

ELECTRONIC TUBE REFERENCE

12K7GT

Voltage - Pentode Remote Cutoff (single) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
PENTODE

Glass-tubular variable-mu RF pentode for receiver RF/IF stages requiring extended cutoff and automatic volume control.

GENERAL CHARACTERISTICS

BASE DESIGNATION	7R	BASE PINS	8
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

SECTION 1 Pentode	
PLATE RESISTANCE	300000 Ω
TRANSCONDUCTANCE	0.00145 S
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM SCREEN VOLTAGE	150 V
<i>Published section data promoted where applicable; additional operating values retained as parameters.</i>	

12K7GT — Remote-Cutoff RF Pentode

The **12K7GT** (also designated as **J5-12K7GT**) is a glass-envelope, remote-cutoff (variable- μ) RF pentode designed for use as a radio-frequency or intermediate-frequency amplifier. It is particularly suited for series-heater AC/DC radio receivers, where its low current requirement optimizes overall power efficiency.

Construction, Heater, and Base Connections

The 12K7GT features a T-9 glass bulb envelope with a small wafer 7-pin octal base with a metal sleeve (base designation B7-27 or 7R). The tube incorporates a coated unipotential cathode and a skirted miniature top cap (C1-3) for the control grid connection. It can be mounted and operated in any position.

The heater is designed for series operation, operating at a nominal voltage of 12.6 V (with some early historical specifications listing 12.5 V) and a current of 0.15 A (150 mA).

- **Heater Power Calculation:** Operating at 12.6 V and 0.15 A, the heater power dissipation is calculated as: $12.6 \text{ V} \times 0.15 \text{ A} = 1.89 \text{ W}$

This 150 mA heater design reduces the total heater power requirement for a receiver by half compared to designs utilizing 0.3 A tubes. Additionally, it minimizes or eliminates the need for large plug-in resistors or specialized line cords by allowing the use of a small series resistance.

The physical dimensions of the 12K7GT are:

- **Maximum Overall Length:** 3-5/16 inches
- **Maximum Seated Height:** 2-3/4 inches
- **Maximum Overall Height:** 2-7/8 inches
- **Maximum Diameter:** 1-5/16 inches

Pinout Configuration

The bottom-view 7R basing arrangement provides the following connections:

- **Pin 1:** Base sleeve / connected to metal shell
- **Pin 2:** Heater (h)
- **Pin 3:** Anode / Plate (a)

- **Pin 4:** Grid 2 / Screen Grid (g₂)
- **Pin 5:** Grid 3 / Suppressor Grid (g₃) [typically connected to Pin 8 at the socket]
- **Pin 6:** No Pin (NP)
- **Pin 7:** Heater (h)
- **Pin 8:** Cathode and internal shield (k, I.S.)
- **Top Cap:** Grid 1 / Control Grid (g₁)

Maximum Ratings

The maximum electrical limits for the 12K7GT under the JETEC and RMA Standard M8-210 rating systems are:

Parameter	Maximum Rating
Plate Voltage	300 V
Grid #2 (Screen) Supply Voltage	300 V
Grid #2 (Screen) Voltage	125 V
Positive DC Grid #1 (Control Grid) Voltage	0 V
Plate Dissipation	2.75 W
Grid #2 Dissipation	0.35 W
Heater-Cathode Voltage	90 V

Typical Operating Conditions and Characteristics

The 12K7GT operates as a Class A1 amplifier. Depending on the plate and screen voltages, the typical operating points and characteristics vary as follows:

Parameter	Operating Point A	Operating Point B	Operating Point C
Plate Voltage	100 V	250 V	250 V
Grid #2 (Screen) Voltage	100 V	100 V	125 V
Grid #1 (Control Grid) Voltage	-1 V to -3 V	-3 V	-3 V
Cathode Bias Resistor	—	—	220 Ω
Plate Current	6.5 to 9.5 mA	7.0 mA	10.5 mA
Grid #2 Current	1.6 to 2.7 mA	1.7 mA	2.6 mA

