

Color Picture Tube

Perma-Chrome Banded-Type Implosion Protection
 90° Rectangular HI-LITE Screen
 New Rare-Earth (Red) Phosphor Unity Current Ratios

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 ^a	900 mA
Focusing Method	Electrostatic
Focus Lens	Bipotential
Convergence Method	Magnetic
Deflection Method	Magnetic
Deflection Angles (Approx.):	
Diagonal	90 deg.
Horizontal	79 deg.
Vertical	63 deg.
Direct Interelectrode Capacitances (Approx.):	
Grid No.1 of any gun to all other electrodes	6 pF
Grid No.3 to all other electrodes	6.5 pF
All cathodes to all other electrodes	15 pF
External conductive coating to anode (Approx.)	{ 2500 max. pF 2000 min. pF

OPTICAL

Faceplate	Filterglass
Light transmission at center (Approx.)	42%
Surface	Polished
Screen, on Inner Surface of Faceplate:	
Type	Aluminized, Tricolor, Phosphor-Dot Phosphor (three separate phosphors, collectively) ^b P22—New Rare-Earth (Red), Sulfide (Blue & Green) Type
Fluorescence and phosphorescence of separate phosphors, respectively	Red, Blue, Green
Persistence of group phosphorescence	Medium Short
Dot Arrangement	Triangular group consisting of red dot, blue dot, and green dot
Spacing between centers of adjacent dot trios (Approx.)	0.025 in (0.64 mm)

22UP22

MECHANICAL

Minimum Screen Area (Projected):	227 sq. in (1465 sq. cm)
Bulb Funnel Designation	JEDEC No.J173-1/2 A1A
Bulb Panel Designation	JEDEC No.FP173-3/4
Base	Small-Button Diheptar 12-pin
Pin Position Alignment	Pin No.12 Aligns Approx. with Anode Bulb Contact
Operating Position	Anode Bulb Contact on Top
Weight (Approx.)	29 lb (13.3 kg)

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	} 27,500 max. V 20,000 min. V
Total Anode Current, Long-Term Average	
Grid-No.3 (Focusing Electrode) Voltage	6000 max. V
Peak Grid-No.2 Voltage, Including Video Signal Voltage . . .	1000 max. V
Grid-No.1 Voltage:	
Negative bias value	400 max. V
Negative operating cutoff value . . .	200 max. V
Positive bias value	0 max. V
Positive peak value	2 max. V
Heater Voltage (ac or dc):	
Under operating conditions ^a	} 6.9 max. V 5.7 min. V
Under standby conditions ^c	
Peak Heater-Cathode Voltage:	
Heater negative with respect to cathode:	
During equipment warm-up period not exceeding 15 seconds	450 max. V
After equipment warm-up period:	
Combined AC and DC value . . .	200 max. V
DC component value	200 max. V
Heater positive with respect to cathode:	
AC component value	200 max. V
DC component value	0 max. V

EQUIPMENT DESIGN RANGES

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

For anode voltages between 20,000 and 27,500 V

Grid-No.3 (Focusing Electrode) Voltage	16.8% to 20% of Anode Voltage;
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Grid-No.2 and Grid-No.1 Voltages for
Visual Extinction of Focused
Spot See *CUTOFF DESIGN CHART*

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:

Under operating conditions ^a	6.3	V
Under standby conditions ^c	5.0	V

Grid-No.3 Current (Total) -45 to +15 μ A

Grid-No.2 Current -5 to +5 μ A

To Produce White 9300^o K + 27 M.P.C.D.
(CIE Coordinates $x = 0.281$, $y = 0.311$):

Percentage of total anode current supplied by each gun (average)	<i>Red</i>	<i>Blue</i>	<i>Green</i>	
	34	32	34	%

Ratio of cathode currents:	<i>Min.</i>	<i>Typ.</i>	<i>Max.</i>
Red/blue	0.75	1.10	1.50
Red/green	0.65	1.00	1.50
Blue/green	0.60	0.91	1.30

Displacements, Measured at Center of Screen:

Raster centering displacement:

Horizontal ± 0.47 in (± 11.9 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)**

± 0.37 in (± 9.4 mm)

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

LIMITING CIRCUIT VALUES:

High-Voltage Circuits:

Grid-No.3 circuit resistance 7.5 max. $M\Omega$

In order to minimize the possibility of damage to the tube caused by a momentary internal arc, it is recommended that the *high-voltage power supply* and the *grid-No.3 power supply* be of the limited-energy type, in which the short-circuit current does not exceed 20 mA.

