

ELECTRONIC TUBE REFERENCE

16BSP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Sixteen-inch P4 high-voltage direct-view picture tube documented by National Video. Its typical anode voltage is about 15 kV with an 18 kV maximum, consistent with monochrome television receiver display service.

GENERAL CHARACTERISTICS

BASE DESIGNATION	8HR	BASE PINS	8
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	18000 V
MAXIMUM SCREEN VOLTAGE	60 V
MAXIMUM HEATER-CATHODE VOLTAGE	180 V
CRT anode and grid-2 maximum ratings are promoted from the printed ratings block; other CRT-specific focus/drive/deflection values are preserved in parameters.	

16BSP4 — Electrostatic-Focus Cathode-Ray Tube

Overview

The **16BSP4** is a 16-inch, 114-degree deflection cathode-ray tube (CRT) designed primarily for television display applications. It features a rectangular screen, a space-saving short neck length of 4 3/8 inches, a banded construction (tension band), and a coated funnel. The tube incorporates an aluminized P4

phosphor screen, an electrostatic focusing system, and a straight electron gun that does not require an ion trap. It is specifically designed for cathode-drive service, utilizing a low Grid No. 2 voltage of 50 volts.

Mechanical Design and Physical Dimensions

The 16BSP4 is built with a J125-B1 bulb and utilizes a JEDEC J1-21 recessed small cavity cap for the high-voltage ultor connection. The tube's physical dimensions and mechanical features include:

- **Overall Length:** $10 \frac{17}{32} \pm \frac{5}{16}$ inches
- **Neck Length:** $4 \frac{3}{8} \pm \frac{1}{8}$ inches
- **Greatest Dimensions:**
 - **Width:** $13 \frac{15}{16}$ inches (maximum)
 - **Height:** $11 \frac{11}{32}$ inches (maximum)
- **Minimum Useful Screen Dimensions (Projected):**
 - **Diagonal:** $14 \frac{7}{8}$ inches
 - **Horizontal Axis:** $12 \frac{15}{16}$ inches
 - **Vertical Axis:** $10 \frac{1}{4}$ inches
 - **Total Area:** 125 square inches
- **Bulb Contact Alignment:** The J1-21 ultor contact aligns with pin position No. 2 with an angular tolerance of ± 30 degrees. The ultor terminal is located on the same side of the tube as Pin No. 2.
- **Tension Band:** The tube features a tension band (banded design) for implosion protection. The tension band clip may extend an additional 0.075 inches beyond the specified envelope dimensions.

The external funnel of the tube is coated with a conductive coating that must be grounded. A transparent insulating coating is also applied to the bulb. For maintenance, the coated area should be cleaned by wiping only with a soft, dry, lint-less cloth.

When mounting the tube, the reference line is determined using JEDEC No. G126 reference-line gauge. When the tube neck is inserted through the flared end of the gauge and seated, the reference line is defined by the intersection of the plane CC' of the gauge with the glass funnel.

Electrical and Optical Characteristics

The 16BSP4 is equipped with an indirectly heated cathode. The heater is designed to operate at a nominal voltage of 6.3 V with a nominal current of 450 mA (with a tolerance of +30 mA). The heater has a controlled warm-up time of 11 seconds.

Optical Specifications

- **Phosphor:** JEDEC designation P4-Aluminized, which provides a white display.
- **Light Transmittance:** Approximately 53% at the center of the screen.

Deflection and Focusing

- **Focusing Method:** Electrostatic.

- **Deflection Angles (Approximate):**

- **Diagonal:** 114 degrees
- **Horizontal:** 103 degrees
- **Vertical:** 87 degrees

Direct Interelectrode Capacitances

- **Cathode to all other electrodes:** Approximately 5 pF
- **Grid No. 1 to all other electrodes:** Approximately 6 pF
- **External conductive coating to anode:** 1000 pF (minimum) to 1500 pF (maximum)

Base and Pin Connections

The tube uses a JEDEC **8HR** base with a JEDEC **B7-208** "Small Button Neoeightar 7 Pin" basing arrangement.

