



ELECTRONIC TUBE REFERENCE

12G11

Power - Beam (NOT sweep) electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

BEAMPOWER-PENTODE

Compactron dissimilar double pentode; the available reference does not reproduce enough application detail to justify a narrower functional classification.

GENERAL CHARACTERISTICS

BASE DESIGNATION	12BU	BASE PINS	12
NOMINAL HEATER	12.6 V / 600 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

12BU - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN1	–	H – Heater	CONNECTED
PIN2	B	K – Cathode	CONNECTED
PIN3	B	G1 – Control Grid	CONNECTED
PIN4	B	G3 – Suppressor Grid	CONNECTED
PIN5	–	IS – Internal Screen	CONNECTED
PIN6	B	P – Plate (Anode)	CONNECTED
PIN7	B	G2 – Screen Grid	CONNECTED
PIN8	A	G1 – Control Grid	CONNECTED
PIN9	A	G3 – Suppressor Grid	CONNECTED
PIN9	A	K – Cathode	CONNECTED
PIN10	A	G2 – Screen Grid	CONNECTED
PIN11	A	P – Plate (Anode)	CONNECTED
PIN12	–	H – Heater	CONNECTED

SECTION0 Pentode	
No fixed ratings recorded.	
Sparse-source exception: power pentode	

SECTION1 Beam Power	
MAXIMUM PLATE VOLTAGE	165 V
MAXIMUM SCREEN VOLTAGE	150 V
MAXIMUM PLATE DISSIPATION	6.5 W
MAXIMUM SCREEN DISSIPATION	1.8 W
Sparse-source exception: dual-control pentode	

12G11 — Dissimilar Double Pentode Compactron

The **12G11** is a multi-electrode vacuum tube in the compactron family containing two dissimilar pentode sections: a power pentode (designated Section 1) and a sharp-cutoff, dual-control pentode (designated Section 2). Designed primarily for television receiver applications, Section 1 is tailored for use as an audio-frequency power output amplifier, while Section 2 is intended for use as an FM detector. The tube was registered under JEDEC release number 3531B on June 11, 1962.

Construction, Heater, and Physical Specifications

The 12G11 is constructed in a T-9 glass envelope utilizing a 12-pin button compactron base (E12-70) with a 12BU basing arrangement. The tube features coated unipotential cathodes. The physical dimensions of the envelope are as follows:

- **Maximum Diameter:** 1.188 inches
- **Maximum Seated Height:** 2.000 inches
- **Maximum Overall Height:** 2.375 inches

Heater Characteristics

The heater is designed for series or parallel operation, with controlled warm-up characteristics to ensure reliable performance in television receiver circuits.

Parameter	Value
Heater Voltage (AC or DC)	12.6 V

Parameter	Value
Heater Current	0.6 ± 0.04 A (600 mA)
Heater Warm-up Time	11 seconds

For series heater string designs, the heater current must be centered at the nominal 0.6 A bogey value, with supply variations restricted to maintain the current within specified tolerances. The heater warm-up time is defined as the time required for the voltage across the heater to reach 80% of its rated value when four times the rated heater voltage is applied to a circuit consisting of the heater in series with a resistance equal to three times the nominal heater resistance (calculated as $3 * (12.6 \text{ V} / 0.6 \text{ A}) = 63 \text{ ohms}$).

Maximum Heater-Cathode Ratings

The insulation between the heater and the individual cathodes is rated under the Design Maximum Rating System:

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

Pinout and Basing Connections

The 12BU basing diagram provides the following pin connections, viewed from the bottom of the 12-pin compactron base:

- **Pin 1:** Plate (Section 2)
- **Pin 2:** Grid No. 2 / Screen Grid (Section 2)
- **Pin 3:** Grid No. 1 (Section 2)
- **Pin 4:** Cathode (Section 2)
- **Pin 5:** Internal Shield (IS)
- **Pin 6:** Grid No. 3 / Suppressor Grid (Section 2)
- **Pin 7:** Grid No. 1 (Section 1)
- **Pin 8:** Cathode, Grid No. 3, and Internal Shield (Section 1)
- **Pin 9:** Grid No. 2 / Screen Grid (Section 1)
- **Pin 10:** Plate (Section 1)
- **Pin 11:** Heater
- **Pin 12:** Heater

Section 1: Audio Power Pentode

Section 1 is a power pentode designed for Class A1 audio amplification. It is capable of delivering moderate power output at relatively low plate and screen voltages.

