# 4583, 4584, 4585

## Projection Kinescopes

7"-Diameter Electrostatic-Focus, Magnetic-Deflection Types

- Matched Trio of Tubes for Color Projection Systems
- Designed for Use with Schmidt Reflective Optical Systems
- Matched Phosphors
- High Picture Brightness
- Wide Range of Synthesized Colors
- Balanced Drive Characteristics

### General Data

**Electrical:**

| | |
|---|---|
| Heater Current at 6.6 Volts | 0.62 A |
| Focusing Method | Electrostatic |
| Deflection Method[a] | Magnetic |
| Deflection Angle (Approx.) | 35° |
| Direct Interelectrode Capacitances (Approx.): | |
| Grid No.1 to all other electrodes | 12 pF |
| Cathode to all other electrodes | 6 pF |

**Optical:**

| | |
|---|---|
| Faceplate, Spherical | Clear, Browning-Resistant Glass |
| Radius of curvature (inner radius) | 15.315 in |
| Minimum Optical-Quality-Rectangle | 5x3-3/4 in |
| Refractive Index of Faceplate | 1.469 |
| Phosphors, Aluminized: | |
| 4583 | Sulfide (Blue) Type |
| C.I.E. coordinates (x,y) | 0.155, 0.048 |
| Luminescence | Blue |
| Persistence | Medium |
| 4584 | Silicate (Green) Type |
| C.I.E. coordinates (x,y) | 0.218, 0.728 |
| Luminescence | Green |
| Persistence | Medium |
| 4585 | Rare-Earth (Red) Type |
| C.I.E. coordinates (x,y) | 0.660, 0.340 |
| Luminescence | Red |
| Persistence | Medium |

**Mechanical:**

Tube Dimensions:

| | |
|---|---|
| Overall length | 19-1/2 ± 5/8 in |
| Greatest diameter of bulb (excluding side cap or cable) | 7 ± 3/16 in |
| Base | Small-Shell Diheptal 14-Pin, JEDEC No.B14-45 |
| Anode Lead | Molded-on, Insulated Cable, 48 in. long |
| Operating Position | Any |
| Weight (Approx.) | 5 lbs |

## Maximum and Minimum Ratings, Absolute-Maximum Values[b]

| | | | |
|---|---|---|---|
| Average Anode Power:[c] | | | |
| With forced-air cooling of faceplate | 160 | max. | W |
| Air Flow to Face[d] | 40 | | cfm |
| Anode-to-Cathode Voltage | 80 | max. | kV |
| Grid-No.3-to-Cathode Voltage | 20 | max. | kV |
| Grid-No.2-to-Cathode Voltage | 1.05 | max. | kV |
| Grid-No.1-to-Cathode Voltage: | | | |
| Negative bias value | 250 | max. | V |
| Positive bias value | 0 | max. | V |
| Peak positive value | 2 | max. | V |
| Anode Current, Long-Term Average (for 5" x 3-3/4" TV raster) | 2 | max. | mA |
| Peak Heater-Cathode Voltage: | | | |
| Heater negative with respect to cathode | 150 | max. | V |
| Heater positive with respect to cathode | 150 | max. | V |
| Heater Voltage (AC or DC)[e] | 6.93 | max. | V |
| | 6.27 | min. | V |

## Recommended Operating Values[f]

| | | |
|---|---|---|
| Raster Size | 5" x 3-3/4" | |
| Anode Voltage | 75 | kV |
| Anode Current, Long-Term Average | 1000 | μA |
| Grid-No.3 Voltage for Focus at an Anode Current of 1000 μA | 15 to 17 | kV |
| Grid-No.2 and Grid-No.1 Voltages for Visual Extinction of Focused Raster | See **Figure 1** | |
| Heater Voltage | 6.6 | V |

## Typical Performance Data

| | Blue | Green | Red | |
|---|---|---|---|---|
| Luminous Output of each Tube at an Anode Current of 1000 μA for each tube | 88 | 1400 | 520 | lumens |
| Luminance of Each Tube at an Anode Current of 1000 μA for Each Tube | 680 | 10800 | 4000 | fL |
| Luminance of Three Tubes Combined at an Anode Current of 1000 μA on Limiting Tube and with Anode Current of Other Two Tubes Adjusted to Produce White of 9300° K + 27 M.P.C.D. | | | 8500 | total fL |
| Percentage of Total Luminance Supplied by Each Tube | 8 | 70 | 22 | % |
| Percentage of Total Anode Current Supplied by Each Tube (Approx.) | 50 | 27 | 23 | % |
| Center Resolution[g] | | | 600 | TV Lines |
| Grid-No.3 Current (Total)[h] | | | ±15 | μA |
| Grid-No.2 Current | | | ±15 | μA |

