

ELECTRONIC TUBE REFERENCE

# 12KP4A

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION  
CONSTRUCTION  
CATHODERAY

Twelve-inch aluminized P4 video-monitor cathode-ray tube with magnetic focusing and deflection, gray filter glass, and external conductive coating. Its white short-to-medium-persistence screen is intended for bright, high-contrast monitor display.

## 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                               |         |
| MAXIMUM PLATE VOLTAGE                              | 13200 V |
| Published source values promoted where applicable. |         |

### 12KP4A — Magnetic-Focus and Deflection Cathode-Ray Tube

The **12KP4A** (also designated as **12KP4-A** or **12KP-A**) is a 12-inch, direct-view, round glass cathode-ray tube designed primarily for use as a video monitor and television picture tube. It features magnetic deflection and magnetic focusing, utilizing an advanced electron gun design that eliminates the need for an external ion-trap magnet. The tube incorporates a spherical gray filter glass faceplate, a reflective aluminized screen, and an external conductive coating.

## Physical and Mechanical Construction

The 12KP4A is constructed with an all-glass envelope using either a J99 1/2 A, J99 1/2 B, or J99 1/2 A1 bulb configuration. The physical dimensions of the tube are characterized by:

- **Overall Length:**  $17 \frac{5}{8} \pm \frac{3}{8}$  inches
- **Greatest Bulb Diameter:**  $12 \frac{7}{16} \pm \frac{1}{8}$  inches
- **Minimum Useful Screen Diameter:**  $11 \frac{1}{4}$  inches
- **Neck Length:**  $7 \frac{1}{8} \pm \frac{3}{16}$  inches
- **Approximate Weight:** 11 1/2 to 12 1/2 pounds

The faceplate is made of spherical gray filter glass, which provides a light transmission of approximately 66% to 74% at the center. This gray filter glass significantly improves picture contrast and detail under high-ambient-light conditions.

The tube features an aluminized P4 sulfide-type phosphor screen. This reflective metal-backed screen increases light output and prevents ion-spot blemish. The screen exhibits white fluorescence and white phosphorescence with a short-to-medium persistence characteristic.

For electrical connection to the high-voltage anode, the tube is equipped with a recessed small cavity cap bulb contact (JETEC No. J1-21). This anode terminal is aligned with the Pin No. 3 position on the base within a tolerance of  $\pm 30$  degrees. The tube can be mounted in any position.

## Heater, Base, and Pin Connections

The 12KP4A contains a coated unipotential cathode and an indirectly heated filament. 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 | $0.6 \text{ A} \pm 10\%$ |
| Heating Method         | Indirect                 |
| Cathode Type           | Coated unipotential      |

The tube utilizes a small shell duodecal 5-pin or 7-pin base (JETEC No. B5-57) with a 12N basing arrangement. The pin connections, viewed from the bottom of the base, are assigned as follows:

- **Pin 1:** Heater
- **Pin 2:** Grid No. 1
- **Pin 6:** No Connection
- **Pin 7:** No Connection
- **Pin 10:** Grid No. 2
- **Pin 11:** Cathode
- **Pin 12:** Heater

- **Recessed Cavity Cap (J1-21):** Anode (internally connected to Grid No. 3)

## Electrostatic and Interelectrode Capacitances

The internal structure of the 12KP4A exhibits specific capacitive properties between its electrodes. Additionally, the external conductive coating on the bulb forms a capacitor when grounded.

- **Cathode to All Other Electrodes:** Approximately 5 pF
- **Grid No. 1 to All Other Electrodes:** Approximately 6 pF
- **External Conductive Coating to Anode:** 500 pF minimum to 2500 pF maximum

When the external conductive coating is properly grounded, it acts as a high-voltage filter capacitor for the anode power supply.

## Operating Ratings and Safety Limits

The maximum ratings for the 12KP4A are defined under different rating systems, including Absolute Maximum and Design-Center values. Operating the tube beyond these limits may cause damage or degrade performance.

| Parameter                         | Design-Center / RMA Limits | Absolute Maximum Limits |
|-----------------------------------|----------------------------|-------------------------|
| Anode Voltage                     | 12,000 V DC                | 13,200 V DC             |
| Grid No. 2 Voltage                | 410 V DC                   | 450 V DC                |
| Grid No. 1 Negative Bias          | 125 V DC                   | 140 V DC                |
| Grid No. 1 Positive Bias          | 0 V DC                     | 0 V DC                  |
| Grid No. 1 Positive Peak          | 2 V                        | 2 V                     |
| Max Grid No. 1 Circuit Resistance | 1.5 MΩ                     | 1.5 MΩ                  |

## Heater-Cathode Voltage Ratings

The peak voltage between the heater and cathode must be kept within strict limits to prevent insulation breakdown:

- **Heater Negative with Respect to Cathode:**
  - During the equipment warm-up period (not to exceed 15 to 45 seconds): 410 V to 450 V maximum.
  - After the warm-up period: 140 V (Design-Center) to 154 V (Absolute Maximum) maximum.
- **Heater Positive with Respect to Cathode:** 140 V (Design-Center) to 154 V (Absolute Maximum) maximum.

