Color Picture Tube

Ultra-Rectangular 
4 x 3 Aspect Ratio

Hi-Lite Matrix Screen
Light-Neutral Screen Appearance

Electrical:
Electron Guns, Three with Axes
Tilted Toward Tube Axis .................. Red, Blue, Green
Heater, of Each Gun Series Connected within Tube with Each of the Other Two Heaters:
Current at 6.3 V ................................ 900 mA
Focusing Method .............................. Electrostatic
Focus Lens ..................................... Bipotential
Convergence Method ......................... Magnetic
Deflection Method ............................ Magnetic

Deflection Angles (Approx.):
  Diagonal .................................... 90 deg
  Horizontal ................................. 78 deg
  Vertical .................................... 60 deg

Direct Interelectrode Capacitance (Approx.):
  Grid No.1 of any gun to all other electrodes .... 7.5 pF
  Grid No.3 to all other electrodes ............... 6.5 pF
  All cathodes to all other electrodes .......... 15 pF

Capacitance Between Anode and External Conductive Coating: 2500 max. pF
  2000 min. pF

Optical:
Faceplate and Safety Panel ................ Filterglass
Light transmission at center (Approx.) ........ 66%
Surface of Safety Panel ..................... Treated to minimize specular reflection

Screen ........................................ Aluminized
Matrix ........................................ Black opaque material
Phosphor, rare-earth (red) sulfide (blue & green) ........ P22
Persistence ................................. Medium-Short
Array ......................................... 566,000 Dot trios
Spacing between centers of adjacent dot trios (approx.) .... 0.026 in (0.66 mm)

Mechanical:
Minimum Screen Area (Projected) ........... 315 sq. in (2032 sq. cm)
Bulb Panel Designation .................... JEDEC No.FP209-3/4 W2
Base Designation^ ......................... Small-Button Diheptar 12-Pin (JEDEC No.B12-244)
Basing Designation ......................... JEDEC No.14BE
Pin Position Alignment .................... Pin No.12 Aligns Approx. with Anode Bulb Contact

RCA Electronic Components
Operating Position, preferred Anode Bulb Contact on Top
Gun Configuration Delta
Weight (Approx.) 49 lb (22.3 kg)

Implosion Protection:
Integral Safety Panel JEDEC No.SP209-1/4A1

Maximum and Minimum Ratings, Design-Maximum Values:
Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode.

Anode Voltage \{ 27.5 max. \kV  
\quad 20 \text{ min.} \kV

Anode Current, Long-Term Average 1000 max. \mu\text{A}

Grid-No.3 (Focusing Electrode) Voltage 6000 max. \text{V}

Peak-Grid-No.2 Voltage, Including Video Signal Voltage 1000 max. \text{V}

Grid-No.1 Voltage:
\begin{align*}
\text{Negative bias value} & \quad 400 \text{ max.} \text{V} \\
\text{Negative operating cutoff value} & \quad 200 \text{ max.} \text{V} \\
\text{Positive bias value} & \quad 0 \text{ max.} \text{V} \\
\text{Positive peak value} & \quad 2 \text{ max.} \text{V}
\end{align*}

Heater Voltage (ac or dc): C
\begin{align*}
\text{Under operating conditions} & \quad 6.9 \text{ max.} \text{V} \\
\text{Under standby conditions} & \quad 5.7 \text{ min.} \text{V} \\
\text{Heater-Cathode Voltage:} & \quad 5.5 \text{ max.} \text{V}
\end{align*}

Heater negative with respect to cathode:
\begin{align*}
\text{During equipment warm-up period} & \quad 450 \text{ max.} \text{V} \\
\text{not exceeding 15 seconds} & \quad 200 \text{ max.} \text{V} \\
\text{After equipment warm-up period:} & \quad 200 \text{ max.} \text{V} \\
\text{DC component value} & \quad 200 \text{ max.} \text{V} \\
\text{Peak value} & \quad 0 \text{ max.} \text{V}
\end{align*}

