

ELECTRONIC TUBE REFERENCE

19FX5

Power - Pentode Single (NOT beam) (under 10W) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
PENTODE

Miniature high-transconductance power pentode for low-voltage audio-amplifier output stages.

GENERAL CHARACTERISTICS

BASE DESIGNATION	7CV	BASE PINS	7
NOMINAL HEATER	18.9 V / 300 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

7CV - TERMINAL PINOUT

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

SECTION RATINGS

SECTION1 Pentode	
PLATE RESISTANCE	17500 Ω
TRANSCONDUCTANCE	0.0135 S
MAXIMUM PLATE VOLTAGE	150 V
MAXIMUM SCREEN VOLTAGE	130 V
MAXIMUM PLATE DISSIPATION	5.5 W
MAXIMUM SCREEN DISSIPATION	2 W
MAXIMUM CATHODE CURRENT	50 mA
60FX5 electrical system; heater changed by 19FX5 sheet.	

19FX5 — Power Pentode Vacuum Tube

A miniature, high-transconductance power pentode designed for the output stages of audio power amplifiers.

Overview

The **19FX5** is a glass-envelope power pentode designed primarily for use in the audio output stages of electronic receivers and amplifiers. It is characterized by its high transconductance, which allows it to deliver efficient power output with relatively low input signal voltages and modest plate and screen-grid supply potentials. The 19FX5 is electrically identical to the **12FX5** and **60FX5** power pentodes, differing only in its heater ratings and characteristics.

Physical Construction and Pinout

The 19FX5 is constructed in a miniature glass envelope requiring a standard miniature 7-contact socket. The tube utilizes the **7CV** basing arrangement, which provides the following pin connections (viewed from the bottom of the base):

Pin	Connection
Pin 1	Grid No. 1 (Control Grid)
Pin 2	Cathode & Grid No. 3 (Suppressor Grid)
Pin 3	Heater
Pin 4	Heater
Pin 5	Grid No. 1 (Control Grid)
Pin 6	Grid No. 2 (Screen Grid)

Pin	Connection
Pin 7	Plate

In this physical layout, Grid No. 1 is internally connected to both Pin 1 and Pin 5. The cathode and Grid No. 3 (suppressor grid) are internally tied together and brought out to Pin 2.

Heater Characteristics and Ratings

The heater of the 19FX5 is designed for series or parallel AC or DC operation. It features a controlled warm-up time to ensure reliable operation in series-string heater circuits.

- **Heater Voltage (AC or DC):** 18.9 V
- **Heater Current:** 0.300 A (with an allowable tolerance of ± 0.020 A)
- **Average Heater Warm-up Time:** 11 seconds
- **Maximum Heater-Cathode Voltage:**
 - **Peak:** ≤ 200 V max
 - **Average:** 100 V max

Using the nominal heater voltage of 18.9 V and nominal heater current of 0.3 A, the calculated heater power dissipation is:

$$\text{Heater Power} = 18.9 \text{ V} \times 0.3 \text{ A} = 5.67 \text{ W}$$

Interelectrode Capacitances

The approximate direct interelectrode capacitances of the 19FX5, measured without an external shield, are:

- **Grid No. 1 to Plate:** 0.65 pF
- **Grid No. 1 to Cathode, Heater, Grid No. 2, and Grid No. 3:** 17 pF
- **Plate to Cathode, Heater, Grid No. 2, and Grid No. 3:** 9 pF

Maximum Ratings (Design-Maximum Values)

The maximum ratings of the 19FX5 are established under the Design-Maximum system. Operating the tube beyond these limits may impair its performance or shorten its operating life.

Parameter	Design-Maximum Limit
Maximum Plate Voltage	150 V
Maximum Grid-No. 2 (Screen-Grid) Voltage	130 V
Maximum Plate Dissipation	5.5 W
Maximum Grid-No. 2 Input	2 W

Parameter	Design-Maximum Limit
Maximum Bulb Temperature (at hottest point)	225 °C

Typical Operation and Electrical Characteristics

In typical Class A1 audio amplifier service, the 19FX5 operates with a relatively low plate supply voltage and exhibits high transconductance. The following parameters represent typical operating conditions:

Parameter	Value
Plate Supply Voltage	110 V
Grid-No. 2 Supply Voltage	115 V
Cathode-Bias Resistor	62 Ω
Peak AF Grid-No. 1 Voltage	3 V
Zero-Signal Plate Current	36 mA
Max-Signal Plate Current	35 mA
Zero-Signal Grid-No. 2 Current	10 mA
Max-Signal Grid-No. 2 Current	12 mA
Plate Resistance (approx.)	17,500 Ω
Transconductance	13,500 μmhos
Load Resistance	3,000 Ω

Curve Observations and Behavior

The electrical behavior of the 19FX5 is illustrated by its characteristic curves. When operating at a Grid-No. 2 voltage of 115 V, the plate current and Grid-No. 2 current curves plotted against plate voltage for Grid-No. 1 voltages ranging from 0 V to -6 V display typical pentode characteristics.

Specifically, the plate current curves show a well-defined pentode "knee" occurring around 20 to 25 V. Below this knee, plate current drops rapidly as plate voltage decreases. Above this knee, the plate current curves flatten out, indicating that plate current is relatively independent of plate voltage in the normal operating region. This flat region corresponds to the high internal plate resistance of approximately 17,500 Ω .

Related Designations

The 19FX5 belongs to a family of identical power pentodes designed for different heater supply configurations. It is identical to the **12FX5** and **60FX5** vacuum tubes in its internal structure, electrode

configuration, and electrical characteristics, differing only in its heater ratings. These designations should not be substituted without verifying that the circuit's heater supply matches the specific requirements of the replacement tube.

Technical Summary

The **19FX5** is a miniature 7-pin power pentode optimized for Class A1 audio power output applications. Operating with a nominal heater voltage of 18.9 V at 0.3 A, it features a controlled 11-second warm-up time suitable for series-string designs. With a design-maximum plate voltage rating of 150 V and plate dissipation of 5.5 W, it is well-suited for low-voltage, high-efficiency amplification. Its exceptionally high transconductance of 13,500 μmhos allows it to deliver effective power output with low grid-drive requirements, making it a highly efficient choice for compact audio output stages.

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

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	18.9 V	—
Heater current	300 mA	—
Heater warm-up time	11 s	ControlledWarmup
Plate voltage	110 V	ClassA
Screen voltage	115 V	ClassA
Cathode resistor	62 ohm	ClassA
Plate current	36 mA	ClassA
Screen current	10 mA	ClassA
Maximum plate voltage	150 V	—
Maximum screen voltage	130 V	—
Plate dissipation	5.5 W	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	17500 ohm	ClassA
Transconductance	13500 uS	ClassA

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

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage (ac/dc) 12.6 18.9	60 V	Published in approved 12FX5 target entry; Section1
Heater Current 0.45 0.3	100 mA	Published in approved 12FX5 target entry; Section1
Heater Warm-up Time (Average) 11	11 seconds	Published in approved 12FX5 target entry; Section1
Plate Voltage	150 V	Published in approved 12FX5 target entry; Section1
Grid-No.2 (Screen-Grid) Voltage	130 V	Published in approved 12FX5 target entry; Section1
Plate Dissipation	5.5 W	Published in approved 12FX5 target entry; Section1
Grid-No.2 Input	2 W	Published in approved 12FX5 target entry; Section1
Plate Supply Voltage	110 V	Published in approved 12FX5 target entry; Section1
Grid-No.2 Supply Voltage	116 V	Published in approved 12FX5 target entry; Section1
Cathode-Bias Resistor	62 Ω	Published in approved 12FX5 target entry; Section1
Peak AF Grid-No.1 Voltage	3 V	Published in approved 12FX5 target entry; Section1
Zero-Signal Plate Current	36 mA	Published in approved 12FX5 target entry; Section1
Maximum-Signal Plate Current	35 mA	Published in approved 12FX5 target entry; Section1
Transconductance	13600 μS	Published in approved 12FX5 target entry; Section1
Load Resistance	3000 Ω	Published in approved 12FX5 target entry; Section1

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid No.1 to Plate	0.65 pF	Published in approved 12FX5 target entry; Section1
Grid No 1 to Cathode. Heater, Grid No.2, and Grid No.3	17 pF	Published in approved 12FX5 target entry; Section1

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate to Cathode, Heater, Grid No.2, and Grid No.3	9 pF	Published in approved 12FX5 target entry; Section1

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