

ELECTRONIC TUBE REFERENCE

13AP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Direct-view television picture tube with aluminized screen and magnetic deflection. Designed for high-voltage monochrome television display service, it typically operates near 12 kV at the anode and uses a 6.3 V, 0.45 A heater.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
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	15000 V
CRT anode/ultor voltage is represented in MaxPlateVoltage; additional electrode, drive, optical, and capacitance data retained as parameters.	

13AP4 Cathode Ray Tube

An indirectly heated, electrostatic-focus, magnetic-deflection cathode ray tube featuring a 13-inch screen, a 110-degree diagonal deflection angle, and a short neck design. The tube is engineered specifically for cathode drive applications.

Overview

The **13AP4** is a specialized cathode ray tube (CRT) featuring a 13-inch screen with a filled rim and a short 4 1/4-inch neck. It utilizes a straight electron gun design that operates without the need for an external ion trap. The tube is designed for cathode drive service, operating with a nominal 6.3-volt, 450-

milliampere heater and a 50-volt Grid No. 2 configuration. Focusing is achieved electrostatically, while beam deflection is handled magnetically.

Mechanical and Optical Specifications

The physical construction of the 13AP4 incorporates a J-101-A1 glass bulb, a J1-21 small cavity cap bulb contact, and a B7-208 small button Neoeightar 7-pin base. The basing configuration is designated as 8HR.

Physical Dimensions

- **Overall Length:** $9 \frac{17}{64} \pm \frac{1}{4}$ inches
- **Neck Length:** $4 \frac{1}{4} \pm \frac{1}{8}$ inches
- **Greatest Dimensions (Metal Rim):**
 - Diagonal: $14 \frac{3}{8} \pm \frac{1}{16}$ inches
 - Width: $11 \frac{13}{16} \pm \frac{1}{16}$ inches
 - Height: $9 \frac{7}{16} \pm \frac{1}{16}$ inches
- **Minimum Useful Screen Dimensions (Projected):**
 - Diagonal: $11 \frac{15}{16}$ inches
 - Horizontal Axis: $10 \frac{1}{2}$ inches
 - Vertical Axis: 8 inches
 - Total Area: 79 square inches

Optical Characteristics

- **Phosphor:** P4 Aluminized
- **Light Transmittance at Center:** Approximately 52%
- **Antireflection Treatment:** None
- **Implosion Protection:** Filled Rim

Installation and Handling

To prevent mechanical stress on the tube, the socket for the B7-208 base must not be rigidly mounted. It should feature flexible leads and be allowed to move freely so that the circuit wiring cannot impress lateral strains through the socket contacts onto the base pins. The bottom circumference of the base wafer is designed to fall within a $1 \frac{3}{4}$ -inch diameter circle concentric with the bulb axis.

The external conductive coating of the tube must be grounded. When cleaning the coating area, only a soft, dry, lint-less cloth should be used.

Electrical Ratings and Operating Conditions

All voltage values, unless otherwise specified, are positive and measured with respect to Grid No. 1. The tube is rated under the Design Maximum System.

Design Maximum Ratings

- **Maximum Anode Voltage:** 15,000 V
- **Minimum Anode Voltage:** 8,000 V
- **Grid No. 4 (Focusing Electrode) Voltage:** +1,100 to -500 V
- **Maximum Grid No. 2 Voltage:** 60 V
- **Minimum Grid No. 2 Voltage:** 25 V
- **Maximum Grid No. 1 Circuit Resistance:** 1.5 M Ω

Cathode Voltage Limits

- **Maximum Negative Value:** 0 V DC
- **Maximum Negative Peak Value:** 2 V
- **Maximum Positive Value:** 100 V DC
- **Maximum Positive Peak Value:** 150 V

Heater and Heater-Cathode Limits

- **Heater Voltage Range:** 5.8 V to 6.9 V (6.3 V nominal)
- **Heater Current at 6.3 V:** 450 $\pm$ 20 mA
- **Heater Warm-up Time:** 11 seconds
- **Maximum Heater-Cathode Voltage (Heater negative with respect to cathode):**
 - During warm-up period (not to exceed 15 seconds): 450 V
 - After equipment warm-up period: 200 V
- **Maximum Heater-Cathode Voltage (Heater positive with respect to cathode):** 200 V

Typical Operating Conditions (Cathode Drive Service)

Under typical operating conditions, the voltages are configured as follows (measured positive with respect to Grid No. 1):

- **Anode Voltage:** 12,000 V DC
- **Grid No. 4 Voltage (Focusing Electrode):** 250 V DC
- **Grid No. 2 Voltage:** 50 V DC
- **Cathode Voltage (for visual extinction of focused raster):** 35 to 55 V DC

While the typical Grid No. 4 focusing voltage is listed as 250 V DC, individual tubes will exhibit satisfactory focus at some value between 0 and +400 V. This typical focus rating is specified with the combined Grid No. 4 bias voltage and video signal voltage adjusted to provide an anode current of 100 microamperes on a 10 1/2" by 8" pattern (using an RCA [2F21](#) monoscope or equivalent).

Interelectrode Capacitances and Resistance

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

- **External conductive coating to anode:** 550 µpf minimum / 800 µpf maximum (measured with the implosion protection hardware connected to the external coating)
- **Resistance between external conductive coating and implosion protection hardware:** 50 megohms minimum

Basing and Pin Connections

The 13AP4 uses the JEDEC 8HR basing arrangement. The J1-21 ultor contact aligns with Pin Position No. 4 with an angular tolerance of ± 30 degrees, and is located on the same side of the tube as Pin No. 4.

Pin Number	Connection
Pin 1	Heater
Pin 2	Grid No. 1
Pin 3	Grid No. 2
Pin 4	Grid No. 4
Pin 5	No Connection
Pin 6	Grid No. 1
Pin 7	Cathode
Pin 8	Heater
Cap	Ultor (CL-G3-G5)

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1964 RMA EIA

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

1964 RMA EIA

Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Minimum anode voltage	8000 V	—
Maximum anode voltage	15000 V	—
Minimum anode voltage	8000 V	—
Typical anode voltage	12000 V	—
Maximum grid No. 2 voltage	60 V	—
Maximum heater voltage	6.9 V	—
Minimum heater voltage	5.8 V	—

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater warm-up time	1 s	—

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid No. 1 to other electrodes capacitance	6 pF	—
Cathode to other electrodes capacitance	5 pF	—