Heater positive with respect to cathode:
\begin{align*}
\text{DC component value} & \quad 0 \text{ max.} \text{V} \\
\text{Peak value} & \quad 200 \text{ max.} \text{V}
\end{align*}

Equipment Design Ranges:
Unless otherwise specified, values are for each gun and voltage values are positive with respect to cathode

For anode voltages between 20 and 27.5 kV

Grid-No.3 (Focusing Electrode) Voltage 16.8\% to 20\% of Anode voltage
Grid-No.2 Voltage for Visual Extinction
of Undeflected Focused Spot ... See CUTOFF DESIGN CHART in Figure 3
At Grid No.1 voltage of -75 V ............... 95 to 295 V
At Grid No.1 voltage of -125 V ............... 205 to 535 V
At Grid No.1 voltage of -175 V ............... 315 to 780 V

Maximum Ratio of Grid-No.2 Voltages, Highest Gun to
Lowest Gun in Any Tube (At grid-No.1 spot cutoff
voltage of -100 V) ...................... 1.86

Heater Voltage: c
Under operating conditions:
When standby operation is not utilized ........ 6.3 V
When 5.0-V standby operation is utilizedd ........ 6.0 V
Under standby conditionsd .................. 5.0 V

Grid-No.3 Current (Total) ...................... ±15 μA
Grid-No.2 Current .......................... ±5 μA
Grid-No.1 Current .......................... ±5 μA

To Produce White Light of ........
CIE Coordinates:
X ...................... 0.313
Y ...................... 0.329

Percentage of total anode current
supplied by each gun (average):
Red ...................... 41
Blue ..................... 24
Green .................... 35

Ratio of cathode currents:
Red/blue:
Minimum .................. 1.35
Typical ................... 1.70
Maximum ................... 2.20

Red/green:
Minimum .................. 0.95
Typical ................... 1.15
Maximum ................... 1.70

Blue/green:
Minimum .................. 0.50
Typical ................... 0.70
Maximum ................... 0.95

Displacements, Measured at Center of Screen:
Raster centering displacement:
Horizontal .................. ± 0.45 in (± 11.4 mm)
Vertical ................... ± 0.45 in (± 11.4 mm)
Lateral distance between the blue beam and
the converged red and green beams ........ ± 0.25 in (± 6.4 mm)
Radial convergence displacement excluding effects of dynamic convergence (each beam) \( \pm 0.37 \text{ in} \ (\pm 9.4 \text{ mm}) \)

Maximum Required Correction for Register
(Including Effect of Earth's Magnetic Field when Using Recommended Components) as Measured at the Center of the Screen in any Direction \( 0.005 \text{ in} \ (0.13 \text{ mm}) \) max.

Typical Operation:

Heater Voltage ........................................ 6.3 \text{ V} 
Anode Voltage ........................................ 25 \text{ kV} 
Grid No.3 Voltage ................................. Adjusted for focus 
Color Temperature ......................... 9300^\circ \text{ K} + 27 \text{ M.P.C.D.} 
Raster Size ........................................ 20.776 x 15.582 \text{ in} 

\( (527.71 \times 395.78 \text{ mm}) \)

Typical White-Light Output Measured within 5 in (127 mm) diameter area centered on tube face:

At anode current of 1000 µA \( \{ 
54 \text{ fL} \\
185 \text{ Nit} 
\} \)

Limiting Circuit Values:

High-Voltage Circuits:
- Grid-No.3 circuit resistance \( 7.5 \text{ max. } \Omega \}

Low-Voltage Circuits:
- Effective grid-No.1-to-cathode-circuit resistance (each gun) \( 0.75 \text{ max. } \Omega \}

X-Radiation Characteristic:

Maximum Anode Voltage at which the X-radiation emitted will not exceed 0.5 mR/h at an anode current of 300 µA \( 35 \text{ kV} \)

