

Color Picture Tube

Ultra-Rectangular
4 X 3 Aspect Ratio
Electrical

Hi-Lite Matrix Screen
Light Neutral Screen Appearance

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 92 deg

Horizontal 79 deg

Vertical 61 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 $\left\{ \begin{array}{l} 2250 \text{ max. pF} \\ 1750 \text{ min. pF} \end{array} \right.$

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 377,000 Dot trios

Spacing between centers of adjacent
dot trios (Approx.) 0.026 in (0.66 mm)

Mechanical

Minimum Screen Area (Projected) 226 sq in (1458 sq cm)

Bulb Funnel Designation JEDEC No.J561AO6

Bulb Panel Designation JEDEC No.FP177-3/4 W2

Base Designation^a 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

21VAKP22

Operating Position, preferred Anode Bulb Contact on Top
Gun Configuration Delta
Weight (Approx.) 35.5 lb (16.0 kg)

Implosion Protection

Integral Safety Panel JEDEC No.SP177-1/4A1

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. 20 min.	kV kV
Anode Current, Long-Term Average ^b	1000 max.	μA
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): ^c		
Under operating conditions	{ 6.9 max. 5.7 min.	V V
Under standby conditions ^d	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 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 Undelected Focused Spot. . . . See CUTOFF DESIGN CHART

in Figure 3

At Grid No.1 voltage of -75 V 80 to 280 V

At Grid No.1 voltage of -125 V 215 to 550 V

At Grid No.1 voltage of -175 V 355 to 820 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 utilized^d 6.0 V

Under standby conditions^d 5.0 V

Grid-No.3 Current (Total) $\pm 15 \mu\text{A}$

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 ^o K + 7 M.P.C.D.	9300 ^o 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 ± 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)

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Radial convergence displacement excluding
effects of dynamic convergence
(each beam) ± 0.37 in (± 9.4 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 in (0.13 mm) max.

Typical Operation

Heater Voltage	6.3 V
Anode Voltage	25 kV
Grid No.3 Voltage	Adjusted for focus
Color Temperature	9300° K + 27 M.P.C.D.
Raster Size	17.538 x 13.256 in (445.47 x 336.70 mm)

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

At anode current of 1000 μ A

58 fL
200 Nit

Limiting Circuit Values

High-Voltage Circuits:

Grid-No.3 circuit resistance 7.5 max. MΩ

Low-Voltage Circuits:

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

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 μ A 35 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 μ 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 μ 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 connection 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.

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 blub 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.

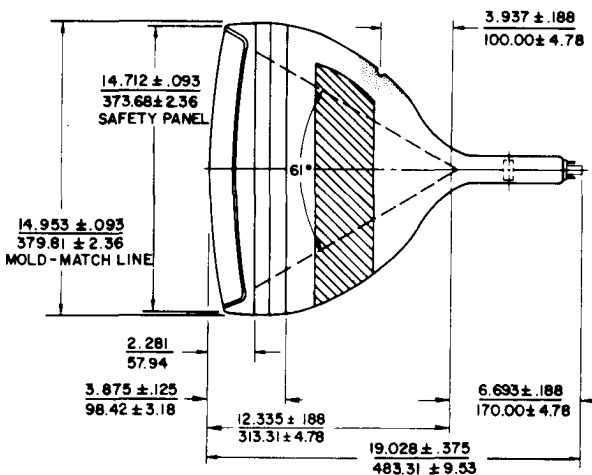
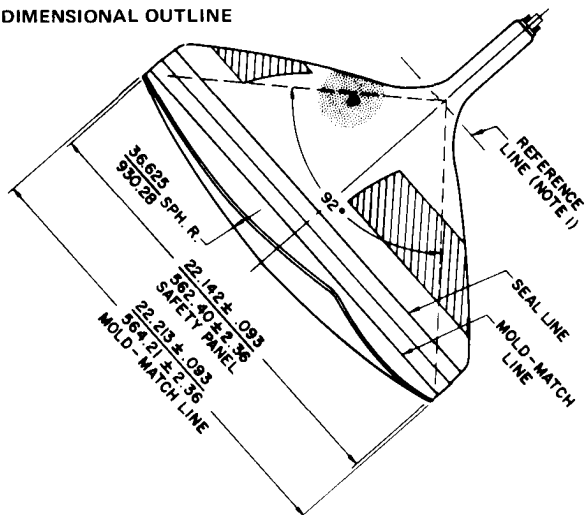
SAGITTAL HEIGHTS AT POINTS $\frac{125}{3.18}$ BEYOND EDGE OF MIN. SCREEN

