

ELECTRONIC TUBE REFERENCE

19AHP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Wide-angle P4 monochrome television picture tube designed for high-voltage direct-view service, with magnetic deflection and manufacturer warnings concerning X-ray shielding at elevated anode voltages.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	6.3 V / 450 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Cathode Ray	
MAXIMUM PLATE VOLTAGE	17600 V
Source-derived physical section; applicable promoted ratings are populated from the printed sheet.	

19AHP4 — Television Picture Tube

The **19AHP4** is a rectangular glass television picture tube designed for cathode-drive service. It features a short-neck construction, low-voltage electrostatic focusing, and 114-degree magnetic deflection. The tube incorporates an aluminized P4 phosphor screen, a spherical gray filter glass faceplate, and an external conductive coating that acts as a supplementary filter capacitor when grounded. It operates without an ion trap.

Mechanical and Physical Design

The 19AHP4 is built using the J149 bulb envelope with a short neck, minimizing the overall depth of the television receiver. The physical dimensions and mechanical limits of the tube are detailed below:

Dimension	Value
Overall Length	11-3/8 $\pm$ 1/4 inches
Neck Length	4-1/8 $\pm$ 1/8 inches
Maximum Neck Diameter (at splice)	1.168 inches
Greatest Diagonal Dimension	18-5/8 $\pm$ 1/8 inches
Greatest Width Dimension	16-13/32 $\pm$ 1/8 inches
Greatest Height Dimension	13-11/32 $\pm$ 1/8 inches
Weight	13-1/2 lbs.

Screen and Optical Characteristics

The tube features a spherical faceplate made of gray filter glass with a light transmittance of approximately 78% at the center. The screen uses aluminized P4 phosphor. The minimum useful projected screen dimensions are:

- **Diagonal:** 17-9/16 inches
- **Horizontal:** 15-1/8 inches
- **Vertical:** 12 inches
- **Total Area:** 172 square inches

Deflection Angles

The magnetic deflection system provides wide-angle scanning to cover the rectangular screen area:

- **Horizontal Deflection:** 103 degrees
- **Vertical Deflection:** 86 degrees
- **Diagonal Deflection:** 114 degrees

Base and Mounting Considerations

The tube is equipped with a B7-208 base and uses the 8HR basing configuration. The perimeter of the base wafer is designed to fit inside a 1-3/4 inch diameter circle concentric with the tube axis. To prevent damage to the tube, lateral strains on the base pins must be avoided, and the socket must be connected using flexible leads.

The anode connection is made via a J1-21 recessed small cavity cap. The angular alignment of the anode terminal with respect to pin 4 has a tolerance of ± 30 degrees.

The yoke reference line is determined by the plane surface of the flared end of a JEDEC Reference-Line Gauge No. 126 when seated on the funnel. For tubes with minimum neck length, a permanent magnet (PM) centering magnet providing 0 to 8 gauss should extend no more than 2-1/8 inches from this reference line.

Heater Ratings and Warm-up

The 19AHP4 has an indirectly heated cathode with the following nominal heater ratings:

- **Heater Voltage:** 6.3 Volts
- **Heater Current (at 6.3 V):** 450 $\pm$ 5% mA
- **Heater Warm-up Time:** 11 seconds

The heater warm-up time is specifically defined as the time required for the heater voltage to reach 80% of its rated value when four times the rated voltage (25.2 V) is applied to the heater in series with an external resistance. This series resistance is calculated as three times the rated voltage divided by the rated current:

$$\text{Series Resistance} = \frac{3 \times 6.3 \text{ V}}{0.45 \text{ A}} = 42 \Omega$$

Electrical Connections and Pinout

The 19AHP4 uses the **8HR** basing diagram. The pin assignments, viewed from the bottom of the base, are as follows:

Pin Number	Connection
Pin 1	Heater (H)
Pin 2	Grid No. 1 (G1)
Pin 3	Grid No. 2 (<u>G2</u>)
Pin 4	Grid No. 4 / Focusing Electrode (G4)
Pin 6	Grid No. 1 (G1)
Pin 7	Cathode (K)
Pin 8	Heater (H)
Recessed Cap	Anode (A)

Grid No. 1 is internally connected to both Pin 2 and Pin 6.

