



## Astro-Brite 135 Color Picture Tube

- High brightness screen assembly
- New 3 x 4 aspect ratio
- Large viewing area - 315 Sq. In.
- High resolution gun - sharper pictures - better detail
- Light neutral screen appearance
- Rare earth (red) phosphor
- New Green Phosphor
- Unity Current Ratios
- Temperature Compensated Shadow Mask
- Integral Implosion Protection with Mounting Lugs
- Increased X-Ray Absorption Panel and Funnel

### Electrical Data

Electron Guns, Three... Red Blue Green  
Heater Current at  
6.3 Volts ..... 0.900 Ampere  
Focusing Method ..... Electrostatic  
Focus Lens ..... Bipotential  
Convergence Method ..... Magnetic  
Deflection Method ..... Magnetic  
Deflection Angles (Approx.):  
Diagonal ..... 90 Degrees  
Horizontal ..... 78 Degrees  
Vertical ..... 60 Degrees  
Direct Interelectrode Capacitances  
(Approx.):  
Grid 1 of any Gun to  
All Other Electrodes ..... 9 pF  
Cathodes to All Guns (Parallel  
Connected) to All Other  
Electrodes ..... 12 pF  
Focusing Electrode (Grid 3) to  
All Other Electrodes ..... 9 pF  
External Conductive Coating to  
Anode:  
Maximum ..... 2500 pF  
Minimum ..... 2000 pF

The  25VAGP22 employs a new improved, high efficiency phosphor screen assembly. This assembly, in conjunction with a higher transmission panel, (50%), provides bright color pictures. The new 3 x 4 aspect ratio provides a larger, more rectangular viewing area of 315 square inches.

To further enhance picture detail, especially under highlight signal conditions, a new high resolution  gun has been utilized in this type.

A neutral screen appearance is an added feature which is a result of the phosphors used in the screen. This feature results in a pleasing appearance when the tube is turned off.

The phosphors which are utilized in the screen are a yttrium oxide rare-earth red phosphors, and improved green and blue sulfide phosphors. The use of these phosphors and new improved techniques in screening processes provide the higher brightness screen assembly. The unity cathode-current ratio feature is maintained in the  25VAGP22 for the industry standard white temperature.

Other features of the  25VAGP22 include a temperature compensated shadow mask; integral implosion protection provided by formed rims and a tension band; mounting lugs.

### Optical Data

Screen, on Inner Surface of Faceplate:  
Type... Aluminized Tri-color Phosphor  
Dot P22  
Spacing between Centers of Adjacent  
Dot Triads (Approx.) ..... 0.029"  
(0.74 mm)  
Light Transmission at Center  
(Approx.) ..... 50%  
Anti-reflection Treatment ..... No

### Mechanical Data

Minimum Useful Screen Dimension  
(Projected):  
Diagonal ..... 24.658"  
(626.31 mm)  
Horizontal Axis ..... 20.776"  
(527.72 mm)  
Vertical Axis ..... 15.582"  
(395.78 mm)  
Area ..... 315 Sq. In.  
(2032.25 Sq. cm)  
Bulb:  
Funnel ..... JEDEC No. J209 D1  
Panel ..... JEDEC No. FP-209 R1  
Implosion Protection ..... Banded Rim  
Weight ..... 44.5 Pounds (20.7 kg)

Westinghouse



## 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                                            | 27500 max. Volts  |
|                                                          | 20000 min. Volts  |
| Total Anode Current, Long-Term Average                   | 1000 max. $\mu$ A |
| Grid 3 (Focusing Electrode) Voltage                      | 6000 max. Volts   |
| Peak-Grid 2 Voltage, Including Video Signal Voltage      | 1000 max. Volts   |
| Grid 1 Voltage:                                          |                   |
| Negative Bias Value                                      | 400 max. Volts    |
| Negative Operating Cutoff Value                          | 200 max. Volts    |
| Positive Bias Value                                      | 0 max. Volts      |
| Positive Peak Value                                      | 2 max. Volts      |
| Heater Voltage (ac or dc):                               |                   |
| Under Operating Conditions (Note 1)                      | 6.9 max. Volts    |
|                                                          | 5.7 min. Volts    |
| Under Standby Conditions (Note 2)                        | 5.5 max. Volts    |
| Peak Heater-Cathode Voltage:                             |                   |
| Heater Negative with respect to Cathode:                 |                   |
| During Equipment Warm-up Period not exceeding 15 seconds | 450 max. Volts    |
| After Equipment Warm-up Period:                          |                   |
| Combined AC and DC Value                                 | 200 max. Volts    |
| DC Component Value                                       | 200 max. Volts    |
| Heater Positive with respect to Cathode:                 |                   |
| AC Component Value                                       | 200 max. Volts    |
| DC Component Value                                       | 0 max. Volts      |