DIAGONAL $\frac{1.561}{39.65}$; HORIZONTAL $\frac{1.100}{27.94}$; VERTICAL $\frac{0.630}{16.00}$

DIMENSIONAL OUTLINE

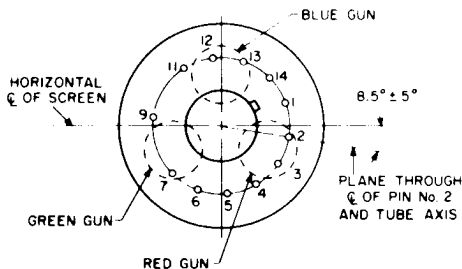


DIMENSIONAL OUTLINE



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BOTTOM VIEW OF BASE

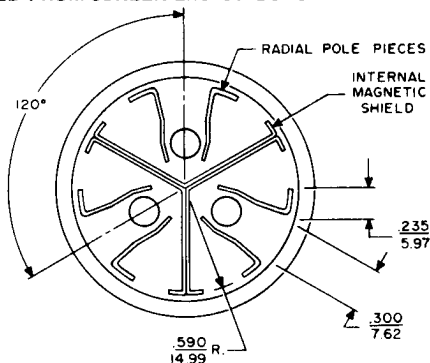


Base Specification — JEDEC No.14BE

92CS 12816

- 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 9— 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



92CS-12835R4

0.5 mR/h ISODOSE-RATE LIMIT CURVE (JEDEC CURVE No.XC-4)

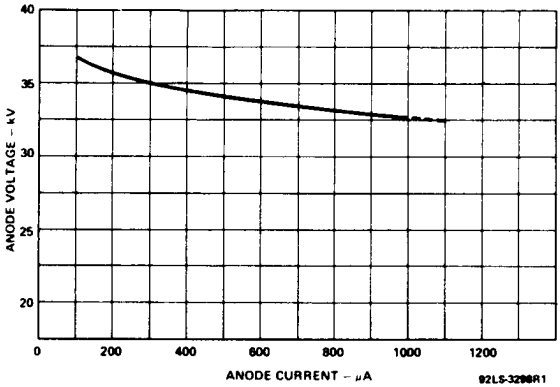


Figure 1

X-RADIATION LIMIT CURVE AT A CONSTANT ANODE CURRENT OF 300 μ A (X-RADIATION AT A CONSTANT ANODE VOLTAGE VARIES LINEARLY WITH ANODE CURRENT) (JEDEC CURVE No.XC-3)

