

ELECTRONIC TUBE REFERENCE

16WP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

P4 cathode-ray display tube documented for high-voltage direct-view operation, using magnetic deflection and manufacturer-specified beam focusing and control arrangements appropriate to type 16WP4.

GENERAL CHARACTERISTICS

BASE DESIGNATION	BS-57	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

SECTION1 Cathode Ray	
MAXIMUM PLATE VOLTAGE	16000 V
MAXIMUM SCREEN VOLTAGE	41 V
CRT-specific anode, focus, deflection and optical data retained as parameters rather than forced into ordinary plate/screen fields.	

16WP4 — Direct-View Cathode Ray Picture Tubes

The **16WP4** and **16WP4A** are direct-view cathode ray tubes designed for television receiver applications. These devices feature a round glass construction, magnetic focus, magnetic deflection, and a grey filter faceplate. The two types are electrically and mechanically identical, with the sole exception of an external conductive coating applied to the bulb of the **16WP4A**.

Construction and Mechanical Specifications

The 16WP4 and [16WP4A](#) are built with a round glass envelope. The physical dimensions and mechanical characteristics of these tubes are highly standardized to facilitate mounting and alignment within television chassis.

Envelope and Screen Dimensions

- **Overall Length:** $17 \frac{3}{4} \pm \frac{3}{8}$ inches
- **Greatest Diameter of Bulb:** $15 \frac{7}{8} \pm \frac{1}{8}$ inches
- **Minimum Useful Screen Diameter:** $14 \frac{1}{2}$ inches
- **Raster Size:** $10 \frac{1}{4}$ inches by $14 \frac{1}{2}$ inches

Optical Characteristics

The faceplate is constructed from a grey filter glass designed to enhance contrast by reducing the effects of ambient room light. The light transmission at the center of the faceplate is approximately 70 percent. The screen utilizes Phosphor No. 4, which produces a white fluorescent color and a white phosphorescent color with medium persistence. This combination is optimized for flicker-free television image reproduction.

Deflection and Focusing Components

The tube neck has a nominal diameter of $1 \frac{7}{16} \pm \frac{1}{16}$ inches. A section of the neck measuring $4 \frac{5}{16}$ inches in length must be kept clear of other components to accommodate an external double-field ion trap magnet. The tube is designed for a nominal deflection angle of approximately 70 degrees. Both focusing and deflection are achieved magnetically, requiring external coils.

Base, Basing, and Alignment

The tube is fitted with a Small Shell Duodecal 5-Pin base (designation BS-57). The high-voltage anode connection is made via a recessed small cavity cap (designation J1-21) located on the side of the bulb.

- **Basing Configurations:** The 16WP4 is wired according to the [12D](#) basing diagram, while the [16WP4A](#) is wired according to the 12N diagram. The difference in basing designations accounts for the external conductive coating present on the [16WP4A](#).
- **Anode Cap Alignment:** The J1-21 contact is aligned with pin position #3 within a tolerance of ± 10 degrees.

Pin Connections

The electrical connections to the electrodes are accessed through the base pins, viewed from the bottom of the tube, and the side anode cap:

Pin / Terminal	Connection
Pin 1	Heater

Pin / Terminal	Connection
Pin 2	Grid No. 1 (Control Grid)
Pin 10	Grid No. 2 (Screen Grid)
Pin 11	Cathode
Pin 12	Heater
Anode Cap	Anode

The cathode is a unipotential, indirectly heated type, allowing the heater and cathode to operate at different electrical potentials within specified limits.

Electrical Characteristics and Ratings

The operating limits of the 16WP4 and [16WP4A](#) are specified under the Design Center rating system. These values represent the limits within which the tube can be operated safely and reliably.

