

June 28, 1956

22EP22

DIRECT VIEW, THREE GUN, SHADOW MASK COLOR PICTURE TUBE

	Magnetic Deflection	
	Magnetic Convergence	
	Aluminized Tricolor Phosphor Dot Screen	
Rectangular Glass		Spherical Face Panel
No Metal Flanges	19-3/8" x 15-1/16" Minimum Picture Size	
Electrostatic Focus		External Conductive Coating

The 22EP22 is a 22" rectangular all glass three gun shadow mask type color picture tube. It features a true all glass envelope to completely eliminate the need for high voltage insulation in the tube support means used in the television receiver.

The 262 square inch rectangular screen, minimum dimensions 15-1/16" high by 19-3/8" wide with rounded corners, is deposited on the inner surface of the gray glass face panel for improved contrast and viewing comfort. The 22EP22 uses three electrostatic focus guns spaced 120° apart with axes tilted toward the tube axis to facilitate convergence of the three beams on the screen. Individual convergence control of each beam is provided by three pairs of pole pieces to be used with external magnets for radial adjustment and an additional pair of pole pieces for tangential adjustment of the blue beam.

GENERAL DATA

ELECTRICAL DATA

Focusing Method	Electrostatic
Convergence Method	Individual Beam Magnetic
Deflection Method	Magnetic
Deflection Angles, approximate	
Horizontal	70°
Vertical	55°
Diagonal	72°
Direct Interelectrode Capacitances, Approximate	
Cathodes to All Other Electrodes	16 uuf
Grid #1 (one gun) to All Other Electrodes*	7 uuf
Grid #3 (All #3 Grids tied together internally) to All Other Electrodes	9 uuf
External Conductive Coating to Anode (Note 1)	1500 to 2800 uuf

*(except No. 1 grids of other two guns)

from JETEC release #1684, July 9, 1956

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OPTICAL DATA

Phosphor Number (of the three separate phosphors collectively)	P22
Fluorescence and phosphorescence of separate phosphors, respectively	Red, green, blue
Persistence (of the separate phosphors collectively)	Medium
Screen	
Type	Aluminized, tricolor, phosphor dot
Minimum useful size	W=19-3/8" X H=15-1/16" D=20-1/8"
Area	262 sq. in.
Arrangement of Phosphor Array	Triangular group consisting of blue dot, green dot, and red dot.
Number of Groups	Approx. 365,000
Separation of Groups	.029" approx.
Facepanel	
Type	Neutral density grey glass
Light Transmission	73%

MECHANICAL DATA

Overall Length	25-3/8"
Greatest Dimensions of Bulb	
Diagonal	22 1/4" ± 1/8"
Width	21 21/32" ± 1/8"
Height, not including blue gun reference guide	17 9/16" ± 1/8"
Neck Length	9 11/16"
Anode Contact	Recessed small cavity cap (JETEC J1-21)
Base	Small Neodiheptal 12-Pin (JETEC B12-131)
Mounting Position	Neck Horizontal, Blue Gun Up
Weight (Approx.)	31 Pounds

MAXIMUM RATINGS

(Design Center Values) (Note 2)

Heater Voltage (ac or dc)	6.3	Volts
Heater Current at 6.3 Volts	1.8 ± 10%	Amperes
Anode Voltage	25000 Max.	Volts
Anode Current (Average, each gun) (Note 3)	500 Max.	uampere
Grid No.3 Voltage	6000 Max.	Volts
Grid #2 Voltage (Each Gun)	800 Max.	Volts

Maximum Ratings (continued):

Grid #1 Voltage (Each Gun)

Negative Bias Value	400 Max. Volts
Positive Bias Value	0 Max. Volts
Positive Peak Value	2 Max. Volts

Peak Heater-Cathode Voltage (Each Gun)

Heater Negative with respect to cathode	
During Equipment Warm-Up not to exceed 15 sec.	410 Max. Volts
After Equipment Warmup	180 Max. Volts
Heater Positive with respect to cathode	180 Max. Volts

