



ELECTRONIC TUBE REFERENCE

14R7

Voltage - Radio Detector Converter electronic tube

CONSOLIDATED TECHNICAL DATA

3 SECTIONS

CONSTRUCTION

DIODE-DIODE-PENTODE

Double-diode pentode combining detector, AVC, and signal-amplifier functions. The two diode plates perform detection and control-voltage rectification while the pentode supplies high-resistance voltage amplification for compact receiver signal chains.

GENERAL CHARACTERISTICS

BASE DESIGNATION	8AE	BASE PINS	8
NOMINAL HEATER	12.6 V / 150 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Common cathode	SECTION CONSTRUCTION	Dissimilar

SECTION RATINGS

SECTION1 Diode	
MAXIMUM CATHODE CURRENT	1 mA
<i>Representative row for the two identical diode sections; maximum continuous current is 1 mA for each diode. Two diode plates share the pentode cathode connection; IsCommonCathode=TRUE from published terminal connections.</i>	

SECTION2 Pentode	
PLATE RESISTANCE	1000000 Ω
TRANSCONDUCTANCE	0.0032 S
MAXIMUM PLATE VOLTAGE	250 V
MAXIMUM SCREEN VOLTAGE	125 V
MAXIMUM PLATE DISSIPATION	2 W
MAXIMUM SCREEN DISSIPATION	0.25 W
<i>Two diode plates share the pentode cathode connection; IsCommonCathode=TRUE from published terminal connections.</i>	

SECTION3 Diode	
MAXIMUM CATHODE CURRENT	1 mA
<i>Added approved missing physical diode section row.</i>	

14R7 — Duplex-Diode Remote-Cutoff Pentode

Overview

The **14R7** is a multi-unit vacuum tube containing a semi-remote-cutoff pentode and two independent diodes within a single envelope, sharing a common cathode. It is designed primarily for service in AC-DC radio receivers as a combined detector, automatic volume control (AVC) rectifier, and audio-frequency amplifier. Alternatively, its pentode section can be utilized as a radio-frequency (R.F.) or intermediate-frequency (I.F.) amplifier.

The tube is constructed with a locking-in eight-pin (Loctal) base and is designed for operation in series-string or parallel heater arrangements, particularly in receivers employing 150 mA heater tubes. The design features exceptionally low coupling capacitance between the diode units and the pentode control grid, minimizing unwanted signal interaction.

Construction, Heater, and Base Pinout

The 14R7 is housed in a T-9 glass envelope with a locking-in 8-pin base (RMA 8AE / D8-1). It features an indirectly heated, coated unipotential cathode that is shared by the pentode and both diode sections. The tube can be mounted in any position.

The physical dimensions of the tube are as follows:

- **Maximum overall length:** 2 25/32 inches
- **Maximum seated height:** 2 1/4 inches
- **Maximum bulb diameter:** 1 3/16 inches

The heater is rated for both AC and DC operation. Under standard conditions, the heater requires:

- **Heater Voltage:** 12.6 V
- **Heater Current:** 0.15 A

Under certain design ratings, nominal heater values are specified as 14.0 V and 0.16 A.

The locking-in 8-pin base provides the following pin connections (viewed from the bottom):

Pin	Connection
Pin 1	Heater
Pin 2	Pentode Plate
Pin 3	Diode Number 2 Plate
Pin 4	Diode Number 1 Plate
Pin 5	Grid Number 2 (Screen Grid)
Pin 6	Grid Number 1 (Control Grid)
Pin 7	Cathode, Grid Number 3 (Suppressor Grid), and Internal Shield
Pin 8	Heater

Electrical Characteristics and Class A1 Operation

The pentode section of the 14R7 operates as a Class A1 amplifier. Typical operating conditions for this section are documented at two different plate voltage levels:

Parameter	Operating Point A	Operating Point B
Plate Voltage	100 V	250 V
Screen (Grid 2) Voltage	100 V	100 V
Control Grid (Grid 1) Voltage	-1 V	-1 V
Plate Current	5.5 mA	5.7 mA
Screen Current	2.2 mA	2.1 mA
Plate Resistance (Approx.)	0.35 MΩ	1.0 MΩ
Transconductance	3,000 μmhos	3,200 μmhos
Grid Voltage for Gm = 10 μmhos	-20 V	-20 V

Parameter	Operating Point A	Operating Point B
Grid Voltage for $G_m = 2 \mu\text{mhos}$	-16 V	-20 V

The diode sections are designed for detection and AVC rectification. When 10 V DC is applied to either diode plate, the average diode current is typically 2.0 mA, with a minimum limit of 0.8 mA per plate.

Maximum Ratings

The maximum ratings for the 14R7 are established under the design-center system:

Rating Parameter	Value
Maximum Plate Voltage	250 V
Maximum Screen Supply Voltage	250 V
Maximum Screen Voltage	100 V to 125 V
Minimum External Grid Bias Voltage	0 V
Maximum Plate Dissipation	2.0 W
Maximum Screen Dissipation	0.25 W
Maximum Heater-Cathode Voltage	90 V
Maximum Continuous Diode Current (Each Diode)	1.0 mA

Resistance-Coupled Amplifier Operation

The pentode section of the 14R7 can be configured as a resistance-coupled audio-frequency voltage amplifier. Typical operating parameters are specified for supply voltages of 90 V, 180 V, and 300 V, using either cathode bias or grid-leak bias:

Cathode-Bias Configuration

In this mode, a cathode resistor (R_k) provides the necessary negative grid bias, and the grid resistor (R_{g1}) is non-critical.

