

ELECTRONIC TUBE REFERENCE

12BV11

Voltage - Dual Pentode electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

PENTODE-PENTODE

Compactron sharp-cutoff twin pentode designed as color-demodulator elements in color television receivers.

GENERAL CHARACTERISTICS

BASE DESIGNATION	12HB	BASE PINS	12
NOMINAL HEATER	12.6 V / 450 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

12HB - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN1	–	H – Heater	CONNECTED
PIN2	B	G3 – Suppressor Grid	CONNECTED
PIN3	B	P – Plate (Anode)	CONNECTED
PIN4	B	G2 – Screen Grid	CONNECTED
PIN5	B	K – Cathode	CONNECTED
PIN6	B	G1 – Control Grid	CONNECTED
PIN7	A	G1 – Control Grid	CONNECTED
PIN8	A	K – Cathode	CONNECTED
PIN9	A	G2 – Screen Grid	CONNECTED
PIN10	A	P – Plate (Anode)	CONNECTED
PIN11	A	G3 – Suppressor Grid	CONNECTED
PIN11	–	IS – Internal Screen	CONNECTED

SECTION RATINGS

SECTION1 Pentode	
PLATE RESISTANCE	170000 Ω
TRANSCONDUCTANCE	0.0032 S
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM SCREEN VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	1.7 W
<i>Promoted from published ratings/characteristics where directly applicable; additional published values retained in TUBE_SECTION_PARAMETER.</i>	

SECTION2 Pentode	
PLATE RESISTANCE	200000 Ω
TRANSCONDUCTANCE	0.013 S
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM SCREEN VOLTAGE	330 V
MAXIMUM PLATE DISSIPATION	3.1 W
MAXIMUM SCREEN DISSIPATION	0.65 W

12BV11 — Twin Dual-Control Sharp-Cutoff Pentode

The **12BV11** is a multi-electrode vacuum tube of the compactron family, designed primarily for use as a color demodulator in color television receivers. It contains two independent, sharp-cutoff pentode units within a single T-9 glass envelope. A key feature of its design is that both Grid No. 1 (control grid) and Grid No. 3 (suppressor grid) of each pentode section are designed to operate as independent control electrodes, allowing for dual-signal control or demodulation functions within each unit.

The 12BV11 is identical to the [6BV11](#) except for its heater ratings, with the 12BV11 configured for parallel heater circuits and the [6BV11](#) configured for series heater circuits.

Physical Construction and Basing

The 12BV11 is constructed in a compactron T-9 glass bulb with a button 12-pin base (E12-70 designation). This physical configuration requires a standard duodecar 12-contact socket.

The physical dimensions of the tube are:

- **Maximum Diameter:** 1.188 inches

- **Maximum Seated Height:** 2.250 inches
- **Maximum Overall Height:** 2.625 inches

Pinout Configuration (12HB Basing)

The tube utilizes the **12HB** basing arrangement. An internal shield is incorporated within the structure to minimize crosstalk and unwanted coupling between the two pentode sections. This internal shield is internally connected to the heater at Pin 12. To achieve the specified electrical characteristics and ensure stable operation, Pin 12 must be connected directly to circuit ground.

The pin connections, viewed from the bottom of the tube base, are assigned as follows:

Pin Number	Electrode Connection
1	Heater
2	Plate (Pentode Unit 2)
3	Grid No. 2 - Screen Grid (Pentode Unit 2)
4	Grid No. 1 - Control Grid (Pentode Unit 2)
5	Cathode (Pentode Unit 2)
6	Grid No. 3 - Suppressor Grid (Pentode Unit 2) / Internal Shield
7	Grid No. 3 - Suppressor Grid (Pentode Unit 1) / Internal Shield
8	Cathode (Pentode Unit 1)
9	Grid No. 1 - Control Grid (Pentode Unit 1)
10	Grid No. 2 - Screen Grid (Pentode Unit 1)
11	Plate (Pentode Unit 1)
12	Heater / Internal Shield

Heater Characteristics

The heater of the 12BV11 is designed for parallel operation in equipment with a nominal 12.6 V supply. It features a controlled warm-up time to ensure reliable operation in series-parallel or coordinated heater strings.

