

Fourteen-inch direct-view television picture tube with electrostatic focusing, magnetic deflection, a 90-degree glass bulb, filter-glass faceplate, external conductive coating, and aluminized screen. It is designed for high-voltage monochrome television display service.

GENERAL CHARACTERISTICS

BASE DESIGNATION	B6-63	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 15000 V; CRT-specific electrode ratings retained in parameter table.

14ACP4 — Electrostatic-Focus Magnetic-Deflection Picture Tube

The **14ACP4** is an all-glass, direct-view cathode ray picture tube designed for television applications. It features electrostatic focusing and magnetic deflection, utilizing a 90-degree diagonal deflection envelope with a spherical filter-glass faceplate. The tube's electron gun is specifically engineered to operate at low Grid No. 2 voltages and is optimized for cathode drive to improve its modulation characteristics. To enhance picture brightness, the screen is aluminized, and the electron gun design requires the use of an external ion trap magnet.

Mechanical Specifications and Physical Dimensions

The 14ACP4 is constructed with a 90-degree deflection bulb and a spherical faceplate made of neutral-density filter glass, which provides a light transmission of approximately 78%. The screen utilizes Phosphor No. 4, which exhibits white fluorescence and a short-to-medium persistence.

Bulb and Screen Dimensions

The physical dimensions of the tube are detailed below:

Dimension Parameter	Value
Overall Length	14 3/16 ± 5/16 inches
Greatest Bulb Diagonal	14 ± 1/8 inches
Greatest Bulb Width	13 1/16 ± 1/8 inches
Greatest Bulb Height	10 9/16 ± 1/8 inches
Minimum Useful Screen Diagonal	13 inches
Minimum Useful Screen Width	12 1/16 inches
Minimum Useful Screen Height	9 1/2 inches
Minimum Useful Screen Area	104 sq. inches
Neck Diameter	1 7/16 ± 1/16 inches

Deflection and Alignment

- **Deflection Angles:** The deflection system operates with approximate angles of 90 degrees diagonally, 85 degrees horizontally, and 68 degrees vertically.
- **Bulb Contact Alignment:** The high-voltage anode connection is made via a **J1-21** bulb contact. The plane passing through the tube axis and the vacant pin position 6 aligns with this anode contact within ±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. The distance from this reference line to the end of the base is 6 1/2 ± 3/16 inches, and the distance from the reference line to the anode contact is 2 1/4 ± 1/4 inches.

Installation and Mounting Requirements

- **Base and Socket:** The tube uses a **B6-63** base with a **12L** basing configuration. The socket for this base must not be rigidly mounted; it must have flexible leads and be free to move to prevent mechanical stress on the tube neck.
- **Deflection Yoke and Centering Device:** These components must be positioned within the designated space along the neck, which extends 2 inches from the reference line toward the bulb body.

- **Ion-Trap Magnet Space:** A dedicated space on the neck, located between the deflection yoke area and the base, must be kept entirely clear of other components to accommodate the external ion-trap magnet.

Electrical Characteristics and Basing

The 14ACP4 utilizes a 12-pin base layout (12L basing) with several pin positions omitted, resulting in a 6-pin base (B6-63). The electrical connections are assigned as follows:

Pin Number	Electrode Connection
Pin 1	Heater
Pin 2	Grid No. 1 (Control Grid)
Pin 6	Grid No. 4 (Focus Control Electrode)
Pin 10	Grid No. 2 (Screen Grid)
Pin 11	Cathode
Pin 12	Heater
Bulb Contact	Ultor / Anode (Grid No. 3 + Grid No. 5)

Note on Basing Alignment: While the basing diagram designates Pin 6 as the connection for Grid No. 4, the mechanical alignment specifications also refer to this position as "vacant pin position 6" when defining the alignment plane with the anode contact.

