ELECTRONIC TUBE REFERENCE

19AP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA
1 SECTION
CONSTRUCTION
CATHODERAY

P4 high-voltage cathode-ray picture-display tube with magnetic focusing and deflection; this 19AP4 variant differs principally in faceplate treatment, with manufacturer documentation warning about X-ray shielding above 16 kV.

General characteristics

BASE DESIGNATION	12D	**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	19000 V
MAXIMUM SCREEN VOLTAGE	410 V

CRT-specific electrode, focusing and deflection data retained as parameters.

19AP4 — Direct-View Metal-Cone Picture Tube

The **19AP4** is a direct-view cathode ray picture tube designed primarily for television receiver applications. It features a round metal-cone construction, a unipotential cathode, and utilizes magnetic focus and magnetic deflection. The tube is designed to operate with an external, single-field ion trap magnet to prevent ion-burn damage to the screen.

Construction and Mechanical Specifications

The 19AP4 is distinguished by its round metal-cone envelope and a clear glass faceplate. This clear faceplate differentiates the base 19AP4 from its later variants in the same family.

The physical dimensions and mechanical characteristics of the tube include:

- **Overall Length:** 21 1/2 ± 1/2 inches
- **Greatest Diameter of Bulb:** 18 5/8 ± 1/8 inches
- **Minimum Useful Screen Diameter:** 17 3/8 inches
- **Bulb Contact:** Metal shell lip
- **Base:** Small shell duodecal 5-pin (B5-57)
- **Basing Configuration:** 12D

The raster size produced on the screen is approximately 11 3/8 to 11 3/4 inches by 15 3/8 to 15 3/4 inches.

Optical Characteristics

The screen of the 19AP4 utilizes Phosphor No. 4, which provides a white fluorescent color and a white phosphorescent color with medium persistence. The clear glass faceplate has a light transmission of approximately 66% at the center of the screen.

Electrical Connections and Interelectrode Capacitances

The 19AP4 uses a duodecal 5-pin base (B5-57) with a 12D basing arrangement. The electrical connections, viewed from the bottom of the base, are assigned as follows:

Pin / Contact	Electrode Connection
Pin 1	Heater
Pin 2	Grid No. 1
Pin 10	Grid No. 2
Pin 11	Cathode
Pin 12	Heater
Metal Shell Lip	Grid No. 3, Anode

The tube has an approximate deflection angle of 66 degrees. The direct interelectrode capacitances are:

- **Cathode to all other electrodes:** Approximately 5 µµF
- **Grid No. 1 to all other electrodes:** Approximately 7 µµF

Maximum Ratings (Design Center Values)

The operating limits for the 19AP4 are established under the design center rating system. Operating the tube beyond these limits may impair performance or cause permanent damage.

- **Heater Voltage:** 6.3 Volts
- **Heater Current:** 0.6 Amp
- **Maximum DC Anode Voltage:** 19,000 Volts (Note: If operated in excess of 16,000 Volts, X-ray radiation shielding may be necessary to avert personal injury)
- **Maximum DC Grid No. 2 Voltage:** 410 Volts
- **Maximum Grid No. 1 Voltage:**
  - **DC Negative-Bias Value:** 125 Volts
  - **DC Positive-Bias Value:** 0 Volts
  - **Positive-Peak Value:** 2 Volts
- **Maximum DC Peak Heater-Cathode Voltage:**
  - **Heater negative with respect to cathode during warm-up (≤ 15 seconds):** 410 Volts
  - **Heater negative with respect to cathode after warm-up:** 150 Volts
  - **Heater positive with respect to cathode:** 150 Volts
- **Maximum Grid No. 1 Circuit Resistance:** 1.5 Megohms

Typical Operating Conditions and Characteristics

Under typical operating conditions, the 19AP4 is set up with the following parameters:

- **DC Anode Voltage:** 12,000 Volts
- **DC Grid No. 2 Voltage:** 300 Volts
- **DC Grid No. 1 Voltage (for visual extinction of the undeflected focused spot):** -33 to -77 Volts
- **DC Focusing Coil Current:** 140 ± 20% mA
  - *Focusing Conditions:* This current is specified using a standard focus coil #106 or equivalent, with the center of the focus coil air gap positioned 3.0 inches from the reference line. The combined Grid No. 1 bias and video signal are adjusted to produce a highlight brightness of 18 foot-lamberts on the picture screen.
- **DC Ion Trap Current:** 75 ± 50% mA (using standard single-field ion trap coil #111)

Associated Family Variants

The 19AP4 is the parent type of a family of tubes sharing similar physical dimensions and electrical characteristics, but differing in faceplate treatment and screen technology:

- **19AP4:** Clear glass faceplate.
- **19AP4A:** Grey filter faceplate to improve contrast.
- **19AP4B:** Frosted filter faceplate to reduce glare.
- **19AP4C:** Grey filter faceplate combined with an aluminized screen for increased brightness.
- **19AP4D:** Clear frosted faceplate.

