

ELECTRONIC TUBE REFERENCE

16AEP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

P4 cathode-ray picture tube documented by Tung-Sol for direct-view display service; manufacturer sources identify the type but extracted technical details are limited.

GENERAL CHARACTERISTICS

BASE DESIGNATION	12M	BASE PINS	6
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	410 V
CRT-specific anode/focus/deflection ratings retained as parameters rather than mapped to ordinary plate/screen fields.	

16AEP4 Cathode Ray Tube

The **16AEP4** is a direct-view picture tube designed specifically for television applications. It features a rectangular glass construction, electrostatic focusing, magnetic deflection, and a grey filter faceplate. The design incorporates an external conductive coating, requires an external single-field ion trap magnet, and provides a nominal raster size of 10 1/8 by 13 1/2 inches.

Mechanical Design and Physical Dimensions

The 16AEP4 is constructed with a rectangular glass bulb and a specialized faceplate designed to optimize picture quality and contrast. The faceplate is a grey filter type with a light transmission of approximately

66 percent at the center.

The physical dimensions of the tube are precisely specified to ensure proper mounting and alignment within television receivers:

Dimension Parameter	Value (Inches)
Overall Length	18 3/4 ± 3/8
Greatest Bulb Diagonal	16 1/8 ± 1/8
Greatest Bulb Width	14 3/4 ± 1/8
Greatest Bulb Height	11 1/8 ± 1/8
Minimum Useful Screen Width	13 1/2
Minimum Useful Screen Height	10 1/8
Minimum Useful Screen Diagonal	14.7
Neck Diameter	1 7/16 ± 1/16

The tube uses a **recessed small cavity cap (J1-21)** for its high-voltage anode connection. The base is a **small shell duodecal 6-pin (B6-63)**, which utilizes the **12M** basing arrangement. The alignment of the J1-21 bulb contact is designed to align with pin position #3 within a tolerance of ±10 degrees.

A specific region along the neck of the tube, measuring 3 5/8 ± 1/16 inches from the reference line, must be kept clear to accommodate the external ion trap magnet. The distance from the reference line to the anode terminal is 3 5/8 ± 3/8 inches, while the distance from the reference line to the front face of the bulb is 11 1/4 ± 3/16 inches.

Electrical Characteristics and Pin Connections

The 16AEP4 features an indirectly heated, unipotential cathode. The electrical connections are distributed across the 6-pin duodecal base and the recessed cavity cap as follows:

Pin / Cap	Connection
Pin 1	Heater
Pin 2	Grid No. 1
Pin 6	Grid No. 4
Pin 10	Grid No. 2
Pin 11	Cathode
Pin 12	Heater

Pin / Cap	Connection
Anode Cap	Grid No. 3

Interelectrode Capacitances

The direct interelectrode capacitances of the tube are approximately:

- **Cathode to all other electrodes:** 5.0 μf
- **Grid No. 1 to all other electrodes:** 6.5 μf

Additionally, the external conductive coating forms a capacitance with the internal anode. The capacitance values are:

- **Maximum external conductive coating to anode:** 1,500 μf
- **Minimum external conductive coating to anode:** 750 μf

Electro-Optical and Deflection Characteristics

The 16AEP4 utilizes magnetic deflection with an approximate diagonal deflection angle of **70 degrees**. The focusing system is electrostatic, controlled via Grid No. 4.

The screen is coated with **Phosphor No. 4**, which exhibits the following optical properties:

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

To prevent ion burn on the phosphor screen, the tube requires an external single-field ion trap magnet. Under typical operating conditions, this magnet is energized by a standard coil (such as Standard Coil #111) carrying an approximate DC current of **75 $\pm$ 50% mA**.

Operating Points and Ratings

The operating limits of the 16AEP4 are defined under the Design Center rating system. Designers must adhere to these maximum ratings to ensure reliable operation and longevity of the tube.

Design Center Maximum Ratings

Parameter	Rating Value
Heater Voltage	6.3 Volts
Heater Current	0.6 Amp.
Maximum DC Anode, Grid #3 Voltage	16,000 Volts
Maximum DC Grid #2 Voltage	410 Volts

Parameter	Rating Value
Maximum Grid #1 DC Negative-Bias Value	125 Volts
Maximum Grid #1 DC Positive-Bias Value	0 Volts
Maximum Grid #1 Positive-Peak Value	2 Volts
Maximum Grid #1 Circuit Resistance	1.5 Megohms

Heater-Cathode Voltage Limits

The maximum peak heater-cathode voltage depends on the polarity and the operating state of the equipment:

- **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**

The cathode should be returned to one side or to the mid-tap of the heater transformer winding to minimize potential differences and hum.

Typical Operating Conditions

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

Parameter	Typical Value
DC Anode, Grid #3 Voltage	14,000 Volts
DC Grid #2 Voltage	300 Volts
DC Grid #1 Voltage (for visual extinction of undeflected focused spot)	-33 to -77 Volts
DC Grid #4 Voltage	-64 to +350 Volts
DC Ion Trap Current (Standard Coil #111)	75 ± 50% mA

The focusing voltage applied to Grid No. 4 can be adjusted within the range of -64 to +350 Volts to achieve a sharp, well-defined spot on the screen. The Grid No. 1 voltage required to achieve visual extinction of an undeflected focused spot ranges from -33 to -77 Volts.

Technical Summary

The **16AEP4** is a 70-degree magnetic deflection, electrostatic-focus cathode ray tube designed for direct-view television applications. It features a rectangular glass envelope, a grey filter faceplate with 66% light transmission, and a No. 4 white phosphor screen of medium persistence. Operating with a nominal 6.3 V,

0.6 A heater, the tube is rated for a maximum anode and Grid No. 3 voltage of 16,000 V, with a typical operating point of 14,000 V. It utilizes a small shell duodecal 6-pin base (B6-63) with a 12M basing configuration and a recessed small cavity cap (J1-21) for the high-voltage anode connection. Proper operation requires an external single-field ion trap magnet and careful adherence to the specified heater-cathode voltage limits and grid circuit resistance constraints.



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	14000 V	—
Maximum Grid2 Voltage	410 V	—
Typical Grid2 Voltage	250 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
DeflectionAngleApproximate	70 degree	—
FocusingMethod	Electrostatic	—
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	Electrostatic	—
Deflecting method	Magnetic	—
Phosphor	P4	White;MediumPersistence

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Deflection angle	70 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	6.5 pF	Approximate

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	6.3 V	—
Heater current	600 mA	—
Maximum DC anode voltage	16000 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	14000 V	TelevisionPictureTube
Typical DC grid #2 voltage	300 V	TelevisionPictureTube
Typical grid #1 voltage minimum	-68 V	VisualExtinctionRange
Typical grid #1 voltage maximum	-33 V	VisualExtinctionRange

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Ion trap current	75 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	—