



ELECTRONIC TUBE REFERENCE

19AQP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

P4 cathode-ray picture-display tube documented by National Video, typically operated at 16 kV with manufacturer-specified heater characteristics.

GENERAL CHARACTERISTICS

BASE DESIGNATION	8HR	BASE PINS	8
NOMINAL HEATER	6.3 V / 300 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Cathode Ray	
MAXIMUM PLATE VOLTAGE	20000 V
MAXIMUM SCREEN VOLTAGE	550 V
MAXIMUM HEATER-CATHODE VOLTAGE	180 V
<i>CRT anode and grid-2 maximum ratings are promoted from the printed ratings block; other CRT-specific focus/drive/deflection values are preserved in parameters.</i>	

19AQP4 — Electrostatic-Focus Television Picture Tube

The **19AQP4** is a magnetically deflected, electrostatic-focus cathode-ray picture tube designed for television receiver applications. It features a wide-angle deflection system, a short neck length, and a straight electron gun design that eliminates the need for an external ion-trap magnet. The tube incorporates an aluminized metal-backed screen utilizing P4 phosphor, providing high brightness and contrast.

Mechanical Design and Physical Dimensions

The 19AQP4 is constructed using the **J-149** glass bulb envelope. The physical dimensions of the tube are highly compact relative to its screen area, characterized by a short overall length and wide deflection angles.

Envelope Dimensions

- **Overall Length:** $11 \frac{3}{8}'' \pm \frac{1}{4}''$
- **Greatest Diagonal Dimension:** $18 \frac{5}{8}'' \pm \frac{1}{8}''$
- **Greatest Width:** $16 \frac{13}{32}'' \pm \frac{1}{8}''$
- **Greatest Height:** $13 \frac{11}{32}'' \pm \frac{1}{8}''$
- **Neck Length:** $4 \frac{1}{8}'' \pm \frac{1}{8}''$

The bulb's splice line seal bulge may increase the maximum envelope width, diagonal, and height by up to 1/8 inch, but it does not protrude more than 1/16 inch beyond the mold match line. The minimum undisturbed area between the mold match line and the panel side of the seal bulge is 3/4 inch. A transparent insulating coating covers the area around the anode button to prevent electrical leakage or arcing.

Screen Characteristics and Useful Area

The screen features an aluminized P4 phosphor with a metal back. The minimum useful screen dimensions (projected) are:

- **Diagonal:** $17 \frac{9}{16}''$
- **Horizontal Axis:** $15 \frac{1}{8}''$
- **Vertical Axis:** $12''$
- **Total Useful Area:** 172 square inches

The light transmittance at the center of the screen is approximately 78%.

Deflection Angles

The tube's wide-angle deflection system is characterized by the following approximate angles:

- **Horizontal Deflection:** 114°
- **Vertical Deflection:** 103°
- **Diagonal Deflection:** 86°

The reference line of the envelope is determined by the JEDEC #126 reference line gauge.

Electrical Connections and Basing

The 19AQP4 utilizes a **B7-208** base, also designated as a Small Button Neoeightar 7-Pin base (Arrangement 1). The electrical connections are configured according to the **8HR** basing diagram.

Pinout Configuration

The pin connections, viewed from the bottom of the base, are assigned as follows:

Pin Number	Connection
Pin 1	Heater
Pin 2	Grid #1 (Control Grid)
Pin 3	Grid #2 (Screen Grid)
Pin 4	Grid #4 (Focusing Electrode)
Pin 5	<i>No Connection</i>
Pin 6	Grid #1 (Control Grid)
Pin 7	Cathode
Pin 8	Heater
Bulb Contact	Ultor (Grid #3, Grid #5, and Collector)

The high-voltage anode connection is made via a **J1-21** recessed small cavity cap (Ultor contact).

Socket Mounting Recommendation

Because of the physical requirements of the tube and its base, the socket must not be rigidly mounted. It should be connected using flexible leads and allowed to move freely to prevent mechanical stress on the tube neck and base pins.

Heater and Electrical Ratings

Heater Ratings

The 19AQP4 is designed to operate from a standard heater supply. The heater ratings are:

- **Nominal Heater Voltage:** 6.3 V
- **Maximum Heater Voltage:** 7.0 V
- **Minimum Heater Voltage:** 5.7 V
- **Heater Current (at 6.3 V):** 0.30 A $\pm$ 5% (300 mA)

Interelectrode Capacitances

The tube features an external conductive coating that, when grounded, acts as a filter capacitor in conjunction with the internal anode coating. The capacitance between these elements is:

- **External Conductive Coating to Anode (Maximum):** 1500 pF (μ F)
- **External Conductive Coating to Anode (Minimum):** 1000 pF (μ F)

Maximum Ratings

The maximum ratings for the 19AQP4 are absolute limits, with all voltage values positive and referenced with respect to the cathode unless otherwise specified.

- **Anode Voltage:** 20,000 V
- **Grid #4 (Focusing Electrode) Voltage:** +1000 V to -500 V
- **Grid #2 Voltage:** 550 V
- **Grid #1 (Control Grid) Voltage:**
 - Maximum Negative DC Value: 155 V
 - Maximum Negative Peak Value: 220 V
 - Maximum Positive DC Value: 0 V
 - Maximum Positive Peak Value: 2 V
- **Heater-Cathode Voltage:**
 - **Heater negative with respect to cathode:**
 - During equipment warm-up period (≤ 15 seconds): 410 V
 - After equipment warm-up period: 180 V
 - **Heater positive with respect to cathode:** 180 V

Typical Operating Conditions (Grid Drive Service)

Under typical operating conditions in grid drive service, the electrode voltages are set as follows (with all voltages positive with respect to the cathode):

- **Anode Voltage:** 16,000 V DC
- **Grid #2 Voltage:** 300 V DC
- **Grid #4 (Focusing Electrode) Voltage:** 0 to 400 V DC
 - *Note:* Satisfactory focus for individual tubes is obtained within this 0 to 400 V range at an anode current of 100 μ A on a 12" x 15 1/8" raster pattern.
- **Grid #1 Voltage (for visual extinction of focused raster):** -38 to -72 V DC

Safety Considerations

When operating the 19AQP4, safety precautions regarding X-ray radiation must be observed. If the tube is operated at anode voltages exceeding 16,000 V, shielding may be necessary to protect personnel against prolonged exposure at close range.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1956 National Video

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

1956 NATIONAL VIDEO

Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Typical Anode Voltage	16000 V	—
Phosphor	P4	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage Nominal	6.3 V	—
Heater Current Nominal	300 mA	—