Technical Summary

The **19AP4** is a 19-inch class, round metal-cone cathode ray tube designed for television display applications. It features a 66-degree deflection angle, magnetic focus, and magnetic deflection, requiring an external single-field ion trap magnet. Operating with a standard 6.3 V, 0.6 A heater, the tube is rated for a maximum anode voltage of 19,000 V, with typical operation at 12,000 V. The 19AP4 is characterized by its clear glass faceplate, distinguishing it from other members of the 19AP4 family (such as the 19AP4A, B, C, and D variants) which incorporate grey filters, frosting, or aluminized screens.

SOURCE OPERATING CONDITIONS

1961 Tung Sol

SOURCE PDF

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	**19000 V**	—
Typical Anode Voltage	**12000 V**	—
Maximum Grid2 Voltage	**410 V**	—
Typical Grid2 Voltage	**300 V**	—

CHARACTERISTIC

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
DeflectionAngleApproximate	**66 degree**	—
FocusingMethod	**Magnetic**	—
DeflectingMethod	**Magnetic**	—
PhosphorNumber	**4**	—
FluorescentColor	**White**	—
Persistence	**Medium**	—
FaceplateVariant	**Clear glass faceplate**	—

SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

1966 Tung Sol Electronic Tubes 4 of 4

SOURCE PDF

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

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CHARACTERISTICS		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
DEFLECTION ANGLE (APPROX.)	**66 degrees**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
FACEPLATE LIGHT TRANSMISSION	**66 percent**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
HEATER	**6.3 V**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
A IF THIS TUBE IS OPERATED AT VOLTAGES IX E%LESS OF 16,000 VOLTS %—RAY RADIATION SHIELD LNG MAY — value 1	**16 V**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
A IF THIS TUBE IS OPERATED AT VOLTAGES IX E%LESS OF 16,000 VOLTS %—RAY RADIATION SHIELD LNG MAY — value 2	**0 V**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
DC ANODE	**12 V**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
DC GRID #2 VOLTAGE — value 1	**2 V**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
DC GRID #2 VOLTAGE — value 2	**300 V**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
DC FOCUSING COIL CURRENTC (APPROX.) — value 1	**140 mA**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
DC FOCUSING COIL CURRENTC (APPROX.) — value 2	**20 mA**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
G FOR STANDARD FOCUS COIL 4106, OR EQUIVALENT S WITH THE COMBINED GRID N1 BIAS VOLTAGE AMD	**4106 V**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
VIDEO SIGNAL VOLTAGE ADJUSTED TO PRODUCE A XiGnL IGnT BRIGHTNESS OF 18 F00T LANBERTS ON A	**18 V**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
11 j/4" % 15 j/R" PICTURE SIZE. DISTANCE FROM REFERENCE LINE TO CENTER OF 41R GAP ON FOCUS — value 1	**4**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
11 j/4" % 15 j/R" PICTURE SIZE. DISTANCE FROM REFERENCE LINE TO CENTER OF 41R GAP ON FOCUS — value 2	**15**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
11 j/4" % 15 j/R" PICTURE SIZE. DISTANCE FROM REFERENCE LINE TO CENTER OF 41R GAP ON FOCUS — value 3	**41**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.

OTHER

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
MAXIMUM DC ANODE	**19000 V**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
MAXIMUM DC GRID #2 VOLTAGE — value 1	**2 V**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
MAXIMUM DC GRID #2 VOLTAGE — value 2	**410 V**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
MAXIMUM GRID #1 VOLTAGE	**1 V**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
MAXIMUM GRID #1 CIRCUIT RESISTANCE — value 1	**1 mA**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
MAXIMUM GRID #1 CIRCUIT RESISTANCE — value 2	**1.5 mA**	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.

Tube Tinker

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