

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

12BV7

1 SECTION
CONSTRUCTION
PENTODE

Voltage - Pentode Sharp Cutoff (single) electronic tube

Sharp-cutoff pentode designed as a television video amplifier. Part of the 12BY7A/12BV7/12DQ7 replacement family, it is fundamentally a high-transconductance wideband signal tube rather than an audio power-output pentode.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9BF	BASE PINS	9
NOMINAL HEATER	12.6 V / 300 mA	PARALLEL HEATER	6.3 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	85000 Ω
TRANSCONDUCTANCE	0.013 S
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM SCREEN VOLTAGE	175 V
MAXIMUM PLATE DISSIPATION	6.25 W
MAXIMUM SCREEN DISSIPATION	1 W
<i>Published Westinghouse ratings, characteristics, capacitances, pulse/deflection data, and typical operating conditions promoted where applicable; additional values retained as parameters.</i>	

12BV7 — High-Transconductance Miniature Pentode

The **12BV7** is a miniature, high-transconductance sharp-cutoff power pentode designed primarily for service as a video output amplifier in television receivers. It is characterized by high power sensitivity and low interelectrode capacitances, enabling it to deliver relatively large output voltages across low values of plate load resistance with low plate-supply voltages. In application and electrical characteristics, the 12BV7 is closely related to the [12BY7](#) and [12BY7A](#).

Construction, Mechanical Specifications, and Pinout

The 12BV7 features a coated unipotential cathode housed in a T-6 1/2 glass envelope. It utilizes a small-button miniature 9-pin base (JEDEC E9-1) and can be mounted in any position.

Physical Dimensions

- **Maximum Overall Length:** 2 5/8 inches
- **Maximum Seated Height:** 2 3/8 inches (with some specifications indicating a nominal seated height of 2 inches $\pm$ 3/32 inches)
- **Maximum Diameter:** 7/8 inches

Pin Connections (Basing Diagram 9BF)

The tube utilizes the EIA 9BF basing arrangement, which provides the following pin connections when viewed from the bottom of the tube:

Pin Number	Connection
Pin 1	Cathode
Pin 2	Grid Number 1 (Control Grid)

Pin Number	Connection
Pin 3	Internal Shield and Grid Number 3 (Suppressor Grid)
Pin 4	Heater
Pin 5	Heater
Pin 6	Heater Center-tap
Pin 7	Plate
Pin 8	Grid Number 2 (Screen Grid)
Pin 9	Internal Shield and Grid Number 3 (Suppressor Grid)

Heater Characteristics

The 12BV7 heater is designed for either series or parallel operation, allowing flexibility in AC or DC series-string or parallel-connected entertainment receiver designs. It also features a controlled average warm-up time.

Parameter	Series Connection	Parallel Connection
Heater Voltage (AC or DC)	12.6 V	6.3 V
Heater Current	0.3 A	0.6 A
Average Warm-up Time	—	11 seconds

Maximum Ratings

The maximum ratings for the 12BV7 are defined under both the Design-Maximum and Design-Center rating systems. These limits must be observed to ensure reliable operation in video amplifier service.

Design-Maximum and Design-Center Limits

Parameter	Design-Maximum Values	Design-Center Values
Plate Supply Voltage	330 V	—
Plate Voltage	—	300 V
Screen-Grid (Grid No. 2) Voltage	190 V	175 V

Parameter	Design-Maximum Values	Design-Center Values
Grid No. 3 (Suppressor Grid) Positive Voltage	0 V	—
Negative DC Grid No. 1 (Control Grid) Voltage	55 V	50 V
Positive DC Grid No. 1 (Control Grid) Voltage	0 V	—
Plate Dissipation	6.5 W	6.25 W
Screen-Grid (Grid No. 2) Dissipation / Input	1.2 W	1.0 W

Heater-Cathode Voltage Ratings

- **Design-Maximum System:**
 - Peak value: ± 200 V max
 - Average value: 100 V max
- **Design-Center System:**
 - Heater negative with respect to cathode (Total DC + Peak): 200 V max
 - Heater positive with respect to cathode (DC component): 100 V max
 - Heater positive with respect to cathode (Total DC + Peak): 200 V max

