

ELECTRONIC TUBE REFERENCE

19BWP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Nineteen-inch direct-view monochrome television picture tube with electrostatic focusing, magnetic deflection, and an aluminized P4 screen. Manufacturer documentation places it in the high-voltage picture-tube family used for bright, high-contrast receiver display.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	6.3 V / 6 A	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Cathode Ray	
MAXIMUM PLATE VOLTAGE	23500 V
Source-derived physical section; applicable promoted ratings are populated from the printed sheet.	

19BWP4 Television Picture Tube

The **19BWP4** is a rectangular glass television picture tube designed for television receiver applications. It features a 114-degree magnetic deflection system, low-voltage electrostatic focusing, and an aluminized P4 phosphor screen. The tube is constructed with a short neck, a spherical faceplate, and gray filter glass to improve picture contrast. It does not require an ion trap and includes an external conductive coating that serves as a supplementary filter capacitor when grounded.

Mechanical and Optical Specifications

The 19BWP4 is built using the J149A1 glass bulb template and features a B7-208 base with an 8HR basing configuration. The physical dimensions of the tube are optimized for a compact cabinet footprint, utilizing

a short neck design.

- **Overall Length:** 11-3/4 \u00b1 1/4 inches
- **Neck Length:** 4-1/2 \u00b1 1/8 inches
- **Maximum Neck Diameter:** 1.168 inches (at the splice)
- **Greatest Dimensions:**
 - **Diagonal:** 18-5/8 \u00b1 1/8 inches
 - **Width:** 16-13/32 \u00b1 1/8 inches
 - **Height:** 13-11/32 \u00b1 1/8 inches
- **Minimum Useful Screen Dimensions:**
 - **Diagonal:** 17-9/16 inches
 - **Horizontal:** 15-1/8 inches
 - **Vertical:** 12 inches
 - **Minimum Useful Area:** 172 square inches
- **Weight:** 13-1/2 lbs

The faceplate is made of gray filter glass with a light transmittance of approximately 78% at the center, which enhances contrast under ambient lighting conditions.

Heater Ratings and Electrical Connections

The 19BWP4 is equipped with an indirectly heated cathode. The heater is designed for series or parallel operation in television receivers, featuring a controlled warm-up time.

- **Heater Voltage:** 6.3 V
- **Heater Current:** 450 \u00b1 5% mA
- **Heater Warm-up Time:** 11 seconds (the time required to reach 80% of the rated voltage under specified test conditions)

The tube uses the 8HR basing arrangement. The electrical connections are distributed as follows:

Pin Number	Connection
Pin 1	Heater
Pin 2	Grid 1 (Control Grid)
Pin 3	Grid 2 (Screen Grid)
Pin 4	Grid 4 (Focusing Electrode)
Pin 6	Grid 1 (Control Grid)
Pin 7	Cathode
Pin 8	Heater
Recessed Cap	Anode (J1-21 small cavity cap)

The anode connection is made via a recessed small cavity cap (J1-21). The alignment of this cap relative to Pin 4 has an angular tolerance of ± 130 degrees.

Interelectrode Capacitances

The internal and external capacitances of the 19BWP4 are critical for proper circuit loading and filtering:

- **Cathode to all other electrodes:** Approximately 5 pF
- **Grid 1 to all other electrodes:** Approximately 6 pF
- **External conductive coating to anode:** 1000 pF minimum, 1500 pF maximum

The external conductive coating forms a supplementary high-voltage filter capacitor in conjunction with the internal anode coating. To ensure proper operation and safety, this external coating must be connected to a reliable system ground.

Design-Maximum Ratings

The following design-maximum ratings represent the limiting values of operating conditions for the 19BWP4. All voltages are specified as positive with respect to Grid 1 unless otherwise noted.

- **Anode Voltage:** 23,500 V maximum, 12,000 V minimum
- **Grid 4 Voltage (Focusing Electrode):** +1100 V maximum, -550 V maximum
- **Grid 2 Voltage:** 700 V maximum
- **Cathode Voltage:**
 - **Maximum Negative DC Value:** 0 V
 - **Maximum Negative Peak Value:** 2 V
 - **Maximum Positive DC Value:** 154 V
 - **Maximum Positive Peak Value:** 220 V
- **Maximum Heater-Cathode Voltage:**
 - **Heater negative with respect to cathode (during warm-up ≤ 15 s):** 450 V
 - **Heater negative with respect to cathode (after warm-up):** 200 V
 - **Heater positive with respect to cathode:** 200 V

Typical Operating Conditions (Cathode Drive Service)

Under typical cathode-drive operating conditions, the voltages are referenced positive with respect to Grid 1:

- **Anode Voltage:** 20,000 V DC
- **Grid 4 Voltage:** 250 V DC
- **Grid 2 Voltage:** 500 V DC (operation below 300 V is not recommended)
- **Cathode Voltage for Raster Cutoff:** 45 to 95 V DC

Limiting Circuit Values and Safety

To protect the tube and associated circuitry from damage due to transient arcs or overloads, specific circuit resistance limits must be observed:

- **Maximum Grid 1 Circuit Resistance:** 1.5 M Ω
- **Minimum Grid 2 and Grid 4 Circuit Resistance:** 10,000 Ω (the inclusion of protective resistance in these circuits is strongly advised)

X-Ray Radiation Warning

When operated at anode voltages exceeding 16,000 V, the 19BWP4 can produce very soft X-rays. Depending on the application and operating voltage, appropriate shielding may be required to protect users from exposure.



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
Horizontal v i e t i e e	23500 deg	Horizontal v i e t i e e 103 Degrees Maximum Anode Voltage 23500 Volts
Vertical e e e e e B6 Degrees Minimum Anode Voitoge (Note	12000 deg	Vertical e e e e e B6 Degrees Minimum Anode Voitage (Note 2} 12000 Volts
Diagonal . . v i i e e e	4 deg	Diagonal . . v i i e e e 14 Degrees Maximum Grid 4 Voltoge {Focusing
Cathode to oll other electrodes, (Apprax.}	700 V	Cathode to oll other electrodes, (Apprax.} 5 put Maximum Grid 2 Voltoge 700 Yolts
Grid	6 V	Grid 1 to oll other electrodes, (Approx.} 6 Tyt Cothode Voltage:
Minimum e e e e e	154 V	Minimum e e e e e 1000 ik Moximum Positive Valve e e 154 Volts DC
Heater Current at	3 V	Heater Current at 6. 3 volts.
. . . 450 £ 5% Ma. Maximum Positive Peak Value , ... 220 Volts	220 V	. . . 450 £ 5% Ma. Maximum Positive Peak Value , ... 220 Volts
Heoter Warm-up Time (Note	11 s	Heoter Warm-up Time (Note 1} 11 Seconds Moximum Heater-Cathode Voltage
Light Transmittance ot Center, Appreximate,	450 s	Light Transmittance ot Center, Appreximate, . . . 78 Percent 15 seconds . . . ol 450 Volrs
MECHANICAL: Heater positive with respect to cathode . ,	200 V	MECHANICAL: Heater positive with respect to cathode . , . 200 Volts
Owverall Length,	4 Inches	Owverall Length, ... 11-3/4 £1/4 Inches
Diggonel. o	8 Inches	Diggonel. o 0ol 18-5/8 + 1/8 Inches CATHGDE DRIVE SERVICE:

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Width. . oo	8 Inches	Width. . oo 16-13/32 £ 1/8 Inches Unless Otherwise Specified, All Yaltage Values
Diagonal	250 Inches	Diagonal 17916 Inches Grid 4 Voltage (Focusing Electrode) 250 Volts DC
Horizontal	500 Inches	Horizontal 15-1/8 Inches Grid 2 Voltage (Note 3) . . . oo v e oo . 500 Velts DC
.. 12 Inches Cothode Voltage for raster cutoff ...	12 Inches	 12 Inches Cothode Voltage for raster cutoff ...
.. ... 45 to 95 Volts DC	95 V	 45 to 95 Volts DC
Neck Length	8 inches	Neck Length 4:1/2 £1/8 inches LIMITING CIRCUIT VALUES:
BUtb v e e	1.5 Mohm	BUtb v e e 1149A1 Maximum Grid 1 Circuit Resistance 1.5 Megohms
Basing. o et BHR voltage across the heater to reach	80 V	Basing. o et BHR voltage across the heater to reach 80% of its rated volue after
Weight . . v it it e it s e e	4 V	Weight . . v it it e it s e e 13-1/2 Pounds applying 4 times rated heater voltage to o circuit consisting of
Operation with onoda voltage less than	12000 V	Operation with onoda voltage less than 12000 volts in not rec.
3. It is recommended that not less than 300 volts on Grid 2 be	2 mm	3. It is recommended that not less than 300 volts on Grid 2 be

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Ar@g o v v v v i e	5 Inches	Ar@g o v v v v i e 172 5q. Inches
BulbContact. . . . it ittt e e e e J1	10000 ohm	BulbContact. . . . it ittt e e e e J1.21 Minimum Grids 2 & 4 Circuit Resistance (Nate 4) 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	23500 V	—
Maximum grid 2 voltage	700 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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