

ELECTRONIC TUBE REFERENCE

12YP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Twelve-and-a-half-inch direct-view television picture tube with electrostatic focusing, magnetic deflection, an ion-trap gun, external conductive coating, and medium-persistence P4 screen. Its construction is optimized for monochrome television display.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	5
NOMINAL HEATER	6.3 V / 600 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION0 Cathode Ray
No fixed ratings recorded.
CRT electrode ratings, focusing/deflection data, capacitances, and operating voltages are preserved in parameter rows.

12YP4 — Cathode-Ray Picture Tube

The **12YP4** is a 12½-inch direct-view cathode-ray picture tube designed primarily for use in television receivers. It features automatic electrostatic focusing, magnetic deflection, and a 3° offset electron gun designed for use with an external ion-trap magnet. Its construction incorporates an internal conductive coating with a specialized insulating band to eliminate stray or spurious electron beams, alongside an external conductive coating that provides a filter capacitance when grounded.

Mechanical Design and Physical Construction

The 12YP4 is built with a glass envelope and has the following physical specifications:

- **Overall Length:** $18\frac{3}{4}" \pm \frac{3}{8}"$
- **Greatest Bulb Diameter:** $12\frac{3}{4}" (+\frac{1}{4}", -\frac{1}{8}")$
- **Minimum Useful Screen Diameter:** $11\frac{1}{4}"$
- **Net Weight:** Approximately 14½ lbs.

The faceplate is coated with **No. 4 phosphor**, which exhibits white fluorescence and medium persistence, making it suitable for television display applications.

To ensure a sharper picture, the lower edge of the internal conductive coating features an insulating band. This band prevents stray or spurious electron beams from reaching the screen. Additionally, the tube features an outside conductive coating that acts as a capacitor of approximately 3000 pF when operating.

For physical mounting, the 12YP4 can be operated in any position. However, the corresponding socket must not be rigidly mounted; instead, it should be wired with flexible leads to allow the socket to move freely and avoid mechanical stress on the tube base. The reference line of the bulb cone is determined by the position where a hinged gauge with an inside diameter of 1.500" (+0.003", -0.000") and a length of 2" rests on the cone.

Electron Gun, Focusing, and Deflection

The 12YP4 utilizes a 3° offset electron gun designed to operate in conjunction with an external ion-trap magnet. The ion-trap magnet must be aligned with the poles of the large coil (coil A) adjacent to the L-shaped pole pieces on the mount. The north pole of the magnet must be positioned on the same side as base pin No. 6, with the other poles directed toward the tube face. The magnet must have a minimum strength of 40 gauss.

- **Focusing Method:** Electrostatic (automatic electrostatic focusing)
- **Deflection Method:** Magnetic
- **Deflection Angle:** Approximately 54°

The physical layout requires that the deflecting yoke be positioned within its designated space on the neck, and the space for the ion-trap magnet must be kept clear of other components.

Electrical Connections and Pinout

The 12YP4 uses a **Small shell duodecal 5-pin base** designated as **JETEC 12D**. The electrical connections are made through the base pins and a recessed small cavity cap on the side of the bulb for the high-voltage anode.

The pinout configuration is as follows:

Pin Number	Electrode Connection
1	Heater
2	Grid No. 1

Pin Number	Electrode Connection
10	Grid No. 2
11	Cathode
12	Heater
Cap	Anode

The plane passing through the tube axis and the vacant pin position No. 3 is aligned with the anode terminal on the bulb. The angular tolerance between the plane of the vacant pin position No. 3 and the anode terminal is within 10° (measured about the tube axis).

Typical Operating Conditions

Under typical operating conditions, the 12YP4 is configured with the following parameters:

- **Anode Voltage:** 11,000 V DC
- **Grid No. 2 Voltage:** 250 V DC
- **Grid No. 1 Voltage (for visual extinction of the undeflected focused spot):** -33 to -73 V DC
- **External Conductive Coating Capacitance:** 3000 pF
- **Ion-Trap Current:** Approximately 120 mA DC (when using a JETEC standard ion-trap magnet of 40 gauss minimum)

The heater operates at a nominal voltage of 6.3 V with a current draw of 0.6 A ($\pm 10\%$ tolerance). Based on these nominal values, the calculated heater power consumption is 3.78 W (6.3 V multiplied by 0.6 A).

The direct interelectrode capacitances of the tube are approximately:

- **Grid No. 1 to all other electrodes:** 6 pF
- **Cathode to all other electrodes:** 5 pF

Maximum Ratings

The maximum ratings for the 12YP4 are established under the Design-Center system:

- **Maximum Anode Voltage:** 12,000 V DC
- **Maximum Grid No. 2 Voltage:** 410 V DC
- **Grid No. 1 Voltage:**
 - **Maximum Negative Bias Value:** 125 V DC
 - **Maximum Positive Bias Value:** 0 V DC
 - **Maximum Positive Peak Value:** 2 V DC
- **Peak Heater-Cathode Voltage:**
 - **Maximum Heater Negative with respect to Cathode:** 125 V
 - **Maximum Heater Positive with respect to Cathode:** 125 V

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

During the equipment warm-up period, a transient peak heater-cathode voltage of up to 410 V maximum is permitted, provided this period does not exceed 15 seconds.

Technical Summary

The **12YP4** is a 12½-inch direct-view cathode-ray picture tube featuring automatic electrostatic focusing and magnetic deflection with a 54° deflection angle. It incorporates a 3° offset electron gun requiring an external ion-trap magnet of at least 40 gauss, an internal conductive coating with an insulating band to eliminate stray beams, and an external conductive coating of 3000 pF. Operating with a 6.3 V, 0.6 A heater, the tube is rated for a maximum anode voltage of 12,000 V DC and a maximum Grid No. 2 voltage of 410 V DC. It utilizes a small shell duodecal 5-pin base (JETEC [12D](#)) and is designed for flexible socket mounting in any physical orientation.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1951 Thomas Electronics

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

1951 THOMAS ELECTRONICS

Section 0 · Cathode Ray

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
FocusingMethod	Electrostatic	—
DeflectionMethod	Magnetic	—
Deflection Angle	54 degree	—
Heater Voltage	6.3 V	—
Heater Current	600 mA	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
TypicalMainAnodeOrAcceleratorVoltage	11000 V	—
Typical Grid2 Voltage	250 V	—
Grid1CutoffVoltage	-73--33 V	—
Maximum Heater Cathode Voltage	125 V	NormalOperation
WarmupHeaterCathodeVoltage	410 V	15SecondWarmup

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
ExternalConductiveCoatingCapacitance	3000 pF	—
Cathode To All Capacitance	5.5 pF	—

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