## Equipment Design Ranges

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

|                                                                         |                                  |
|-------------------------------------------------------------------------|----------------------------------|
| For Anode Voltages between 20000 and 27500 Volts                        |                                  |
| Grid 3 (Focusing Electrode) Voltage as a % of Anode Voltage             | 16.8 to 20 %                     |
| Grid 2 and Grid 1 Voltage for Visual Extinction of Focused Spot         | See Figure 1                     |
| Maximum Ratio of Grid 2 Voltages, Highest Gun to Lowest Gun in Any Tube |                                  |
| (At Grid 1 spot cutoff voltage of -100 Volts)                           | 1.86                             |
| Heater Voltage:                                                         |                                  |
| Under Operating Conditions: (Note 1)                                    |                                  |
| When Standby Operation is not Utilized                                  | 6.3 Volts                        |
| When 5.0 Volts Standby Operation is Utilized                            | 6.0 Volts                        |
| Under Standby Conditions (Note 2)                                       | 5.0 Volts                        |
| Grid 3 Current (Total)                                                  | -45 to +15 $\mu$ A               |
| Grid 2 Current                                                          | -5 to +5 $\mu$ A                 |
| To Produce White of 9300°K +27 M.P.C.D.                                 |                                  |
| (CIE Coordinates $x = 0.281$ , $y = 0.311$ ):                           | Red Blue Green                   |
| Percentage of Total Anode Current supplied by each gun                  |                                  |
| (Average)                                                               | 30 31 39 %                       |
| Ratio of Cathode Currents:                                              | Min. Typ. Max.                   |
| Red/Blue                                                                | .75 .95 1.25 -                   |
| Red/Green                                                               | .60 .75 1.10 -                   |
| Displacements, Measured at Center of Screen:                            |                                  |
| Raster Centering Displacement:                                          |                                  |
| Horizontal                                                              | $\pm 0.45$ Inch ( $\pm 11.4$ mm) |
| Vertical                                                                | $\pm 0.45$ Inch ( $\pm 11.4$ mm) |
| Lateral Distance Between the Blue Beam and the                          |                                  |
| Converged Red and Green Beams                                           | $\pm 0.25$ Inch ( $\pm 6.4$ mm)  |
| Radial Convergence Displacement excluding effects                       |                                  |
| of Dynamic Convergence (each beam)                                      | $\pm 0.37$ Inch ( $\pm 9.4$ mm)  |
| Maximum Required Correction for Resister (Including                     |                                  |
| Effect of Earth's Magnetic Field when Using Recommended                 |                                  |
| Components) as Measured at the Center of the Screen                     |                                  |
| in any Direction                                                        | 0.005 Inch (0.13 mm)             |

## Limiting Circuit Values

High-Voltage Circuits:

Grid 3 Circuit Resistance  
(Note 3) . . . . . 7.5 max. Megohms

Low-Voltage Circuits:

Effective Grid 1-to-Cathode-Circuit  
Resistance (each gun)  
(Note 4) . . . . . 0.75 max. Megohm

## Notes

- 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 100,000 ohms and 1 megohm.
- The use of a 5-volt standby condition in conjunction with 6-volt operating condition 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.
- 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 3 power supply be of the limited-energy type, in which the short-circuit current does not exceed 20 milliamperes.
- 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 milliamperes 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.

