

P4 cathode-ray display tube using electrostatic focusing and approximately 90-degree magnetic deflection, with white short-to-medium persistence, an external ion trap, and typical 12 kV anode operation.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	6.3 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	16500 V
Published maximum ratings and characteristics promoted semantically from the approved source.	

14XP4 — Electrostatic-Focus Television Picture Tube

The **14XP4** and **14XP4A** are 14-inch, direct-viewed, rectangular glass-envelope television picture tubes. They feature a spherical faceplate made of gray filter glass, magnetic deflection, and electrostatic focusing. The tubes are designed with a single-field ion trap and an external conductive coating. The Sylvania Type **14XP4A** is identical to the Type 14XP4 except that it incorporates an aluminized screen to enhance brightness and picture contrast.

Mechanical Design and Physical Characteristics

The 14XP4 has a rectangular glass bulb with a spherical faceplate. The faceplate is constructed of gray filter glass with an approximate light transmittance of 78 percent, which improves picture contrast under ambient room lighting.

Screen and Bulb Dimensions

The tube provides a minimum useful screen area of 104 square inches, with maximum assured minimum useful screen dimensions of 12-1/16 by 9-1/2 inches. The bulb features a recessed small cavity cap (J1-21) for the high-voltage anode connection.

Base and Basing Connection

The tube utilizes a small shell duodecal 6-pin base (designation B6-63) with a 12L basing arrangement. The physical layout requires that base pin number 6 aligns with the anode contact terminal (J1-21) within an angular tolerance of 30 degrees.

External Conductive Coating

An external conductive coating is applied to the glass envelope and must be grounded during operation. The capacitance between this external coating and the internal anode is rated between a minimum of 1100 μpF and a maximum of 1500 μpF . The contact area for grounding the external conductive coating is a 2-inch by 2-inch patch located 90 degrees counterclockwise from the anode contact when viewed from the base end of the tube.

Electrical Characteristics and Heater Ratings

The electrical system of the 14XP4 operates with an indirectly heated cathode. The heater is designed for series or parallel operation in television receivers.

Heater Specifications

- **Heater Voltage:** 6.3 Volts
- **Heater Current:** $0.450 \pm 5\%$ Ampere (450 mA nominal)
- **Heater Warm-up Time:** 11 Seconds

The heater warm-up time is defined as the time required for the voltage across the heater terminals to increase to 5.0 volts when tested in a standard JETEC test circuit. This test is conducted with an applied voltage (E) of 25 volts and a series resistance (R) of 42 ohms.

Direct Interelectrode Capacitances

The direct interelectrode capacitances of the tube, measured without external shielding, are approximately:

- **Cathode to All Other Electrodes:** 5 μpF

- **Grid No. 1 to All Other Electrodes:** 6 μ F

Ion Trap Magnet Requirements

The tube requires an external, single-field type ion trap magnet to prevent ion burn on the phosphor screen. When using a standard JETEC Ion Trap Magnet No. 117, the pole pieces must be centered over Grid No. 2 on the mount and rotated to achieve maximum raster brightness. Under these conditions, the average ion trap magnet current is 28 mA DC. Alternatively, a permanent magnet (PM) ion trap magnet may be used, requiring a minimum field strength of 30 gauss (with a typical field strength tolerance of ± 3 gauss).

Operating Conditions and Adjustments

The 14XP4 is operated under specified typical conditions to achieve proper focus and beam cutoff.

Typical Operating Points

- **Anode Voltage:** 12,000 Volts DC
- **Grid No. 4 Voltage (Focusing Electrode):** -50 to +350 Volts DC
- **Grid No. 2 Voltage:** 300 Volts DC
- **Grid No. 1 Voltage Required for Cutoff:** -28 to -72 Volts DC

The Grid No. 1 voltage range specified for cutoff is based on the visual extinction of a focused raster. If a stationary focused spot is used instead of a raster, the extinction of the spot will require the Grid No. 1 bias to be approximately 5 volts more negative than the raster cutoff value.

Circuit Constraints

To ensure stable operation and prevent damage to the control grid structure, the maximum allowable Grid No. 1 circuit resistance is 1.5 Megohms.

Absolute Maximum Ratings and Safety

The ratings for the 14XP4 are defined under the Absolute Maximum system. Operating the tube beyond these limits can cause permanent damage or shorten its operating life.

Electrode Voltage Limits

- **Anode Voltage:** 16,500 Volts DC
- **Grid No. 4 Voltage (Focusing Electrode):** -550 to +1100 Volts DC
- **Grid No. 2 Voltage:** 440 Volts DC
- **Grid No. 1 Voltage:**
 - **Negative Bias Value:** 140 Volts DC
 - **Negative Peak Value:** 180 Volts
 - **Positive Bias Value:** 0 Volts DC

- **Positive Peak Value:** 2 Volts

Heater-Cathode Voltage Limits

The insulation between the heater and cathode is rated to withstand specific peak voltages depending on the operating state:

- **Heater Negative with Respect to Cathode:**
 - During the initial warm-up period (not to exceed 15 seconds): 450 Volts peak
 - After the equipment warm-up period: 200 Volts peak
- **Heater Positive with Respect to Cathode:** 200 Volts peak

X-Ray Radiation Warning

When television picture tubes are operated at high voltages, they can produce X-rays. Appropriate X-ray radiation shielding may be necessary to protect users from potential personal injury during prolonged exposure at close range. This precaution is especially critical if the tube is operated at voltages higher than 16,000 volts, or higher than the manufacturer's maximum rated anode voltage of 16,500 volts, whichever is less.



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

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate Voltage	16500 V	—
Typical Anode Voltage	12000 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Phosphor	P4	—
Focusing Method	Electrostatic	—
Deflecting Method	Magnetic	—



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	450 mA	—
Focusing Method	Electrostatic text	—
Deflection Method	Magnetic text	—
Fluorescence	White text	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Persistence	Short to Medium text	—
Phosphor	P4 text	—
Horizontal Deflection Angle	79 deg	Approximate
Diagonal Deflection Angle	90 deg	Approximate
Light Transmittance	78 percent	Approximate
Ion Trap	External Single Field text	—
Cathode-to-All Capacitance	5 pF	Approximate
Grid1-to-All Capacitance	6 pF	Approximate
External Coating-to-Anode Capacitance Minimum	1100 pF	—
External Coating-to-Anode Capacitance Maximum	1500 pF	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Anode Voltage	12000 V	—
Grid2 Voltage	300 V	—
Ion Trap Magnet Current	28 mA	Representative
Minimum Ion Trap Field Strength	30 gauss	—
Maximum Anode Voltage	16500 V	—
Maximum Grid2 Voltage	440 V	—
Focus Voltage Minimum	-50 V	Grid4
Focus Voltage Maximum	350 V	Grid4
Grid1 Cutoff Voltage Minimum	-72 V	—
Grid1 Cutoff Voltage Maximum	-28 V	—
Maximum Grid1 Circuit Resistance	1.5 Mohm	—

TUBE TINKER

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