



ELECTRONIC TUBE REFERENCE

14E7

Voltage Radio Detector Converter electronic tube

CONSOLIDATED TECHNICAL DATA

3 SECTIONS

CONSTRUCTION

DIODE-DIODE-PENTODE

Double-diode remote-cutoff pentode combining receiver detection, AVC, and signal amplification. The two diodes provide signal and control-voltage rectification while the pentode supplies useful voltage gain for RF, IF, or audio-frequency service.

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	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

SECTION RATINGS

SECTION1 Diode

No fixed ratings recorded.

Promoted from clearly identified printed ratings/characteristics; additional published operating points and capacitances retained in TUBE_SECTION_PARAMETER. The chart identifies the repeated detector-diode section(s) but does not publish separate diode electrical ratings on this row.

SECTION2 Pentode

PLATE RESISTANCE	700000 Ω
TRANSCONDUCTANCE	0.0013 S
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM SCREEN VOLTAGE	100 V

Promoted from clearly identified printed ratings/characteristics; additional published operating points and capacitances retained in TUBE_SECTION_PARAMETER.

No fixed ratings recorded.

Added approved missing physical diode section row.

14E7 — Duplex-Diode Remote-Cutoff Pentode

The **14E7** is a multi-unit vacuum tube of lock-in construction, combining a remote-cutoff pentode and a duplex-diode detector within a single envelope. It is designed for versatile service in radio receivers, functioning as a combined detector, automatic volume control (AVC) rectifier, and radio-frequency (RF), intermediate-frequency (IF), or audio-frequency (AF) amplifier.

Construction, Heater, and Pinout

The 14E7 features a lock-in construction utilizing an 8-pin metal-lock-in base (designated as the **8AE** basing arrangement) and a T-9 glass bulb. This physical design ensures secure mechanical mounting and reliable electrical contact. The tube can be operated in any mounting position.

The physical dimensions of the envelope are as follows:

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

The tube incorporates a coated unipotential cathode. The heater is designed for either AC or DC operation.

Heater Parameter	Value
Nominal Heater Voltage	12.6 V
Nominal Heater Current	150 mA (0.15 A)

The 8-pin lock-in base connections, viewed from the bottom of the tube, are assigned as follows:

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

Direct Interelectrode Capacitances

The direct interelectrode capacitances of the pentode and diode sections are measured with an external shield (such as an RMA shield #308) connected to the cathode. The typical values are:

- **Grid #1 to Plate (G_1 to P):** 0.005 $\mu\mu\text{F}$ maximum
- **Input (G_1 to $H + K + G_2 + IS$):** 4.6 $\mu\mu\text{F}$
- **Output (P to $H + K + G_2 + IS$):** 5.3 to 5.5 $\mu\mu\text{F}$
- **Diode #1 to Grid #1 ($1P$ to G_1):** 0.013 $\mu\mu\text{F}$ maximum
- **Diode #2 to Grid #1 ($2P$ to G_1):** 0.003 $\mu\mu\text{F}$ maximum

Maximum Ratings

The maximum electrical ratings for the 14E7 must be observed to ensure reliable operation and prevent premature failure. These ratings are interpreted according to standard design limits:

Parameter	Maximum Rating
Heater Voltage	12.6 V
Plate Voltage	250 to 300 V
Grid #2 (Screen) Voltage	100 V
Grid #2 Supply Voltage	300 V
Positive DC Grid #1 Voltage	0 V
Plate Dissipation	2.0 W
Screen Dissipation	0.3 W
Heater-Cathode Voltage	90 V
Diode Voltage Drop (at 0.8 mA per plate)	10 V
Diode Current (per plate, continuous)	1.0 mA

Typical Operating Conditions and Characteristics

The pentode section of the 14E7 is characterized by its remote-cutoff grid characteristic, allowing for effective gain control. Typical operating conditions for the pentode section as an RF or IF amplifier are detailed below:

Parameter	Operating Point A	Operating Point B
Plate Voltage	100 V	250 V
Grid #2 (Screen) Voltage	100 V	100 V

Parameter	Operating Point A	Operating Point B
Grid #1 (Control Grid) Voltage	-1 V	-3 V
Plate Current	10 mA	7.5 mA
Grid #2 Current	2.7 mA	1.6 mA
Plate Resistance (Approx.)	0.15 MΩ	0.7 MΩ
Transconductance	1600 μmhos	1300 μmhos
Grid #1 Voltage for $g_m = 2$ μmhos	-36 V	-42.5 V

Application and Curve Analysis

The remote-cutoff characteristic of the pentode section is clearly demonstrated by the relationship between the control grid voltage and transconductance. At a plate voltage of 250 V and screen voltage of 100 V, a control grid bias of -3 V yields a transconductance of 1300 μmhos . When the grid bias is increased negatively to -42.5 V, the transconductance drops to a nominal 2 μmhos . This wide range of gain control makes the 14E7 highly effective in automatic volume control (AVC) circuits, where strong incoming signals can be attenuated smoothly without introducing significant distortion.

The plate characteristics of the pentode unit show typical pentode behavior, where the plate current rises rapidly at low plate voltages and then flattens into a relatively horizontal plateau. The screen current curves show that screen current is highest at low plate voltages and decreases to a stable level as plate voltage increases.

The two independent diode units share the common cathode and are designed for signal detection and AVC rectification. The rectification characteristics of each diode unit show the relationship between the developed DC voltage and the rectified current. For instance, with an RMS signal input of 30 V, the developed DC voltage varies depending on the diode load resistance (ranging from 0.1 Megohm to 2.0 Megohms), allowing designers to optimize the detection and AVC time constants for specific 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	4.6 pF	Section1
Output capacitance	5.3 pF	Section1
Grid-to-plate capacitance	0.005 pF	Section1

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	250 V	ClassA
Screen voltage	100 V	ClassA
Control-grid voltage	-3 V	ClassA
Plate current	7.5 mA	ClassA
Screen current	1.6 mA	ClassA

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	700000 Ω	ClassA
Transconductance	1300 μS	ClassA

1961 Tung Sol

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

1961 TUNG SOL

Section 2 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Service	Detector / AVC / RF-IF-AF amplifier	—