## Application Data

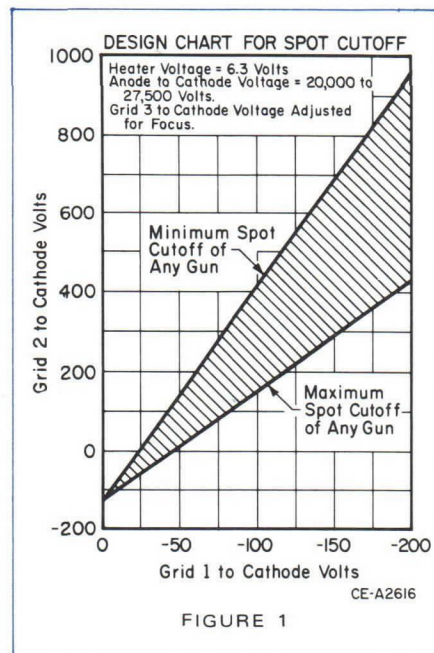


FIGURE 1

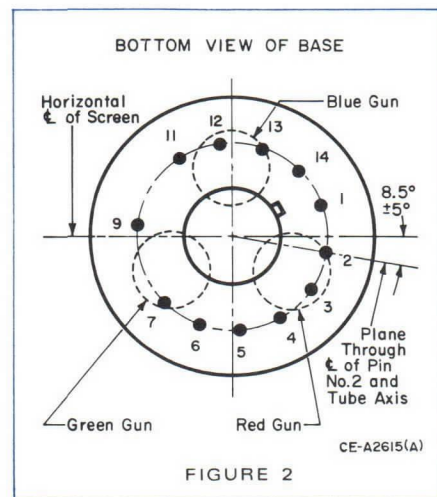


FIGURE 2

## Index of Terminals

## EIA Basing 14 BE

| Pin | Gun   | Element | Pin | Gun              | Element |
|-----|-------|---------|-----|------------------|---------|
| 1   | All   | Heater  | 9   | All              | Grid 3  |
| 2   | Red   | Cathode | 11  | Blue             | Cathode |
| 3   | Red   | Grid 1  | 12  | Blue             | Grid 1  |
| 4   | Red   | Grid 2  | 13  | Blue             | Grid 2  |
| 5   | Green | Grid 2  | 14  | All              | Heater  |
| 6   | Green | Cathode | Cap | —                | Anode   |
| 7   | Green | Grid 1  | C   | Ext. Cond. Coat. |         |

## General Considerations

## Tube Handling

The tube should be handled carefully as required by any glass picture tube. Particular care should be taken to prevent damage to the seal area and the edge of the protective window.

Support for the tube may be provided by a mounting system which supports the tube in the area in front of the seal line together with a pull-up ring or similar support on the tube funnel. The mounting system should not place mechanical stress on or cause abrasion of the tube particularly in the seal area and the edge of the protective window.

The color receiver mounting system should incorporate sufficient cushioning so that under normal conditions of shipment or handling an impact force of more than 35g is never applied to the tube.

Contact to the external conductive coating should be made by multiple fingers to prevent possible damage to the tube from localized overheating due to poor contact.

## Component Considerations

The deflection yoke should not be used for supporting the picture tube. The yoke and tube axis must coincide and the yoke must be free to move along the neck for a distance of approximately 0.5 inch (13 mm) from its most forward position for adjustment purposes. The yoke mount should also provide for a small amount of rotational adjustment.

## Positioning of Purity Magnet and Lateral Convergence Device

For best operation, it is recommended that the purity magnet and lateral convergence device be positioned as shown in Figure 4. The purity magnet (approximate strength of 10-gauss) should be centered on the neck over the Grid 3 cylinder, 1.10 inch from the centerline of the internal radial convergence pole pieces. The blue lateral convergence device should be positioned over the Grid 3 cylinder, 1.60 inch from the centerline of the internal convergence pole pieces.

## X-Ray Warning

- X-radiation Registration Reference Point:** The maximum anode voltage at which the X-radiation emitted from this tube will not exceed 0.5 mR/h at 300  $\mu$ A anode current is 35 kV.
- X-radiation Characteristics:** The X-radiation emitted from this picture tube, as measured in accordance with the procedure of JEDEC Publication 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, 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 XC-4.

Operation above those 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 (PL-90-602), as published in the Federal Register, Volume 34, No. 247, of Thursday, December 25, 1969.

Maximum X-radiation as a function of anode voltage at 300  $\mu$ A anode current is shown by the curve of Figure XC-3. X-radiation at constant voltage varies linearly with anode current.

