

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

17TP4

Specialized - Cathode Ray electronic tube

1 SECTION
CONSTRUCTION
CATHODERAY

High-voltage P4 cathode-ray picture-display tube using magnetic deflection, with manufacturer data supporting wide-angle scanning and typical anode operation in the 12-14 kV range.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	5
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 SCREEN VOLTAGE	500 V
CRT-specific electrode/focus/deflection data retained as parameter rows.	

17TP4 — Electrostatic-Focus Metal-Shell Kinescope

The **17TP4** is a rectangular, direct-view metal-shell picture tube (kinescope) designed for television receiver applications. It features a unipotential cathode, low-voltage electrostatic focusing, and magnetic deflection. The tube incorporates an external single-field ion trap and a frosted filterglass faceplate designed to reduce reflections and improve contrast, providing approximately 66% light transmission at the center. The screen utilizes a No. 4 sulfide-type phosphor, which exhibits white fluorescence, white phosphorescence, and a short persistence characteristic.

Mechanical Design and Physical Characteristics

The 17TP4 is constructed with a rectangular metal shell, offering a nominal raster size of 14-5/8 inches by 11 inches. The physical dimensions of the tube are as follows:

- **Overall Length:** 19-5/16 inches
- **Greatest Bulb Dimensions:**
 - Diagonal: 16-13/16 $\pm$ 3/16 inches
 - Width: 15-15/16 $\pm$ 1/8 inches
 - Height: 12-1/4 $\pm$ 1/8 inches
- **Minimum Useful Screen Dimensions:**
 - Diagonal: 15-1/2 inches
 - Width: 14-5/8 inches
 - Height: 11 inches

The tube features slightly curved sides and rounded corners, with a maximum shell diagonal of 17 inches. It uses a small-shell duodecal 6-pin base (JETEC No. B6-63) with a 12M basing configuration. The base is aligned such that pin number 6 aligns with the horizontal picture axis within ± 10 degrees. The electrical contact to the high-voltage anode is made via the metal shell lip. The tube is designed to be mounted in any position.

Electrical Connections and Pinout

The 17TP4 utilizes a 6-pin duodecal base. The pin connections, viewed from the bottom of the base, are assigned as follows:

Pin Number	Connection
Pin 1	Heater
Pin 2	Grid No. 1 (Control Grid)
Pin 6	Grid No. 4 (Focusing Electrode)
Pin 10	Grid No. 2 (Screen Grid)
Pin 11	Cathode
Pin 12	Heater
Metal Shell Lip	Grid No. 3, Grid No. 5, Collector (Ultor)

The Grid No. 3, Grid No. 5, and Collector are internally connected and brought out to the metal shell lip, which serves as the ultor terminal.

Interelectrode Capacitances

The direct interelectrode capacitances of the 17TP4 are approximately:

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

Electrostatic Focusing and Magnetic Deflection

The 17TP4 employs low-voltage electrostatic focusing, controlled by Grid No. 4. This design allows the focusing voltage to be maintained at a low potential relative to the high-voltage ultor. The focusing voltage typically ranges from 0% to 2.5% of the ultor voltage. In practical receiver designs, this low-voltage focus potential can be obtained from a fixed tap on the low-voltage DC supply or from a potentiometer connected between the boost voltage and the negative bias (-B) supply.

Deflection is accomplished magnetically, with approximate deflection angles as follows:

- **Diagonal Deflection Angle:** 70°
- **Horizontal Deflection Angle:** 66°
- **Vertical Deflection Angle:** 50°

To prevent ion burn on the phosphor screen, the electron gun requires an external, single-field ion-trap magnet. The required field strength of the single-field ion-trap magnet is mathematically related to the ultor voltage (E_u) and can be calculated using the following formula:

$$\text{Field Strength (Gausses)} \approx \sqrt{\frac{E_u}{12000}} \times 33$$

An adjustable centering magnet providing a field strength of 0 to 8 gaussses is also utilized for raster alignment.

Operating Characteristics and Design Ranges

The 17TP4 is designed to operate over a range of ultor and screen-grid voltages. The equipment design ranges are specified for ultor voltages (E_u) between 12,000 and 18,000 volts and Grid No. 2 voltages (E_{c2}) between 150 and 500 volts:

- **Grid No. 4 Voltage (for 100 μA Ultor Current):** 0% to 2.5% of E_u
- **Grid No. 1 Voltage (for Visual Extinction of Undelected Focused Spot):** 11% to 25.7% of E_{c2}
- **Grid No. 4 Current:** -25 to +25 μA
- **Grid No. 2 Current:** -15 to +15 μA

Typical Operating Examples

The following examples illustrate typical operating conditions derived from these design ranges:

Parameter	Example 1	Example 2
Ultor Voltage (E_u)	14,000 V	18,000 V
Grid No. 2 Voltage (E_{c2})	300 V	300 V

