

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

14BCP22

3 SECTIONS
CONSTRUCTION
CATHODERAY

Specialized - Cathode Ray electronic tube

Direct-view 14-inch three-gun shadow-mask color television picture tube. Its multi-gun color-display construction and high-voltage operation distinguish it from monochrome CRTs and place it squarely in color television receiver service.

GENERAL CHARACTERISTICS

BASE DESIGNATION	B12-131	BASE PINS	14
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	
MAXIMUM PLATE VOLTAGE	22000 V
MAXIMUM SCREEN VOLTAGE	650 V
Repeated identical physical sections represented by one populated row.	

14BCP22 — Three-Gun Color Picture Tube

A directly viewed, 14-inch rectangular glass picture tube featuring a three-gun shadow mask system, electrostatic focusing, magnetic deflection, and an aluminized sulfide-type phosphor screen for color television receivers.

Overview

The **14BCP22** is a specialized 14-inch rectangular glass cathode-ray tube designed for displaying either full-color or black-and-white television pictures. It provides a minimum useful screen area of 100 square inches, with a rectangular image measuring 9-1/8 inches by 11-27/32 inches.

The design incorporates a three-gun shadow mask system with axes tilted toward the tube axis, a graded-hole shadow mask, and a high-efficiency sulfide-group phosphor screen. These features simplify color-field setup, improve image sharpness on rapid-action scenes, and significantly increase screen brightness compared to contemporary larger color tubes.

Construction and Optical Characteristics

The 14BCP22 utilizes three independent electron guns aligned with the blue, green, and red color channels. The screen is coated with **P22-A11** aluminized sulfide-type phosphors arranged in a triangular dot configuration of blue, green, and red dots.

This phosphor system and mask design offer several distinct advantages:

- **Enhanced Brightness:** The sulfide-group phosphors produce color pictures up to 300% brighter than those of older 17-inch and 21-inch color tubes.
- **Medium-Short Persistence:** The phosphors exhibit medium-short persistence, which reduces motion blur and ensures sharp rendering of fast-moving scenes.
- **Balanced Gun Currents:** The screen is formulated to produce a balanced white light using nearly equal currents from each of the three electron guns.
- **Graded-Hole Shadow Mask:** The shadow mask features apertures that gradually increase in diameter from the outer edges inward to the center. This gradation increases the overall light output from the screen.

Mechanical Specifications and Installation

The 14BCP22 is housed in a rectangular glass bulb with the following physical dimensions and tolerances:

Dimension	Value
Overall Length	19-9/32 ± 3/8 inches
Greatest Diagonal	14 ± 1/8 inches
Greatest Width	13-1/16 ± 1/8 inches
Greatest Height	10-9/16 ± 1/8 inches
Neck Length	9-9/16 ± 1/4 inches
Minimum Useful Screen Diagonal	12-19/32 inches
Minimum Useful Screen Width	11-27/32 inches
Minimum Useful Screen Height	9-1/8 inches
Minimum Useful Screen Area	100 sq. inches

The tube is equipped with a **B12-131** small shell Neodiheptal 12-pin base and a **J1-21** recessed small cavity cap for the ultor terminal. The reference line is determined by the intersection of plane CC' of a

standard neck-funnel-contour gauge when seated against the glass funnel.

For proper installation, the socket for the B12-131 base must not be rigidly mounted; it should have flexible leads and be allowed to move freely. The bottom circumference of the base shell falls within a 3-inch diameter circle concentric with the bulb axis. The external conductive coating must be grounded, and its contact band is positioned to provide the required capacitance. The insulating coating area of the bulb should be cleaned only by wiping with a soft, dry, lintless cloth.