Design Maximum Ratings (Section 1)

- **Plate Voltage:** 150 V
- **Screen Voltage (Grid No. 2):** 135 V
- **Plate Dissipation:** 6.5 W
- **Screen Dissipation:** 1.8 W
- **DC Cathode Current:** 65 mA

Typical Operating Characteristics (Class A1 Amplifier)

Parameter	Value
Plate Voltage	120 V
Screen Voltage	110 V
Grid No. 1 Voltage	-8.0 V
Peak AF Grid No. 1 Voltage	8.0 V
Plate Resistance (Approx.)	10,000 ohms
Transconductance	7,500 umhos
Zero-Signal Plate Current	49 mA
Maximum-Signal Plate Current	50 mA
Zero-Signal Screen Current	4.0 mA
Maximum-Signal Screen Current	8.5 mA
Load Resistance	2,500 ohms
Total Harmonic Distortion (Approx.)	10%
Maximum-Signal Power Output	2.3 W

Section 2: Sharp-Cutoff, Dual-Control Pentode

Section 2 is a sharp-cutoff pentode featuring two independent control grids (Grid No. 1 and Grid No. 3), making it highly suitable for FM detection and similar applications requiring dual-control characteristics.

Design Maximum Ratings (Section 2)

- **Plate Voltage:** 330 V
- **Suppressor Voltage (Grid No. 3):** 28 V
- **Screen Supply Voltage (Grid No. 2):** 330 V
- **Positive DC Grid No. 1 Voltage:** 0 V

- **Plate Dissipation:** 1.7 W
- **Screen Dissipation:** 1.1 W

Typical Operating Characteristics

Parameter	Value
Plate Voltage	150 V
Suppressor Voltage (Grid No. 3)	0 V
Screen Voltage	100 V
Cathode Bias Resistor	560 ohms
Plate Resistance (Approx.)	0.15 Megohms
Grid No. 1 Transconductance	1,000 umhos
Grid No. 3 Transconductance	400 umhos
Plate Current	1.3 mA
Screen Current	2.0 mA
Grid No. 1 Voltage (Approx.) for $I_b = 10 \text{ uA}$	-4.5 V
Grid No. 3 Voltage (Approx.) for $I_b = 10 \text{ uA}$	-4.5 V

Direct Interelectrode Capacitances

The direct interelectrode capacitances of the 12G11 are measured without an external shield.

Section 1 (Power Pentode)

- **Grid No. 1 to Plate:** 0.26 pF
- **Input (Grid No. 1 to Heater, Cathode, Grid No. 2, Internal Shield):** 12 pF
- **Output (Plate to Heater, Cathode, Grid No. 2, Internal Shield):** 12 pF

Section 2 (Dual-Control Pentode)

- **Grid No. 1 to Plate:** 0.034 pF
- **Grid No. 3 to Plate:** 2.8 pF
- **Grid No. 1 to All Except Plate (Grid No. 1 to Heater, Cathode, Grid No. 2, Grid No. 3, Internal Shield):** 6.5 pF
- **Grid No. 3 to All (Grid No. 3 to Heater, Cathode, Grid No. 1, Grid No. 2, Plate, Internal Shield):** 7.5 pF
- **Grid No. 1 to Grid No. 3:** 0.24 pF

Inter-Section Capacitance

- Plate (Section 1) to Plate (Section 2): 0.12 pF

Related Designations

The **12G11** is electrically identical to the **6G11**, except for its heater characteristics. The **6G11** operates with a heater voltage of **6.3 V** and a heater current of **1.2 A (1200 mA)**, whereas the 12G11 is configured for **12.6 V** and **0.6 A (600 mA)**.

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