



ELECTRONIC TUBE REFERENCE

12ANP7

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Twelve-inch direct-view oscilloscope CRT using electrostatic focus and deflection with post-deflection acceleration. It incorporates gray-filter glass and an aluminized screen and operates its principal anodes at several kilovolts for bright instrument traces.

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.**Values promoted from the supplied Sylvania source where explicitly published.*

12ANP7 — Electrostatic Deflection and Focus Oscilloscope Tube

A 12-inch, direct-viewed, round glass-envelope cathode-ray tube featuring electrostatic deflection, electrostatic focus, post-deflection acceleration, and an aluminized screen.

Overview

The **12ANP7** is a specialized 12-inch cathode-ray tube (CRT) designed primarily for precision oscilloscope and display applications. It utilizes electrostatic focusing and electrostatic deflection, combined with post-

deflection acceleration (PDA) to achieve high brightness and deflection sensitivity. The tube is equipped with an aluminized screen and a gray filter glass faceplate to optimize contrast and visual clarity.

The "12ANP-" family of tubes, manufactured by Sylvania Electric Products Inc., is characterized by its physical dimensions and electrical design, with individual designations corresponding to different screen phosphors. The **12ANP7** variant is specifically configured with the **P7** phosphor, which exhibits a blue-white fluorescence, a yellow phosphorescence, and long persistence. This combination is particularly suited for the visual observation of low-speed, transient, or non-recurring waveforms. Other members of this tube family include the 12ANPP14, 12ANPP19, and 12ANPP25.

Mechanical Specifications and Physical Outline

The 12ANP7 features a robust mechanical design optimized for mounting in standard oscilloscope chassis.

Physical Dimensions

- **Overall Length:** 22 1/2 ± 3/8 inches
- **Bulb Diameter:** 12 3/16 (+1/8, -3/32) inches
- **Neck Diameter:** 2 3/16 ± 1/16 inches
- **Minimum Useful Screen Diameter:** 11 inches
- **Faceplate Curvature:** 40-inch external radius of curvature, 24-inch internal radius of curvature
- **Corner Radius:** 7/16 inch nominal

Base, Contacts, and Alignment

The tube is designed with a **Medium Shell Diheptal 12-Pin** base (designation **B12-37**) and follows the **14AW** basing diagram. High-voltage and deflection connections are made via specialized external contacts:

- **Bulb Contact:** A Recessed Small Cavity Cap (**J1-22**) is used for the post-deflection accelerator (Anode No. 3).
- **Neck Contacts:** Small Ball Caps (**J1-25**) provide connections for the deflection plates and intermediate anodes.

Precise physical alignment is maintained during manufacturing to ensure trace accuracy:

- The J1-22 bulb contact aligns with the D3-D4 trace within ±10 degrees and with Pin No. 11 within ±10 degrees.
- The A2 neck contact aligns with the D1-D2 trace within ±10 degrees.
- A positive voltage applied to deflecting plate D1 deflects the electron beam approximately away from the A2 neck contact.
- A positive voltage applied to deflecting plate D3 deflects the beam approximately away from the post-accelerator button (J1-22).

Electrical and Interelectrode Capacitances

The 12ANP7 operates with an indirectly heated cathode. Its low interelectrode capacitances minimize loading on the deflection amplifiers, preserving bandwidth.

Heater Ratings

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

Direct Interelectrode Capacitances (Approximate)

- **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

Absolute Maximum Ratings

The following absolute maximum values represent the physical limits of the 12ANP7. Operating the tube beyond these limits may cause permanent damage or severely degrade performance.

- **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-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
 - **Positive Bias Value:** 0 Volts DC
 - **Positive Peak Value:** 2 Volts
- **Peak Heater-Cathode Voltage:**
 - **Heater Negative with Respect to Cathode:** 180 Volts
 - **Heater Positive with Respect to Cathode:** 180 Volts
- **Peak Voltage Between Anode No. 2 and Any Deflecting Plate:** 1,500 Volts
- **Ratio of Post-Accelerator Voltage to Anode Voltage:** 2.5 Maximum

Typical Operating Conditions

Under typical operating conditions, the 12ANP7 is configured to balance brightness, focus quality, and deflection sensitivity. The deflection plates 1 and 2 are positioned nearer to the screen than plates 3 and 4.

- **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)
- **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 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)
- **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
- **Trace Alignment:** The angle between the D1-D2 trace and the D3-D4 trace is 90 ± 1 Degree

Circuit Design Values

To ensure stable operation and prevent damage to the control grid and deflection plates, the external circuitry must comply with the following maximum resistance limits:

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

Phosphor Family and Performance Characteristics

The "12ANP-" series is available with several screen phosphors to suit different application requirements. The primary variants are:

Tube Designation	Phosphor Type	Fluorescence	Phosphorescence	Persistence
12ANP7	P7	Blue-White	Yellow	Long
12ANPP14	P14	Purple	Orange	Medium-Long
12ANPP19	P19	Orange	Orange	Long
12ANPP25	P25	Orange	Orange	Long

The aluminized screen backing on all variants increases light output toward the faceplate, prevents the accumulation of electrostatic charge on the phosphor, and protects the screen from ion-bombardment damage.

Technical Summary

The **12ANP7** is a **12-inch, electrostatic-deflection, electrostatic-focus CRT** featuring **post-deflection acceleration** and a **P7 long-persistence phosphor screen**. Operating with a **6.3 V, 0.6 A heater**, it is capable of handling post-accelerator voltages up to **16,000 V DC** and accelerator voltages up to **8,000 V DC**. With deflection factors of **100 to 150 V DC/Inch** for both axes under typical operating conditions, it provides a highly readable, sharp display (with line widths down to 0.5 mm) suitable for precision laboratory oscilloscopes and specialized radar or transient-recording displays.



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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