

ELECTRONIC TUBE REFERENCE

19BUP4

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.

19BUP4 — Rectangular Glass Cathode Ray Tube

The **19BUP4** is a 19-inch direct-view rectangular glass cathode ray tube designed for television applications. It features a wide-angle diagonal deflection of 114 degrees, electrostatic focusing, and magnetic deflection. The tube is constructed with a straight electron gun that requires no ion trap, an aluminized P4 screen, and a low-power heater designed for rapid warm-up.

Design and Mechanical Construction

The 19BUP4 utilizes a J149A1 glass bulb envelope with a relatively flat compound-radius faceplate. To achieve its wide 114-degree deflection angle while remaining compatible with standard 110-degree components, the envelope features special internal contouring in the deflection yoke region. The neck of

the tube is terminated in a hard lead stem, and it uses a short B7-208 base with an indexing lug. The electrical connections are arranged according to the 8HR basing configuration.

The anode contact is a recessed small cavity cap (J1-21 design), which is aligned with Pin #4 within a tolerance of ± 30 degrees. The area surrounding the anode button is covered with an insulating coating to prevent electrical discharge.

Physical Dimensions

The physical specifications of the tube are as follows:

- **Overall Length:** $11\text{-}5/8 \pm 3/16$ inches
- **Neck Length:** $4\text{-}3/8 \pm 1/8$ inches
- **Greatest Bulb Dimensions:**
 - **Diagonal:** $18\text{-}5/8 \pm 1/8$ inches
 - **Width:** $16\text{-}13/32 \pm 1/8$ inches
 - **Height:** $13\text{-}11/32 \pm 1/8$ inches
- **Minimum Useful Screen Dimensions:**
 - **Diagonal:** $17\text{-}9/16$ inches
 - **Width:** $15\text{-}1/8$ inches
 - **Height:** 12 inches
 - **Total Area:** 172 square inches

For proper installation, the reference line of the tube is determined using a JEDEC #126 gauge. Additionally, the socket must not be rigidly mounted; it must have flexible leads and free movement to accommodate the tube.

Heater and Electrical Characteristics

The 19BUP4 is designed with a highly efficient, low-power heater that operates at less than 1/4 watt. This low power requirement enables rapid warm-up, allowing the screen to reach an acceptable level of brightness quickly.

Parameter	Value
Heater Voltage	$2.2\text{ V} \pm 10\%$
Heater Current (at 2.2 V)	102 mA
Calculated Heater Power	$\sim 0.224\text{ W}$

Note: The heater power is calculated as 2.2 V multiplied by 0.102 A.

Direct Interelectrode Capacitances

The approximate capacitances of the tube electrodes are:

- **Cathode to All Other Electrodes:** 1.2 μF
- **Grid #1 to All Other Electrodes:** 5.5 μF
- **External Coating Capacitance:** 1300 μF (minimum) to 1700 μF (maximum)

Deflection Angles

The design of the envelope and yoke region supports the following approximate deflection angles:

- **Diagonal:** 114 degrees
- **Horizontal:** 102 degrees
- **Vertical:** 85 degrees

Optical Characteristics

The tube is equipped with an aluminized P4 phosphor screen, which produces a white fluorescence with medium-short persistence. The faceplate exhibits a light transmission of approximately 78% at the center.

Cathode Drive Service Ratings and Operating Conditions

All voltage values for cathode drive service are specified as positive with respect to Grid #1, unless otherwise noted.

Absolute Maximum Ratings

Operating the tube beyond these absolute maximum limits may cause permanent damage:

- **Anode Voltage:** 18,750 V DC maximum (Note: The Anode, Grid #3, and Grid #5 are internally connected)
- **Grid #4 Voltage (Focusing Electrode):** -200 V to +500 V DC
- **Grid #2 Voltage:** 250 V DC maximum
- **Cathode Voltage:**
 - **Positive-Bias DC Value:** 154 V maximum
 - **Positive-Peak Value:** 220 V maximum
 - **Negative-Bias DC Value:** 0 V maximum
 - **Negative-Peak Value:** 2 V maximum
- **Peak Heater-Cathode Voltage:**
 - **Heater Negative to Cathode (during warm-up $\leq$ 15 seconds):** 450 V maximum
 - **Heater Negative to Cathode (after warm-up):** 200 V maximum
 - **Heater Positive to Cathode:** 200 V maximum

Typical Operating Conditions

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

- **Anode Voltage:** 14,000 V DC
- **Grid #4 Voltage (Focus):** 0 to 400 V DC
- **Grid #2 Voltage:** 100 V DC
- **Grid #1 Voltage:** 0 V DC
- **Cathode Voltage (for visual extinction of focused raster):** +45 V to +60 V DC

Note: For the cutoff of an undeflected focus spot, the absolute bias value increases by approximately 3 V.

Maximum Circuit Values

- **Grid #1 Circuit Resistance:** 1.5 Megohms maximum

Safety and Handling

Because the 19BUP4 operates at high voltages, safety precautions must be observed:

- **X-ray Radiation:** If the tube is operated at anode voltages exceeding 16,000 V, X-ray shielding may be necessary to protect personnel from injury during prolonged, close-range exposure.
- **Mechanical Stress:** To prevent damage to the glass neck and base, the socket must have flexible leads and be free to move rather than being rigidly mounted.

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