

ELECTRONIC TUBE REFERENCE

19VP22

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	— / —	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Cathode Ray
No fixed ratings recorded.
Color television CRT display system.

19VP22 — Tri-Color Picture Tube

The **19VP22** is a 19-inch, glass-envelope, tri-color picture tube designed for use in color television receivers. It features electrostatic focusing, magnetic deflection, and an aluminized, metal-backed screen. The tube is stated to be equivalent to the CBS-Colortron "205".

Construction and Screen Characteristics

The 19VP22 is constructed with a glass funnel and a metal-flange seal. The face plate incorporates a neutral density filter providing approximately 75% light transmission. The tube has a useful screen area of 205 square inches, with screen dimensions of 17-1/2 by 13-1/8 inches corresponding to a 4:3 aspect ratio.

The screen consists of a metal-backed, tri-color, phosphor-dot type using the JETEC P22 designation. This phosphor provides medium persistence with red, blue, and green fluorescence and phosphorescence. The phosphor dots are arranged in approximately 300,000 triangular groups (triads), with each triad containing one red, one blue, and one green dot, totaling approximately 900,000 dots.

A thin, arched shadow mask containing approximately 300,000 uniform-size round holes is positioned approximately 0.4 inches behind the phosphor screen. This mask is mounted on three glass hemispheres molded directly onto the edge of the face plate.

The electron-gun assembly consists of three matched, identical electron beam sources arranged in a triangular configuration, tilted toward the common tube axis. The assembly contains three pairs of pole pieces mounted 120 degrees apart above the anode.

Mechanical Specifications and Mounting

The physical dimensions and mechanical characteristics of the 19VP22 are as follows:

Parameter	Specification
Over-all Length	26-7/16 inches
Maximum Face-Plate Diameter	19-1/2 inches
Maximum Metal-Flange Diameter	20-27/32 inches
Weight	Approximately 31 pounds
Mounting Position	Blue Gun Down

The tube uses a small shell diheptal 12-pin base (JETEC B12-105). The anode connection is made via the metal-flange seal on the bulb.

Heater and Electrical Connections

Each of the three beam sources contains a unipotential cathode. The heaters for these cathodes are connected electrically in parallel within the tube.

- **Heater Voltage:** 6.3 V
- **Heater Current:** 1.8 A

Pinout (JETEC Basing Designation 14W)

The 12-pin diheptal base provides the following connections, viewed from the bottom of the tube:

- **Pin 1:** Heater
- **Pin 2:** Grid No. 1 of red beam source
- **Pin 3:** Grid No. 2 of red beam source
- **Pin 4:** Cathode of red beam source

- **Pin 5:** Cathode of green beam source
- **Pin 6:** Grid No. 1 of green beam source
- **Pin 7:** Grid No. 2 of green beam source
- **Pin 9:** Grids No. 3 (all three No. 3 grids tied together internally)
- **Pin 11:** Grid No. 2 of blue beam source
- **Pin 12:** Grid No. 1 of blue beam source
- **Pin 13:** Cathode of blue beam source
- **Pin 14:** Heater
- **Metal Flange:** Anode

Interelectrode Capacitances

The approximate capacitances of the tube electrodes are:

- **Grid No. 1 of any beam source to all other electrodes (except Grid No. 1 of other two beam sources):** 7.0 pF
- **Three cathodes externally tied together to all other electrodes:** 10.0 pF
- **Grid No. 3 to all other electrodes:** 6.0 pF
- **External conductive coating:** 1500 pF minimum, 3000 pF maximum

Absolute and Design-Maximum Ratings

The following design-center maximum ratings must be observed for the 19VP22:

- **Anode Voltage:** 27,000 V max.
- **Anode Input:** 20 W max.
- **Peak Anode Current (to not more than 25 sq. inches of picture area with 205 sq. inch scan):** 3,000 μ A max.
- **Grid-No. 3 Voltage:** 9,000 V max.
- **Grid-No. 2 Voltage (each beam source):** 500 V max.
- **Grid-No. 1 Voltage (each beam source):**
 - Negative-bias value: 200 V max.
 - Positive-bias value: 0 V max.
 - Positive-peak value: 2 V max.
- **Peak Heater-Cathode Voltage (each beam source):**
 - Heater negative with respect to cathode (during warm-up period $\leq$ 15 seconds): 410 V max.
 - Heater negative with respect to cathode (after warm-up): 180 V max.
 - Heater positive with respect to cathode: 180 V max.

Typical Operating Conditions

Under typical operating conditions, the tube is operated with the following parameters:

- **Anode Voltage:** 25,000 V
- **Grid-No. 3 (Focus) Voltage:** 6,500 to 8,000 V
- **Grid-No. 1 Voltage (for visual extinction of focused raster, with 200 V on No. 2 grids):** -45 to -100 V
- **Grid-No. 2 Voltage (with -75 V on No. 1 grids):** 150 to 330 V
- **Maximum Peak Grid-No. 3 Current:** 225 μ A
- **Grid-No. 2 Current:** -15 to +15 μ A

Application and Circuit Considerations

Operating the 19VP22 requires several specialized external magnetic and electrical components to ensure proper color purity, convergence, and beam positioning:

- **Grid-No. 1 Circuit Resistance:** The maximum resistance in the Grid-No. 1 circuit for each beam source must not exceed 1.5 megohms.
- **Anode Voltage Regulation:** It is highly desirable to maintain anode voltage regulation within 2%. A shunt regulator tube, such as the CBS-Hytron [6BD4A](#), is recommended for this purpose.
- **Deflection Yoke:** A Rola Type CY600 or equivalent deflection yoke is recommended. The mounting arrangement must allow at least 2 inches of axial movement toward the tube base to facilitate color purity adjustment.
- **Magnetic Convergence Coils:** A Rola Type CC600 unit or equivalent is recommended. This unit consists of three electromagnets positioned 120 degrees apart over the internal pole pieces of the electron-gun assembly.
- **Color-Purifying Coil:** A Rola CP600 or equivalent is recommended, requiring a current source adjustable from 0 to 200 mA.
- **Field Neutralizing Coil:** A coil of approximately 21 inches in diameter, capable of producing about 15 ampere-turns (for example, 150 turns of No. 24 wire with a current range of +100 mA to -100 mA), is recommended.
- **Blue-Beam Positioning Magnet:** This magnet is mounted on the neck of the tube to provide tangential movement of the blue beam.
- **Magnetic Shielding:** A MuMetal or equivalent shield placed over the bulb portion of the tube is recommended to minimize the effects of the earth's magnetic field.
- **Protection Against Scanning Failure:** To prevent damage to the screen in the event of scanning failure, Grid-No. 2 voltages should be obtained from the boost voltage of the horizontal scanning circuit. This ensures that all beam current is cut off if scanning ceases.
- **Grid-No. 2 Controls:** The receiver circuitry should allow independent adjustment of the Grid-No. 2 voltages from 100 to 450 volts to achieve proper color balance.

Technical Summary

The **19VP22** is a 19-inch, 62-degree magnetically deflected, electrostatically focused tri-color picture tube with a 12-pin diheptal base. It features an aluminized, metal-backed screen with approximately 900,000 phosphor dots (300,000 triads) of the P22 type, protected by an arched shadow mask. The tube operates with a nominal 6.3 V, 1.8 A heater supply powering three parallel-connected unipotential cathodes.

Designed for color television receivers, it operates at a typical anode voltage of 25,000 V and requires external magnetic components for convergence, purity, and beam positioning, alongside robust anode voltage regulation and scanning failure protection.

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