

## 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   | $\mu\text{uf}$ |
| Grid 1 to all other electrodes         | 6.5   | $\mu\text{uf}$ |
| D 1 to D 2                             | 1.6   | $\mu\text{uf}$ |
| D 3 to D 4                             | 1.4   | $\mu\text{uf}$ |
| D 1 to all other electrodes except D 2 | 3.8   | $\mu\text{uf}$ |
| D 2 to all other electrodes except D 1 | 3.8   | $\mu\text{uf}$ |
| D 3 to all other electrodes except D 4 | 2.4   | $\mu\text{uf}$ |
| D 4 to all other electrodes except D 3 | 2.4   | $\mu\text{uf}$ |
| Grid 1 to D 1, D 2, D 3, D 4           | 0.001 | $\mu\text{uf}$ |
| Cathode to D 1, D 2, D 3, D 4          | 0.001 | $\mu\text{uf}$ |
| D 1, D 2 to D 3, D 4                   | 0.005 | $\mu\text{uf}$ |

## 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                                        | $15\frac{5}{32}$                  | Max Inches |
| Greatest Diameter of Bulb                             | $3\frac{15}{16} \pm \frac{5}{64}$ | Inches     |
| Minimum Useful Screen Diameter                        | $3\frac{35}{64}$                  | 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      | $45 \pm 10$                       | 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<br>(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<br>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<br>D 1, D 2 (Note 10) | 100,000 | Max Ohms    |
| Resistance for Deflecting-Electrode Circuit<br>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  $\mu$ 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 |



