



ELECTRONIC TUBE REFERENCE

19ERP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

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

SECTION 1 Cathode Ray*No fixed ratings recorded.**Television CRT electron-gun/display section.*

19ERP4 — Television Picture Tube

The **19ERP4** is a television picture tube designed with low-voltage electrostatic focus and magnetic deflection. It features a wide-angle deflection system, an aluminized screen, and integrated implosion protection. The tube does not require an ion trap.

Physical and Mechanical Specifications

The 19ERP4 is constructed using a spherical gray filter glass envelope with a light transmittance of approximately 49% at the center. The screen utilizes an aluminized P4 phosphor. Implosion protection is provided by a tension band system (banded implosion protection).

Envelope and Screen Dimensions

The physical dimensions of the tube are highly specified to ensure proper mounting and alignment:

- **Over-all Length:** 11.375" $\pm$ 0.250"
- **Neck Length:** 4.125" $\pm$ 0.125"
- **Neck Diameter:** Maximum of 1.168" at the splice
- **Greatest Dimensions:**
 - Diagonal: 18.733" $\pm$ 0.100"
 - Width: 16.552" $\pm$ 0.100"
 - Height: 13.446" $\pm$ 0.100"
- **Minimum Useful Screen Dimensions (Projected):**
 - Diagonal: 17.563"
 - Horizontal Axis: 15.125"
 - Vertical Axis: 12"
 - Total Area: 172 square inches
- **Net Weight:** 15 lbs.

Bulb and Base Designations

The tube utilizes the **EIA J149F1** bulb configuration. The anode connection is made via an **EIA J1-21** bulb contact (JEDEC No. J1-21). The base is an **EIA B7-208** (Small Button 7-Pin Base, JEDEC No. B7-208) with an **EIA 8HR** basing arrangement.

Mechanical Alignment and Installation Notes

- **Base Pin Alignment:** Base pin 4 aligns with the major axis of the tube within 30° and is positioned on the same side as the anode terminal.
- **Yoke Reference Line:** The reference line is determined by JEDEC Reference Line Gauge No. 126 positioned on the funnel. Any permanent magnet (PM) centering magnet (rated 0 to 8 gauss) should extend no more than 2.125" from this reference line.
- **Tension Band:** The tension band must be grounded.
- **Insulating Coating:** A transparent insulating coating 3" in diameter is present on the bulb. This area must be cleaned only with a soft, dry, lintless cloth.

Electrical Connections and Pinout

The 19ERP4 uses an 8HR basing configuration. The pin assignments are as follows:

Pin Number	Connection
Pin 1	Heater (H)
Pin 2	Grid No. 1 (G1)

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

Heater Ratings

The heater is designed for a nominal voltage of 6.3 V and a current of $600 \pm 5\%$ mA. The heater warm-up time is 11 seconds. This warm-up time is defined as the time required to reach 80% of the rated heater voltage when 4 times the rated heater voltage is applied to a circuit consisting of the heater in series with a resistance equal to 3 times the rated voltage divided by the rated current.

Interelectrode Capacitances

- **Cathode to All Other Electrodes:** Approximately 5 pF
- **Grid No. 1 to All Other Electrodes:** Approximately 6 pF
- **External Conductive Coating to Anode:** Minimum 1250 pF, Maximum 1750 pF. This external coating must be grounded, as it forms a supplementary filter capacitance for the high-voltage supply.

Insulation Resistance

The electrical resistance between the external conductive coating and the implosion protection hardware must be a minimum of 5 Megohms.

Design-Maximum Ratings

The following ratings are established under the Design-Maximum System. All voltages are positive and measured with respect to Grid No. 1 unless otherwise specified.

Parameter	Rating Value
Maximum Anode Voltage	23,000 V
Minimum Anode Voltage	11,000 V
Maximum Grid No. 4 (Focusing Electrode) Voltage	+1100 V to -550 V
Maximum Grid No. 2 Voltage	550 V

Parameter	Rating Value
Minimum Grid No. 2 Voltage	200 V
Maximum Grid No. 1 Negative Bias Value	154 V
Maximum Grid No. 1 Negative Peak Value	220 V
Maximum Grid No. 1 Positive Bias Value	0 V
Maximum Grid No. 1 Positive Peak Value	2 V

Heater-Cathode Voltage Limits

To prevent breakdown between the heater and cathode, the following voltage limits must be observed:

- **Heater Negative with Respect to Cathode (During Warm-up, ≤ 15 seconds):** Maximum 450 V
- **Heater Negative with Respect to Cathode (After Warm-up):** Maximum 300 V
- **Heater Positive with Respect to Cathode:** Maximum 200 V

Operating Characteristics and Typical Conditions

Typical Cathode Drive Operation

In typical cathode drive service, voltages are specified positive with respect to Grid No. 1:

- **Anode Voltage:** 20,000 V. *Note: Operation above 16 kV may require shielding to limit soft X-ray radiation.*
- **Grid No. 4 (Focusing Electrode) Voltage:** 200 V. Individual tubes are designed to achieve satisfactory focus between 0 and 400 V under specified focus conditions.
- **Grid No. 2 Voltage:** 400 V. A voltage of not less than 300 V is recommended, as lower voltages can adversely affect resolution.
- **Cathode Voltage for Raster Cutoff:** 36 to 78 V.

Focus Condition Measurement

The focus condition is measured with the cathode bias and video-signal adjusted to produce an anode current of 150 μ A on a 12" x 15.125" pattern. This pattern is generated from a type 2F21 monoscope or an equivalent source.

Deflection Angles

The tube is designed for wide-angle magnetic deflection, with approximate deflection angles of:

- **Diagonal:** 114°
- **Horizontal:** 102°
- **Vertical:** 86°

Limiting Circuit Values

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

- **Maximum Grid No. 1 Circuit Resistance:** 1.5 Megohms
- **Minimum Grid No. 2 & Grid No. 4 Circuit Resistance:** 10,000 Ohms (protective resistance is advisable).

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	102 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	49 percent	Approximate
Cathode-to-All Capacitance	5 pF	Approximate
Grid1-to-All Capacitance	6 pF	Approximate
External Coating-to-Anode Capacitance Minimum	1750 pF	—
External Coating-to-Anode Capacitance Maximum	2250 pF	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Anode Voltage	23000 V	—
Minimum Anode Voltage	11000 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	300 V	—
Typical Anode Voltage	20000 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	78 V	CathodeDrive
Maximum Grid1 Circuit Resistance	1.5 Mohm	—

TUBE TINKER

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