

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

10ANP19

Specialized - Cathode Ray electronic tube

1 SECTION
CONSTRUCTION
CATHODERAY

Magnetically focused and deflected P19 cathode-ray display tube with orange long-persistence fluorescence, approximately 50-degree deflection, and typical 9 kV anode operation.

GENERAL CHARACTERISTICS

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

SECTION RATINGS

SECTION1 Cathode Ray
No fixed ratings recorded.
Special-purpose CRT electron-gun/display section.

10ANP19 Cathode Ray Tube

The **10ANP19** is a special-purpose, 10-inch round glass cathode ray tube designed for applications requiring magnetic deflection and magnetic focusing. It features a spherical, gray glass faceplate with an aluminized screen utilizing the P19 phosphor, which provides orange fluorescence, orange phosphorescence, and long persistence. The tube is characterized by a narrow 7/8-inch neck diameter, a miniature base, and a low-power heater.

Phosphor and Screen Characteristics

The 10ANP19 is specifically configured with the P19 phosphor screen. The characteristics of this and other phosphors available in the 10ANP family are as follows:

Phosphor	Fluorescence	Phosphorescence	Persistence
P4	White	White	Medium
P7	Blue	Yellow	Long
P16	Violet	Violet	Extremely Short
P19	Orange	Orange	Long
P25	Orange	Orange	Long

The faceplate of the tube is spherical, composed of gray glass, and aluminized to enhance brightness and performance.

Because of the physical properties of the P19 phosphor (as well as P16 and P25), the screen can be permanently damaged or burned if the electron beam current density is allowed to rise too high. To prevent screen burning, circuits must be designed and operated to employ minimum beam current densities.

Mechanical Specifications and Handling

The 10ANP19 features a robust mechanical design with precise alignment requirements:

- **Overall Length:** 16 inches maximum.
- **Faceplate Diameter:** 10-1/2 ± 1/16 inches.
- **Minimum Useful Screen Diameter:** 9 inches.
- **Neck Diameter:** 7/8 inch (nominally 0.840 inches, with a tolerance of +0.056 to -0.030 inches).
- **Bulb Contact:** J1-21 recessed small cavity cap, located on the cone.
- **Base:** E9-37 miniature base.
- **Basing Configuration:** 9NB.

Alignment and Installation

The alignment of the J1-21 bulb contact is tightly controlled: the plane of the J1-21 cap passes halfway between Pin 1 and Pin 9 with a tolerance of ±10 degrees. Additionally, the J1-21 cap is positioned on the same side of the tube as Pin 1 and Pin 9.

When installing the tube, a socket with a center opening must be used to clear the exposed tubulation at the base. Special care must be taken during handling to avoid damaging this exposed tubulation and to prevent bending the base pins.

The reference line of the tube is determined by the point where the leading edge of a JEDEC G-112 reference line gauge (a cylinder 2 inches long with an inside diameter of 1.500 inches, +0.003/-0.000 inches I.D.) stops.

Electrical Data and Basing

The 10ANP19 operates with a nominal heater voltage of 6.3 Volts and a heater current of 0.3 Ampere (with a tolerance of $\pm 10\%$).

Direct Interelectrode Capacitances

The approximate direct interelectrode capacitances of the tube are:

- **Cathode to all other electrodes:** 5 pF
- **Grid No. 1 to all other electrodes:** 6 pF
- **Grid No. 2 to all other electrodes:** 5 pF

Pin Connection Diagram (9NB Basing)

The E9-37 miniature base uses the 9NB basing arrangement, viewed from the bottom of the tube:

Pin Number	Connection
Pin 1	Grid No. 1 (G1)
Pin 2	Heater (H)
Pin 3	Grid No. 2 (<u>G2</u>)
Pin 4	No Connection (NC)
Pin 5	No Connection (NC)
Pin 6	Cathode (K)
Pin 7	Grid No. 2 (<u>G2</u>)
Pin 8	Heater (H)
Pin 9	Grid No. 1 (G1)
Cap	Anode (J1-21 Recessed Small Cavity Cap)

