

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

16ASP4

1 SECTION
CONSTRUCTION
CATHODERAY

Specialized - Cathode Ray electronic tube

Sixteen-inch P4 cathode-ray picture tube documented by Philco for direct-view display service. The available source is comparatively sparse, so specialized construction details are not inferred beyond its television-style picture-tube function.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	0
NOMINAL HEATER	— / —	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Cathode Ray
No fixed ratings recorded.
Published values promoted where clearly attributable to this section.

16ASP4 Television Picture Tube

The **16ASP4** is a 16-inch, 114-degree direct-view rectangular cathode ray tube (CRT) designed primarily for television receiver applications. It features a sagged glass twin safety panel (bonded shield type FP125) and incorporates an aluminized screen and a non-ion trap electron gun. The tube is engineered to operate with electrostatic focusing and magnetic deflection. Its electron gun is designed to produce an exceptionally small spot size, resulting in sharp picture resolution. The mechanical design includes a short tube base with straight-through leads oriented by an indexing lug.

Optical and Screen Characteristics

The 16ASP4 utilizes an aluminized P4 phosphor screen, which produces a white fluorescent color with medium-short persistence. The faceplate incorporates an FP125 bonded shield, and the light transmission at the center of the screen is approximately 60 percent.

The tube provides a reliable and well-defined viewing area, with the following screen dimensions:

- **Minimum Useful Screen Area:** 125 square inches
- **Minimum Useful Diagonal:** 14 7/8 inches
- **Minimum Useful Width:** 12 15/16 inches
- **Minimum Useful Height:** 10 1/4 inches

Mechanical Specifications and Installation

The physical structure of the 16ASP4 is characterized by its compact neck and short overall length, which facilitates its integration into shallow television cabinets. The mechanical dimensions and tolerances are as follows:

- **Overall Length:** 10 13/32 +1/4 -3/16 inches
- **Neck Length:** 4 1/8 +1/8 -1/16 inches
- **Greatest Bulb Diagonal:** 15 5/8 +3/32 -1/32 inches
- **Greatest Bulb Width:** 13 45/64 +3/32 -1/32 inches
- **Greatest Bulb Height:** 11 3/32 +3/32 -1/32 inches
- **Bulb Designation:** J125A1
- **Base Type:** B7-208
- **Basing Configuration:** 8HR
- **Anode Contact:** J1-21 cavity contact, which aligns with Pin #4 within a tolerance of ± 30 degrees.

Installation and Socketing Considerations

To prevent mechanical stress on the tube, the socket for the B7-208 base must not be rigidly mounted. It should be wired with flexible leads and allowed to move freely. The socket design must ensure that the circuit wiring does not impress lateral strains on the base pins. 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. Additionally, the area surrounding the anode contact button is covered with an insulating coating to prevent electrical leakage or arcing, and the reference line is determined using a JEDEC #126 reference line gauge.

Heater and Electrical Characteristics

The 16ASP4 is equipped with an indirectly heated cathode. The electrical specifications for the heater and the tube's internal capacitances are detailed below:

Parameter	Value
Heater Voltage	6.3 V
Heater Current	0.45 A $\pm$ 5%
Heater Warm-up Time	11 seconds
Cathode to All Other Electrodes Capacitance	4 pF
Grid #1 to All Other Electrodes Capacitance	5 pF
External Coating Capacitance	1000 pF (min) / 1500 pF (max)

The heater warm-up time is defined under specific test conditions: it is the time required for the voltage across the heater to reach 80% of its rated value (5.04 V) after applying four times the rated heater voltage (25.2 V) to a circuit consisting of the tube heater in series with a resistance equal to three times the rated heater voltage divided by the rated heater current (an external series resistance of approximately 42 ohms).

Operating Services and Electrical Ratings

The 16ASP4 can be operated under either Grid Drive Service or Cathode Drive Service. In both modes, the anode, Grid #3, and Grid #5 are internally connected together and are collectively referred to as the anode. The maximum circuit resistance for the Grid #1 circuit is limited to 1.5 Megohms.

Grid Drive Service

Under Grid Drive Service, electrode voltages are specified as positive with respect to the cathode, unless otherwise indicated.

- **Absolute Maximum Ratings:**

- **Anode Voltage:** 20,000 V DC
- **Grid #4 (Focusing Electrode) Voltage:** -550 V to +1100 V DC
- **Grid #2 Voltage:** 550 V DC
- **Grid #1 Voltage:**
 - Negative-Bias Value: 154 V DC
 - Negative-Peak Value: 220 V
 - Positive-Bias Value: 0 V DC
 - Positive-Peak Value: 2 V
- **Peak Heater-Cathode Voltage:**
 - Heater negative with respect to cathode during warm-up ($\leq$ 15 seconds): 450 V max
 - Heater negative with respect to cathode after warm-up: 200 V max
 - Heater positive with respect to cathode: 200 V max

- **Typical Operating Conditions:**

- **Anode Voltage:** 15,000 V DC

- **Grid #4 Voltage for Focus:** -100 V to +300 V DC
- **Grid #2 Voltage:** 300 V DC
- **Grid #1 Voltage (for visual extinction of focused raster):** -43 V to -70 V DC

Cathode Drive Service

Under Cathode Drive Service, electrode voltages are specified as positive with respect to Grid #1, unless otherwise indicated.

- **Absolute Maximum Ratings:**
 - **Anode Voltage:** 20,000 V DC
 - **Grid #4 Voltage:** -400 V to +1250 V DC
 - **Grid #2 Voltage:** 700 V DC
 - **Cathode Voltage:**
 - Positive-Bias Value: 154 V DC
 - Positive-Peak Value: 220 V
 - Negative-Bias Value: 0 V DC
 - Negative-Peak Value: 2 V
 - **Peak Heater-Cathode Voltage:**
 - Heater negative with respect to cathode during warm-up (□ 15 seconds): 450 V max
 - Heater negative with respect to cathode after warm-up: 200 V max
 - Heater positive with respect to cathode: 200 V max
- **Typical Operating Conditions:**
 - **Anode Voltage:** 15,000 V DC
 - **Grid #4 Voltage for Focus:** -100 V to +300 V DC
 - **Grid #2 Voltage:** 300 V DC
 - **Grid #1 Voltage:** 0 V DC
 - **Cathode Voltage (for visual extinction of focused raster):** +38 V to +59 V DC

Note on Cutoff: The typical operating voltages for Grid #1 (in Grid Drive) and Cathode (in Cathode Drive) are specified for the visual extinction of a focused raster. For the complete cutoff of an undeflected focused spot, the absolute value of the bias between the cathode and Grid #1 must be increased by approximately 5 volts.

Safety and X-Ray Radiation Shielding

When operating the 16ASP4, safety precautions regarding X-ray radiation must be observed. If the tube is operated at anode voltages exceeding 16,000 volts, prolonged exposure at close range can pose a risk of personal injury. Under these high-voltage operating conditions, appropriate X-ray radiation shielding must be installed around the tube to protect users and service personnel.

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