



ELECTRONIC TUBE REFERENCE

12SR7

Voltage - Triode (with diode, heptode or hexode) electronic tube

CONSOLIDATED TECHNICAL
DATA

3 SECTIONS

CONSTRUCTION

DIODE-DIODE-TRIODE

Double-diode low-mu triode combining detector and audio-amplifier functions in receiving equipment. The paired diodes provide signal and control-voltage rectification while the relatively low-resistance triode offers useful current-driving capability after detection.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	8
NOMINAL HEATER	12.6 V / 150 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

SECTION RATINGS

SECTION1 Diode

No fixed ratings recorded.

Representative of the two diode sections.

SECTION2 Triode

PLATE RESISTANCE	8000 Ω
TRANSCONDUCTANCE	0.0018 S
AMPLIFICATION FACTOR	14
MAXIMUM PLATE VOLTAGE	275 V
MAXIMUM PLATE DISSIPATION	2.8 W
<i>Triode section.</i>	

No fixed ratings recorded.

Added approved missing physical diode section row.

12SR7 — Duplex-Diode Medium-Mu Triode

An indirectly heated, multi-unit vacuum tube containing two diodes and a medium-mu triode in a single envelope, designed for combined detector, audio amplifier, and automatic-volume-control service.

Overview

The **12SR7** (along with its glass-envelope counterpart, the **12SR7-GT**) is a multi-unit receiving tube designed for radio receiver applications. It combines a medium-mu triode with two independent diode units sharing a common, coated unipotential cathode. This configuration allows a single tube to perform the functions of AM detection, automatic volume control (AVC), and low-frequency audio voltage amplification.

The tube features a nominal **12.6 V** heater and utilizes an eight-pin octal base. The standard 12SR7 is housed in an MT-8 metal shell, while the 12SR7-GT is housed in a glass envelope.

Construction, Basing, and Pin Connections

The 12SR7 is constructed with a coated unipotential cathode that is common to both the triode and the two diode units. In the metal-envelope version, an internal shield is connected directly to the cathode. The tube is designed to operate in any mounting position.

Heater Ratings

Parameter	Value
Heater Voltage (AC or DC)	12.6 V
Heater Current	0.15 A
Heating Method	Indirect
Cathode Type	Coated Unipotential

Octal Base Pinout (RMA 8Q)

Using the standard octal base configuration, the pin connections viewed from the bottom of the tube are as follows:

- **Pin 1:** Metal Shell
- **Pin 2:** Triode Grid

- **Pin 3:** Cathode and Internal Shield
- **Pin 4:** Diode Plate Number 2
- **Pin 5:** Diode Plate Number 1
- **Pin 6:** Triode Plate
- **Pin 7:** Heater
- **Pin 8:** Heater

Direct Interelectrode Capacitances

Capacitance values vary slightly depending on the envelope construction and shielding conditions:

- **Metal Envelope (12SR7)** (*with shell connected to cathode and internal shield*):
 - Input: 2.4 μpF
 - Output: 3.6 μpF
 - Plate to Cathode: 2.8 μpF
- **Metal Envelope (12SR7)** (*without external shield*):
 - Input: 3.6 pF
 - Output: 2.8 pF
 - Grid-to-Plate: 2.4 pF
- **Glass Envelope (12SR7-GT)** (*without external shield*):
 - Input: 3.5 pF
 - Output: 3.8 pF
 - Grid-to-Plate: 2.3 pF

Electrical Characteristics and Typical Operation

At typical Class A operating points, the triode section of the 12SR7 provides moderate amplification with a relatively low plate resistance. Under typical operating conditions, the triode exhibits the following characteristics:

- **Plate Voltage:** 250 V
- **Grid Bias Voltage:** -9 V
- **Amplification Factor (μ):** 16
- **Plate Resistance (R_p):** 8,500 Ω
- **Transconductance (G_m):** 1,900 μmhos (1.9 mA/V)
- **Plate Current:** 9.5 mA (*Note: Some specifications list typical plate current as 6.5 mA under these same voltage conditions*)
- **Optimum Load Resistance:** 10,000 Ω
- **Power Output:** 0.30 W (300 mW)

When designing circuits for the triode section, the d-c resistance in the grid circuit must not exceed **1.0 megohm** under rated maximum conditions.

