19VBRP22

Color Picture Tube

Ultra-Rectangular — Hi-Lite Matrix Screen

4 x 3 Aspect Ratio — **Light Neutral Screen Appearance**

Electrical:

Electron Guns, Three with Axes Tilted Toward Tube Axis	Red, Blue, Green
Heater:	
Voltage	6.3 V
Current	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	6 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	2300 max. pF 1800 min. pF
Resistance Between Metal Hardware and External Conductive Coating	50 MΩ

Optical:

Faceplate	Filterglass
Light transmission at center (Approx.)	70%
Surface	Polished
Screen	Aluminized
Matrix	Black opaque material
Phosphor, rare-earth (red) sulfide (blue & 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.J510A06
Bulb Panel Designation	JEDEC No.FP161-3/4 W1
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

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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	Rim Bands and Tension Band

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 Undeflected 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	**365 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 in 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)	±15 μA
Grid-No.2 Current	±5 μA
Grid-No.1 Current	±5 μA

To Produce White Light of	**Illum. D** 6550° K + 7 M.P.C.D.	**Color** 9300° 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)

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

Maximum Required Correction for Register[e] (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.

Light-Output Characteristic:

Typical White-Light Output . . . . . { 80 fL / 274 Nit

Measured within a 4 in (102 mm) diameter area centered on the tube face with the following operating conditions:

Anode Voltage	25 kV
Anode Current	1000 μA
Grid No.3 Voltage	Adjusted for focus
Color Temperature	9300° K + 27 M.P.C.D.

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. MΩ

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 . . . . . 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 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.

[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 bulb axis.

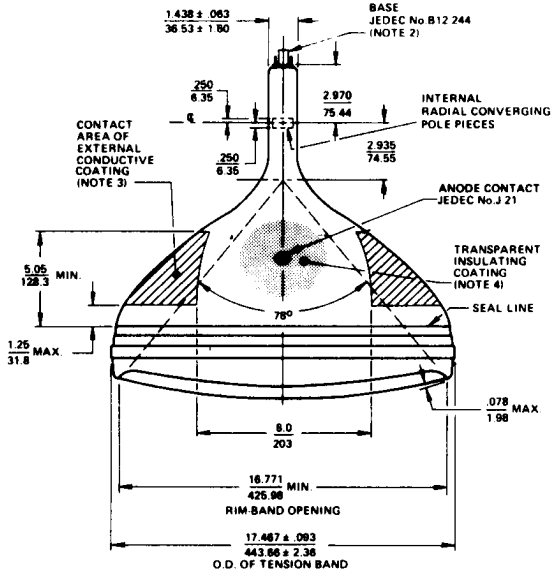
Note 3 – The drawing shows the size and location of the contact area of the external conductive coating. The actual area of this coating will be greater than that of the contact area so as to provide the required capacitance. External conductive coating must be grounded with multiple contacts.

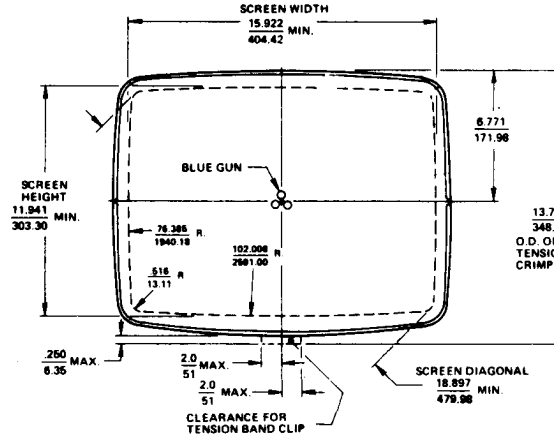
Note 4 – To clean this area, wipe only with soft, dry, lintless cloth.

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

DIAGONAL	$\frac{1.485}{37.72}$	WIDTH	$\frac{1.044}{26.52}$	HEIGHT	$\frac{.582}{14.78}$

