

ELECTRONIC TUBE REFERENCE

19AP4D

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 19AP4D 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.	

19AP4D — Round Metal Picture Tube

The **19AP4D** is a direct-view cathode-ray picture tube designed primarily for television receiver applications. It features a round metal-shell construction, a unipotential cathode, and a clear frosted faceplate. The tube utilizes magnetic focus and magnetic deflection with a deflection angle of approximately 66 degrees. It is designed to operate with an external single-field ion trap magnet to prevent ion-burn damage to the phosphor screen.

The 19AP4 Family and Construction

The 19AP4D belongs to a family of physically and electrically identical picture tubes. The primary distinction among these family members lies in their faceplate treatments and screen configurations:

- **19AP4**: Clear glass faceplate.
- **19AP4A**: Grey filter faceplate.
- **19AP4B**: Frosted filter faceplate.
- **19AP4C**: Grey filter faceplate with an aluminized screen.
- **19AP4D**: Clear frosted faceplate.

The tube's mechanical design features a round metal body. The electrical connection to the anode and Grid No. 3 is made directly via the lip of the metal shell. The physical dimensions of the envelope are as follows:

- **Overall Length**: 21-1/2" $\pm$ 1/2"
- **Greatest Diameter of Bulb**: 18-5/8" $\pm$ 1/8"
- **Minimum Useful Screen Diameter**: 17-3/8"
- **Raster Size**: 11-3/4" x 15-3/4"

Base and Pin Connections

The 19AP4D is equipped with a small shell duodecal 5-pin base (designated B5-57) and utilizes the 12D basing arrangement. The pin connections, viewed from the bottom of the base, are:

- **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 and Anode

Electrical Ratings and Operating Conditions

The electrical ratings of the 19AP4D are specified under the Design Center system. Operating parameters must be maintained within these limits to ensure reliable operation and safety.

Maximum Ratings (Design Center Values)

- **Heater Voltage**: 6.3 V
- **Heater Current**: 0.6 A
- **Maximum DC Anode Voltage**: 19,000 V
 - *Safety Note*: If the anode is operated at potentials exceeding 16,000 V, appropriate X-ray radiation shielding may be necessary to protect users from exposure.
- **Maximum DC Grid No. 2 Voltage**: 410 V

- **Maximum Grid No. 1 Voltage:**
 - DC Negative-bias value: 125 V
 - DC Positive-bias value: 0 V
 - Positive-peak value: 2 V
- **Maximum DC Peak Heater-Cathode Voltage:**
 - Heater negative with respect to cathode (during warm-up period ≤ 15 seconds): 410 V
 - Heater negative with respect to cathode (after equipment warm-up): 150 V
 - Heater positive with respect to cathode: 150 V
- **Maximum Grid No. 1 Circuit Resistance:** 1.5 M Ω

Typical Operating Characteristics

Under typical operating conditions, the tube is configured with the following parameters:

- **DC Anode Voltage:** 12,000 V
- **DC Grid No. 2 Voltage:** 300 V
- **DC Grid No. 1 Voltage:** -33 V to -77 V (range required for visual extinction of an undeflected focused spot)
- **DC Focusing Coil Current:** Approximately 140 $\pm$ 20% mA
 - This current is specified using a standard focus coil #106 or equivalent, with the focus coil air gap center positioned 3.0" from the reference line. The combined Grid No. 1 bias and video signal are adjusted to achieve a highlight brightness of 18 foot-lamberts on the 11-3/4" x 15-3/4" picture area.
- **DC Ion Trap Current:** Approximately 75 $\pm$ 50% mA (using a standard single-field ion trap coil #111)

Interelectrode Capacitances

The approximate capacitances between the electrodes are:

- **Cathode to all other electrodes:** 5 μ F
- **Grid No. 1 to all other electrodes:** 7 μ F

Optical Characteristics

The 19AP4D utilizes **Phosphor No. 4**, which produces a white fluorescent and white phosphorescent color with medium persistence, suitable for television display rates. The clear frosted faceplate provides a light transmission of approximately 66% at the center of the screen, helping to diffuse reflections while maintaining image contrast.



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	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 frosted faceplate	—



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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