

Twelve-inch cathode-ray display tube with electrostatic focusing and magnetic deflection. It combines a long-persistence orange P19 screen with high-voltage operation for direct-view instrument and display applications requiring a lingering trace.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	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	13200 V
Published ratings and characteristics promoted semantically from the approved source; repeated identical sections compressed where applicable.	

12ABP19A — High-Definition Electrostatic-Focus Cathode Ray Tube

The 12ABP19A is a specialized, 12-inch direct-viewed round glass cathode ray tube (CRT) designed primarily for military and professional equipment. It features electromagnetic deflection, electrostatic focusing, an aluminized screen, and a semi-flat (spherical) faceplate. The tube's reinforced internal structure provides high mechanical robustness and exceptional operational safety in demanding environments.

Optical and Phosphor Characteristics

The 12ABP19A utilizes a P19 phosphor screen, which is characterized by orange fluorescence and orange phosphorescence with long persistence. This long-decay characteristic is highly suited for displaying slow-moving or continuous data. The spectral output of the P19 phosphor peaks in the orange region of the visible spectrum, at approximately 600 millimicrons (nanometers). Under typical operating conditions, the phosphorescence decay curve shows that relative intensity drops to approximately 0.5% after 120 seconds of decay from an initial luminance of 20 arbitrary units.

A key distinction of the "A" suffix in the 12ABP19A designation is the inclusion of an aluminized screen, which improves light output and prevents screen burning compared to the non-aluminized [12ABP19](#). The faceplate is constructed from gray filter glass with a nominal light transmittance of 74%, enhancing contrast under ambient lighting. The tube provides a minimum useful screen diameter of 11 inches (279.4 mm).

Mechanical Design, Basing, and Handling

The mechanical assembly of the 12ABP19A is designed to withstand severe environmental stress. The tube has a net weight of approximately 6.1 kg and features a deflection angle of approximately 55 degrees.

Basing and Pin Connections

The tube utilizes a Small Shell Duodecal 6-Pin base (designated as B6-63 or 12 C 27 U.T.E.) with a 12M basing configuration. The electrical connections are assigned as follows:

- **Pin 1:** Heater (Filament)
- **Pin 2:** Grid No. 1
- **Pin 6:** Grid No. 4 / Anode 1 (Focusing Electrode)
- **Pin 10:** Grid No. 2
- **Pin 11:** Cathode
- **Pin 12:** Heater (Filament)
- **Recessed Cavity Cap (J1-21):** Anode 2 (A)

The high-voltage Anode 2 connection is made via a recessed small cavity cap. The physical orientation of this anode contact aligns with the vacant pin position No. 3 within a tolerance of plus or minus 10 degrees.

Handling and Installation Precautions

Due to the high risk of implosion, the 12ABP19A must be handled with extreme care:

- **Support Points:** The tube must be supported at two points: near the front face using a molded support, and at the cone of the bulb (or via the deflection coils). Both support points must be lined with felt or rubber to prevent direct metal-to-glass contact. The neck or base must never be used as a support or point of leverage.

- **Handling Technique:** When removing the tube from its packaging, it should be held by the bulb near the front face, never by the neck. Avoid scratching the glass, especially the front faceplate.
- **Safety Equipment:** Operators should wear a protective face mask, gloves, and a protective vest or apron. A transparent, impact-resistant protective screen must be installed in front of the tube face in its final operating position.
- **Electrical Safety:** The anode connector carries extremely high voltage and can retain a significant charge even after power is removed. Avoid touching the anode contact directly. Flexible wiring must be used for all electrode connections to prevent mechanical stress on the glass envelope.

Electrical Specifications and Operating Points

The 12ABP19A operates with a nominal heater voltage of 6.3 V (allowable range of 6.3 V plus or minus 10%) and a nominal heater current of 0.6 A (with an acceptable range of 540 to 660 mA).

Interelectrode Capacitances

Measured without an external shield, the direct interelectrode capacitances are:

- **Cathode to all other electrodes:** 5 to 8 pF
- **Grid No. 1 to all other electrodes:** 6 to 10 pF

Typical Operating Conditions

For standard operation, the following typical electrical parameters are established:

- **Anode 2 Voltage (V_{a2}):** 10,000 V dc
- **Grid No. 4 (Focusing Electrode) Voltage (V_{a1}):** 0 to 300 V dc
- **Grid No. 2 Voltage (V_{g2})(/tubes/G2):** 300 V dc
- **Grid No. 1 Voltage for Cutoff (V_{g1}):** -28 to -72 V dc (with a typical blocking voltage of -50 V)
- **Alignment Magnet Field Strength:** 0 to 4 Gauss

Under these typical conditions, the tube achieves a high-definition line width of no more than 0.5 mm at the center of the screen (measured at a beam current of 5 μ A). The maximum distance of the focused spot from the geometric center of the screen is 16 mm. The modulation voltage required to produce a beam current of 100 μ A is a maximum of 32 V (which remains stable at a maximum of 32 V even after 500 hours of operation).

