

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 / 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	20000 V
MAXIMUM SCREEN VOLTAGE	70 V
Same as 19CHP4 except 450 mA heater and 12 kV minimum anode rating.	

19CMP4 Television Picture Tube

Overview

The **19CMP4** is a rectangular glass television picture tube designed for cathode-drive operation. It features a 114-degree magnetic deflection angle and low-voltage electrostatic focusing. The tube incorporates an aluminized P4 phosphor screen, a gray filter glass faceplate, and a low Grid No. 2 voltage design that eliminates the need for an ion trap.

The 19CMP4 is electrically identical to the [19CHP4](#) except for specific electrical differences. Its physical design provides a compact overall length and a wide-angle deflection system, making it suitable for space-

efficient television receiver designs.

Mechanical and Physical Specifications

The 19CMP4 is constructed with a J149 glass bulb and uses a B7-208 base with an 8HR basing configuration. The anode connection is made via a recessed small cavity cap (J1-21) located on the bulb cone. The tube has a total weight of approximately 13-1/2 pounds.

Envelope Dimensions

The physical dimensions of the tube are tightly specified to ensure proper fitment within television cabinets:

- **Overall Length:** 11-5/8 $\pm$ 1/4 inches
- **Neck Length:** 4-3/8 $\pm$ 1/8 inches
- **Neck Diameter:** 1.168 inches maximum at the splice
- **Greatest Diagonal Dimension:** 18-5/8 $\pm$ 1/8 inches
- **Greatest Width:** 16-13/32 $\pm$ 1/8 inches
- **Greatest Height:** 13-11/32 $\pm$ 1/8 inches

Screen and Optical Characteristics

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

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

Heater and Basing Configuration

The 19CMP4 is equipped with an indirectly heated cathode. The heater is designed for operation at a nominal voltage of 6.3 V. The rated heater current is 450 mA, with a specified tolerance of $\pm 5\%$ or ± 20 mA depending on the standard applied.

The heater warm-up time is 11 seconds. This warm-up time is defined as the time required for the heater voltage to reach 80% of its rated value when a voltage equal to four times the rated heater voltage (25.2 V) is applied in series with a resistance equal to three times the rated voltage divided by the rated current.

As a calculation, using the nominal heater voltage of 6.3 V and rated current of 0.45 A, the required series resistance is:

$$\text{Series Resistance} = (3 * 6.3 \text{ V}) / 0.45 \text{ A} = 42 \text{ Ohms}$$

Pin Connections (8HR Basing)

The tube uses an 8-pin base where several pins are assigned to specific electrodes, and Grid 1 is redundant across two pins. The anode cap is aligned with pin 4 with an angular tolerance of ± 30 degrees.

Pin Number	Electrode Connection
Pin 1	Heater (H)
Pin 2	Grid 1 (G1)
Pin 3	Grid 2 (<u>G2</u>)
Pin 4	Grid 4 (G4, Focusing Electrode)
Pin 6	Grid 1 (G1)
Pin 7	Cathode (C)
Pin 8	Heater (H)
Cap	Anode (A)

To prevent damage to the tube, lateral strains on the base pins must be avoided. The receiver socket should be connected using flexible leads rather than rigid wiring.

Interelectrode Capacitances

The internal structure of the 19CMP4 exhibits the following capacitances:

- **Cathode to all other electrodes:** approximately 5 uuf
- **Grid 1 to all other electrodes:** approximately 6 uuf
- **External conductive coating to Anode:** 1000 uuf minimum, 1500 uuf maximum

The external conductive coating forms a supplementary high-voltage filter capacitor when the coating is properly connected to the chassis ground.

Electrical Ratings and Operating Conditions

Design-Maximum Ratings

The design-maximum ratings define the limiting operating conditions for the 19CMP4. Unless otherwise noted, all voltages are specified as positive with respect to Grid 1.

Parameter	Minimum Value	Maximum Value
Anode Voltage	12,000 V	20,000 V

Parameter	Minimum Value	Maximum Value
Grid 4 (Focusing Electrode) Voltage	-550 V	+1,100 V
Grid 2 Voltage	20 V	60 V
Cathode Voltage (DC)	0 V	154 V
Cathode Voltage (Peak)	-2 V	220 V
Heater-Cathode Voltage (Heater negative to cathode, during warm-up ≤ 15 s)	—	450 V
Heater-Cathode Voltage (Heater negative to cathode, after warm-up)	—	200 V
Heater-Cathode Voltage (Heater positive to cathode)	—	200 V

Operation of the anode below the minimum limit of 12,000 V is not recommended, as it may degrade focus and brightness performance.

