

P4 cathode-ray display tube documented for high-voltage direct-view operation, using magnetic deflection and manufacturer-specified beam focusing and control arrangements appropriate to type 17BMP4.

GENERAL CHARACTERISTICS

BASE DESIGNATION	B6-63	BASE PINS	6
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	18000 V
CRT-specific anode, focus, deflection and optical data retained as parameters rather than forced into ordinary plate/screen fields.	

17BMP4 Cathode Ray Tube

The **17BMP4** is a direct-view cathode ray picture tube designed for television applications. It features electrostatic focusing and magnetic deflection, incorporating an aluminized screen with a gray filter faceplate to enhance picture contrast and brightness. The tube utilizes an external single-field ion trap to prevent ion burn on the phosphor screen.

Mechanical Specifications and Physical Dimensions

The 17BMP4 is constructed with a glass envelope and a rectangular faceplate. Its physical dimensions and alignment tolerances are precisely specified for television receiver integration:

- Overall Length:** 15 5/8 ± 3/8 inches

- **Greatest Bulb Dimensions:**
 - **Diagonal:** 16 5/8 \u00b1 1/8 inches
 - **Width:** 15 3/8 \u00b1 1/8 inches
 - **Height:** 12 1/4 \u00b1 1/8 inches
- **Minimum Useful Screen Dimensions:**
 - **Diagonal:** 15 9/16 inches
 - **Width:** 14 15/16 inches
 - **Height:** 11 1/8 inches
- **Raster Sizes:** The tube is rated for raster sizes of 14 5/16" x 11 1/8" and 19 1/8" x 15".

Base and Bulb Contact

The tube uses a **Small Shell Duodecal 6-Pin base (B6-63)** with a **12L basing arrangement**. The high-voltage anode connection is made via a **Recessed Small Cavity Cap (J1-21)**. The J1-21 contact is aligned with pin position #6 within a tolerance of \u00b1 30 degrees.

Heater and Electrical Characteristics

The 17BMP4 contains an indirectly heated, unipotential cathode. The heater is designed for standard television receiver power supplies.

Parameter	Value
Heater Voltage	6.3 V
Heater Current	0.6 A
Cathode Type	Unipotential

Direct Interelectrode Capacitances

The approximate capacitances between the electrodes are:

- **Cathode to all other electrodes:** 5 \u00b5\u00b5F
- **Grid #1 to all other electrodes:** 6 \u00b5\u00b5F
- **External conductive coating to anode:** 1500 \u00b5\u00b5F (maximum), 750 \u00b5\u00b5F (minimum)

The external conductive coating forms a capacitor with the internal anode coating, which can be utilized as a filter capacitor for the high-voltage power supply.

Optical and Screen Characteristics

The screen of the 17BMP4 is aluminized to increase light output and prevent charge buildup.

- **Phosphor:** P-4 (Sulfide type)

- **Fluorescent Color:** White
- **Phosphorescent Color:** White
- **Persistence:** Short
- **Faceplate:** Gray filter glass with an approximate light transmission of 71% at the center, which improves contrast under ambient room lighting.

Deflection Angles

The magnetic deflection system must be capable of scanning the following approximate angles:

- **Horizontal:** 80°
- **Vertical:** 65°
- **Diagonal:** 90°

Electrical Ratings (Design Center System)

The maximum ratings for the 17BMP4 are established under the Design Center System. Operating the tube beyond these limits can impair performance and shorten its operating life.

Parameter	Minimum Rating	Maximum Rating
DC Anode Voltage	12,000 V	18,000 V
DC Grid #4 Voltage	-500 V	+1000 V
DC Grid #2 Voltage	—	200 V
DC Grid #1 Negative-Bias	—	125 V
DC Grid #1 Positive-Bias	—	0 V
Grid #1 Positive-Peak Bias	—	0 V
Grid #1 Circuit Resistance	—	1.5 MΩ

Heater-Cathode Voltage Limits

To prevent insulation breakdown between the heater and the cathode, the peak voltage between these elements must not exceed the following limits:

- **Heater negative with respect to cathode (during warm-up \u2264 15 seconds):** 410 V
- **Heater negative with respect to cathode (after warm-up):** 180 V
- **Heater positive with respect to cathode:** 180 V

Typical Operating Conditions

Under typical operating conditions, the 17BMP4 is configured with the following electrode potentials and magnetic field strengths:

- **DC Anode Voltage:** 14,000 V
- **DC Grid #4 Voltage:** -55 to +300 V (used for electrostatic focusing)
- **DC Grid #2 Voltage:** 110 V
- **DC Grid #1 Voltage:** -32 to -50 V (for raster cutoff)
- **DC Ion Trap Magnet Rated Strength:** 37 Gauss (requires an external single-field ion trap magnet)

At anode voltages below 12,000 V, the brilliance and definition of the raster decrease significantly.

