

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

# 10RP4

1 SECTION  
CONSTRUCTION  
CATHODERAY

Specialized - Cathode Ray electronic tube

Ten-inch direct-view television cathode-ray tube using electrostatic focusing and magnetic deflection. Its metal-backed screen and external conductive coating support bright picture display, with the accelerator/anode operated at about 14 kV.

## GENERAL CHARACTERISTICS

|                     |                   |                      |               |
|---------------------|-------------------|----------------------|---------------|
| BASE DESIGNATION    | —                 | BASE PINS            | 6             |
| 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                                           |         |
| MAXIMUM PLATE VOLTAGE                                          | 16000 V |
| CRT accelerator/final-anode maximum mapped to MaxPlateVoltage. |         |

## 10RP4 — Electrostatic-Focus Magnetic-Deflection Cathode-Ray Tube

The **10RP4** is an all-glass, direct-view cathode-ray tube designed primarily for television applications. It features electrostatic focusing and magnetic deflection, providing a compact and efficient solution for displaying video signals. The tube is suitable for both standard black-and-white television systems and CBS color television systems.

### Construction and Physical Characteristics

The 10RP4 is constructed with an all-glass envelope featuring a clear-glass faceplate and a metal-backed screen. The metal backing on the screen serves a dual purpose: it prevents screen burning caused by ion

bombardment and increases the overall light output of the display. The screen utilizes Phosphor No. 4, which exhibits white fluorescence and medium persistence.

To assist in power supply filtering, the tube is equipped with an external conductive coating. When grounded, this coating forms a filter capacitor in conjunction with the internal anode structure.

## Mechanical Dimensions and Alignment

- **Overall Length:** 16-1/2 ± 1/4 inches
- **Greatest Diameter of Bulb:** 10-1/2 ± 1/8 inches
- **Minimum Useful Screen Diameter:** 9-1/8 inches
- **Deflecting Angle (Approximate):** 50 degrees
- **Bulb Contact:** Recessed small cavity cap (J1-21)
- **Base:** Small shell duodecal 6-pin base (B6-63)
- **Basing Designation:** 12L

The physical alignment of the bulb contact is critical for proper installation. The J1-21 contact aligns with the vacant pin position #3 within a tolerance of ±30 degrees. The reference line, which determines the seating position of the tube, is defined as the point where an R.T.M.A. Gauge #112 rests on the bulb.

## Heater and Basing Configuration

The 10RP4 utilizes an indirectly heated cathode. The heater is designed to operate from either an AC or DC source.

### Heater Specifications

- **Nominal Heater Voltage:** 6.3 V
- **Nominal Heater Current:** 0.6 A ± 10%
- **Calculated Nominal Heater Power:** 6.3 V × 0.6 A = 3.78 W

## Pin Connection Diagram

The tube uses a duodecal base with specific pin assignments. Underneath the base, the connections are mapped as follows:

| Pin Number | Electrode Connection                   |
|------------|----------------------------------------|
| Pin 1      | Heater                                 |
| Pin 2      | Grid No. 1 (Control Grid)              |
| Pin 6      | Grid No. 4 (Focusing Electrode)        |
| Pin 10     | Grid No. 2 (Screen Grid / Accelerator) |
| Pin 11     | Cathode                                |

| Pin Number   | Electrode Connection                              |
|--------------|---------------------------------------------------|
| Pin 12       | Heater                                            |
| Recessed Cap | Grid No. 3 & Grid No. 5 (Final Anode / Collector) |

*Note: Pin position #3 is vacant and is used as the alignment reference for the anode cap.*

## Electrical Characteristics and Interelectrode Capacitances

The electrostatic focusing system of the 10RP4 requires a focusing voltage that is dynamically related to the final anode voltage. The required focusing voltage ranges from -0.4% to +2.2% of the active anode voltage.

