



ELECTRONIC TUBE REFERENCE

16CP4

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 52-degree deflection, and typical 14 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	15000 V
MAXIMUM SCREEN VOLTAGE	410 V
<i>CRT-specific anode/focus/deflection ratings retained as parameters rather than mapped to ordinary plate/screen fields.</i>	

16CP4 — Cathode Ray Picture Tube

A direct-view, magnetically focused and deflected cathode ray tube with a round glass envelope, designed for monochrome television receiver applications.

Overview

The **16CP4** is a specialized cathode ray picture tube designed for direct-view television applications. It features a round glass bulb construction with a nominal 15-inch minimum useful screen diameter, capable of displaying a standard 10 1/4" by 14 1/2" raster. The tube incorporates a unipotential cathode and

requires external magnetic fields for both focusing and deflection. To prevent ion-burn damage to the phosphor screen, the design requires an external double-field ion trap magnet.

Mechanical Specifications and Physical Dimensions

The physical construction of the 16CP4 is characterized by its round glass envelope and specific neck dimensions designed to accommodate external deflection and focusing components. The key mechanical dimensions are:

- **Overall Length:** 21 1/2 ± 3/8 inches
- **Greatest Diameter of Bulb:** 15 7/8 inches (with a tolerance of +1/16 to -1/8 inches)
- **Minimum Useful Screen Diameter:** 15 inches
- **Neck Diameter:** 1 7/16 ± 1/16 inches
- **Deflection Angle:** Approximately 52 degrees

Installation and Component Space Requirements

To ensure proper operation of the external magnetic controls, specific physical clearances must be maintained along the neck of the tube:

- **Ion Trap Clearance:** A minimum length of 4 1/4 inches must be kept entirely clear along the neck, starting from the base, to allow the proper positioning of the double-field ion trap magnet.
- **Anode Terminal Position:** The high-voltage anode connection is made via a recessed small cavity cap (designation J1-21) located on the side of the bulb cone. This terminal is positioned 4 3/4 ± 3/8 inches from the reference line.
- **Bulb Contact Alignment:** The J1-21 contact is aligned with pin position #3 within a tolerance of ±10 degrees.

The tube is completed with a small shell duodecal 5-pin base (designation B5-57), utilizing the [12D](#) basing configuration.

Electrical Connections and Basing

The [12D](#) basing arrangement provides the electrical connections for the heater, cathode, and lower-voltage grids. Viewed from the bottom of the base, the pin assignments are:

Pin Number	Connection
Pin 1	Heater
Pin 2	Grid No. 1 (Control Grid)
Pin 10	Grid No. 2 (Screen Grid)
Pin 11	Cathode
Pin 12	Heater

Pin Number	Connection
Recessed Cap	Anode

The cathode is an indirectly heated unipotential type. While it shares the neck assembly with the heater, it is electrically isolated to permit independent biasing.

Optical Characteristics

The screen of the 16CP4 is coated with a standard **No. 4 phosphor**, which is optimized for monochrome television reproduction. Its optical characteristics include:

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

This phosphor formulation provides a bright white display with a decay rate that prevents noticeable motion smear at standard television frame rates.

Electrical Ratings

The operating limits of the 16CP4 are defined under the Design Center rating system. These values represent the limits within which the tube can be safely and reliably operated:

Parameter	Rating Value
Heater Voltage	6.3 V
Heater Current	0.6 A
Maximum DC Anode Voltage	15,000 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 MΩ

Heater-Cathode Voltage Limits

To prevent electrical breakdown of the insulation between the heater and the cathode, the peak voltage difference between these elements must not exceed the following limits:

- **Heater Negative with Respect to Cathode:**
 - During the initial warm-up period (not to exceed 15 seconds): **410 V**

- After the equipment warm-up period: **125 V**
- **Heater Positive with Respect to Cathode: 125 V**

Typical Operating Conditions and Characteristics

Under typical operating conditions in a television receiver, the tube is configured with the following electrical operating points and external magnetic components:

- **DC Anode Voltage:** 12,000 V
- **DC Grid No. 2 Voltage:** 250 V
- **DC Grid No. 1 Voltage (for visual extinction of undeflected focused spot):** -27 V to -63 V
- **DC Focusing Coil Current (approximate):** 110 mA
- **DC Ion Trap Current (approximate, using Standard Coil #108):** 120 mA

Focusing and Deflection Setup

The typical focusing coil current of 110 mA is specified for a standard focus coil #109 (or an equivalent component). This operating point is established under the following conditions:

- The combined Grid No. 1 bias voltage and video signal voltage are adjusted to produce a highlight brightness of 20 foot-lamberts.
- The raster size is adjusted to the standard 10 1/4" by 14 1/2" dimensions.
- The distance from the reference line to the center of the air gap on the focus coil is maintained at exactly 3.25 inches.

Technical Summary

The **16CP4** is a 15-inch round glass cathode ray picture tube designed for monochrome television service. It features a unipotential cathode, a shared 6.3 V / 0.6 A heater, and a No. 4 white phosphor screen with medium persistence. Utilizing magnetic focus and a 52-degree magnetic deflection system, the tube operates typically at an anode voltage of 12,000 V and a Grid No. 2 voltage of 250 V. It requires an external double-field ion trap magnet (such as standard coil #108 operating at approximately 120 mA) and a standard focusing coil (such as focus coil #109 operating at approximately 110 mA) to produce a focused, ion-free 10 1/4" by 14 1/2" raster.



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	15000 V	—
Typical Anode Voltage	12000 V	—
Maximum Grid2 Voltage	410 V	—
Typical Grid2 Voltage	300 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
DeflectionAngleApproximate	52 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	52 deg	Approximate

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode to all other electrodes capacitance	5 pF	Approximate
Grid #1 to all other electrodes capacitance	6.5 pF	Approximate

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	6.3 V	—
Heater current	600 mA	—
Maximum DC anode voltage	15000 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	250 V	TelevisionPictureTube
Typical grid #1 voltage minimum	-63 V	VisualExtinctionRange
Typical grid #1 voltage maximum	-27 V	VisualExtinctionRange
Focusing coil current	110 mA	Approximate
Ion trap current	120 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	—