Direct Interelectrode Capacitances

The approximate capacitances of the tube's internal electrodes are:

- **Cathode to all other electrodes:** 5 μF (pF)
- **Grid No. 1 to all other electrodes:** 6 μF (pF)
- **External conductive coating to anode:** 1200 μF (pF) maximum, 800 μF (pF) minimum.

The external conductive coating forms a capacitor with the internal anode, which can be utilized for high-voltage filtering in the receiver's power supply.

Heater and Electron Gun Design

The 14ACP4 is equipped with an indirectly heated cathode. The heater is designed for operation under the following nominal conditions:

- **Heater Voltage:** 6.3 Volts
- **Heater Current:** 0.6 Amperes (with an allowable tolerance of $\pm 10\%$)

The electron gun is designed to operate at low Grid No. 2 voltages, which simplifies the receiver circuitry and improves the modulation characteristic when cathode drive is employed. The gun requires an external single-field ion trap magnet to prevent ion burn on the aluminized phosphor screen.

Operating Ratings and Typical Conditions

The ratings for the 14ACP4 are established under the Design Center Values system. These limits must not be exceeded under the worst-case operating conditions.

Maximum Ratings

- **Anode Voltage:** 15,000 Max. Volts D.C.
- **Grid No. 4 Voltage (Focus Electrode):** -500 to +500 Max. Volts D.C.
- **Grid No. 2 Voltage:** 200 Max. Volts D.C.
- **Grid No. 1 Voltage:**
 - Negative peak value: 160 Max. Volts D.C.
 - Negative bias value: 110 Max. Volts D.C.
 - Positive bias value: 0 Max. Volts D.C.
 - Positive peak value: 2 Max. Volts D.C.
- **Peak Heater-Cathode Voltage:**
 - Heater negative with respect to cathode during warm-up (not to exceed 15 seconds): 410 Max. Volts D.C.
 - Heater negative with respect to cathode after equipment warm-up: 180 Max. Volts D.C.
 - Heater positive with respect to cathode: 180 Max. Volts D.C.
- **Grid No. 1 Circuit Resistance:** 1.5 Max. Megohms

Typical Operating Conditions

For standard operation, the following typical operating points are specified:

- **Anode Voltage:** 10,000 Volts D.C.
- **Grid No. 4 Voltage:** -50 to +350 Volts D.C.
- **Grid No. 2 Voltage:** 125 Volts D.C.
- **Grid No. 1 Voltage (for visual extinction of focused raster):** -40 to -80 Volts D.C.
- **Field Strength of PM Ion Trap Magnet:** 36 Minimum Gauss

When operating at the typical anode voltage of 10,000 V, the focus voltage (Grid No. 4) is adjusted for best overall focus with the combined Grid No. 1 bias and video signal adjusted to produce an anode current of 100 μ A on a 12 1/16 x 9 1/2 inch picture. For other anode voltages, the required focus voltage will range from 0% to 5.5% of the anode voltage.

Ion Trap Magnet Adjustment

To achieve maximum brightness and prevent highlight degradation, a permanent magnet (PM) ion trap magnet (such as the Heppner Model No. E437 or equivalent) must be used. The magnet must be

positioned on the neck to yield maximum brightness. The tolerance range for the strength of the PM ion magnet should be added to the minimum value of 36 gauss. The maximum strength of the magnet must not exceed the specified minimum value by more than 6 gauss (resulting in a maximum limit of 42 gauss). This ensures that the magnet can be adequately adjusted for optimum performance without reducing highlight brightness.

Technical Summary

The **14ACP4** is a specialized 14-inch, 90-degree television picture tube featuring electrostatic focus and magnetic deflection. It incorporates an aluminized screen with Phosphor No. 4 for high-brightness white displays, housed in an all-glass envelope with a 78% transmission neutral-density faceplate. Operating with a standard 6.3 V, 0.6 A heater, the tube is optimized for low Grid No. 2 voltages and cathode drive. It requires an external ion trap magnet (minimum 36 gauss) and is rated for a maximum anode voltage of 15,000 V D.C., with typical operation at 10,000 V D.C.