## Circuit Requirements

**High-Voltage Circuits**

In order to minimize the possibility of damage to the tubes and adjacent circuits caused by a 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. An external spark gap must be provided at the grid-No.3 terminal. The following resistor and voltage values are mandatory.

| | | | |
|---|---|---|---|
| Anode-Circuit Resistance (unbypassed) | 0.5 | min. | MΩ |
| Grid-No.3 Circuit Resistance (unbypassed) | 0.1 | | MΩ |
| Grid-No.3 Spark-Gap Firing Voltage | 20 | | kV |

**Low-Voltage Circuits**

| | | | |
|---|---|---|---|
| Grid-No.2 Circuit Resistance (bypassed) | 10 | | kΩ |
| Grid-No.1 Circuit Resistance (unbypassed) | 1 | | kΩ |
| Effective Grid-No.1-to-Cathode Circuit Resistance | 1.5 | max. | MΩ |

[a] Sharp corners on the yoke assembly in the vicinity of the tube neck should be avoided. Insulation between the yoke winding and/or the core and the tube neck should be capable of withstanding at least 10 kV and preferably 15 kV.

b A description of the Absolute Maximum Rating is given in the General Section, titled Rating Systems for Electron Tubes.

c The product of anode-to-cathode voltage and anode current (long term average) should never exceed 160 watts.

d The specified air flow should be delivered perpendicularly from a nozzle having a diameter of about 2 inches onto the face of the tube while it is in operation. In a typical system with air filter, the total system static pressure is approximately 0.25 inch of water. The cooling air must not contain water, dust, or other foreign matter. The air-cooling system should be electrically interconnected with the anode power supply to prevent operation of the tube without cooling.

Cooling of the tube by a tangential flow of air across its face is not recommended because the temperature gradient produced across the face may result in immediate or delayed cracking of the face.

e For maximum cathode life, it is recommended that the heater supply be regulated at 6.6 volts.

f These tubes may be operated at reduced anode voltage and/or anode current. At reduced anode voltage, center resolution will decrease. At reduced anode voltage and/or anode current, luminance will decrease. The grid-No.3 voltage for focus will be reduced in proportion to the reduction in anode voltage. Other performance characteristics may also be affected.

g Determined for a 3-3/4 inch high TV resolution test pattern with tube operating at a screen current of 1000 microamperes.

h Grid-No.3 current is normally low, as indicated in the data, when the tube is operated under recommended conditions. Lower grid-No.3 voltages (as required for focus if anode voltage is reduced) and/or higher grid-No.2 voltages can lead to a grid-No.3 current level approaching that measured in the anode circuit. Note that the fraction of available current intercepted by the grid-No.3 electrode is not constant, but increases with increasing anode current.

**The Conductive Coating**

The conductive coating on the exterior of the tube neck must be grounded. Connection to the coating may be made by using a flexible metal band fastened firmly around the neck at the base end of the coating. The metal band should be fastened only tight enough to insure good contact. If

the band is clamped very tight, resultant glass strains may eventually cause the neck to break. This coating must not be scratched and must never be washed with liquids likely to soften or dissolve lacquers.

The external coating on the neck serves to prevent corona between the neck and the yoke. Corona would damage the yoke insulation and cause breakdown in the glass of the neck. It is important that the yoke insulation be adequate for operation of the yoke against the external grounded coating. The resistance of the external conductive coating is sufficiently high so that damping of the yoke deflecting energy is negligible. Because of this high resistance, a contact area of at least 1/4 square inch should be used in making connection to the external coating.

**Safety Precautions**

**X-Radiation Warning**

Although X-radiation is generated primarily at the face of the tube when it is operated, the X-rays are emitted in all directions.

These rays can constitute a health hazard unless the tube is adequately shielded. Make sure that the shielding provides the required protection against personal injury.

On the neck of the tube itself the following warning appears and should be strictly adhered to:

**X-Ray Warning**

**This tube in operation produces X-rays which can constitute a health hazard unless the tube is adequately shielded for radiation.**

**High Voltage**

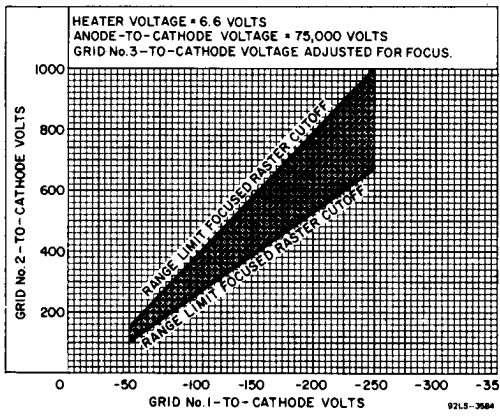
The high voltages at which these tubes are operated may be very dangerous. Great care should be taken in the design of apparatus to prevent the operator from coming in contact with the high voltages. Precautions include the enclosing of

high-potential terminals and the use of interlocking switches to break the primary circuit of the power supply when access to the equipment is required.

