

ELECTRONIC TUBE REFERENCE

17EZP22

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Seventeen-inch 90-degree rectangular color picture tube using three electrostatically focused guns, magnetic convergence and deflection, and an aluminized P22 tricolor dot-trio screen. Rare-earth red phosphor and sulfide blue/green phosphors form the color image.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	6.3 V / 900 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Cathode Ray	
MAXIMUM PLATE VOLTAGE	22500 V
MAXIMUM SCREEN VOLTAGE	1000 V
Three-gun color CRT; rare-earth red and sulfide blue/green phosphors.	

17EZP22 — Color Picture Tube

The **17EZP22** is a specialized color picture tube featuring a 90-degree diagonal deflection angle and a three-gun electrostatic-focus, magnetic-deflection design. It incorporates a high-contrast screen with a black opaque matrix and rare-earth phosphors to deliver high-quality color television displays.

Construction and Screen Characteristics

The 17EZP22 is built with a rectangular glass envelope utilizing a JEDEC No. FP 139 B1 bulb panel and a JEDEC No. J 139 A bulb funnel. For implosion protection, the tube features a Derma-Chrome banded-type system.

The viewing screen is a Hi-Lite screen that uses an aluminized, black opaque matrix material. The phosphor array consists of dot trios with a spacing of approximately 0.029 inches (0.74 mm) between the centers of adjacent trios. The phosphor type is P22, which utilizes a rare-earth red phosphor alongside sulfide blue and green phosphors, providing a medium-short persistence. The faceplate is made of polished filterglass with a light transmission of approximately 48% at the center.

The tube employs three separate electron guns (designated for red, blue, and green) whose axes are tilted slightly toward the tube axis. The tube is designed for "Blue-Gun-Down" operation with unity current ratios.

Mechanical and Physical Specifications

The physical dimensions and mechanical properties of the 17EZP22 are characterized by the following parameters:

- **Deflection Angles:** Diagonal 90°, Horizontal 79°, Vertical 63°
- **Minimum Screen Area (Projected):** 145 sq. in (935 sq. cm)
- **Weight:** Approximately 17.5 lb (8.0 kg)
- **Base:** Small-Button Diheptar 12-pin (JEDEC No. B12-244)
- **Basing Arrangement:** JEDEC No. 14BH
- **Operating Position:**
 - For Blue-Gun-Down operation, the anode bulb contact is positioned on top.
 - For Blue-Gun-Up operation, the anode bulb contact is positioned on the bottom.
- **Alignment:** Pin No. 5 aligns approximately with the anode bulb contact.

Heater and Filament Ratings

The heaters for the three electron guns are connected in series internally. The heater system can be operated under standard or standby conditions:

- **Heater Current:** 900 mA at a nominal 6.3 V
- **Calculated Heater Power:** The calculated heater power under standard operating conditions is **5.67 W** (calculated as the nominal heater voltage of 6.3 V multiplied by the nominal heater current of 0.9 A).
- **Heater Voltage (AC or DC) - Operating Conditions:**
 - Standard (without standby): 6.3 V typical (5.7 V minimum, 6.9 V maximum)
 - With 5.0 V standby utilized: 6.0 V
- **Heater Voltage (AC or DC) - Standby Conditions:** 5.0 V typical (5.5 V design-maximum)

Pinout and Terminal Connections

The 17EZP22 uses the JEDEC No. 14BH basing configuration. The pin connections, viewed from the bottom of the base, are assigned as follows:

Pin	Connection
1	Heater
2	Cathode of Red Gun
3	Grid No. 1 of Red Gun
4	Grid No. 2 of Red Gun
5	Grid No. 2 of Green Gun
6	Cathode of Green Gun
7	Grid No. 1 of Green Gun
9	Grid No. 4 (Focusing Electrode)
11	Cathode of Blue Gun
12	Grid No. 1 of Blue Gun
13	Grid No. 2 of Blue Gun
14	Heater
Cap	Anode (Grid No. 3, Grid No. 5, Screen, Collector)
C	External Conductive Coating