Parameter	Value	Unit
Heater Arrangement	Parallel	—

Parameter	Value	Unit
Heater Voltage (AC or DC)	12.6	V
Heater Current	0.45 (450)	A (mA)
Heater Warm-up Time	11	seconds

For comparison, the otherwise identical [6BV11](#) utilizes a series heater arrangement operating at 6.3 V with a current draw of 0.9 A (900 mA).

Direct Interelectrode Capacitances

The direct interelectrode capacitances of the 12BV11 are measured without an external shield. The values for each of the two pentode sections are symmetrical and are specified as follows:

Capacitance Parameter	Value	Unit
Grid No. 1 to Plate	0.10	pF
Grid No. 3 to Plate	3.2	pF
Input: Grid No. 1 to Heater, Cathode, Grid No. 2, Grid No. 3, and Internal Shield	7.0	pF
Grid No. 3 to All Other Electrodes	8.5	pF
Grid No. 1 to Grid No. 3	0.08	pF

The low capacitance between Grid No. 1 and Grid No. 3 (0.08 pF) is critical for preventing signal leakage and maintaining isolation between the two independent control inputs of each pentode section.

Electrical Characteristics and Typical Operation

Under typical Class A1 amplifier operating conditions, each pentode section of the 12BV11 exhibits the following characteristics. In this operating state, Grid No. 3 is maintained at a DC potential of 0 volts.

Parameter	Value	Unit
Plate Supply Voltage	150	V
Grid No. 3 Voltage	0	V
Grid No. 2 Supply Voltage	100	V
Cathode Resistor	180	Ω

Parameter	Value	Unit
Plate Current	3.1	mA
Grid No. 2 Current	2.4	mA
Grid No. 1 Transconductance	3200	μmhos
Grid No. 3 Transconductance	390	μmhos
Plate Resistance (Approximate)	0.17	$\text{M}\Omega$
Amplification Factor (Grid No. 3 to Plate)	67	—
Grid No. 1 Voltage (Approximate) for Plate Current of 75 μA	-3.5	V
Grid No. 3 Voltage (Approximate) for Plate Current of 85 μA	-5.5	V

The dual-control nature of the tube is reflected in the transconductance figures: Grid No. 1 provides a high transconductance of 3200 μmhos for sensitive control, while Grid No. 3 provides a lower transconductance of 390 μmhos , suitable for injection of a local oscillator or reference signal in demodulator circuits.

Maximum Ratings and Circuit Values

The maximum ratings are established under the Design-Maximum Rating System. These limits must not be exceeded under the worst-case operating conditions of supply voltage variation, component tolerances, and signal modulation.

Maximum Ratings (Each Section)

Parameter	Maximum Limit	Unit
DC Plate Voltage	300	V
Grid No. 3 (Suppressor-Grid) Positive-Bias Voltage (DC and Peak)	25	V
Grid No. 3 (Suppressor-Grid) Negative-Bias Voltage (DC and Peak)	100	V

Parameter	Maximum Limit	Unit
DC Grid No. 2 (Screen-Grid) Supply Voltage	300	V
Grid No. 1 (Control-Grid) Positive-Bias Voltage	0	V
Grid No. 1 (Control-Grid) Negative-Bias Voltage	50	V
Plate Dissipation	1.7	W
Grid No. 3 Input	0.1	W
Grid No. 2 Input (for Grid No. 2 voltages up to 150 V)	1.0	W
Grid No. 2 Input (for Grid No. 2 voltages between 150 V and 300 V)	See Note	—

Note: For Grid No. 2 voltages between 150 V and 300 V, the maximum Grid No. 2 input is restricted and must be determined in accordance with standard screen-grid rating curves.

Maximum Circuit Values

To prevent thermal runaway and ensure bias stability, the resistance in the grid circuits must be kept within the following limits:

- **Grid No. 3 Circuit Resistance (Each Unit):** 0.68 MΩ maximum.
- **Grid No. 1 Circuit Resistance (Each Unit):**
 - For fixed-bias operation: 0.22 MΩ maximum.
 - For cathode-bias (self-bias) operation: 0.47 MΩ maximum.

Technical Summary

The **12BV11** is a specialized **compactron twin dual-control sharp-cutoff pentode** designed for color television demodulator applications. Operating with a **12.6 V, 0.45 A** parallel heater, it houses two independent pentode units in a single T-9 envelope. Each unit features independent control capabilities on both Grid No. 1 and Grid No. 3, with Grid No. 1 offering a transconductance of **3200 μmhos** and Grid No. 3 offering **390 μmhos** under typical operating conditions. The integration of an internal shield connected to the heater at Pin 12 provides the necessary isolation between sections, provided Pin 12 is tied directly to ground. With a maximum plate voltage rating of **300 V** and a plate dissipation limit of **1.7 W** per section, the 12BV11 provides a compact and efficient solution for dual-control signal processing and demodulation.

