

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

16KP4A

1 SECTION
CONSTRUCTION
CATHODERAY

Specialized - Cathode Ray electronic tube

Direct-view cathode-ray picture tube documented by manufacturer data for type 16KP4A; 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 SCREEN VOLTAGE	41 V
CRT-specific anode/focus/deflection ratings retained as parameters rather than mapped to ordinary plate/screen fields.	

16KP4A — Rectangular Glass Cathode-Ray Picture Tube

The **16KP4A** (also designated as **16KP4-A/16RP4-A**) is a direct-view, all-glass cathode-ray picture tube designed for television receiver applications. It features a space-saving rectangular face shape, a spherical gray filter faceplate, and is designed for magnetic focus and deflection. The tube utilizes an electron gun configured for use with an external single-field ion-trap magnet.

The 16KP4A is identical to the **16KP4** except for its screen construction; the 16KP4A incorporates a reflective aluminized screen that significantly increases light output compared to the non-aluminized screen of the standard **16KP4**.

Mechanical Design and Construction

The 16KP4A is constructed with a rectangular glass bulb (ASA designation **J129B**) and is designed to be mounted in any position. It features a high-quality gray filter faceplate with an approximate light transmission of 72 percent at the center, which improves picture contrast and detail under high ambient light conditions.

The outer surface of the cone is treated with an external conductive coating. When grounded, this coating acts as a filter capacitor in conjunction with the internal anode coating. The physical dimensions and mechanical limits of the tube are detailed below:

Physical Dimensions

- **Overall Length:** $18 \frac{3}{4} \pm \frac{3}{8}$ inches
- **Neck Length:** $7 \frac{1}{2}$ inches
- **Greatest Bulb Dimensions:**
 - *Diagonal:* $16 \frac{1}{8} \pm \frac{1}{8}$ inches
 - *Width:* $14 \frac{3}{4} \pm \frac{1}{8}$ inches
 - *Height:* $11 \frac{1}{2} \pm \frac{1}{8}$ inches
- **Minimum Useful Screen Dimensions:**
 - *Diagonal:* $14 \frac{7}{8}$ inches
 - *Width:* $13 \frac{1}{2}$ inches
 - *Height:* $10 \frac{1}{8}$ inches
- **Approximate Net Weight:** 16 pounds

The bulb contact is a recessed small cavity cap (**JETEC No. J1-21**), and the base is a small-shell duodecal 5-pin (**JETEC No. B5-57**). The anode contact aligns with the Pin No. 6 position within a tolerance of ± 30 degrees.

Electrical Characteristics and Basing

The 16KP4A utilizes a unipotential cathode with an indirectly heated filament. The nominal heater requirements and the interelectrode capacitances are as follows:

Heater Specifications

- **Heater Voltage:** 6.3 Volts
- **Heater Current:** 0.6 Amperes (with a tolerance of $\pm 10\%$)
- **Calculated Nominal Heater Power:** 3.78 Watts

Direct Interelectrode Capacitances

- **Cathode to all other electrodes (approximate):** 5 μf
- **Grid No. 1 to all other electrodes (approximate):** 6 μf
- **External conductive coating to anode:** 750 μf (minimum) to 1500 μf (maximum)

Basing Diagram (JETEC 12N)

The tube uses the **12N** basing arrangement, viewed from the bottom of the base:

- **Pin 1:** Heater
- **Pin 2:** Grid No. 1
- **Pin 10:** Grid No. 2
- **Pin 11:** Cathode
- **Pin 12:** Heater
- **Anode Cap:** Grid No. 3 (Grid No. 3 and the Anode are connected internally and brought out to the recessed small cavity cap)

Typical Operating Conditions

The 16KP4A is designed to operate at high anode voltages to maintain brightness and focus quality. If the anode voltage falls below 12,000 Volts, both brightness and focus quality decrease. Typical operating parameters are documented under two distinct setups:

Parameter	Operating Setup A	Operating Setup B
Anode Voltage	12,000 Volts DC	14,000 Volts DC
Grid No. 2 Voltage	300 Volts DC	300 Volts DC
Grid No. 1 Voltage (for visual extinction)	-33 to -77 Volts DC	-28 to -72 Volts DC
Focusing Coil Current (approximate)	90 $\pm$ 20% mA DC	108 mA DC
Ion-Trap Field / Current (approximate)	75 $\pm$ 50% mA DC	35 Gauss

In Setup A, the focusing coil current is specified for a standard focus coil No. 109 (or equivalent) with the combined Grid No. 1 bias and video signal adjusted to produce a highlight brightness of 35 foot-lamberts on a 10 1/8" by 13 1/2" picture size. The distance from the reference line to the center of the air gap on the focus coil is 3.0 inches.

