



ELECTRONIC TUBE REFERENCE

16SP4A

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Round-glass P4 television picture tube using magnetic focusing and deflection, with white medium-persistence fluorescence, approximately 70-degree deflection, and typical 12 kV anode operation.

GENERAL CHARACTERISTICS

BASE DESIGNATION	12N	BASE PINS	5
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	14000 V
<i>CRT-specific anode/focus/deflection ratings retained as parameters rather than mapped to ordinary plate/screen fields.</i>	

16SP4A — Cathode Ray Picture Tube

The **16SP4A** is a direct-view, round glass cathode ray picture tube designed primarily for television applications. It features a unipotential cathode, magnetic focus and deflection, and an external conductive coating. The 16SP4A is identical to the [16SP4](#) except for the inclusion of a grey filter faceplate on the 16SP4A to improve picture contrast.

Mechanical Specifications and Physical Dimensions

The 16SP4A is constructed with a round glass bulb and requires an external single-field ion trap magnet. The physical dimensions and mechanical features of the tube include:

- **Overall Length:** 17 5/16 ± 3/8 inches

- **Greatest Diameter of Bulb:** 15 7/8 ± 1/8 inches
- **Minimum Useful Screen Diameter:** 14 1/2 inches
- **Neck Diameter:** 1 7/16 ± 1/16 inches
- **Raster Size:** 10 1/4 inches by 14 1/2 inches
- **Bulb Contact:** Recessed small cavity cap (J1-21)
- **Base:** Small shell duodecal 5-pin (B5-57)
- **Basing Designation:** 12N

The recessed small cavity cap serves as the anode terminal and is aligned with pin position #3 within a tolerance of ±10 degrees. The neck of the tube requires a specific clear space of 3 5/8 ± 5/16 inches to accommodate the external ion trap magnet.

Electrical Characteristics and Pin Connections

The 16SP4A utilizes a unipotential cathode and a standard heater supply. The electrical connections, viewed from the bottom of the base, are assigned as follows:

Pin Number	Connection
Pin 1	Heater
Pin 2	Grid No. 1
Pin 10	Grid No. 2
Pin 11	Cathode
Pin 12	Heater
Cap	Anode

The tube operates with a nominal heater voltage of 6.3 V and a heater current of 0.6 A. The direct interelectrode capacitances between the external conductive coating and the anode are:

- **Maximum Capacitance:** 3,500 µF
- **Minimum Capacitance:** 1,500 µF

Focusing and deflection are both achieved magnetically. The nominal deflection angle of the electron beam is approximately 70 degrees.

Optical Characteristics

The screen of the 16SP4A utilizes Phosphor No. 4, which provides the following optical properties:

- **Fluorescent Color:** White
- **Phosphorescent Color:** White
- **Persistence:** Medium

The faceplate of the 16SP4A is treated with a grey filter, which distinguishes it from the clear faceplate of the standard [16SP4](#).

Operating Conditions and Maximum Ratings

The operating limits and typical operating conditions are specified under the Design Center system.

Maximum Ratings (Design Center Values)

Parameter	Maximum Value
DC Anode Voltage	14,000 V
DC Grid No. 2 Voltage	410 V
Grid No. 1 DC Negative-Bias Value	125 V
Grid No. 1 DC Positive-Bias Value	0 V
Grid No. 1 Positive-Peak Value	2 V
Heater-Cathode Voltage (Heater negative with respect to cathode during warm-up, ≤ 15 s)	410 V
Heater-Cathode Voltage (Heater negative with respect to cathode after warm-up)	125 V
Heater-Cathode Voltage (Heater positive with respect to cathode)	125 V

Typical Operating Conditions

Under typical operating conditions, the tube is configured with the following parameters:

- **DC Anode Voltage:** 12,000 V
- **DC Grid No. 2 Voltage:** 300 V
- **DC Grid No. 1 Voltage:** -33 V to -77 V (for visual extinction of the undeflected focused spot)
- **DC Focusing Coil Current:** Approximately 110 mA
- **DC Ion Trap Current:** Approximately 120 mA
- **Maximum Grid No. 1 Circuit Resistance:** 1.5 Megohms

The typical focusing coil current of 110 mA is specified for standard focus when the combined Grid No. 1 bias voltage and video signal voltage are adjusted to produce a highlight brightness of 20 foot-lamberts on a 10 1/4 inch by 14 1/2 inch picture size. This condition assumes the distance from the reference line to the center of the air gap on the focus coil is exactly 3.25 inches.

Technical Summary

The **16SP4A** is a 70-degree magnetic focus and deflection cathode ray tube featuring a 14 1/2-inch minimum useful screen diameter and a grey filter faceplate. Operating with a 6.3 V heater and a maximum anode rating of 14,000 V, it provides a white-emitting, medium-persistence display (Phosphor No. 4) for television receiver applications. The tube's design incorporates an external conductive coating, a unipotential cathode, and requires an external single-field ion trap magnet for proper operation.



SOURCE OPERATING CONDITIONS

1961 Tung Sol

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

1961 TUNG SOL

Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Anode Voltage	14000 V	—
Typical Anode Voltage	12000 V	—
Maximum Grid2 Voltage	410 V	—
Typical Grid2 Voltage	300 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
DeflectionAngleApproximate	70 degree	—
FocusingMethod	Magnetic	—
DeflectingMethod	Magnetic	—
PhosphorNumber	4	—
FluorescentColor	White	—
Persistence	Medium	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1966 Tung Sol Electronic Tubes 4 of 4

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

1966 TUNG SOL ELECTRONIC TUBES 4 OF 4

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
ROUND GLASS CONSTRUCTION	8 mA	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
DEFLECTION	7 degrees	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
HEATER	6.3 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
B FOR STANDARD FOCUS WI TM THE COMBINED GRID /1 BIAS VOLTAGE AND VI OEO SIGNAL VOLTAGE AO JUSTEO	1 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
MAXIMUM	14000 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
MAXIMUM GRID 81 CIRCUIT RESISTANCE – value 1	81 mA	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
MAXIMUM GRID 81 CIRCUIT RESISTANCE – value 2	1.5 mA	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.

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