

ELECTRONIC TUBE REFERENCE

12AXP2

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

High-voltage cathode-ray display tube with multiple accelerating anodes, typically operating its third anode at 10 kV and rated for 6 W anode input.

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	6000 V
Cathode-ray display tube; section represents the electron-gun/display system.	

12AXP2 — Electrostatic Deflection and Focus Cathode Ray Tube

The **12AXP2** is a 12-inch direct-viewed, round glass cathode ray tube (CRT) designed for oscilloscope applications. It features electrostatic deflection, electrostatic focus, and post-deflection acceleration to achieve high-performance trace display. The "12AXP2" designation specifically identifies the variant equipped with a **P2** phosphor screen, which is optimized for applications requiring medium persistence and green-colored visual output.

Phosphor and Screen Characteristics

The screen of the 12AXP2 is characterized by its specific phosphor composition and faceplate design:

- **Phosphor Type:** P2
- **Fluorescence (Spontaneous Emission):** Green
- **Phosphorescence (Afterglow):** Green
- **Persistence:** Medium
- **Faceplate:** Gray filter glass to enhance contrast.
- **Minimum Useful Screen Diameter:** 11 inches.
- **Useful Scan (Centered on Tube Face):** A minimum area of 9 3/4 inches by 9 3/4 inches. Under the operating condition where the post-accelerator voltage equals the second anode voltage ($E_{A3} = E_{A2}$), the entire useful screen area can be scanned.

Mechanical Design and Physical Dimensions

The 12AXP2 is a large-format CRT with a robust mechanical structure:

- **Bulb Designation:** C99 1/2 Exp. 28, or equivalent.
- **Bulb Contact:** Recessed small cavity cap (J1-21) for the high-voltage post-accelerator connection.
- **Base:** Medium Shell Diheptal 12-Pin (B12-37).
- **Basing Configuration:** 14J.
- **Weight:** Approximately 12 pounds.
- **Overall Length:** 22 1/4 ± 3/8 inches.
- **Maximum Bulb Diameter:** 12 7/16 ± 3/16 inches.
- **Neck Diameter:** 2 ± 1/32 inches.
- **Deflection Section Neck Diameter:** 3 3/4 ± 3/16 inches.
- **Alignment Tolerances:** The J1-21 bulb contact aligns with the trace of deflecting plates D1-D2 within ±10 degrees, and also aligns with Pin No. 5 within ±10 degrees.
- **Deflection Direction:** A positive voltage applied to deflecting plate D1 deflects the electron beam approximately toward Pin No. 5. A positive voltage applied to deflecting plate D3 deflects the beam approximately toward Pin No. 1.

Pinout Connections (14J Basing)

The 12-pin diheptal base provides the following electrical connections, viewed from the bottom of the tube:

Pin Number	Connection	Description
1	H	Heater
2	K	Cathode
3	G1	Grid No. 1 (Control Grid)
4	IC	Internal Connection (Do not use)

Pin Number	Connection	Description
5	A1	Anode No. 1 (Focus Electrode)
7	D3	Deflecting Plate 3
8	D4	Deflecting Plate 4
9	A2, <u>G2</u>	Anode No. 2 (Accelerating Anode) / Grid No. 2
10	<u>D2</u>	Deflecting Plate 2
11	<u>D1</u>	Deflecting Plate 1
12	NC	No Connection
14	H	Heater
Cap	A3	Anode No. 3 (Post-Deflection Accelerator)

Electrical and Heater Characteristics

The 12AXP2 utilizes an indirectly heated cathode with the following heater specifications:

- **Heater Voltage:** 6.3 Volts
- **Heater Current:** 0.6 $\pm$ 10% Amperes
- **Heater Supply:** AC or DC

Direct Interelectrode Capacitances

The approximate interelectrode capacitances of the tube structure are:

Electrode Combination	Capacitance
Cathode to All Other Electrodes	10 pF
Grid No. 1 to All Other Electrodes	8 pF
Between Deflecting Plates 1-2 (D_1 - D_2)	4 pF
Between Deflecting Plates 3-4 (D_3 - D_4)	2 pF
Deflecting Plate 1 to All Other Electrodes Except D_2	8 pF
Deflecting Plate 2 to All Other Electrodes Except D_1	8 pF

Electrode Combination	Capacitance
Deflecting Plate 3 to All Other Electrodes Except D_4	6 pF
Deflecting Plate 4 to All Other Electrodes Except D_3	6 pF

Absolute Maximum Ratings

The following absolute maximum values represent the limits within which the 12AXP2 must be operated to prevent damage or premature degradation:

- **Anode Input:** 6 Watts (calculated as the product of the Anode No. 2 voltage and the average Anode No. 2 current)
- **Anode No. 3 Voltage (Post-Accelerator):** 12,000 Volts dc
- **Anode No. 2 Voltage:** 6,000 Volts dc
- **Anode No. 1 Voltage (Focusing Electrode):** 2,500 Volts dc
- **Grid No. 1 Voltage:**
 - **Negative Bias Value:** 200 Volts dc
 - **Positive Bias Value:** 0 Volts dc
 - **Positive Peak Value:** 2 Volts
- **Peak Heater-Cathode Voltage:**
 - **Heater Negative with Respect to Cathode:** 200 Volts
 - **Heater Positive with Respect to Cathode:** 200 Volts
- **Peak Voltage Between Anode No. 2 and Any Deflecting Plate:** 750 Volts
- **Ratio of Post-Accelerator Voltage to Anode No. 2 Voltage (E_{A3}/E_{A2}):** 2.3:1

Typical Operating Conditions

Under standard operating conditions, the 12AXP2 is typically configured with the following electrical parameters:

- **Anode No. 3 Voltage (E_{A3}):** 10,000 Volts dc
- **Anode No. 2 Voltage (E_{A2}):** 5,000 Volts dc
- **Anode No. 1 Voltage for Focus (E_{A1}):** 1,300 to 2,200 Volts dc
- **Grid No. 1 Voltage Required for Cutoff (E_{G1}):** -60 to -100 Volts dc (defined as the voltage required for visual extinction of the undeflected focused spot)
- **Deflection Factors:**
 - **Deflecting Plates 1-2 (plates nearer the screen):** 105 to 145 Volts dc/Inch
 - **Deflecting Plates 3-4:** 80 to 115 Volts dc/Inch
- **Modulation:** 30 Volts maximum (measured in accordance with MIL-E-1 specifications at a post-accelerator current of 25 μ A)

- **Line Width "A":** 0.5 mm (measured at a post-accelerator current of 25 μ A)
- **Focus Electrode Current:** -15 to +10 μ A dc (measured at a post-accelerator current of 25 μ A)
- **Spot Position (Undelected):** Within a 30 mm square
- **Angle Between D_1 - D_2 Trace and D_3 - D_4 Trace:** 90 $\pm$ 2 Degrees

Circuit Design Constraints

To maintain proper focus and prevent damage to the tube's internal structures, the external circuitry must comply with the following maximum resistance limits:

- **Grid No. 1 Circuit Resistance:** 1.5 Megohms maximum
- **Resistance in Any Deflection Plate Circuit:** 5.0 Megohms maximum



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

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	6.3 V	—
Heater current	600 mA	—
Anode input maximum	6 W	—
Anode No. 2 voltage maximum	6000 V	—
Anode No. 1 voltage maximum	2500 V	—
Anode No. 3 voltage	10000 V	—
Grid No. 1 cutoff voltage	-60 to -100 V	—
Heater-cathode peak voltage	200 V	—

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