Parameter	Example 1	Example 2
Grid No. 4 Voltage (for 100 μ A Ultor Current)	0 to 350 V	0 to 400 V
Grid No. 1 Voltage (for Visual Extinction)	-33 to -77 V	-33 to -77 V
Ion-Trap Magnet Field Strength	35 Gauss	40 Gauss

Drive Characteristics and Performance

The average grid-drive characteristics of the 17TP4 demonstrate a non-linear relationship between the video drive signal and both highlight brightness and ultor current:

- **Highlight Brightness:** As the video signal drive increases from cutoff, the highlight brightness increases non-linearly, reaching up to 220 foot-lamberts. Operating the tube at higher Grid No. 2 voltages (up to 500 V) shifts the drive curve, requiring higher video signal voltages to achieve equivalent brightness levels.
- **Ultor Current:** When Grid No. 2 is operated at 500 V, the ultor current rises non-linearly with grid drive, reaching approximately 1.7 mA at a drive of about 68 V from cutoff.

Maximum Ratings and Circuit Constraints

The maximum ratings for the 17TP4 are established under the Design-Center system. Operating the tube beyond these limits may impair performance or cause permanent damage.

Parameter	Maximum Rating
DC Ultor Voltage (Grid No. 3, Grid No. 5, Collector)	16,000 V
DC Grid No. 4 Voltage	-500 to +1000 V (with some specifications listing a maximum of 500 V)
DC Grid No. 2 Voltage	500 V
Grid No. 1 Voltage:	
— DC Negative-Bias Value	125 V
— DC Positive-Bias Value	0 V
— Positive-Peak Value	2 V
Peak Heater-Cathode Voltage:	
— Heater negative with respect to cathode (during warm-up ≤ 15 s)	410 V

Parameter	Maximum Rating
— Heater negative with respect to cathode (after warm-up)	180 V
— Heater positive with respect to cathode	180 V

The maximum allowable resistance in the Grid No. 1 circuit is **1.5 Megohms**.

Technical Summary

The **17TP4** is a rectangular metal-shell television picture tube featuring a 17-inch diagonal envelope, low-voltage electrostatic focusing, and magnetic deflection. Operating with a nominal 6.3 V, 0.6 A heater, the tube is designed for direct-view television receivers. It utilizes a No. 4 sulfide-type white phosphor screen with short persistence, housed behind a frosted filterglass faceplate that provides 66% light transmission. With an ultor rating of up to 16,000 V and a low-voltage focusing grid (Grid No. 4) operating at 0% to 2.5% of the ultor voltage, the 17TP4 provides a reliable and high-contrast display solution when paired with an external single-field ion-trap magnet of 33 to 40 gauss.

SOURCE OPERATING CONDITIONS

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1940 RCA

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

1940 RCA

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OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
focusing electrode (grid No	2.5	focusing electrode (grid No.4) operates at tow voltage (only 0 to 2.5% of
Voltage (AC OF DClu v v o o & & o o o o o o o o o o o o o s o o &«	6.3 V	Voltage (AC OF DClu v v o o & & o o o o o o o o o o o o o s o o &« 6.3 volts
CUTTENT & & ¢	600 mA	CUTTENT & & ¢ 4 & o o o o o s s o s o o o o s o o o o o o o o o 0.6 ampere
HOTIZOMEAL. & v v v o o o o o o o o o o s o o o o o o s o o v s o o o o v o v	66	HOTIZOMEAL. & v v v o o o o o o o o o o o s o o o o o s o o v s o o o o v o v 66°
VEertlcCale v o o ¢ o o ¢ o o o o a o o o s o o o o s o o o s s s o s e s e	50	VEertlcCale v o o ¢ o o ¢ o o o o a o o o s o o o o s o o o s s s o s e s e 50°
ULTOR® VOLTAGE® « & v & ¢ v v ¢ ¢ o v o o o o & « e s s e e e e	16000 V	ULTOR® VOLTAGE® « & v & ¢ v v ¢ ¢ o v o o o o & « e s s e e e e . 16000 max. volts
GRID-NO	500 V	GRID-NO.4 VOLTAGE « 4+ 4 & ¢ o ¢ o o o o o o o @ e e s e e e e 500 max. volts
GRID-NO	500 V	GRID-NO.2 VOLTAGE ¢ ¢ ¢ ¢ o o o ¢ o o o o o o » e e s e s e 4 . 500 max. volts
GRID-NO	1	GRID-NO.1 VOLTAGE:
Negative blas value . . . « « « v ¢ & « & e e e s	125 V	Negative blas value . . . « « « v ¢ & « & e e e s 4 e e s 125 max. volts
Positive Dlas value + ¢	0 V	Positive Dlas value + ¢ 4o ¢ ¢ 4 o o o « o o o & e s e e e e 0 max. volts
POSItiVe PEAK VALUE v &v v ¢ v	2 V	POSItiVe PEAK VALUE v &v v ¢ v 4 ¢ o o o o o o » s e e e e e e 2 max. volts
puring equipment warm--up period not exceeding	410 V	puring equipment warm--up period not exceeding 16 seconds. . . 410 max. volts