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Low-Voltage Circuits:

Effective grid-No.1-to-cathode-circuit resistance (each gun) 0.75 max. $M\Omega$

The low-voltage circuits, including all heater circuits, should be analyzed by assuming the color picture tube heater is connected directly to the receiver chassis ground. Under these conditions the circuits to the elements of all tubes, including the color picture tube, operating from the same heater winding and all connections of any other circuits to the heater winding should each have an impedance such that their respective power sources in combination will not supply a continuous short circuit current of more than 750 mA total in the assumed picture tube heater ground connection. The leads from all other circuits must be separated from the picture tube leads by a minimum distance of 0.25 inch (6.4 mm) to prevent energy transfer to the picture tube circuits. Such current limitation will help prevent picture tube damage in case of momentary cascade arcing.

- a For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts. The series impedance to any chassis connection in the DC biasing circuit for the heater should be between 100,000 ohms and 1 megohm.
- b For curve, see *Group Phosphor-P22-New Rare Earth (Red), Sulfide (Blue & Green)* at front of this section.
- c For "instant on" applications, a maximum heater voltage of 5.5 volts (design-maximum value) may be maintained on the color picture tube when the receiver is in the "off" (standby) position. All other voltages normally applied to the tube must be removed during standby operation.
- d Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

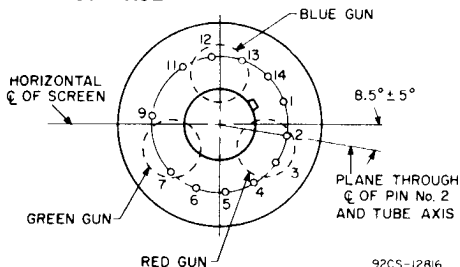
X-RADIATION WARNING

Because the 22UP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (design-maximum value), shielding of the 22UP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

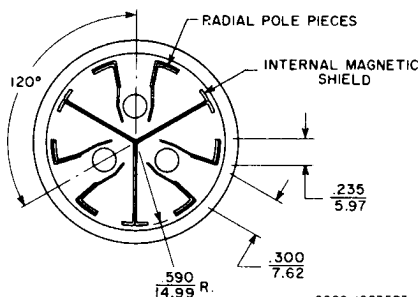
BASE SPECIFICATION - JEDEC No. 14BE

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

BOTTOM VIEW OF BASE



LOCATION OF RADIAL-CONVERGING POLE PIECES
VIEWED FROM SCREEN END OF GUNS

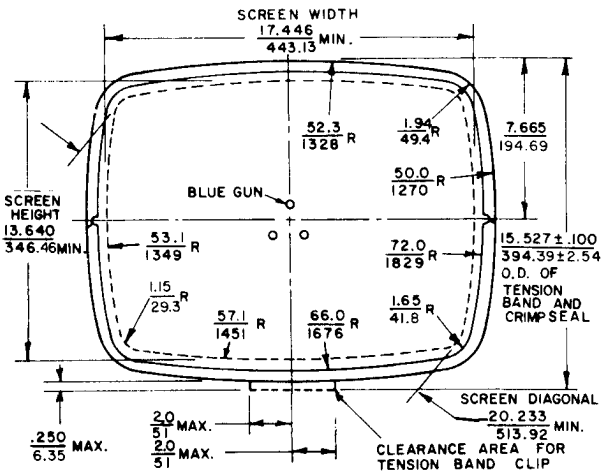
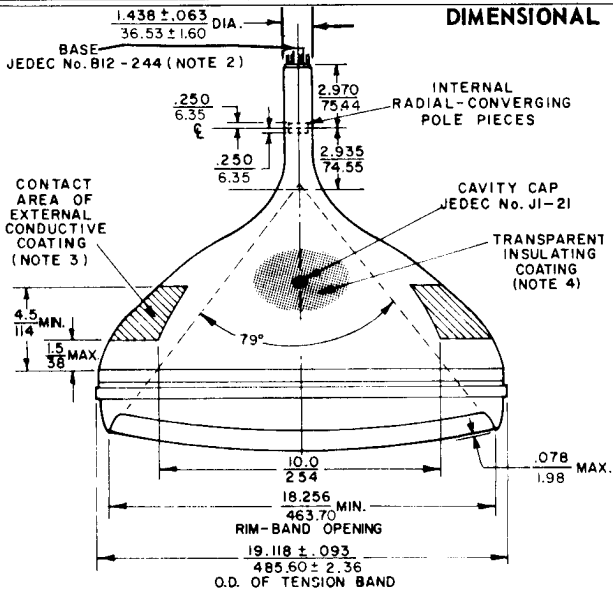


NOTES FOR DIMENSIONAL OUTLINE

- Note 1:** With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge JEDEC No.G162 and with tube seated in gauge, the reference line is determined by the intersection of the plane C-C' of the gauge with the glass funnel.
- Note 2:** Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Bottom circumference of base will fall within a 2-inch (51-mm) circle concentric with bulb axis.
- Note 3:** The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.
- Note 4:** To clean this area, wipe only with soft, dry, lintless cloth.