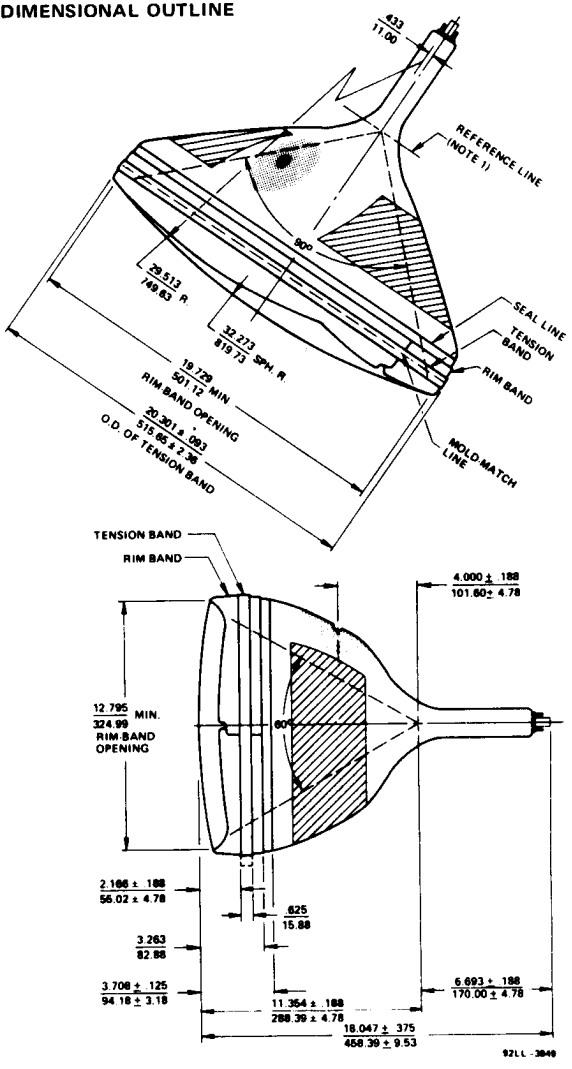
DIMENSIONAL OUTLINE



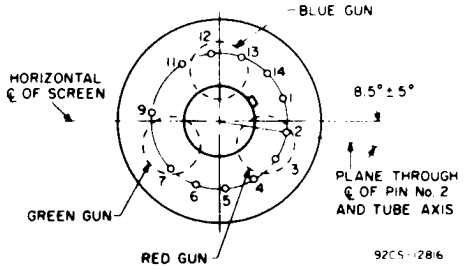


Dimensions in Inches/mm unless otherwise noted

DIMENSIONAL OUTLINE



BOTTOM VIEW OF BASE

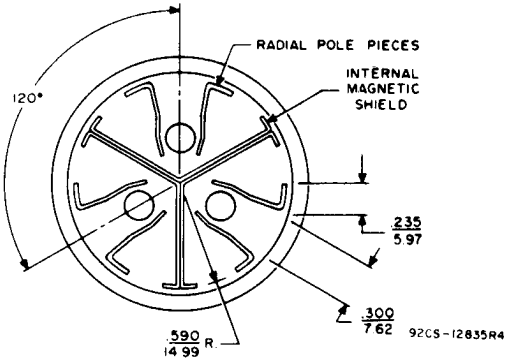


Base Specification – JEDEC No.14BE

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 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

Bulb Contact – 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 (JEDEC CURVE No.XC-2)

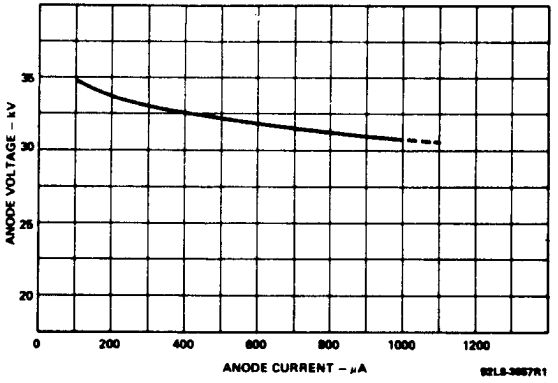


Figure 1

X-RADIATION LIMIT CURVE AT A CONSTANT ANODE CURRENT OF 300 μA (X-RADIATION AT A CONSTANT ANODE VOLTAGE VARIES LINEARLY WITH ANODE CURRENT) (JEDEC CURVE No.XC-1)

