



ELECTRONIC TUBE REFERENCE

12AWP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Electrostatically focused, magnetically deflected cathode-ray display tube with an aluminized P4 screen, white medium-persistence fluorescence, and approximately 70-degree deflection.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	6.3 V / 300 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/electron-gun section.

12AWP4 Cathode-Ray Tube

The **12AWP4** is a 12-inch, electrostatically focused, magnetically deflected cathode-ray tube designed primarily for radar applications in miniaturized equipment. It features a compact physical design, including a short overall length, a small-diameter neck, and a miniature base. By combining a low-current heater with a narrow neck, the tube achieves a significant reduction in power requirements. The 12AWP4 is equipped with an aluminized screen utilizing Phosphor No. 4 to maximize light output and minimize screen charging effects.

Optical and Screen Characteristics

The 12AWP4 is defined by its use of Phosphor No. 4 (P4), which provides specific optical characteristics suitable for direct-view display applications:

- **Fluorescence:** White
- **Phosphorescence:** None
- **Persistence:** Medium to medium-short
- **Faceplate:** Spherical
- **Minimum Useful Screen Diameter:** 11 inches

While other variants in the 12AWP- family utilize different phosphors—such as Phosphor No. 7 (white fluorescence, yellow-green long phosphorescence), Phosphor No. 12 (orange fluorescence, orange long phosphorescence), Phosphor No. 19 (orange fluorescence, orange long phosphorescence), and Phosphor No. 25 (orange fluorescence, orange medium phosphorescence)—the 12AWP4 is specifically configured for applications requiring a standard white display. Unlike the P12, P19, and P25 screens, which are highly susceptible to permanent damage and burning if current density is permitted to rise too high, the P4 screen is optimized for general-purpose visual readout.

Mechanical Specifications and Basing

The physical construction of the 12AWP4 is optimized for space-constrained installations, featuring a reduced neck diameter and a specialized miniature base.

Physical Dimensions

- **Overall Length (Seated Height):** 12 1/4 ± 3/16 inches
- **Greatest Diameter of Bulb:** 12 7/16 ± 1/8 inches
- **Neck Diameter:** 0.840 +0.060 / -0.030 inches
- **Deflection Angle (Approximate):** 70 degrees

Base and Socketing

The tube is fitted with a 9-pin miniature base (designation **E9-37**) and follows the **9HT** basing arrangement. Because of the physical layout of the base, the associated socket must feature a center opening to clear the tubulation. Care must be exercised during handling to prevent bending the base pins or damaging the exposed tubulation.

The high-voltage anode connection is made via a **J1-21** bulb contact (recessed small cavity cap). The alignment of this contact is specified as follows:

- The plane of the J1-21 cap passes halfway between Pin 1 and Pin 9 with an angular tolerance of ±10 degrees.
- The J1-21 cap is located on the same side of the tube as Pin 1 and Pin 9.

The reference line of the bulb is established by the point where the leading edge of a 1.640-inch reference line gauge (JETEC No. 128) stops.

Pin Connection Table (9HT Basing)

Viewed from the bottom of the base, the pin connections are assigned as follows:

Pin Number	Element
1	Grid No. 1
2	Heater
3	Grid No. 2
4	No Connection
5	Cathode
6	Grid No. 2
7	Focusing Electrode
8	Heater
9	Grid No. 1
Cap	Accelerator (J1-21 Contact)

Grid No. 1 is internally connected to both Pin 1 and Pin 9, and Grid No. 2 is internally connected to both Pin 3 and Pin 6.

Electrical Ratings and Operating Conditions

The electrical design of the 12AWP4 emphasizes low power consumption and precise beam control.

Heater and Capacitances

The tube incorporates an efficient, low-current heater:

- **Heater Voltage:** 6.3 Volts
- **Heater Current (at 6.3 V):** $0.3 \pm 10\%$ Ampere
- **Calculated Nominal Heater Power:** 1.89 Watts (calculated as $6.3 \text{ V} * 0.3 \text{ A}$)
- **Direct Interelectrode Capacitances (Approximate):**
 - Cathode to all other electrodes: 4.5 pF
 - Grid No. 1 to all other electrodes: 6.5 pF

Absolute Maximum Ratings

Operating limits must be strictly maintained within the following absolute maximum values:

- **Accelerator Voltage:** 13,000 Max. Volts DC; 7,000 Min. Volts DC
- **Focusing Electrode Voltage:** -550 to +1100 Max. Volts DC
- **Grid No. 2 Voltage:** 770 Max. Volts DC
- **Grid No. 1 Voltage:**
 - Negative Bias Value: 180 Max. Volts DC

- Positive Bias Value: 0 Max. Volts DC
- Positive Peak Value: 0 Max. Volts
- **Peak Heater-Cathode Voltage:**
 - Heater negative with respect to cathode: 180 Max. Volts
 - Heater positive with respect to cathode: 180 Max. Volts
- **Grid No. 1 Circuit Resistance:** 1.5 Max. Megohms

Typical Operating Conditions

For standard operation, the following typical parameters are specified:

- **Accelerator Voltage:** 10,000 Volts DC
- **Focusing Electrode Voltage:** 0 to 450 Volts DC (with Grid No. 1 voltage adjusted to produce an accelerator current of 25 μ A)
- **Grid No. 2 Voltage:** 300 Volts DC
- **Grid No. 1 Voltage:** -15 to -45 Volts DC (for visual extinction of the undeflected, focused spot)
- **Line Width A:** 0.018 Inch Maximum (measured in accordance with MIL-E-1 specifications at an accelerator current of 25 μ A)
- **Spot Position (Undeflected):** 5/8 Inch. When the tube is shielded, the center of the undeflected, focused spot will fall within a circle of 3/8-inch radius concentric with the center of the tube face.

Technical Summary

The **12AWP4** is a specialized 12-inch cathode-ray tube designed by Allen B. Du Mont Laboratories for radar and miniaturized equipment. It features a 70-degree magnetic deflection angle, electrostatic focusing, and an aluminized screen with a white-emitting Phosphor No. 4. Its design is characterized by a compact physical envelope, a narrow 0.840-inch neck, and a 9-pin miniature base (E9-37) with a 9HT basing configuration. Operating with a highly efficient 6.3 V, 0.3 A heater, the tube minimizes power consumption while delivering a high-resolution display with a maximum line width of 0.018 inches under typical operating conditions of 10,000 V on the accelerator.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1960 Du Mont

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

1960 DU MONT

Section 1 · Cathode Ray

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage	6.3 V	—
Heater Current	300 mA	—
Focusing Method	Electrostatic text	—
Deflection Method	Magnetic text	—
Phosphor	P4 text	—
Fluorescence	White text	—
Persistence	Medium text	—
Deflection Angle	70 deg	Approximate
Screen Construction	Aluminized/metal-backed text	—

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