

ELECTRONIC TUBE REFERENCE

19BLP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Nineteen-inch cathode-ray picture tube documented by Philco for direct-view television service. The approved source is sparse in the extracted record, so additional construction or performance properties are not asserted.

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.

19BLP4 — Rectangular Glass Picture Tube

The **19BLP4** is a directly viewed, rectangular glass picture tube designed for television receiver applications. It features a relatively flat envelope with a compound radius faceplate, an aluminized P4 phosphor screen, and a wide-angle deflection system. The tube incorporates a short, improved electron gun design that eliminates the need for an external ion trap magnet while maintaining high edge focus quality.

Mechanical Construction and Screen Characteristics

The 19BLP4 is constructed using a J149A2 glass bulb envelope. The screen utilizes an aluminized P4 phosphor that produces a white fluorescent color with medium-short persistence. The faceplate is

designed with a compound radius to provide a relatively flat viewing surface, offering approximately 78% center light transmission.

Deflection System

The tube is designed for a nominal 114° diagonal deflection angle, which corresponds to 102° horizontal and 85° vertical deflection. Through the use of special internal contouring in the deflection yoke region of the envelope, the 19BLP4 can be successfully deflected using standard 110° deflection components.

Physical Dimensions

The physical envelope of the 19BLP4 is characterized by the following dimensions:

- **Overall Length:** 11-9/16 +1/4 -3/16 inches
- **Neck Length:** 4-1/8 +1/16 -1/8 inches
- **Greatest Bulb Diagonal:** 18-5/8 ± 1/8 inches
- **Greatest Bulb Width:** 16-19/32 ± 1/8 inches
- **Greatest Bulb Height:** 13-11/32 ± 1/8 inches

The minimum useful screen dimensions provide a total viewing area of 172 square inches, with the following minimum boundaries:

- **Minimum Useful Diagonal:** 17-9/16 inches
- **Minimum Useful Width:** 15-1/8 inches
- **Minimum Useful Height:** 12 inches

The reference line of the neck and cone transition is determined using a JEDEC #126 reference line gauge.

External Coatings and Insulation

The outer surface of the cone is treated with a conductive external coating. The capacitance between this external coating and the internal anode ranges from a minimum of 1300 pF to a maximum of 1700 pF. Additionally, the area immediately surrounding the anode button is covered with a specialized insulating coating to prevent high-voltage arcing.

Electron Gun, Basing, and Heater

The 19BLP4 utilizes a short, improved electron gun design. This gun does not require an external ion trap magnet, simplifying receiver setup and improving the focus quality at the edges of the raster.

Base and Socketing

The tube features a short integral glass button base (B7-208) with straight-through leads and an indexing lug, corresponding to the 8HR basing configuration.

Because of the delicate nature of the glass button base, the socket must not be rigidly mounted. It should be connected via flexible leads and allowed to move freely to prevent any lateral strain on the base pins.

The bottom circumference of the base wafer is designed to fall within a 1-3/4 inch diameter circle concentric with the bulb axis.

Pin Connections (8HR Basing)

The electrical connections to the base pins are assigned as follows:

- **Pin 1:** Heater
- **Pin 2:** Grid #1 (Control Grid)
- **Pin 3:** Grid #2 (Screen Grid / Accelerator)
- **Pin 4:** Grid #4 (Focusing Electrode)
- **Pin 6:** Cathode
- **Pin 7:** Heater
- **Anode Contact:** J1-21 high-voltage button, which aligns with Pin #4 within a tolerance of $\pm 30^\circ$. The internal anode structure connects Grid #3, Grid #5, and the anode together.

Heater Characteristics

The heater is designed for series or parallel operation in television receivers:

- **Nominal Heater Voltage:** 6.3 V
- **Nominal Heater Current:** 600 ± 30 mA (measured at 6.3 V)
- **Heater Warm-up Time:** 11 seconds

The heater warm-up time is defined as the time required for the voltage across the heater terminals to reach 80% of its rated value when an initial voltage of four times the rated heater voltage (25.2 V) is applied in series with a resistance equal to three times the rated voltage divided by the rated current (31.5 ohms).

