

ELECTRONIC TUBE REFERENCE

19TP22

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

P22 color cathode-ray picture tube documented for color television display service, using a multicolor screen and high-voltage CRT construction.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	6.3 V / 1.8 A	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Cathode Ray
No fixed ratings recorded.
Representative electron-beam display section; repeated beam systems are electrically similar.

19TP22 — Tricolor Picture Tube

The **19TP22** is an all-glass, 19-inch direct-view tricolor picture tube designed for color television applications. It features a curved shadow mask and a metal-backed tricolor phosphor-dot screen deposited directly on the inside surface of the faceplate. The tube utilizes three separate electron guns (representing the blue, green, and red channels) with electrostatic focusing and magnetic deflection. A common electrostatic convergence element is shared among all three beams to ensure proper alignment.

Physical Specifications and Base Configuration

The 19TP22 is a substantial device weighing approximately 31 pounds. Its physical dimensions are characterized by an overall length of $24 \frac{3}{8} \pm \frac{3}{8}$ inches, a greatest bulb diameter of $19 \frac{5}{16} \pm \frac{3}{16}$

inches, and a neck length of $8 \frac{27}{32} \pm 1/4$ inches. The greatest diameter of the metal flange, which serves as the accelerator connection, is 20.800 inches maximum.

The tube is designed to be mounted with any single gun positioned on top as the preferred rotation. It utilizes a small-shell bidecal 14-pin base (designated B14-103). The pin connections, viewed from the bottom of the base, are as follows:

Pin	Connection
Pin 1	Heater
Pin 2	Cathode of Red Gun
Pin 3	Grid No. 1 of Red Gun
Pin 4	Grid No. 2 of Red Gun
Pin 6	Focusing Electrodes (Grid No. 3 of each gun tied together internally)
Pin 7	Cathode of Green Gun
Pin 8	Grid No. 1 of Green Gun
Pin 9	Grid No. 2 of Green Gun
Pin 13	Convergence Electrode (Grid No. 4, common to the three guns)
Pin 17	Grid No. 2 of Blue Gun
Pin 18	Grid No. 1 of Blue Gun
Pin 19	Cathode of Blue Gun
Pin 20	Heater
Metal Flange	Accelerator

The heater operates at a nominal voltage of 6.3 Volts, drawing a current of $1.8 \pm 10\%$ Amperes.

Optical and Screen Characteristics

The 19TP22 utilizes the P22 phosphor designation collectively for its three phosphors, which produce red, blue, and green fluorescent and phosphorescent colors with medium persistence. The screen has a physical size of $16 \frac{9}{16}$ by $12 \frac{7}{16}$ inches, providing a total screen area of 185 square inches.

The phosphor-dot screen is arranged in approximately 440,000 triangular groups, totaling 1,320,000 individual dots (each group consisting of one blue, one green, and one red dot). The faceplate has an approximate light transmission of 75%, acting as a neutral density filter to improve contrast.

Electrical Ratings and Operating Conditions

The design center maximum ratings and typical operating conditions for the 19TP22 are detailed below.

Design Center Maximum Ratings

- **Accelerator Voltage:** 22,000 Max. Volts DC
- **Accelerator Input:** 20 Max. Watts
- **Convergence Electrode Voltage (Grid No. 4):** 12,000 Max. Volts DC
- **Focusing Electrode Voltage (Grid No. 3):** 4,000 Max. Volts DC
- **Grid No. 2 Voltage (each gun):** 500 Max. Volts DC
- **Grid No. 1 Voltage (each gun):**
 - Negative Bias Value: 200 Max. Volts DC
 - Positive Bias Value: 0 Max. Volts DC
 - Positive Peak Value: 2 Max. Volts
- **Peak Heater-Cathode Voltage (each gun):**
 - Heater negative with respect to cathode (during equipment warm-up ≤ 15 seconds): 410 Max. Volts DC
 - Heater negative with respect to cathode (after warm-up): 180 Max. Volts DC
 - Heater positive with respect to cathode: 180 Max. Volts DC

Typical Operating Conditions

- **Accelerator Voltage:** 20,000 Volts
- **Convergence Electrode Voltage (for convergence in center of screen):** 8,500 to 10,200 Volts
- **Focusing Electrode Voltage:** 1,950 to 3,250 Volts
- **Grid No. 2 Voltage:** 200 Volts
- **Grid No. 1 Voltage (for visual extinction of focused raster):** -42 to -78 Volts (varies linearly with Grid No. 2 voltage)
- **Maximum Average Accelerator Current:** 1,000 Microamperes
- **Maximum Average Grid No. 3 Current:** 300 Microamperes

Circuit Values and External Components

- **Grid No. 1 Circuit Resistance:** Each gun must not exceed a maximum grid-circuit resistance of 1.5 Megohms.
- **Dynamic Converging Voltage:** A maximum of 1,200 Volts peak-to-peak is specified. This is an AC voltage with an essentially parabolic waveform synchronized with scanning, excluding blanking time.
- **Dynamic Focusing Voltage:** A maximum of 340 Volts peak-to-peak is specified, also utilizing an AC voltage with an essentially parabolic waveform synchronized with scanning, excluding blanking time.
- **Deflection Yoke:** The mounting arrangement must allow clearance to slide the deflection yoke at least 1 inch from the reference line.

- **Color Purity and Beam Positioning:** The color purity coil and beam positioning magnets must be located behind the deflection yoke and ahead of the focus gaps.
- **Focus Gaps:** These are positioned approximately 4 3/4 inches from the reference line.
- **Shielding:** It is recommended to use a suitable magnetic shield and a field neutralizing coil to prevent external magnetic fields from disrupting beam alignment.
- **X-Ray Protection:** Because the tube operates above 16,000 V, X-ray shielding is required. The shielding is considered adequate if the radiation measured in contact with the face viewing window does not exceed 6.25 mr/hr.

Direct Interelectrode Capacitances

The approximate capacitances of the tube's electrodes are as follows:

- **All Cathodes (connected together externally) to all other electrodes:** 16.5 μpf
- **Grid No. 1 (of any gun) to all other electrodes (except Grid No. 1 of the other two guns):** 6.0 μpf
- **Grid No. 3 (Focusing Electrode) to all other electrodes:** 8.5 μpf
- **Grid No. 4 (Convergence Electrode) to all other electrodes:** 10.5 μpf
- **External conductive coating to Accelerator:** 1,500 Min. μpf to 3,000 Max. μpf



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1960 Du Mont

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

1960 DU MONT

Section 1 · Cathode Ray

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage	6.3 V	—
Heater Current	1.8 A	—
Focusing Method	Electrostatic text	—
Deflection Method	Magnetic text	—
Phosphor	P22 text	—
Fluorescence	Red/blue/green text	—
Persistence	Medium text	—
Deflection Angle	60 deg	Approximate

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