

ELECTRONIC TUBE REFERENCE

# 19CUP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION  
CONSTRUCTION  
CATHODERAY

Nineteen-inch cathode-ray tube documented by Philco. The available source identifies the device as a CRT but provides insufficient extracted detail here to support specialized construction claims beyond its direct-view picture-tube family.

## GENERAL CHARACTERISTICS

|                     |                   |                      |               |
|---------------------|-------------------|----------------------|---------------|
| BASE DESIGNATION    | —                 | BASE PINS            | 0             |
| NOMINAL HEATER      | — / —             | PARALLEL HEATER      | — / —         |
| HEATING             | Indirect          | SERIES OPERATION     | Not specified |
| CATHODE ARRANGEMENT | Separate cathodes | SECTION CONSTRUCTION | Similar       |

## SECTION RATINGS

|                                                                       |
|-----------------------------------------------------------------------|
| SECTION1 Cathode Ray                                                  |
| No fixed ratings recorded.                                            |
| Published values promoted where clearly attributable to this section. |

## 19CUP4 — Rectangular Glass Television Picture Tube

The **19CUP4** is a 19-inch, direct-view rectangular glass television picture tube designed with a 114-degree diagonal deflection angle. It features an aluminized screen, a spherical faceplate, a non-ion trap gun, internal shielding, electrostatic focusing, and magnetic deflection. As a "HiGm" (high transconductance) tube, it is specifically optimized for cathode drive service under low Grid #2 voltage conditions. The physical design incorporates a short tube base with straight-through leads oriented by an indexing lug.

# Mechanical and Optical Specifications

## Physical Dimensions and Bulb Structure

The 19CUP4 is constructed using the J149A2 glass bulb. Its physical dimensions are characterized by the following measurements:

- **Overall Length:** 11 5/8 inches (with a tolerance of +1/4 and -3/16 inches)
- **Neck Length:** 4 3/16 inches (with a tolerance of +1/8 and -1/16 inches)
- **Greatest Bulb Dimensions:**
  - Diagonal: 18 5/8 ± 1/8 inches
  - Width: 16 13/32 ± 1/8 inches
  - Height: 13 11/32 ± 1/8 inches

The minimum useful screen dimensions provide a total viewing area of 172 square inches, defined by:

- Diagonal: 17 9/16 inches
- Width: 15 1/8 inches
- Height: 12 inches

## Optical Characteristics

The screen utilizes an aluminized P4 phosphor, which produces a white fluorescent color with medium-short persistence. The spherical faceplate has a light transmission of approximately 77% at the center.

## Base and Electrical Connections

The tube is equipped with a B7-208 base and uses an 8HR basing configuration. The high-voltage anode connection is made via a J1-21 contact, which aligns with Pin #4 within a tolerance of ±30 degrees.

## Electrical Characteristics and Deflection

### Deflection Angles

The 19CUP4 employs magnetic deflection with the following approximate angles:

- **Diagonal:** 114°
- **Horizontal:** 102°
- **Vertical:** 85°

### Direct Interelectrode Capacitances

The approximate capacitances of the tube's electrodes are:

- **Cathode to all other electrodes:** 4.0 pF
- **Grid #1 to all other electrodes:** 6.0 pF

- **External conductive coating capacitance:** 1300 pF minimum to 1700 pF maximum

## Heater Ratings

The heater is designed for a nominal voltage of 6.3 V and draws a current of 0.45 A  $\pm$  5% at this voltage. The heater warm-up time is rated at 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 voltage is applied in series with a resistance equal to 3 times the rated voltage divided by the rated current.

## Cathode Drive Service Ratings

The 19CUP4 is rated under the Design Maximum system. All voltages are positive with respect to Grid #1 unless otherwise indicated.

| Parameter                                                        | Design Maximum Rating      |
|------------------------------------------------------------------|----------------------------|
| Anode Voltage (Anode, Grid #3, and Grid #5 connected internally) | 22,000 V DC Max            |
| Grid #4 Voltage (Focusing Electrode)                             | -550 Min to +1100 Max V DC |
| Grid #2 Voltage                                                  | 80 V DC Max                |
| Positive-Bias Cathode Voltage                                    | 154 V DC Max               |
| Positive-Peak Cathode Voltage                                    | 220 V Max                  |
| Negative-Bias Cathode Voltage                                    | 0 V DC Max                 |
| Negative-Peak Cathode Voltage                                    | 2 V Max                    |
| Grid #1 Circuit Resistance                                       | 1.5 M $\Omega$ Max         |

## Heater-Cathode Voltage Limits

The peak heater-cathode voltage limits vary depending on the polarity and operating state:

- **Heater negative with respect to cathode:**
  - During the warm-up period (less than or equal to 15 seconds): 450 V Max
  - After the equipment warm-up period: 200 V Max
- **Heater positive with respect to cathode:** 200 V Max

## Typical Operating Conditions

For typical cathode drive service, the operating conditions are established with voltages positive with respect to Grid #1:

- **Anode Voltage:** 16,000 V DC
- **Grid #4 Voltage (Focus):** -100 to +300 V DC

- **Grid #2 Voltage:** 65 V DC
- **Cathode Voltage (for visual extinction of focused raster):** +41 to +56 V DC

For the cutoff of an undeflected focus spot, the absolute bias value increases by approximately 4 V.

## Technical Summary

The **19CUP4** is a 19-inch rectangular glass picture tube featuring a 114-degree diagonal deflection angle, electrostatic focusing, and magnetic deflection. Its "HiGm" electron gun is optimized for cathode drive service under low Grid #2 voltage conditions, requiring a typical Grid #2 potential of only 65 V DC and an anode potential of 16,000 V DC (up to a design maximum of 22,000 V DC). The tube utilizes an aluminized P4 phosphor screen for a white, medium-short persistence display, and is equipped with a B7-208 base and an 8HR basing arrangement.

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