

ELECTRONIC TUBE REFERENCE

12SP7B

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Twelve-inch P7 persistent-screen cathode-ray display tube with magnetic focusing and deflection. Its blue-white fluorescence and long yellow afterglow are suited to radar-style presentation, with high-voltage anode operation for a bright trace.

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

SECTION1 Cathode Ray	
MAXIMUM PLATE VOLTAGE	11000 V
Cathode-ray display/electron-gun section.	

12SP7B — Radar Indicator Cathode Ray Tube

The **12SP7B** is a 12-inch, direct-viewed, round glass cathode ray tube designed primarily for radar indicator applications. It features magnetic deflection and magnetic focus, utilizing a spherical faceplate made of gray filter glass. The tube is equipped with an aluminized screen and a long-persistence P7 phosphor, which provides high-contrast displays suitable for radar systems.

Screen and Optical Characteristics

The 12SP7B is characterized by its specialized screen and faceplate design, optimized for radar indicator service:

- **Phosphor:** The tube uses a P7 phosphor, which exhibits blue-white fluorescence and yellow phosphorescence. It is a long-persistence phosphor designed to retain images for extended observation.
- **Screen Type:** Unlike the non-aluminized [12SP7](#), the 12SP7B features an aluminized screen, which enhances brightness and display efficiency.
- **Faceplate:** The spherical faceplate is constructed of gray filter glass with an approximate light transmittance of 74 percent, improving contrast under ambient light conditions.
- **Useful Screen Area:** The tube provides a minimum useful screen diameter of 11 inches.

Mechanical Specifications and Basing

The physical structure and electrical connections of the 12SP7B conform to standard industrial specifications for cathode ray tubes of its class:

- **Bulb:** J99 1/2 A or equivalent.
- **Bulb Contact:** A recessed small cavity cap (J1-21) is located on the side of the bulb for the high-voltage anode connection.
- **Base:** Small shell Duodecal 5-pin base (B5-57).
- **Basing Configuration:** Labeled as [12D](#), which provides the following pinout connections (viewed from the bottom of the base):
 - **Pin 1:** Heater
 - **Pin 2:** Grid No. 1
 - **Pin 10:** Grid No. 2
 - **Pin 11:** Cathode
 - **Pin 12:** Heater
 - **Recessed Cavity Cap (A):** Anode
- **Physical Dimensions:**
 - **Overall Length:** 18 3/4 ± 3/8 inches
 - **Greatest Bulb Diameter:** 12 7/16 ± 1/8 inches
 - **Neck Diameter:** 1 7/16 ± 1/16 inches
- **Deflection Angle:** Approximately 54 degrees.
- **Mechanical Alignment:** Base pin position No. 3 is aligned with the anode contact (J1-21) within a tolerance of 10 degrees.

Electrical Ratings and Capacitances

The 12SP7B operates with a standard heater supply and has specific absolute maximum ratings that must be observed to prevent damage.

Heater and Capacitance Data

- **Heater Voltage:** 6.3 Volts
- **Heater Current:** 0.6 ± 10% Ampere

- **Direct Interelectrode Capacitances:**
 - Cathode to all other electrodes: Approximately 5 μf
 - Grid No. 1 to all other electrodes: Approximately 6 μf

Absolute Maximum Ratings

The absolute maximum ratings for the 12SP7B are defined as follows:

- **Anode Voltage:** 11,000 Volts dc
- **Grid No. 2 Voltage:** 550 Volts dc
- **Grid No. 1 Voltage:**
 - Negative bias value: 140 Volts dc
 - Positive bias value: 0 Volts dc
 - Positive peak value: 2 Volts
- **Peak Heater-Cathode Voltage:**
 - Heater negative with respect to cathode: 200 Volts
 - Heater positive with respect to cathode: 200 Volts

These ratings differ from related variants; for example, the [12SP7](#) has a lower Grid No. 2 maximum rating of 450 Volts and lower heater-cathode voltage limits of 150 Volts, while the [12SP7D](#) has higher maximum ratings across several parameters.