Absolute Maximum Ratings

To ensure reliable operation and prevent permanent damage, the following absolute maximum limits must not be exceeded:

- **Anode 2 Voltage:** 13,000 to 13,200 V dc (minimum 7,000 V dc)
- **Grid No. 4 (Focusing Electrode) Voltage:** -550 to 1,100 V dc
- **Grid No. 2 Voltage:** 770 V dc
- **Grid No. 1 Voltage:**

- **Continuous Negative Bias:** 200 V dc
- **Positive Bias Value:** 0 V dc
- **Positive Peak Value:** 0 V
- **Peak Heater-Cathode Voltage:** plus or minus 180 to 200 V dc (heater negative or positive with respect to cathode)
- **Grid No. 1 Circuit Resistance:** 1.5 MΩ maximum

Circuit Integration and Safety Guidelines

Power and Voltage Constraints

To prevent permanent damage to the aluminized screen, the effective resistance of the high-voltage anode supply must be designed to limit the total anode input power to a maximum of 6 watts. Additionally, to maintain acceptable brilliance and definition, the operating anode voltage should not be allowed to drop below 8,000 V.

Screen Burn Prevention

To avoid burning the phosphor screen, the electron beam spot must never remain stationary or move slowly across the screen, except at extremely low beam current densities. Designers should configure the power supply control circuitry to apply the deflection (sweep) voltages *before* applying the Grid No. 2 and Anode voltages.

High-Voltage Supply Design

The high-voltage supply for the accelerating anode can be implemented using a half-wave rectifier (with either a single-anode vacuum valve or a dry rectifier) or a voltage doubler circuit. Because the typical current demand is very low (1 mA maximum), small filter capacitors (such as 0.1 μF) are sufficient to provide adequate filtering.

Shielding and Alignment

The tube must be protected from external electromagnetic and electrostatic fields using a high magnetic permeability shield, such as a mu-metal shield (type U 6078). For optimum spot quality, an adjustable beam alignment magnet with a strength of 0 to 4 Gausses should be positioned approximately 5-3/16 inches from the reference line.

Environmental and Ruggedness Testing

To verify its suitability for military and professional applications, the 12ABP19A is rated to withstand rigorous vibration testing along two perpendicular axes:

- Sinusoidal vibrations at a frequency of 25 Hz with an acceleration of 2.5 g for 60 seconds in each direction.
- Sinusoidal vibrations at a frequency of 50 Hz with an acceleration of 10 g for 300 seconds in each direction.

- The tube is also rated to withstand an external atmospheric pressure of 3 kg/cm².

X-Ray Radiation Warning

When the 12ABP19A is operated at or near its maximum rated anode voltage, or at any voltage exceeding 16,000 V (whichever is lower), X-ray radiation shielding may be necessary to protect personnel from prolonged exposure at close range.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1958 Compagnie General

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

1958 COMPAGNIE GENERAL

Section 1 · Cathode Ray

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Focusing Method	Electrostatic	—
Deflection Method	Electromagnetic	—
Aluminized Screen	Yes	—
High Definition Screen	Yes	—
Ruggedized Construction	Yes	Military/professional equipment



SOURCE OPERATING CONDITIONS

1960 Du Mont

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

1960 DU MONT

Section 1 · Cathode Ray

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage	6.3 V	—
Heater Current	600 mA	—
Focusing Method	Electrostatic text	—
Deflection Method	Magnetic text	—
Phosphor	P19 text	—
Fluorescence	Orange text	—
Persistence	Long text	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Deflection Angle	55 deg	Approximate
Screen Construction	Aluminized/metal-backed text	—



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

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	6.3 V	—
Heater current	600 mA	—
Anode voltage maximum	13200 V	—
Grid No. 2 voltage maximum	770 V	—
Grid No. 1 negative bias maximum	200 V	—
Heater-cathode peak voltage	200 V	—