The X-radiation emitted from this picture tube, as measured in accordance with the procedure of JEDEC Publication No.64A will not exceed 0.5 mR/h throughout the useful life of the tube when operated within the Design-Maximum ratings: 27.5 kV anode voltage and 1000 µA anode current. The tube should not be operated beyond its Design-Maximum ratings stated above (such operation may shorten tube life or have other permanent adverse affects on its performance), but its X-radiation will not exceed 0.5 mR/h for anode voltage and current combinations given by the isodose-rate limit characteristics as shown in Figure 1. Operation above the values shown by the curve may result in failure of the television receiver to comply with the Federal Performance Standard for Television Receivers, Sub-Part C of Part 78 of Title 42, Code of Federal Regulations (PL90-602) as published in the Federal Register Vol.34, No. 247, Thursday, December 25, 1969. Maximum X-radiation as a function of anode voltage at 300 µA anode current is shown by the curve in Figure 2. X-radiation at a constant anode voltage varies linearly with anode current.
Dimensions in inches/mm unless otherwise noted
DIMENSIONAL OUTLINE

REFERENCE LINE (NOTE 1)

SEAL LINE

MOLD-MATCH LINE

26.165±.093
66.39±2.36
SAFETY PANEL

26.247±.093
66.867±2.36
MOLD-MATCH LINE

4.650±.188
118.11±4.80

17.128±.093
435.05±2.36
SAFETY PANEL

17.420±.093
442.47±2.36
MOLD-MATCH LINE

2.662
67.61

4.537±.125
115.24±3.18

10.392±.063
263.96±1.60
21.622±.375
549.20±9.33

6.693±.188
170.00±4.78

92±.14H2

Sagittal Heights with Reference to Centerface at Points (3.18 mm) Beyond Edge of Minimum Screen.

<table>
<thead>
<tr>
<th>Station No.</th>
<th>X Coordinates</th>
<th>Y Coordinates</th>
<th>Sagittal Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Minor)</td>
<td>0 (0)</td>
<td>7.916 (201.07)</td>
<td>.680 (17.27)</td>
</tr>
<tr>
<td>2</td>
<td>1.000 (25.40)</td>
<td>7.912 (200.96)</td>
<td>.692 (17.58)</td>
</tr>
<tr>
<td>3</td>
<td>2.000 (50.80)</td>
<td>7.901 (200.69)</td>
<td>.730 (18.54)</td>
</tr>
<tr>
<td>4</td>
<td>3.000 (76.20)</td>
<td>7.882 (220.20)</td>
<td>.791 (20.09)</td>
</tr>
<tr>
<td>5</td>
<td>4.000 (101.60)</td>
<td>7.856 (199.54)</td>
<td>.877 (22.28)</td>
</tr>
<tr>
<td>6</td>
<td>5.000 (127.00)</td>
<td>7.822 (198.68)</td>
<td>.987 (25.07)</td>
</tr>
</tbody>
</table>

(continued on next page.)
**Sagittal Heights (Cont’d)**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Height (in mm)</th>
<th>Height (in mils)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>6.000 (152.40)</td>
<td>7.781 (197.64)</td>
</tr>
<tr>
<td>8</td>
<td>7.000 (177.80)</td>
<td>7.732 (196.39)</td>
</tr>
<tr>
<td>9</td>
<td>8.000 (203.20)</td>
<td>7.676 (194.97)</td>
</tr>
<tr>
<td>10</td>
<td>9.000 (228.60)</td>
<td>7.612 (193.34)</td>
</tr>
<tr>
<td>11</td>
<td>9.540 (242.32)</td>
<td>7.574 (192.38)</td>
</tr>
<tr>
<td>12 (Diagonal)</td>
<td>10.132 (257.35)</td>
<td>7.242 (183.95)</td>
</tr>
<tr>
<td>13</td>
<td>10.279 (261.09)</td>
<td>6.832 (173.53)</td>
</tr>
<tr>
<td>14</td>
<td>10.333 (262.46)</td>
<td>6.000 (152.40)</td>
</tr>
<tr>
<td>15</td>
<td>10.388 (263.86)</td>
<td>5.000 (127.00)</td>
</tr>
<tr>
<td>16</td>
<td>10.433 (265.00)</td>
<td>4.000 (101.60)</td>
</tr>
<tr>
<td>17</td>
<td>10.468 (265.89)</td>
<td>3.000 (76.20)</td>
</tr>
<tr>
<td>18</td>
<td>10.493 (266.52)</td>
<td>2.000 (50.80)</td>
</tr>
<tr>
<td>19</td>
<td>10.508 (266.90)</td>
<td>1.000 (25.40)</td>
</tr>
<tr>
<td>20 (Major)</td>
<td>10.513 (267.03)</td>
<td>0.000 (0.00)</td>
</tr>
</tbody>
</table>

