μ A):** -4.5 V

Cathode Bias Calculation

Using the typical operating values, the total cathode current (I_k) is the sum of the plate current (I_b) and the screen-grid current (I_{c2}): $I_k = I_b + I_{c2} = 30 \text{ mA} + 5.2 \text{ mA} = 35.2 \text{ mA}$

The resulting self-bias voltage (V_k) developed across the 47_Ω cathode resistor is calculated as: $V_k = I_k \times R_k = 0.0352 \text{ A} \times 47 \Omega \approx 1.65 \text{ V}$

Thus, the effective grid-to-cathode operating bias under these conditions is approximately -1.65 V.

Design-Maximum Ratings and Circuit Limits

The design-maximum ratings define the absolute limits within which the 11HM7 must be operated to ensure reliable performance and prevent premature failure. These ratings apply to Class A1 amplifier service:

Parameter	Design-Maximum Value
DC Plate Voltage	330 V
DC Grid No. 2 (Screen-Grid) Supply Voltage	330 V
DC Grid No. 1 (Control-Grid) Positive-Bias Voltage	0 V
Plate Dissipation	7 W
Grid No. 2 Input (for $E_{c2} \leq 165 \text{ V}$)	1 W
Grid No. 2 Input (for $165 \text{ V} < E_{c2} \leq 330 \text{ V}$)	See Rating Chart

Maximum Circuit Values

To maintain bias stability and prevent thermal runaway, the resistance in the grid-No. 1 circuit must not exceed the following limits:

- **For Fixed-Bias Operation:** 0.1 M_Ω maximum
- **For Cathode-Bias Operation:** 0.25 M_Ω maximum

Interelectrode Capacitances

The direct interelectrode capacitances of the 11HM7 are measured without an external shield. The typical values are:

- **Grid No. 1 to Plate (Maximum):** 0.15 pF (RCA documentation) or 0.16 pF (Sylvania documentation)
- **Input (g_1 to $k, g_3 + IS, g_2, h$):** 14 pF
- **Output (p to $k, g_3 + IS, g_2, h$):** 5.0 pF

The extremely low grid-to-plate capacitance (0.15–0.16 pF maximum) is a direct benefit of the frame-grid construction and internal shielding, which minimizes Miller effect feedback and enables stable high-gain performance at video frequencies.

Analysis of Characteristic Curves

The published characteristic curves for the 11HM7 illustrate its performance as a high-performance pentode:

Plate Characteristics

The plate current (I_b) and screen-grid current (I_{c2}) curves plotted against plate voltage (at a fixed Grid No. 2 voltage of 135 V) demonstrate a sharp pentode "knee" occurring below 50 V. Above this knee, the plate current curves are highly horizontal, indicating a very high dynamic plate resistance.

- At $E_{c1}(/tubes/C1) = 0$ V, the plate current reaches approximately 80–90 mA at typical plate voltages, while the screen current (I_{c2}) remains low and stable.
- As the control grid bias is stepped more negative (from 0 V down to -3.0 V), the plate current curves shift downward in regular increments, showing linear control characteristics over a wide dynamic range.

Transfer Characteristics

The transfer curves (plotted at a plate voltage of 200 V and a screen-grid voltage of 135 V) show the relationship of transconductance (g_m), plate current (I_b), and screen current (I_{c2}) against Grid No. 1 voltage:

- **Transconductance (g_m):** The transconductance curve rises steeply as the grid voltage becomes less negative, peaking at approximately 45,000 μ mhos near $E_{c1}(/tubes/C1) = 0$ V. At the typical operating bias of approximately -1.65 V, the transconductance is 30,000 μ mhos.
- **Cutoff Behavior:** The plate current approaches zero asymptotically, with a sharp cutoff occurring at approximately -4.5 V for a plate current of 100 μ A.

Technical Summary

The **11HM7** is a high-performance, frame-grid, sharp-cutoff pentode housed in a 9-pin miniature envelope. Designed specifically for video output amplifier service in color television receivers, it features

a dual-voltage heater (11.0 V series / 5.5 V parallel) and a 9BF pinout configuration. With a typical transconductance of 30,000 μ mhos, a plate dissipation rating of 7 W, and exceptionally low feedback capacitance, the 11HM7 provides the high gain-bandwidth product and power handling required for demanding video applications.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1971 RCA HB3 Binder 5 of 7

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

1971 RCA HB3 BINDER 5 OF 7

Section 1 · Pentode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Resistance	40000 Ω	—
Transconductance	30000 μS	—
DC Plate Current	30 mA	—
DC Screen Current	5.2 mA	—
DC Screen Supply Voltage	135 V	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate Voltage	330 V	—
Plate Dissipation	7 W	—
Peak Heater-Cathode Voltage	1200 V	—
Average Heater-Cathode Voltage	100 V	—



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

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid No.1 to Plate	0.15 pF	—
Grid No.1 to other electrodes	14 pF	—
Plate to other electrodes	5 pF	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate supply voltage	200 V	ClassA
Screen-grid voltage	135 V	ClassA
Cathode-bias resistor	47 ohm	ClassA
Plate current	30 mA	ClassA

TUBE TINKER

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

[Catalog](#) [Tube types](#) [Full books](#) [Blog](#) [Feedback & corrections](#)

© 2026 Tube Tinker