

ELECTRONIC TUBE REFERENCE

10WP7A

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Ten-inch cathode-ray display tube with electrostatic focusing, magnetic deflection, and an aluminized P7 screen. It combines blue fluorescence with long persistence, retaining displayed information substantially longer than ordinary short-persistence picture tubes.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	6.3 V / 600 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Cathode Ray
No fixed ratings recorded.
Cathode-ray display/electron-gun section.

10WP7A — Special-Purpose Electrostatic-Focus Cathode-Ray Tube

The **10WP7A** is a 10-inch, direct-viewed, round glass cathode-ray tube (CRT) designed for specialized display applications. It features electrostatic focusing, magnetic deflection, and a spherical faceplate made of gray filter glass. The tube is characterized by its use of a long-persistence P7 phosphor screen and an aluminized backing, which distinguishes it from the standard 10WP7.

Overview and Screen Characteristics

The 10WP7A is designed for applications requiring a direct-viewed round display with a nominal deflection angle of approximately 50 degrees. The tube's faceplate is constructed of gray filter glass with a light transmittance of 76 percent, enhancing contrast under ambient lighting conditions.

The primary distinguishing feature of the 10WP7A is its screen construction. It utilizes a **P7 phosphor**, which exhibits a dual-color, long-persistence characteristic:

- **Fluorescence:** Blue
- **Phosphorescence:** Yellow
- **Persistence:** Long

The "A" suffix in the 10WP7A designation indicates that the screen is **aluminized**. This aluminized backing increases light output and prevents ion burn compared to the non-aluminized [10WP7](#), with which the 10WP7A is otherwise electrically and mechanically identical.

Mechanical Specifications and Physical Dimensions

The mechanical design of the 10WP7A incorporates a round glass envelope with a spherical faceplate. The physical dimensions and installation parameters are as follows:

- **Overall Length:** 16 11/16 ± 3/8 inches
- **Maximum Bulb Diameter:** 10 1/2 ± 1/16 inches
- **Minimum Useful Screen Diameter:** 9 inches
- **Neck Diameter:** 1 7/16 ± 1/16 inches
- **Faceplate Radius of Curvature:** 42 inches
- **Outer Bulb Body Radius:** 20 inches
- **Seated Length (Reference Line to Face):** 9 5/16 ± 3/16 inches

Connections and Basing

The tube uses a **Small Shell Duodecal 6-Pin base (B6-63)** with a **12M basing configuration**. The electrical connections are assigned as follows:

- **Pin 1:** Heater
- **Pin 2:** Grid No. 1
- **Pin 6:** Grid No. 4 (Focusing Electrode)
- **Pin 10:** Grid No. 2
- **Pin 11:** Cathode
- **Pin 12:** Heater
- **Recessed Small Cavity Cap (J1-21):** Anode

The anode bulb contact (J1-21) is aligned with the vacant pin position No. 3 within a tolerance of ±10 degrees.

Handling and Installation Notes

- **Reference Line:** The reference line is defined as the point where a 1.500-inch (+0.003 / -0.000) diameter ring gauge, 2 inches in length, stops against the bulb.
- **Anti-Corona Coating:** An anti-corona coating is applied to the bulb with a minimum radius of 1 1/2 inches concentric with the anode contact. To avoid damaging or contaminating this protective layer, the tube must not be handled by the portion of the bulb containing the anti-corona coating.

Electrical Data and Ratings

The 10WP7A operates with an indirectly heated, unipotential cathode. The electrical characteristics and absolute maximum ratings are detailed below.

Heater and Capacitance Characteristics

- **Heater Voltage:** 6.3 Volts
- **Heater Current:** 0.6 $\pm$ 10% Ampere
- **Direct Interelectrode Capacitances (approximate):**
 - Cathode to all other electrodes: 5 μ F
 - Grid No. 1 to all other electrodes: 6 μ F

Absolute Maximum Ratings (Absolute System)

These ratings represent the limits beyond which the serviceability of the tube may be impaired:

- **Anode Voltage:** 13,200 Volts DC
- **Grid No. 4 Voltage (Focusing Electrode):** -550 to +1100 Volts DC
- **Grid No. 2 Voltage:** 770 Volts DC
- **Grid No. 1 Voltage:**
 - Negative Bias Value: 200 Volts DC
 - Positive Bias Value: 0 Volts DC
 - Positive Peak Value: 0 Volts DC
- **Peak Heater-Cathode Voltage:**
 - Heater negative with respect to cathode: 200 Volts DC
 - Heater positive with respect to cathode: 200 Volts DC
- **Maximum Grid No. 1 Circuit Resistance:** 1.5 Megohms

