



ELECTRONIC TUBE REFERENCE

12DP7A

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Twelve-inch P7 cathode-ray display tube with magnetic focusing and deflection. Its blue-white long-persistence screen retains traces after excitation, while published ratings permit high anode voltage for bright persistent presentation.

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

SECTION 1 Cathode Ray	
MAXIMUM PLATE VOLTAGE	13200 V
<i>Cathode-ray display/electron-gun section.</i>	

12DP7A — Magnetic Focus and Deflection Cathode-Ray Tube

The **12DP7A** is a 12-inch, magnetically focused and magnetically deflected cathode-ray tube designed primarily for radar indicator applications. It features a large screen area and a long-persistence screen, making it highly suitable for displaying radar sweeps where information must remain visible between scans. The tube is a direct-viewed, round glass type with a spherical faceplate and is recommended primarily for replacement purposes.

Physical and Mechanical Construction

The 12DP7A has a round glass envelope with a nominal outer bulb diameter of 12 +/- 3/16 inches and a minimum useful screen diameter of 10 inches.

- **Overall Length:** 19 5/8 +/- 1/2 inches.
- **Bulb Type:** J96S or equivalent.
- **Faceplate:** The 12DP7A is available with a clear or gray filter glass faceplate. The gray filter glass faceplate has a light transmittance of approximately 75 percent to improve contrast under ambient light.
- **Base:** Long Medium-Shell Octal 5-pin or 8-pin base (B5-80 or B8-65).
- **Basing Designation:** 5AN.
- **Bulb Contact (Anode Cap):** Medium Cap (C1-5).
- **Bulb Contact Alignment:** The C1-5 anode cap aligns with pin No. 5 within +/- 10 degrees and is on the same side of the tube as pin No. 5.
- **Weight:** Approximately 8 1/2 pounds.

The pin connections for the 5AN basing arrangement (viewed from the bottom of the base) are:

Pin Number	Element
Pin 2	Heater
Pin 3	Grid No. 2
Pin 5	Grid No. 1
Pin 7	Cathode
Pin 8	Heater
Cap	Anode

Phosphor and Screen Characteristics

The 12DP7A utilizes a No. 7 phosphor (P7), which is characterized by:

- **Fluorescence:** Blue or Blue-White (depending on manufacturer/variant).
- **Phosphorescence:** Yellow.
- **Persistence:** Long.

This dual-color, long-persistence characteristic is ideal for radar indicators, where the initial sweep produces a bright blue-white flash (fluorescence) followed by a lingering yellow glow (phosphorescence) that tracks targets over time.

Electrical and Interelectrode Characteristics

The tube has an indirectly heated cathode.

- **Heater Voltage:** 6.3 Volts.
- **Heater Current:** 0.6 +/- 10% Ampere.
- **Deflection Angle (Approximate):** 50 Degrees.
- **Focusing Method:** Magnetic.
- **Deflecting Method:** Magnetic.

Direct Interelectrode Capacitances

The approximate direct interelectrode capacitances of the tube are:

- **Cathode to all other electrodes:** 5 to 6 pF
- **Grid No. 1 to all other electrodes:** 8 to 9 pF
- **Grid No. 2 to all other electrodes:** 7.5 pF

Ratings and Operating Conditions

The maximum ratings for the 12DP7A vary depending on the rating system used (Design Center Values vs. Absolute Maximum Values):

Parameter	Design Center Values	Absolute Maximum Values
Anode Voltage	10,000 Max. Volts D-C	11,000 Max. Volts D-C
Grid No. 2 Voltage	700 Max. Volts D-C	770 Max. Volts D-C
Grid No. 1 Voltage (Negative Bias)	125 Max. Volts D-C	200 Max. Volts D-C
Grid No. 1 Voltage (Positive Bias)	0 Max. Volts D-C	0 Max. Volts D-C
Grid No. 1 Voltage (Positive Peak)	2 Max. Volts	2 Max. Volts
Peak Grid No. 1 Drive from Cut-off	65 Max. Volts	—
Peak Heater-Cathode Voltage (Heater Negative)	125 Max. Volts D-C	140 Max. Volts
Peak Heater-Cathode Voltage (Heater Positive)	125 Max. Volts D-C	140 Max. Volts

Note on Anode Supply: At or near the maximum anode rating, the effective resistance of the anode supply should be adequate to limit the anode input power to 6 watts.