Parameter	Operating Point A	Operating Point B	Operating Point C
Plate Resistance (approx.)	0.15 to 0.25 MΩ	0.8 MΩ	0.6 MΩ
Transconductance	1,325 to 1,650 μmhos	1,450 μmhos	1,650 μmhos
Amplification Factor	350	1,150	—
Grid #1 Voltage for g_m = 2 μmhos	-38 to -38.5 V	-42 to -42.5 V	-52 to -52.5 V

Interelectrode Capacitances

The direct interelectrode capacitances of the 12K7GT depend on whether an external shield is used.

Capacitance	Without External Shield	With External Shield (No. 308 connected to Pin 8)
Grid to Plate (g_1 to p) (max)	0.005 μμF	0.005 μμF
Input (g_1 to $h + k + g_2 + g_3 +$ shell)	4.0 to 4.6 μμF	4.6 μμF
Output (p to $h + k + g_2 + g_3 +$ shell)	9.0 to 12.0 μμF	12.0 μμF

Application and Performance Curves

The 12K7GT is designed primarily for RF and IF amplifier stages featuring Automatic Volume Control (AVC). Its remote-cutoff characteristic is specifically tailored to minimize cross-modulation in the presence of strong signals.

The performance of the tube is characterized by several key relationships:

- **Plate Characteristics:** Curves of plate voltage versus plate current demonstrate the pentode behavior across control grid voltages ($E_{c1}(/tubes/C1)$) from 0 V to -20 V, under conditions of a 12.6 V heater, 100 V screen grid, and grounded suppressor grid.
- **Grid #2 Characteristics:** Curves of screen grid voltage versus plate current, screen current, and transconductance illustrate the tube's behavior at a plate voltage of 250 V, control grid voltage of -3 V, and grounded suppressor grid.
- **Grid #1 Characteristics:** Curves of control grid voltage versus plate current, screen current, and transconductance (plotted on a semi-logarithmic scale) show the remote-cutoff behavior at a plate voltage of 250 V, screen voltage of 100 V, and grounded suppressor grid.

Related Designations

The 12K7GT is electrically identical to the [6K7GT](#) in its ratings, characteristics, and physical dimensions, differing only in its heater requirements (the [6K7GT](#) utilizes a 6.3 V heater).

Technical Summary

The **12K7GT** is an octal-based, remote-cutoff RF pentode featuring a 12.6 V, 150 mA heater and a unipotential cathode. It is designed for RF and IF amplification in AC/DC series-string receivers, offering excellent cross-modulation performance and AVC compatibility. With a maximum plate voltage rating of 300 V and typical transconductance values ranging from 1,325 to 1,650 μmhos , it provides a highly efficient amplification solution identical in performance to the [6K7GT](#) but optimized for 12.6 V heater circuits.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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	7 mA	—
Screen-grid current	1.7 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	10.5 mA	—
Screen Voltage	125 V	—
Screen Current	2.6 mA	—
Control Grid Voltage	-3 V	—
Cathode Bias Resistor	220 ohm	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Control Grid Voltage for Low Transconductance	-52 V	Transconductance=0.002mA/V


SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

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195X General Electric Essential Characteristics

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195X GENERAL ELECTRIC ESSENTIAL CHARACTERISTICS

Section 1 · Pentode

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Input capacitance	4.6 pF	—
Output capacitance	12 pF	—
Grid-to-plate capacitance	0.005 pF	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	250 V	ClassA
Screen voltage	125 V	ClassA
Grid voltage	-3 V	ClassA
Plate current	10.5 mA	ClassA
Screen current	2.6 mA	ClassA


SOURCE DATA APPENDIX

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

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cutoff characteristic	Variable-mu	—

APPLICATION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Application	RF / IF amplifier	—



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

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	12.6 V	Nominal

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