

ELECTRONIC TUBE REFERENCE

16KP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

CATHODERAY

Direct-view cathode-ray picture tube documented by manufacturer data for type 16KP4; 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.	

16KP4 — Rectangular Cathode Ray Picture Tube

The **16KP4** and **16KP4A** are direct-view rectangular glass picture tubes designed for use in television receiver applications. These tubes are identical in their electrical, mechanical, and optical specifications, with the sole exception of the screen construction: the **16KP4A** features an aluminized screen, whereas the standard **16KP4** does not.

Both types utilize magnetic focusing and deflection, an external single-field ion trap, a grey filter faceplate, and an external conductive bulb coating. They provide a nominal raster size of 13 1/2 inches by 10 1/8 inches.

Mechanical Specifications and Physical Dimensions

The 16KP4 and 16KP4A are constructed using rectangular glass bulbs. The physical dimensions and alignment tolerances are tightly controlled to ensure proper mounting and deflection yoke positioning:

- **Overall Length:** $18 \frac{3}{4} \pm \frac{3}{8}$ 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
- **Bulb Contact:** Recessed small cavity cap (J1-21)
- **Base:** Small shell duodecal 5-pin base (BS-57)
- **Basing Designation:** 12N
- **Anode Contact Alignment:** The J1-21 recessed cavity cap aligns with pin position #6 within a tolerance of ± 30 degrees.

Electrical Design, Heater, and Pin Connections

The tube incorporates an indirectly heated, unipotential coated cathode. The heater is designed for standard television receiver series or parallel supply configurations.

Heater Ratings

Parameter	Value
Heater Voltage (AC or DC)	6.3 V
Heater Current	0.6 A

Pinout Configuration (12N Basing)

The electrical connections are made through the 5-pin duodecal base and the recessed bulb contact cap. The pin assignments, viewed from the bottom of the base, are as follows:

- **Pin 1:** Heater
- **Pin 2:** Grid No. 1 (Control Grid)
- **Pin 10:** Grid No. 2 (Screen Grid)
- **Pin 11:** Cathode
- **Pin 12:** Heater
- **Anode Cap:** Grid No. 3 / Anode

Optical and Screen Characteristics

The screen of the 16KP4 and [16KP4A](#) utilizes a sulfide-type phosphor designated as Phosphor No. 4. It is designed to provide a clear, high-contrast black-and-white television picture.

- **Fluorescent Color:** White
- **Phosphorescent Color:** White
- **Persistence:** Short
- **Faceplate Light Transmission:** Approximately 72% at the center of the grey filter faceplate.

Electrostatic and Electromagnetic Characteristics

The 16KP4 and [16KP4A](#) rely on external magnetic fields for both focusing the electron beam and deflecting it across the screen area.

- **Focusing Method:** Magnetic
- **Deflecting Method:** Magnetic
- **Deflection Angles (Approximate):**
 - **Horizontal:** 66 degrees
 - **Diagonal:** 70 degrees
- **Direct Interelectrode Capacitances (Approximate):**
 - **Cathode to all other electrodes:** 5 μpF (pF)
 - **Grid No. 1 to all other electrodes:** 6 μpF (pF)
 - **External conductive coating to Anode (Maximum):** 1,500 μpF (pF)
 - **External conductive coating to Anode (Minimum):** 750 μpF (pF)

The external conductive coating acts as a capacitor in conjunction with the internal anode coating, which assists in high-voltage ripple filtering when connected to the receiver's chassis ground.

Maximum Ratings (Design Center Values)

The following maximum ratings represent the limits within which the 16KP4 and [16KP4A](#) must be operated to ensure reliable performance and longevity.

Parameter	Absolute Limit
DC Anode and Grid No. 3 Voltage	16,000 V max.
DC Grid No. 2 Voltage	410 V max.
Grid No. 1 Voltage:	
— DC Negative-Bias Value	125 V max.
— DC Positive-Bias Value	0 V max.
— Positive-Peak Value	2 V max.

Parameter	Absolute Limit
DC Peak Heater-Cathode Voltage:	
— Heater negative with respect to cathode (during warm-up ≤ 15 s)	410 V max.
— Heater negative with respect to cathode (after warm-up)	150 V max.
— Heater positive with respect to cathode	150 V max.

Safety and Circuit Constraints

- **X-Ray Radiation Shielding:** If the tube is operated at voltages in excess of 16,000 volts, x-ray radiation shielding may be necessary to avert possible danger of injury from prolonged exposure at close range.
- **Heater-Cathode Return:** The cathode should be returned to one side or to the mid-tap of the heater transformer winding.
- **Grid No. 1 Circuit Resistance:** The maximum grid No. 1 circuit resistance must not exceed 1.5 Megohms.

Typical Operating Conditions and Characteristics

Under typical operating conditions in a television receiver, the tube is set up with the following electrical parameters:

- **DC Anode and Grid No. 3 Voltage:** 12,000 V
- **DC Grid No. 2 Voltage:** 300 V
- **DC Grid No. 1 Voltage (for visual extinction of undeflected focused spot):** -33 V to -77 V
- **DC Focusing Coil Current (Approximate):** $90 \pm 20\%$ mA
- **DC Ion Trap Current (Approximate):** $75 \pm 50\%$ mA (using standard coil #111)

Focusing and Ion Trap Alignment Details

The typical focusing coil current of 90 mA is specified for a standard focus coil #109 (or equivalent), under the condition that the combined Grid No. 1 bias voltage and video signal voltage are adjusted to produce a highlight brightness of 35 foot-lamberts on a 10 1/8-inch by 13 1/2-inch picture size. The physical distance from the reference line to the center of the air gap on the focus coil must be maintained at 3.0 inches.

An external single-field ion trap magnet must be positioned on the neck of the tube in the designated space (which must be kept clear of other components) to prevent ion burn on the phosphor screen.



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	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

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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

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 NAY – 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 NAY – 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.

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