



ELECTRONIC TUBE REFERENCE

12ANP19

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Twelve-inch direct-view oscilloscope cathode-ray tube using electrostatic focus and deflection plus post-deflection acceleration. Its gray-filter glass and aluminized screen support a bright, high-voltage instrument display with controlled beam cutoff.

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.*

12ANP19 — Electrostatic Deflection and Focus Cathode-Ray Tube

The **12ANP19** is a 12-inch, direct-viewed, round glass-type cathode-ray tube (CRT) designed for oscilloscope applications. It features electrostatic deflection, electrostatic focus, post-deflection acceleration, and an aluminized screen. The 12ANP19 is specifically configured with the **P19** phosphor screen, which provides orange fluorescence, orange phosphorescence, and long persistence, making it highly suitable for displaying slow-scan signals or transient waveforms.

Phosphor and Screen Characteristics

The 12ANP- series of cathode-ray tubes can be supplied with several different screen phosphors. The 12ANP19 variant is defined by its P19 phosphor screen. The primary characteristics of this screen include:

- **Fluorescence:** Orange
- **Phosphorescence:** Orange
- **Persistence:** Long
- **Screen Type:** Aluminized
- **Minimum Useful Screen Diameter:** 11 Inches

Other variants in the same family utilize alternative phosphors to suit different display requirements. For example, the P7 phosphor provides blue-white fluorescence, yellow phosphorescence, and long persistence; the P14 phosphor provides purple fluorescence, orange phosphorescence, and medium-long persistence; and the P25 phosphor provides orange fluorescence, orange phosphorescence, and long persistence.

Mechanical Specifications and Basing

The 12ANP19 is constructed with a round glass bulb and utilizes a **Medium Shell Diheptal 12-Pin** base (designation **B12-37**). High-voltage and deflection connections are made via specialized bulb and neck contacts.

Physical Connections and Alignment

- **Base Type:** B12-37
- **Basing Configuration:** 14AW
- **Bulb Contact:** Recessed Small Cavity Cap (J1-22)
- **Neck Contacts:** Small Ball Caps (J1-25)
- **Bulb Contact Alignment:** The J1-22 contact aligns with the D3-D4 trace within ± 10 degrees, and with Pin No. 11 within ± 10 degrees.
- **Neck Contact Alignment:** The neck contact (A2) aligns with the D1-D2 trace within ± 10 degrees.

Deflection Geometry and Beam Behavior

- **Deflection Plate Arrangement:** Deflection plates 1 and 2 are positioned nearer to the screen than deflection plates 3 and 4.
- **Trace Orthogonality:** The angle between the D1-D2 trace and the D3-D4 trace is **90 ± 1 Degree**.
- **Deflection Direction:**
 - A positive voltage applied to deflection plate **D1** deflects the electron beam approximately away from the neck contact **A2**.
 - A positive voltage applied to deflection plate **D3** deflects the electron beam approximately away from the post-accelerator button (J1-22).

- **Undelected Spot Position:** The undelected, focused spot falls within a **20 mm square** centered on the tube face.

Electrical and Interelectrode Capacitances

The direct interelectrode capacitances of the 12ANP19 are approximately as follows:

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

Heater and Power Supply Requirements

The tube's electron gun is indirectly heated, requiring a stable heater supply:

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

Maximum Ratings (Absolute Maximum Values)

Operating the 12ANP19 beyond these absolute maximum limits may cause permanent damage or severely degrade performance.

Parameter	Absolute Maximum Value
Anode Input	6 Watts
Anode No. 3 Voltage (Post-Deflection Accelerator)	16,000 Volts DC
Anode No. 2 Voltage	8,000 Volts DC
Anode No. 1 Voltage (Focusing Electrode)	3,000 Volts DC
Grid No. 1 Voltage (Negative Bias Value)	300 Volts DC
Grid No. 1 Voltage (Positive Bias Value)	0 Volts DC

Parameter	Absolute Maximum Value
Grid No. 1 Voltage (Positive Peak Value)	2 Volts
Peak Heater-Cathode Voltage (Heater Negative wrt Cathode)	180 Volts
Peak Heater-Cathode Voltage (Heater Positive wrt Cathode)	180 Volts
Peak Voltage Between Anode No. 2 and Any Deflecting Plate	1,500 Volts
Ratio of Post-Accelerator Voltage to Anode Voltage (Anode 3 to Anode 2)	2.5

Note on Anode Input: The anode input is defined as the product of the Anode No. 2 voltage and the average Anode No. 2 current.

Typical Operating Conditions

The following values represent typical operating parameters for the 12ANP19 in standard oscilloscope service:

- **Anode No. 3 Voltage:** 9,700 Volts DC
- **Anode No. 2 Voltage:** 6,100 Volts DC
- **Anode No. 1 Voltage for Focus:** 1,510 to 2,225 Volts DC
- **Grid No. 1 Voltage Required for Cutoff:** -135 to -202 Volts DC (defined as the voltage required for visual extinction of an undeflected focused spot)
- **Focus Electrode Current:** -25 to +25 μ A
- **Deflection Factors:**
 - **Deflecting Plates 1-2:** 100 to 150 Volts DC/Inch
 - **Deflecting Plates 3-4:** 100 to 150 Volts DC/Inch
- **Modulation:** 45 Volts Max. (measured in accordance with MIL-E-1 specification 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)

Circuit Design Constraints

To ensure stable operation and protect the tube's electrodes, the external circuit must adhere to the following maximum resistance limits:

- **Grid No. 1 Circuit Resistance:** 2.0 Megohms Max.
- **Resistance in Any Deflection Plate Circuit:** 5.0 Megohms Max.

Technical Summary

The **12ANP19** is a high-performance, 12-inch electrostatic deflection and focus cathode-ray tube featuring post-deflection acceleration and an aluminized screen with a long-persistence orange **P19** phosphor. Designed for precision oscilloscope and display applications, it operates with a **6.3 V, 0.6 A** heater and supports post-deflection accelerator voltages up to **16,000 V DC**. With its well-defined deflection factors (100 to 150 V/inch), tight trace orthogonality (90 ± 1 degree), and controlled line widths, the 12ANP19 provides a reliable, high-resolution display solution for specialized electronic instrumentation.

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	—