

Nineteen-inch short-neck black-and-white television picture tube with 114-degree magnetic deflection, gray filter glass, electrostatic focusing, and no ion trap. Its aluminized P4 screen operates at high anode voltage for direct viewing.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	7
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
Cathode-ray electron-gun/screen system; anode/ultor maximum promoted to MaxPlateVoltage when explicitly published. No explicit X-ray precaution detected in the supplied source.	

19YP4 — Television Picture Tube

The **19YP4** is a 19-inch direct-viewed, short rectangular glass television picture tube. It features a spherical faceplate made of gray filter glass, an aluminized screen with P4-Sulfide phosphor, and low-voltage (or Tri-Potential) electrostatic focusing. The tube utilizes magnetic deflection with a wide diagonal deflection angle of 114° and does not require an ion-trap magnet. It is designed with a short neck and an external conductive coating that must be grounded during operation.

Mechanical and Physical Construction

The 19YP4 is housed in a J149A1 glass bulb with a short neck, measuring $3\text{-}9/16 \pm 1/8$ inches in length and $1\text{-}1/8$ inches in diameter, with a maximum neck diameter at the splice of 1.168 inches. The overall length of the tube is $10\text{-}13/16 \pm 1/4$ inches.

The screen has a minimum useful projected area of 172 square inches, with minimum useful screen dimensions of $15\text{-}1/8$ inches in width and 12 inches in height. The diagonal dimension of the faceplate is $18\text{-}5/8 \pm 1/8$ inches, while the greatest physical width and height of the bulb are $16\text{-}13/32 \pm 1/8$ inches and $13\text{-}11/32 \pm 1/8$ inches, respectively. The tube weighs approximately 13-1/2 to 14 pounds.

The faceplate is constructed of gray filter glass providing approximately 78% light transmission at the center. The aluminized screen utilizes P4-Sulfide phosphor, which exhibits white fluorescence and phosphorescence with medium-short to short-to-medium persistence.

Deflection is achieved magnetically, with approximate deflection angles of:

- **Diagonal:** 114°
- **Horizontal:** 102° to 103°
- **Vertical:** 85° to 86°

Electrical Connections and Pinout

The 19YP4 uses a Small-Button Neoeightar 7-Pin base (JEDEC No. B7-208) with an 8JR basing designation. High-voltage connection to the anode (ultor) is made via a Recessed Small Cavity Cap (JEDEC No. J1-21) located on the bulb envelope, which is aligned with Pin 4 within an angular tolerance of 30° .

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

Pin	Connection
Pin 1	Heater
Pin 2	Grid No. 1 (Control Grid)
Pin 3	Grid No. 2 (Screen Grid)
Pin 4	Grid No. 3 (Focusing Electrode)
Pin 6	Internal Connection (IC) — Do Not Use
Pin 7	Cathode
Pin 8	Heater
Cap	Anode / Ultor (Grid No. 4, Collector)
Coating	External Conductive Coating (C) — Must be Grounded

Heater Ratings

The heater is designed for controlled warm-up service with the following parameters:

- **Nominal Heater Voltage:** 6.3 V (AC or DC)
- **Heater Voltage Range (Design-Maximum):** 5.7 V to 6.9 V
- **Heater Current (at 6.3 V):** 600 mA (with a tolerance of $\pm 5\%$ or ± 30 mA)
- **Average Warm-Up Time:** 11 seconds

Interelectrode Capacitances

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

Operating Conditions and Drive Services

The 19YP4 can be operated in either Grid-Drive or Cathode-Drive configurations. The design-maximum ratings and typical operating conditions differ depending on the chosen drive service.

Grid-Drive Service

In Grid-Drive service, voltages are referenced to the cathode.

