

## Color Picture Tube

## ULTRA-RECTANGULAR

## HI-LITE SCREEN

4 X 3 Aspect Ratio

Blue-Gun-Down Operation

## 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 . . . . . Unipotential

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.4 to all other electrodes . . . . . 6 pF

All cathodes to all other electrodes . . . . . 15 pF

Capacitance Between Anode and External

Conductive Coating . . . . . { 2300 max. pF  
1800 min. pF

Resistance Between Metal Hardware and

External Conductive Coating . . . . . 50 M $\Omega$ 

## Optical

Faceplate . . . . . Filterglass

Light transmission at center (Approx.) . . . . . 53%

Surface . . . . . Polished

Screen . . . . . Aluminized

Phosphor, rare-earth (red) sulfide (blue &amp; green) . . . . . P22

Persistence . . . . . Medium-Short

Array . . . . . 382,000 Dot trios

Spacing between centers of adjacent

dot trios (Approx.) . . . . . 0.024 in (0.61 mm)

## Mechanical

Minimum Screen Area (Projected) . . . . . 185 sq in (1194 sq cm)

Bulb Funnel Designation . . . . . JEDEC No.J160-3/4 B1/C1

Bulb Panel Designation . . . . . JEDEC No.FP161-3/4 V1

Base Designation<sup>a</sup> . . . . . Small-Button Dihexar 12-Pin  
(JEDEC No.B12-244)

Basing Designation . . . . . JEDEC No.14BH

Pin Position Alignment . . . . . Pin No.5 Aligns Approx. with  
Anode Bulb Contact

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Operating Position, preferred . . . . . Anode Bulb Contact on Top  
Gun Configuration . . . . . Delta  
Weight (Approx.) . . . . . 25 lb (11.4 kg)

## Implosion Protection

Type . . . . . Banded

## 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 . . . . .	}	22.5 max.	kV
		17 min.	kV
Anode Current, Long-Term Average <sup>b</sup> . . . . .		1000 max.	μA
Grid-No.4 (Focusing Electrode) Voltage:			
Positive value . . . . .		1100 max.	V
Negative value . . . . .		550 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 . . . . .		140 max.	V
Positive bias value . . . . .		0 max.	V
Positive peak value . . . . .		2 max.	V
Heater Voltage (ac or dc): <sup>c</sup>	}		
Under operating conditions . . . . .		6.9 max.	V
Under standby conditions <sup>d</sup> . . . . .		5.7 min.	V
		5.5 max.	V
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:			
DC component value . . . . .		200 max.	V
Peak value . . . . .		200 max.	V
Heater positive with respect to cathode:			
DC component value . . . . .		0 max.	V
Peak value . . . . .		200 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 17 and 22.5 kV

Grid-No.4 (Focusing Electrode) Voltage . . . . . -75 to 400 V

Grid-No.2 Voltage for Visual Extinction  
of Undelected Focused Spot . . . See CUTOFF DESIGN CHART  
in Figure 3

At Grid No.1 voltage of -75 V . . . . . 90 to 270 V

At Grid No.1 voltage of -125 V . . . . .	210 to 505 V
At Grid No.1 voltage of -140 V . . . . .	245 to 580 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:<sup>c</sup>

Under operating conditions:

When standby operation is not utilized . . . . . 6.3 V

When 5.0-V standby operation is utilized<sup>d</sup> . . . . . 6.0 V

Under standby conditions<sup>d</sup> . . . . . 5.0 V

Grid-No.4 Current (Total) . . . . .  $\pm 60 \mu\text{A}$

Grid-No.2 Current . . . . .  $\pm 5 \mu\text{A}$

Grid-No.1 Current . . . . .  $\pm 5 \mu\text{A}$

	Illum. D	Color
To Produce White Light of . . . . .	6550 <sup>o</sup> K + 7 M.P.C.D.	9300 <sup>o</sup> K + 27 M.P.C.D.