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 tube type	1	The tube type 1LACP) is an electrostatic focus and magnetic deflection
direct view picture tube. The all glass	90	direct view picture tube. The all glass 90° deflection bulb has a spherical
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 ceoating to anode	1200	External conductive ceoating to anode 1200 Max. vuf
Screen Area	10	Screen Area 10 Sq. Inches
Heater Voltage	6.3 V	Heater Voltage 6.3 Volts
Heater Current [1]	600 mA	Heater Current 0.6 + 10¢ Amperes
Heater Current [2]	10 A	Heater Current 0.6 + 10¢ Amperes
Anode Voltagel	15000 V	Anode Voltagel 15,000 Max. Volts D.Ce
Grid No. I} Voltage = [1]	500 V	Grid No. I} Voltage =500 to +500 Maxe. Volts D.C.
Grid No. I} Voltage = [2]	500 V	Grid No. I} Voltage =500 to +500 Maxe. Volts D.C.
Orid No [1]	2 V	Orid No. 2 Voltage 200 Max. Volts D.C.
Orid No [2]	200 V	Orid No. 2 Voltage 200 Max. Volts D.C.
Grid No	1 V	Grid No. 1 Voltage
warm-up period not to exceed [1]	15 V	warm-up period not to exceed 15 seconds 410 Max. Volts D.C.

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
warm-up period not to exceed [2]	410 V	warm-up period not to exceed 15 seconds 410 Max. Volts D.C.
After equipment warmup	180 V	After equipment warmup 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	10000 V	Anode Voltage 10,000 Volts D.C.
Grid No. k Voltage? [1]	-50 V	Grid No. k Voltage? -50 to +350 Volts D.C.,
Grid No. k Voltage? [2]	350 V	Grid No. k Voltage? -50 to +350 Volts D.C.,
Grid No [1]	2 V	Grid No. 2 Voltage 125 Volts D.C.
Grid No [2]	125 V	Grid No. 2 Voltage 125 Volts D.C.
Grid No [1]	1 V	Grid No. 1 Voltage3 =40 to -80 Volts D.C.
Grid No [2]	40 V	Grid No. 1 Voltage3 =40 to -80 Volts D.C.
Grid No [3]	-80 V	Grid No. 1 Voltage3 =40 to -80 Volts D.C.
Grid No [1]	1	Grid No. 1 Circuit Resistance 1.5 Max. Meghons
Grid No [2]	1.5	Grid No. 1 Circuit Resistance 1.5 Max. Meghons
Published value	10	10rid number four in this tube is the focus control electrode.
Published value [1]	2 V	2With the combined grid No. 1 bias voltage and video signal adjusted to produce
Published value [2]	1 V	2With 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 12 1/16 x 9 1/2 inch picture adjusted for best
an anode current of [2]	12	an anode current of 100 ua on a 12 1/16 x 9 1/2 inch picture adjusted for best
an anode current of [3]	1	an anode current of 100 ua on a 12 1/16 x 9 1/2 inch picture adjusted for best
an anode current of [4]	16	an anode current of 100 ua on a 12 1/16 x 9 1/2 inch picture adjusted for best
an anode current of [5]	9	an anode current of 100 ua on a 12 1/16 x 9 1/2 inch picture adjusted for best
an anode current of [6]	1	an anode current of 100 ua on a 12 1/16 x 9 1/2 inch picture adjusted for best
an anode current of [7]	2	an anode current of 100 ua on a 12 1/16 x 9 1/2 inch picture adjusted for best

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
overall focus. For other anode voltages, the focus voltage will be from	0 V	overall focus. For other anode voltages, the focus voltage will be from 0%
Published value	3	3visual extinction of focused raster.
with the anode contact +	30	with the anode contact + 30°.

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