

CATHODE-RAY TUBE

The TELEFUNKEN Type 4 TP is a four inch flat face, single beam, electrostatic deflection and focus Cathode-Ray-Tube, with very high deflection sensitivity, small spot size and a good uniformity of the deflection factor. A low current heater is employed to reduce power requirements.

4 TP 2
DN 10-18

4 TP 7
DP 10-18

4 TP 11
DB 10-18

4 TP 31
DG 10-18

Tentative

Focusing Method
Deflecting Method

electrostatic
electrostatic

Direct Interelectrode Capacitances, Approximate

Cathode to all other electrodes	4.8	μuf
Grid 1 to all other electrodes	6.5	μuf
D 1 to D 2	1.6	μuf
D 3 to D 4	1.4	μuf
D 1 to all other electrodes except D 2	3.8	μuf
D 2 to all other electrodes except D 1	3.8	μuf
D 3 to all other electrodes except D 4	2.4	μuf
D 4 to all other electrodes except D 3	2.4	μuf
Grid 1 to D 1, D 2, D 3, D 4	0.001	μuf
Cathode to D 1, D 2, D 3, D 4	0.001	μuf
D 1, D 2 to D 3, D 4	0.005	μuf

OPTICAL DATA

Phosphor Number	P 2	P 7	P 11	P 31
Fluorescent Color	Bluegreen	Blue	Blue	Green
Phosphorescent Color	Green	Yellowgreen		
Persistence	Long	Long	Short	Short

MECHANICAL DATA

Overall Length	15 ⁵ / ₃₂	Max Inches
Greatest Diameter of Bulb	3 ¹⁵ / ₁₆ ± ⁵ / ₆₄	Inches
Minimum Useful Screen Diameter	3 ³⁵ / ₆₄	Inches
Base Small-Button Unidekar 11 pin	E 11-22	
Basing	11 Y	
Base Alignment		
D3 D4 trace aligns with pin No. 11 and tube axis	45 ± 10	Degrees
Positive voltage on D 2 deflects beam		
approximately toward the midpoint between pin 3 and 4		
Positive voltage on D 3 deflects beam		
approximately toward the midpoint between pin 6 and 7		



MECHANICAL DATA (Continuation)

Angle between D 3 D 4 and D 1 D 2 traces	90±1	Degrees
Bulb contact alignment:		
J 1-22 contact aligns with trace of D 1-D 2 (between pin 9 and 10)	±10	Degrees

RATINGS (Absolute maxima) Note 1

Heater Voltage	6.3	Volts
Heater Current at 6.3 volts	0.3±10 %	Ampere
Post-Accelerator voltage	5,000	Max Volts DC
	1,600	Min Volts DC
Isolation Shield voltage	1,500	Max Volts DC
Accelerator voltage	1,200	Max Volts DC
	400	Min Volts DC
Grid 3 voltage (Focusing Electrode)	600	Max Volts DC
Grid 1 Voltage		
Negative-Bias Value	-250	Max Volts DC
Positive-Bias Value	0	Max Volts DC
Positive-Peak Value	0	Max Volts DC
Peak-Heater-Cathode Voltage		
Heater negative with respect to cathode	125	Max Volts
During warm-up period not to exceed 15 seconds	125	Max Volts
After equipment warm-up period	125	Max Volts
Heater positive with respect to cathode	125	Max Volts
Peak Voltage between Accelerator and any Deflection Electrode	500	Max Volts
Cathode current	300	Max Microamp. eff.

MAXIMUM CIRCUIT VALUES

Grid 1 Circuit Resistance	5	Max Megohms
Resistance for Deflecting-Electrode Circuit D 1, D 2 (Note 10)	100,000	Max Ohms
Resistance for Deflecting-Electrode Circuit D 3, D 4 (Note 10)	50,000	Max Ohms



TYPICAL OPERATING CONDITIONS (Note 1)

Post-Accelerator voltage	2,000	Volts
Isolation Shield voltage	600	Volts
Grid 3 voltage (Focusing Electrode)	100 to 160	Volts
Accelerator voltage (Note 2)	500 to 530	Volts
Modulation (Note 3)	30	Max Volts
Grid 1 voltage (Note 4)	-32 to -18	Volts

Deflection Factors:

D 1 and D 2	25.7 to 32.8	Volts DC per inch
D 3 and D 4	7.4 to 9.65	Volts DC per inch

Focusing Electrode Current

for any operating condition	-10 to +10	Microamperes
Spot Position (undeflected) (Note 5)	5	Max Millimeters
Line Width (Note 6)	0.024	Max Inches
Deflection factor uniformity (Note 7)	0.5	% max.
Pattern distortion (Note 8)	1.4	% max.

For Anode Voltage not shown in the preceding table,
the following can be used as a guide:

Focusing Electrode Voltage	20 % to 32 %	of Anode Volts
Grid 1 Voltage (Note 4)	3.6 % to 6.4 %	of Anode Volts

Deflection Factors:

D 1 and D 2	51.4 to 65.6 Volts DC per inch per Kilovolt of Anode
D 3 and D 4	14.8 to 19.3 Volts DC per inch per Kilovolt of Anode
Useful scan D 1-D 2 (Note 9)	80 Min Millimeters
Useful scan D 3-D 4 (Note 9)	80 Min Millimeters
Post Accelerator helix resistance	56...280 Megohms

Pin Connection

Pin No. 1	Heater	Pin No. 7	Internal Connection
Pin No. 2	Heater	Pin No. 8	Accelerator
Pin No. 3	Grid No. 1	Pin No. 9	Internal Connection
Pin No. 4	Cathode	Pin No. 10	Internal Connection
Pin No. 5	Focusing Electrode Grid No. 3	Pin No. 11	Internal Connection
Pin No. 6	Internal Connection		



1. All voltages taken with respect to cathode.
2. The accelerator voltage is made variable from 500 Volts to 530 Volts to provide for astigmatism control. In order to maintain proper astigmatism adjustment as total cathode current is varied, it is recommended that the resistance in the accelerator circuit is small. (The midpotential of the deflection electrodes is 500 V.)
3. The increase in Grid No. 1 voltage from cutoff to produce a screen current of 10 μ A DC.
4. Visual extinction of undeflected focused spot.
5. Connect free deflecting electrodes to anode.
6. For a beam current of 10 microamperes DC in accordance with Mil-E-1 C specification.
7. The deflection factor (for both D 1 D 2 and D 3 D 4 plate pairs, separately) for deflections of less than 75% of the useful scan will not differ from the deflection factor for a deflection of 25% of the useful scan by more than specified amount.
8. The edges of a raster pattern with the mean dimension 60 $\times$ 60 mm will not deviate from the mean dimension by more than the specified amount.
9. If use is made of the full deflection capabilities of the tube, the deflection plates will intercept part of the electron beam near the edge of scan, hence a low impedance deflection plate drive is desirable.
10. It is recommended that the deflecting-electrode-circuit resistance be approximately equal.

Accessories:

Shielding	stock no. 30461
Socket	stock no. 30232
Post-acceleration cap	stock no. 30317
Caps for deflection terminals	stock no. 30429
Husk for socket	stock no. 30462



