

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA
1 SECTION
CONSTRUCTION
CATHODERAY

10ABP4

Specialized - Cathode Ray electronic tube

Direct-view rectangular picture tube using electrostatic focusing and magnetic deflection, designed for approximately 90-degree scanning and operation with an anode supply up to 12 kV.

GENERAL CHARACTERISTICS

BASE DESIGNATION	B6-43	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
No fixed ratings recorded.
CRT maximum anode voltage 12000 V; CRT-specific electrode ratings retained in parameter table.

10ABP4 — Electrostatic Focus and Magnetic Deflection Picture Tube

The **10ABP4** is an all-glass, rectangular, direct-view cathode-ray picture tube designed primarily for television receiver applications. It features a nominal diagonal deflection angle of 90 degrees and utilizes electrostatic focusing in combination with magnetic deflection. The tube is constructed with a clear glass faceplate having a spherical contour, an electron gun designed for use with an external single-field ion-trap magnet, and an external conductive coating that forms a high-voltage filter capacitor when grounded.

Mechanical Specifications and Physical Dimensions

The 10ABP4 is characterized by its rectangular bulb geometry and relatively short overall length, which facilitates compact cabinet designs.

Bulb Dimensions and Screen Area

The physical envelope of the tube has the following dimensional specifications:

- **Overall Length:** 11 7/8 inches
- **Greatest Bulb Diagonal:** 10 3/8 inches (+1/8, -1/16 inch)
- **Greatest Bulb Width:** 9 3/4 inches (+1/8, -1/16 inch)
- **Greatest Bulb Height:** 7 1/2 inches (+1/8, -1/16 inch)
- **Neck Diameter:** 1 7/16 inches (+/- 1/16 inch)
- **Weight:** 4.5 lbs

The minimum useful screen dimensions are guaranteed to meet or exceed:

- **Useful Screen Area:** 53 1/2 square inches
- **Useful Screen Diagonal:** 9 9/16 inches
- **Useful Screen Width:** 8 7/8 inches
- **Useful Screen Height:** 6 9/16 inches

Hardware and Alignment

The tube is equipped with a standard **J1-21** high-voltage bulb contact (anode cap) and a **B6-63** base. The basing configuration is designated as **12L**.

Proper mechanical alignment is critical for installation:

- **Anode Contact Alignment:** The plane passing through the tube axis and pin position 6 aligns with the J1-21 bulb contact within a tolerance of +/- 30 degrees.
- **Reference Line:** The reference line of the bulb is defined by the plane where a standard JETEC reference line gauge #116 stops against the bulb body.
- **Socket Mounting:** To prevent mechanical stress on the glass neck and base pins, the socket for the B6-63 base must not be rigidly mounted. It must be free to move and connected via flexible electrical leads.

Electrical and Electro-Optical Characteristics

The 10ABP4 utilizes a specialized phosphor and electrode structure to achieve high-brightness monochrome displays.

Phosphor and Optical Characteristics

- **Phosphor Type:** No. 4 (P4)
- **Fluorescence Color:** White

- **Persistence:** Short to Medium
- **Faceplate Light Transmission:** Approximately 90% (utilizing clear glass with a spherical contour)

Direct Interelectrode Capacitances

The internal electrodes exhibit the following approximate capacitances:

- **Cathode to all other electrodes:** 5 uuf (pF)
- **Grid No. 1 to all other electrodes:** 6 uuf (pF)
- **External conductive coating to anode:** 850 uuf maximum, 400 uuf minimum

The capacitance between the external conductive coating and the internal anode serves as a filter capacitor for the high-voltage anode power supply when the external coating is properly connected to the receiver's chassis ground.

