

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA  
**1 SECTION**  
CONSTRUCTION  
**CATHODERAY**

# 14ATP4

Specialized - Cathode Ray electronic tube

Fourteen-inch short-neck television kinescope with electrostatic focusing, magnetic deflection, 90-degree geometry, and an aluminized screen. Designed specifically as a television picture tube, it supports high-voltage direct-view monochrome display service.

## GENERAL CHARACTERISTICS

|                     |                   |                      |               |
|---------------------|-------------------|----------------------|---------------|
| BASE DESIGNATION    | —                 | BASE PINS            | —             |
| NOMINAL HEATER      | 8.4 V / 450 mA    | PARALLEL HEATER      | — / —         |
| HEATING             | Indirect          | SERIES OPERATION     | Not specified |
| CATHODE ARRANGEMENT | Separate cathodes | SECTION CONSTRUCTION | Similar       |

## SECTION RATINGS

|                                                                                                |         |
|------------------------------------------------------------------------------------------------|---------|
| SECTION1 Cathode Ray                                                                           |         |
| MAXIMUM PLATE VOLTAGE                                                                          | 14000 V |
| Television kinescope; source explicitly discusses X-ray shielding precautions at high voltage. |         |

### 14ATP4 — Low-Voltage Electrostatic Focus Kinescope

The **14ATP4** is a short, directly viewed rectangular glass picture tube (kinescope) designed for television receiver applications. It incorporates low-voltage electrostatic focusing and magnetic deflection. Featuring a wide-angle 90-degree deflection envelope, the 14ATP4 is approximately 3 inches shorter than comparable 70-degree deflection tubes with the same faceplate size. Its design includes an aluminized screen, a spherical Filterglass faceplate, a short-neck construction, and a "straight" electron gun that eliminates the need for an external ion-trap magnet.

## Design and Physical Construction

The 14ATP4 is built with a rectangular glass bulb (J112) and a short neck measuring 5-1/2 inches. The electron gun is a "straight" type designed to minimize deflection distortion while keeping the overall tube length to a maximum of 13-1/2 inches.

The faceplate is made of spherical Filterglass with an approximate light transmission of 78%. The screen utilizes a P4-sulfide phosphor that exhibits white fluorescence and white phosphorescence with a short persistence.

An external conductive bulb coating is applied to the envelope. When combined with the internal conductive coating, this structure forms a supplementary filter capacitor. The external coating must be grounded during operation.

## Physical Dimensions and Mechanical Specifications

| Parameter                     | Value                |
|-------------------------------|----------------------|
| Overall Length                | 13-3/16" $\pm$ 5/16" |
| Greatest Width                | 13-1/16" $\pm$ 1/8"  |
| Greatest Height               | 10-9/16" $\pm$ 1/8"  |
| Diagonal                      | 14" $\pm$ 1/8"       |
| Neck Length                   | 5-1/2" $\pm$ 3/16"   |
| Minimum Screen Width          | 12-1/16"             |
| Minimum Screen Height         | 9-1/2"               |
| Minimum Screen Diagonal       | 13"                  |
| Minimum Projected Screen Area | 104 sq. in.          |
| Approximate Weight            | 8.5 lbs              |
| Mounting Position             | Any                  |

## Heater and Electrical Characteristics

The 14ATP4 utilizes an indirectly heated, coated unipotential cathode. The heater is designed with a controlled warm-up time, making it suitable for television receivers that employ series-connected heater strings.

## Heater Ratings and Capacitances

| Characteristic                                 | Value                             |
|------------------------------------------------|-----------------------------------|
| Heater Voltage (AC or DC)                      | 8.4 V                             |
| Heater Current                                 | 0.45 A (450 mA)                   |
| Average Heater Warm-Up Time                    | 11 seconds                        |
| Grid No. 1 to All Other Electrodes Capacitance | 6 $\mu\text{F}$                   |
| Cathode to All Other Electrodes Capacitance    | 5 $\mu\text{F}$                   |
| External Coating to Ultor Capacitance          | 500 min to 1000 max $\mu\text{F}$ |

The average heater warm-up time is defined as the time required for the voltage across the heater terminals to increase from zero to 6.7 volts when tested in a standard circuit where the supply voltage is four times the rated heater voltage (33.6 V) and a series resistor is set to three times the rated heater voltage divided by the rated heater current ( $R = 3E_f/I_f$ ).

