

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

19ELP4

Specialized - Cathode Ray electronic tube

1 SECTION
CONSTRUCTION
CATHODERAY

Wide-angle aluminized P4 monochrome television picture tube using electrostatic focusing and magnetic deflection, designed for high-voltage direct-view service with a large approximately 19-inch screen.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
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
No fixed ratings recorded.
Television CRT electron-gun/display section.

19ELP4 — Television Picture Tube

The **19ELP4** is a rectangular glass television picture tube designed with a spherical faceplate, gray filter glass, and an aluminized screen. It utilizes a 114-degree magnetic deflection system and low-voltage electrostatic focusing. The tube incorporates an external conductive coating that forms a supplementary filter capacitor when properly grounded.

Mechanical Specifications and Physical Dimensions

The 19ELP4 is constructed using the EIA J149A1 glass bulb and weighs approximately 13.5 lbs. Its physical dimensions are characterized by the following parameters:

- Overall Length:** 11.375 inches ± 0.250 inches

- **Neck Length:** 4.125 inches $\pm$ 0.125 inches
- **Maximum Neck Diameter:** 1.168 inches at the splice
- **Greatest Diagonal:** 18.625 inches $\pm$ 0.125 inches
- **Greatest Width:** 16.406 inches $\pm$ 0.125 inches
- **Greatest Height:** 13.343 inches $\pm$ 0.125 inches

The screen provides a minimum useful projected area of 172 square inches, with the following minimum dimensions:

- **Diagonal:** 17.562 inches
- **Horizontal:** 15.125 inches
- **Vertical:** 12.000 inches

Installation and Alignment

The yoke reference line is determined by the plane surface of the flared end of JEDEC Reference-Line Gauge No. 126. A permanent magnet (PM) centering magnet, operating in the range of 0 to 8 gauss, should extend no more than 2.125 inches from this reference line. The anode terminal, which uses an EIA J1-21 recessed small cavity cap, is aligned with pin 4 of the base with an angular tolerance of ± 30 degrees about the tube axis.

To prevent mechanical damage, lateral strains on the base pins must be avoided. The base wafer perimeter fits within a 1.750-inch diameter circle, and the mating socket should be equipped with flexible leads.

Heater and Basing Configuration

The 19ELP4 features an indirectly heated cathode. The heater is designed for series or parallel operation with controlled warm-up characteristics.

Parameter	Value
Nominal Heater Voltage	6.3 V
Nominal Heater Current	600 $\pm$ 5% mA
Calculated Heater Power	3.78 W
Heater Warm-up Time	11 seconds

Note on Warm-up Time: The 11-second warm-up rating represents the time required to reach 80% of the rated heater voltage when four times the rated voltage is applied in series with an external resistance equal to three times the rated voltage divided by the rated current. The nominal heater power is calculated as $6.3 \text{ V} \times 0.6 \text{ A} = 3.78 \text{ W}$.

Pinout and Base Connections

The tube utilizes an EIA B7-208 base with an EIA 8HR basing arrangement. The electrical connections are assigned as follows:

Pin Number	Electrode Connection
Pin 1	Heater (H)
Pin 2	Grid No. 1 (G1)
Pin 3	Grid No. 2 (G2)
Pin 4	Grid No. 4 / Focus Electrode (G4)
Pin 6	Grid No. 1 (G1)
Pin 7	Cathode (C)
Pin 8	Heater (H)
Recessed Cap	Anode (A)

Electrical and Optical Characteristics

Direct Interelectrode Capacitances

The internal electrodes exhibit the following approximate capacitances:

- **Cathode to all other electrodes:** ~5 pF
- **Grid No. 1 to all other electrodes:** ~6 pF
- **External conductive coating to anode:** 1000 pF minimum to 1500 pF maximum

The external conductive coating must be grounded to serve as a supplementary filter capacitor for the high-voltage anode supply.

Optical Properties

The screen features an aluminized P4 phosphor. The center of the spherical faceplate, constructed of gray filter glass, exhibits a light transmittance of approximately 78%.

Operating Conditions and Design Maximum Ratings

All voltage ratings are specified as positive with respect to Grid No. 1 unless otherwise noted.

