

Nineteen-inch direct-view monochrome television CRT with electrostatic focusing, magnetic deflection, and an aluminized P4 white screen. Published high-voltage ratings and operating data support bright receiver display at anode voltages around 20 kV.

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	
MAXIMUM PLATE VOLTAGE	20000 V
Published maximum ratings and electrical characteristics promoted from the approved source.	

19XP4 — Rectangular Glass Television Picture Tube

The 19XP4 is a 19-inch, directly viewed, rectangular glass television picture tube designed for use in television receivers. It features a low-voltage electrostatic focusing system and a 114-degree magnetic deflection system. The tube incorporates an aluminized screen and does not require an external ion-trap magnet.

Mechanical and Envelope Design

The 19XP4 utilizes a rectangular glass envelope with a spherical faceplate. The faceplate is constructed from gray filter glass with approximately 78% light transmittance to enhance picture contrast under

ambient light. The screen is coated with aluminized P4 phosphor, which exhibits white fluorescence with short to medium persistence.

The physical dimensions and mechanical characteristics of the tube are as follows:

- Minimum Useful Screen Dimensions: Height of 12 inches, width of 15-1/8 inches, and a diagonal of 17-9/16 inches.
- Minimum Useful Screen Area: 172 square inches.
- Deflection Angles: 114° diagonal, 101° to 102° horizontal, and 85° to 86° vertical.
- Bulb Designation: J149A or J149A1.
- Neck Diameter: 1-1/8 inches.
- Neck Length: 4-1/8 ± 1/8 inches (with some specifications indicating up to 4-3/8 ± 1/8 inches).
- Overall Length: 11-3/8 ± 1/4 inches, with a maximum length of 11-5/8 inches.
- Weight: Approximately 13.5 to 14 pounds.
- Bulb Contact: Recessed Small Cavity Cap (JEDEC No. J1-21).
- Base: Small-Button Neoeightar 7-Pin with indexing plug (JEDEC No. B7-208), using the 8HR basing arrangement.
- External Coating: An external conductive bulb coating is provided and must be grounded to serve as a high-voltage filter capacitor.

Heater and Electrical Characteristics

The 19XP4 is equipped with an indirectly heated cathode. The heater is designed for series or parallel operation in television receivers.

- Nominal Heater Voltage: 6.3 V
- Nominal Heater Current: 600 ± 30 mA (or 0.60 A ± 5%)
- Heater Warm-up Time: 11 seconds average

The heater warm-up time is defined using a standard test circuit. The test circuit applies 4 times the rated heater voltage ($4 * 6.3 \text{ V} = 25.2 \text{ V}$) to the heater in series with a resistance. The series resistance is calculated as 3 times the rated heater voltage divided by the rated heater current:

Calculation: $R = 3 * (6.3 \text{ V} / 0.60 \text{ A}) = 31.5 \text{ ohms}$

The warm-up time is the duration required for the voltage across the heater terminals to reach 80% of its rated value (5.04 V) in this series circuit.

Direct Interelectrode Capacitances

- Cathode to all other electrodes: 5 pF (μF)
- Grid No. 1 to all other electrodes: 6 pF (μF)
- External conductive coating to ultor (anode): 1000 pF minimum, 1500 pF maximum

Pinout and Basing

The 19XP4 uses the 8HR basing configuration on a 7-pin Neoeightar base. The pin connections are assigned as follows:

- Pin 1: Heater
- Pin 2: Grid No. 1
- Pin 3: Grid No. 2
- Pin 4: Grid No. 4 (Focusing Electrode)
- Pin 6: Grid No. 1
- Pin 7: Cathode
- Pin 8: Heater
- Recessed Cavity Cap: Ultor (Grid No. 3, Grid No. 5, Collector / Anode)
- External Coating: Ground Connection

Base Pin No. 4 is aligned within 30 degrees of the horizontal centerline of the tube and is positioned on the same side as the anode contact cap.

Design-Maximum Ratings

The 19XP4 can be operated in either grid-drive or cathode-drive configurations. The design-maximum ratings represent the limiting values for safe and reliable operation and must not be exceeded under any circumstances.

Grid-Drive Service

In grid-drive service, voltages are specified positive with respect to the cathode:

- Ultor (Anode) Voltage: 20,000 V maximum, 11,000 V minimum
- Grid No. 4 (Focusing Electrode) Voltage: -550 V to +1100 V
- Grid No. 2 Voltage: 550 V maximum, 200 V minimum
- Grid No. 1 Voltage:
 - Negative bias value: 154 V
 - Negative peak value: 220 V
 - Positive bias value: 0 V
 - Positive peak value: 2 V

Cathode-Drive Service

In cathode-drive service, voltages are specified positive with respect to Grid No. 1:

- Ultor-to-Grid-No. 1 Voltage: 20,000 V maximum, 11,000 V minimum
- Grid-No. 4-to-Grid-No. 1 Voltage: -400 V to +1250 V (with some ratings specifying -550 V to +1100 V)
- Grid-No. 2-to-Grid-No. 1 Voltage: 350 V to 700 V (with some ratings specifying a minimum of 200 V)
- Grid-No. 2-to-Cathode Voltage: 550 V maximum

- Cathode-to-Grid-No. 1 Voltage:
 - Positive bias value: 154 V
 - Positive peak value: 220 V
 - Negative bias value: 0 V
 - Negative peak value: 2 V

Common Heater and Cathode Ratings

- Heater Voltage: 5.7 V minimum, 6.9 V maximum
- Peak Heater-Cathode Voltage:
 - Heater negative with respect to cathode during warm-up (≤ 15 seconds): 450 V maximum
 - Heater negative with respect to cathode after warm-up: 200 V maximum
 - Heater positive with respect to cathode: 200 V maximum

Typical Operating Conditions and Circuit Design

The 19XP4 can be set up under typical operating conditions for both drive methods. The focusing electrode (Grid No. 4) operates at a low voltage relative to the high-voltage ultor.

Typical Operating Examples

Parameter	Grid-Drive (Example A)	Grid-Drive (Example B)	Cathode-Drive (Example A)	Cathode-Drive (Example B)
Ultor Voltage	16,000 V	18,000 V	16,000 V	18,000 V
Grid No. 2 Voltage	400 V	400 V	400 V	400 V (to G1)
Grid No. 4 Voltage for Focus	0 to 400 V	0 to 400 V	0 to 400 V	0 to 400 V (to G1)
Cutoff Voltage	-46 to -94 V	-36 to -94 V	42 to 78 V	36 to 78 V
Video Drive (White-level)	—	36 to 94 V	—	-36 to -78 V

Circuit Design and Operating Notes

- Grid No. 1 Circuit Resistance: The maximum allowable resistance in the Grid No. 1 circuit is 1.5 Megohms.
- Focusing Electrode Current: Grid No. 4 current ranges from -25 to +25 μA .
- Screen Grid Current: Grid No. 2 current ranges from -15 to +15 μA .
- Centering Magnet Field Strength: A centering magnet with a field strength of 0 to 8 gaussess may be used.

- **Spot Cutoff:** For cutoff of the undeflected focused spot, the absolute value of the bias between the cathode and Grid No. 1 will increase by approximately 5 volts compared to the standard raster-cutoff values.
- **Raster Cutoff Range:** The cutoff voltage magnitude increases as the Grid No. 2 (or Grid-No. 2-to-Grid-No. 1) voltage is increased.
- **Drive Characteristics:** Both cathode-drive and grid-drive configurations exhibit highly similar ultor current and highlight brightness curves relative to the video signal voltage from cutoff. Cathode-drive operation yields a slightly higher ultor current at high drive levels. Under typical conditions with a 16,000 V ultor supply, highlight brightness can reach up to 1000 footlamberts at approximately 70 to 80 V of drive.
- **X-ray Warning:** When the 19XP4 is operated at anode voltages exceeding 16,000 V, X-ray shielding may be required to protect users from radiation exposure, as the potential for soft X-ray generation increases with higher operating voltages.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1940 RCA

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

1940 RCA

Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
HeaterVoltageNominal	6.3 V	Nominal
HeaterCurrentNominal	600 mA	Nominal
Maximum Plate Voltage	20000 V	—
UltorVoltageMaximum	20000 V	Grid-drive service

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

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Phosphor	P4	—
Focusing method	Electrostatic	—
Deflection method	Magnetic	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	6.3 V	—
Heater current	600 mA	—

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

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage	6.3 V	—
Heater Current	600 mA	—
FocusingMethod	Electrostatic	—
DeflectionMethod	Magnetic	—
Phosphor	Aluminized P4 white	—
DeflectionAngles	114-degree magnetic	—
Cathode To All Capacitance	5 pF	—
Grid1 To All Capacitance	6 pF	—
ExternalConductiveCoatingToAnodeCapacitanceMaximum	1500 pF	—
ExternalConductiveCoatingToAnodeCapacitanceMinimum	1000 pF	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
AnodeVoltageMaximum	23000 V	—
AnodeVoltageMinimum	15000 V	—
FocusingElectrodeVoltageRangeMaximum	-400 to +1250 V	—
Grid2VoltageMaximum	700 V	—
Grid2VoltageMinimum	350 V	—
Grid1NegativeBiasMagnitudeMaximum	155 V	—
Grid1PositivePeakVoltageMaximum	2 V	—
HeaterCathodeVoltageMaximum	450 V	Warmup<=15s;HeaterNegative
HeaterCathodeVoltageMaximum	200 V	AfterWarmup
HeaterCathodeVoltageMaximum	200 V	HeaterPositive

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Anode Voltage	20000 V	—
FocusingElectrodeVoltage	0 to +400 V	—
Grid1VoltageForCutoff	-42 to -78 V	—
Grid1CircuitResistanceMaximum	1.5 Mohm	—

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