



ELECTRONIC TUBE REFERENCE

11AF9

Power - Pentode (NOT beam) electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

PENTODE-PENTODE

Miniature dual-pentode television tube combining a high-current video-output section with a lower-power section for sound IF, AGC, or sync-separator service, integrating multiple television signal functions in one envelope.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	10
NOMINAL HEATER	11.6 V / 450 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

SECTION RATINGS

SECTION 1 Pentode	
PLATE RESISTANCE	32000 Ω
TRANSCONDUCTANCE	0.022 S
MAXIMUM PLATE VOLTAGE	250 V
MAXIMUM SCREEN VOLTAGE	250 V
MAXIMUM PLATE DISSIPATION	5.1 W
MAXIMUM SCREEN DISSIPATION	2.5 W
MAXIMUM CATHODE CURRENT	60 mA
Video-output pentode.	

SECTION2 Pentode	
PLATE RESISTANCE	160000 Ω
TRANSCONDUCTANCE	0.0085 S
MAXIMUM PLATE VOLTAGE	250 V
MAXIMUM SCREEN VOLTAGE	250 V
MAXIMUM PLATE DISSIPATION	1.5 W
MAXIMUM SCREEN DISSIPATION	0.5 W
MAXIMUM CATHODE CURRENT	15 mA
Sound IF, AGC amplifier, or sync-separator pentode.	

11AF9 — Dual Pentode Vacuum Tube

A miniature, dual-unit pentode vacuum tube designed for television receiver applications, featuring a high-transconductance video output pentode and a separate signal-processing pentode in a single envelope.

Overview

The **11AF9** is a multi-unit miniature vacuum tube containing two highly dissimilar pentodes designed for specific roles in television receivers. Unit No. 1 is optimized as a high-transconductance video output pentode, while Unit No. 2 is designed for signal-processing applications, including sound intermediate-frequency (IF) amplification, automatic gain control (AGC) amplification, or sync separation.

The tube is constructed with a 10-pin miniature base (basing configuration 10L) and requires a specialized miniature 10-contact socket. The 11AF9 is electrically identical to the [6AF9](#) except for its heater ratings, which are tailored for series-string heater chains.

Construction, Heater, and Physical Characteristics

The 11AF9 is housed in a miniature glass envelope conforming to Outlines section 6L, modified to accommodate a 10-pin base. The two pentode units are electrically independent with separate cathode connections, allowing them to operate at different bias levels. An internal shield (IS) is connected internally to minimize capacitive coupling and crosstalk between the two high-frequency pentode systems.

The heater is shared between both units and is designed for series-string operation. The heater characteristics of the 11AF9 and its sister type, the [6AF9](#), are compared below:

Parameter	11AF9	6AF9
Heater Voltage (AC/DC)	11.5 V	6.3 V
Heater Current	0.45 A	0.85 A

Parameter	11AF9	<u>6AF9</u>
Calculated Heater Power	5.175 W	5.355 W
Peak Heater-Cathode Voltage	□200 V max	□200 V max

Direct Interelectrode Capacitances

To ensure stable operation in high-frequency and wideband applications, the interelectrode and inter-unit capacitances are tightly controlled. The direct interelectrode capacitances for each unit, measured without an external shield, are as follows:

Capacitance Parameter	Unit No. 1	Unit No. 2
Plate to All Other Electrodes (except Grid No. 1)	7 pF	11 pF
Grid No. 1 to All Other Electrodes (except Plate)	12 pF	10 pF
Plate to Grid No. 1	0.105 pF	0.140 pF
Grid No. 1 to Heater	—	0.140 pF

The isolation between the two pentode units is characterized by the following maximum inter-unit capacitances:

- **Plate of Unit No. 1 to Plate of Unit No. 2:** 0.150 pF max
- **Grid No. 1 of Unit No. 1 to Grid No. 1 of Unit No. 2:** 0.010 pF max
- **Plate of Unit No. 1 to Grid No. 1 of Unit No. 2:** 0.100 pF max
- **Plate of Unit No. 2 to Grid No. 1 of Unit No. 1:** 0.005 pF max