## Tube Base and Socket Connections

The tube features a Small-Shell Duodecal 6-Pin base (JETEC No. B6-63) and a Recessed Small Cavity cap (JETEC No. J1-21) for the ultor connection. The ultor electrode consists of Grid No. 5, Grid No. 3, and the collector connected internally.

### Pinout Configuration (Bottom View)

- **Pin 1:** Heater
- **Pin 2:** Grid No. 1
- **Pin 6:** Grid No. 4
- **Pin 10:** Grid No. 2
- **Pin 11:** Cathode
- **Pin 12:** Heater
- **Recessed Cap:** Ultor (Grid No. 3, Grid No. 5, Collector)
- **External Coating (C):** Ground connection

The socket for this base must not be rigidly mounted; it should have flexible leads and be allowed to move freely. The bottom circumference of the base shell will fall within a 2-3/4 inch diameter circle concentric with the bulb axis.

## Operating Services and Drive Configurations

The 14ATP4 can be operated in either Grid-Drive Service or Cathode-Drive Service. The maximum ratings are design-center values, which must be maintained within the standard design-center limits (allowing for line voltage variations of  $\pm 10\%$  around a nominal 117 V line).

## Grid-Drive Service

In Grid-Drive Service, the video signal varies the Grid No. 1 potential with respect to the cathode. All voltages are expressed positive with respect to the cathode.

### Maximum Ratings (Design-Center Values)

- **Ultor Voltage:** 14,000 max V, 8,000 min V
- **Grid No. 4 Voltage:** Positive value 1,000 max V, Negative value 500 max V
- **Grid No. 2 Voltage:** 500 max V
- **Grid No. 1 Voltage:**
  - Negative peak value: 200 max V
  - Negative bias value: 140 max V
  - Positive bias value: 0 max V
  - Positive peak value: 2 max V
- **Peak Heater-Cathode Voltage:**
  - Heater negative with respect to cathode: 180 max V
  - Heater positive with respect to cathode: 180 max V

### Equipment Design Ranges

For an ultor voltage ( $E_{c5k}$ ) between 8,000 and 14,000 V and Grid No. 2 voltage ( $E_{c2k}$ ) between 200 and 500 V:

- **Grid No. 4 Voltage for Focus:** 0 to +400 V
- **Grid No. 4 Current:** -25 to +25  $\mu$ A
- **Grid No. 2 Current:** -15 to +15  $\mu$ A
- **Centering Magnet Field Strength:** 0 to 8 gauss

### Typical Operating Examples (Grid-Drive)

- **At Ultor Voltage = 10,000 V and Grid No. 2 Voltage = 300 V:**
  - Grid No. 4 Voltage for Focus: 0 to +400 V
  - Grid No. 1 Voltage for Visual Extinction of Focused Raster: -25 to -69 V
  - Grid No. 1 Video Drive from Raster Cutoff (White-Level): 25 to 69 V
- **At Ultor Voltage = 14,000 V and Grid No. 2 Voltage = 400 V:**
  - Grid No. 4 Voltage for Focus: 0 to +400 V
  - Grid No. 1 Voltage for Visual Extinction of Focused Raster: -31 to -90 V
  - Grid No. 1 Video Drive from Raster Cutoff (White-Level): 31 to 90 V

## Cathode-Drive Service

In Cathode-Drive Service, the video signal varies the cathode potential with respect to Grid No. 1. All voltages are expressed positive with respect to Grid No. 1.

