



ELECTRONIC TUBE REFERENCE

19HR6

Voltage Pentode - Remote Cutoff (single) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

PENTODE

Semi-remote-cutoff pentode for gain-controlled RF/IF amplification, using an 18.9 V heater while retaining 6HR6 electrical characteristics.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	9
NOMINAL HEATER	18.9 V / 300 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Pentode	
PLATE RESISTANCE	500000 Ω
TRANSCONDUCTANCE	0.006 S
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM SCREEN VOLTAGE	150 V
MAXIMUM PLATE DISSIPATION	3 W
MAXIMUM SCREEN DISSIPATION	0.75 W
MAXIMUM CATHODE CURRENT	25 mA
<i>6HR6 semiremote-cutoff electrical system.</i>	

19HR6 — Semiremote-Cutoff Pentode

The **19HR6** is a miniature, semiremote-cutoff pentode designed primarily for use as an intermediate-frequency (IF) amplifier in FM receivers. It features a high transconductance and is constructed in a compact 7-pin miniature envelope.

Mechanical Specifications and Pinout

The 19HR6 is housed in a miniature T-5½ glass envelope with a button 7-pin base (E7-1 designation). It requires a standard miniature 7-contact socket. The physical dimensions of the tube are:

- **Maximum Overall Height:** 2.125 inches
- **Maximum Seated Height:** 1.875 inches
- **Maximum Diameter:** 0.750 inches

The tube utilizes the **7BK** basing diagram. The pin connections, viewed from the bottom of the base, are as follows:

Pin Number	Electrode Connection
Pin 1	Grid No. 1 (Control Grid)
Pin 2	Grid No. 3 (Suppressor Grid) / Internal Shield
Pin 3	Heater
Pin 4	Heater
Pin 5	Plate
Pin 6	Grid No. 2 (Screen Grid)
Pin 7	Cathode

Heater and Heater-Cathode Ratings

The 19HR6 is designed for series-string or parallel heater circuits, featuring a controlled warm-up time. Its heater ratings and heater-cathode limits are:

- **Heater Voltage (AC or DC):** 18.9 V
- **Heater Current:** 0.150 A (150 mA) $\pm$ 0.010 A
- **Average Heater Warm-up Time:** 17 seconds
- **Calculated Heater Power:** 18.9 V $\times$ 0.150 A = 2.835 W (calculated from nominal voltage and current)

Heater-Cathode Voltage Limits (Design-Maximum Values)

- **Heater Negative with Respect to Cathode (Total DC and Peak):** 200 V max
- **Heater Positive with Respect to Cathode (DC):** 100 V max
- **Heater Positive with Respect to Cathode (Total DC and Peak):** 200 V max
- **Peak Heater-Cathode Voltage:** 200 V max
- **Average Heater-Cathode Voltage:** 100 V max

Direct Interelectrode Capacitances

The capacitances of the 19HR6 are specified for an unshielded tube:

- **Grid No. 1 to Plate (Maximum):** 0.006 pF
- **Grid No. 1 to Cathode, Grid No. 3, Internal Shield, Grid No. 2, and Heater:** 8.8 pF
- **Plate to Cathode, Grid No. 3, Internal Shield, Grid No. 2, and Heater:** 5.2 pF

Maximum Ratings (Design-Maximum System)

The following maximum ratings are established for Class A1 amplifier service:

- **Plate Supply Voltage:** 300 V max
- **Grid No. 3 (Suppressor-Grid) Positive Voltage:** 0 V max (Grid No. 3 should be connected to the cathode at the socket)
- **Grid No. 2 (Screen-Grid) Supply Voltage:** 300 V max
- **Grid No. 2 Voltage:** Dependent on operating conditions (subject to rating curves)
- **Grid No. 1 (Control-Grid) Positive-Bias Voltage:** 0 V max
- **Grid No. 1 (Control-Grid) Negative-Bias Voltage:** 50 V max
- **Plate Dissipation:** 3 W max
- **Grid No. 2 Input:**
 - For Grid No. 2 voltages up to 150 V: 1 W max
 - For Grid No. 2 voltages between 150 V and 300 V: Subject to rating curves

Maximum Circuit Values

- **Grid No. 1 Circuit Resistance (Fixed-bias):** 0.5 M Ω max
- **Grid No. 1 Circuit Resistance (Cathode-bias):** 1 M Ω max

Typical Characteristics and Class A1 Operation

Under typical operating conditions as a Class A1 amplifier, the 19HR6 exhibits high transconductance and high plate resistance. The typical operating parameters are:

- **Plate Supply Voltage:** 200 V
- **Grid No. 3 (Suppressor-Grid):** Connected to cathode at the socket
- **Grid No. 2 Supply Voltage:** 115 V
- **Grid No. 1 Supply Voltage:** 0 V
- **Cathode-Bias Resistor:** 68 Ω
- **Plate Resistance (Approximate):** 0.5 M Ω
- **Transconductance:** 8500 μ mhos
- **Plate Current:** 13.2 mA
- **Grid No. 2 Current:** 4.3 mA
- **Grid No. 1 Voltage for Transconductance of 60 μ mhos (Approximate):** -15 V

Electrical Behavior and Curve Observations

The 19HR6 exhibits typical pentode characteristics. When plate current and Grid No. 2 current are plotted against plate voltage up to 300 V (with Grid No. 2 held at 115 V and Grid No. 3 connected to the cathode), the following behaviors are observed:

- **Pentode Knee:** A distinct pentode knee is present below 50 V plate voltage, where plate current rises rapidly before flattening into a relatively constant region.
- **Control Grid Bias:** The Grid No. 1 bias curves range from 0 V to -8 V.
- **Semiremote-Cutoff Characteristic:** The tube's semiremote-cutoff design is demonstrated by its transconductance behavior. At a typical bias point, the transconductance is 8500 μmhos , but it is reduced to approximately 60 μmhos when the Grid No. 1 bias is increased to -15 V. This allows the tube to handle a wide range of signal levels without excessive distortion, making it highly suitable for automatic volume control (AVC) or automatic gain control (AGC) circuits in IF stages.

Related Designations

The 19HR6 is identical to the [6HR6](#) except for its heater characteristics and ratings. The [6HR6](#) is designed for a different heater supply, whereas the 19HR6 is optimized for series-string heater chains requiring a 0.150 A current and an 18.9 V drop.

Technical Summary

The **19HR6** is a 7-pin miniature semiremote-cutoff pentode designed for IF-amplifier service in FM receivers. It features an 18.9 V, 150 mA heater with a controlled 17-second warm-up time. Operating at a typical plate supply of 200 V and a screen supply of 115 V, it provides a high transconductance of 8500 μmhos and a plate resistance of approximately 0.5 M Ω . Its semiremote-cutoff characteristic allows for effective gain control, while its low grid-to-plate capacitance of 0.006 pF ensures stable high-frequency amplification.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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

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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	150 V	ClassA
Screen voltage	100 V	ClassA
Plate current	10 mA	ClassA
Screen current	3 mA	ClassA
Maximum plate voltage	300 V	—
Maximum screen voltage	150 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	500000 ohm	ClassA
Transconductance	6000 uS	ClassA
Extended/semiremote cutoff characteristic	Present	RemoteCutoff

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-to-plate capacitance	0.01 pF	—