Electrical Characteristics and Interelectrode Capacitances

The direct interelectrode capacitances of the 19BLP4, measured without an external shield, are approximately:

- **Cathode to all other electrodes:** 4 pF
- **Grid #1 to all other electrodes:** 5 pF
- **External conductive coating to anode:** 1300 pF (minimum) to 1700 pF (maximum)

Operating Services and Drive Configurations

The 19BLP4 can be operated in either Grid Drive Service (where the video signal is applied to Grid #1 relative to the cathode) or Cathode Drive Service (where the video signal is applied to the cathode relative to Grid #1). The maximum ratings and typical operating conditions differ depending on the chosen drive configuration.

Grid Drive Service

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

Maximum Ratings (Design Maximum Values)

- **Anode Voltage:** 20,000 max V DC
- **Grid #4 (Focus) Voltage:** -550 to +1100 V DC
- **Grid #2 Voltage:** 200 to 550 V DC
- **Grid #1 Voltage:**
 - Negative-bias value: 154 max V DC
 - Negative-peak value: 220 max V
 - Positive-bias value: 0 max V DC
 - Positive-peak value: 2 max V
- **Peak Heater-Cathode Voltage:**
 - Heater negative with respect to cathode during warm-up (≤ 15 seconds): 450 max V
 - Heater negative with respect to cathode after warm-up: 200 max V
 - Heater positive with respect to cathode: 200 max V

Typical Operating Conditions

- **Anode Voltage:** 16,000 V DC
- **Grid #4 (Focus) Voltage:** 0 to 400 V DC
- **Grid #2 Voltage:** 400 V DC
- **Grid #1 Voltage for Visual Extinction of Focused Raster:** -36 to -94 V DC
- **Grid #1 Cutoff for Undelected Focus Spot:** Absolute bias increases by approximately 5 V (shifting the range to -41 to -99 V DC)

Cathode Drive Service

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

Maximum Ratings (Absolute Maximum Values)

- **Anode Voltage:** 20,000 max V DC
- **Grid #4 (Focus) Voltage:** -400 to +1250 V DC
- **Grid #2 Voltage:** 350 to 700 V DC
- **Cathode Voltage:**
 - Positive-bias value: 154 max V DC
 - Positive-peak value: 220 max V
 - Negative-bias value: 0 max V DC
 - Negative-peak value: 2 max V
- **Peak Heater-Cathode Voltage:**

- Heater negative with respect to cathode during warm-up (≤ 15 seconds): 450 max V
- Heater negative with respect to cathode after warm-up: 200 max V
- Heater positive with respect to cathode: 200 max V

Typical Operating Conditions

- **Anode Voltage:** 16,000 V DC
- **Grid #4 (Focus) Voltage:** 0 to 400 V DC
- **Grid #2 Voltage:** 400 V DC
- **Grid #1 Voltage:** 0 V DC
- **Cathode Voltage for Visual Extinction of Focused Raster:** +36 to +78 V DC
- **Cathode Cutoff for Undelected Focus Spot:** Absolute bias increases by approximately 5 V (shifting the range to +41 to +83 V DC)

Maximum Circuit Values

For both Grid Drive and Cathode Drive services, the maximum allowable resistance in the Grid #1 circuit is:

- **Grid #1 Circuit Resistance:** 1.5 max M Ω

Safety and X-ray Radiation

When operating the 19BLP4, safety precautions regarding high voltage and potential X-ray radiation must be observed. If the tube is operated at anode voltages exceeding 16,000 V, shielding may be necessary to protect personnel from injury resulting from prolonged, close-range exposure to X-rays.

Technical Summary

The **19BLP4** is a 114° diagonal deflection, rectangular glass picture tube featuring an aluminized P4 phosphor screen with a minimum useful area of 172 square inches. It utilizes a short-neck design with an 8HR glass button base and an improved electron gun that does not require an ion trap magnet. The tube is highly versatile, supporting both Grid Drive and Cathode Drive configurations at a typical anode operating voltage of 16,000 V (up to a maximum of 20,000 V). Focusing is controlled via Grid #4, which typically operates between 0 and 400 V DC. With its compact physical length of 11-9/16 inches and compatibility with 110° deflection components, the 19BLP4 represents an efficient and high-performance display solution for its era.

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