



ELECTRONIC TUBE REFERENCE

19AJP4

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

Wide-angle P4 monochrome television picture tube designed for high-voltage direct-view service, with magnetic deflection and manufacturer warnings concerning X-ray shielding at elevated anode voltages.

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	19800 V
MAXIMUM SCREEN VOLTAGE	70 V
<i>Low-grid-2 cathode-drive picture tube; voltages referenced to grid No.1.</i>	

19AJP4 — Television Picture Tube

The **19AJP4** is a 19-inch direct-viewed, rectangular glass television picture tube designed primarily for cathode-drive service. It features a low-voltage electrostatic focusing system, 114-degree magnetic deflection, and an aluminized screen. The tube operates with a low Grid No. 2 voltage and does not require an ion-trap magnet.

Mechanical and Physical Construction

The 19AJP4 is built using a rectangular glass bulb (J149A) and has a nominal weight of approximately 13.5 to 14 pounds.

Dimensions and Screen Area

- **Overall Length:** 11-3/8 ± 1/4 inches
- **Neck Length:** 4-1/8 ± 1/8 inches
- **Neck Diameter:** 1-1/8 inches
- **Minimum Useful Screen Dimensions:**
 - Height: 12 inches
 - Width: 15-1/8 to 15-5/8 inches
 - Diagonal: 17-9/16 inches
- **Minimum Useful Screen Area:** 172 square inches

Faceplate and Screen Characteristics

The tube features a spherical faceplate made of gray filter glass with a light transmittance of approximately 78% to 79%. The screen is coated with an aluminized P4-Sulfide Type phosphor, which exhibits white fluorescence and short-to-medium persistence.

To prevent electrostatic charge buildup, the tube is equipped with an external conductive coating that must be grounded. The grounding contact area is located near the Reference Line. The high-voltage connection is made via a recessed small cavity cap (JEDEC No. J1-21) on the bulb. The tube can be operated in any position.

Heater and Warm-Up Characteristics

The 19AJP4 utilizes an indirectly heated, coated unipotential cathode. The heater is designed with controlled warm-up characteristics to facilitate series-string operation in television receivers.

- **Nominal Heater Voltage:** 6.3 V
- **Heater Voltage Range (Design-Maximum):** 5.8 V to 7.0 V
- **Heater Current:** 450 mA (with a tolerance of ±5% to ±10%)
- **Average Heater Warm-Up Time:** 11 seconds

The heater 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 an external resistance equal to three times the rated heater voltage divided by the rated current. The maximum warm-up period under these conditions is 15 seconds.

Basing and Pin Connections

The 19AJP4 uses a special 6-pin base (JEDEC No. B6-214) with a 7FA basing designation (viewed from the bottom). Base Pin No. 7 aligns with the anode contact (J1-21) within an angular tolerance of 30 degrees.

Depending on the specific manufacturing variant, the pin connections for the 7FA basing are documented with the following configurations:

Configuration 1

- **Pin 2:** Cathode
- **Pin 3:** Heater
- **Pin 4:** Heater
- **Pin 5:** Grid No. 1
- **Pin 6:** Grid No. 4 (Focusing Electrode)
- **Pin 7:** Grid No. 2
- **Recessed Cap:** Ultor (Grid No. 3, Grid No. 5, Collector)
- **External Coating:** Grounding contact

Configuration 2

- **Pin 1:** Heater
- **Pin 2:** Cathode
- **Pin 3:** Grid No. 1
- **Pin 4:** Grid No. 4 / Focus
- **Pin 6:** Grid No. 4 / Focus
- **Pin 7:** Grid No. 2
- **Pin 8:** Heater
- **Recessed Cap:** Anode
- **External Coating:** Grounding contact

Configuration 3

- **Pin 1:** Heater
- **Pin 2:** Cathode
- **Pin 3:** Grid No. 1
- **Pin 4:** Heater
- **Pin 5:** Grid No. 1
- **Pin 6:** Grid No. 4 / Focusing Electrode
- **Pin 7:** Grid No. 2
- **Recessed Cap:** Anode
- **External Coating:** Grounding contact

Interelectrode Capacitances

The direct interelectrode capacitances of the tube are approximately:

- **Grid No. 1 to all other electrodes:** 6 μF
- **Cathode to all other electrodes:** 5 μF
- **External conductive coating to anode/ultor:** 1400 μF minimum to 1900 μF maximum

Electrical Ratings and Operating Limits

The following limits are specified under the Design-Maximum Rating System. Operating the tube beyond these limits can cause permanent damage or severely degrade performance.

