

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA
1 SECTION
CONSTRUCTION
CATHODERAY

16LP4A

Specialized - Cathode Ray electronic tube

Direct-view cathode-ray picture tube documented by manufacturer data for type 16LP4A; available extracted technical detail is limited, so the description remains conservative.

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	4000 V
MAXIMUM SCREEN VOLTAGE	41 V
CRT-specific anode/focus/deflection ratings retained as parameters rather than mapped to ordinary plate/screen fields.	

16LP4A — Direct-View Cathode-Ray Picture Tube

The **16LP4A** (also designated as **16LP4-A**) is an all-glass, direct-view cathode-ray picture tube designed primarily for television receiver applications. It features a 16-inch round glass envelope with a spherical faceplate, providing a nominal picture size of 14 1/2 inches by 10 7/8 inches (or a raster size of 10 1/4 inches by 14 1/2 inches) with rounded sides.

The tube utilizes magnetic focusing and magnetic deflection, a unipotential cathode, and an electron gun designed for operation with an external double-field ion-trap magnet. An external conductive coating is applied to the bulb, which serves as a high-voltage filter capacitor when connected to ground.

The 16LP4A is identical to the [**16LP4**](#) except for its faceplate construction. While the standard [**16LP4**](#) uses a clear faceplate, the 16LP4A incorporates a high-quality gray filter faceplate designed to enhance picture contrast and detail under high ambient light conditions.

Mechanical Specifications and Physical Dimensions

The 16LP4A is constructed with a round glass bulb (ASA designation J127C) and a spherical faceplate. The physical dimensions and mechanical limits of the tube are as follows:

- **Overall Length:** 22 1/4 ± 3/8 inches
- **Greatest Diameter of Bulb:** 15 7/8 ± 1/8 inches
- **Minimum Useful Screen Diameter:** 14 1/2 inches
- **Neck Length:** 7 3/8 inches
- **Approximate Net Weight:** 17 1/2 pounds
- **Mounting Position:** Any

Base and Terminal Connections

The tube is equipped with a small-shell duodecal 5-pin base (JETEC No. B5-57) and uses the **12N** basing configuration. The high-voltage anode terminal is a recessed small cavity cap (JETEC No. J1-21) located on the side of the bulb cone.

The anode terminal aligns with the pin No. 3 position on the base, with an alignment tolerance of ±10 to ±30 degrees. The space along the neck (approximately 3 5/8 ± 1/16 inches from the base end) must be kept clear to accommodate the external ion-trap magnet.

The pin connections, viewed from the bottom of the base, are assigned as follows:

Pin Number	Connection
Pin 1	Heater
Pin 2	Grid No. 1
Pin 10	Grid No. 2
Pin 11	Cathode
Pin 12	Heater
Cap	Anode (Grid No. 3 / Anode)

Note: Grid No. 3 and the anode are connected internally within the tube and are collectively referred to as the anode.

Electrical and Optical Characteristics

Heater Ratings

The 16LP4A is designed for indirect heating of its unipotential cathode. The nominal heater operating parameters are:

- **Heater Voltage:** 6.3 Volts (AC or DC)
- **Heater Current:** 0.6 Amperes (with a tolerance of $\pm 10\%$)

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)
- **External Conductive Coating to Anode (Maximum):** 2,000 μf (pF)
- **External Conductive Coating to Anode (Minimum):** 750 μf (pF)

The external conductive coating acts as a filter capacitor for the high-voltage anode supply when the coating is properly grounded.

Optical Characteristics

The faceplate of the 16LP4A is made of gray-tinted glass to improve contrast. The optical properties of the screen and faceplate include:

- **Phosphor Number:** P4 (Sulfide type)
- **Fluorescent Color:** White
- **Phosphorescent Color:** White
- **Persistence:** Short to Medium
- **Faceplate Light Transmission at Center:** Approximately 66% to 73%

Maximum Ratings (Design-Center Values)

The following maximum ratings are established under the design-center system. These ratings represent limits that the tube can withstand under normal variations in line voltage and component tolerances, provided the design-center values are not exceeded by more than ten percent. All voltages are measured with respect to the cathode.

Parameter	Maximum Rating	Unit
Anode Voltage	14,000	Volts DC
Grid No. 2 Voltage	410	Volts DC

Parameter	Maximum Rating	Unit
Grid No. 1 Voltage (Negative-Bias Value)	125	Volts DC
Grid No. 1 Voltage (Positive-Bias Value)	0	Volts DC
Grid No. 1 Voltage (Positive-Peak Value)	2	Volts
Grid No. 1 Circuit Resistance	1.5	Megohms

Peak Heater-Cathode Voltage Limits

The maximum allowable peak voltage between the heater and the cathode depends on the polarity and operating state:

- **Heater Negative with Respect to Cathode:**
 - *During warm-up period (not to exceed 15 seconds):* 410 Volts DC
 - *After equipment warm-up / Normal operation:* 125 Volts DC
- **Heater Positive with Respect to Cathode:** 125 Volts DC

Typical Operating Conditions

Under typical operating conditions, the tube is operated at an anode voltage of 12,000 Volts DC. Brightness and focus quality decrease if the anode voltage is reduced; in general, the anode voltage should not be operated below 10,000 Volts.