Direct Interelectrode Capacitances

The approximate direct interelectrode capacitances of the tube are:

- **Grid No. 1 of any gun to all other electrodes:** 7.5 pF
- **Grid No. 4 to all other electrodes:** 6 pF
- **All cathodes to all other electrodes:** 15 pF
- **External conductive coating to anode:** 1000 pF minimum, 1500 pF maximum

Absolute and Design-Maximum Ratings

The following absolute maximum and minimum ratings apply to each individual gun, with all voltage values being positive with respect to the cathode unless otherwise specified:

- **Anode Voltage:** 17,000 V minimum, 22,500 V maximum
- **Total Anode Current (Long-Term Average):** 750 μ A maximum
- **Grid-No. 4 (Focusing Electrode) Voltage:** Positive 1100 V maximum, Negative 550 V maximum
- **Peak Grid-No. 2 Voltage (including video signal):** 1000 V maximum
- **Grid-No. 1 Voltage:**

- Negative bias value: 400 V maximum
- Negative operating cutoff value: 140 V maximum
- Positive bias value: 0 V maximum
- Positive peak value: 2 V maximum
- **Peak Heater-Cathode Voltage:**
 - Heater negative with respect to cathode (during warm-up ≤ 15 seconds): 450 V maximum
 - Heater negative with respect to cathode (after warm-up): 200 V maximum (combined AC/DC), with a DC component of 200 V maximum
 - Heater positive with respect to cathode: 200 V maximum (AC component), with a DC component of 0 V maximum

Equipment Design Ranges and Operating Characteristics

For anode operating voltages between 17,000 V and 22,500 V, the equipment design ranges are specified as follows:

- **Grid-No. 4 (Focusing Electrode) Voltage:** -75 V to 400 V
- **Grid-No. 4 Current (Total):** -60 μ A to +60 μ A
- **Grid-No. 2 Current:** -5 μ A to +5 μ A
- **Grid-No. 2 Voltage Ratio:** The maximum ratio of Grid-No. 2 voltages (highest gun to lowest gun in any tube at a Grid-No. 1 spot cutoff of -100 V) is 1.86.

White Point Alignment (9300° K + 27 M.P.C.D., CIE $x=0.281$, $y=0.311$)

To achieve the standard white point, the average percentage of total anode current contributed by each gun is:

- **Red Gun:** 34%
- **Blue Gun:** 32%
- **Green Gun:** 34%

The corresponding cathode current ratios are:

- **Red to Blue:** 0.75 minimum, 1.10 typical, 1.50 maximum
- **Red to Green:** 0.65 minimum, 1.00 typical, 1.50 maximum
- **Blue to Green:** 0.60 minimum, 0.91 typical, 1.30 maximum

Beam Displacements and Correction Limits

At the center of the screen, the following displacement and correction limits apply:

- **Raster Centering:** Horizontal ± 0.45 in (± 11.4 mm), Vertical ± 0.45 in (± 11.4 mm)
- **Lateral Distance (Blue beam to converged Red/Green):** ± 0.25 in (± 6.4 mm)

- **Radial Convergence Displacement (excluding dynamic):** ± 0.37 in (± 9.4 mm)
- **Maximum Required Correction for Register:** 0.005 in (0.13 mm) maximum

Limiting Circuit Values and Installation Guidelines

To ensure reliable operation and prevent damage, the following circuit limits must be observed:

- **Grid-No. 1-to-Cathode Circuit Resistance:** The effective resistance for each gun must not exceed 0.75 M Ω .
- **Heater Ground Impedance:** Low-voltage circuits must limit the continuous short-circuit current to 750 mA or less in the assumed heater-to-ground connection. This precaution is necessary to prevent damage from cascade arcing.
- **Lead Separation:** Leads from other circuits must be separated from the picture tube leads by a minimum distance of 0.25 inches (6.4 mm).

