



ELECTRONIC TUBE REFERENCE

12ANP1

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Twelve-inch direct-view oscilloscope cathode-ray tube with electrostatic focus and deflection, post-deflection acceleration, gray-filter glass, and an aluminized screen. Its multi-anode system operates at several kilovolts to produce a bright instrument trace.

GENERAL CHARACTERISTICS

BASE DESIGNATION	14AW	BASE PINS	12
NOMINAL HEATER	6.3 V / 600 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Cathode Ray*No fixed ratings recorded.**Cathode-ray display tube; section represents the electron-gun/display system.*

12ANP1 — Electrostatic Focus and Deflection Cathode-Ray Tube

The **12ANP1** is a 12-inch, direct-viewed, round glass cathode-ray tube designed primarily for oscilloscope applications. It features electrostatic deflection, electrostatic focus, and post-deflection acceleration to achieve high-brightness displays. The tube incorporates an aluminized screen and a gray filter glass faceplate to enhance contrast and readability under ambient light.

Phosphor Options and Screen Characteristics

The 12ANP1 can be supplied with several different screen phosphors depending on the application requirements. The primary documented phosphors include:

Phosphor	Fluorescence	Phosphorescence	Persistence
P7	Blue-White	Yellow	Long
P14	Purple	Orange	Medium-Long
P19	Orange	Orange	Long
P25	Orange	Orange	Long

The minimum useful screen diameter is 11 inches, providing a large viewing area for detailed waveform analysis.

Electrical and Interelectrode Capacitance Data

The 12ANP1 utilizes an indirectly heated cathode. The heater is designed for AC or DC operation with the following nominal characteristics:

- **Heater Voltage:** 6.3 V
- **Heater Current:** $0.6 \pm 10\%$ A

Direct Interelectrode Capacitances

The approximate direct interelectrode capacitances of the tube's structures are:

Electrode Connection	Capacitance
Cathode to all other electrodes	6.0 pF
Grid No. 1 to all other electrodes	8.0 pF
Between Deflecting Plates 1-2	5.0 pF
Between Deflecting Plates 3-4	3.0 pF
Deflecting Plate 1 to all other electrodes	14.5 pF
Deflecting Plate 2 to all other electrodes	13.0 pF
Deflecting Plate 3 to all other electrodes	6.2 pF
Deflecting Plate 4 to all other electrodes	6.5 pF

Mechanical Specifications and Basing

The physical construction of the 12ANP1 is characterized by a round glass bulb with specialized external contacts to accommodate high-voltage operation and deflection signals.

- **Overall Length:** 22 1/2 ± 3/8 inches
- **Bulb Diameter (Face):** 12 7/16 +1/16 -3/32 inches
- **Neck Diameter:** 2 3/16 ± 1/16 inches
- **Base:** Medium Shell Diheptal 12-Pin (B12-37)
- **Basing Arrangement:** 14AW
- **Bulb Contact:** Recessed Small Cavity Cap (J1-22)
- **Neck Contacts:** Small Ball Caps (J1-25)

Alignment and Deflection Geometry

Precise mechanical alignment is maintained during manufacturing to ensure predictable trace orientation:

- The J1-22 bulb contact aligns with the D3-D4 trace within ±10 degrees.
- The J1-22 bulb contact aligns with Pin No. 11 within ±10 degrees.
- The neck contact (Anode No. 2) aligns with the D1-D2 trace within ±10 degrees.
- The angle between the D1-D2 trace and the D3-D4 trace is 90 ± 1 degree.

Applying a positive voltage to deflecting plate D1 deflects the electron beam approximately away from the Anode No. 2 neck contact. Applying a positive voltage to deflecting plate D3 deflects the beam approximately away from the post-accelerator button (J1-22).

Absolute Maximum Ratings

The following absolute maximum ratings must not be exceeded under any operating conditions:

Parameter	Maximum Rating
Anode Input	6 W
Anode No. 3 Voltage (Post Accelerator)	16,000 V DC
Anode No. 2 Voltage	8,000 V DC
Anode No. 1 Voltage (Focus)	3,000 V DC
Grid No. 1 Voltage (Negative Bias)	300 V DC
Grid No. 1 Voltage (Positive Bias)	0 V DC
Grid No. 1 Voltage (Positive Peak)	2 V

Parameter	Maximum Rating
Peak Heater-Cathode Voltage (Heater Negative)	180 V
Peak Heater-Cathode Voltage (Heater Positive)	180 V
Peak Voltage Between Anode No. 2 and Any Deflecting Plate	1,500 V
Ratio of Post Accelerator Voltage to Anode No. 2 Voltage	2.5

Note: Anode input is calculated as the product of the Anode No. 2 voltage and the average Anode No. 2 current.

Typical Operating Conditions

For standard applications, the following typical operating parameters are established:

- **Anode No. 3 Voltage:** 9,700 V DC
- **Anode No. 2 Voltage:** 6,100 V DC
- **Anode No. 1 Voltage (for Focus):** 1,510 to 2,225 V DC
- **Grid No. 1 Voltage (for Cutoff):** -135 to -202 V DC (for visual extinction of an undeflected focused spot)
- **Deflection Factors (Plates 1-2):** 100 to 150 V DC/inch
- **Deflection Factors (Plates 3-4):** 100 to 150 V DC/inch
- **Modulation:** 45 V Max (measured 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)
- **Line Width 'B':** 0.75 mm (measured at a post-accelerator current of 25 μ A)
- **Focus Electrode Current:** -25 to +25 μ A
- **Undeflected Spot Position:** Within a 20 mm square centered on the tube face

Deflection plates 1 and 2 are positioned nearer to the screen than plates 3 and 4, which influences their relative deflection sensitivity and capacitance.

Circuit Design Values

To ensure stable operation and prevent damage to the tube's electrodes, the external circuit impedances must be kept within the following limits:

- **Grid No. 1 Circuit Resistance:** 2.0 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 No. 3 voltage	9700 V	—
Anode No. 2 voltage	6100 V	—
Anode No. 1 focus voltage	1510-2225 V	—
Grid No. 1 cutoff voltage	-135 to -202 V	—
Peak voltage between Anode No. 2 and deflecting plate	1500 V	—
Heater-cathode peak voltage	180 V	—

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