

ELECTRONIC TUBE REFERENCE

# 15EW7

Power - TV Vertical Output electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

TRIODE-TRIODE

Dissimilar dual triode designed for combined television vertical-deflection oscillator and amplifier service. It combines a small-signal oscillator section with a 10 W power section and published high pulse-voltage ratings.

## GENERAL CHARACTERISTICS

|                     |                   |                      |               |
|---------------------|-------------------|----------------------|---------------|
| BASE DESIGNATION    | 9HF               | BASE PINS            | 9             |
| NOMINAL HEATER      | 14.8 V / 450 mA   | PARALLEL HEATER      | – / –         |
| HEATING             | Indirect          | SERIES OPERATION     | Not specified |
| CATHODE ARRANGEMENT | Separate cathodes | SECTION CONSTRUCTION | Dissimilar    |

## 9HF - TERMINAL PINOUT

| TERMINAL | SECTION | ELEMENT              | STATUS    |
|----------|---------|----------------------|-----------|
| PIN1     | B       | P – Plate (Anode)    | CONNECTED |
| PIN2     | B       | G1 – Control Grid    | CONNECTED |
| PIN3     | B       | G3 – Suppressor Grid | CONNECTED |
| PIN4     | –       | H – Heater           | CONNECTED |
| PIN5     | –       | H – Heater           | CONNECTED |
| PIN6     | A       | P – Plate (Anode)    | CONNECTED |
| PIN7     | A       | G1 – Control Grid    | CONNECTED |
| PIN8     | A       | K – Cathode          | CONNECTED |
| PIN9     | B       | K – Cathode          | CONNECTED |

## SECTION RATINGS

| SECTION1 Triode                                                                                                                                   |               |
|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| PLATE RESISTANCE                                                                                                                                  | 8750 $\Omega$ |
| TRANSCONDUCTANCE                                                                                                                                  | 0.002 S       |
| AMPLIFICATION FACTOR                                                                                                                              | 17.5          |
| MAXIMUM PLATE VOLTAGE                                                                                                                             | 330 V         |
| MAXIMUM PLATE DISSIPATION                                                                                                                         | 1.5 W         |
| MAXIMUM CATHODE CURRENT                                                                                                                           | 22 mA         |
| <i>Promoted from published ratings/characteristics where directly applicable; additional published values retained in TUBE_SECTION_PARAMETER.</i> |               |

| SECTION2 Triode                                                                                                                                   |              |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| PLATE RESISTANCE                                                                                                                                  | 800 $\Omega$ |
| TRANSCONDUCTANCE                                                                                                                                  | 0.0075 S     |
| AMPLIFICATION FACTOR                                                                                                                              | 6            |
| MAXIMUM PLATE VOLTAGE                                                                                                                             | 330 V        |
| MAXIMUM PLATE DISSIPATION                                                                                                                         | 10 W         |
| MAXIMUM CATHODE CURRENT                                                                                                                           | 50 mA        |
| <i>Promoted from published ratings/characteristics where directly applicable; additional published values retained in TUBE_SECTION_PARAMETER.</i> |              |

# 15EW7 — Dissimilar Double Triode

An indirectly heated, dissimilar double triode designed for television vertical-deflection oscillator and vertical-deflection amplifier applications.

## Overview

The **15EW7** is a miniature, dissimilar double triode containing two highly distinct triode units within a single glass envelope. Unit 1 is a medium-mu triode optimized for vertical-deflection oscillator service, while Unit 2 is a low-mu, high-current power triode designed for vertical-deflection amplification.

The 15EW7 belongs to a family of identical tubes that differ only in their heater ratings, which includes the [6EW7](#), [10EW7](#), [19EW7](#), and [20EW7](#).

## Construction, Physical Dimensions, and Basing

The 15EW7 is constructed in a T9 glass bulb with a 9-pin button base (E9-68). It is classified as a neonoval or miniature 9-contact type. The physical dimensions are as follows:

- **Maximum Diameter:** 1.188 inches
- **Maximum Seated Height:** 2.620 inches
- **Maximum Overall Height:** 2.930 inches

The tube utilizes the **9HF** basing arrangement. The pin connections, viewed from the bottom of the tube, are:

- **Pin 1:** Plate of Triode Unit 1 (1P)
- **Pin 2:** Grid of Triode Unit 2 (2G)
- **Pin 3:** Grid of Triode Unit 2 (2G) (internally connected to Pin 2)
- **Pin 4:** Heater (H)
- **Pin 5:** Heater (H)
- **Pin 6:** Plate of Triode Unit 2 (2P)
- **Pin 7:** Grid of Triode Unit 1 (1G)
- **Pin 8:** Cathode of Triode Unit 1 (1K)
- **Pin 9:** Cathode of Triode Unit 2 (2K)

This configuration provides separate cathode connections for each triode, allowing them to be operated at different bias levels, provided heater-to-cathode voltage limits are respected.