Interelectrode Capacitances

The internal and external capacitances of the tube are:

- **Cathode to all other electrodes (approximate):** 5 μ f
- **Grid No. 1 to all other electrodes (approximate):** 6 μ f
- **External conductive coating to anode:**
 - **Maximum:** 1500 μ f
 - **Minimum:** 1000 μ f

The external conductive coating forms a supplementary high-voltage filter capacitor with the internal anode coating. This external coating must be properly grounded in the receiver chassis.

Design Maximum System Ratings

The following absolute and design-maximum ratings are established to ensure reliable operation. All voltage values are positive with respect to Grid No. 1 unless otherwise specified.

Electrode Voltages

- **Anode Voltage:**
 - **Maximum:** 17,600 Volts
 - **Minimum:** 12,000 Volts
- **Grid No. 4 Voltage (Focusing Electrode):** +1100 to -550 Volts
- **Grid No. 2 Voltage:** 650 Volts
- **Cathode Voltage:**
 - **Maximum Negative DC Value:** 0 Volts
 - **Maximum Negative Peak Value:** 2 Volts
 - **Maximum Positive DC Value:** 154 Volts
 - **Maximum Positive Peak Value:** 220 Volts

Note: Operation of the anode below the minimum limit of 12,000 Volts is not recommended, as it causes a significant decrease in picture brilliance and definition.

Heater-Cathode Voltage Limits

- **Heater negative with respect to cathode during warm-up (≤ 15 seconds):** 450 Volts maximum
- **Heater negative with respect to cathode after warm-up:** 200 Volts maximum
- **Heater positive with respect to cathode:** 200 Volts maximum

Typical Operating Conditions

Under typical cathode drive service conditions, where voltages are referenced positive with respect to Grid No. 1, the operating parameters are:

Parameter	Typical Value
Anode Voltage	14,000 Volts DC
Grid No. 4 Voltage (Focusing Electrode)	0 to 400 Volts DC
Grid No. 2 Voltage	500 Volts DC
Cathode Voltage for Raster Cutoff	40 to 63 Volts DC

Limiting Circuit Values and Safety

To protect the tube from damage due to internal arcing or excessive current, the following circuit resistance limits must be observed:

- **Maximum Grid No. 1 Circuit Resistance:** 1.5 Megohms
- **Minimum Grid No. 2 and Grid No. 4 Circuit Resistance:** 10,000 Ohms

The inclusion of a protective series resistance of at least 10,000 Ohms in both the Grid No. 2 and Grid No. 4 circuits is strongly advised to prevent damage to the electrode structures.

X-Ray Radiation Warning

When the 19AHP4 is operated at anode voltages exceeding 16,000 Volts, it can produce very soft X-rays. Depending on the installation and operating voltage, appropriate shielding may be required to limit radiation exposure to safe levels.

Technical Summary

The **19AHP4** is a short-neck, 114-degree magnetic deflection television picture tube featuring low-voltage electrostatic focusing and an aluminized P4 screen. Operating with a nominal 6.3 V, 450 mA heater, the tube is designed for cathode-drive service without an ion trap. Its physical construction utilizes a J149 bulb, a B7-208 base with an 8HR pinout, and an external conductive coating that provides supplementary anode filtering when grounded. With design-maximum ratings supporting anode voltages up to 17,600 V and typical operation at 14,000 V, the 19AHP4 provides a compact, high-performance display solution for television receivers, provided that appropriate protective grid resistances and X-ray shielding are implemented.