The typical operating parameters are defined as follows:

- **DC Anode Voltage:** 12,000 Volts
- **DC Grid No. 2 Voltage:** 300 Volts
- **DC Grid No. 1 Voltage (for visual extinction of focused raster/spot):** -28 to -77 Volts
- **Deflection Angle (Approximate):** 52 Degrees

Focusing and Ion-Trap Magnet Requirements

The focusing and ion-trap systems require external magnetic fields, which are typically provided by standardized electromagnetic coils or permanent magnets:

- **Focusing Coil Current:**
 - *Using standard focus coil No. 106 (or equivalent):* Approximately 110 mA. This is specified with the combined Grid No. 1 bias and video signal adjusted to produce a highlight brightness of 20 foot-lamberts on a 10 1/4 inches by 14 1/2 inches picture size. The distance from the reference line to the center of the air gap on the focus coil is set to 3.25 inches.

- *Using RETMA focusing coil No. 109:* Approximately 97 mA. The distance from the yoke-reference-line to the center of the air gap on the focus coil is set to 3 1/2 inches.
- **Ion-Trap Magnet:**
 - *Field Intensity:* Approximately 35 Gaussses (using a double-field ion-trap magnet adjusted to the optimum position).
 - *Current Equivalent:* Equivalent to approximately 120 mA through a standard RETMA ion-trap magnet No. 108.

The reference line of the tube is determined by the plane of the upper edge of a reference-line gage (such as RETMA No. 112) when the gage is resting on the cone of the bulb.

Technical Summary

The **16LP4A** is a 16-inch round, all-glass, magnetic-focus and magnetic-deflection cathode-ray picture tube featuring a 52-degree deflection angle and a unipotential cathode. It is designed with a gray-tinted spherical faceplate (66% to 73% light transmission) to optimize picture contrast under ambient light, distinguishing it from the clear-glass **16LP4**.

Operating at a typical anode voltage of 12,000 V (with a design-center maximum of 14,000 V), the tube requires an external double-field ion-trap magnet and a focusing coil (such as RETMA No. 106 or No. 109) to achieve optimal spot focus and raster illumination. Its external conductive coating provides integrated high-voltage filtering (750 to 2,000 pF) when grounded, making it a self-contained solution for high-voltage stability in television receiver circuits.



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

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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	62 degree	—
FocusingMethod	Magnetic	—
DeflectingMethod	Magnetic	—
PhosphorNumber	4	—
FluorescentColor	White	—
Persistence	Medium	—



SOURCE OPERATING CONDITIONS

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1966 Tung Sol Electronic Tubes 4 of 4

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1966 TUNG SOL ELECTRONIC TUBES 4 OF 4

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CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
E XTE P,NAL DOUBLE FIELD ION TRAP – value 1	4	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
E XTE P,NAL DOUBLE FIELD ION TRAP – value 2	1	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
E XTE P,NAL DOUBLE FIELD ION TRAP – value 3	2	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
DEFLECTION ANGLE (APPROX.)	5 degrees	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
HEATER	6 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
DC GRID #2 VOLTAGE	2 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
DC FOCUSING COIL CURRENT (APPROX.) B	11 mA	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
DC ION TRAP CURRENT STANDARD COIL #108 (APPROX.) – value 1	108 mA	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
DC ION TRAP CURRENT STANDARD COIL #108 (APPROX.) – value 2	12 mA	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
BFOR STANDARD FOCUS COIL 1106, OR EQUIVALENT. WITH THE COMBINED G0.1D W1 BIAS VOLTAGE 0.0D VI 0E0 – value 1	1106 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
BFOR STANDARD FOCUS COIL 1106, OR EQUIVALENT. WITH THE COMBINED G0.1D W1 BIAS VOLTAGE 0.0D VI 0E0 – value 2	0 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
SIGNAL VOLTAGE ADJUSTED TO PRODUCE A MIGNLIGHT BRIGHTNESS OF 20 FOOT LAMBERTS ON A 10 1/4" BT – value 1	10 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
SIGNAL VOLTAGE ADJUSTED TO PRODUCE A MIGNLI GHT BRIGHTNESS OF 20 FOOT LAM8ERT5 ON A 10 1/4" BT – value 2	1 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
SIGNAL VOLTAGE ADJUSTED TO PRODUCE A MIGNLI GHT BRIGHTNESS OF 20 FOOT LAM8ERT5 ON A 10 1/4" BT – value 3	4 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
14 1/2" PICTURE SIZE. DISTANCE FROM REFERENCE LINE TO CENTER OF AIR GAP ON FOCUS COIL SHALL BE – value 1	14	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
14 1/2" PICTURE SIZE. DISTANCE FROM REFERENCE LINE TO CENTER OF AIR GAP ON FOCUS COIL SHALL BE – value 2	1	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
14 1/2" PICTURE SIZE. DISTANCE FROM REFERENCE LINE TO CENTER OF AIR GAP ON FOCUS COIL SHALL BE – value 3	2	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
MAXIMUM DC ANODE	4000 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
MAXIMUM OC GRID #2 VOLTAGE – value 1	2 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
MAXIMUM OC GRID #2 VOLTAGE – value 2	41 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
MAXIMUM GRID #1 VOLTAGE	1 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
MAXIMUM GRID #1 CIRCUIT RESISTANCE	1 mA	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.

SOURCE OPERATING CONDITIONS

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1968 General Electric Co

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1968 GENERAL ELECTRIC CO

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OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
HeaterOrFilamentVoltageNominal	6.3 V	—
HeaterOrFilamentCurrentNominal	600 mA	—