

ELECTRONIC TUBE REFERENCE

12J7GT

Voltage - Pentode Sharp Cutoff (single) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
PENTODE

Brimar RF pentode with documented pentode and triode-connected Class A operation. Its 12.6 V heater and high anode impedance suit fixed-gain high-frequency signal-amplifier service.

GENERAL CHARACTERISTICS

BASE DESIGNATION	7R	BASE PINS	7
NOMINAL HEATER	12.6 V / 150 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

7R - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN1 – SH	A	SH – Internal Shield	CONNECTED
PIN2 – H	–	H – Heater	CONNECTED
PIN3 – P	A	P – Plate (Anode)	CONNECTED
PIN4 – G2	A	G2 – Screen Grid	CONNECTED
PIN5 – G3	A	G3 – Suppressor Grid	CONNECTED
PIN7 – H	–	H – Heater	CONNECTED
PIN8 – K	A	K – Cathode	CONNECTED
CAP1 – G1	A	G1 – Control Grid	CONNECTED

SECTION RATINGS

SECTION1 Pentode	
TRANSCONDUCTANCE	0.001225 S
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM SCREEN VOLTAGE	125 V
MAXIMUM PLATE DISSIPATION	0.75 W
MAXIMUM SCREEN DISSIPATION	0.1 W
Pentode connection promoted; triode-connection data retained in parameters.	

12J7GT — Sharp-Cutoff Pentode

An indirectly heated, octal-base sharp-cutoff pentode designed for radio frequency amplification, voltage amplification, and anode bend detector service in AC/DC series-string receivers.

Overview

The **12J7GT** is a triple-grid, sharp-cutoff general-purpose R.F. pentode. It features an indirectly heated unipotential cathode and is housed in a glass envelope with an eight-pin international octal base. The tube was developed primarily for series-heater operation in AC/DC receivers, where its low-current heater design significantly reduces overall power consumption compared to older 0.3 A heater designs.

In terms of electrical characteristics, ratings, and physical dimensions, the 12J7GT is identical to the 6.3 V **6J7GT** (and closely related to the **6J7** and **6J7G**), differing only in its heater requirements. It also shares similar electrical characteristics with the older **6C6** type, except for its heater and capacitance ratings.

Physical Construction and Pinout

The 12J7GT is constructed with a glass envelope (often designated as a T-9 or midget bulb) and a small 7-pin octal base. The physical dimensions of the tube typically include a maximum overall height of 2 7/8 inches to 3 5/16 inches, and a maximum diameter of 1 5/16 inches.

The tube utilizes the **7R** basing arrangement, which features a top cap for the control grid connection. Pin 1 is internally connected to the metal shell to provide shielding. The detailed pin connections, viewed from the bottom of the base, are as follows:

Pin Number	Electrode Connection
Pin 1	Metal Shell / Shield (C.S.)
Pin 2	Heater (H)
Pin 3	Plate (P)
Pin 4	Screen Grid (Grid 2 / <u>G2</u>)

Pin Number	Electrode Connection
Pin 5	Suppressor Grid (Grid 3 / G3)
Pin 6	No Pin (NP)
Pin 7	Heater (H)
Pin 8	Cathode (K)
Top Cap	Control Grid (Grid 1 / G1)

Heater Ratings

The heater is designed for series-string AC or DC operation. The nominal heater ratings are:

- **Heater Voltage:** 12.6 V (historically also registered as 12.5 V)
- **Heater Current:** 0.15 A (150 mA)
- **Heating Method:** Indirectly heated, unipotential cathode

Electrical Ratings

The maximum electrical ratings for the 12J7GT depend on whether the tube is operated in a standard pentode configuration or a triode-connected configuration (where the suppressor grid and screen grid are tied directly to the plate).

Parameter	Triode Connection	Pentode Connection
Maximum Plate Voltage	250 V	300 V
Maximum Screen Supply Voltage	—	300 V
Maximum Screen Voltage	—	125 V
Minimum External Control Grid Bias	0 V	0 V
Maximum Plate Dissipation	1.75 W	0.75 W
Maximum Screen Dissipation	—	0.10 W

Reregistration and Standardized Ratings

Under standardized industry reregistrations, additional limits and guidelines were established for the 12J7GT:

- **Suppressor Grid:** Must be connected to the cathode at the socket.
- **Maximum Screen Input:**

- For screen voltages up to 150 V: 0.1 W
- For screen voltages between 150 V and 300 V: Subject to standardized rating curves.
- **Peak Heater-Cathode Voltage:**
 - Heater negative with respect to cathode: 90 V maximum
 - Heater positive with respect to cathode: 90 V maximum