Basing Configuration (12L Pinout)

The 12L base connections, viewed from the bottom of the tube base, are assigned as follows:

Pin Number	Electrode Connection	Function
1	Heater (H)	Filament supply
2	Grid No. 1 (G1)	Control grid (bias and video signal input)
6	Grid No. 4 (G4)	Focus control electrode
10	Grid No. 2 (G2)	Screen grid (accelerating electrode)
11	Cathode (K)	Electron emitter
12	Heater (H)	Filament supply
Cap	Anode (A)	High-voltage accelerating anode (J1-21 contact)

Maximum Ratings (Design Center Values)

Operating the 10ABP4 beyond its design center ratings can cause permanent damage or severely degrade performance. The following absolute limits must be observed:

Electrode Voltages

- **Anode Voltage:** 12,000 Volts D.C. maximum
- **Grid No. 4 (Focus) Voltage:** -500 to +1,000 Volts D.C. maximum
- **Grid No. 2 Voltage:** 500 Volts D.C. maximum

- **Grid No. 1 Voltage:**
 - *Negative peak value:* 200 Volts D.C. maximum
 - *Negative bias value:* 140 Volts D.C. maximum
 - *Positive bias value:* 0 Volts D.C. maximum
 - *Positive peak value:* 2 Volts maximum
- **Grid No. 1 Circuit Resistance:** 1.5 Megohms maximum

Heater and Cathode Ratings

- **Heater Voltage:** 6.3 Volts
- **Heater Current:** 0.6 Amperes (with a +/- 10% operating tolerance)
- **Peak Heater-Cathode Voltage:**
 - *Heater negative with respect to cathode during warm-up (not to exceed 15 seconds):* 410 Volts D.C. maximum
 - *Heater negative with respect to cathode after warm-up:* 180 Volts D.C. maximum
 - *Heater positive with respect to cathode:* 180 Volts D.C. maximum

Typical Operating Conditions and Adjustments

Under typical operating conditions, the 10ABP4 is configured with the following voltage potentials and magnetic adjustments to achieve optimal focus and raster geometry.

Typical Operating Voltages

- **Anode Voltage:** 7,500 Volts D.C.
- **Grid No. 2 Voltage:** 300 Volts D.C.
- **Grid No. 4 (Focus) Voltage:** 0 to 500 Volts D.C.
- **Grid No. 1 Voltage (for visual extinction of focused raster):** -38 to -62 Volts D.C.

Focus Voltage Calculation

The focus control electrode (Grid No. 4) voltage is typically adjusted to produce the sharpest overall image. At the nominal anode voltage of 7,500 V, the focus voltage is adjusted between 0 and 500 V with the combined Grid No. 1 bias and video signal set to produce an anode current of 100 ua on an 8 7/8 x 6 9/16 inch picture. For other anode operating voltages, the required focus voltage scales proportionally and will lie within the range of 0% to 5.5% of the anode voltage.

For example, if the anode is operated at 10,000 V:

- Minimum Focus Voltage = $10,000 \text{ V} * 0\% = 0 \text{ V}$
- Maximum Focus Voltage = $10,000 \text{ V} * 5.5\% = 550 \text{ V}$

Thus, the focus voltage range for a 10,000 V anode supply is calculated as 0 to 550 V D.C.

Magnetic Components and Alignment

The 10ABP4 requires precise placement of external magnetic components along its neck:

1. **Deflection Yoke and Centering Device:** These components must be positioned within the designated space on the neck immediately adjacent to the bulb cone.
2. **Ion-Trap Magnet:** The electron gun is designed for use with an external single-field permanent magnet (PM) ion-trap magnet, such as the Heppner Model No. E437 or an equivalent model.
 - *Minimum Field Strength:* 32 Gauss.
 - *Adjustment Procedure:* The ion-trap magnet must be positioned on the neck in the designated clear space to yield maximum brightness. To account for equipment variation, the tolerance range of the specific PM ion magnet should be added to the minimum value. However, the maximum strength of the magnet must not exceed the specified minimum by more than 6 gauss (yielding an upper limit of 38 gauss for a 32-gauss nominal specification). This ensures that the ion-trap magnet can be adjusted adequately to permit satisfactory performance without a loss of highlight brightness.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1956 National Video

