

ELECTRONIC TUBE REFERENCE

14AUP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Fourteen-inch direct-view rectangular television cathode-ray tube intended for series-string heater operation. It uses wide-angle deflection and high-voltage anode operation to provide a compact monochrome receiver picture display.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	6
NOMINAL HEATER	6.3 V / 450 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Cathode Ray	
MAXIMUM PLATE VOLTAGE	16500 V
CRT accelerator/final-anode maximum mapped to MaxPlateVoltage.	

14AUP4 — Electrostatic-Focus Magnetic-Deflection Cathode-Ray Tube

The **14AUP4** is a 14-inch, 90-degree rectangular, direct-view cathode-ray picture tube designed specifically for cathode-drive television applications. It features electrostatic focusing and magnetic deflection. Key design attributes include a short overall length, a spherical gray filter glass faceplate, an aluminized metal-backed screen, and a construction that eliminates the need for an external ion trap magnet. Additionally, it incorporates a high-capacity external conductive coating that, when grounded, acts as a filter capacitor and assists in suppressing radiation. The 14AUP4 is designed for series-string heater operation with a controlled warm-up time.

Construction and Mechanical Characteristics

The 14AUP4 is built with a rectangular glass envelope featuring a spherical gray filter glass faceplate. This faceplate provides a light transmission of approximately 79%, which improves picture contrast under ambient light. The screen uses an aluminized P4 phosphor that produces white fluorescence with medium persistence.

Physical Dimensions

The tube's mechanical design is optimized for a short overall length, reducing the depth required for television cabinets. The physical dimensions are:

- **Overall Length:** $13 \frac{3}{16} \pm \frac{5}{16}$ inches
- **Greatest Bulb Dimensions:**
 - **Diagonal:** $14 \pm \frac{1}{8}$ inches
 - **Width:** $13 \frac{1}{16} \pm \frac{1}{8}$ inches
 - **Height:** $10 \frac{9}{16} \pm \frac{1}{8}$ inches
- **Neck Length:** $5 \frac{1}{2} \pm \frac{3}{16}$ inches
- **Minimum Useful Screen Dimensions:** $9 \frac{1}{2} \times 12 \frac{1}{16}$ inches
- **Minimum Useful Screen Area:** 104 square inches

Connections and Alignment

The tube uses a recessed small cavity cap (J1-21) for the high-voltage anode connection and a small shell duodecal 6-pin base (B6-63) with a 12L basing arrangement. The J1-21 anode contact aligns with pin position No. 6 within a tolerance of ± 30 degrees.

Heater and Electrical Specifications

The 14AUP4 is designed for series-string television receivers, requiring a controlled heater warm-up characteristic to prevent voltage surges across other heaters in the string.

Heater Characteristics

- **Heater Voltage:** 6.3 V
- **Heater Current:** $0.450 \pm 5\%$ A (450 mA)
- **Heater Warm-up Time:** 11 seconds
 - *Warm-up Time Definition:* This is defined as the time required for the voltage across the heater terminals to increase to 5.0 volts when tested in a standard test circuit with an applied voltage (E) of 25 volts and a series resistance (R) of 42 ohms.

Direct Interelectrode Capacitances

- **Cathode to all other electrodes:** 5 μ F
- **Grid No. 1 to all other electrodes:** 6 μ F

- **External conductive coating to anode:** 1500 μF maximum, 1000 μF minimum (this coating must be grounded to serve as a filter capacitor).

Basing and Pin Connections

The 12L basing configuration provides the following pin connections (viewed from the bottom of the base):

Pin Number	Connection
Pin 1	Heater
Pin 2	Grid No. 1
Pin 6	Grid No. 4 (Focusing Electrode)
Pin 10	Grid No. 2
Pin 11	Cathode
Pin 12	Heater
Recessed Cap	Final Anode (Grid No. 3, Grid No. 5, and Collector)

Grid No. 3, Grid No. 5, and the Collector are connected internally and are referred to collectively as the "Final Anode".

Absolute Maximum Ratings

The absolute maximum ratings represent the limiting values of operation for the 14AUP4:

Parameter	Absolute Maximum Value
Final Anode Voltage	16,500 V DC
Grid No. 4 Voltage (Focusing Electrode)	-500 to 1,100 V DC
Grid No. 2 to Grid No. 1 Voltage	70 V DC
Cathode to Grid No. 1 Voltage (Positive Bias)	150 V DC
Cathode to Grid No. 1 Voltage (Negative Peak)	0 V DC
Peak Heater-Cathode Voltage (Warm-up, ≤ 15 seconds)	450 V
Peak Heater-Cathode Voltage (After Warm-up)	200 V
Heater Positive with Respect to Cathode	200 V

Parameter	Absolute Maximum Value
Grid No. 1 Circuit Resistance	1.5 Max. Megohms

Typical Operating Conditions and Performance

Under typical operating conditions, the 14AUP4 is configured as follows:

- **Anode Voltage:** 12,000 V DC
- **Grid No. 2 to Grid No. 1 Voltage:** 50 V DC
- **Grid No. 4 to Grid No. 1 Voltage for Focus (at 100 μ A cathode current):** 0 to $\pm$ 350 V DC
- **Cathode to Grid No. 1 Voltage for Cut-off:** 30 to 50 V DC

Focus and Cut-off Characteristics

- **Spot Cut-off and Cathode Current:** The tube has a maximum spot cut-off of 50 volts and is capable of a minimum cathode current of 1000 microamperes when operated in cathode drive with a Grid No. 2 voltage of 50 volts.
- **Focus Electrode Modulation:** The focus electrode (Grid No. 4) may be modulated to improve overall focus across the screen.
- **Raster Extinction:** The typical cathode-to-grid-cutoff voltage of 30 to 50 V is specified for the visual extinction of a focused raster. Extinction of a stationary focused spot requires these values to be increased by approximately 5 volts.
- **Cut-off Voltage Sensitivity:** The cut-off voltage changes by approximately 2% for every 1 kV change in anode voltage.
 - *Calculation Example:* If the nominal cut-off voltage is 40 V at an anode voltage of 12 kV, a 1 kV increase in anode voltage to 13 kV results in a cut-off voltage change of approximately 2%. This is calculated as: $\text{Change} = 40 \text{ V} \times 0.02 = 0.8 \text{ V}$ Thus, the new cut-off voltage would be approximately 40.8 V.

Technical Summary

The **14AUP4** is a specialized 14-inch rectangular cathode-ray tube designed for cathode-drive television applications. It features a 90-degree diagonal deflection angle (85-degree horizontal), electrostatic focusing via Grid No. 4, and magnetic deflection. Its design incorporates an aluminized P4 white phosphor screen, a 79% transmission gray filter glass faceplate, and a grounded external conductive coating that provides 1000 to 1500 μ F of filter capacitance. Operating with a 6.3 V, 450 mA heater optimized for series-string warm-up (11 seconds), the tube operates typically at an anode voltage of 12,000 V, providing sharp focus and high cathode current capability without requiring an external ion trap magnet.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1963 Rauland

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

1963 RAULAND

Section 1 · Cathode Ray

OTHER

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	6.3 V	—
Heater current	450 mA	—
Typical anode/accelerator voltage	12000 V	—

CAPACITANCE

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode to all other electrodes capacitance	5 pF	—

CHARACTERISTIC

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Deflection angle	85 deg	—

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