Maximum Ratings

To ensure reliable operation, the operating potentials and currents must be kept within the manufacturer's specified limits. The ratings are defined under both Design Center and Absolute Maximum systems:

Parameter	Design Center	Absolute Maximum
Plate Voltage	250 V	275 V
Plate Dissipation	2.50 W	2.75 W
Diode Operating Current per Plate	0.9 mA	1.0 mA
D-C Heater-Cathode Voltage	90 V	100 V

Resistance-Coupled Amplifier Service

The triode section of the 12SR7 is highly suited for resistance-coupled audio amplifier stages. Operating parameters and performance vary depending on the plate supply voltage (E_{bb}), plate load resistance (R_p), and grid bias method:

Cathode-Bias Operation

Under typical cathode-bias conditions with a grid resistor (R_{g1}) of a non-critical value and a subsequent stage grid resistor (R_s) equal to the plate load resistor:

- **With $R_p = 0.10 \text{ M}\Omega$ and $R_s = 0.10 \text{ M}\Omega$:**
 - At $E_{bb} = 90 \text{ V}$: $R_k = 3,300 \Omega$, Voltage Gain = 10, Peak Output (E_o) = 15 V
 - At $E_{bb} = 180 \text{ V}$: $R_k = 3,000 \Omega$, Voltage Gain = 10, Peak Output (E_o) = 32 V
 - At $E_{bb} = 300 \text{ V}$: $R_k = 2,700 \Omega$, Voltage Gain = 10, Peak Output (E_o) = 46 V
- **With $R_p = 0.25 \text{ M}\Omega$ and $R_s = 0.51 \text{ M}\Omega$:**
 - At $E_{bb} = 90 \text{ V}$: $R_k = 8,200 \Omega$, Voltage Gain = 11, Peak Output (E_o) = 20 V
 - At $E_{bb} = 180 \text{ V}$: $R_k = 7,500 \Omega$, Voltage Gain = 11, Peak Output (E_o) = 36 V
 - At $E_{bb} = 300 \text{ V}$: $R_k = 6,800 \Omega$, Voltage Gain = 11, Peak Output (E_o) = 53 V

Zero-Bias (Grid-Leak Bias) Operation

When operating with a high-value grid resistor ($R_{g1} = 10 \text{ M}\Omega$) and zero applied d-c bias voltage, the cathode resistor is omitted ($R_k = 0 \Omega$):

- **With $R_p = 0.24 \text{ M}\Omega$ and $R_s = 0.24 \text{ M}\Omega$:**
 - At $E_{bb} = 90 \text{ V}$: Voltage Gain = 12, Peak Output (E_o) = 7.8 V
 - At $E_{bb} = 180 \text{ V}$: Voltage Gain = 13, Peak Output (E_o) = 16 V

- At $E_{bb} = 300$ V: Voltage Gain = 13, Peak Output (E_O) = 27 V
- **With $R_p = 0.51$ M Ω and $R_s = 1.0$ M Ω :**
 - At $E_{bb} = 90$ V: Voltage Gain = 13, Peak Output (E_O) = 11 V
 - At $E_{bb} = 180$ V: Voltage Gain = 14, Peak Output (E_O) = 20 V
 - At $E_{bb} = 300$ V: Voltage Gain = 15, Peak Output (E_O) = 28 V

Note: The peak output voltage (E_O) represents the maximum RMS voltage output for five percent (5%) total harmonic distortion. The voltage gain is measured at an output level of 2.0 V RMS.

Technical Summary

The **12SR7** is an octal-based, duplex-diode medium-mu triode featuring a **12.6 V, 0.15 A** heater and a common unipotential cathode. Its triode section provides an amplification factor of **16**, a transconductance of **1,900 μ mhos**, and a plate resistance of **8,500 Ω** under typical Class A operating conditions. Designed primarily for combined detector, AVC, and audio preamplifier service, the tube offers reliable performance in both transformer-coupled and resistance-coupled circuits. For detailed characteristic curves and further operating parameters, reference is made to the electrically similar **6R7G** vacuum tube.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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 2 · Triode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Anode Voltage	250 V	—
Anode Current	6.5 mA	—
Grid Voltage	-9 V	—
Optimum Load	10000 ohm	—
Power Output	0.3 W	—

TUBE TINKER

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and their source documents.

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