ELECTRONIC TUBE REFERENCE

12GJ5

Power - TV Horizontal Output (sweep) electronic tube

CONSOLIDATED TECHNICAL DATA
1 SECTION
CONSTRUCTION
BEAMPOWER

Television horizontal-output beam-power tube with controlled-warm-up 12.6 V heater, approximately 17.5 W plate dissipation, and multi-kilovolt flyback pulse capability.

General characteristics

BASE DESIGNATION	–	**BASE PINS**	9
NOMINAL HEATER	12.6 V / 600 mA	**PARALLEL HEATER**	– / –
HEATING	Indirect	**SERIES OPERATION**	Not specified
CATHODE ARRANGEMENT	Separate cathodes	**SECTION CONSTRUCTION**	Similar

Section ratings

SECTION1 Beam Power	
PLATE RESISTANCE	15000 Ω
TRANSCONDUCTANCE	0.0071 S
MAXIMUM PLATE VOLTAGE	770 V
MAXIMUM SCREEN VOLTAGE	220 V
MAXIMUM PLATE DISSIPATION	17.5 W
MAXIMUM SCREEN DISSIPATION	3.5 W
MAXIMUM CATHODE CURRENT	175 mA

12GJ5 — Beam Power Pentode

An indirectly heated beam power tube designed for horizontal deflection amplifier service in television receivers.

Overview

The **12GJ5** is a Novar-type beam power pentode designed primarily for use as a horizontal deflection amplifier in television receivers. It features a high peak positive plate voltage rating and high peak cathode current capability, making it well-suited for the demanding pulse service of horizontal deflection circuits.

The 12GJ5 is electrically identical to the **6GJ5** and **17GJ5** except for its heater ratings. It is also closely related to the **12GJ5A** variant, which shares the same electrical characteristics but features a modified base construction with an exhaust tip at the bottom and a slightly shorter bulb.

Construction and Physical Characteristics

The 12GJ5 is constructed in a **T-12** glass envelope with a **Novar Button 9-Pin** base (designation **E9-76**). The plate connection is made via a top cap, which can accommodate **C1-2**, **C1-3**, or **C1-33** connectors.

The physical dimensions of the 12GJ5 are:

- **Maximum Diameter:** 1.562 inches
- **Maximum Seated Height:** 3.170 inches
- **Maximum Overall Height:** 3.550 inches

The **12GJ5A** variant utilizes an **E9-88** Novar Button 9-Pin base with an exhaust tip on the base, resulting in a slightly shorter seated height of 3.125 inches and an overall height of 3.505 inches, while maintaining the same 1.562-inch maximum diameter.

Heater and Basing Configuration

The 12GJ5 features an indirectly heated cathode. The heater is designed for series-string or parallel operation with a controlled warm-up time to ensure reliable operation in television receivers.

Parameter	Value
Heater Voltage (AC or DC)	12.6 V
Heater Current	0.600 ± 0.040 A
Average Warm-up Time	11 seconds

Pinout (9QK Basing)

The tube uses the **9QK** basing diagram, viewed from the bottom of the base:

- **Pin 1:** Grid No. 2 (Screen Grid)
- **Pin 2:** Grid No. 1 (Control Grid)
- **Pin 3:** Cathode and Grid No. 3 (Beam Plates)
- **Pin 4:** Heater
- **Pin 5:** Heater

- **Pin 6:** Grid No. 1 (Control Grid)
- **Pin 7:** Grid No. 2 (Screen Grid)
- **Pin 8:** No Connection (NC)
- **Pin 9:** Internal Connection (IC) - Do not use
- **Top Cap:** Plate (Anode)

The duplicate connections for Grid No. 1 (Pins 2 and 6) and Grid No. 2 (Pins 1 and 7) facilitate flexible circuit layout and help with heat dissipation.

Electrical Characteristics and Typical Operation

Under typical Class A amplifier conditions, the 12GJ5 exhibits the following characteristics:

Parameter	Value
Plate Voltage	250 V
Grid No. 2 (Screen) Voltage	150 V
Grid No. 1 (Control) Voltage	-22.5 V
Plate Current	70 mA
Grid No. 2 Current	2.1 mA
Transconductance	7,100 µmhos
Plate Resistance	15,000 Ω
Amplification Factor (Triode Connected)*	4.4
Grid No. 1 Cutoff Voltage (for Ib = 1 mA)	-42 V (approx.)