To prevent mechanical stress on the glass-to-metal seals, the socket for this base must not be rigidly mounted. It should be connected via flexible leads, allowing it to move freely. The socket design must ensure that the circuit wiring cannot impress lateral strains on the base pins through the socket contacts. The bottom circumference of the base wafer is designed to fall within a circle concentric with the bulb axis having a diameter of 1 3/4 inches.

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

Pin Number	Connection
Pin 1	Heater
Pin 2	Grid No. 1
Pin 3	Grid No. 2
Pin 4	Grid No. 4 (Focusing Electrode)
Pin 6	Grid No. 1
Pin 7	Cathode
Pin 8	Heater
Cap	Ultor (Grid No. 3, Grid No. 5, Collector)
C	External Conductive Coating

(Note: Pins 2 and 6 are both internally connected to Grid No. 1.)

Ratings and Operating Conditions

The ratings of the 16BSP4 are defined 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:** 18,000 Volts (Maximum) / 12,000 Volts (Minimum)
- **Grid No. 4 (Focusing Electrode) Voltage:** +1100 to -500 Volts
- **Grid No. 2 Voltage:** 60 Volts (Maximum) / 25 Volts (Minimum)
- **Cathode Voltage:**
 - *Maximum Negative Value:* 0 Volts DC
 - *Maximum Negative Peak Value:* 2 Volts
 - *Maximum Positive Value:* 100 Volts DC
 - *Maximum Positive Peak Value:* 150 Volts
- **Heater Voltage:** 6.9 Volts (Maximum) / 5.8 Volts (Minimum)
- **Maximum Heater-Cathode Voltage:**
 - *Heater negative with respect to cathode:*
 - During warm-up period (not to exceed 15 seconds): 450 Volts
 - After equipment warm-up period: 200 Volts
 - *Heater positive with respect to cathode:* 200 Volts
- **Maximum Grid No. 1 Circuit Resistance:** 1.5 Megohms

Typical Operating Conditions (Cathode Drive Service)

In typical cathode drive service, voltages are positive with respect to Grid No. 1:

- **Anode Voltage:** 15,000 Volts DC
- **Grid No. 4 Voltage (Focusing Electrode):** 250 Volts DC
- **Grid No. 2 Voltage:** 50 Volts DC
- **Cathode Voltage:** 35 to 55 Volts DC

Under these typical operating conditions, the cathode voltage range of 35 to 55 Volts DC corresponds to the visual extinction of the focused raster.

The typical Grid No. 4 focusing voltage of 250 Volts DC is specified with the combined Grid No. 1 bias voltage and video-signal voltage adjusted to produce an anode current of 100 microamperes on a 12 15/16" x 10 1/4" pattern (such as from an RCA [2F21](#) Monoscope or equivalent). While 250 Volts is typical, individual tubes are guaranteed to achieve satisfactory focus at some value between 0 and 400 Volts.

Technical Summary

The **16BSP4** is a specialized 16-inch rectangular cathode-ray tube featuring a wide 114-degree deflection angle and a compact 4 3/8-inch neck. Designed for cathode-drive television applications, it operates with a low Grid No. 2 potential of 50 V and utilizes electrostatic focusing (Grid No. 4) alongside magnetic

deflection. Its straight-gun design eliminates the need for an ion trap, and its aluminized P4 phosphor screen delivers high-brightness white displays. With its Neoeightar 7-pin base, integrated tension band, and robust design-maximum ratings, the 16BSP4 represents a highly optimized display component of its era.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1956 National Video

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

1956 NATIONAL VIDEO

Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Typical Anode Voltage	15000 V	—
Phosphor	P4	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage Nominal	6.3 V	—
Heater Current Nominal	450 mA	—

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode to All Other Electrodes Capacitance	5 pF	Approximate
Grid 1 to All Other Electrodes Capacitance	6 pF	Approximate

TUBE TINKER

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