RANGE VALUES FOR EQUIPMENT DESIGN

(For anode voltage, Eb, of 25000 volts)

Grid #3 (Focusing Electrode) Voltage	16.0 to 20.4% of Eb Volts
Grid #2 Voltage for Visual Extinction of Focused Raster with Grid#1 Voltage at a Fixed Value (Each Gun)	See Cutoff Design Chart
Grid #1 Voltage for Visual Extinction of Focused Raster with Grid #2 Voltage at a Fixed Value (Each Gun)	See Cutoff Design Chart
Variation in Raster Cutoff between Guns in any Tube	±21% of average of highest and lowest cutoff values
Grid #3 Current (Total) (Note 4)	-45 to +75 uampere
Grid #2 Current (Each Gun)	-15 to +15 uampere
Percentage of Anode Current Supplied by Each Gun for Illuminant C white (ICI coordinates X= .0310, Y= 0.316)	
Red Gun	47 to 67 Percent
Green Gun	15 to 30 Percent
Blue Gun	13 to 27 Percent
Maximum Raster Shift in Any Direction from Screen Center (Note 5)	1-1/4" in any direction
Maximum Raster or Beam Shift to be Provided for Purity and Convergence:	
Purity Device	1-1/4" in any direction
Converging Devices (Note 6)	
Radial Static Convergence Shift (each Beam)	±5/8"
Radial Dynamic Convergence Shift (Horizontal)	
Red Beam	1/4"
Green Beam	1/4"
Blue Beam	1/2"
Radial Dynamic Convergence Shift (Vertical)	
Red Beam	3/8"
Green Beam	3/8"
Blue Beam	1/8"
Lateral Static Convergence Shift (Blue Beam)	±1/2"

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EXAMPLE OF USE OF DESIGN RANGES
(For anode voltage = 25000 volts)

Grid #3 (Focusing Electrode) Voltage 4000 to 5100 Volts
Grid #2 Voltage for Visual Extinction of Focused Raster
with Grid #1 Voltage of -60 Volts (Each Gun) 50 to 225 Volts
Grid #1 Voltage for Visual Extinction of Focused Raster
with Grid #2 Voltage of 200 Volts (Each Gun) -55 to -105 Volts

CIRCUIT VALUES

Grid #1 Circuit Resistance (Each Gun) 1.5 Max. Megohms
Effective Resistance of the Several Electrode-Heater
Circuits should be Sufficient to Limit Instantaneous
Short Circuit Current to 300 Max. Ma. (total)
Suggested Resistance between Anode and Grid #3 Supply
Output Capacitor and Tube to Limit Instantaneous
Short Circuit Current 50000 Min. Ohms

