"PERMA-CHROME" ASSEMBLY FOR OPTIMUM FIELD PURITY AND UNIFORMITY DURING WARM-UP

RECTANGULAR TUBE  
90° MAGNETIC DEFLECTION

ALUMINIZED TRICOLOR PHOSPHOR-DOT Hi-Lite Screen
(Using a New Improved Rare-Earth Red-Emitting Phosphor)

INTEGRAL FILTERGLASS PROTECTIVE WINDOW

MAGNETIC CONVERGENCE  
3 ELECTROSTATIC-FOCUS GUNS

For Use in Color-TV Receivers

ELECTRICAL

Electron Guns, Three: Red, Blue, Green
Axes tilted toward tube axis

Heater, of Each Gun
Series connected within tube with each
of the other two heaters
Current at 6.3 volts: 900 mA

Focusing Method: Electrostatic
Focus Lens: Bipotential
Convergence Method: Magnetic
Deflection Method: Magnetic

Deflection Angles (Approx.)
Diagonal: 89°
Horizontal: 78°
Vertical: 83°

Direct Interelectrode Capacitances (Approx.)
Grid No.1 of any gun to all other electrodes: 6 pF
All cathodes to all other electrodes: 15 pF
Grid No.3 to all other electrodes: 6.5 pF
External conductive coating to anode: 2500 max pF
2000 min pF

OPTICAL

Faceplate and Protective Window: Filterglass
Light transmission at center (Approx.): 41%
Surface of Protective Window: Treated to minimize specular reflection

Screen, on Inner Surface of Faceplate
Phosphor (Three separate phosphors, collectively)P22—New Rare-Earth (Red), Sulfide (Blue & Green) Type

Fluorescence and phosphorescence of separate phosphors, respectively: Red, Blue, Green
Persistence of group phosphorescence: Medium Short
Dot arrangement: Each triangular group consists of a red, green, and blue dot
Spacing between centers of adjacent dot trios (Approx.): 0.029 in (0.74 mm)
MECHANICAL

Tube Dimensions
Overall length. .... 20.924 ± 0.375 in (531.5 ± 9.5 mm)
Neck length ...... 6.693 ± 0.188 in (170.0 ± 4.8 mm)
Diagonal .......... 24.566 ± 0.093 in (624.0 ± 2.4 mm)
Greatest width .. 21.500 ± 0.093 in (546.1 ± 2.4 mm)
Greatest height .... 17.263 ± 0.093 in (438.5 ± 2.4 mm)

Minimum Screen Dimensions (Projected)
Diagonal ............ 22.995 in (584.1 mm)
Greatest width ...... 19.875 in (504.8 mm)
Greatest height .. 15.575 in (395.6 mm)
Area .................. 295 sq. in (1905 sq. cm)

Bulb Funnel Designation .......... JEDEC No.JI95-1/2 A1
Bulb Panel Designation .......... JEDEC No.FP196-1/2 A3
Protective Window Designation .. JEDEC No.FP196-1/2 CI
Bulb Contact Designation .......... Recessed Small Cavity Cap
(JEDEC No.JI-21)

Pin Position Alignment .......... Pin No.12 Aligns Appro.x.
with Anode Bulb Contact
Operating Position ........ Anode Bulb Contact on Top
Weight (Approx.) ........... 42 lb (19.1 kg)
Base ........... Small-Button Diheptar 12-pin (JEDEC No.B12-244)

TERMINAL DIAGRAM (Bottom View)

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 ............... 27,500 max V
Total Anode Current, Long-Term Average .......... 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 .................. \[400 \text{ max V}\]
Negative operating cutoff value ........ \[200 \text{ max V}\]
Positive bias value .................. \[0 \text{ max V}\]
Positive peak value .................. \[2 \text{ max V}\]

Heater Voltage (AC or DC)
Under operating conditions \[6.9 \text{ max V}\]
Under standby conditions \[5.7 \text{ min V}\]