CIE Coordinates:

X . . . . . 0.313 0.281

Y . . . . . 0.329 0.311

Percentage of total anode current  
supplied by each gun (average):

Red . . . . . 41 30 %

Blue . . . . . 24 31 %

Green . . . . . 35 39 %

Ratio of cathode currents:

Red/blue:

Minimum . . . . . 1.35 0.75

Typical . . . . . 1.70 0.95

Maximum . . . . . 2.20 1.25

Red/green:

Minimum . . . . . 0.95 0.60

Typical . . . . . 1.15 0.75

Maximum . . . . . 1.70 1.10

Blue/green:

Minimum . . . . . 0.50 0.60

Typical . . . . . 0.70 0.80

Maximum . . . . . 0.95 1.10

Displacements, Measured at Center of Screen:

Raster centering displacement:

Horizontal . . . . .  $\pm 0.45$  in ( $\pm 11.4$  mm)

Vertical . . . . .  $\pm 0.45$  in ( $\pm 11.4$  mm)

Lateral distance between the blue beam and  
the converged red and green beams . . .  $\pm 0.25$  in ( $\pm 6.4$  mm)

Radial convergence displacement excluding  
effects of dynamic convergence  
(each beam) . . . . .  $\pm 0.37$  in ( $\pm 9.4$  mm)

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Maximum Required Correction for Register<sup>e</sup>  
(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.

## Typical Operation

Heater Voltage . . . . . 6.3 V  
Anode Voltage . . . . . 20 kV  
Grid-No.4 Voltage . . . . . Adjusted for focus  
Color Temperature . . . . . 9300<sup>o</sup> K + 27 M.P.C.D.  
Raster Size . . . . . 15.922 x 11.941 in  
(404.42 x 303.30 mm)

Typical White-Light Output Measured within 4 in  
(102 mm) diameter area centered on tube face:

At anode current of 1000  $\mu$ A . . . . .  $\left\{ \begin{array}{l} 44 \text{ fL} \\ 151 \text{ Nit} \end{array} \right.$

## Limiting Circuit Values

### Low-Voltage Circuits:

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

## 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  $\mu$ A . . . . . 33 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  $\mu$ A 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  $\mu$ A anode current is shown by the curve in Figure 2. X-radiation at a constant anode voltage varies linearly with anode current.

- a The mating socket, including its associated, physically-attached hardware and circuitry, must not weigh more than one pound (one-half kilogram).
- b The short-term average anode current should be limited by circuitry to 1500 microamperes.
- c For maximum cathode life, it is recommended that the heater supply be regulated. The series impedance to any chassis con-



nection in the dc biasing circuit for the heater should be between 100 kilohms and 1 megohm. The surge voltage across the heater must be limited to 9.5 volts rms.

- d The use of a 5-volt standby condition in conjunction with 6-volt operating conditions is recommended to improve the reliability of the color picture tube by extending the emission wear-out life and reducing other gun-related defects. 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.
- e Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

