

ELECTRONIC TUBE REFERENCE

16AP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Sixteen-inch direct-view television picture tube with magnetic focusing and deflection and a white medium-persistence P4 screen. Tung-Sol specifies typical anode operation around 12 kV with a maximum near 14 kV.

GENERAL CHARACTERISTICS

BASE DESIGNATION	120	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	14000 V
MAXIMUM SCREEN VOLTAGE	410 V
CRT-specific anode/focus/deflection ratings retained as parameters rather than mapped to ordinary plate/screen fields.	

16AP4 — Direct-View Cathode Ray Picture Tube

A 16-inch round metal-cone picture tube designed for television receiver applications, featuring magnetic focus and deflection, and a unipotential cathode.

Overview

The **16AP4** and **16AP4A** are direct-view cathode ray tubes designed primarily for television display systems. These tubes feature a round metal-cone construction, magnetic focus, magnetic deflection, and require an external double field ion trap magnet. They provide a standard **10" x 13-1/4"** raster size.

The two designations are electrically and mechanically identical with the exception of the faceplate treatment: the **16AP4A** incorporates a frosted grey filter faceplate to improve picture contrast under ambient light, whereas the standard **16AP4** uses a clear faceplate.

Mechanical Design, Base, and Pin Connections

The 16AP4 utilizes a metal-cone envelope design where the metal shell itself serves as the electrical contact for the high-voltage anode (Grid No. 3). The tube has a nominal deflection angle of **53 degrees**.

Physical Dimensions

- **Overall Length:** 22-1/4 ± 3/8 inches
- **Greatest Diameter of Bulb:** 15-7/8 ± 1/8 inches
- **Minimum Useful Screen Diameter:** 14-3/8 inches
- **Neck Diameter:** 1-7/16 ± 1/16 inches

A designated space along the neck must be kept clear of surrounding components to accommodate the external double field ion trap magnet.

Base and Pinout

The tube is equipped with a **Small Shell Duodecal 5-Pin** base (designation **B5-57**), utilizing the **12D** basing arrangement. The electrical connections, viewed from the bottom of the base, are as follows:

Pin	Connection
Pin 1	Heater
Pin 2	Grid No. 1
Pin 10	Grid No. 2
Pin 11	Cathode
Pin 12	Heater
Metal Shell Lip	Anode, Grid No. 3

Heater and Cathode Characteristics

The 16AP4 contains an indirectly heated, unipotential coated cathode. The heater is designed for AC or DC operation.

Parameter	Value
Nominal Heater Voltage	6.3 V
Nominal Heater Current	0.6 A

Heater-Cathode Voltage Ratings

To prevent insulation breakdown, the voltage difference between the heater and the cathode must be kept within specified limits. Under the Design Center System, these maximum ratings are:

- **Heater negative with respect to cathode:**
 - During warm-up period (not to exceed 15 seconds): **410 V**
 - After equipment warm-up period: **150 V**
- **Heater positive with respect to cathode: 150 V**

For proper operation, the cathode should be returned directly to one side of the heater transformer winding or to its center tap.

Optical and Screen Specifications

The screen utilizes a specialized phosphor designed for television reproduction, providing a clear black-and-white display.

- **Phosphor Number:** No. 4
- **Fluorescent Color:** White
- **Phosphorescent Color:** White
- **Persistence:** Medium
- **Faceplate Light Transmission ([16AP4A](#) only):** Approximately 66% at the center

Electrical Ratings

The maximum ratings for the 16AP4 are established under the **Design Center System**. Operating the tube beyond these limits may impair performance and tube life.

Rating Parameter	Maximum Limit
DC Anode & Grid No. 3 Voltage	14,000 V
DC Grid No. 2 Voltage	410 V
Grid No. 1 Voltage:	
- DC Negative-Bias Value	125 V
- DC Positive-Bias Value	0 V
- Positive-Peak Value	2 V
Grid No. 1 Circuit Resistance	1.5 MΩ

Typical Operating Conditions and Characteristics

Under typical operating conditions, the tube is configured with the following parameters to achieve standard brightness and focus:

- **DC Anode & Grid No. 3 Voltage:** 12,000 V
- **DC Grid No. 2 Voltage:** 300 V
- **DC Grid No. 1 Voltage (for visual extinction of undeflected focused spot):** -33 V to -77 V
- **DC Focusing Coil Current (approximate):** $85 \pm 20\%$ mA

Operating Notes and Focus Requirements

The typical anode operating voltage is 12,000 V. While the tube can operate at lower anode potentials, both brilliance and definition decrease with decreasing anode voltage; operation should generally not fall below a minimum of 9,000 V.

The specified focusing coil current of 85 mA is based on using a standard focus coil (such as the No. 109 or equivalent). This current is measured with the combined Grid No. 1 bias voltage and video signal voltage adjusted to produce a highlight brightness of 30 foot-lamberts on a standard 10" x 13-1/4" picture size. For proper focusing, the distance from the reference line to the center of the air gap on the focus coil must be maintained at 3 inches.

Interelectrode Capacitances

The direct interelectrode capacitances of the tube elements are approximately:

- **Cathode to all other electrodes:** 5.0 μpF
- **Grid No. 1 to all other electrodes:** 6.0 μpF

Technical Summary

The **16AP4** and **16AP4A** are 16-inch round metal-cone cathode ray tubes designed for television receiver display service. Utilizing magnetic focus and deflection with a 53-degree deflection angle, they provide a 10" x 13-1/4" raster. The tubes operate with a standard 6.3 V, 0.6 A heater supply and require an external double field ion trap magnet. Under typical operating conditions, they run at an anode potential of 12,000 V (with a minimum recommended limit of 9,000 V) and a Grid No. 2 potential of 300 V, utilizing a small shell duodecal 5-pin base. The **16AP4A** variant features a frosted grey faceplate with 66% light transmission to enhance contrast under ambient lighting conditions.



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	14000 V	—
Typical Anode Voltage	12000 V	—
Maximum Grid2 Voltage	410 V	—
Typical Grid2 Voltage	300 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
DeflectionAngleApproximate	53 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

Section 1 · Cathode Ray

CONSTRUCTION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Focusing method	Magnetic	—
Deflecting method	Magnetic	—
Phosphor	P4	White;MediumPersistence

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

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode to all other electrodes capacitance	5 pF	Approximate
Grid #1 to all other electrodes capacitance	6 pF	Approximate

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	6.3 V	—
Heater current	600 mA	—
Maximum DC anode voltage	14000 V	—
Maximum DC grid #2 voltage	410 V	—
Maximum grid #1 negative-bias magnitude	125 V	—
Maximum grid #1 positive DC bias	0 V	—
Maximum grid #1 positive peak	2 V	—
Typical DC anode voltage	12000 V	TelevisionPictureTube
Typical DC grid #2 voltage	300 V	TelevisionPictureTube
Typical grid #1 voltage minimum	-77 V	VisualExtinctionRange
Typical grid #1 voltage maximum	-33 V	VisualExtinctionRange
Focusing coil current	85 mA	Approximate

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum heater-cathode voltage during warm-up	410 V	HeaterNegative;Warmup<=15s

APPLICATION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Application	Direct-view television picture tube	—