

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA
1 SECTION
CONSTRUCTION
CATHODERAY

11AP4

Specialized - Cathode Ray electronic tube

Eleven-inch P4 cathode-ray picture tube documented for direct-view television display service. Manufacturer data support a conventional high-voltage CRT function; the surviving source is comparatively terse, so specialized properties are not inferred.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	12
NOMINAL HEATER	6.3 V / 600 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Cathode Ray
<i>No fixed ratings recorded.</i>
<i>CRT anode/focus/deflection data are preserved in parameters rather than forced into ordinary plate/screen fields.</i>

11AP4 — Electrostatic-Focus Magnetic-Deflection Cathode Ray Tube

The **11AP4** is an 11-inch rectangular glass picture tube designed for television display applications. It features electrostatic focusing, magnetic deflection with a 110-degree diagonal deflection angle, and an integral plastic implosion barrier. The tube is characterized by its lightweight construction, short overall length, small neck diameter, and a non-ion trap gun optimized for operation at an intermediate Grid No. 2 voltage in cathode-drive circuits.

Mechanical Design and Physical Dimensions

The 11AP4 features a spherical gray faceplate and a rectangular glass bulb. Its compact mechanical design is defined by the following physical specifications:

- **Overall Length:** $8\text{-}15/16 \pm 1/4$ inches
- **Neck Length:** $4\text{-}1/4 \pm 1/8$ inches
- **Greatest Dimensions of Tube:**
 - **Diagonal:** $10\text{-}15/16 \pm 1/8$ inches
 - **Width:** $9\text{-}13/16 \pm 1/8$ inches
 - **Height:** $8\text{-}1/16 \pm 1/8$ inches
- **Minimum Useful Screen Dimensions (Projected):**
 - **Diagonal:** $10\text{-}1/4$ inches
 - **Horizontal Axis:** 9 inches
 - **Vertical Axis:** $7\text{-}1/16$ inches
 - **Useful Area:** 60 square inches

Bulb Contact and Basing

The high-voltage anode connection is made via a **JEDEC No. J1-21** bulb contact. This contact is aligned with base Pin No. 4 within a tolerance of ± 30 degrees. The tube uses a **JEDEC No. B7-208** or **B7-237** base, corresponding to the **8HR** basing diagram.

To prevent mechanical strain, the tube should be connected using a non-rigidly mounted socket with flexible leads. The bottom circumference of the base wafer is designed to fall within a 1-3/4 inch diameter circle concentric with the bulb axis.

Basing Pinout (8HR)

The pin connections, viewed from the bottom of the base, are:

Pin	Connection
1	Heater
2	Grid No. 1
3	Grid No. 2
4	Grid No. 4 (Focusing Electrode)
6	Grid No. 1
7	Cathode
8	Heater
Recessed Cap	Anode (J1-21 Contact)

Electrical and Optical Characteristics

The 11AP4 operates with an indirectly heated cathode. The heater is designed with a controlled warm-up time to facilitate integration into receiver circuits.

- **Heater Voltage:** 6.3 V
- **Heater Current:** 450 ± 23 mA
- **Heater Warm-Up Time:** 11 seconds
- **Direct Interelectrode Capacitances:**
 - **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:** 750 pF maximum, 500 pF minimum

Optical and Screen Characteristics

The tube utilizes a **P4 Aluminized** phosphor screen. The aluminized layer increases light output and prevents screen charging. The spherical gray faceplate has an approximate light transmittance of **48 percent** at the center, which helps maintain contrast under ambient light.

Deflection Angles

The magnetic deflection system is designed for wide-angle scanning:

- **Diagonal Deflection:** 110 degrees
- **Horizontal Deflection:** 99 degrees
- **Vertical Deflection:** 82 degrees

The reference line of the deflection yoke is determined by the intersection of the plane C-C of an EIA No. 126 gage with the glass funnel.

Design Maximum Ratings

The following limits are established under the **Design Maximum System**. Unless otherwise specified, all voltage values are positive and measured with respect to Grid No. 1.

- **Maximum Anode Voltage:** 15,000 V
- **Minimum Anode Voltage:** 9,000 V
- **Grid No. 4 (Focusing Electrode) Voltage:** -500 V to +1,000 V
- **Maximum Grid No. 2 Voltage:** 250 V
- **Minimum Grid No. 2 Voltage:** 100 V
- **Cathode Voltage:**
 - **Maximum Positive DC Value:** 140 V
 - **Maximum Positive Peak Value:** 200 V
 - **Maximum Negative DC Value:** 0 V
 - **Maximum Negative Peak Value:** 2 V

- **Maximum Heater Voltage:** 6.9 V
- **Minimum Heater Voltage:** 5.7 V

Heater-Cathode Voltage Limits

To prevent insulation breakdown, the voltage difference between the heater and the cathode must not exceed the following limits:

- **Heater Negative with respect to Cathode:**
 - *During Warm-Up Period (not to exceed 15 seconds):* 410 V maximum
 - *After Equipment Warm-Up Period:* 200 V maximum
- **Heater Positive with respect to Cathode:** 200 V maximum

Typical Operating Conditions (Cathode-Drive Service)

In typical cathode-drive service, the video signal is applied directly to the cathode, with Grid No. 1 acting as a reference. The typical operating parameters are:

- **Anode Voltage:** 11,000 V DC
- **Grid No. 4 (Focusing Electrode) Voltage:** 250 V DC
- **Grid No. 2 Voltage:** 150 V DC
- **Cathode to Grid No. 1 Voltage for Cut-off:** 31 V to 49 V DC (measured at visual extinction of a focused raster)

Focus Range

Although the typical Grid No. 4 voltage is specified as 250 V DC, individual tubes will achieve satisfactory focus at some value between **0 and 400 volts**. This focus range is specified with the combined Grid No. 1 bias voltage and video-signal voltage adjusted to produce an anode current of 150 μ A on a 9-inch by 7-1/16-inch pattern (using an RCA [2F21](#) monoscope or equivalent as the signal source).

Maximum Circuit Values and Protection

To ensure reliable operation and protect the tube from damage due to internal arcs, the following circuit resistance limits must be maintained:

- **Maximum Grid No. 1 Circuit Resistance:** 1.5 megohms
- **Minimum Grid No. 2 Circuit Resistance:** 0.1 megohms
- **Minimum Focusing Electrode Circuit Resistance:** 0.1 megohms

It is highly advisable to include protective resistance in the Grid No. 2 and focusing electrode electrical circuits to prevent damage to the tube. If applicable, a single common resistor may be used for both of these circuits.

Technical Summary

The **11AP4** is an 11-inch rectangular glass cathode ray tube featuring electrostatic focus and 110-degree magnetic deflection. It is designed with an integral plastic implosion barrier, an aluminized P4 screen, and a spherical gray faceplate with 48% light transmittance. Operating with a 6.3 V, 450 mA heater, the tube is optimized for cathode-drive television applications. It operates at a typical anode voltage of 11,000 V, with a focusing electrode range of 0 to 400 V and a Grid No. 2 voltage of 150 V. Circuit designers must observe the Design Maximum ratings, particularly the heater-to-cathode voltage limits and the minimum circuit resistance requirements for Grid No. 2 and the focusing electrode.