

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

11BP4

1 SECTION
CONSTRUCTION
CATHODERAY

Specialized - Cathode Ray electronic tube

Eleven-inch P4 cathode-ray picture tube for high-voltage direct-view display service. Manufacturer ratings place the anode in roughly the 9-15 kV range and provide an adjustable focusing-electrode voltage for obtaining a sharp raster.

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.	

11BP4 Cathode Ray Tube

The **11BP4** is an 11-inch rectangular glass cathode ray tube designed primarily for television receiver applications. It features electrostatic focusing and magnetic deflection with a nominal 110-degree diagonal deflection angle. The tube is characterized by its lightweight construction, short overall length, small neck diameter, and a non-ion trap gun designed to operate at intermediate Grid No. 2 voltages, making it particularly suited for cathode-drive circuitry. Its screen is aluminized to enhance light output and prevent screen charging, and it includes an external conductive coating that acts as a filter capacitor when properly grounded.

Physical and Mechanical Design

The 11BP4 utilizes a rectangular glass envelope with a spherical gray faceplate. The physical dimensions and mechanical characteristics of the tube are highly compact:

- **Overall Length:** $8-15/16 \pm 1/4$ inches
- **Neck Length:** $4-1/4 \pm 1/8$ inches
- **Greatest Bulb Dimensions:**
 - Diagonal: $10-7/8 \pm 1/8$ inches
 - Width: $9-3/4 \pm 1/8$ inches
 - Height: $8-1/8$ inches
- **Minimum Useful Screen Dimensions (Projected):**
 - Diagonal: $10-1/4$ inches
 - Horizontal Axis: 9 inches
 - Vertical Axis: $7-1/16$ inches
 - Total Area: 60 square inches

The tube incorporates a JEDEC No. J1-21 recessed bulb contact for the high-voltage anode connection and a JEDEC No. B7-208 base. The basing configuration is designated as 8HR. The anode bulb contact is aligned with base pin number 4 within a tolerance of ± 30 degrees. For installation, a non-rigidly mounted socket with flexible leads is required, and the bottom circumference of the base wafer must fall within a $1-3/4$ inch diameter circle concentric with the bulb axis.

Electrical and Optical Characteristics

The 11BP4 is equipped with an indirectly heated cathode. The heater is designed to operate within a narrow voltage range and features a controlled warm-up characteristic:

Parameter	Value
Nominal Heater Voltage	6.3 V
Heater Current (at 6.3 V)	450 ± 23 mA
Heater Warm-up Time	11 seconds

Calculation of Nominal Heater Power: Using the nominal heater voltage of 6.3 V and nominal heater current of 0.45 A, the nominal heater power is calculated as: $6.3 \text{ V} \times 0.45 \text{ A} = 2.835 \text{ W}$

Deflection and Capacitance

The tube achieves wide-angle deflection using magnetic fields, with approximate deflection angles as follows:

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

Direct interelectrode capacitances are kept low to maintain signal integrity:

- **Cathode to all other electrodes:** approximately 0.5 uuf
- **Grid No. 1 to all other electrodes:** approximately 0.6 uuf
- **External conductive coating to anode:** 400 uuf minimum to 700 uuf maximum

The optical system utilizes a P4 aluminized phosphor screen. The center light transmittance of the spherical gray faceplate is approximately 80 percent.

Basing Configuration (8HR)

The 8HR base connection scheme, viewed from the bottom of the tube, provides the following pin assignments:

- **Pin 1:** Heater
- **Pin 2:** Grid No. 1
- **Pin 3:** Grid No. 2
- **Pin 4:** Focusing Electrode (Grid No. 4)
- **Pin 6:** Grid No. 1
- **Pin 7:** Cathode
- **Pin 8:** Heater
- **Recessed Bulb Contact:** Anode

Ratings and Operating Conditions

The 11BP4 is rated under the Design Maximum System. Unless otherwise specified, all voltage values are positive and measured with respect to Grid No. 1.

Design Maximum Ratings

- **Anode Voltage:** 9,000 V minimum to 15,000 V maximum
- **Grid No. 4 (Focusing Electrode) Voltage:** -500 V to +1000 V
- **Grid No. 2 Voltage:** 100 V minimum to 250 V maximum
- **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
- **Heater Voltage:** 5.7 V minimum to 6.9 V maximum
- **Maximum Heater-Cathode Voltage:**
 - *Heater negative with respect to cathode:* 410 V during an initial warm-up period not exceeding 15 seconds; 200 V after the equipment warm-up period.
 - *Heater positive with respect to cathode:* 200 V.

Typical Operating Conditions (Cathode-Drive Service)

Under typical operating conditions, the tube is configured as follows:

- **Anode Voltage:** 11,000 V DC
- **Grid No. 4 Voltage:** 200 V DC (Individual tubes will achieve satisfactory focus at some value between 0 V and 400 V DC when evaluated with an anode current of 150 μ A on a 9" x 7-1/16" pattern).
- **Grid No. 2 Voltage:** 150 V DC
- **Cathode-to-Grid No. 1 Cutoff Voltage:** 31 V to 49 V (defined by the visual extinction of a focused raster).

Circuit Design and Safety Constraints

To ensure reliable operation and prevent damage to the tube, specific circuit resistance limits must be observed:

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

It is highly recommended to incorporate protective resistance in both the Grid No. 2 and focusing electrode electrical circuits. If applicable, a single common resistor may be shared between both of these circuits to safeguard the tube against internal arcing or voltage surges.

Technical Summary

The **11BP4** is a compact, lightweight, 11-inch rectangular glass cathode ray tube featuring electrostatic focus and 110-degree magnetic deflection. Designed specifically for cathode-drive applications, it operates with a nominal 6.3 V heater and utilizes a non-ion trap gun configuration. With its aluminized P4 screen, spherical gray faceplate, and integrated external conductive coating, the 11BP4 provides a highly integrated display solution. Circuit designers must adhere to the Design Maximum ratings, particularly regarding heater-cathode voltage differentials and minimum circuit resistances on Grid No. 2 and the focusing electrode, to ensure stable and long-term performance.

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	9000 V	—
Maximum anode voltage	15000 V	—
Minimum anode voltage	9000 V	—
Maximum grid No. 2 voltage	250 V	—
Minimum grid No. 2 voltage	100 V	—
Typical grid No. 2 voltage	150 V	—
Maximum heater voltage	4 V	—
Minimum heater voltage	5.7 V	—
Grid No. 4 focusing voltage range	500–1000 V	—

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater warm-up time	11 s	—

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid No. 1 to other electrodes capacitance	6 pF	—
Cathode to other electrodes capacitance	5 pF	—
External conductive coating capacitance	700 pF	—

An independent reference for electronic tubes, vacuum tubes,
and their source documents.

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