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

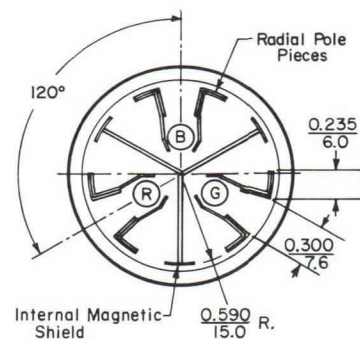


FIGURE 3

## SUGGESTED RELATIVE PLACEMENT OF PICTURE TUBE COMPONENTS

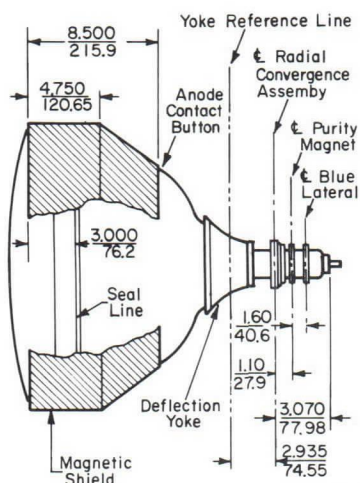


FIGURE 4

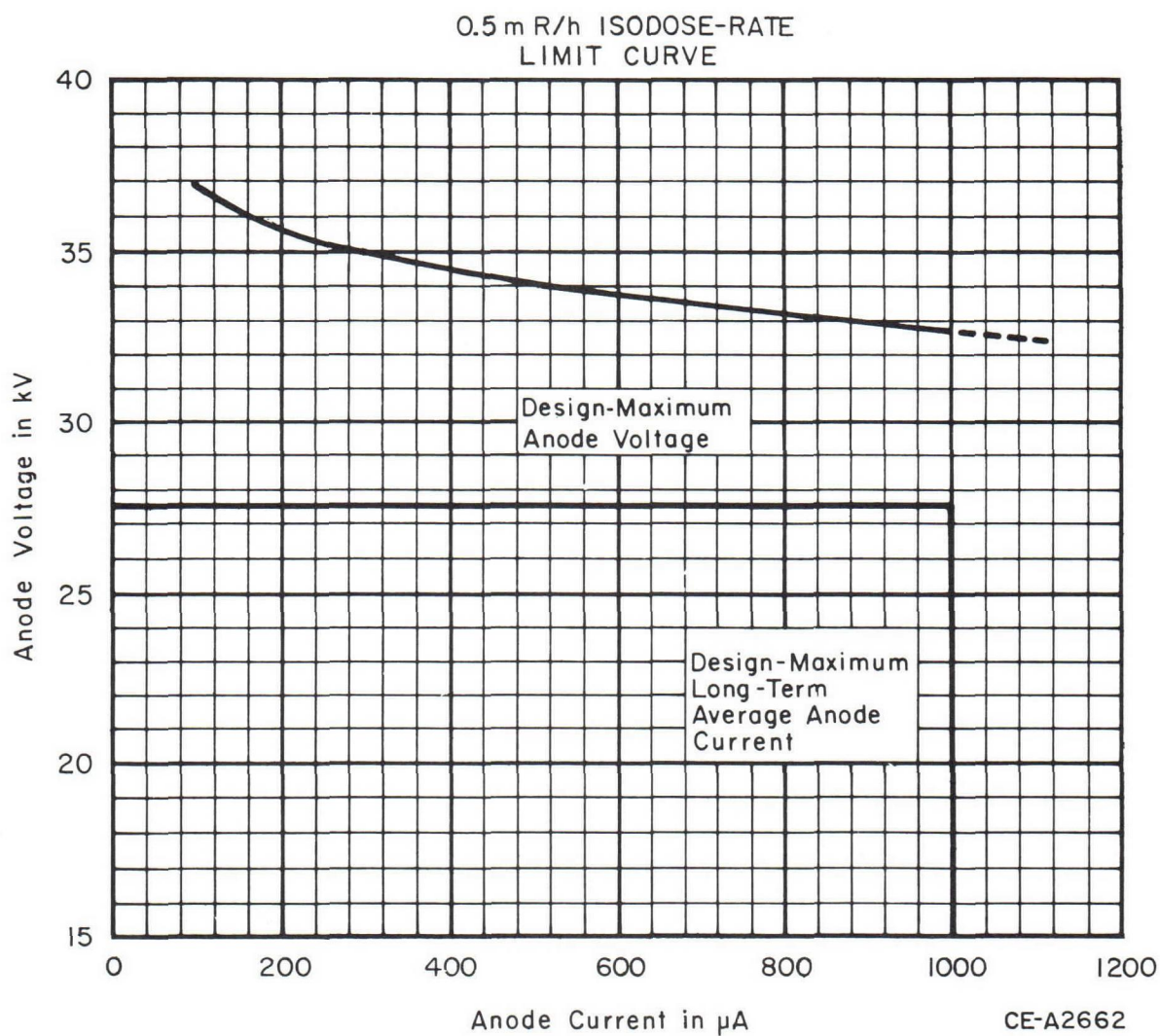
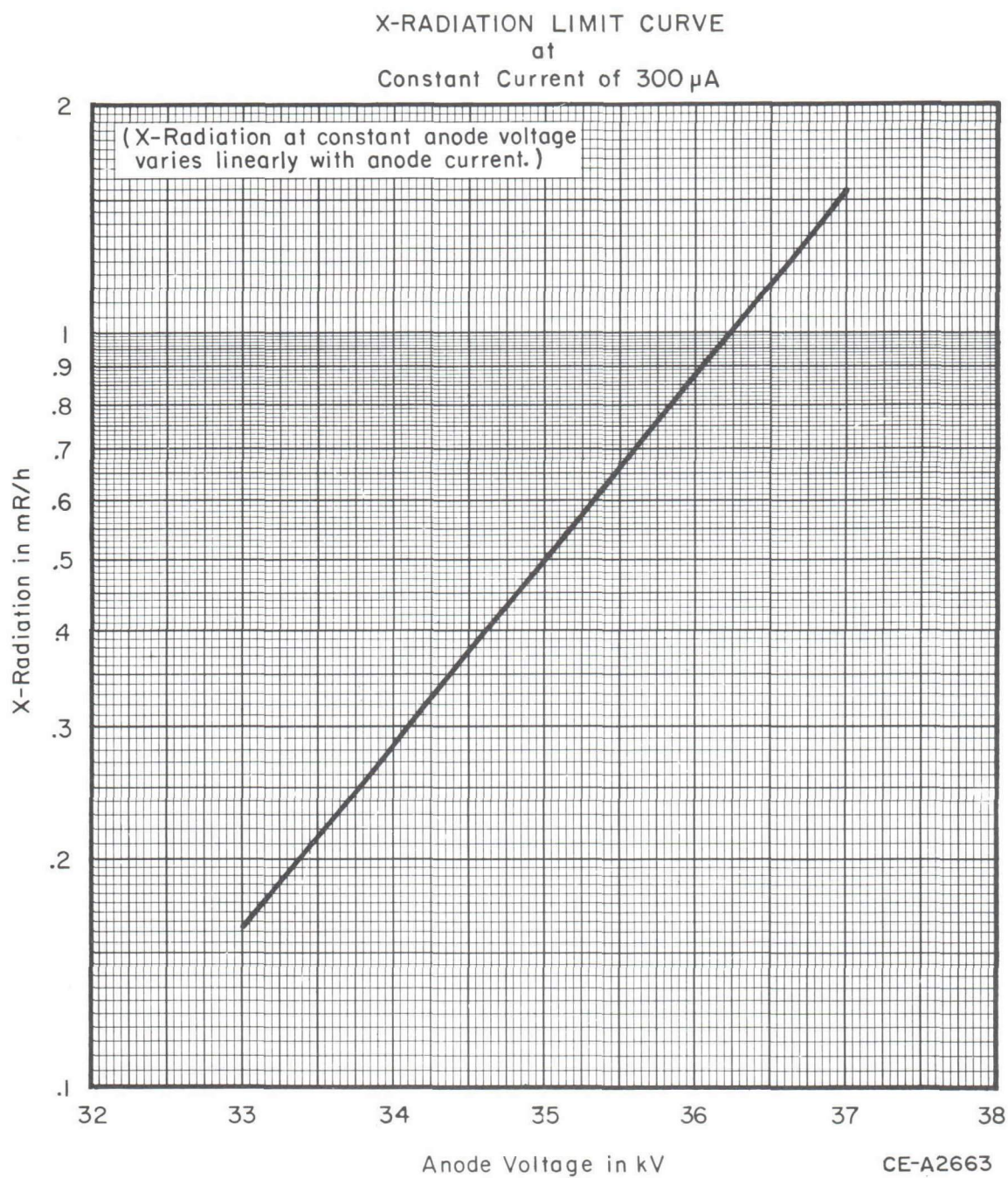
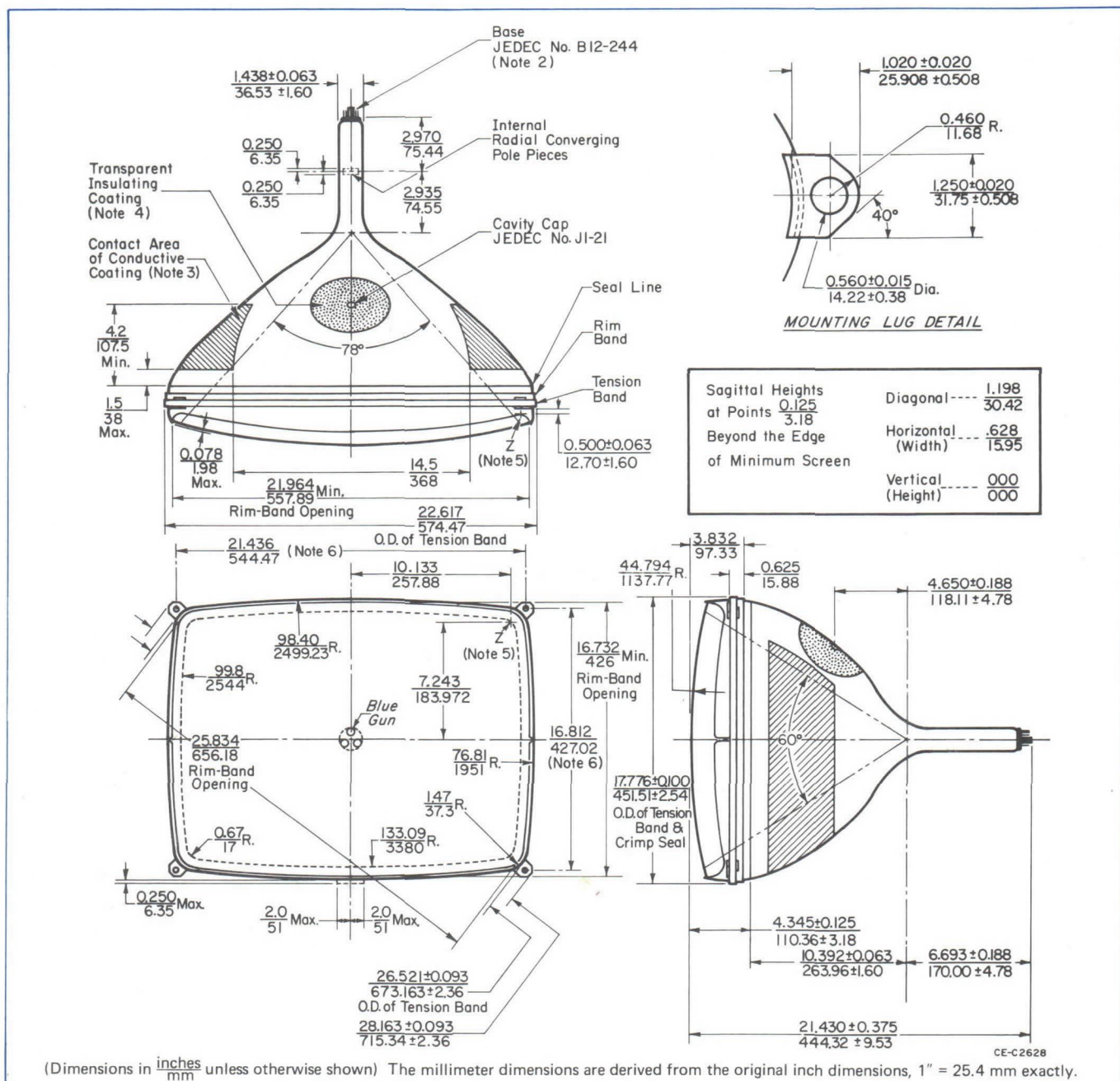


FIGURE XC-4

**25 VAG P22****90° Deflection****FIGURE XC-3**

## 25 VAG P22

90° Deflection



## Outline Notes

1. With tube neck inserted through flared end of reference-line and neck-funnel-counter 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.
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.
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.
4. To clean this area, wipe only with soft, dry, lintless cloth.
5. "Z" is located on the outside surface of the faceplate, on the screen diagonal at a point 0.125" beyond the minimum screen. This point is used as a reference for the mounting lugs.
6. The tolerance of the mounting lug holes will accommodate mounting screws up to 0.375" (9.5 mm) in diameter when positioned on the true hole centers.