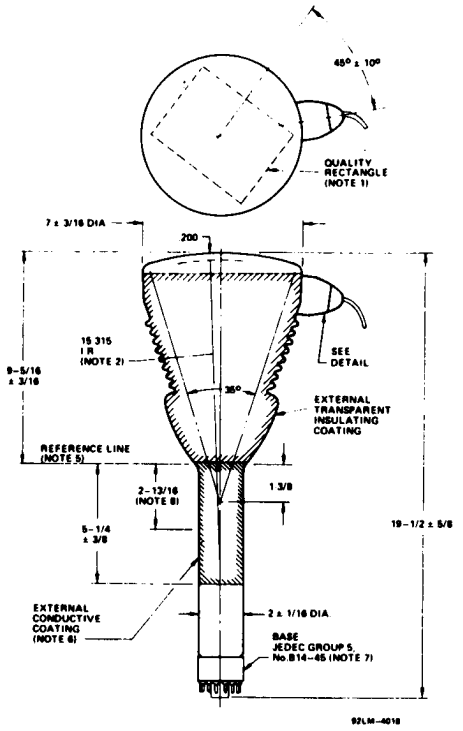
In the use of these tubes it should always be remembered that high voltages may appear at normally low-potential points in the circuit because of capacitor breakdown or incorrect circuit connections, and that the tube surface maintains a static charge for some time after the power has been turned off. Therefore, before any part of the circuit or the tube is touched, the power-supply switch should be turned off, both terminals of high-voltage capacitors should be grounded, and the terminals of the high-voltage power supply should be grounded.

After these steps have been taken and before touching the tube, discharge the anode terminal, the surface of the faceplate, and the coated surface of the cone by use of a suitable wand which is connected to ground. It is to be noted that the entire surface of the cone and of the faceplate will not be discharged by touching the wand to a single point on either surface, because the surfaces have high resistance. Therefore, to discharge each surface, it will be necessary to sweep over the entire surface with the wand.

**Cutoff Design Chart**



## Dimensional Outline




**Note 1:** When viewed from the face of the tube, the minor axis of the 5" x 3-3/4" quality rectangle is located 45° ± 10° in a counter-clockwise direction from a plane through the anode terminal and the tube axis.

**Note 2:** Inside surface of faceplate within the quality rectangle may vary ± 0.006" from the spherical surface having a 15.315" radius.

**Note 4:** The plane through Base Pin No.9 and the tube axis may vary from the plane through the anode terminal and the tube axis by an angular tolerance (measured about the tube axis) of ± 10°. The anode terminal is on same side as Pin No.9.

**Note 5:** Reference line is determined by position where gauge 2.100" ± 0.001" I.D. and 3" long will rest on bulb cone.

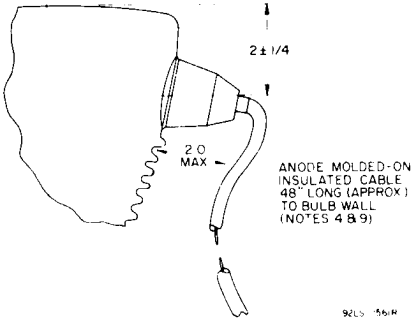
**Note 6:** External conductive coating must be grounded.

**Note 7:** Socket for this base should not be rigidly mounted; it should have flexible leads and be allowed to move freely. Socket contacts for Pins 5, 6, 7, 8, 10, 11, 12, and 13 should be removed in order to provide maximum insulation for Pin No.9.

**Note 8:** Effective deflecting field must be within this space.

**Note 9:** Anode cable should not be sharply bent within 5" of bulb wall.

## Dimensional Outline Detail

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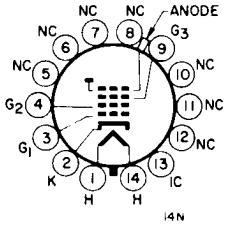
## Socket Connections (Bottom View)

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**Note:** Socket contacts for Pins No. 5, 6, 7, 8, 10, 11, 12, and 13 should be removed so that maximum insulation is provided for Pin No. 9.

Pin 1: Heater
Pin 2: Cathode
Pin 3: Grid No.1
Pin 4: Grid No.2
Pin 5: No Connection
Pin 6: No Connection
Pin 7: No Connection
Pin 8: No Connection
Pin 99: Grid No.3
Pin 10: No Connection
Pin 11: No Connection
Pin 12: No Connection
Pin 13: Internal Connection - Do Not use
Pin 14: Heater
Cable: Anode