Typical Operating Conditions and Circuit Values

For typical operation, the 12SP7B is designed to run under the following electrical conditions:

- **Anode Voltage:** 9,000 Volts dc (Note: Brightness and focus quality decrease with decreasing anode voltage; operation should generally not fall below 4,000 Volts).
- **Grid No. 2 Voltage:** 250 Volts dc
- **Grid No. 1 Voltage for Cutoff:** -27 to -63 Volts dc (defined as the voltage required for visual extinction of an undeflected focused spot).
- **Focusing Coil Current:** Approximately 110 mA dc. This value is specified using a RETMA focusing coil No. 106 positioned at a distance of 3 1/4 inches from the yoke reference line to the center of the air gap.
- **Spot Position:** The center of the undeflected, unfocused spot will fall within a circle of 20 mm radius concentric with the tube face.
- **Maximum Grid No. 1 Circuit Resistance:** 1.5 Megohms.

Safety and Operational Considerations

When operating the 12SP7B, appropriate safety precautions must be taken regarding high voltage and radiation:

- **X-Ray Radiation:** X-ray radiation shielding may be necessary to protect against potential personal injury from prolonged exposure at close range if the tube is operated at voltages higher than its

maximum rated anode voltage of 11,000 Volts (or 16,000 Volts, whichever is less). Since the maximum rating of the 12SP7B is 11,000 Volts, shielding considerations apply if this limit is exceeded.

Technical Summary

The **12SP7B** is a magnetic-deflection, magnetic-focus radar indicator cathode ray tube featuring a 12-inch round glass envelope, a spherical gray filter glass faceplate, and an aluminized screen. Utilizing the long-persistence P7 phosphor, it is optimized for radar display applications requiring high contrast and image retention. Operating with a 6.3 V, 0.6 A heater, the tube supports an absolute maximum anode voltage of 11,000 V dc and a maximum Grid No. 2 voltage of 550 V dc. Its physical design includes a small shell Duodecal 5-pin base and a recessed cavity cap for high-voltage anode connection, ensuring reliable integration into specialized indicator circuits.



SOURCE OPERATING CONDITIONS

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

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate Voltage	11000 V	—
Typical Anode Voltage	9000 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Phosphor	P7	—
Focusing Method	Magnetic	—
Deflecting Method	Magnetic	—



SOURCE OPERATING CONDITIONS

1960 Du Mont

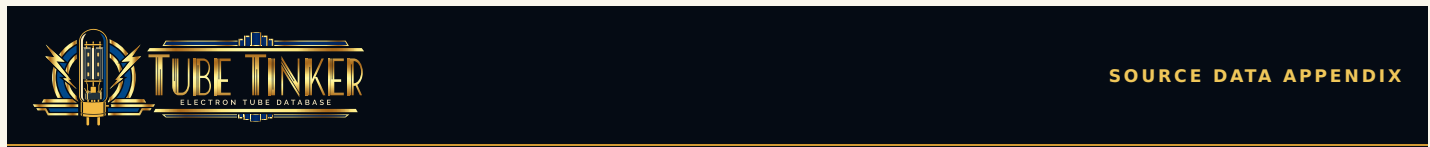
Published test conditions and operating points. Values on this page are preserved as reported by this source.

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	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Fluorescence	Blue/white text	—
Persistence	Long text	—
Deflection Angle	55 deg	Approximate
Screen Construction	Aluminized/metal-backed text	—



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

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage	6.3 V	—
Heater Current	600 mA	—
Focusing Method	Magnetic text	—
Deflection Method	Magnetic text	—
Fluorescence	Blue-White text	—
Persistence	Long text	—
Phosphorescence	Yellow text	—
Deflection Angle	54 deg	Approximate
Screen Aluminized	Yes text	—
Faceplate	Gray Filter Glass text	—
Maximum Undelected Spot Radius	20 mm	—
Light Transmittance	74 percent	Approximate

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Anode Voltage	11000 V	—
Maximum Grid2 Voltage	550 V	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Grid1 Negative Bias	140 V	—
Maximum Grid1 Positive Peak	2 V	—
Maximum Heater-Cathode Voltage	200 V	Either Polarity
Anode Voltage	9000 V	—
Grid2 Voltage	250 V	—
Grid1 Cutoff Voltage Minimum	-63 V	—
Grid1 Cutoff Voltage Maximum	-27 V	—
Focusing Coil Current	110 mA	Approximate
Maximum Grid1 Circuit Resistance	1.5 Mohm	—

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