Design-Maximum Ratings

- **Anode (Ultor) Voltage:** 11,000 V to 20,000 V DC
- **Grid No. 3 (Focusing) Voltage:** -350 V to +700 V DC
- **Grid No. 2 Voltage:** 300 V to 600 V DC
- **Grid No. 1 Voltage:**
 - Negative-bias value: 154 V or 155 V DC
 - Negative-peak value: 220 V
 - Positive-bias value: 0 V DC
 - Positive-peak value: 2 V

Typical Operating Conditions

- **Anode Voltage:** 16,000 V DC
- **Grid No. 3 Voltage for Focus:** 0 to 400 V DC
- **Grid No. 2 Voltage:** 500 V DC
- **Grid No. 1 Voltage for Visual Extinction of Focused Raster (Cutoff):** -43 V to -78 V DC

Cutoff Behavior

The Grid No. 1 cutoff voltage varies linearly with Grid No. 2 voltage. At a Grid No. 2 voltage of 300 V, cutoff occurs between -25 V and -50 V. At a Grid No. 2 voltage of 600 V, cutoff shifts to between -52 V and -92 V.

Cathode-Drive Service

In Cathode-Drive service, voltages are referenced to Grid No. 1.

Design-Maximum Ratings

- **Anode-to-Grid No. 1 Voltage:** 11,000 V to 20,000 V DC
- **Grid No. 3-to-Grid No. 1 Voltage:** -200 V to +850 V DC
- **Grid No. 2-to-Grid No. 1 Voltage:** 450 V to 750 V DC
- **Grid No. 2-to-Cathode Voltage:** 600 V DC
- **Cathode-to-Grid No. 1 Voltage:**
 - Positive-bias value: 154 V or 155 V DC
 - Positive-peak value: 220 V
 - Negative-bias value: 0 V DC
 - Negative-peak value: 2 V

Typical Operating Conditions

- **Anode-to-Grid No. 1 Voltage:** 16,000 V DC
- **Grid No. 3-to-Grid No. 1 Voltage for Focus:** 0 to 400 V DC
- **Grid No. 2-to-Grid No. 1 Voltage:** 500 V DC
- **Cathode-to-Grid No. 1 Voltage for Visual Extinction of Focused Raster (Cutoff):** 41 V to 69 V DC

Cutoff Behavior

The Cathode-to-Grid No. 1 cutoff voltage varies linearly with the Grid No. 2-to-Grid No. 1 voltage. At a Grid No. 2-to-Grid No. 1 voltage of 450 V, cutoff occurs between 38 V and 62 V. At a Grid No. 2-to-Grid No. 1 voltage of 750 V, cutoff shifts to between 58 V and 102 V.

Heater-Cathode Voltage Ratings (Both Services)

- **Heater negative with respect to cathode:**
 - During warm-up period (≤ 15 seconds): 450 V max
 - After equipment warm-up: 200 V max
- **Heater positive with respect to cathode:** 200 V max

Limiting Circuit Values

- **Maximum Grid No. 1 Circuit Resistance:** 1.5 Megohms
- **Minimum Grid No. 2 and Grid No. 3 Circuit Resistance:** 10,000 Ohms (protective resistance is advised to prevent damage from internal arcing)

Focus and Centering Characteristics

The low-voltage electrostatic focusing system (Grid No. 3) typically requires a voltage between 0 and 400 V DC to achieve optimum focus. This focus voltage is dynamic and varies based on other operating parameters:

- It increases directly with anode voltage at a rate of approximately 46 V per 1000 V change in anode potential.
- It decreases inversely with Grid No. 2 voltage at a rate of approximately 60 V per 100 V change in Grid No. 2 potential.
- It decreases inversely with anode current at a rate of approximately 60 V per 100 μ A change in anode current.

Centering Magnet

A permanent magnet (PM) centering magnet may be positioned at a distance not exceeding 2-1/4 inches from the reference line. The maximum field strength of this magnet is dependent on the anode voltage and is calculated using the following formula:

$$\text{Max Field Strength} = \sqrt{\frac{E_{\text{anode}}}{16000}} \times 10 \text{ gauss}$$

Where E_{anode} is represented by E_{c4k} in Grid-Drive service or E_{c4g1} in Cathode-Drive service. Under typical operating conditions at 16,000 V, the maximum field strength is 10 gauss.