Grid Drive Operation and Cutoff Calculations

The 17BMP4 may be operated in a grid-drive configuration, although this mode of operation is associated with some loss in efficiency.

The average raster cutoff voltage (E_{g1co}) can be calculated as a function of the Grid #2 voltage (E_{g2}). Depending on the specific design parameters and operating conditions, two mathematical models are used to estimate this cutoff point:

1. **Power-law model:** $E_{g1co} = -0.502 * E_{g2}^{0.8}$
2. **Linear model:** $E_{g1co} = -0.502 * E_{g2} + 5.8$

For a typical Grid #2 voltage of 110 V, these calculations yield:

- Using the power-law model: $-0.502 * (110)^{0.8} \approx -0.502 * 42.87 \approx -21.5 \text{ V}$
- Using the linear model: $-0.502 * 110 + 5.8 = -55.22 + 5.8 = -49.42 \text{ V}$

These calculated values represent the grid bias required to completely extinguish the raster under the respective design assumptions.

Pin Connections and Basing

The 17BMP4 uses the **12L** basing configuration. Looking at the bottom view of the base, the pin connections are assigned as follows:

- **Pin 1:** Heater
- **Pin 2:** Grid #1 (Control Grid)
- **Pin 6:** Grid #4 (Focusing Electrode)
- **Pin 10:** Grid #2 (Screen Grid)
- **Pin 11:** Cathode
- **Pin 12:** Heater
- **Anode Cap:** Grid No. 3 and Grid No. 5 (connected internally to the high-voltage anode)

Technical Summary

The **17BMP4** is a 90-degree diagonal deflection, electrostatic-focus, magnetic-deflection cathode ray tube designed for television receivers. It features a unipotential cathode, a 6.3 V / 0.6 A heater, and an

aluminized screen with a white-emitting P-4 sulfide phosphor. The tube operates typically with an anode voltage of 14,000 V (with an absolute maximum of 18,000 V) and requires an external single-field ion trap magnet of 37 Gauss. Its physical design utilizes a small shell duodecal 6-pin base and a recessed small cavity cap for the high-voltage anode connection.



SOURCE OPERATING CONDITIONS

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1961 Tung Sol

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

1961 TUNG SOL

Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Anode Voltage	18000 V	—
Typical Anode Voltage	14000 V	—
Maximum Grid2 Voltage	200 V	—
Typical Grid2 Voltage	110 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
FocusingMethod	Electrostatic	—
DeflectingMethod	Magnetic	—
DiagonalDeflectionAngleApproximate	90 degree	—
PhosphorNumber	4	—
FluorescentColor	White	—
Persistence	Short	—



SOURCE OPERATING CONDITIONS

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1966 Tung Sol Electronic Tubes 4 of 4

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

1966 TUNG SOL ELECTRONIC TUBES 4 OF 4

Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum DC grid 2 voltage	200 V	—
Maximum DC grid 4 voltage	-500–1000 V	—
Maximum grid 1 negative-bias voltage	125 V	NegativeBias
Maximum grid 1 positive-bias voltage	0 V	PositiveBias
Maximum grid 1 positive-peak voltage	0 V	PositivePeak
Peak heater-cathode voltage	410 V	HeaterNegativeWarmup
Peak heater-cathode voltage	180 V	HeaterNegativeAfterWarmup
Peak heater-cathode voltage	180 V	HeaterPositive
DC anode voltage	14000 V	TypicalOperation
DC grid 4 voltage	-55–300 V	TypicalOperation
DC grid 2 voltage	110 V	TypicalOperation
DC grid 1 voltage	-32--50 V	TypicalOperation
Ion trap magnet rated strength	37 gauss	—
Faceplate transmission at center	71 %	Approximate

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Horizontal deflection angle	80 degrees	Approximate
Vertical deflection angle	65 degrees	Approximate
Diagonal deflection angle	90 degrees	Approximate

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Cathode to all other electrodes capacitance	5 pF	Approximate
Grid 1 to all other electrodes capacitance	6 pF	Approximate
External conductive coating to anode capacitance	1500 pF	Maximum

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
External conductive coating to anode capacitance	750 pF	Minimum

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