

ELECTRONIC TUBE REFERENCE

19AP4C

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 19AP4C 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.	

19AP4C — Direct-View Metal-Shell Cathode Ray Tube

A direct-view, metal-shell picture tube designed for television receiver applications, featuring a grey filter faceplate and an aluminized screen.

Overview

The **19AP4C** is a direct-view cathode ray tube (CRT) designed primarily for television receivers. It is a member of the 19AP4 family, which includes the 19AP4, 19AP4A, 19AP4B, and 19AP4D. While sharing the

same electrical and physical dimensions as other members of its family, the 19AP4C is distinguished by its specific faceplate design, which features a grey filter faceplate and an aluminized screen to improve picture contrast and brightness.

The tube utilizes magnetic deflection and magnetic focusing, requiring an external single-field ion trap magnet to prevent ion burn on the phosphor screen. It provides a standard rectangular television raster with nominal dimensions of 11 3/4 inches by 15 3/4 inches.

Mechanical Specifications and Base Configuration

The 19AP4C features a round metal-cone construction with a unipotential cathode. The physical dimensions of the envelope are as follows:

- **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

The electrical connection to the high-voltage anode and Grid No. 3 is made directly via the metal shell lip of the bulb. The remaining electrical connections are routed through a **small shell duodecal 5-pin base (B5-57)**, which conforms to the [12D](#) basing diagram.

Pinout Connections

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

Pin Number	Connection
Pin 1	Heater
Pin 2	Grid No. 1 (Control Grid)
Pin 10	Grid No. 2 (Screen Grid)
Pin 11	Cathode
Pin 12	Heater
Metal Shell Lip	Grid No. 3 and Anode

Optical and Deflection Characteristics

The 19AP4C is equipped with a **No. 4 Phosphor**, which produces a white fluorescent and white phosphorescent light with medium persistence. This phosphor is optimized for black-and-white television reproduction. The faceplate is constructed from a grey filter glass that provides approximately **66% light transmission** at the center, reducing ambient light reflections and enhancing contrast.

Deflection and focusing are achieved magnetically:

- **Deflection Angle (Approximate):** 66 degrees

- **Focusing Method:** Magnetic, requiring an external focusing coil
- **Ion Trap:** External single-field ion trap magnet

Electrical Ratings

The following limits are established under the **Design Center** rating system. Operating the tube beyond these limits may impair performance or cause permanent damage.

Parameter	Rating
Heater Voltage	6.3 V
Heater Current	0.6 A
Maximum DC Anode Voltage	19,000 V
Maximum DC Grid No. 2 Voltage	410 V
Maximum DC Grid No. 1 Negative-Bias Value	125 V
Maximum DC Grid No. 1 Positive-Bias Value	0 V
Maximum Grid No. 1 Positive-Peak Value	2 V

Heater-Cathode Voltage Limits

- **Heater negative with respect to cathode:** 410 V during the warm-up period (not to exceed 15 seconds); 150 V after the equipment has warmed up.
- **Heater positive with respect to cathode:** 150 V.

Safety Note: X-ray radiation shielding may be necessary if the tube is operated at anode voltages exceeding 16,000 V.

Typical Operating Conditions

Under typical operating conditions in a television receiver, the 19AP4C is operated with the following parameters:

- **DC Anode 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):** 140 $\pm$ 20% mA
 - *Condition:* Measured using a standard focus coil (No. 106 or equivalent) positioned with the center of its air gap 3.0 inches from the reference line. The combined Grid No. 1 bias and video signal must be adjusted to produce a highlight brightness of 18 foot-lamberts on the 11 3/4" x 15 3/4" picture area.
- **DC Ion Trap Current (Approximate):** 75 $\pm$ 50% mA (using a standard coil No. 111)

Circuit Design and Capacitances

To ensure stable operation and prevent grid emission or bias instability, the control grid circuit must not exceed a maximum resistance limit:

- **Maximum Grid No. 1 Circuit Resistance:** 1.5 Megohms

The interelectrode capacitances of the tube are relatively low, minimizing loading on the video amplifier and drive circuits:

- **Cathode to all other electrodes (Approximate):** 5 pF
- **Grid No. 1 to all other electrodes (Approximate):** 7 pF

Technical Summary

The **19AP4C** is a 66-degree magnetic deflection, magnetically focused cathode ray tube featuring a round metal-shell envelope. It operates with a standard **6.3 V, 0.6 A** heater and is capable of handling anode voltages up to **19,000 V**. Its grey filter faceplate (66% transmission) and aluminized screen distinguish it from other members of the [19AP4](#) family, providing improved contrast and brightness for direct-view television applications. With its standard duodecal 5-pin base, external single-field ion trap, and typical anode operating potential of **12,000 V**, the 19AP4C represents a classic implementation of mid-century metal-cone television display technology.



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	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	Grey filter faceplate; aluminized screen	—



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.

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