

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

19CFP4

1 SECTION
CONSTRUCTION
CATHODERAY

Specialized - Cathode Ray electronic tube

Nineteen-inch direct-view monochrome television picture tube with electrostatic focusing, 114-degree magnetic deflection, an aluminized screen, external conductive coating, and a low-grid-2 cathode-drive gun. It belongs to the high-voltage picture-tube family designed for bright receiver display.

GENERAL CHARACTERISTICS

BASE DESIGNATION	8HR	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.
CRT specialized anode, grid, optical, and deflection data retained in TUBE_SECTION_PARAMETER.

19CFP4 — 19-Inch Rectangular Glass Picture Tube

The **19CFP4** is a 19-inch rectangular glass picture tube (cathode-ray tube) designed for television receiver applications. It features electrostatic focusing and magnetic deflection with a wide 114-degree diagonal deflection angle. The tube incorporates a non-ion trap gun designed specifically for low Grid No. 2 voltage cathode-drive operation. Its screen utilizes an aluminized P4 phosphor on a spherical gray faceplate, providing high-contrast images with approximately 76% light transmittance at the center. An external conductive coating is applied to the bulb, which serves as a high-voltage filter capacitor when properly grounded.

Physical Construction and Screen Characteristics

The 19CFP4 is constructed using a J149-A1 glass bulb envelope. The screen features a spherical gray faceplate with a light transmittance of approximately 76% at the center. The screen is deposited with an aluminized P4 phosphor, which is highly efficient and optimized for television display service.

To facilitate high-voltage connection, the bulb is equipped with a recessed small cavity contact (JETEC No. J1-21) serving as the anode terminal. This anode contact is aligned with Pin No. 4 of the base within a tolerance of ± 30 degrees. The tube utilizes either a JETEC No. B7-237 or B7-208 base with an 8HR basing configuration.

An external conductive coating is applied to the envelope. When connected to a system ground, this coating forms a filter capacitor in conjunction with the internal anode coating, helping to smooth the high-voltage anode supply.

Heater and Warm-Up Ratings

The 19CFP4 is equipped with an indirectly heated cathode. The heater is designed for reliable operation under standard television receiver power configurations.

Parameter	Value
Nominal Heater Voltage	6.3 V
Heater Current	600 $\pm$ 30 mA
Heater Warm-Up Time	11 seconds
Minimum Heater Voltage (Design-Maximum)	5.7 V
Maximum Heater Voltage (Design-Maximum)	6.9 V

The heater-to-cathode insulation is rated to withstand significant potential differences, which vary depending on the operating state:

- **Heater negative with respect to cathode (during warm-up $\leq$ 15 seconds):** 410 V maximum
- **Heater negative with respect to cathode (after warm-up):** 180 V maximum
- **Heater positive with respect to cathode:** 180 V maximum

Pinout and Basing (8HR)

The 19CFP4 uses the **8HR** basing diagram. The electrical connections, viewed from the bottom of the base, are as follows:

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

Pin Number	Connection
Pin 3	Grid No. 2 (<u>G2</u>)
Pin 4	Focus / Grid No. 4 (F)
Pin 6	Grid No. 1 (G1)
Pin 7	Cathode (K)
Pin 8	Heater (H)
Recessed Cap	Anode (J1-21)

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

Electrostatic Focus and Magnetic Deflection

The tube employs electrostatic focusing via Grid No. 4 (the focusing electrode) and magnetic deflection to sweep the electron beam across the screen.

- **Diagonal Deflection Angle:** 114 degrees
- **Horizontal Deflection Angle:** 102 degrees
- **Vertical Deflection Angle:** 87 degrees

The electrostatic focusing system is designed to operate at or near ground potential, with typical focus voltages centered around 250 V DC, though individual tubes may focus anywhere within a range of 0 to 500 V DC.

Electrical Characteristics and Interelectrode Capacitances

The direct interelectrode capacitances of the 19CFP4 are relatively low, minimizing loading on the drive circuitry:

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

Typical Operating Conditions (Cathode-Drive Service)

In typical cathode-drive service, the video signal is applied to the cathode, and Grid No. 1 is maintained at a reference potential. The operating parameters under these conditions are:

Parameter	Typical Value
Anode Voltage	13,000 V DC

Parameter	Typical Value
Grid No. 4 (Focusing Electrode) Voltage	250 V DC (focus range: 0 to 500 V)
Grid No. 2 Voltage	50 V DC
Cathode-to-Grid No. 1 Voltage (for visual extinction of focused raster)	31 to 49 V DC

Design-Maximum Ratings

The design-maximum rating system defines the limiting receiver design values for the tube. These ratings must not be exceeded under the worst-case operating conditions.

- **Anode Voltage:** 10,000 V (min) to 17,500 V (max)
- **Grid No. 4 (Focusing Electrode) Voltage:** -500 V to +1000 V (max)
- **Grid No. 2 Voltage:** 40 V (min) to 100 V (max)
- **Grid No. 1 Voltage:**
 - Maximum Negative DC Value: 140 V
 - Maximum Negative Peak Value: 200 V
 - Maximum Positive DC Value: 0 V
 - Maximum Positive Peak Value: 2 V

Circuit Design Constraints and Maximum Values

To ensure reliable operation and prevent damage to the tube's electrodes from internal arcing or transient overloads, specific circuit resistance limits must be observed:

- **Maximum Grid No. 1 Circuit Resistance:** 1.5 MΩ
- **Minimum Grid No. 2 Circuit Resistance:** 0.1 MΩ
- **Minimum Focusing Electrode (Grid No. 4) Circuit Resistance:** 0.1 MΩ

The inclusion of protective series resistance in the Grid No. 2 and focusing electrode circuits is highly advisable to limit surge currents. A single common resistor may be utilized for this protective function where appropriate.

Technical Summary

The **19CFP4** is a **114-degree magnetic deflection, electrostatic-focus 19-inch rectangular picture tube** featuring an aluminized P4 phosphor screen and a non-ion trap gun optimized for low Grid No. 2 cathode-drive operation. With a nominal **6.3 V, 600 mA** heater and an 11-second warm-up time, it is designed for integration into standard television receiver architectures. The tube operates with typical anode voltages up to **17,500 V** and utilizes an external conductive coating to provide high-voltage filtering. Proper circuit design requires adhering to the specified minimum series resistances on Grid No. 2 and Grid No. 4 to protect the electrostatic gun structure.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1968 General Electric Co

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

1968 GENERAL ELECTRIC CO

Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Anode Voltage	17500 V	—
Heater Warmup Time	11 s	—
Minimum Anode Voltage	10000 V	—
Maximum Grid2 Voltage	100 V	—
Minimum Grid2 Voltage	40 V	—
Typical Anode Voltage	13000 V	—
Typical Focus Grid Voltage	250 V	—
Typical Grid2 Voltage	50 V	—
Cathode To Grid1 Voltage	31–49 V	CathodeDriveService

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Horizontal Deflection Angle	102 degree	—
Vertical Deflection Angle	87 degree	—
Diagonal Deflection Angle	114 degree	—

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode To All Other Electrodes Capacitance	5 pF	—
Grid1 To All Other Electrodes Capacitance	6 pF	—