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

#### 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.

SAGITTAL HEIGHTS AT POINTS  $\frac{.125}{3.18}$  BEYOND EDGE OF MIN. SCREEN

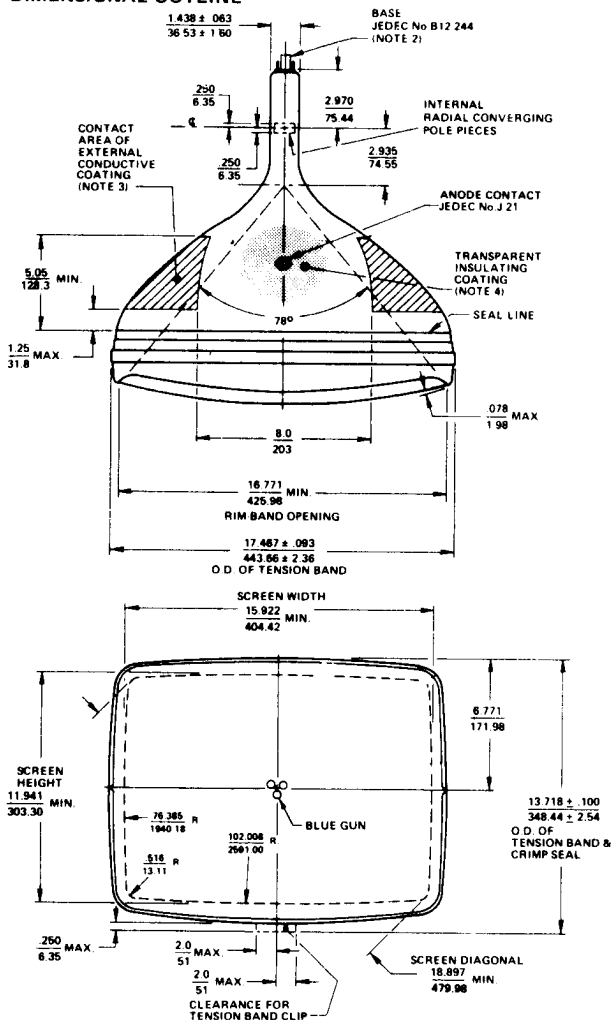
DIAGONAL  $\frac{1.485}{37.72}$

WIDTH  $\frac{1.044}{28.52}$

HEIGHT  $\frac{.582}{14.78}$

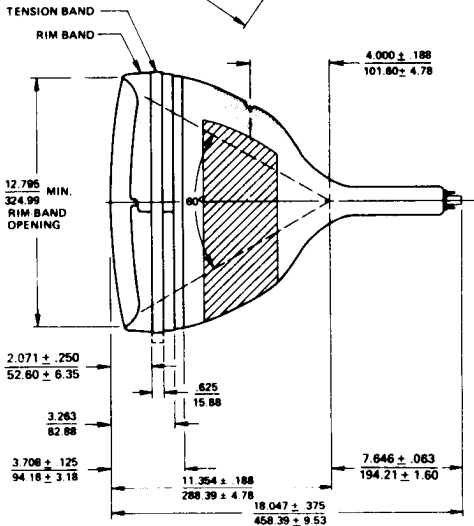
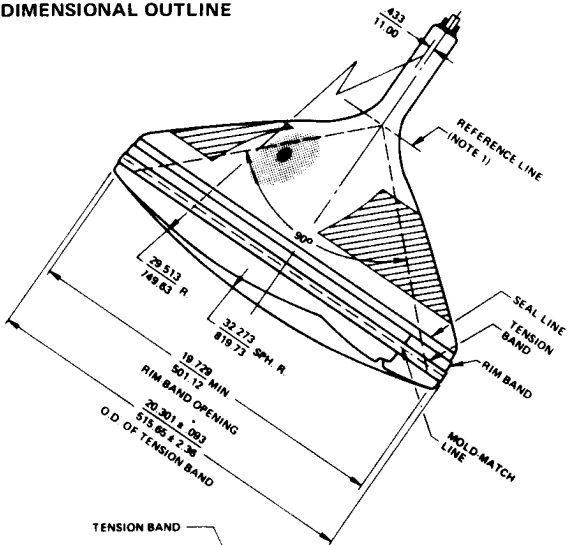
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## DIMENSIONAL OUTLINE