## Maximum Ratings (Design-Center Values)

- **Ultor-to-Grid-No. 1 Voltage:** 14,000 max V, 8,000 min V
- **Grid-No. 4-to-Grid-No. 1 Voltage:** Positive value 1,000 max V, Negative value 500 max V
- **Grid-No. 2-to-Grid-No. 1 Voltage:** 640 max V
- **Grid-No. 2-to-Cathode Voltage:** 500 max V
- **Cathode-to-Grid-No. 1 Voltage:**
  - Positive peak value: 200 max V
  - Positive bias value: 140 max V
  - Negative bias value: 0 max V
  - Negative peak value: 2 max V
- **Peak Heater-Cathode Voltage:**
  - Heater negative with respect to cathode: 180 max V
  - Heater positive with respect to cathode: 180 max V

## Equipment Design Ranges

For an ultor-to-grid-No. 1 voltage ( $E_{c5g1}$ ) between 8,000 and 14,000 V and Grid-No. 2-to-grid-No. 1 voltage ( $E_{c2g1}$ ) between 225 and 640 V:

- **Grid-No. 4-to-Grid-No. 1 Voltage for Focus:** 0 to +400 V
- **Grid No. 4 Current:** -25 to +25  $\mu$ A
- **Grid No. 2 Current:** -15 to +15  $\mu$ A
- **Centering Magnet Field Strength:** 0 to 8 gauss

## Typical Operating Examples (Cathode-Drive)

- **At Ultor-to-Grid-No. 1 Voltage = 10,000 V and Grid-No. 2-to-Grid-No. 1 Voltage = 300 V:**
  - Grid-No. 4-to-Grid-No. 1 Voltage for Focus: 0 to +400 V
  - Cathode-to-Grid-No. 1 Voltage for Visual Extinction of Focused Raster: 25 to 58 V
  - Cathode-to-Grid-No. 1 Video Drive from Raster Cutoff (White-Level): -25 to -58 V
- **At Ultor-to-Grid-No. 1 Voltage = 14,000 V and Grid-No. 2-to-Grid-No. 1 Voltage = 400 V:**
  - Grid-No. 4-to-Grid-No. 1 Voltage for Focus: 0 to +400 V
  - Cathode-to-Grid-No. 1 Voltage for Visual Extinction of Focused Raster: 31 to 75 V
  - Cathode-to-Grid-No. 1 Video Drive from Raster Cutoff (White-Level): -31 to -75 V

## Maximum Circuit Values

For both Grid-Drive and Cathode-Drive services, the maximum Grid-No. 1 circuit resistance must not exceed **1.5 megohms**.

# Operating Considerations and Safety

## Series Heater String Design

In television receivers utilizing series-connected heater strings, a series resistor with a negative temperature coefficient is recommended. This minimizes voltage surges across individual tubes during the initial warm-up phase.

## X-Ray Radiation Safety

When operated at or below the maximum design-center ratings, the 14ATP4 does not produce harmful X-ray radiation. Picture tubes of this type can be operated at voltages up to 16 kilovolts (absolute value) without risk of personal injury from prolonged exposure at close range. If the operating voltage exceeds 16 kilovolts, special shielding precautions against X-ray radiation may be required.

## Centering and Spot Alignment

To achieve proper centering, an adjustable centering magnet with a field strength of 0 to 8 gaussses may be used. The distance from the reference line to the centering magnet should not exceed 2-1/4 inches.

Excluding external magnetic fields, the center of the undeflected focused spot will fall within a 1/4-inch radius circle concentric with the center of the tube face. The earth's magnetic field can cause a deflection of up to 7/16 of an inch from the physical center of the screen, which must be compensated for during installation.



## SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

# 1940 RCA

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

1940 RCA

## Section 1 · Cathode Ray

| APPLICATION |                            |                  |
|-------------|----------------------------|------------------|
| PARAMETER   | PUBLISHED VALUE            | CONDITION / NOTE |
| Application | TelevisionPictureTube text | —                |

| CHARACTERISTIC |                 |                  |
|----------------|-----------------|------------------|
| PARAMETER      | PUBLISHED VALUE | CONDITION / NOTE |
| ScreenDiagonal | 14 in           | —                |

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