

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

16ACP4

1 SECTION
CONSTRUCTION
CATHODERAY

Specialized - Cathode Ray electronic tube

Direct-view P4 television picture tube using electrostatic focusing and magnetic deflection, with white medium-persistence fluorescence, approximately 60-degree deflection, and typical 13 kV anode operation.

GENERAL CHARACTERISTICS

BASE DESIGNATION	12N	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.	

16ACP4 — Electrostatic-Focus Cathode-Ray Picture Tube

The **16ACP4** is a 16-inch, direct-view cathode-ray picture tube designed primarily for use in television receivers. It features a round glass construction, automatic electrostatic focusing, and magnetic deflection. The design incorporates a 3-degree offset electron gun designed for use with an external ion-trap magnet, an internal conductive coating with an insulating bond on its lower edge to eliminate stray or spurious electron beams, and an external conductive coating.

Mechanical Design and Physical Dimensions

The 16ACP4 is constructed with a round glass bulb envelope. It has a nominal screen diameter of 16 inches, with specific physical dimensions as follows:

- **Overall Length:** 20 7/8 ± 1/4 inches
- **Greatest Diameter of Bulb:** 15 7/8 ± 1/8 inches
- **Minimum Useful Screen Diameter:** 15 1/4 inches
- **Approximate Net Weight:** 18 3/4 lbs

Bulb Contact and Base Configuration

The tube utilizes a recessed small cavity cap (J1-21 designation) for the high-voltage anode connection. The base is a small shell duodecal 5-pin configuration (B5-57 designation), with a JETEC 12D (or 12N) basing arrangement.

The physical alignment of the anode bulb contact is oriented such that the J1-21 contact aligns with the vacant pin position No. 3 within an angular tolerance of ±10 degrees, measured about the tube axis. The anode terminal is positioned on the same side of the envelope as the vacant pin position No. 3.

Mounting and Installation

The 16ACP4 can be mounted in any position. To prevent mechanical stress on the glass neck, the corresponding socket must not be rigidly mounted; instead, it should be wired with flexible leads, allowing the socket to move freely.

The reference line of the bulb cone is determined by the position where a standard hinged gauge with an inside diameter of 1.500 (+0.003, -0.000) inches and a length of 2 inches rests on the cone. Specific clearance zones must be maintained along the neck: a 4 1/4-inch space must be kept clear for the external ion-trap magnet, and the deflecting yoke must be positioned within its designated space adjacent to the bulb cone.

Electrical Characteristics and Pin Connections

The 16ACP4 features an indirectly heated, unipotential cathode. The electrical connections to the base pins, viewed from the bottom of the tube, are assigned as follows:

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
Metal Cap	Anode

Heater and Capacitance Ratings

The heater is designed for AC or DC operation. The direct interelectrode capacitances and heater ratings are:

Parameter	Value
Heater Voltage	6.3 V
Heater Current	0.6 A $\pm$ 10%
Grid No. 1 to all other electrodes (approx.)	6 μ F
Cathode to all other electrodes (approx.)	5 μ F
Maximum external conductive coating to anode	2000 μ F

Optical and Deflection Specifications

The tube's screen utilizes Phosphor No. 4, which provides a white fluorescent color and a white phosphorescent color. The persistence of the phosphor is classified as medium, making it suitable for standard television frame rates.

Deflection and Focusing

The 16ACP4 employs magnetic deflection with an approximate deflection angle of 60 degrees. Focusing is achieved electrostatically and is designed to be automatic, eliminating the need for an adjustable external focusing coil or high-voltage focusing supply.

Ion-Trap Magnet Alignment

The electron gun is designed with a 3-degree offset, requiring an external single-field ion-trap magnet to prevent ion burn on the phosphor screen. The magnet must have a minimum strength of 40 gauss. During installation, the ion-trap magnet must be aligned with the poles of the large coil (coil A) adjacent to the L-shaped pole pieces on the gun mount. The north pole of the magnet must be positioned on the same side as base pin No. 6, with the other poles oriented toward the face of the tube.

Operating Conditions and Maximum Ratings

The operating limits of the 16ACP4 are specified under the Design-Center rating system. Operating the tube beyond these limits can impair performance or cause permanent damage.

Maximum Ratings (Design-Center Values)

- **Anode Voltage:** 14,000 V DC
- **Grid No. 2 Voltage:** 410 V DC
- **Grid No. 1 Voltage:**
 - *DC Negative-Bias Value:* 125 V
 - *DC Positive-Bias Value:* 0 V
 - *Positive-Peak Value:* 2 V
- **Peak Heater-Cathode Voltage:**
 - *Heater negative with respect to cathode (during equipment warm-up, $\square$ 15 seconds):* 410 V
 - *Heater negative with respect to cathode (after warm-up):* 125 V
 - *Heater positive with respect to cathode:* 125 V
- **Grid No. 1 Circuit Resistance:** 1.5 M maximum

Typical Operating Conditions

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

- **Anode Voltage:** 12,000 to 13,000 V DC
- **Grid No. 2 Voltage:** 250 V DC
- **Grid No. 1 Voltage (for visual extinction of undeflected focused spot):** -33 to -68 V DC
- **Ion-Trap Magnet Current (approximate):** 120 mA (when using a standard magnet)

The grid No. 1 voltage range of -33 to -68 V represents the cutoff bias required to achieve complete visual extinction of the undeflected focused spot at the specified anode and grid No. 2 potentials.

Technical Summary

The **16ACP4** is a specialized 16-inch round glass cathode-ray picture tube designed for television display applications. By combining automatic electrostatic focusing with a 60-degree magnetic deflection system, it simplifies receiver circuitry by eliminating external focusing controls. Its electrical design features a 6.3 V, 0.6 A heater, a maximum anode rating of 14,000 V, and a Phosphor No. 4 screen that delivers a medium-persistence white image. Proper operation requires an external ion-trap magnet of at least 40 gauss, careful alignment of the magnetic poles, and adherence to the strict heater-cathode voltage limits during the initial 15-second warm-up period.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1951 Thomas Electronics

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1951 THOMAS ELECTRONICS

Section 1 · Cathode Ray

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
FocusingMethod	Electrostatic	—
DeflectionMethod	Magnetic	—
Deflection Angle	70 degree	—
Heater Voltage	6.3 V	—
Heater Current	600 mA	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
MaximumMainAnodeOrAcceleratorVoltage	14000 V	—
TypicalMainAnodeOrAcceleratorVoltage	12500 V	—
Maximum Heater Cathode Voltage	125 V	NormalOperation
WarmupHeaterCathodeVoltage	410 V	15SecondWarmup



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	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Typical Anode Voltage	13000 V	—
Maximum Grid2 Voltage	410 V	—
Typical Grid2 Voltage	250 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
DeflectionAngleApproximate	60 degree	—
FocusingMethod	Electrostatic	—
DeflectingMethod	Magnetic	—
PhosphorNumber	4	—
FluorescentColor	White	—
Persistence	Medium	—


SOURCE DATA APPENDIX

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	60 deg	Approximate

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

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
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	13000 V	TelevisionPictureTube
Typical DC grid #2 voltage	250 V	TelevisionPictureTube
Typical grid #1 voltage minimum	-68 V	VisualExtinctionRange
Typical grid #1 voltage maximum	-33 V	VisualExtinctionRange
Ion trap current	120 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	—