Maximum Circuit Values

- **Grid-Number 1 Circuit Resistance (Fixed Bias):** 0.25 Megohms max
- **Grid-Number 1 Circuit Resistance (Cathode Bias):** 1.0 Megohm max

Electrical Characteristics and Typical Operation

The 12BV7 operates as a Class A1 amplifier. Depending on the circuit configuration and bias method, the tube exhibits the following typical characteristics:

Parameter	Operating Point A (Cathode Bias)	Operating Point B (Cathode Bias)	Operating Point C (Fixed Bias / Cutoff Test)
Plate Voltage	250 V	250 V	250 V
Screen Voltage	150 V	180 V	180 V
Grid-Number 1 Voltage	—	—	-8 V
Cathode-Bias Resistor	68 Ohms	100 Ohms	—

Parameter	Operating Point A (Cathode Bias)	Operating Point B (Cathode Bias)	Operating Point C (Fixed Bias / Cutoff Test)
Plate Resistance (Approx.)	85,000 Ohms	93,000 Ohms	—
Transconductance	13,000 μ mhos	11,000 μ mhos	—
Plate Current	27 mA	26 mA	0.5 mA (Minimum)
Screen Current	6.0 mA	5.75 mA	—
Grid-No. 1 Cutoff Voltage (approx. for plate current of 20 μ A)	-12 V	-11.5 V	—
Triode Amplification Factor (Triode Connected)	28	—	—

Direct Interelectrode Capacitances

The interelectrode capacitances of the 12BV7 vary slightly depending on whether an external shield is used during measurement.

Capacitance Parameter	Without External Shield	With External Shield
Grid No. 1 to Plate	0.055 pF	0.063 pF
Input (Grid No. 1 to Cathode, Heater, Grid No. 2, Grid No. 3, and Internal Shield)	11.0 pF	10.2 pF
Output (Plate to Cathode, Heater, Grid No. 2, Grid No. 3, and Internal Shield)	3.0 pF	3.5 pF

Characteristic Curves and Interpretation

The electrical behavior of the 12BV7 is further illustrated by its average characteristic curves:

- Average Plate Characteristics:** These curves plot plate current against plate voltage for various grid-No. 1 voltages ranging from positive values (such as +2.0 V and +1.0 V) down to negative values (such as -7.0 V), with the screen voltage held constant at 150 V. The curves demonstrate a sharp knee at low plate voltages, indicating efficient operation and the ability to deliver high output voltage swings into low load resistances.

- **Average Screen Characteristics:** These curves display screen current as a function of plate voltage for different grid-No. 1 voltages, with the screen voltage maintained at 150 V. Screen current rises significantly at very low plate voltages where plate current falls.
- **Average Transfer Characteristics:** These curves plot plate current and screen current against grid-No. 1 voltage for various screen voltages (ranging from 25 V to 150 V) at a constant plate voltage of 250 V. They show the control grid's modulation capability and the cutoff behavior of the tube.
- **Transconductance Characteristics:** Curves of transconductance versus grid-No. 1 voltage show that the transconductance rises rapidly as the grid bias becomes less negative, peaking near 20,000 micromhos under high screen voltage conditions.

Related Designations and Replacements

The 12BV7 is closely related to the [12BY7](#) and [12BY7A](#) pentodes. In many television receiver applications, the [12BY7A](#), [12BV7](#), and [12DQ7](#) are grouped together as interchangeable or direct replacements for one another, sharing similar physical dimensions, pinouts, and general electrical characteristics.

Technical Summary

The **12BV7** is a high-transconductance, sharp-cutoff miniature power pentode featuring a 9-pin small-button base (EIA 9BF) and a T-6 1/2 glass envelope. Designed primarily for television video output amplifier service, it operates with a flexible series (12.6 V / 0.3 A) or parallel (6.3 V / 0.6 A) heater arrangement. Under typical Class A1 operating conditions, it exhibits a transconductance of 11,000 to 13,000 μmhos , a plate resistance of 85,000 to 93,000 ohms, and a plate current of 26 to 27 mA. With a plate dissipation rating of up to 6.5 watts (Design-Maximum) and low interelectrode capacitances, the 12BV7 is optimized for delivering large output voltages across low-value load resistances.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1965 Westinghouse Data Book