**Bottom View of Base**

**Base Specification — JEDEC No.14BE**

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 5: Grid No.2 of Green Gun  
Pin 6: Cathode of Green Gun  
Pin 7: Grid No.1 of Green Gun  
Pin 8: Grid No.3  
Pin 11: Cathode of Blue Gun  
Pin 12: Grid No.1 of Blue Gun  
Pin 13: Grid No.2 of Blue Gun  
Pin 14: Heater  
Cap: Anode (Grid No.4, Screen, Collector)  
C: External Conductive Coating

**Location of Radial-Converging Pole Pieces**

Viewed from Screen End of Guns
0.5 mR/h ISODOSE - RATE LIMIT CURVE

![Graph showing anode voltage vs. anode current](image)

**Figure 1**

X-RADIATION LIMIT CURVE AT A CONSTANT ANODE CURRENT OF 300 μA (X-RADIATION AT A CONSTANT ANODE VOLTAGE VARIES LINEARLY WITH ANODE CURRENT)

![Graph showing x-radiation vs. anode voltage](image)

**Figure 2**
TYPICAL DRIVE CHARACTERISTICS, GRID-DRIVE SERVICE

HEATER VOLTAGE = 6.3 V
ANODE - TO - CATHODE VOLTAGE = 20 TO 27.5 kV.
GRID No. 3 - TO - CATHODE VOLTAGE ADJUSTED FOR FOCUS.
GRID No. 2 - TO - CATHODE VOLTAGE (EACH GUN) ADJUSTED TO PROVIDE SPOT CUTOFF.

● ZERO - BIAS POINT

ANODE CURRENT PER GUN - µA

VIDEO SIGNAL VOLTAGE PER GUN - V
TYPICAL DRIVE CHARACTERISTICS,
CATHODE-DRIVE SERVICE

HEATER VOLTAGE = 6.3V
ANODE-TO-GRID No.1 VOLTAGE = 20 TO 27.5kV
GRID No.3 - TO - GRID No.1 VOLTAGE ADJUSTED FOR FOCUS.
GRID No.2 - TO - GRID No.1 VOLTAGE (EACH GUN) ADJUSTED TO PROVIDE SPOT CUTOFF.

● = ZERO - BIAS POINT

ANODE CURRENT PER GUN - μA

VIDEO SIGNAL VOLTAGE PER GUN - V

RCA Electronic Components

DATA 6 2-72
HEATER VOLTAGE = 6.3 V
ANODE-TO-CATHODE VOLTAGE = 20 TO 27.5 kV
GRID No. 3 - TO - CATHODE VOLTAGE ADJUSTED FOR FOCUS.

GRID No. 1 - TO - CATHODE VOLTAGE — V
GRID No. 2 - TO - CATHODE VOLTAGE — V
GRID No. 3 - TO - CATHODE VOLTAGE — V

MINIMUM SPOT CUT-OFF OF ANY GUN
MAXIMUM SPOT CUT-OFF OF ANY GUN

IMPORTANT: Refer to sheet Safety Precautions for Color Picture Tubes at front of this section.

Figure 3