



ELECTRONIC TUBE REFERENCE

16AP4A

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Sixteen-inch P4 direct-view television picture tube with magnetic focusing and deflection. Its white medium-persistence screen operates at approximately 12 kV typical anode voltage, with a published maximum around 14 kV.

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	14000 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>	

16AP4A — Metal-Cone Cathode-Ray Picture Tube

The **16AP4A** (also designated as **16AP4-A**) is a 16-inch round, metal-cone direct-view cathode-ray picture tube designed for television receiver applications. It features magnetic focusing and magnetic deflection with a nominal deflection angle of approximately 53 degrees. The tube provides a picture size of approximately 14 3/8 by 10 3/4 inches (or a 10 by 13 1/4 inch raster) with rounded sides.

A key distinguishing feature of the 16AP4A compared to the standard 16AP4 is its faceplate. While both share identical electrical characteristics and physical dimensions, the 16AP4A incorporates a frosted grey

filter faceplate to increase picture contrast and detail under high ambient light conditions. The tube utilizes a lightweight metal cone envelope, an electron gun designed for use with an external double-field ion-trap magnet, and a unipotential cathode.

Mechanical Construction and Physical Dimensions

The 16AP4A is constructed with a high-quality spherical glass faceplate sealed to a lightweight metal cone. The metal cone operates at high voltage and must be adequately insulated in equipment designs to withstand the maximum applied anode voltage. An external insulating coating is applied to the cone surface.

The physical dimensions and mechanical specifications of the tube include:

- **Overall Length:** $21 \frac{7}{8} \pm \frac{3}{8}$ inches to $22 \frac{1}{4} \pm \frac{3}{8}$ inches
- **Greatest Diameter of Bulb:** $15 \frac{7}{8} \pm \frac{1}{8}$ inches
- **Minimum Useful Screen Diameter:** $14 \frac{3}{8}$ inches
- **Neck Length:** $7 \frac{5}{8}$ inches
- **Net Weight (approximate):** 11 pounds
- **Mounting Position:** Any

The tube's bulb contact is established via the metal cone lip. It uses a **Small-shell Duodecal 5-pin** base (JETEC No. B5-57) with a **12D** basing designation.

Pin Connections and Basing

The **12D** basing configuration provides the following connections, 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
- **Metal Shell Lip:** Anode (Grid No. 3)

Electrical and Optical Characteristics

The 16AP4A operates with an indirectly heated, coated unipotential cathode. The heater is designed for standard television receiver power supplies.

Heater and Capacitance Data

- **Heater Voltage:** 6.3 V
- **Heater Current:** 0.6 A (with a tolerance of $\pm 10\%$)
- **Direct Interelectrode Capacitances (approximate):**
 - Cathode to all other electrodes: 5.0 μF

- Grid No. 1 to all other electrodes: 6.0 μF

Optical Specifications

The tube utilizes a **P4** phosphor (sulfide type) which produces a white fluorescent and phosphorescent color. The persistence of the phosphor is characterized as short to medium. The frosted grey faceplate has an approximate light transmission of 66% at the center, which helps minimize reflections and improve contrast in brightly lit environments.

Maximum Ratings (Design-Center System)

The maximum ratings for the 16AP4A are interpreted according to the standard Design-Center System. These ratings provide a safety margin, allowing the tube to withstand normal variations in line voltage and component tolerances.

Parameter	Maximum Rating
Anode & Grid No. 3 Voltage	14,000 V DC
Grid No. 2 Voltage	410 V DC
Grid No. 1 Voltage (Negative-Bias Value)	125 V DC
Grid No. 1 Voltage (Positive-Bias Value)	0 V DC
Grid No. 1 Voltage (Positive-Peak Value)	2 V
Peak Heater-Cathode Voltage (Heater negative to cathode during warm-up, ≤ 15 s)	410 V
Peak Heater-Cathode Voltage (Heater negative to cathode after warm-up)	150 V
Peak Heater-Cathode Voltage (Heater positive to cathode)	150 V
Grid No. 1 Circuit Resistance	1.5 M Ω

The cathode should be returned to one side or to the mid-tap of the heater transformer winding.

Typical Operating Conditions

Under typical operating conditions, the 16AP4A requires an external focusing coil and a double-field ion-trap magnet. The anode and grid No. 3 are connected together internally and referred to collectively as the anode.

- **Anode Voltage:** 12,000 V DC (In general, the anode voltage should not be less than 9,000 to 10,000 V, as brightness and focus quality decrease significantly at lower voltages.)
- **Grid No. 2 Voltage:** 300 V DC

- **Grid No. 1 Voltage (for visual extinction of focused raster/spot):** -28 to -72 V DC (or -33 to -77 V DC depending on specific operating setups)
- **Focusing-Coil Current (approximate):** $85 \pm 20\%$ mA to 99 mA DC (measured using a standard focusing coil such as RETMA No. 109, with the distance from the yoke reference line to the center of the air gap on the focus coil set to 3 1/4 inches or 3 inches)
- **Ion-Trap Field Intensity (approximate):** 35 Gauss (adjusted to optimum position, equivalent to 120 milliamperes through a RETMA ion-trap magnet No. 108)

The external double-field ion-trap magnet must be positioned correctly on the neck of the tube (the space on the neck must be kept clear for the ion-trap magnet) to prevent ion burn on the phosphor screen and to ensure proper electron beam alignment.

Technical Summary

The **16AP4A** is a 16-inch round, metal-cone cathode-ray picture tube featuring magnetic focus, magnetic deflection, and a 53-degree deflection angle. It is distinguished by its frosted grey filter faceplate, which provides 66% light transmission to improve contrast under high ambient light. Operating with a 6.3 V, 0.6 A heater, the tube is rated for a maximum anode voltage of 14,000 V DC, with a typical operating anode voltage of 12,000 V DC. It utilizes a Small-shell Duodecal 5-pin base ([12D](#) basing) and requires an external double-field ion-trap magnet and focusing coil for proper operation.



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	14000 V	—
Typical Anode Voltage	12000 V	—
Maximum Grid2 Voltage	410 V	—
Typical Grid2 Voltage	300 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
DeflectionAngleApproximate	53 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	70 deg	Approximate
Faceplate light transmission at center	66 %	Approximate

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode to all other electrodes capacitance	5 pF	Approximate
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	12000 V	TelevisionPictureTube
Typical DC grid #2 voltage	300 V	TelevisionPictureTube
Typical grid #1 voltage minimum	-77 V	VisualExtinctionRange
Typical grid #1 voltage maximum	-33 V	VisualExtinctionRange

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Focusing coil current	85 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	—



SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1968 General Electric Co

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

1968 GENERAL ELECTRIC CO

Section 1 · Cathode Ray

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