**Note: Triode connection is measured with 150 V on the plate and Grid No. 2, and -22.5 V on Grid No. 1.*

Instantaneous Plate Knee Values

To characterize the tube's performance at low plate voltages (such as during the peak of the deflection cycle), the instantaneous knee values are specified at Eb = 60 V, Ec2 = 150 V, and Ec1 = 0 V:

- **Plate Current (Ib):** 390 mA
- **Grid No. 2 Current (Ic2):** 32 mA

Direct Interelectrode Capacitances (Unshielded)

- **Grid to Plate (g1 to p):** 0.26 pF
- **Input (g1 to k + g3 + g2 + h):** 15 pF
- **Output (p to k + g3 + g2 + h):** 6.5 pF

Horizontal Deflection Service Ratings

The 12GJ5 is rated under the **Design Maximum Rating System** for horizontal deflection amplifier service. These ratings must not be exceeded under the worst-case operating conditions.

Rating Parameter	Maximum Limit
DC Plate Supply Voltage (Boost + DC Power Supply)	770 V
Peak Positive Plate Voltage	6,500 V
Peak Negative Plate Voltage	1,500 V
Grid No. 2 Voltage	220 V
Negative Grid No. 1 Voltage	-55 V
Peak Negative Grid No. 1 Voltage	330 V
Plate Dissipation	17.5 W
Grid No. 2 Input	3.5 W
Average Cathode Current	175 mA
Peak Cathode Current	550 mA
Grid No. 1 Circuit Resistance	1.0 MΩ
Bulb Temperature (at hottest point)	240 °C

Heater-Cathode Voltage Limits

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

Application Notes

1. **Pulse Duty Cycle:** For operation in a standard 525-line, 30-frame television system, the duty cycle of the peak positive voltage pulse must not exceed 15% of one horizontal scanning cycle.
2. **Grid Leak Bias Protection:** In stages operating with grid leak bias, an adequate cathode bias resistor or other suitable protective means must be employed to protect the tube from excessive dissipation in the event that excitation is lost.

Characteristic Curves and Interpretation

The average plate characteristics of the 12GJ5 (with screen grid voltage Ec2 held constant at 150 V) demonstrate a sharp knee at low plate voltages. At Ec1 = 0 V, the plate current rises rapidly to nearly 400 mA at a plate voltage of only 60 V, while the screen current (Ic2) remains low (32 mA). This low-knee characteristic is essential for high efficiency in horizontal deflection circuits, minimizing plate dissipation during the conduction interval. As the control grid bias becomes more negative (from 0 V down to -25 V), the plate current curves flatten out, showing high dynamic plate resistance and predictable cutoff behavior.

Related Designations

The **12GJ5** belongs to a family of identical-characteristic tubes with different heater configurations:

- **6GJ5:** Designed for 6.3 V, 1200 mA heater operation.
- **17GJ5:** Designed for 16.8 V, 450 mA heater operation.

Additionally, the **12GJ5A** (along with the **6GJ5A** and **17GJ5A**) represents a physical redesign featuring an exhaust tip on the base (E9-88 base) and a slightly shorter T-12 bulb, but it is electrically identical to the non-A version.

Technical Summary

The **12GJ5** is a **Novar-type beam power pentode** designed for horizontal deflection amplifier service. It features a **12.6 V, 600 mA** heater with an 11-second warm-up time, a **T-12** envelope, and a **9QK** basing configuration. With a maximum plate dissipation of **17.5 W**, a peak positive plate voltage rating of **6,500 V**, and a peak cathode current rating of **550 mA**, it is optimized for high-voltage pulse applications. Its low-knee plate characteristics ensure efficient operation, and its electrical identity to the 6GJ5 and 17GJ5 families provides design flexibility across different heater supply configurations.

SOURCE OPERATING CONDITIONS

1971 RCA HB3 Binder 5 of 7

SOURCE PDF

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 · Beam Power

OTHER		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Heater voltage	**12.6 V**	—
Heater current	**600 mA**	—
Maximum DC plate voltage	**770 V**	HorizontalDeflection
Peak positive-pulse plate voltage	**6500 V**	HorizontalDeflection
Maximum screen voltage	**220 V**	HorizontalDeflection
Average cathode current	**175 mA**	HorizontalDeflection
Plate dissipation	**17.5 W**	—
Heater warm-up time	**11 s**	ControlledWarmup

CHARACTERISTIC		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Plate voltage	**250 V**	ClassA
Screen voltage	**150 V**	ClassA
Plate current	**70 mA**	ClassA
Plate resistance	**15000 ohm**	ClassA
Transconductance	**7100 uS**	ClassA

CAPACITANCE		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Grid-to-plate capacitance	**0.26 pF**	—

TUBE TINKER
An independent reference for electronic tubes, vacuum tubes, and their source documents.

© 2026 Tube Tinker