Typical Operating Conditions and Adjustments

Under typical operating conditions, the 10WP7A is configured with the following parameters:

- **Anode Voltage:** 10,000 Volts DC
- **Grid No. 2 Voltage:** 300 Volts DC
- **Grid No. 4 Voltage for Focus:** 0 to 300 Volts DC

- **Grid No. 1 Voltage for Cutoff:** -28 to -72 Volts DC

Focus and Cutoff Adjustments

- **Focusing Procedure:** With the Grid No. 1 voltage adjusted to establish an anode current (I_b) of 100 microamperes, the Grid No. 4 voltage (E_{c4}) is adjusted within the 0 to 300 Volt range to achieve the best overall focus of a 6" x 8" raster pattern.
- **Raster and Spot Cutoff:** The typical Grid No. 1 cutoff voltage range (-28 to -72 Volts) is defined for the visual extinction of a focused raster. Complete extinction of a stationary focused spot requires the Grid No. 1 voltage to be approximately **5 volts more negative** than the raster cutoff value.

Operating Precautions and Safety

Power and Voltage Limitations

- **Anode Supply Impedance:** When operating at or near the maximum anode voltage rating, the effective resistance of the anode supply must be sufficient to limit the anode input power to **6 watts**. This protects the screen from thermal damage.
- **Minimum Operating Voltage:** To maintain acceptable display quality, the anode voltage should not be operated below **7,000 volts**. Operating below this threshold results in a significant decrease in both brilliance and definition.

X-ray Radiation Hazard

If the 10WP7A is operated at voltages exceeding its maximum rated anode voltage (13,200 Volts) or 16,000 volts (whichever is less), X-ray radiation shielding may be required. This shielding is necessary to protect personnel from potential injury during prolonged exposure at close range.

Related Designations and Comparisons

The 10WP7A is part of a family of 10-inch CRTs sharing identical mechanical dimensions, electrical ratings, and basing configurations, but utilizing different phosphor types and screen backings:

- **10WP7:** The non-aluminized counterpart to the 10WP7A, sharing the same P7 long-persistence phosphor.
- **10WP14 / 10WP14A:** Employs a P14 phosphor (blue fluorescence, orange phosphorescence, medium-long persistence). The "A" version features an aluminized screen.
- **10WP19 / 10WP19A:** Employs a P19 phosphor (orange fluorescence, orange phosphorescence, long persistence). The "A" version features an aluminized screen. For the 10WP19 series, the screen is highly sensitive to current density; to prevent permanent burning of the phosphor, minimum beam current densities must be maintained.



SOURCE OPERATING CONDITIONS

1960 Du Mont

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1960 DU MONT

Section 1 · Cathode Ray

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage	6.3 V	—
Heater Current	600 mA	—
Focusing Method	Electrostatic text	—
Deflection Method	Magnetic text	—
Phosphor	P7 text	—
Fluorescence	Blue/white text	—
Persistence	Long text	—
Deflection Angle	50 deg	Approximate
Screen Construction	Aluminized/metal-backed text	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1965 Sylvania Electronic Tubes Vol3

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1965 SYLVANIA ELECTRONIC TUBES VOL3

Section 1 · Cathode Ray

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage	6.3 V	—
Heater Current	600 mA	—
Focusing Method	Electrostatic text	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Deflection Method	Magnetic text	—
Deflection Angle	50 deg	Approximate
Phosphor	P7 text	—
Fluorescence	Blue text	—
Persistence	Long text	—
Screen Aluminized	Yes text	—
Light Transmittance	76 percent	Approximate
Phosphorescence	Yellow text	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Anode Voltage	13200 V	—
Focus Electrode Voltage Minimum	-550 V	Grid4
Focus Electrode Voltage Maximum	1100 V	Grid4
Maximum Grid2 Voltage	550 V	—
Maximum Heater-Cathode Voltage During Warmup	450 V	Duration<=15s
Maximum Heater-Cathode Voltage After Warmup	200 V	—
Anode Voltage	10000 V	—
Focus Voltage Minimum	0 V	Grid4
Focus Voltage Maximum	300 V	Grid4
Grid2 Voltage	300 V	—
Grid1 Cutoff Voltage Minimum	-72 V	—
Grid1 Cutoff Voltage Maximum	-28 V	—
Maximum Grid1 Circuit Resistance	1.5 Mohm	—

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