Heater Specifications

- **Heater Voltage:** 6.3 Volts
- **Heater Current:** 0.6 Ampere

Maximum Ratings

- **Maximum DC Anode Voltage:** 16,000 Volts
- **Maximum DC Grid No. 2 Voltage:** 410 Volts
- **Maximum Grid No. 1 Voltage:**
 - **DC Negative-Bias Value:** 125 Volts
 - **DC Positive-Bias Value:** 0 Volts
 - **Positive-Peak Value:** 2 Volts
- **Maximum DC Peak Heater-Cathode Voltage:**
 - **Heater Negative with Respect to Cathode:**
 - *During warm-up period (not to exceed 15 seconds):* 410 Volts
 - *After equipment warm-up period:* 125 Volts
 - **Heater Positive with Respect to Cathode:** 125 Volts

Interelectrode Capacitances

The [16WP4A](#) features an external conductive coating that acts as one plate of a capacitor, with the internal conductive anode coating acting as the other. This structure provides a built-in high-voltage filtering capacitance:

- **Maximum External Coating to Anode Capacitance:** 1,500 micromicrofarads (uuf)

- **Minimum External Coating to Anode Capacitance:** 750 micromicrofarads (uuf)

The standard 16WP4 does not have this external coating, and therefore does not exhibit this specific capacitance.

Typical Operating Conditions

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

- **DC Anode Voltage:** 12,000 Volts
- **DC Grid No. 2 Voltage:** 250 Volts
- **DC Grid No. 1 Voltage (for visual extinction of undeflected focused spot):** -27 to -63 Volts
- **DC Focusing Coil Current:** Approximately 110 mA. This typical value applies when using a standard focus coil (such as standard focus coil #109 or equivalent) with the combined Grid No. 1 bias voltage and video signal voltage adjusted to produce a highlight brightness of 20 foot-lamberts on the standard 10 1/4 inches by 14 1/2 inches picture area. The focus coil must be positioned such that the distance from the reference line to the center of the air gap on the focus coil is 3 inches.
- **DC Ion Trap Current:** Approximately 120 mA when using a standard double-field ion trap coil (standard coil #108).

Circuit Values

To prevent grid emission and maintain stable bias conditions, the maximum allowable resistance in the Grid No. 1 circuit is 1.5 Megohms.

Technical Summary

The **16WP4** and **16WP4A** are 16-inch class, round glass, direct-view television picture tubes. They feature magnetic focusing and magnetic deflection with a 70-degree deflection angle, a grey filter faceplate, and a unipotential cathode. Operating at a typical anode voltage of 12,000 Volts, they utilize an external double-field ion trap and require a standard focusing coil. The **16WP4A** is distinguished by its external conductive coating, which provides a capacitance of 750 to 1,500 uuf to the anode, serving as an integrated high-voltage filter capacitor. Both tubes utilize a Small Shell Duodecal 5-Pin base and are rated for a maximum anode voltage of 16,000 Volts.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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	16000 V	—
Typical Anode Voltage	12000 V	—
Maximum Grid2 Voltage	410 V	—
Typical Grid2 Voltage	250 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
FocusingMethod	Magnetic	—
DeflectingMethod	Magnetic	—
DiagonalDeflectionAngleApproximate	70 degree	—
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

Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum DC grid 2 voltage	410 V	—
Maximum grid 1 negative-bias voltage	125 V	NegativeBias
Maximum grid 1 positive-bias voltage	0 V	PositiveBias
Maximum grid 1 positive-peak voltage	2 V	PositivePeak
Peak heater-cathode voltage	410 V	HeaterNegativeWarmup
Peak heater-cathode voltage	125 V	HeaterNegativeAfterWarmup
Peak heater-cathode voltage	125 V	HeaterPositive
DC anode voltage	12000 V	TypicalOperation
DC grid 2 voltage	250 V	TypicalOperation
DC grid 1 voltage	-27--63 V	TypicalOperation
Focusing coil current	110 mA	Approximate
Ion trap current	120 mA	Approximate
Faceplate transmission at center	70 %	Approximate

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Deflection angle	70 degrees	Approximate

TUBE TINKER

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