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
After equipment warm-up period. c e e e e e	180 V	After equipment warm-up period. c e e e e e 180 max. volts
Heater positive with respect to cathode et e e s s e	180 V	Heater positive with respect to cathode et e e s s e 180 max. volts
For any ultor voltage (E,) between	18000 V	For any ultor voltage (E,) between 12000 and 18000 volts
and grid-No	500 V	and grid-No.2 voltage (Bcy) between 150 and 500 volts
Grid-No	2.5 V	Grid-No.4 voltage for Ultor Current of 100 pamp. 0% to 2.5% of Eu e e e volts
Grid-No	1	Grid-No.1 voltage for Visual Extinction
of yUndelected Focused Spot	25.7 V	of yUndelected Focused Spot. . . 11% to 25.7% of Ec, s e e volts
Grid-No	25	Grid-No.4 Current 4 o o o -25 to +25 « e e e pamp
Grid-No	15 A	Grid-No.2 Current L N N) =15 to +15 . e e e .amp
For ultor voltage of	18000 V	For ultor voltage of 14000 18000 volts
and grid-No	300 V	and grid-No.2 voltage of 300 300 volts
Grid-No	400 V	Grid-No.4 Voltage for Ultor current of 100 wamp. 0 to 350 0 to 400 volts
Grid-No	1	Grid-No.1 Voltage for visual Extinction
0of yndelected Focused Spot . . » -33 to -77 -33 to ~77 volts	77 V	0of yndelected Focused Spot . . » -33 to -77 -33 to ~77 volts
function, grid No	3	function, grid No.3, and collector are con—creasing ultor voltage. In general, the
nected together within the tube and are con- ul%?r voltage should not be less than	12000	nected together within the tube and are con- ul%?r voltage should not be less than 12000
dc voltage for accelerating theelectrons inthe ness, the ion—trap magnet current is	70	dc voltage for accelerating theelectrons inthe ness, the ion—trap magnet current is 70 milli-
beam prior to its deflection. amperes dc when theultor voltage is	14000 A	beam prior to its deflection. amperes dc when theultor voltage is 14000 volts.

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
REFERENCE-LINE GAUGE (JETEC NO	110	REFERENCE-LINE GAUGE (JETEC NO.110) AND WITH TUBE VOLTAGE. ANY MATERIAL IN CONTACT WITH THE SHELL OR
Eff=	6.3 V	Eff= 6.3 VOLTS $FE\phi$ = 6.3 VOLTS T
AND cou_r:cmn)vours	16000 V	AND cou_r:cmn)vours 14000 o AND COLLECTOR) VOLTS= 12000 TO 16000
GRID-N2	4 V	GRID-N2 4 VOLTS ADJUSTED TO GIVE FOCUS GRID N2 BIASED TO CUTOFF OF
92CM-7608 92CM-7607	7607	92CM-7608 92CM-7607



SOURCE DATA APPENDIX

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	500 V	—
Typical Grid2 Voltage	300 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
FocusingMethod	Magnetic	—
DeflectingMethod	Magnetic	—
DeflectionAngleApproximate	90 degree	—
PhosphorNumber	4	—
FluorescentColor	White	—

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

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
FACEPLATE LIGHT TRANSMISSION AT CENTER (APPROX.)	66 percent	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
HEATER VOLTAGE	6.3 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
HEATER POSITIVE WITH RESPECT TO CATHODE	1 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
DC 6R ID #3, GRID #5~ COLLECTOR VOLTAGE – value 1	3 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
DC 6R ID #3, GRID #5~ COLLECTOR VOLTAGE – value 2	5 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
DC 6R ID #3, GRID #5~ COLLECTOR VOLTAGE – value 3	14 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
DC GRID #2 VOLTAGE – value 1	2 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
DC GRID #2 VOLTAGE – value 2	3 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
ION TRAP MAGNET (RATED STRENGTH)	35 mA	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
DC GRID #4 VOLTAGE – value 1	4 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
DC GRID #4 VOLTAGE – value 2	350 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
MAXIMUM DC GRID #3~ GRID #5, COLLECTOR VOLTAGE – value 1	3 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
MAXIMUM DC GRID #3~ GRID #5, COLLECTOR VOLTAGE – value 2	5 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
MAXIMUM DC GRID #3~ GRID #5, COLLECTOR VOLTAGE – value 3	1 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
MAXIMUM DC GRID #4 VOLTAGE – value 1	4 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
MAXIMUM DC GRID #4 VOLTAGE – value 2	500 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
MAXIMUM DC GRID #4 VOLTAGE – value 3	1000 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
MAXIMUM DC GRID #2 VOLTAGE – value 1	2 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
MAXIMUM DC GRID #2 VOLTAGE – value 2	500 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
MAXIMUM GRID #1 VOLTAGE	1 V	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.
MAXIMUM GRID #i CIRCUIT RESISTANCE	1.5 mA	Published CRT datasheet value; multiple values on a row correspond to separate source-table conditions or limits.

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