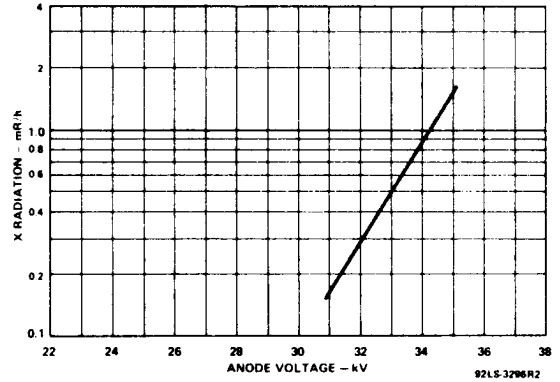
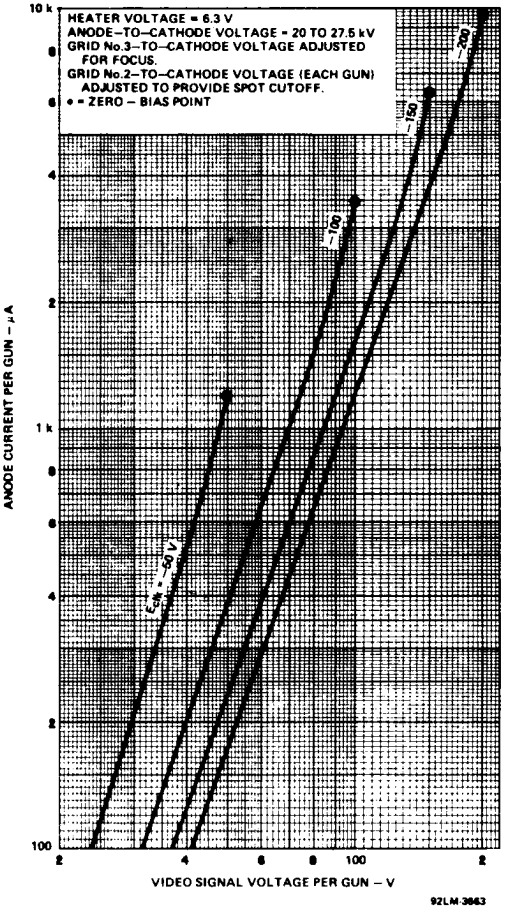


Figure 2

TYPICAL DRIVE CHARACTERISTICS, GRID-DRIVE SERVICE



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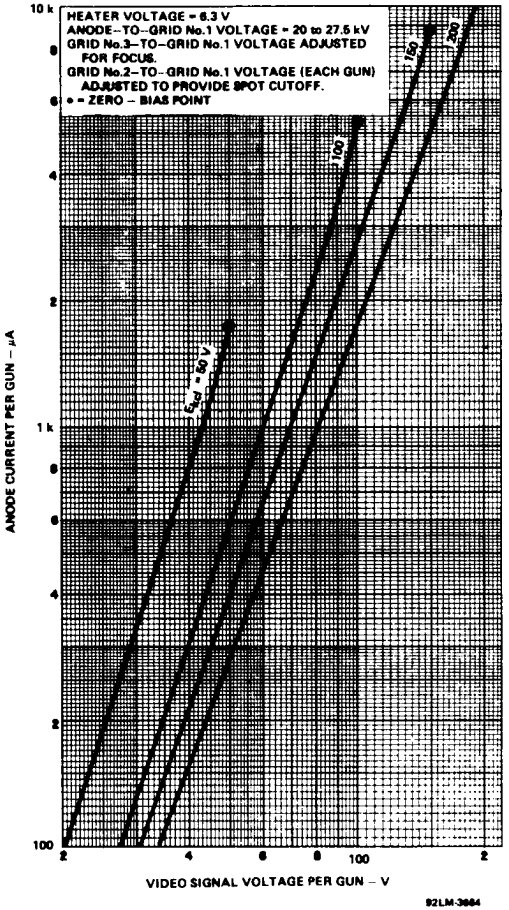
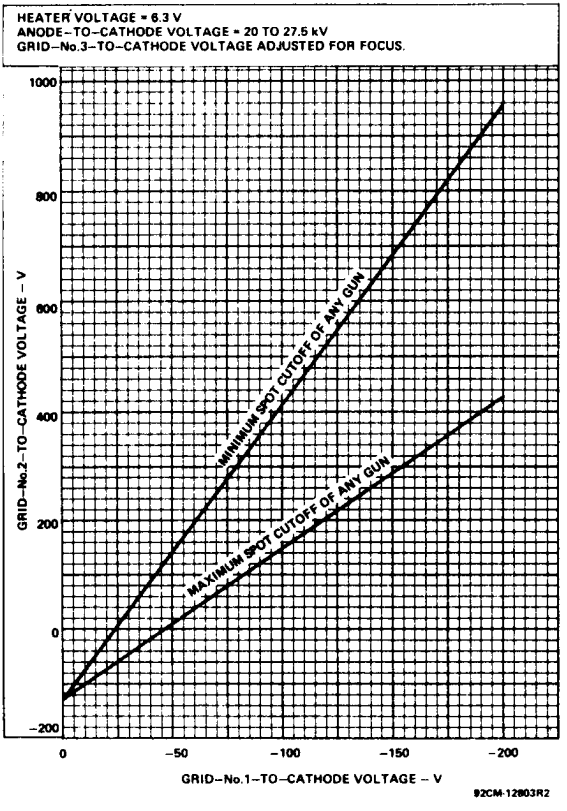
TYPICAL DRIVE CHARACTERISTICS, CATHODE-DRIVE SERVICE



CUTOFF DESIGN CHART



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

FIGURE 3