Dimensions in  $\frac{\text{Inches}}{\text{mm}}$  unless otherwise noted

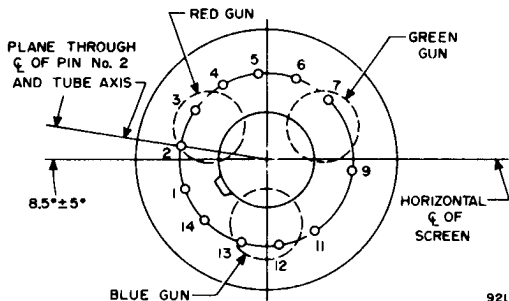
## DIMENSIONAL OUTLINE



92LL 3049R1

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## BOTTOM VIEW OF BASE

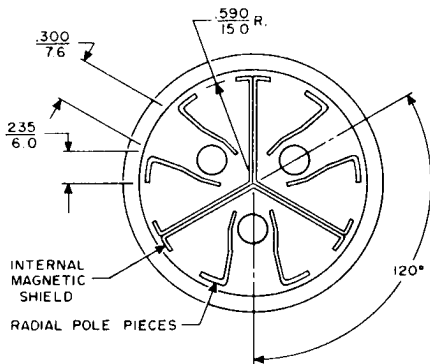


92LM-1252

## Base Specification — JEDEC No.14BH

Pin 1:	Heater	Cap:	Anode (Grid No.3, Grid No.5, Screen, Collector)
Pin 2:	Cathode of Red Gun	C:	External Conductive Coating
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 9:	Grid No.4		
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		

## LOCATION OF RADIAL-COVERING POLE PIECES VIEWED FROM SCREEN END OF GUNS



92LM-1251R1



## 0.5 mR/h ISODOSE – RATE LIMIT CURVE

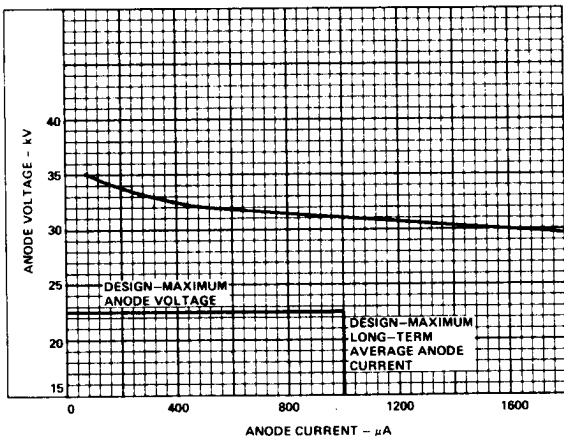


Figure 1

92LS-3657

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

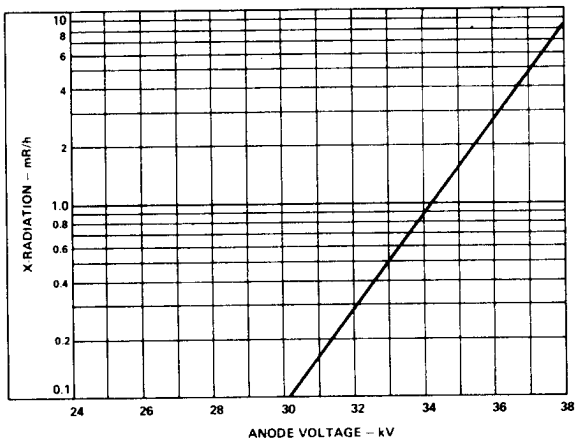
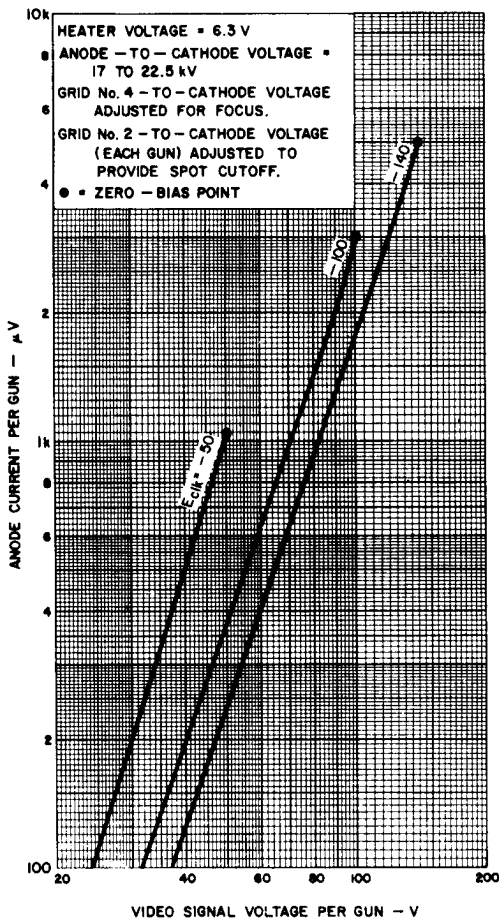