Cutoff Characteristics

The relationship between the Grid-No. 2-to-cathode voltage and the Grid-No. 1-to-cathode voltage required for visual extinction of the focused spot is defined by linear diverging limits. For Grid-No. 2-to-cathode voltages ranging from 0 to 600 V, the Grid-No. 1-to-cathode cutoff voltage ranges from 0 to -140 V. The boundaries representing the minimum and maximum spot cutoff of any gun diverge linearly across this range, allowing designers to establish appropriate bias levels for individual guns.

Technical Summary

The **17EZP22** is a 90-degree, rectangular color picture tube utilizing a three-gun, electrostatic-focus, and magnetic-deflection design. It features a Hi-Lite screen with a black opaque matrix and P22 rare-earth phosphors, housed in a glass envelope with a Derma-Chrome banded-type implosion protection system. The series-connected heater system operates at a nominal 6.3 V with a 900 mA current draw, yielding a calculated heater power of 5.67 W (calculated as 6.3 V multiplied by 0.9 A). The tube is designed for Blue-Gun-Down operation and utilizes a Small-Button Diheptar 12-pin base. With an anode voltage range of 17,000 V to 22,500 V, the 17EZP22 requires careful alignment of the red, green, and blue gun currents to achieve standard white point balance, while circuit designs must respect strict limits on heater-cathode voltage, grid resistances, and lead separation to prevent arcing and ensure stable performance.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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

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Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	6.3 V	—
Heater current	900 mA	—
Heater warm-up time	Controlled	ControlledWarmup
Maximum anode/ultor voltage	22500 V	—
Minimum anode/ultor voltage	17000 V	—
Typical anode/ultor voltage	20000 V	PictureTubeService
Maximum grid No.2 voltage	1000 V	—
Focus-voltage range minimum	-75 V	OptimumFocus
Focus-voltage range maximum	400 V	OptimumFocus
Maximum grid No.1 circuit resistance	1.5 megohm	—
X-ray shielding warning	Present	HighAnodeVoltage
Long-term average total anode current	750 uA	AllThreeGuns
Maximum focusing-electrode positive voltage	1100 V	—
Maximum focusing-electrode negative-voltage magnitude	550 V	—
Maximum peak grid No.2 voltage	1000 V	IncludingVideoSignal
Maximum negative grid No.1 bias magnitude	400 V	—
Maximum negative operating cutoff magnitude	140 V	—
Operating heater voltage	6.3 V	NoStandby

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Standby heater voltage	5 V	Standby

CONSTRUCTION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Focusing method	Electrostatic	—
Focus lens	Unipotential	—
Deflection method	Magnetic	—
Phosphor	P22	—
Screen type	Aluminized tricolor dot-trio	—
Phosphor red	Rare-earth	P22
Phosphor blue and green	Sulfide	P22

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Deflection angle	90 deg	Approximate
Persistence	Medium-Short	—
Faceplate light transmission	48 %	Approximate
Grid No.4 current minimum	-60 uA	AllThreeGuns
Grid No.4 current maximum	160 uA	AllThreeGuns
Grid No.2 current minimum	-5 uA	EachGun
Grid No.2 current maximum	5 uA	EachGun
Red share of total anode current	34 %	White9300K
Blue share of total anode current	32 %	White9300K
Green share of total anode current	34 %	White9300K
Diagonal deflection angle	90 deg	Approximate
Horizontal deflection angle	79 deg	Approximate
Vertical deflection angle	63 deg	Approximate

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode to all other electrodes capacitance	15 pF	Approximate

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid No.1 to all other electrodes capacitance	7.5 pF	Approximate
External conductive coating to anode capacitance minimum	1000 pF	Approximate
External conductive coating to anode capacitance maximum	1500 pF	Approximate

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