Maximum Ratings

The following design-maximum values represent the absolute limits within which the 10ANP19 must be operated to ensure reliability and prevent damage:

- **Anode Voltage:** 12,000 Volts dc
- **Grid No. 2 Voltage:** 450 Volts dc
- **Grid No. 1 Voltage:**
 - *Negative Bias Value:* 200 Volts dc
 - *Positive Bias Value:* 0 Volts dc

- *Positive Peak Value:* 0 Volts dc
- **Peak Heater-Cathode Voltage:**
 - *Heater Negative with Respect to Cathode:* 180 Volts
 - *Heater Positive with Respect to Cathode:* 180 Volts
- **Grid No. 1 Circuit Resistance:** 1.5 Megohms maximum

Typical Operating Conditions

Under typical operating conditions, the tube is set up with the following parameters:

- **Anode Voltage:** 9,000 Volts dc. Although rated up to 12,000 Volts, operating the tube with a lower accelerator voltage decreases both brilliance and definition. In general, the accelerator voltage should not be less than 7,000 Volts.
- **Grid No. 2 Voltage:** 250 Volts dc.
- **Grid No. 1 Voltage:** -15 to -45 Volts dc. This range is utilized to achieve visual extinction of the undeflected focused spot.
- **Focusing Coil Current:** Approximately 40 to 60 mA dc. This value is measured at an accelerator current of 100 μ A, using a JEDEC Focus Coil No. 127 (or equivalent) positioned 2-1/2 inches from the reference line.
- **Linewidth A:** 0.013 inch maximum. This is measured per MIL-E-1 specifications at an anode current of 400 μ A.
- **Spot Position (Undeflected):** The center of the undeflected focused spot will fall within a circle of 1/2-inch radius concentric with the center of the tube face, provided the tube is properly shielded.
- **Modulation:** 40 Volts maximum, measured per MIL-E-1 specifications at an anode current of 400 μ A.

Safety and X-Ray Radiation Precautions

When operating the 10ANP19, safety precautions regarding X-ray radiation must be observed. If the tube is operated at voltages higher than the manufacturer's maximum rated anode voltage (12,000 Volts) or 16,000 Volts, whichever is less, X-ray radiation shielding may be necessary. This shielding protects personnel from the potential danger of personal injury resulting from prolonged exposure at close range.

Technical Summary

The **10ANP19** is a specialized 10-inch round cathode ray tube featuring magnetic deflection (approximately 50-degree deflection angle) and magnetic focus. It utilizes a 6.3 V, 300 mA heater, a miniature E9-37 base with a 9NB pinout, and a J1-21 anode cap. Designed with a long-persistence orange P19 phosphor screen, it is optimized for specific display applications where image retention is required. To maintain performance and prevent permanent damage, designers must adhere to the 12,000 V maximum anode rating, limit beam current density to avoid screen burning, and implement appropriate X-ray shielding when operating at elevated voltages.

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
Heater Voltage	6.3 V	—
Heater Current	300 mA	—
Focusing Method	Magnetic text	—
Deflection Method	Magnetic text	—
Deflection Angle	50 deg	Approximate
Phosphor	P19 text	—
Fluorescence	Orange text	—
Persistence	Long text	—
Maximum Line Width	0.013 in	—
Maximum Undelected Spot Radius	0.5 in	—
Phosphorescence	Orange text	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Anode Voltage	12000 V	—
Maximum Grid2 Voltage	450 V	—
Maximum Grid1 Negative Bias	200 V	—
Maximum Grid1 Positive Bias	0 V	—
Maximum Heater-Cathode Voltage	180 V	EitherPolarity
Anode Voltage	9000 V	—
Grid2 Voltage	250 V	—
Grid1 Cutoff Voltage Minimum	-45 V	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid1 Cutoff Voltage Maximum	-15 V	—
Focusing Coil Current Minimum	40 mA	Approximate
Focusing Coil Current Maximum	60 mA	Approximate
Maximum Grid1 Circuit Resistance	1.5 Mohm	—