In Setup B, the focusing coil current is specified for a RETMA focusing coil No. 109 positioned with a distance of 3 1/4 inches from the yoke reference line to the center of the air gap. The ion-trap field intensity of 35 Gauss is achieved using a single-field ion-trap magnet adjusted to its optimum position, equivalent to 35 milliamperes through a RETMA ion-trap magnet No. 117.

The reference line of the tube is determined by the plane of the upper edge of a standard reference-line gauge (RETMA No. 110) when resting on the cone.

Maximum Ratings and Safety Considerations

The maximum ratings of the 16KP4A are established under the Design-Center system. Under this system, the tube can withstand normal variations in line voltage and associated components, provided the design-center values are not exceeded by more than ten percent.

Design-Center Maximum Values

- **Anode Voltage:** 16,000 Max Volts DC
- **Grid No. 2 Voltage:** 410 Max Volts DC
- **Grid No. 1 Voltage:**
 - *DC Negative-Bias Value:* 125 Max Volts DC
 - *DC Positive-Bias Value:* 0 Max Volts DC
 - *Positive-Peak Value:* 2 Max Volts
- **Peak Heater-Cathode Voltage:**
 - *Heater negative with respect to cathode (during warm-up, ≤ 15 seconds):* 410 Max Volts
 - *Heater negative with respect to cathode (after equipment warm-up):* 150 Max Volts
 - *Heater positive with respect to cathode:* 150 Max Volts
- **Grid No. 1 Circuit Resistance:** 1.5 Max Megohms

Safety and Circuit Integration

To prevent damage and ensure stable operation, the cathode should be returned to one side or to the mid-tap of the heater transformer winding.

Additionally, if the 16KP4A is operated at voltages exceeding 16,000 Volts, X-ray radiation shielding may be necessary. This shielding is required to avert the potential danger of injury resulting from prolonged exposure at close range.

Technical Summary

The **16KP4A** is a 16-inch rectangular glass cathode-ray tube featuring magnetic focus, magnetic deflection, and a 70-degree diagonal deflection angle. It is characterized by its reflective aluminized screen, which distinguishes it from the standard [16KP4](#) by providing enhanced light output. Operating with a 6.3 V, 0.6 A heater, the tube requires an external single-field ion-trap magnet and a focusing coil for proper raster alignment and spot extinction. With an anode rating of up to 16,000 Volts DC and a maximum Grid No. 1 circuit resistance of 1.5 Megohms, the 16KP4A provides a reliable, high-contrast display solution for vintage television designs when operated within its design-center limits.



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	16000 V	—
Typical Anode Voltage	12000 V	—
Maximum Grid2 Voltage	410 V	—
Typical Grid2 Voltage	300 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
DeflectionAngleApproximate	70 degree	—
FocusingMethod	Magnetic	—
DeflectingMethod	Magnetic	—
PhosphorNumber	4	—
FluorescentColor	White	—
Persistence	Medium	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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
MAGNETIC FOCUS & DEFLECTION	8 mA	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
HEATER	6.3 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
A IF THIS TUBE IS OPERATED AT VOLTAGES IN RANGE OF 16r 000 VOLTS r %-RAY RAOI ATI ON SHIELDING MAY – value 1	16 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
A IF THIS TUBE IS OPERATED AT VOLTAGES IN RANGE OF 16r 000 VOLTS r %-RAY RAOI ATI ON SHIELDING MAY – value 2	0 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
DC ANODE r	12000 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
DC GRID #2 VOLTAGE – value 1	6 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
DC GRID #2 VOLTAGE – value 2	2 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
DC GRID #2 VOLTAGE – value 3	300 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
DC GRID #1 VOLTAGE C – value 1	33 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
DC GRID #1 VOLTAGE C – value 2	77 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
DC FOCUSING COIL CURRENT D (APPROX.)	90 mA	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
DC ION TRAP CURRENT STANDARD COIL #111 (APPROX.) – value 1	111 mA	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
OC ION TRAP CURRENT STANDARD COIL #111 (APPROX.) – value 2	75 mA	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
OC ION TRAP CURRENT STANDARD COIL #111 (APPROX.) – value 3	50 mA	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
D FOR STANDARD FOCUS COIL f109r OR EQUIVAL EMT r WITH THE COMBINED GRID !1 BIAS VOLTAGE AND VIDEO	1 V	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
lj 1/2" PICTURE SIZE. DISTANCE FROM DEFERENCE LIME TO CENTER OF AIR GAP OX FOCUS COIL SN ALL BE – value 1	1	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.
lj 1/2" PICTURE SIZE. DISTANCE FROM DEFERENCE LIME TO CENTER OF AIR GAP OX FOCUS COIL SN ALL BE – value 2	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 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 DC 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 #i CIRCUIT RESISTANCE	1.5 mA	Published CRT datasheet value; multiple values on a row represent the source table's separate conditions/limits.



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	—

TUBE TINKER

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