SOURCE OPERATING CONDITIONS
[SOURCE PDF](#)

1947 Westinghouse

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

1947 WESTINGHOUSE

Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
114° Magnetic Deflection 6.3 Volt, 450 Ma. Heater External Conductive	450 V	114° Magnetic Deflection 6.3 Volt, 450 Ma. Heater External Conductive Coating
Horizontalo oo i o	17600 deg	Horizontalo oo i o 103 Degrees Maximum Anode Yoltage 17600 Volts
Vertical L o	12000 deg	Vertical L o 86 Degrees Minimum Anode Yoltage 12000 Volts
Oiagonal L	4 deg	Oiagonal L 114 Degrees Maximum Grid 4 Yoltage {Focusing
Direct Interelectrode Capacitances: Electrode)	-550 V	Direct Interelectrode Capacitances: Electrode) +1100, -550 Volts
Cathode	450 V	Cathode 1o all other electrodes, (Apprax.). 5 gyt Maximum Grid 2 Yoltage 450 Volts
Grid	1 pF	Grid 1 1o all other slectrodas, (Approx.) [ppf Cathode Yoltouge:
External Conductive Coating to Anode: Maximum Negative Yalve	0 V	External Conductive Coating to Anode: Maximum Negative Yalve. 0 Volts DC
MOXImMUm .o i s e e	2 mM	MOXImMUm .o i s e e 1500 et Moaximum Negative Peak Value 2 VVolts
MINIMUM & e i e e s e e e	154 pF	MINIMUM & e i e e s e e e 1000 pLpf Moximum Positive Value 154 Volts DC
Heoter Current at	220 V	Heoter Current at 6.3 volts 450 + 5% Ma. Moximum Positive Peak Yalue 220 Yolis
Heater Warm-up Time®	11 s	Heater Warm-up Time® 11 Seconds Maximum Heoter-Cothode Voltage

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
1S seconds . . o o v v i v v e e s 450 Volts	450 s	1S seconds . . o o v v i v v e e s 450 Volts
After squipment worm-up period	200 V	After squipment worm-up period 200 Volts
Overall Length	4 Inches	Overall Length 11-3/8 £ 1/4 Inches
Diagonal oL	8 Inches	Diagonal oL 18-5/8 + 1/8 Inches CATHODE DRIVE SERVICE:
Width	8 Inches	Width. 16-13/32 + 1/8 Inches Unless Otherwise Specified, All Voltage Values
Minimum Useful Screen Dimensions (Projected): Anode Voltage	14000 V	Minimum Useful Screen Dimensions (Projected): Anode Voltage 14000 Volts DC
Diagonal	400 Inches	Diagonal 17-9/16 Inches Grid 4 Voltage (Focusing Electrode) 010 400 Volts DC
Horizontal ,	500 Inches	Horizontal , 15-1/8 Inches Grid 2 Voltage. oo 500 Volss DC
Vertical	63 Inches	Vertical 12 Inches Cathode Voltage for raster cutoff 40 to 63 Velts DC
. 4-1/8 + 1/8 Inches	8 Inches	 4-1/8 + 1/8 Inches
Weight i	4 V	Weight i 13-1/2 Lbs. applying 4 times rated hecter voltoge to o circuit consisting of
Operotion with anode voltage less than	12000 V	Operotion with anode voltage less than 12000 volts in not ree-
X=RAY WARNING: Operation with voltages in excess of	16 V	X=RAY WARNING: Operation with voltages in excess of 16KV may

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Areo . . oo e e e	172 Inches	Areo . . oo e e e 172 Sq. Inches
Moximum Grid	1.5 Mohm	Moximum Grid 1 Circuit Resistance 1.5 Megohms
Minimum Grids	10000 ohm	Minimum Grids 2 & 4 Circuit Resistance?. 10000 Ohms



SOURCE DATA APPENDIX

1965 Sylvania Electronic Tubes Vol3

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

1965 SYLVANIA ELECTRONIC TUBES VOL3

Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	6.3 V	—
Heater current	450 mA	—
Maximum anode voltage	17600 V	—
Maximum grid 2 voltage	650 V	—
Maximum positive cathode voltage	154 V	—
Maximum positive peak cathode voltage	220 V	—
Minimum recommended anode voltage	12000 V	—
Maximum focusing electrode voltage	1100 V	Positive limit

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode to all other electrodes capacitance	5 pF	—
Grid 1 to all other electrodes capacitance	6 pF	—

TUBE TINKER

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