Peak Heater-Cathode Voltage
Heater negative with respect to cathode:
During equipment warm-up period not exceeding 15 seconds. \[450 \text{ max V}\]
After equipment warm-up period:
Combined AC and DC value .................. \[200 \text{ max V}\]
DC component value .................. \[200 \text{ max V}\]
Heater positive with respect to cathode:
AC component value .................. \[200 \text{ max V}\]
DC component value .................. \[0 \text{ max V}\]

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

For anode voltages between 20,000 and 27,500 V

Grid-No.3 (Focusing Electrode Voltage) .................. \[16.8\% \text{ to } 20\% \text{ of anode volts}\]

Grid-No.2 and Grid-No.1 Voltages. .................. \[\text{See accompanying Cutoff Design Chart}\]

For visual extinction of focused spot

Maximum Ratio of Grid-No.2 Voltages \[\text{1.86}\]

Highest gun to lowest gun in any tube (At grid-No.1 spot cutoff voltage of -100 volts)

Grid-No.3 Current (Total) .................. \[{-45 \text{ to } +15 \mu A}\]
Grid-No.2 Current .................. \[{-5 \text{ to } +5 \mu A}\]

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) \[34 \, 32 \, 34 \, \%\]

Ratio of cathode currents:
Red/blue .................. \[0.75 \, 1.10 \, 1.50 \, \text{Min Typ Max}\]
Red/green .................. \[0.65 \, 1.00 \, 2.50 \, \text{Typ}\]
Blue/green .................. \[0.60 \, 0.91 \, 1.30 \, \text{Typ}\]

Displacement, Measured at Center of Screen
Raster centering displacement:
Horizontal .................. \[\pm 0.47 \text{ in (}\pm 11.9 \text{ mm)}\]
Vertical .................. \[\pm 0.45 \text{ in (}\pm 11.4 \text{ mm)}\]
Lateral distance between the blue beam and the converged red and green beams. \[\pm 0.25 \text{ in (}\pm 6.4 \text{ mm)}\]
Radial convergence displacement excluding effects of dynamic convergence (Each beam) .................. \[\pm 0.37 \text{ in (}\pm 9.4 \text{ mm)}\]
Maximum Required Correction for Register (Including Effect of Earth's Magnetic Field when Using Recommended Components)

Measured at the center of the screen in any direction... 0.005 in (0.13 mm) max

EXAMPLES OF USE OF DESIGN RANGES

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

Anode Voltage .................................. 25,000 V

Grid-No.3 (Focusing Electrode) Voltage .......... 4200 to 5000 V

Grid-No.2 Voltage when circuit design utilizes grid-No.1 voltage of -150 volts for visual extinction of focused spot. .......................... 285 to 685 V

Grid-No.1 Voltage for visual extinction of focused spot when circuit design utilizes grid-No.2 voltage of 400 volts... -95 to -190 V

Heater Voltage
- Under operating conditions a .................. 6.3 V
- Under standby conditions. ...................... 5.0 V

LIMITING CIRCUIT VALUES

High-Voltage Circuits

Grid-No.3 Circuit Resistance ...................... 7.5 max Ω

In order to minimize the possibility of damage to the tube caused by momentary internal arc, it is recommended that the high-voltage power supply and the grid-No.3 power supply be of the limited-energy type, in which the short-circuit current does not exceed 20 mA.

Low-Voltage Circuits

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

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 mA 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.
a For maximum cathode life, it is recommended that the heater supply be regulated at 6.3 volts. The series impedance to any chassis connection in the DC biasing circuit for the heater should be between 100,000 ohms and 1 megohm.

b For curve, see Group Phosphor P22—New Rare-Earth (Red), Sulfide (Blue & Green) at front of this section.

c For "instant on" applications, 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.

d Register is defined as the relative position of the beam trios with respect to the associated phosphor-dot trios.

GENERAL CONSIDERATIONS

X-Radiation Warning. Because the 25XP22 is designed to be operated at anode voltages as high as 27.5 kilovolts (design-maximum value), shielding of the 25XP22 for X-radiation may be needed to protect against possible injury from prolonged exposure at close range.