### Direct Interelectrode Capacitances

The approximate capacitances between the internal electrodes and external structures are:

- **Cathode to all other electrodes:** 5  $\mu\text{F}$  (pF)
- **Grid No. 1 to all other electrodes:** 6  $\mu\text{F}$  (pF)
- **External conductive coating to Anode:** 750 pF minimum to 1500 pF maximum

## Operating Conditions and Comparative Data

The 10RP4 can be operated under different voltage configurations depending on the application requirements. The table below compares the standard JETEC comparative conditions with the recommended operating conditions:

| Parameter                                  | JETEC Comparative Conditions | Recommended Operating Conditions |
|--------------------------------------------|------------------------------|----------------------------------|
| Final Anode Voltage                        | 12,000 V D-C                 | 14,000 V D-C                     |
| Grid No. 4 Voltage Range                   | -48 to +260 V D-C            | -55 to +300 V D-C                |
| Grid No. 4 Current                         | -15 to +25 $\mu\text{A}$ D-C | -15 to +25 $\mu\text{A}$ D-C     |
| Grid No. 2 Voltage                         | 300 V D-C                    | 300 V D-C                        |
| Grid No. 1 Voltage (for visual extinction) | -28 to -72 V D-C             | -28 to -72 V D-C                 |

*Note: The Grid No. 4 voltage range is measured at a final anode current of 100  $\mu\text{A}$  with equal vertical and horizontal resolution. Visual extinction refers to the complete cutoff of the focused raster.*

# Maximum Ratings and Circuit Limits

The maximum ratings are established under the Design Center system and represent the absolute limits within which the tube must be operated to ensure reliability and longevity.

## Design Center Maximum Values

- **Final Anode Voltage:** 16,000 Max. Volts D-C
- **Grid No. 4 (Focusing Electrode) Voltage Range:** -64 to +350 Max. Volts D-C
- **Grid No. 4 Voltage (Absolute Limits):** -500 to +1000 Max. Volts D-C
- **Grid No. 2 Voltage:** 500 Max. Volts D-C
- **Grid No. 1 Voltage:**
  - **Negative-Bias Value:** 125 Max. Volts D-C
  - **Positive-Bias Value:** 0 Max. Volts D-C
  - **Positive-Peak Value:** 2 Max. Volts
- **Peak Heater-Cathode Voltage:**
  - **Heater Negative with Respect to Cathode (During Warm-up,  $\leq 15$ s):** 410 Max. Volts D-C
  - **Heater Negative with Respect to Cathode (After Warm-up):** 180 Max. Volts D-C
  - **Heater Positive with Respect to Cathode:** 180 Max. Volts D-C

## Circuit Constraints

- **Maximum Grid No. 1 Circuit Resistance:** 1.5 Megohms

To optimize and improve overall focus across the entire screen area, the focus electrode (Grid No. 4) may be modulated with an external waveform.

## Technical Summary

The **10RP4** is a specialized 10-inch class, all-glass cathode-ray tube utilizing electrostatic focus and magnetic deflection. Designed for black-and-white and CBS color television receivers, it features a metal-backed screen with Phosphor No. 4, providing a bright, medium-persistence white display. With a nominal heater rating of 6.3 V at 0.6 A, a maximum final anode rating of 16,000 V, and a flexible focusing voltage range, the 10RP4 represents a robust display solution for its era. Proper operation requires adherence to the specified design-center limits, particularly regarding heater-to-cathode potential and control grid circuit resistance.



## SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

# 1963 Rauland

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

## 1963 RAULAND

## Section 1 · Cathode Ray

| OTHER                             |                 |                  |
|-----------------------------------|-----------------|------------------|
| PARAMETER                         | PUBLISHED VALUE | CONDITION / NOTE |
| Heater voltage                    | 6.3 V           | —                |
| Heater current                    | 600 mA          | —                |
| Typical anode/accelerator voltage | 14000 V         | —                |
| Typical grid 2 voltage            | 300 V           | —                |

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