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

1956 NATIONAL VIDEO

Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
The type	1	The type 100ABPL is an electrostatic focus and magnetic deflection direct view
picture tube. It has an all glass, rectangular bulb designed for	90	picture tube. It has an all glass, rectangular bulb designed for 90° deflection.
Deflection Angle (Approx.) Horizontal	85	Deflection Angle (Approx.) Horizontal 85 Degrees
Cathode to all other electrodes	5 pF	Cathode to all other electrodes 5 uuf
Grid No [1]	1 pF	Grid No. 1 to all other electrodes 6 uuf
Grid No [2]	6 pF	Grid No. 1 to all other electrodes 6 uuf
External conductive coating to anode	850 pF	External conductive coating to anode 850 Max, uuf
Screen Area [1]	53	Screen Area 53 1/2 Sq. Inches
Screen Area [2]	1	Screen Area 53 1/2 Sq. Inches
Screen Area [3]	2	Screen Area 53 1/2 Sq. Inches
Heater Voltage	6.3 V	Heater Voltage 6.3 Volts
Heater Current o6 +	105 A	Heater Current o6 + 105 Amperes
Anode Voltage	12000 V	Anode Voltage 12,000 Maxe Volts D.Ce
Grid No. Y Voltagel = [1]	500 V	Grid No. Y Voltagel =500 to +1,000 Max. Volts D.C.
Grid No. Y Voltagel = [2]	1000 V	Grid No. Y Voltagel =500 to +1,000 Max. Volts D.C.
Grid No [1]	2 V	Grid No. 2 Voltage 500 Max. Volts D.C.
Grid No [2]	500 V	Grid No. 2 Voltage 500 Max. Volts D.C.
Grid No	1 V	Grid No. 1 Voltage

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
warm-up period not to exceed [1]	15 V	warm-up period not to exceed 15 seconds 10 Max. Volts D.C.
warm-up period not to exceed [2]	10 V	warm-up period not to exceed 15 seconds 10 Max. Volts D.C.
After equipment warm-up	180 V	After equipment warm-up 180 Max. Volts D.C.
Heater positive with respect to cathode	180 V	Heater positive with respect to cathode 180 Max. Volts D.C.
Anode Voltage	7500 V	Anode Voltage 7,500 Volts D.C.
Grid No. Y Voltage? [1]	0 V	Grid No. Y Voltage? 0 to 500 Volts D.C.
Grid No. Y Voltage? [2]	500 V	Grid No. Y Voltage? 0 to 500 Volts D.C.
Grid No [1]	2 V	Grid No. 2 Voltage 300 Volts D.C.
Grid No [2]	300 V	Grid No. 2 Voltage 300 Volts D.C.
Grid No [1]	1 V	Grid No. 1 Voltaged 4 ~38 to <62 Volts D.C.
Grid No [2]	4 V	Grid No. 1 Voltaged 4 ~38 to <62 Volts D.C.
Grid No [3]	38 V	Grid No. 1 Voltaged 4 ~38 to <62 Volts D.C.
Grid No [4]	62 V	Grid No. 1 Voltaged 4 ~38 to <62 Volts D.C.
Grid Nos [1]	1	Grid Nos 1 Circuit Resistance 1,5 Max. Meghoms
Grid Nos [2]	15	Grid Nos 1 Circuit Resistance 1,5 Max. Meghoms
Published value	1	1Grid number four in this tube is the focus control electrode.
Published value [1]	2 V	2 th the combined grid No. 1 bias voltage and video signal adjusted to produce
Published value [2]	1 V	2 th the combined grid No. 1 bias voltage and video signal adjusted to produce
an anode current of [1]	100	an anode current of 100 ua on a 8 7/8 x 6 9/16 inch picture adjusted for best
an anode current of [2]	8	an anode current of 100 ua on a 8 7/8 x 6 9/16 inch picture adjusted for best
an anode current of [3]	7	an anode current of 100 ua on a 8 7/8 x 6 9/16 inch picture adjusted for best
an anode current of [4]	8	an anode current of 100 ua on a 8 7/8 x 6 9/16 inch picture adjusted for best
an anode current of [5]	6	an anode current of 100 ua on a 8 7/8 x 6 9/16 inch picture adjusted for best

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
an anode current of [6]	9	an anode current of 100 ua on a 8 7/8 x 6 9/16 inch picture adjusted for best
an anode current of [7]	16	an anode current of 100 ua on a 8 7/8 x 6 9/16 inch picture adjusted for best
Published value	3	3Visual extinction of focused raster.
the anode contact +	30	the anode contact + 30°.