Typical Operating Conditions (Cathode-Drive Service)

In typical cathode-drive applications, the electrodes are operated at the following potentials (voltages are positive with respect to Grid 1):

- **Anode Voltage:** 16,000 V DC
- **Grid 4 (Focusing Electrode) Voltage:** 0 to 400 V DC
- **Grid 2 Voltage:** 30 V DC
- **Cathode Voltage for Raster Cutoff:** 30 to 45 V DC

Limiting Circuit Values

To protect the tube's internal electrodes from damage due to momentary arcs or overloads, the circuit design must adhere to the following resistance limits:

- **Maximum Grid 1 Circuit Resistance:** 1.5 MOhms
- **Minimum Grid 2 & Grid 4 Circuit Resistance:** 10,000 Ohms (protective series resistance is strongly advised)

Application and Safety Guidelines

The installation and operation of the 19CMP4 require specific precautions to ensure safety and proper performance:

- **Grounding:** The external conductive coating must be reliably grounded to the receiver chassis, as it serves as a high-voltage filter capacitor.
- **Centering:** A permanent magnet (PM) centering magnet providing a field of 0 to 8 gauss should be used. This magnet must not extend more than 2-1/8 inches from the Yoke Reference Line, which is determined using JEDEC Reference-Line Gauge No. 126.
- **X-Ray Radiation Shielding:** When the tube is operated at anode voltages exceeding 16,000 V, it may produce X-rays. Appropriate shielding must be provided in the receiver design to protect users from exposure.

Technical Summary

The **19CMP4** is a 114-degree magnetic deflection, low-voltage electrostatic focus television picture tube. It features a rectangular glass envelope with a 172-square-inch useful screen area, an aluminized P4 phosphor screen, and a gray filter glass faceplate. Operating with a 6.3 V, 450 mA heater, the tube is designed specifically for cathode-drive service with low Grid No. 2 voltages (typically 30 V). Its design-maximum ratings support anode voltages up to 20,000 V, with typical operation at 16,000 V. Safe operation requires proper grounding of the external conductive coating, protective series resistance in the grid circuits, and appropriate X-ray shielding for anode potentials above 16 kV.

SOURCE OPERATING CONDITIONS

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	20000 V	—
Maximum grid 2 voltage	60 V	—
Maximum positive cathode voltage	154 V	—
Maximum positive peak cathode voltage	220 V	—
Minimum recommended anode voltage	12000 V	—
Maximum focusing electrode voltage	1700 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	—

1971 RCA HB3 Binder 1 of 7

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

1971 RCA HB3 BINDER 1 OF 7
Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	6.3 V	—
Heater current	450 mA	—
Heater warm-up time	11 s	—
Maximum anode/ultor voltage	20000 V	—
Minimum anode/ultor voltage	12000 V	—
Typical anode/ultor voltage	16000 V	PictureTubeService
Maximum grid No.2 voltage	70 V	—
Typical grid No.2 voltage	50 V	PictureTubeService
Focus-voltage range minimum	-50 V	OptimumFocus
Focus-voltage range maximum	250 V	OptimumFocus
Visual-extinction voltage range minimum	32 V	FocusedRasterExtinction
Visual-extinction voltage range maximum	50 V	FocusedRasterExtinction
Maximum grid No.1 circuit resistance	1.5 megohm	—
X-ray shielding warning	Present	HighAnodeVoltage
Maximum cathode positive bias voltage	100 V	CathodeDrive
Maximum cathode positive peak voltage	150 V	CathodeDrive
Maximum cathode negative peak voltage	2 V	CathodeDrive
Peak heater-cathode voltage during warm-up	450 V	HeaterNegative;Warmup<=15s
Peak heater-cathode voltage after warm-up	200 V	HeaterNegative
Peak heater-cathode voltage heater positive	200 V	HeaterPositive

CONSTRUCTION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Focusing method	LowVoltageElectrostatic	—
Deflection method	Magnetic	—
Phosphor	P4	—
Screen type	White	P4
Ion-trap magnet required	No	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Deflection angle	114 deg	Approximate
Faceplate light transmission	78 %	Approximate

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode to all other electrodes capacitance	5 pF	Approximate
Grid No.1 to all other electrodes capacitance	6 pF	Approximate
External conductive coating to anode capacitance minimum	1000 pF	Approximate
External conductive coating to anode capacitance maximum	1500 pF	Approximate