## Heater Characteristics and Family Variants

The 15EW7 features an indirectly heated cathode with a controlled warm-up time. The heater characteristics of the 15EW7 and its related family members are detailed below:

| Tube Designation             | Heater Voltage (AC/DC) | Heater Current | Calculated Heater Power | Heater Warm-up Time |
|------------------------------|------------------------|----------------|-------------------------|---------------------|
| <u><a href="#">6EW7</a></u>  | 6.3 V                  | 0.90 A         | 5.67 W                  | —                   |
| <u><a href="#">10EW7</a></u> | 9.7 V                  | 0.60 A         | 5.82 W                  | 11 seconds          |
| <b>15EW7</b>                 | 14.8 V                 | 0.45 A         | 6.66 W                  | 11 seconds          |
| <u><a href="#">19EW7</a></u> | 18.9 V                 | 0.30 A         | 5.67 W                  | 11 seconds          |
| <u><a href="#">20EW7</a></u> | 20.5 V                 | 0.30 A         | 6.15 W                  | 11 seconds          |

## Heater-Cathode Voltage Limits

For all family members, the maximum heater-cathode ratings under the Design-Maximum System are:

- **Heater Negative with Respect to Cathode:**
  - Total DC and Peak: 200 V max
- **Heater Positive with Respect to Cathode:**
  - DC: 100 V max
  - Total DC and Peak: 200 V max

# Electrical Characteristics and Class A1 Operation

The two triode sections of the 15EW7 have highly dissimilar electrical characteristics. Unit 1 is a medium- $\mu$  voltage amplifier, whereas Unit 2 is a low- $\mu$  power triode with low plate resistance and high transconductance.

The typical operating characteristics for each section under Class A1 amplifier conditions are:

| Parameter                                            | Unit 1 (Oscillator) | Unit 2 (Amplifier) |
|------------------------------------------------------|---------------------|--------------------|
| Plate Voltage                                        | 250 V               | 150 V              |
| Grid Voltage                                         | -11 V               | -17.5 V            |
| Amplification Factor                                 | 17.5                | 6.0                |
| Plate Resistance (Approx.)                           | 8,750 $\Omega$      | 800 $\Omega$       |
| Transconductance                                     | 2,000 $\mu$ mhos    | 7,500 $\mu$ mhos   |
| Plate Current                                        | 5.5 mA              | 45 mA              |
| Plate Current (at $E_b = 60$ V, $E_c = 0$ V)         | —                   | 95 mA              |
| Plate Current (at $E_c = -25$ V)                     | —                   | 8 mA               |
| Grid Voltage for 10 $\mu$ A Plate Current (Approx.)  | -20 V               | —                  |
| Grid Voltage for 100 $\mu$ A Plate Current (Approx.) | —                   | -40 V              |

## Direct Interelectrode Capacitances

The approximate unshielded capacitances for each section are:

- **Unit 1:**
  - Grid to Plate: 4.2 pF
  - Grid to Cathode and Heater: 2.2 pF
  - Plate to Cathode and Heater: 0.4 pF
- **Unit 2:**
  - Grid to Plate: 9.0 pF
  - Grid to Cathode and Heater: 7.0 pF
  - Plate to Cathode and Heater: 1.2 pF

# Vertical-Deflection Service and Design-Maximum Ratings

In television receiver applications, the 15EW7 operates in a 525-line, 30-frame system. The maximum ratings and circuit values for each section under these conditions are:

| Rating / Value                                    | Unit 1 (Oscillator) | Unit 2 (Amplifier) |
|---------------------------------------------------|---------------------|--------------------|
| DC Plate Voltage (Max.)                           | 330 V               | 330 V              |
| Peak Positive-Pulse Plate Voltage (Max.)          | —                   | 1,500 V            |
| Peak Negative-Pulse Grid Voltage (Max.)           | 400 V               | 250 V              |
| Peak Cathode Current (Max.)                       | 77 mA               | 175 mA             |
| Average Cathode Current (Max.)                    | 22 mA               | 50 mA              |
| Plate Dissipation (Max.)                          | 1.5 W               | 10 W               |
| Grid-Circuit Resistance (Self-Bias Max.)          | 2.2 M               | 2.2 M              |
| Grid-Circuit Resistance (Grid-Resistor-Bias Max.) | 2.2 M               | 2.2 M              |

Under television vertical deflection service, the peak positive-pulse plate voltage rating of 1,500 V for Unit 2 is subject to a pulse duration limit of 15% of a scanning cycle (which corresponds to 2.5 milliseconds). In stages operating with grid-leak bias, an adequate bias resistor or other suitable means must be employed to protect the tube from damage in the event that excitation is lost.