## X-Ray Radiation Warning

When operated at voltages near or above its maximum ratings, the 12KP4A can produce X-rays. X-ray radiation shielding may be necessary to protect against personal injury from prolonged exposure at close range if the tube is operated at anode voltages exceeding 16,000 volts or the maximum rated anode voltage, whichever is less.

## Typical Operating Conditions

The 12KP4A can be operated under different typical conditions depending on the anode voltage applied. In general, the anode voltage should not be less than 9,000 volts, as brilliance and focus quality decrease significantly below this level.

### Operating Point A (11,000 V Supply)

- **Anode Voltage:** 11,000 V DC
- **Grid No. 2 Voltage:** 250 V DC
- **Grid No. 1 Voltage for Cutoff:** -22 to -58 V DC (or -27 to -63 V DC for visual extinction of the undeflected focused spot)

### Operating Point B (12,000 V Supply)

- **Anode Voltage:** 12,000 V DC
- **Grid No. 2 Voltage:** 300 V DC
- **Grid No. 1 Voltage for Cutoff:** -33 to -77 V DC

## Focusing Requirements

Focusing is accomplished magnetically. When using a standard focusing coil (such as JETEC Focusing Coil No. 106) positioned with the center line of its air gap 3 1/4 inches from the yoke reference line, the typical focusing current required is approximately **135 mA DC**. This current is specified for conditions where the combined Grid No. 1 bias and video signal voltage are adjusted to produce a highlight brightness of 35 foot-lamberts on a 10 1/2 by 7 3/4 inches picture area, with the spot sharply focused at the center of the screen. Under undeflected and unfocused conditions, the center of the spot will fall within a circle of 20 mm radius concentric with the center of the tube face.

## Technical Summary

The **12KP4A** is a robust, 12-inch round glass cathode-ray tube utilizing magnetic focus and magnetic deflection with a 54-degree deflection angle. It features an aluminized P4 screen that provides a bright, high-contrast white display without requiring an external ion-trap magnet. Operating with a standard 6.3 V, 0.6 A heater, the tube is rated for anode voltages up to 12,000 V (Design-Center) or 13,200 V (Absolute Maximum). With its integrated external conductive coating serving as a high-voltage filter capacitor when grounded, and its spherical gray filter glass faceplate optimizing contrast under ambient light, the 12KP4A is highly optimized for television receivers and video monitoring equipment.



## SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

# 1950 Sylvania

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

1950 SYLVANIA

## Section 1 · Cathode Ray

## CHARACTERISTICS

| PARAMETER         | PUBLISHED VALUE | CONDITION / NOTE |
|-------------------|-----------------|------------------|
| Phosphor          | P4              | —                |
| Deflection method | Magnetic        | —                |



## 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           | Nominal          |
| Heater current | 600 mA          | Nominal          |



## 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

| CHARACTERISTICS                               |                        |                  |
|-----------------------------------------------|------------------------|------------------|
| PARAMETER                                     | PUBLISHED VALUE        | CONDITION / NOTE |
| Heater Voltage                                | 6.3 V                  | —                |
| Heater Current                                | 600 mA                 | —                |
| Focusing Method                               | Magnetic text          | —                |
| Deflection Method                             | Magnetic text          | —                |
| Fluorescence                                  | White text             | —                |
| Persistence                                   | Short to Medium text   | —                |
| Phosphor                                      | Aluminized P4 text     | —                |
| Faceplate                                     | Gray Filter Glass text | —                |
| Light Transmittance                           | 74 percent             | Approximate      |
| Cathode-to-All Capacitance                    | 5 pF                   | Approximate      |
| Grid1-to-All Capacitance                      | 6 pF                   | Approximate      |
| External Coating-to-Anode Capacitance Minimum | 500 pF                 | —                |
| External Coating-to-Anode Capacitance Maximum | 2500 pF                | —                |

| OTHER                             |                 |                  |
|-----------------------------------|-----------------|------------------|
| PARAMETER                         | PUBLISHED VALUE | CONDITION / NOTE |
| Maximum Anode Voltage             | 13200 V         | —                |
| Maximum Grid2 Voltage             | 450 V           | —                |
| Minimum Recommended Anode Voltage | 9000 V          | SourceNote       |
| Maximum Grid1 Circuit Resistance  | 1.5 Mohm        | —                |

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