Electrical Characteristics and Interelectrode Capacitances

The 14BCP22 operates with electrostatic focusing, magnetic convergence, and magnetic deflection. The approximate deflection angles are:

- **Horizontal:** 65 degrees
- **Vertical:** 50 degrees
- **Diagonal:** 70 degrees

Heater Ratings

Parameter	Value
Nominal Heater Voltage	6.3 V
Nominal Heater Current	1.8 A
Heater Warm-up Time	11 seconds

Direct Interelectrode Capacitances

- **Combined Cathodes to All Other Electrodes:** The combined capacitance of the Blue Gun cathode, Green Gun cathode, and Red Gun cathode to all other electrodes is **16 µpf**.
- **Grid No. 1 to All Other Electrodes:** The capacitance from Grid No. 1 of any individual gun to all other electrodes is **7 µpf**.
- **External Conductive Coating to Ultor:**
 - Minimum: **500 µpf**
 - Maximum: **1,500 µpf**

Maximum Ratings (Design Maximum System)

All voltage values are positive and measured with respect to the cathode, unless otherwise specified.

Parameter	Rating
Maximum Anode Voltage	22,000 Volts

Parameter	Rating
Minimum Anode Voltage	12,000 Volts
Maximum Grid No. 3 Voltage	5,300 Volts
Maximum Grid No. 2 Voltage	650 Volts
Grid No. 1 Maximum Negative DC Voltage	400 Volts
Grid No. 1 Maximum Positive DC Voltage	0 Volts
Grid No. 1 Maximum Positive Peak Voltage	2 Volts
Maximum Heater Voltage	6.9 Volts
Minimum Heater Voltage	5.7 Volts
Heater-Cathode Voltage (Heater Negative to Cathode)	
— During warm-up period (not to exceed 15 seconds)	450 Volts
— After equipment warm-up period	200 Volts
Heater-Cathode Voltage (Heater Positive to Cathode)	200 Volts

Maximum Circuit Values

- **Maximum Grid No. 3 Circuit Resistance:** 7.5 Megohms
- **Maximum Grid No. 1 Circuit Resistance:** 0.75 Megohms

Typical Operating Conditions

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

- **Anode Voltage:** 16,000 Volts
- **Grid No. 3 Voltage (Focusing Electrode):** 2,400 to 3,400 Volts
- **Grid No. 2 Voltage:** 200 Volts
- **Grid No. 1 Voltage (for visual extinction of focused raster):** -45 to -100 Volts

Equipment Design Ranges

To produce a standard white light of 9,300°K + 27 M.P.C.D. (CIE Coordinates x = 0.281, y = 0.311), the average percentage of total ultor current supplied by each gun is:

- **Red Gun:** 42%

- **Green Gun:** 30%
- **Blue Gun:** 28%

The ratio of cathode currents required to produce this white point varies within the following ranges:

- **Red-to-Green Current Ratio:** Minimum 0.8, Average 1.4, Maximum 1.95
- **Red-to-Blue Current Ratio:** Minimum 0.8, Average 1.5, Maximum 2.2

Basing and Pin Connections

The 14BCP22 uses a 12-pin Neodiheptal base with the **14AU** basing diagram. The pin connections, viewed from the bottom of the base, are as follows:

- **Pin 1:** Heater
- **Pin 2:** Grid No. 1 of Red Gun
- **Pin 3:** Grid No. 2 of Red Gun
- **Pin 4:** Cathode of Red Gun
- **Pin 5:** Cathode of Green Gun
- **Pin 6:** Grid No. 1 of Green Gun
- **Pin 7:** Grid No. 2 of Green Gun
- **Pin 9:** Grid No. 3
- **Pin 11:** Grid No. 2 of Blue Gun
- **Pin 12:** Grid No. 1 of Blue Gun
- **Pin 13:** Cathode of Blue Gun
- **Pin 14:** Heater
- **Cap:** Ultor (Grid No. 4, Grid No. 5, Collector)
- **External Coating (C):** External Conductive Coating



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1963 Hitachi

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

1963 HITACHI

Section 1 · Cathode Ray

CAPACITANCE

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Interelectrode capacitances published	1	See source table

CHARACTERISTIC

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Warm-up Time	11 s	—

OTHER

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Anode Voltage	22000 V	—

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and their source documents.

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