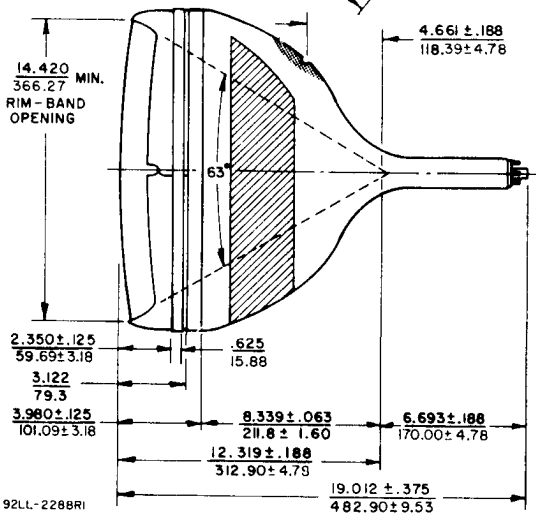
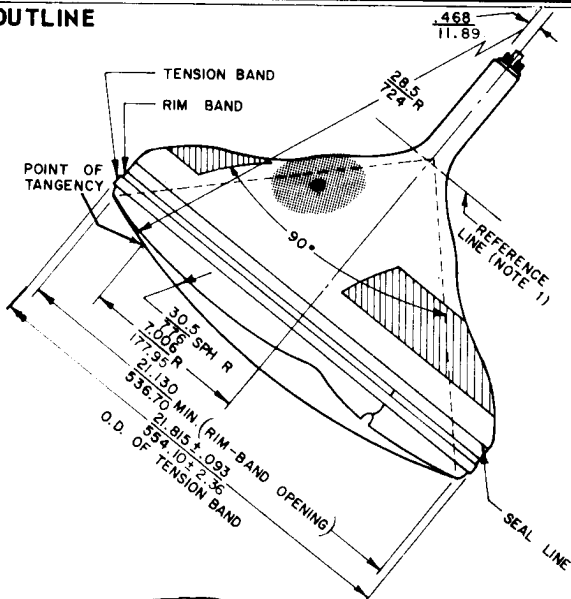
22UP22

DIMENSIONAL



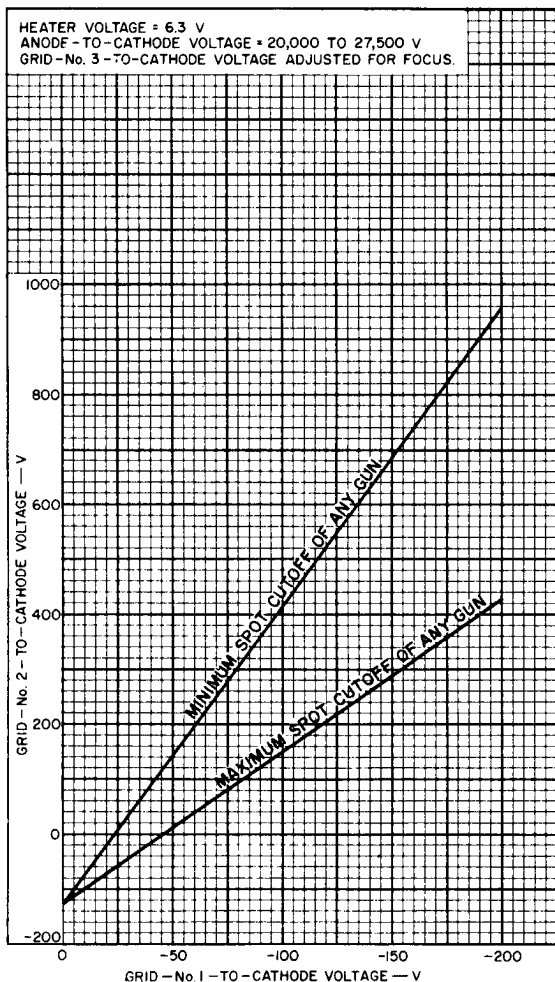
Dimensions in Inches/mm

OUTLINE



92LL-228BRI

CUTOFF DESIGN CHART



92CM-12803R1