- **Anode (Ultor) Voltage:** 12,000 V DC (minimum) to 19,800 V DC (maximum)
- **Grid No. 4 (Focusing Electrode) Voltage:** -500 V to +1100 V DC (or -550 V to +1100 V DC)
- **Grid No. 2 Voltage:** 40 V DC (minimum) to 70 V DC (maximum)
- **Cathode Voltage (Positive Bias):** 100 V DC (maximum)
- **Cathode Voltage (Negative Peak):** 0 V
- **Grid No. 1 Circuit Resistance:** 1.5 MΩ (maximum)

Peak Heater-Cathode Voltage Limits

- **Heater negative with respect to cathode:**
 - During equipment warm-up (≤ 15 seconds): 410 V maximum
 - After equipment warm-up (steady state): 180 V maximum
- **Heater positive with respect to cathode:** 180 V maximum

Typical Operating Conditions (Cathode-Drive Service)

In typical cathode-drive applications, all electrode voltages are specified as positive with respect to the Grid No. 1 voltage:

- **Anode (Ultor) Voltage:** 14,500 V DC
- **Grid No. 2 Voltage:** 50 V DC
- **Grid No. 4 (Focusing) Voltage:** 0 to +500 V DC
- **Cathode Voltage for Cutoff (Visual Extinction of Focused Raster):** 31 to 49 V DC (or 35 to 50 V DC)

Note: Visual extinction of a stationary focused spot requires an increase of approximately 5 V in the cathode voltage.

Focus Modulation

The focus electrode (Grid No. 4) may be modulated to improve overall focus across the entire screen area.

Safety and Operating Considerations

X-ray Radiation Warning

When operated at voltages above 16,000 volts or the maximum rated anode voltage (whichever is less), the 19AJP4 can produce X-rays. Adequate shielding may be necessary to protect against prolonged exposure at close range.

Grounding

The external conductive coating must be securely grounded to the chassis to prevent electrostatic charge buildup and ensure safe operation.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1950 Sylvania

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

1950 SYLVANIA

Section 1 · Cathode Ray

OTHER

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate Voltage	20000 V	—
Anode Voltage	14500 V	—

CHARACTERISTIC

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Phosphor	P4	Aluminized



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

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

CHARACTERISTICS

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Focusing method	Electrostatic	—
Deflection method	Magnetic	—
Horizontal deflection angle	101 deg	—
Diagonal deflection angle	114 deg	—
Vertical deflection angle	86 deg	—
Fluorescence	White	—
Persistence	Short to medium	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	6.3 V	—
Heater current	450 mA	—

CONSTRUCTION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Phosphor	Aluminized P4	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum anode voltage	20000 V	—
Typical anode voltage	14500 V	—
Typical focus-electrode voltage maximum	500 V	—
Typical grid2 voltage	50 V	—
Cutoff voltage range	+35 to +50 V	—
Grid1 circuit resistance maximum	1.5 Mohm	—

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid1-to-all capacitance	6 pF	—
External conductive coating to anode capacitance maximum	1900 pF	—

APPLICATION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Application	Monochrome television picture display	—



SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1971 RCA HB3 Binder 1 of 7

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

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	19800 V	—
Minimum anode/ultor voltage	12000 V	—
Typical anode/ultor voltage	19800 V	PictureTubeService
Maximum grid No.2 voltage	70 V	—
Typical grid No.2 voltage	50 V	PictureTubeService
Focus-voltage range minimum	0 V	OptimumFocus
Focus-voltage range maximum	500 V	OptimumFocus
Visual-extinction voltage range minimum	31 V	FocusedRasterExtinction
Visual-extinction voltage range maximum	49 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	410 V	HeaterNegative;Warmup<=15s
Peak heater-cathode voltage after warm-up	200 V	HeaterNegative
Peak heater-cathode voltage heater positive	180 V	HeaterPositive

CONSTRUCTION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Focusing method	LowVoltageElectrostatic	—
Deflection method	Magnetic	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Phosphor	P4	—
Screen type	White	P4

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Deflection angle	114 deg	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