Typical Operating Conditions

The 12DP7A is typically operated under the following conditions:

- **Anode Voltage:** 4,000 to 7,000 Volts D-C (Brilliance and definition decrease with decreasing anode voltage; in general, the anode voltage should not be less than 4,000 Volts).
- **Grid No. 2 Voltage:** 250 Volts D-C.
- **Grid No. 1 Voltage Required for Cutoff:** -25 to -70 Volts D-C (measured at visual extinction of the undeflected focused spot).
- **Focusing Coil Current (Approximate):**
 - At 4,000 Volts Anode: 75 to 102 mA D-C.
 - At 7,000 Volts Anode: 99 to 135 mA D-C.
 - *Focusing Coil Specification:* Measured using JEDEC standard focus coil No. 106 (or equivalent), with the Grid No. 1 voltage adjusted to produce an anode current of 200 microamperes, and with the distance from the yoke reference line (or reference line) to the center of the air gap equal to 4 1/8 inches (4.125 inches).
- **Spot Position / Alignment:** The center of the undeflected, unfocused spot will fall within a circle of 20 mm radius concentric with the center of the tube face.

Circuit Values and Protection

To prevent damage to the tube's electrodes in the event of power supply discharges, specific circuit resistance limits must be observed.

- **Maximum Grid No. 1 Circuit Resistance:** 1.5 Megohms.

Minimum Circuit Resistance Requirements

When the output capacitor of the power supply is capable of storing more than 250 micro-coulombs, and when the inherent regulation of the power supply permits the instantaneous short-circuit current to exceed 1 ampere, the effective resistance in the circuit between the indicated electrode and the output capacitor must meet the following minimum values:

- **Grid No. 1 Circuit Resistance:** 150 Ohms minimum.
- **Grid No. 2 Circuit Resistance:** 820 Ohms minimum.
- **Anode Circuit Resistance:** 11,000 Ohms minimum.

Safety and X-Ray Warnings

When operating the 12DP7A, precautions must be taken regarding potential X-ray radiation. X-ray radiation shielding may be necessary to protect against possible danger of personal injury from prolonged exposure at close range if the tube is operated at higher than the manufacturer's Maximum Rated Anode Voltage or 16,000 volts, whichever is less.

Average Characteristics and Curve Interpretation

The average transfer characteristics of the 12DP7A demonstrate the relationship between Grid No. 1 voltage and anode current. Under typical operating conditions with a filament voltage of 6.3 Volts, Grid No. 2 voltage of 250 Volts, and accelerator (anode) voltages ranging from 7,000 to 10,000 Volts:

- At a Grid No. 1 bias of 0 Volts, the anode current reaches approximately 1,000 microamperes.
- As the Grid No. 1 bias is made more negative, the anode current decreases, dropping to approximately 600 microamperes at -15 Volts, 200 microamperes at -25 Volts, and approaching visual cutoff (extinction) between -25 and -70 Volts.

Related Designations

The **12DP7C** is a closely related variant of the 12DP7A. While sharing the same basic physical dimensions, 5AN basing, and magnetic focus/deflection characteristics, the **12DP7C** features an **aluminized screen** and a gray faceplate. It also possesses higher absolute maximum ratings, such as an anode voltage limit of 13,200 Volts D-C and a peak heater-cathode voltage limit of 200 Volts. The **12DP7C** has a specified maximum line width of 0.50 mm when measured in accordance with MIL-E-1 at an anode current of 200 microamperes.

Technical Summary

The **12DP7A** is a 12-inch, magnetically focused and deflected cathode-ray tube featuring a round glass envelope, a spherical faceplate, and a long-persistence No. 7 phosphor screen. Operating with a 6.3 V, 0.6 A heater, it is designed primarily for radar indicator applications. It provides high-contrast imaging via its optional gray filter glass faceplate and requires careful circuit design, including minimum electrode resistances, to protect against high-energy power supply discharges.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1950 Sylvania

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

1950 SYLVANIA

Section 1 · Cathode Ray

CHARACTERISTICS

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Phosphor	P7	—
Deflection method	Magnetic	—



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	600 mA	—
Focusing Method	Magnetic text	—
Deflection Method	Magnetic text	—
Phosphor	P7 text	—
Fluorescence	Blue/white text	—
Persistence	Long text	—
Deflection Angle	50 deg	Approximate

SOURCE OPERATING CONDITIONS

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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 voltage maximum	11000 V	—
Grid No. 2 voltage maximum	770 V	—
Anode voltage	4000 V	—
Grid No. 2 voltage	250 V	—

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode to all other electrodes capacitance	5 pF	—
Grid No. 1 to all other electrodes capacitance	8 pF	—