## Plate Characteristics and Curve Interpretation

The plate characteristics of the two units reflect their distinct design roles:

- **Unit 1:** The average plate characteristics of Unit 1 are identical to those of the Unit 1 section of the [6DE7](#). This section behaves as a standard medium-mu triode, providing stable voltage amplification and oscillation.
- **Unit 2:** The plate characteristics of Unit 2 show a very high current capability at low plate voltages. At zero grid bias ( $E_c = 0$  V), the plate current rises steeply, reaching 95 mA at a plate voltage of only 60 V. As negative grid bias is increased, the curves shift to the right, demonstrating the low plate resistance of 800 ohms. This allows Unit 2 to deliver the high peak currents required to drive the vertical deflection coils of a television picture tube.

## Technical Summary

The **15EW7** is a versatile, dissimilar double triode featuring a **14.8 V, 0.45 A** heater with an 11-second warm-up time. Housed in a T9 bulb with a 9-pin button base and a **9HF** pinout, it combines a medium-mu oscillator triode (Unit 1:  $\mu = 17.5$ ,  $g_m = 2,000 \text{ } \mu\text{mhos}$ ) and a high-power, low-impedance amplifier triode (Unit 2:  $\mu = 6.0$ ,  $g_m = 7,500 \text{ } \mu\text{mhos}$ , 10 W plate dissipation) in a single envelope. It is electrically identical to the [6EW7](#), [10EW7](#), [19EW7](#), and [20EW7](#) except for its specific heater ratings.

## SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

# 1975 RCA RC30

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

1975 RCA RC30

## Section 1 · Triode

| CHARACTERISTIC                                   |                    |                                            |
|--------------------------------------------------|--------------------|--------------------------------------------|
| PARAMETER                                        | PUBLISHED VALUE    | CONDITION / NOTE                           |
| Grid-No                                          | <b>125 volts</b>   | Published value from supplied target entry |
| Plate Resistance (Approx.)                       | <b>0.2 megohm</b>  | Published value from supplied target entry |
| Transconductance                                 | <b>14000</b>       | Published value from supplied target entry |
| Grid-No                                          | <b>2</b>           | Published value from supplied target entry |
| Grid-No.1 Voltage (Approx.) for plate current of | <b>3.5 volts</b>   | Published value from supplied target entry |
| Heater Voltage (ac/dc)                           | <b>14.8 volts</b>  | Published value from supplied target entry |
| Heater Current                                   | <b>0.45 ampere</b> | Published value from supplied target entry |
| Plate Voltage                                    | <b>150 volts</b>   | Published value from supplied target entry |
| Plate Current for plate voltage of               | <b>60 volts</b>    | Published value from supplied target entry |
| Grid Voltage (Approx.) for plate current of      | <b>-20 volts</b>   | Published value from supplied target entry |
| Grid Voltage (Approx.) for plate current of      | <b>-40 volts</b>   | Published value from supplied target entry |
| DC Plate Voltage                                 | <b>330 volts</b>   | Published value from supplied target entry |
| Peak Positive-Pulse Plate Voltage*               | <b>1500 volts</b>  | Published value from supplied target entry |
| Peak Negative-Pulse Grid Voltage                 | <b>250 volts</b>   | Published value from supplied target entry |
| Peak Cathode Current                             | <b>175 mA</b>      | Published value from supplied target entry |
| Average Cathode Current                          | <b>50 mA</b>       | Published value from supplied target entry |
| Plate Dissipation                                | <b>10 watts</b>    | Published value from supplied target entry |
| Heater Voltage (ae/dc)                           | <b>13 volts</b>    | Published value from supplied target entry |
|                                                  |                    |                                            |

| PARAMETER                        | PUBLISHED VALUE   | CONDITION / NOTE                           |
|----------------------------------|-------------------|--------------------------------------------|
| Heater Warm-up Time<br>(Average) | <b>11 seconds</b> | Published value from supplied target entry |

| CAPACITANCE                                                         |                 |                                            |
|---------------------------------------------------------------------|-----------------|--------------------------------------------|
| PARAMETER                                                           | PUBLISHED VALUE | CONDITION / NOTE                           |
| Direct Interelectrode Capacitances (Approx.) :<br>Unit No.1 Unit No | <b>2</b>        | Published value from supplied target entry |
| Grid to Plate                                                       | <b>9 pF</b>     | Published value from supplied target entry |
| Grid to Cathode and Heater                                          | <b>7 pF</b>     | Published value from supplied target entry |
| Plate to Cathode and Heater                                         | <b>1.2 pF</b>   | Published value from supplied target entry |
| Grid to Plate                                                       | <b>10 PF</b>    | Published value from supplied target entry |
| Grid to Cathode and Heater                                          | <b>6.5 PF</b>   | Published value from supplied target entry |