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

1965 WESTINGHOUSE DATA BOOK

Section 1 · Pentode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Series heater voltage	12.6 V	SeriesHeater
Series heater current	300 mA	SeriesHeater
Parallel heater voltage	6.3 V	ParallelHeater
Parallel heater current	600 mA	ParallelHeater
Transconductance	13000 μ S	—
Plate resistance	68000 ohm	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Typical plate voltage	250 V	—
Heater-cathode voltage maximum	200 V	—

APPLICATION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Application	Video amplifier	—

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-to-plate capacitance	0.055 pF	—
Output capacitance	3 pF	—



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 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Current	27 mA	ClassA
Screen Current	6 mA	ClassA



SOURCE DATA APPENDIX

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	6.3 V	Published in approved 12BV7 target entry; Section1
Heater Current 0.3	600 mA	Published in approved 12BV7 target entry; Section1
Heater Warm-up Time (Average)	11 seconds	Published in approved 12BV7 target entry; Section1
Plate Supply Voltage	330 V	Published in approved 12BV7 target entry; Section1
Grid-No.3 (Suppressor-Grid) Voltage, Positive value	0 V	Published in approved 12BV7 target entry; Section1
Grid-No.2 (Screen-Grid) Voltage	190 V	Published in approved 12BV7 target entry; Section1
Negative-bias value	65 V	Published in approved 12BV7 target entry; Section1
Positive-bias value	0 V	Published in approved 12BV7 target entry; Section1

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Dissipation	6.5 W	Published in approved 12BV7 target entry; Section1
Grid-No.2 Input	1.2 W	Published in approved 12BV7 target entry; Section1
grid-no	2 V	Published in approved 12BV7 target entry; Section1
For fixed-bias operation	0.25 MΩ	Published in approved 12BV7 target entry; Section1
For cathode-bias operation	1 MΩ	Published in approved 12BV7 target entry; Section1
Heater Voltage (ac/dc) 6.3 16.8	25.3 V	Published in approved 12BV7 target entry; Section1
Heater Current 0.6 0.45	300 mA	Published in approved 12BV7 target entry; Section1
Heater Warm-up Time {Average} 11 11	11 seconds	Published in approved 12BV7 target entry; Section1
Peak Inverse Plate Voltage*	5000 V	Published in approved 12BV7 target entry; Section1
Peak Plate Current	1200 mA	Published in approved 12BV7 target entry; Section1
Average Plate Current	250 mA	Published in approved 12BV7 target entry; Section1
Plate Dissipation	4.75 W	Published in approved 12BV7 target entry; Section1
Peak value +800	-5000 V	Published in approved 12BV7 target entry; Section1
Average value -(-100	-900 V	Published in approved 12BV7 target entry; Section1

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid No.1 to Plate	0.063 pF	Published in approved 12BV7 target entry; Section1
and Internal Shield	10.2 pF	Published in approved 12BV7 target entry; Section1
Plate to Cathode, Heater, Grid No.2, and Internal Shield	3.5 pF	Published in approved 12BV7 target entry; Section1
Plate to Cathode and Heater	12 pF	Published in approved 12BV7 target entry; Section1

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode to Plate and Heater	9.5 pF	Published in approved 12BV7 target entry; Section1
Heater to Cathode	2.8 pF	Published in approved 12BV7 target entry; Section1

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Supply Voltage	250 V	Published in approved 12BV7 target entry; Section1
Grid-No.2 Supply Voltage	180 V	Published in approved 12BV7 target entry; Section1
Cathode-Bias Resistor	100 Ω	Published in approved 12BV7 target entry; Section1
Plate Resistance (Approx.)	93000 Ω	Published in approved 12BV7 target entry; Section1
Plate Current	26 mA	Published in approved 12BV7 target entry; Section1
Grid-No.2 Current B	75 mA	Published in approved 12BV7 target entry; Section1
Grid-No.1 Voltage (Approx.) for plate current of 20 jtA	11.6 V	Published in approved 12BV7 target entry; Section1

TUBE TINKER

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