

Twelve-inch P4 television picture tube with magnetic focusing and deflection. Manufacturer documentation identifies a conventional high-voltage direct-view picture tube, with the P4 screen providing the white image used in monochrome television receivers.

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	12000 V
Published maximum ratings and characteristics promoted semantically from the approved source.	

12VP4A — Cathode-Ray Picture Tube

A twelve-inch magnetic-focus and magnetic-deflection direct-view picture tube designed for television receiver applications, featuring a tinted neutral gray faceplate and an external conductive coating.

Overview

The **12VP4A** is a specialized cathode-ray tube (CRT) designed for television display applications. It provides a direct-view image with a nominal twelve-inch screen size. The tube utilizes magnetic focusing and magnetic deflection, operating with a deflection angle of approximately 55 degrees. To enhance picture contrast under ambient lighting, the faceplate is constructed of tinted neutral gray glass. The 12VP4A features an electron gun of triode construction designed to operate with an external ion-trap

magnet, and it includes an external conductive coating that forms a capacitor with the internal anode structure.

Construction and Mechanical Specifications

The physical design of the 12VP4A is optimized for integration into television chassis. The mechanical dimensions and structural features include:

- **Overall Length:** 18 ± 3/8 inches
- **Greatest Bulb Diameter:** 12 7/16 inches (with a tolerance of +1/16 to -1/8 inches)
- **Minimum Useful Screen Diameter:** 11 inches
- **Bulb Contact:** J1-21, Recessed Small Cavity Cap
- **Base:** B5-57, Small Shell Duodecal 5-Pin
- **Basing Configuration:** 12G
- **Bulb Contact Alignment:** The anode bulb contact is aligned with the vacant pin position #3 within a tolerance of ±10 degrees.
- **Reference Line:** The reference line is defined by the position where a standard ring gauge with an inside diameter of 1.500 inches (+0.003", -0.000") and a length of 2 inches rests on the bulb cone.

Screen and Phosphor Characteristics

The screen of the 12VP4A utilizes the **P4 phosphor**, which is characterized by:

- **Fluorescence:** White
- **Persistence:** Medium
- **Face Transmittance:** 66% (measured with a 7000° K all-sulphide P4 screen as the light source)

Capacitance

The external conductive coating on the bulb cone, when combined with the internal anode, provides a capacitance that can be utilized as part of the high-voltage power supply filtering circuit:

- **Maximum Capacitance (External Coating to Anode):** 3,000 µf
- **Minimum Capacitance (External Coating to Anode):** 750 µf

Heater and Basing Configuration

The 12VP4A contains an indirectly heated cathode. The heater is designed for standard series or parallel operation in television receivers:

Heater Parameter	Value
Nominal Heater Voltage	6.3 V
Nominal Heater Current	0.6 A ± 10%

Pin Connections

The tube uses a 5-pin duodecal base (B5-57) with the 12G basing layout. The pin connections, viewed from the bottom of the base, are assigned as follows:

Pin Number	Connection
Pin 1	Heater
Pin 2	Grid (Grid #1)
Pin 10	No Connection
Pin 11	Cathode
Pin 12	Heater
Recessed Cap	Anode (Bulb Contact)

Electrical Characteristics and Operating Conditions

The 12VP4A operates with high anode potentials and requires careful biasing of the control grid to manage beam cut-off and brightness.

Maximum Ratings (Design Center Values)

Operating limits must be strictly observed to prevent damage to the tube and ensure longevity. The design center maximum ratings are:

- **Anode Voltage (DC):** 12,000 V
- **Grid Voltage (Negative-Bias, DC):** 125 V
- **Grid Voltage (Positive-Bias, DC):** 0 V
- **Grid Voltage (Positive Peak):** 2 V
- **Peak Heater-Cathode Voltage:**
 - **Normal Operation:** ± 125 V
 - **Equipment Warm-up:** A maximum peak heater-cathode voltage of -410 V may be applied for a duration of not more than 15 seconds during the initial warm-up period of the equipment.

Typical Operating Conditions

For standard television sweep and display operation, the typical electrical parameters are:

- **Anode Voltage (DC):** 11,000 V
- **Grid Voltage for Cut-Off (DC):** -33 V to -77 V
- **Maximum Grid #1 Circuit Resistance:** 1.5 megohms

Operational Requirements

Because of the triode gun design, the 12VP4A requires external components to focus and deflect the electron beam, as well as to protect the phosphor screen from ion damage:

1. **Focusing:** Magnetic focusing is achieved via an external focus coil positioned on the neck of the tube.
2. **Deflection:** Magnetic deflection is managed by an external deflection yoke, providing a nominal deflection angle of 55 degrees.
3. **Ion Trap:** An external ion-trap magnet must be properly positioned over the electron gun to prevent heavy ions from striking and damaging the screen, while allowing the lighter electrons to pass through to the deflecting and focusing fields.

Technical Summary

The **12VP4A** is a twelve-inch, magnetic-focus and magnetic-deflection cathode-ray picture tube designed for direct-view television receivers. It features a white-fluorescing P4 phosphor screen with medium persistence, a 66% transmissive neutral gray faceplate, and an integrated external conductive coating providing 750 to 3,000 μf of capacitance to the anode. Operating with a 6.3 V, 0.6 A heater, the tube is rated for a maximum DC anode voltage of 12,000 V (typically operated at 11,000 V) and requires an external ion-trap magnet alongside standard magnetic focusing and deflection coils. The electrical connections are made via a J1-21 recessed small cavity cap for the anode and a Small Shell Duodecal 5-pin base (B5-57) with a 12G basing configuration.



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	12000 V	—
Typical Anode Voltage	11000 V	—

CHARACTERISTIC

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

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