Design Maximum Ratings

- **Anode Voltage:** 10,000 V minimum to 18,000 V maximum
- **Grid No. 4 (Focusing Electrode) Voltage:** -550 V to +1100 V

- **Grid No. 2 Voltage:** 550 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
- **Heater-Cathode Voltage:**
 - Heater negative with respect to cathode during warm-up (≤ 45 seconds): 450 V maximum
 - Heater negative with respect to cathode after warm-up: 200 V maximum
 - Heater positive with respect to cathode: 200 V maximum

Typical Cathode-Drive Operating Conditions

Under typical cathode-drive service, the operating parameters are established as follows:

- **Anode Voltage:** 14,000 V DC
- **Grid No. 4 Voltage:** 0 to 400 V DC
- **Grid No. 2 Voltage:** 400 V DC
- **Cathode Voltage for Raster Cutoff:** 36 to 94 V DC

Operating Note: Operating Grid No. 2 below 300 V is not recommended, as it adversely affects the resolution of the displayed image. Similarly, operating the anode below 10,000 V reduces both brilliance and definition.

Limiting Circuit Values

- **Maximum Grid No. 1 Circuit Resistance:** 1.5 M Ω
- **Minimum Grid No. 2 and Grid No. 4 Circuit Resistance:** 10,000 Ω (protective resistance is recommended to prevent electrode damage)

Safety and Operational Warnings

X-Ray Radiation

When the 19ELP4 is operated at anode voltages exceeding 16,000 V, it may produce soft X-rays. Under these conditions, appropriate shielding must be installed to limit radiation exposure to safe levels.

Base Pin Protection

Because of the physical construction of the glass-to-metal seals at the base, the socket must not exert lateral mechanical strain on the pins. Flexible lead connections are required to accommodate slight alignment variations.

Technical Summary

The **19ELP4** is a **114-degree magnetic deflection, low-voltage electrostatic focus television picture tube** featuring an 18.625-inch diagonal rectangular glass envelope. It utilizes an **aluminized P4 phosphor** screen with a 172 square inch useful area and a gray filter glass faceplate. Operating with a **6.3 V, 600 mA heater**, the tube is optimized for cathode-drive service with a nominal anode voltage of **14,000 V DC**. It incorporates protective circuit requirements, including a minimum 10,000 Ω resistance in the Grid 2 and Grid 4 circuits, and requires grounding of its external conductive coating to utilize its integrated 1000–1500 pF filter capacitance.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1965 Westinghouse Data Book

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

1965 WESTINGHOUSE DATA BOOK

Section 1 · Cathode Ray

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage	6.3 V	—
Heater Current	600 mA	—
Heater Warm-up Time	11 s	—
Focusing Method	Low Voltage Electrostatic text	—
Deflection Method	Magnetic text	—
Horizontal Deflection Angle	103 deg	Approximate
Vertical Deflection Angle	86 deg	Approximate
Diagonal Deflection Angle	114 deg	Approximate
Phosphor	Aluminized P4 text	—
Fluorescence	White text	—
Persistence	Short to Medium text	—
Light Transmittance	78 percent	Approximate
Cathode-to-All Capacitance	5 pF	Approximate
Grid1-to-All Capacitance	6 pF	Approximate
External Coating-to-Anode Capacitance Minimum	1000 pF	—
External Coating-to-Anode Capacitance Maximum	1500 pF	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Anode Voltage	18000 V	—
Minimum Anode Voltage	10000 V	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Focus Electrode Voltage Positive	1100 V	Grid4
Maximum Focus Electrode Voltage Negative	-550 V	Grid4
Maximum Grid2 Voltage	550 V	—
Minimum Grid2 Voltage	200 V	—
Maximum Heater-Cathode Voltage During Warmup	450 V	Duration<=15s
Maximum Heater-Cathode Voltage After Warmup	200 V	—
Typical Anode Voltage	14000 V	CathodeDrive
Typical Focus Voltage Minimum	0 V	Grid4
Typical Focus Voltage Maximum	400 V	Grid4
Typical Grid2 Voltage	400 V	CathodeDrive
Cathode Voltage for Raster Cutoff Minimum	36 V	CathodeDrive
Cathode Voltage for Raster Cutoff Maximum	94 V	CathodeDrive
Maximum Grid1 Circuit Resistance	1.5 Mohm	—

TUBE TINKER

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