Typical Operating Characteristics

The 12J7GT can be operated as either a Class A1 pentode amplifier or a triode-connected amplifier. Typical operating points and characteristics under these configurations are detailed below:

Pentode Connection

Parameter	Operating Point A	Operating Point B
Plate Voltage	100 V	250 V
Screen Voltage	100 V	100 V
Control Grid Voltage	-3 V	-3 V
Suppressor Grid	Connected to cathode	Connected to cathode
Cathode Bias Resistor	—	1,000 Ω
Plate Current	2.0 mA	2.0 mA
Screen Current	0.5 mA	0.5 mA
Plate Resistance	1.0 M Ω	> 1.0 M Ω (up to 1.5 M Ω)
Transconductance	1,185 μ mhos	1,225 μ mhos (1.25 mA/V)
Amplification Factor	1,185	1,500
Grid Voltage for Cathode Current Cut-off	-7 V	-7 V

Triode Connection (Suppressor and Screen Tied to Plate)

Parameter	Operating Point A	Operating Point B
Plate Voltage	180 V	250 V
Control Grid Voltage	-5.3 V	-8 V
Plate Current	5.3 mA	6.5 mA
Plate Resistance	11,000 Ω	10,500 Ω

Parameter	Operating Point A	Operating Point B
Transconductance	1,800 μmhos	1,900 μmhos
Amplification Factor	20	20

Interelectrode Capacitances

Direct interelectrode capacitances vary depending on the circuit connection and the presence of external shielding.

Pentode Connection

When operated as a pentode with an external shield connected to the cathode, the capacitances are:

- **Control Grid to Plate (Max.):** 0.005 μF
- **Input (Control Grid to Cathode):** 4.6 μF (measured at 4.3 μF in some configurations)
- **Output (Plate to Cathode):** 12.0 μF (measured at 9.0 μF in some configurations)

Triode Connection

When operated in a triode connection without an external shield, the capacitances are:

- **Control Grid to Plate:** 1.8 μF
- **Control Grid to Cathode:** 2.6 μF
- **Plate to Cathode:** 17.0 μF

Application Notes

The 12J7GT is primarily utilized in AC/DC radio receivers. By drawing only 0.15 A of heater current, it consumes half the heater power of comparable 0.3 A tubes. When wired into a series heater string, the 12J7GT requires only a small series resistance to drop the remaining line voltage, eliminating the need for bulky, heat-generating line cords or plug-in drop resistors.

In practical receiver circuits, the tube serves as a high-gain R.F. or I.F. amplifier, a resistance-coupled audio-frequency voltage amplifier, or an anode bend detector. Its sharp-cutoff characteristic allows for stable, high-gain amplification with minimal distortion when biased correctly within its linear operating region.



SOURCE OPERATING CONDITIONS

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1939 Arcturus

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

1939 ARCTURUS

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	250 V	—
Screen-grid voltage	100 V	—
Control-grid voltage	-3 V	—
Plate current	2 mA	—
Screen-grid current	0.5 mA	—



SOURCE OPERATING CONDITIONS

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1948 Brimar Radio Valve Manual

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

1948 BRIMAR RADIO VALVE MANUAL

Section 1 · Pentode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Anode Voltage	250 V	—
Anode Current	2 mA	—
Screen Voltage	100 V	—
Screen Current	0.5 mA	—
Control Grid Voltage	-3 V	—
Cathode Bias Resistor	1000 ohm	—

SOURCE OPERATING CONDITIONS

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195X General Electric Essential Characteristics

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

195X GENERAL ELECTRIC ESSENTIAL CHARACTERISTICS

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	250 V	ClassA;PentodeConnection
Screen voltage	100 V	ClassA;PentodeConnection
Grid voltage	-3 V	ClassA;PentodeConnection
Plate current	2 mA	ClassA;PentodeConnection
Screen current	0.5 mA	ClassA;PentodeConnection

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	10500 ohm	ClassA;TriodeConnection
Transconductance	1900 uS	ClassA;TriodeConnection
Amplification factor	20	ClassA;TriodeConnection

SOURCE OPERATING CONDITIONS

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1961 Ferranti Technical Handbook

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

1961 FERRANTI TECHNICAL HANDBOOK

Section 1 · Pentode

APPLICATION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Application	RF amplifier / anode-bend detector	—



SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

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1961 Tung Sol

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

1961 TUNG SOL

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	12.6 V	—
Heater current	150 mA	—
Triode-connection maximum plate voltage	250 V	TriodeConnection
Triode-connection maximum plate dissipation	1.75 W	TriodeConnection

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Triode-connection plate resistance	11000 ohm	TriodeConnection
Triode-connection transconductance	1800 uS	TriodeConnection

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Pentode grid-to-plate capacitance	0.005 pF	—

TUBE TINKER

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