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) 6.3	12.6 V	Published in approved 12BV11 target entry; Section1
Heater Current 0.9	450 mA	Published in approved 12BV11 target entry; Section1
Heater Warm-up Time	11 seconds	Published in approved 12BV11 target entry; Section1
DC Plate Voltage	300 V	Published in approved 12BV11 target entry; Section1
Positive-bias value	25 V	Published in approved 12BV11 target entry; Section1
Negative-bias value	100 V	Published in approved 12BV11 target entry; Section1
Grid-No.2 (Screen-Grid) Supply Voltage	300 V	Published in approved 12BV11 target entry; Section1
Positive-bias value	0 V	Published in approved 12BV11 target entry; Section1
Negative-bias value	50 V	Published in approved 12BV11 target entry; Section1
Plate Dissipation	1.7 W	Published in approved 12BV11 target entry; Section1
Grid-No.3 Input	0.1 W	Published in approved 12BV11 target entry; Section1
For grid-No.2 voltages up to	150 V	Published in approved 12BV11 target entry; Section1
For grid-No.2 voltages up to 150 volts	1 W	Published in approved 12BV11 target entry; Section1
For grid-No.2 voltages between 150 and	300 V	Published in approved 12BV11 target entry; Section1

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-No.3-Circuit Resistance	0.68 MΩ	Published in approved 12BV11 target entry; Section1
For fixed-bias operation	0.22 MΩ	Published in approved 12BV11 target entry; Section1
For cathode-bias operation	0.47 MΩ	Published in approved 12BV11 target entry; Section1
330	330 V	Published in approved 12BV11 target entry; Section1
Grid-No.2 (Screen-Grid) Supply Voltage 330	330 V	Published in approved 12BV11 target entry; Section1
Grid-No.1 (Control-Grid) Voltage, Positive-bias value 0	0 V	Published in approved 12BV11 target entry; Section1
4	3.1 W	Published in approved 12BV11 target entry; Section1
0.8	0.65 W	Published in approved 12BV11 target entry; Section1
Plate Voltage 125	125 V	Published in approved 12BV11 target entry; Section1
Grid-No.2 Voltage 125	125 V	Published in approved 12BV11 target entry; Section1
56	56 Ω	Published in approved 12BV11 target entry; Section1
0.12	0.2 MΩ	Published in approved 12BV11 target entry; Section1
For cathode-bias operation 0.25	0.25 MΩ	Published in approved 12BV11 target entry; Section1

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid No.1 to Plate	0.1 pF	Published in approved 12BV11 target entry; Section1
Internal Shield	7 pF	Published in approved 12BV11 target entry; Section1
Grid No.3 to All Other Electrodes	8.5 pF	Published in approved 12BV11 target entry; Section1
Grid No.1 to Grid No.3	0.08 pF	Published in approved 12BV11 target entry; Section1

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Supply Voltage	150 V	Published in approved 12BV11 target entry; Section1
Grid-No.3 Voltage	0 V	Published in approved 12BV11 target entry; Section1
Grid-No.2 Supply Voltage	100 V	Published in approved 12BV11 target entry; Section1
Cathode Resistor	180 Ω	Published in approved 12BV11 target entry; Section1
Plate Current	3.1 mA	Published in approved 12BV11 target entry; Section1
Grid-No.2 Current	2.4 mA	Published in approved 12BV11 target entry; Section1
Transconductance, Grid No.1	3200 μS	Published in approved 12BV11 target entry; Section1
Transconductance, Grid No.3	390 μS	Published in approved 12BV11 target entry; Section1
Plate Resistance (Approx.)	0.17 MΩ	Published in approved 12BV11 target entry; Section1
8500	13000 μS	Published in approved 12BV11 target entry; Section1
Plate Current 22	11 mA	Published in approved 12BV11 target entry; Section1
Grid-No.2 Current 4.8	3.8 mA	Published in approved 12BV11 target entry; Section1
20 /iA -9.5	-3 V	Published in approved 12BV11 target entry; Section1

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