Safety and Operational Warnings

- **X-ray Radiation:** X-ray shielding may be required if the tube is operated at anode voltages exceeding 16,000 V.
- **Grounding:** The external conductive coating must be reliably grounded to prevent electrical shock and ensure proper operation.

Technical Summary

The **19YP4** is a high-performance, 19-inch rectangular television picture tube utilizing low-voltage electrostatic focus and 114° magnetic deflection. Featuring a short neck design, a spherical gray filterglass faceplate with 78% light transmission, and an aluminized P4-Sulfide phosphor screen, it provides a minimum useful projected area of 172 square inches without requiring an ion-trap magnet. Operating typically at an anode voltage of 16,000 V, the tube supports both Grid-Drive and Cathode-Drive configurations with a controlled 11-second heater warm-up time. Its design-maximum ratings, linear cutoff characteristics, and protective circuit requirements ensure reliable operation in television receiver applications.



SOURCE OPERATING CONDITIONS

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	16000 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

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage	6.3 V	—
Heater Current	600 mA	—
FocusingMethod	Electrostatic	—
DeflectionMethod	Magnetic	—
Phosphor	Aluminized P4 white	—
DeflectionAngles	102H/85V/114D	—
Cathode To All Capacitance	5 pF	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid1 To All Capacitance	6 pF	—
ExternalConductiveCoatingToAnodeCapacitanceMaximum	1500 pF	—
ExternalConductiveCoatingToAnodeCapacitanceMinimum	1000 pF	—
Heater Warmup Time	11 s	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
AnodeVoltageMaximum	20000 V	—
AnodeVoltageMinimum	11000 V	—
FocusingElectrodeVoltageRangeMaximum	-350 to +700 V	—
Grid2VoltageMaximum	750 V	—
Grid2VoltageMinimum	450 V	—
Grid1NegativeBiasMagnitudeMaximum	155 V	—
Grid1PositivePeakVoltageMaximum	2 V	—
HeaterCathodeVoltageMaximum	450 V	Warmup<=15s;HeaterNegative
HeaterCathodeVoltageMaximum	200 V	AfterWarmup
HeaterCathodeVoltageMaximum	200 V	HeaterPositive
Anode Voltage	16000 V	—
FocusingElectrodeVoltage	0 to +400 V	—
Grid1VoltageForCutoff	-45 to -78 V	—
Grid1CircuitResistanceMaximum	1.5 Mohm	—



SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1965 Westinghouse Data Book

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

1965 WESTINGHOUSE DATA BOOK

Section 1 · Cathode Ray

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage	6.3 V	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Current	600 mA	—
Heater Warm-up Time	11 s	—
Focusing Method	Low Voltage Electrostatic text	—
Deflection Method	Magnetic text	—
Horizontal Deflection Angle	103 deg	Approximate
Vertical Deflection Angle	86 deg	Approximate
Diagonal Deflection Angle	114 deg	Approximate
Phosphor	Aluminized P4 text	—
Fluorescence	White text	—
Persistence	Short to Medium text	—
Light Transmittance	78 percent	Approximate
Cathode-to-All Capacitance	5 pF	Approximate
Grid1-to-All Capacitance	6 pF	Approximate
External Coating-to-Anode Capacitance Minimum	1000 pF	—
External Coating-to-Anode Capacitance Maximum	1500 pF	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Anode Voltage	20000 V	—
Minimum Anode Voltage	11000 V	—
Maximum Focus Electrode Voltage Positive	1100 V	Grid4
Maximum Focus Electrode Voltage Negative	-550 V	Grid4
Maximum Grid2 Voltage	700 V	—
Minimum Grid2 Voltage	300 V	—
Maximum Heater-Cathode Voltage During Warmup	450 V	Duration<=15s
Maximum Heater-Cathode Voltage After Warmup	200 V	—
Typical Anode Voltage	16000 V	CathodeDrive
Typical Focus Voltage Minimum	0 V	Grid4