Figure 2

92LS-3296R1

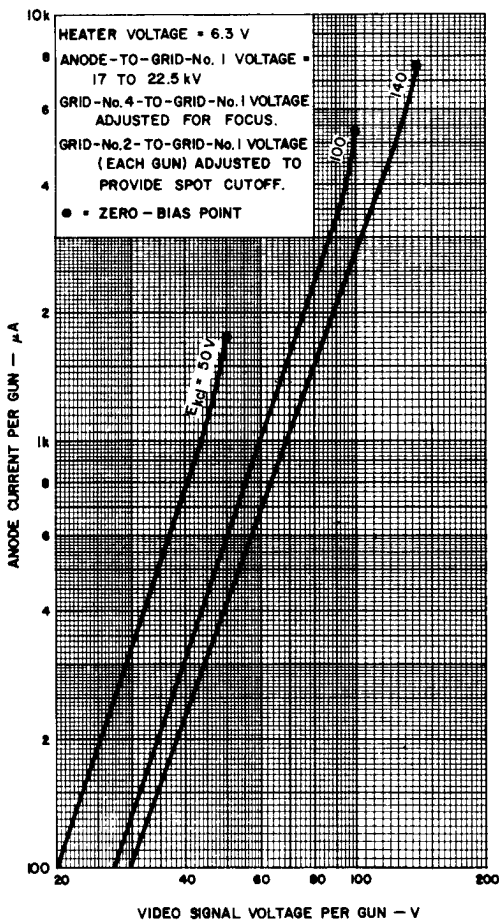
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## TYPICAL DRIVE CHARACTERISTICS, GRID-DRIVE SERVICE



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TYPICAL DRIVE CHARACTERISTICS, CATHODE-DRIVE SERVICE



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## CUTOFF DESIGN CHART

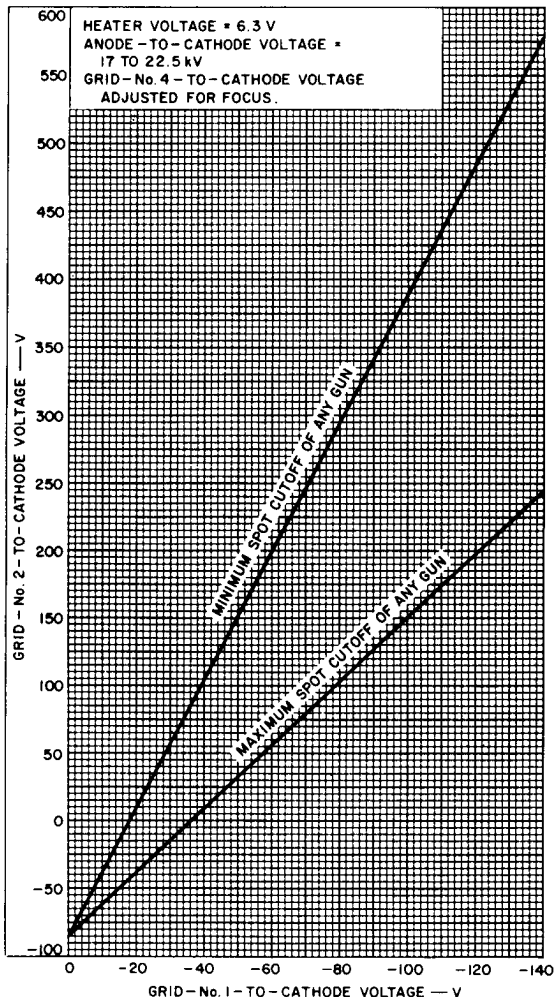


Figure 3