- **With Plate Load (R_p) = 0.10 M Ω and Grid Resistor (R_s) = 0.10 M Ω :**
 - **At 90 V Supply:** $R_k = 900 \Omega$, Screen Resistor (R_{sg}) = 0.22 M Ω , Voltage Gain = 39, Peak Output (E_o) = 9.2 V RMS (at 5% THD).
 - **At 180 V Supply:** $R_k = 540 \Omega$, $R_{sg} = 0.28 \text{ M}\Omega$, Voltage Gain = 59, Peak Output (E_o) = 18 V RMS.
 - **At 300 V Supply:** $R_k = 360 \Omega$, $R_{sg} = 0.38 \text{ M}\Omega$, Voltage Gain = 80, Peak Output (E_o) = 31 V RMS.
- **With Plate Load (R_p) = 0.24 M Ω and Grid Resistor (R_s) = 0.24 M Ω :**

- **At 90 V Supply:** $R_k = 2,000\ \Omega$, $R_{sg} = 0.69\ \text{M}\Omega$, Voltage Gain = 57, Peak Output (E_O) = 8.7 V RMS.
- **At 180 V Supply:** $R_k = 1,100\ \Omega$, $R_{sg} = 0.79\ \text{M}\Omega$, Voltage Gain = 85, Peak Output (E_O) = 18 V RMS.
- **At 300 V Supply:** $R_k = 760\ \Omega$, $R_{sg} = 1.00\ \text{M}\Omega$, Voltage Gain = 125, Peak Output (E_O) = 28 V RMS.

Grid-Leak Bias Configuration

In this mode, the cathode is grounded ($R_k = 0$), and bias is developed across a high-value grid resistor ($R_{g1} = 10\ \text{M}\Omega$).

- **With Plate Load (R_p) = 0.24 MΩ and Grid Resistor (R_g) = 0.24 MΩ:**
 - **At 90 V Supply:** $R_{sg} = 0.64\ \text{M}\Omega$, Voltage Gain = 57, Peak Output (E_O) = 8.5 V RMS.
 - **At 180 V Supply:** $R_{sg} = 0.74\ \text{M}\Omega$, Voltage Gain = 91, Peak Output (E_O) = 18 V RMS.
 - **At 300 V Supply:** $R_{sg} = 0.88\ \text{M}\Omega$, Voltage Gain = 131, Peak Output (E_O) = 30 V RMS.

Interelectrode Capacitances

The direct interelectrode capacitances of the 14R7, measured with an external shield connected to the cathode (Pin 7), are:

- **Input (Control Grid to all other electrodes except Plate):** 5.6 μf
- **Output (Plate to all other electrodes except Control Grid):** 5.3 μf
- **Control Grid to Plate (Maximum):** 0.004 μf
- **Diode 1 Plate to Control Grid (Maximum):** 0.005 μf
- **Diode 2 Plate to Control Grid (Maximum):** 0.002 μf

These low coupling values, especially between the diode plates and the pentode control grid, prevent RF/IF signals in the detector stage from feeding back into the amplifier input.

Related Designations

Brimar documentation indicates that the electrical characteristics and application data for the 14R7 are closely related to the [7R7](#), which utilizes a different heater voltage (typically 6.3 V). For further detailed operating information, reference is made to the [7R7](#).

Technical Summary

The **14R7** is a versatile, loctal-base duplex-diode remote-cutoff pentode designed for multi-function service in compact radio receivers. Combining a high-gain, remote-cutoff pentode with two independent detector diodes, it allows a single tube envelope to perform detection, AVC rectification, and voltage amplification. With a 12.6 V, 0.15 A heater, a maximum plate rating of 250 V, and low internal coupling

capacitances, the 14R7 represents a highly integrated solution for mid-century superheterodyne receiver designs.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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 2 · Pentode

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Input capacitance	5.6 pF	Section1
Output capacitance	5.3 pF	Section1
Grid-to-plate capacitance	0.004 pF	Section1

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	250 V	ClassA
Screen voltage	100 V	ClassA
Control-grid voltage	-1 V	ClassA
Plate current	5.7 mA	ClassA
Screen current	2.1 mA	ClassA
Plate voltage	100 V	ClassA
Screen voltage	100 V	ClassA
Control-grid voltage	-1 V	ClassA
Plate current	5.5 mA	ClassA
Screen current	2.2 mA	ClassA

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	1000000 Ω	ClassA
Transconductance	3200 μS	ClassA
Plate resistance	350000 Ω	ClassA
Transconductance	3000 μS	ClassA



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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 · Diode

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
MinimumDiodeCurrentPerPlate	0.8 mA	10VApplied



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1968 General Electric Co

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

1968 GENERAL ELECTRIC CO

Section 1 · Diode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
HeaterOrFilamentVoltageNominal	12.6 V	—
HeaterOrFilamentCurrentNominal	150 mA	—
MaximumContinuousDiodeCurrentEach	1 mA	EachDiode

1968 GENERAL ELECTRIC CO

Section 2 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate Voltage	250 V	DesignCenter
Maximum Screen Supply Voltage	260 V	DesignCenter
Maximum Screen Voltage	125 V	DesignCenter

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate Dissipation	2 W	DesignCenter
Maximum Screen Dissipation	0.25 W	DesignCenter
Typical Plate Voltage	250 V	ClassA
Typical Screen Voltage	100 V	ClassA
Typical Grid1 Voltage	-1 V	ClassA
Typical Plate Current	5.7 mA	ClassA;PlateVoltage=250V
Typical Screen Current	2.1 mA	ClassA;PlateVoltage=250V

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
GridToPlateCapacitanceMaximum	0.004 pF	PentodeSection
Input Capacitance	5.6 pF	PentodeSection
Output Capacitance	5.3 pF	PentodeSection

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Resistance	1000000 Ohm	ClassA;PlateVoltage=250V
Transconductance	3200 uS	ClassA;PlateVoltage=250V

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