



ELECTRONIC TUBE REFERENCE

16EP4A

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Direct-view P4 television picture tube using magnetic focusing and deflection, with white medium-persistence fluorescence, approximately 60-degree deflection, and typical 12 kV anode operation.

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

SECTION 1 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.	

16EP4A — Cathode Ray Picture Tube

A direct-view, round metal-cone cathode ray tube featuring magnetic focus and deflection, designed for television receiver applications.

Overview

The **16EP4A** is a direct-view cathode ray picture tube designed primarily for television applications. It features a round metal-cone construction, a unipotential cathode, and utilizes magnetic methods for both focusing and deflection. The tube is designed to display a standard **10" by 13 1/4"** raster size.

The 16EP4A belongs to a family of closely related tubes that includes the [16EP4](#) and the [16EP4B](#). These three types share identical electrical, mechanical, and basing characteristics, with differences limited to their faceplate treatments:

- The **16EP4A** and [16EP4B](#) feature a grey filter faceplate to improve picture contrast under ambient light.
- The [16EP4B](#) additionally receives a specialized surface treatment designed to reduce specular reflection of ambient light.
- The standard [16EP4](#) lacks the grey filter faceplate.

Mechanical Design and Physical Dimensions

The 16EP4A is constructed with a round metal cone body and a glass faceplate. It has a nominal deflection angle of **60 degrees**. The physical dimensions and installation clearances are critical for mounting within a television chassis:

Dimension Parameter	Value
Overall Length	19 5/16 ± 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
Distance from Reference Line to Anode Terminal	12 7/16 ± 5/16 inches
Distance from Reference Line to End of Neck	7 1/8 ± 1/8 inches
Required Space for Ion Trap Magnet	3 3/4 inches (from base end of neck)

The electrical connection to the high-voltage anode (Grid No. 3) is made directly via the **metal cone lip**, which serves as the bulb contact. The tube uses a **Small Shell Duodecal 5-Pin** base (designation **B5-57**) with a [12D](#) basing arrangement.

Electrical Connections and Basing

The [12D](#) basing configuration provides the following connections, viewed from the bottom of the tube base:

- **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

The heater is designed for operation from a standard **6.3 V** supply and draws a nominal current of **0.6 A**.

To prevent damage and maintain safety, the cathode should be returned to one side of the heater transformer winding or to its center-tap.

Optical and Electrostatic Characteristics

The 16EP4A utilizes a **No. 4 phosphor** (P4), which produces a white fluorescent color and a white phosphorescent color with medium persistence.

Faceplate Transmission

The grey filter faceplate of the 16EP4A provides an approximate light transmission of **66 percent** at the center of the screen. This reduction in transmission helps absorb reflected ambient light, thereby enhancing the contrast ratio of the displayed image in brightly lit environments. (By comparison, the [16EP4B](#) shares this 66% transmission but limits specular reflection to 2.5%).

Direct Interelectrode Capacitances

The approximate direct interelectrode capacitances of the tube are:

- **Cathode to all other electrodes:** 5 μF (pF)
- **Grid No. 1 to all other electrodes:** 6 μF (pF)

These low capacitances ensure stable operation and minimize loading on the video drive circuitry.

Ratings and Operating Conditions

The maximum ratings for the 16EP4A are defined under the Design Center Values system. Operating the tube beyond these limits can impair performance or cause permanent damage.

Maximum Ratings (Design Center Values)

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

Heater-Cathode Voltage Limits

The maximum DC peak heater-cathode voltage limits are strictly defined based on the operating state of the equipment:

- **Heater negative with respect to cathode:**
 - During the warm-up period (not to exceed 15 seconds): **410 V**
 - After the equipment warm-up period: **140 V**
- **Heater positive with respect to cathode: 140 V**

Typical Operating Conditions

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

- **DC Anode & Grid No. 3 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:** 105 ± 20% mA
- **DC Ion Trap Current:** 80 ± 50% mA

The typical focusing coil current of **105 mA** is specified using a standard focus coil (such as the standard focus coil #109 or equivalent) under the following conditions:

1. The combined Grid No. 1 bias voltage and video signal voltage are adjusted to produce a highlight brightness of **30 foot-lamberts** on the standard 10" by 13 1/4" picture area.
2. The distance from the reference line to the center of the air gap on the focus coil is exactly **2.75 inches**.

The ion trap current of **80 mA** is specified using a standard single-field ion trap coil (such as standard coil #111 or equivalent).

Technical Summary

The **16EP4A** is a **60-degree magnetic focus and deflection** cathode ray tube featuring a round metal-cone envelope and a **grey filter faceplate** with **66% light transmission**. It operates with a **6.3 V, 0.6 A** heater and is designed for a maximum anode voltage of **14,000 V** (typically operated at **12,000 V**).

Utilizing a **No. 4 white phosphor** and a **Small Shell Duodecal 5-pin base**, the 16EP4A provides a robust, high-contrast display solution for vintage television receivers when paired with an external single-field ion trap and appropriate magnetic focusing and deflection coils.



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	60 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	60 deg	Approximate
Faceplate light transmission at center	66 %	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

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Focusing coil current	105 mA	Approximate
Ion trap current	80 mA	Approximate
Maximum heater-cathode voltage during warm-up	410 V	HeaterNegative;Warmup<=15s

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

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