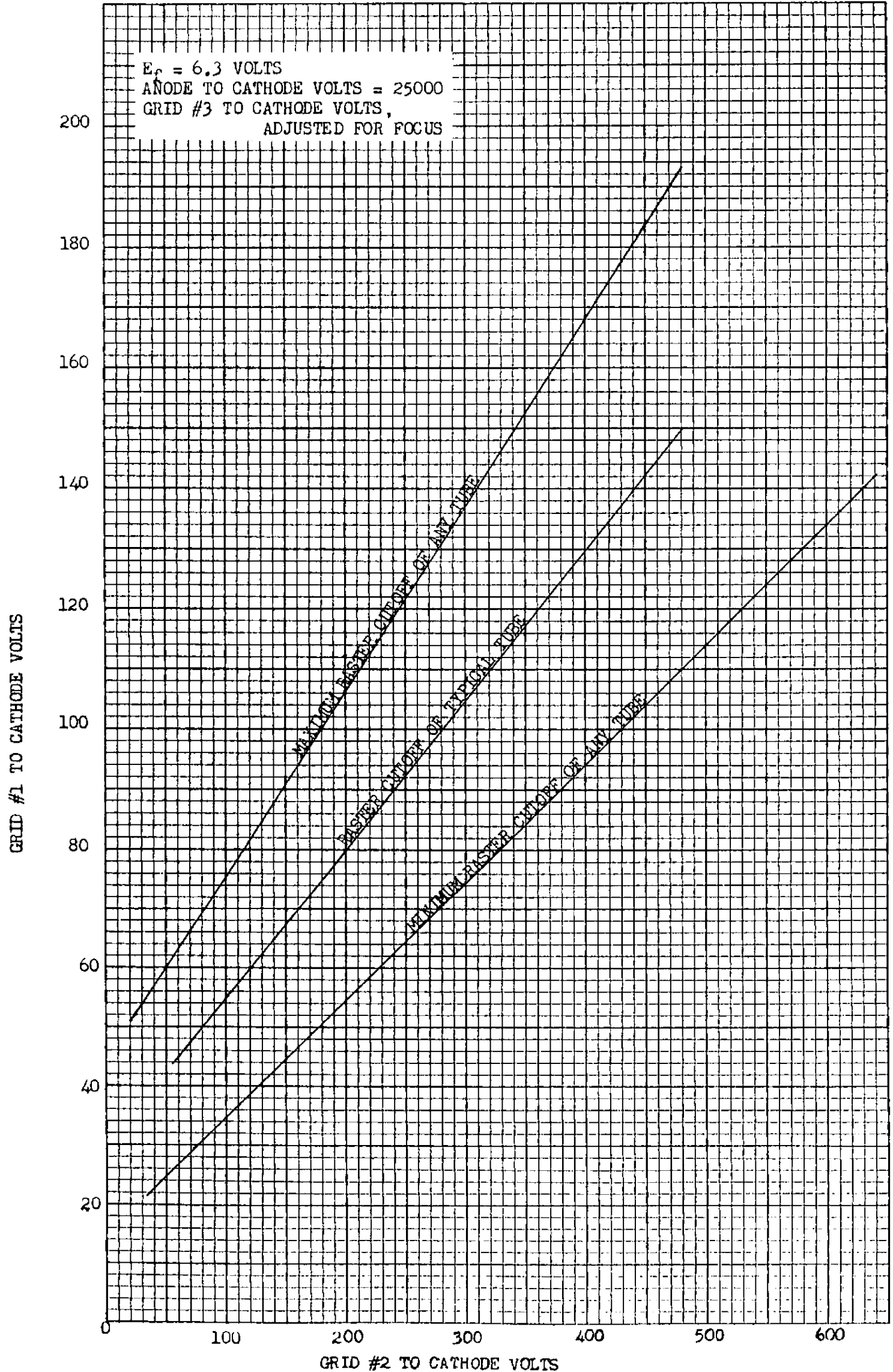
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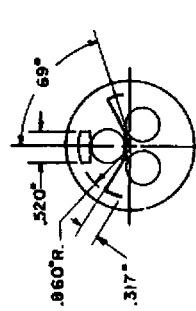
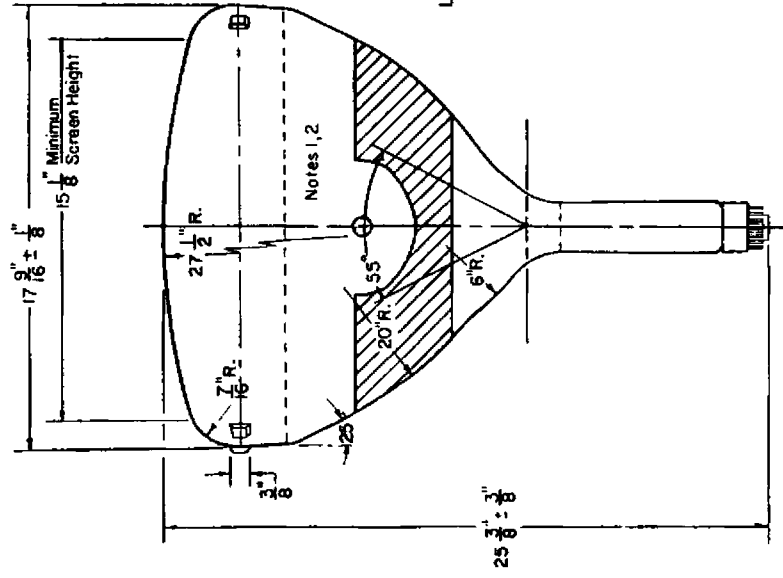
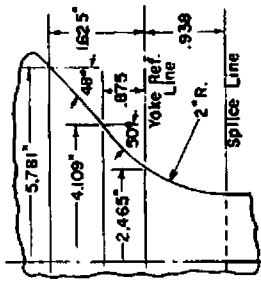
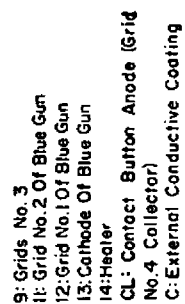
1. External conductive coating must be grounded.
2. The maximum ratings provide a ten percent safety factor in accordance with the standard Design-Center System of rating cathode-ray tubes; i.e., the tube will withstand the combined effects of variations in line voltage and components provided the maximum Design-Center values are not exceeded by more than ten percent.
3. A value of average anode current per gun higher than 500 ua will increase picture brightness but may impair resolution and shorten cathode life.
4. For an anode current of 800 ua drawn from any one gun.
5. Centering of the raster on the screen is accomplished by passing direct current of the required value through each pair of deflecting coils to compensate for the raster shift resulting from optimum adjustments of convergence, color purity, and concentricity.
6. Convergence shifts are produced by external permanent magnetic and/or electromagnetic devices adjacent to each gun. The static shifts are controlled by dc currents through appropriate coils or static magnetic fields produced by adjustable permanent magnets. Dynamic convergence shifts are produced by ac currents, having essentially parabolic waveforms, which are synchronized with the scanning.