Orientation. The 25XP22 must be operated with tube axis in a horizontal position and with the blue gun uppermost (i.e., the anode contact button on top).

The Deflecting Yoke and tube axes 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.

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.

Misregister Compensation. Proper operation of the 25XP22 requires compensation for the effects of extraneous magnetic fields, the earth’s magnetic field, and other causes which may produce misregister. Compensation for these effects may be accomplished by the use of a purifying magnet.

REFERENCE-LINE AND NECK-FUNNEL-CONTOUR GAUGE JEDEC No.0162

Reference Line is determined by plane C-C' when gauge is seated.
Note 1: With tube neck inserted through flared end of reference-line and neck-funnel-contour gauge and with tube seated in gauge, the reference line is determined by the intersection on 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.
Cutoff Design Chart

HEATER VOLTAGE = 6.3 VOLTS
ANODE-TO-CATHODE VOLTAGE = 20,000 TO 27,500 VOLTS
GRID-N0. 3-TO-CATHODE VOLTAGE ADJUSTED FOR FOCUS.

MINIMUM SPOT CUTOFF OF ANY GUN

MAXIMUM SPOT CUTOFF OF ANY GUN

GRID-N0.1-TO-CATHODE VOLTS

GRID-N0.2-TO-CATHODE VOLTS

92CM-12803
Typical Light-Output Characteristic

HEATER VOLTAGE = 6.3 VOLTS
ANODE-TO-CATHODE VOLTAGE = 25000 VOLTS
GRID-No. 3-TO-CATHODE VOLTAGE ADJUSTED FOR FOCUS.
DRIVE OF EACH GUN IS ADJUSTED TO GIVE COMPOSITE ANODE CURRENT TO PRODUCE 9300°K ± 27 M.P.C.D. WHITE-LIGHT OUTPUT.
PERCENTAGE OF TOTAL ANODE CURRENT SUPPLIED BY EACH GUN TO PRODUCE 9300°K ± 27 M.P.C.D. WHITE:
RED GUN: 34%
BLUE GUN: 32%
GREEN GUN: 34%
Raster size: 19.875" x 15.575" (504.8 mm x 395.6 mm)
*MEASURED WITHIN 5" – DIAMETER AREA CENTERED ON TUBE FACE.
Typical Drive Characteristics
Grid-Drive Service

- Heater voltage = 6.3 volts
- Anode-to-cathode voltage = 20000 to 27500 volts
- Grid-No. 3-to-cathode voltage adjusted for focus.
- Grid-No. 2-to-cathode voltage (each gun) adjusted to provide spot cutoff for desired fixed grid-No. 1-to-cathode (each gun) voltage ($E_{cik}$).

- * = zero-bias point

<table>
<thead>
<tr>
<th>Anode microamperes per gun</th>
</tr>
</thead>
<tbody>
<tr>
<td>10000</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Video signal volts from spot cutoff per gun</th>
</tr>
</thead>
<tbody>
<tr>
<td>10000</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

$E_{cik}$ (for spot cutoff) volts
- 50
- 100
- 150
- 200

92CM-12807
Typical Drive Characteristics
Cathode-Drive Service

HEATER VOLTAGE * 6.3 VOLTS
ANODE-TO-GRID-No.1 VOLTAGE * 20000 TO 27500 VOLTS
GRID-No. 3-TO-GRID-No.1 VOLTAGE ADJUSTED FOR FOCUS.
GRID-No. 2-TO-GRID-No.1 VOLTAGE (EACH GUN) ADJUSTED
TO PROVIDE SPOT CUTOFF FOR DESIRED FIXED CATHODE-
TO-GRID-No.1 (EACH GUN) VOLTAGE (E_{kci})

* = ZERO-BIAS POINT

ANODE MICROAMPERES PER GUN

VIDEO SIGNAL VOLTS FROM SPOT CUTOFF PER GUN

92CM-12806