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Typical Focus Voltage Maximum	400 V	Grid4
Typical Grid2 Voltage	500 V	CathodeDrive
Cathode Voltage for Raster Cutoff Minimum	41 V	CathodeDrive
Cathode Voltage for Raster Cutoff Maximum	69 V	CathodeDrive
Maximum Grid1 Circuit Resistance	1.5 Mohm	—


SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

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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	Nominal heater voltage
Heater Current	600 mA	Nominal heater current
Phosphor	P4	Published phosphor designation
Heater Current at	30 mA	Heater Current at 6.3 volts 600 t 30 ma
Heater Warm-Up Time (Average)	11 s	Heater Warm-Up Time (Average) 11 seconds
External conductive coating to ultor	1500 pF	External conductive coating to ultor 1500 max. pF
ULTOR VOLTAGE j20000 max. volts	0 V	ULTOR VOLTAGE j20000 max. volts
HEATER VOLTAGE f6.9 max. volts	9 V	HEATER VOLTAGE f6.9 max. volts
After equipment warm-up period	200 V	After equipment warm-up period. 200 max. volts
respect to cathode	200 V	respect to cathode 200 max. volts

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
With ultor voltage (Ec4 p) o} i6000 volts	0 V	With ultor voltage (Ec4 p) o} i6000 volts
and grid—No.2 voltage (Ecz	0 V	and grid—No.2 voltage (Ecz 21 0} goo volts `
Grid-No.3 Voltage for focus	0–400 V	Grid-No.3 Voltage for focus 0 to 400 volts
extinction of focused raster*	-43--78 V	extinction of focused raster* -43 to -78 volts
Grid-No.1-Circuit Resistance	1.5 MΩ	Grid-No.1-Circuit Resistance 1.5 max. megohms
ULTOR-TO-GRID-No.1 VOLTAGE	111000 V	ULTOR-TO-GRID-No.1 VOLTAGE 111000 min. volts
GRID-No.2-TO-GRID-No.1 VOLTAGE	1450 V	GRID-No.2-TO-GRID-No.1 VOLTAGE 1450 min. volts
GRID-No.2-TO-CATHODE VOLTAGE	600 V	GRID-No.2-TO-CATHODE VOLTAGE 600 max. volts
voltage (Ec4g l	16000 V	voltage (Ec4g l 1 0} 16000 volts
for focus	0–400 V	for focus 0 to 400 volts
extinction of focused rasters	41–69 V	extinction of focused rasters 41 to 69 volts
Grid-No_1-Circuit Resistance	1.5 MΩ	Grid-No_1-Circuit Resistance 1.5 max. megohms
46 volts for each	1000 V	46 volts for each 1000—volt change in ultor voltage; Inversely with
gritl—No.2 voltage at the rate of about	100 V	gritl—No.2 voltage at the rate of about 60 volts for each 100—volt
rate of about	100 μA	rate of about 60 volts for each 100—microampere change in ultor
o Dtaintel IP [he focusing voltage Is within	75 V	o Dtaintel IP [he focusing voltage Is within 75 volts of the value
wl thin	75 V	wl thin 75 volts of the optimum value tluring line-voltage fluctuations.
GRID-N\$3 VOLTS ADJUSTED FOR FOCUS	3 V	GRID-N\$3 VOLTS ADJUSTED FOR FOCUS.
GR D-N~3-GRID-N'I VOLTS ADJUSTED	3 V	GR D-N~3-GRID-N'I VOLTS ADJUSTED
GRID-N42 -TO-GRID-Nsl VOLTS	2 V	GRID-N42 -TO-GRID-Nsl VOLTS

CONSTRUCTION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Focusing Method	Electrostatic	Published focusing method
Deflection Method	Electrostatic	Published deflection method

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid No.1 to all other electrodes	6 pF	Grid No.1 to all other electrodes. 6 pF
Cathode to all other electrodes	5 pF	Cathode to all other electrodes 5 pF