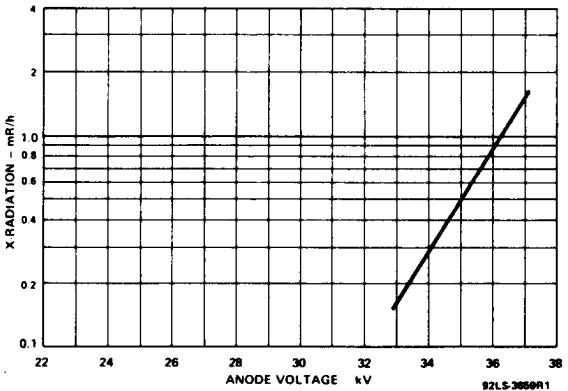
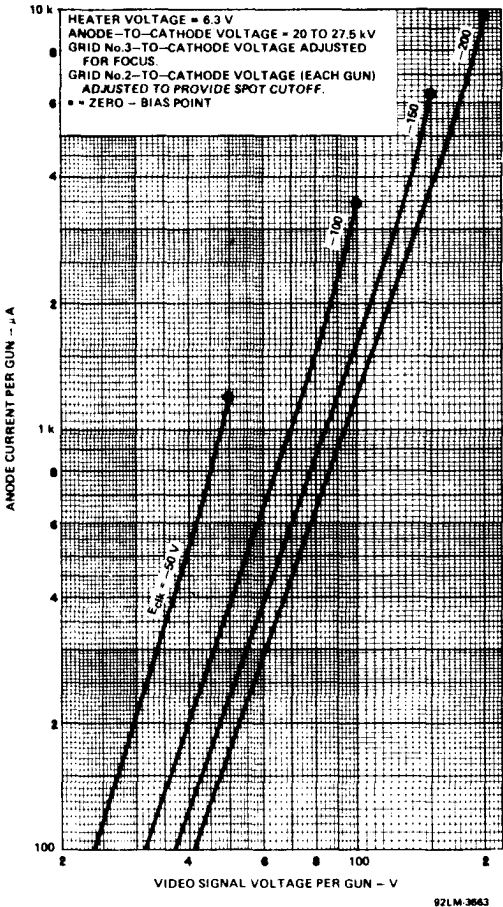
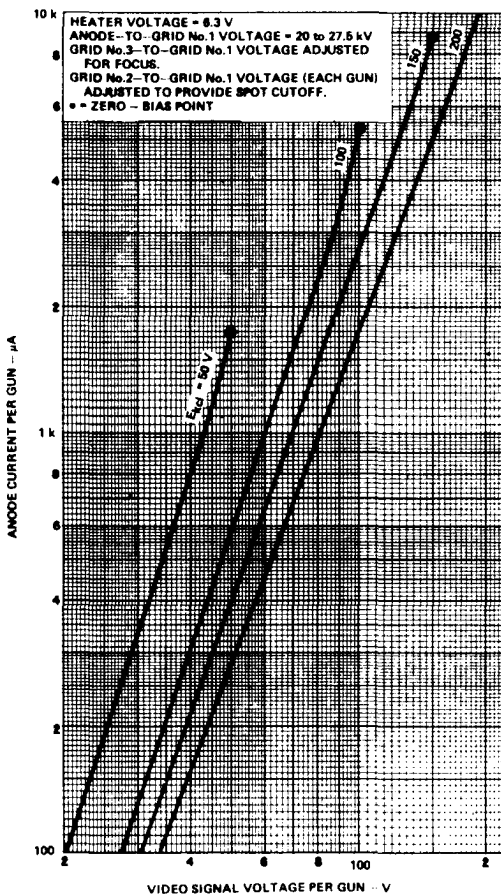


Figure 2

TYPICAL DRIVE CHARACTERISTICS, GRID-DRIVE SERVICE



TYPICAL DRIVE CHARACTERISTICS, CATHODE- DRIVE SERVICE



92LM 3884

CUTOFF DESIGN CHART

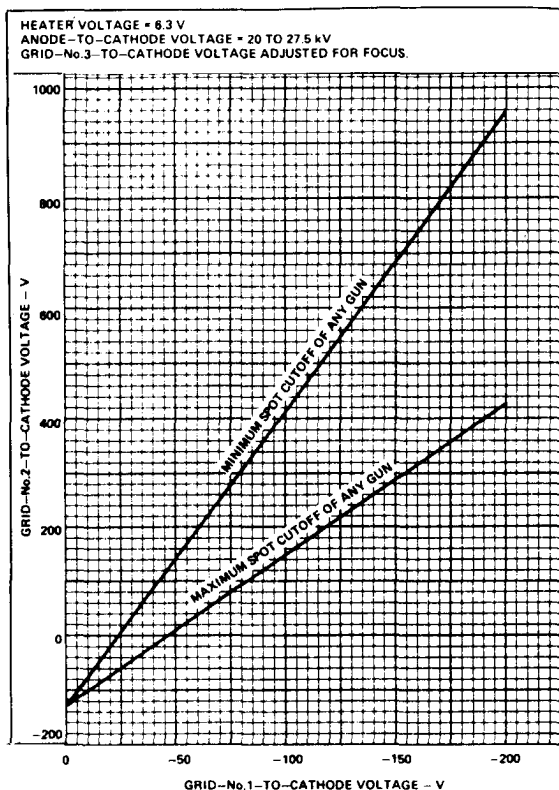


Figure 3

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