Class A1 Amplifier Maximum Ratings

The maximum ratings for the 11AF9 are established under the Design-Maximum system. These limits must not be exceeded under the worst-case operating conditions. The two units have highly asymmetrical power handling capabilities, reflecting their different intended applications:

Rating (Design-Maximum Values)	Unit No. 1 (Video Output)	Unit No. 2 (Signal Processing)
Plate Supply Voltage	550 V	550 V
Plate Voltage	250 V	250 V
Grid-No. 2 (Screen-Grid) Supply Voltage	550 V	550 V

Rating (Design-Maximum Values)	Unit No. 1 (Video Output)	Unit No. 2 (Signal Processing)
Grid-No. 2 Voltage	250 V	250 V
Cathode Current	60 mA	15 mA
Plate Dissipation	5.1 W	1.5 W
Grid-No. 2 Input	2.5 W	0.5 W

Additionally, the maximum Grid-No. 1 circuit resistance for both units is limited to **1 megohm** under typical operating conditions.

Electrical Characteristics and Operating Points

The typical operating characteristics of the two pentode units under Class A1 amplifier conditions highlight their distinct design optimizations:

- **Unit No. 1 (Video Output Pentode):** Optimized for high transconductance and high current delivery to drive the capacitive load of a television picture tube. At a plate and screen voltage of 170 V, it exhibits an exceptionally high transconductance of **22,000 μ mos** and a plate current of **30 mA**.
- **Unit No. 2 (Sound IF / AGC / Sync Separator):** Optimized for voltage amplification and signal processing. At a plate and screen voltage of 150 V, it operates at a lower plate current of **10 mA** and a transconductance of **8,500 μ mos**, with a higher internal plate resistance.

The typical operating parameters for both units are detailed below:

Parameter	Unit No. 1	Unit No. 2
Plate Voltage	170 V	150 V
Grid-No. 2 Voltage	170 V	150 V
Grid-No. 1 (Control-Grid) Voltage	-2.6 V	-2.1 V
Mu Factor (Grid No. 1 to Grid No. 2)	38	38
Internal Resistance	0.032 M Ω	0.16 M Ω
Transconductance	22,000 μ mos	8,500 μ mos
Plate Current	30 mA	10 mA
Grid-No. 2 Current	7.2 mA	3 mA

The grid-to-screen amplification factor (μ -factor from Grid No. 1 to Grid No. 2) is identical for both units at **38**, indicating similar control grid-to-screen grid geometry, despite the significant differences in their

overall plate current and transconductance capabilities.

Technical Summary

The **11AF9** is a specialized, high-performance **miniature dual pentode** featuring a **10-pin base** and a **11.5 V, 0.45 A heater** designed for series-string television receivers. By combining a high-power, high-transconductance video output pentode (Unit No. 1, with **5.1 W** plate dissipation and **22,000 μmhos** transconductance) and a medium-power signal-processing pentode (Unit No. 2, with **1.5 W** plate dissipation and **8,500 μmhos** transconductance) in a single envelope, the 11AF9 provides a compact and efficient solution for television receiver designs. Its controlled interelectrode capacitances and internal shielding ensure reliable, high-gain performance in demanding video and intermediate-frequency 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 · Pentode

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate to other electrodes	7 pF	—
Grid No.1 to other electrodes	12 pF	—
Plate to Grid No.1	0.105 pF	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	170 V	ClassA
Screen-grid voltage	170 V	ClassA
Control-grid voltage	-2.6 V	ClassA
Plate current	30 mA	ClassA
Screen-grid current	7.2 mA	ClassA

1975 RCA RC30

Section 2 · Pentode

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate to other electrodes	11 pF	—
Grid No.1 to other electrodes	10 pF	—
Plate to Grid No.1	0.14 pF	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	150 V	ClassA
Screen-grid voltage	150 V	ClassA

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Control-grid voltage	-2.1 V	ClassA
Plate current	10 mA	ClassA
Screen-grid current	3 mA	ClassA