

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

# 10BP4A

1 SECTION  
CONSTRUCTION  
CATHODERAY

Specialized - Cathode Ray electronic tube

P4 cathode-ray picture tube with a 6.3 V, 0.6 A heater; available Tung-Sol and General Electric documentation provides limited additional descriptive detail.

## GENERAL CHARACTERISTICS

|                     |                   |                      |               |
|---------------------|-------------------|----------------------|---------------|
| BASE DESIGNATION    | —                 | BASE PINS            | 12            |
| 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.                                                                                        |
| CRT anode/focus/deflection data are preserved in parameters rather than forced into ordinary plate/screen fields. |

## 10BP4A — Magnetic Focus and Deflection Cathode-Ray Tube

The **10BP4A** (also designated as the **10BP4-A**) is a 10-inch round glass, direct-view cathode-ray picture tube designed primarily for television receiver applications. It features magnetic focus and magnetic deflection with an approximate deflection angle of 50 degrees. A key feature of the 10BP4A is its spherical, gray neutral-density faceplate, which is engineered to increase picture contrast and detail under high ambient light conditions. The tube's electron gun is designed for use with an external ion-trap magnet to prevent ion-spot blemish on the screen. Additionally, the tube incorporates an external conductive coating that, when grounded, serves as a high-voltage filter capacitor.

In terms of design relationships, the 10BP4A is identical to the [10FP4](#) except for the inclusion of the gray filter faceplate.

## Mechanical Construction and Physical Dimensions

The 10BP4A is constructed with a glass bulb designated as ASA J84C. The faceplate is spherical and tinted gray, providing an approximate light transmission of 74 percent at the center. The tube produces a picture size of approximately 9-1/8 inches by 6-3/4 inches, with a minimum useful screen diameter of 9 to 9-1/8 inches.

The physical dimensions and mechanical specifications of the tube are as follows:

- **Over-all Length:** 17-5/8  $\pm$  3/8 inches
- **Greatest Bulb Diameter:** 10-1/2  $\pm$  1/8 inches
- **Neck Length:** 8-1/8 inches
- **Neck Diameter:** 1-7/16  $\pm$  1/16 inches
- **Approximate Net Weight:** 10-1/2 pounds
- **Mounting Position:** Any

Electrical and mechanical connections are made via a small-shell Duodecal base and a high-voltage bulb contact. The bulb contact is a recessed small-cavity cap (JETEC No. J1-21) that serves as the connection for the anode (Grid No. 3). This anode terminal is aligned with the Pin No. 3 position within a tolerance of  $\pm 30$  degrees.

The external conductive coating must be grounded to function as a filter capacitor. The capacitance of this external coating to the anode ranges from a minimum of 500 uuf to a maximum of 2500 uuf.

## Heater, Base, and Pinout

The 10BP4A utilizes a coated unipotential cathode. The heater is designed to operate on either alternating current (AC) or direct current (DC).

| Heater Parameter       | Value                               |
|------------------------|-------------------------------------|
| Nominal Heater Voltage | 6.3 V                               |
| Nominal Heater Current | 0.6 A (with a $\pm 10\%$ tolerance) |

The tube features a small-shell Duodecal base, which is classified as either a 5-pin configuration (JETEC No. B5-57) or a 7-pin configuration, depending on the physical pin layout, and uses the JETEC 12N basing designation. The pin connections, viewed from the underside of the base, are assigned as follows:

| Pin Number | Connection |
|------------|------------|
| Pin 1      | Heater     |
| Pin 2      | Grid No. 1 |

| Pin Number   | Connection        |
|--------------|-------------------|
| Pin 6        | No Connection     |
| Pin 7        | No Connection     |
| Pin 10       | Grid No. 2        |
| Pin 11       | Cathode           |
| Pin 12       | Heater            |
| Recessed Cap | Anode, Grid No. 3 |

For proper circuit operation, the cathode should be returned to one side or to the midtap of the heater transformer winding.