X-Ray Warning - Since this tube is operated at voltages as high as 25000 volts, x-ray radiation shielding may be necessary to avert possible danger of personal injury from prolonged exposure at close range. The protective window provided in the equipment using this tube may provide such a safeguard.

Field Neutralizing Device - This tube is designed to be used without a magnetic shield. Varying effects of earth's magnetic field in various locations and for various receiver orientations require a neutralizing coil and trimming magnets around the periphery of the tube face for optimum color purity.

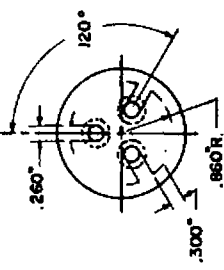
22EP22 CUTOFF DESIGN CHART



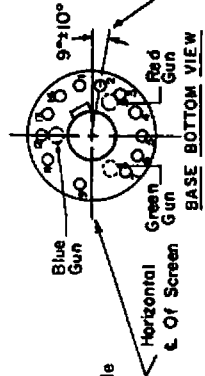
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REFERENCE GUIDE UP

Location of Blue Positioning Pole Pieces



Location Of Beam Converging Pole Pieces



Note 1: Anode Terminal Aligns $\pm 30^\circ$ With A Plane Through The Tube Axis Passing Between Pin[#] 1 And^m 2.

Note 2: An Area Approximately 8" In Dia. Centered On The Anode Terminal Is Left Free Of External Conductive Coating.

SEE BASE BOTTOM VIEW

Note 3: The Shaded Area Indicates The Approximate Shape And Location Of The External Conductive Coating, In All Cases The Coating Will Contain The 2" X 2"

Note 4: Yoke Reference Line Is Determined By The Plane Of The Upper Edge Of A Reference Line Gage (2.465 I.D. Cylinder) When The Gage Is Resting On The Cone