## Electrostatic and Optical Characteristics

The optical characteristics of the 10BP4A screen are defined by its phosphor composition and faceplate properties:

- **Phosphor Number:** P4 (Sulfide Type)
- **Fluorescent Color:** White
- **Phosphorescent Color:** White
- **Persistence:** Characterized as short to medium
- **Faceplate Light Transmission:** Approximately 74% at the center

The direct interelectrode capacitances of the tube's internal structure are approximately:

- **Grid No. 1 to all other electrodes:** 6.0 to 6.5 uuf
- **Cathode to all other electrodes:** 5.0 uuf
- **External conductive coating to anode:** 500 uuf (minimum) to 2500 uuf (maximum)

## Maximum Ratings

The maximum ratings for the 10BP4A are established under the design-center system (such as RMA Standard M8-210). These design-center values provide a ten-percent safety factor, meaning the tube can 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 under normal conditions.

| Parameter                          | Design-Center Maximum Value |
|------------------------------------|-----------------------------|
| Anode Voltage (Anode & Grid No. 3) | 10,000 to 12,000 V DC       |
| Grid No. 2 Voltage                 | 410 V DC                    |
| Grid No. 1 Negative-Bias Value     | 125 V DC                    |

| Parameter                      | Design-Center Maximum Value |
|--------------------------------|-----------------------------|
| Grid No. 1 Positive-Bias Value | 0 V DC                      |
| Grid No. 1 Positive-Peak Value | 2 V                         |
| Grid No. 1 Circuit Resistance  | 1.5 Max Megohms             |

The peak heater-cathode voltage ratings restrict the potential difference between the heater and cathode elements:

- **Heater negative with respect to cathode (during equipment warm-up,  $\leq 15$  seconds):** 410 Max Volts
- **Heater negative with respect to cathode (after equipment warm-up):** 125 to 140 Max Volts
- **Heater positive with respect to cathode:** 125 to 140 Max Volts

## Typical Operating Conditions and Focus/Deflection Requirements

The 10BP4A can be operated under different typical conditions depending on the anode and grid potentials applied. Two representative operating configurations are documented:

| Parameter                                  | Configuration A  | Configuration B            |
|--------------------------------------------|------------------|----------------------------|
| Anode Voltage                              | 9,000 V DC       | 11,000 V DC                |
| Grid No. 2 Voltage                         | 250 V DC         | 300 V DC                   |
| Grid No. 1 Voltage (for visual extinction) | -27 to -63 V DC  | -28 to -72 V DC            |
| Focusing-Coil Current                      | 110 mA DC        | 100 mA DC                  |
| Ion-Trap Field / Current                   | 120 mA (current) | 33 Gauss (field intensity) |

The visual extinction voltage of Grid No. 1 is measured either for an undeflected focused spot or a focused raster. In general, the anode voltage should not be operated below 8000 volts, as both brightness and focus quality decrease significantly with decreasing anode voltage.

To achieve proper focus and deflection, the external components must be positioned precisely along the neck of the tube:

- **Focusing Coil:** Designed for magnetic focusing. When using a standard focusing coil (such as JETEC No. 109), the recommended position for the center of the focusing field is at a distance of 4-1/2 inches from the yoke-reference-line to the center-of-the-air-gap. The deflecting yoke and focusing coil must be located within a designated area of approximately 4-5/8 inches along the neck.
- **Ion-Trap Magnet:** The electron gun requires an external, double-field magnetic ion trap adjusted to its optimum position to prevent ion-spot blemish. A space of  $3\text{-}3/4 \pm 3/16$  inches along the neck must be kept entirely clear of other components to accommodate the ion-trap magnet.

- **Reference Line:** The reference line is determined by the plane of the upper edge of a standard reference-line gage (such as RETMA No. 112) when the gage is resting on the cone of the bulb.

## Technical Summary

The **10BP4A** is a specialized 10-inch round glass cathode-ray tube featuring magnetic focus, magnetic deflection, and a 50-degree deflection angle. It is characterized by its gray neutral-density faceplate, which provides 74% light transmission to enhance contrast under high ambient light, and its requirement for an external ion-trap magnet. Operating with a 6.3 V, 0.6 A heater and a small-shell Duodecal base, the tube is rated for a maximum anode voltage of up to 12,000 V DC and a maximum Grid No. 2 voltage of 410 V DC. By utilizing an external conductive coating as a filter capacitor and maintaining proper positioning of the focusing coil and ion-trap magnet, the 10BP4A delivers a reliable, high-contrast display for television applications.



## SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

# 1961 Tung Sol

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

## 1961 TUNG SOL

## Section 1 · Cathode Ray

| OTHER          |                 |                  |
|----------------|-----------------|------------------|
| PARAMETER      | PUBLISHED VALUE | CONDITION / NOTE |
| Heater Voltage | 6.3 V           | —                |
| Heater Current | 600 mA          | —                |

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