



# TECHNICAL DATA

TEKTRONIX  
T519P \_\_\_

Revision B

11/20/61

The Tektronix Type T519P\_\_\_ is a 5-inch, extremely tight-tolerance wide-band CRT with a distributed vertical deflector giving high vertical sensibility and high spot writing rate. The tube has electrostatic focus and deflection. The flat-faced envelope has a helical post-accelerator and an aluminized screen. The T519P\_\_\_ was designed primarily for use in the Tektronix Type 519 Oscilloscope.

## MECHANICAL SPECIFICATIONS:

Overall length .....	21 <sup>3</sup> / <sub>4</sub> ± 1 <sup>1</sup> / <sub>8</sub> inches
Greatest diameter of bulb .....	5 <sup>5</sup> / <sub>16</sub> inches
Bulb contacts (2) .....	J1-21
Neck pins (10) .....	0.040 ± .002 inch
Base .....	14 pin special (See outline drawing)
Bulb and base alignment .....	See outline drawing

## ELECTRICAL DATA:

Heater voltage .....	6.3 volts RMS
Heater current .....	0.6 ± 10% ampere RMS
Helix resistance .....	200 megohms Min.
Capacitance, interelectrode (typical values)	
Grid No. 1 to all other electrodes .....	10.8 μμf
Grid No. 1 to cathode .....	2.0 μμf
Cathode to all other electrodes .....	4.4 μμf
Cathode to heater .....	2.2 μμf
DJ <sub>1</sub> to DJ <sub>2</sub> .....	2.65 μμf
DJ <sub>1</sub> to all other electrodes except DJ <sub>2</sub> .....	4.3 μμf
DJ <sub>2</sub> to all other electrodes except DJ <sub>1</sub> .....	4.3 μμf
Vertical deflector <sup>1</sup>	
Characteristic impedance .....	125 ± 5 ohms
Typical CRT risetime less than .....	0.35 nanosec
Typical signal delay through deflector .....	2 nanosec
Internal signal bypass capacitor .....	1500 μμf Min. 5000 μμf Max.
(to vertical position electrode)	

## Deflection polarity

Positive voltage on DJ<sub>1</sub> deflects beam toward pin No. 2

Positive voltage on DJ<sub>3</sub> deflects beam toward pin No. 6

Geometry (measured under typical operating conditions and PDA ratio of 6)

Scan<sup>2</sup>

DJ<sub>1</sub>-DJ<sub>2</sub>

Usable DJ<sub>1</sub>-DJ<sub>2</sub> (horizontal) scan is at least 6 cm centered within 3 mm of geometrical center with trace centered vertically.

DJ<sub>3</sub>-DJ<sub>4</sub>

Usable DJ<sub>3</sub>-DJ<sub>4</sub> (vertical) scan is at least 2 cm centered within 3 mm of geometrical center with trace centered horizontally.

Raster Distortion ..... 1% horizontal  
2% vertical

MAXIMUM RATINGS (all measurements taken with respect to cathode):

Post-accelerator voltage ..... 24,000 volts Max.

Accelerator and deflection system

(1st anode, 2nd anode, deflection plates, deflection plate shields, isolation shield, lower helix) ..... 4500 volts Max.

Focus electrode

Voltage range ..... 0 to 4500 volts

Maximum current to focus electrode .....  $\pm 10 \mu a$

Peak voltage between electrodes

Plate DJ<sub>1</sub> to plate DJ<sub>2</sub> ..... 500 volts Max.

Plate DJ<sub>3</sub> to plate DJ<sub>4</sub> (position) ..... 200 volts Max.

Plate DJ<sub>3</sub> to plate DJ<sub>4</sub> (signal ground) ..... 200 volts Max.

Plate DJ<sub>4</sub> (position) to plate DJ<sub>4</sub> (signal ground) ..... 100 volts Max.

DJ<sub>1</sub>-DJ<sub>2</sub> plates to all other electrodes in the accelerator and deflection system ..... 500 volts Max.

Between any other two electrodes in the accelerator and deflection system ..... 500 volts Max.

Grid No.1 voltage

Negative bias value ..... 200 volts Max.

Positive bias value ..... 0 volts Max.

Peak positive bias value ..... 2 volts Max.

Peak heater-cathode voltage

Heater negative with respect to cathode ..... 125 volts Max.

Heater positive with respect to cathode ..... 125 volts Max.

Maximum average electrode power dissipation

1st anode ..... 6 watts Max.

TYPICAL OPERATING CONDITIONS (all measurements taken with respect to cathode):

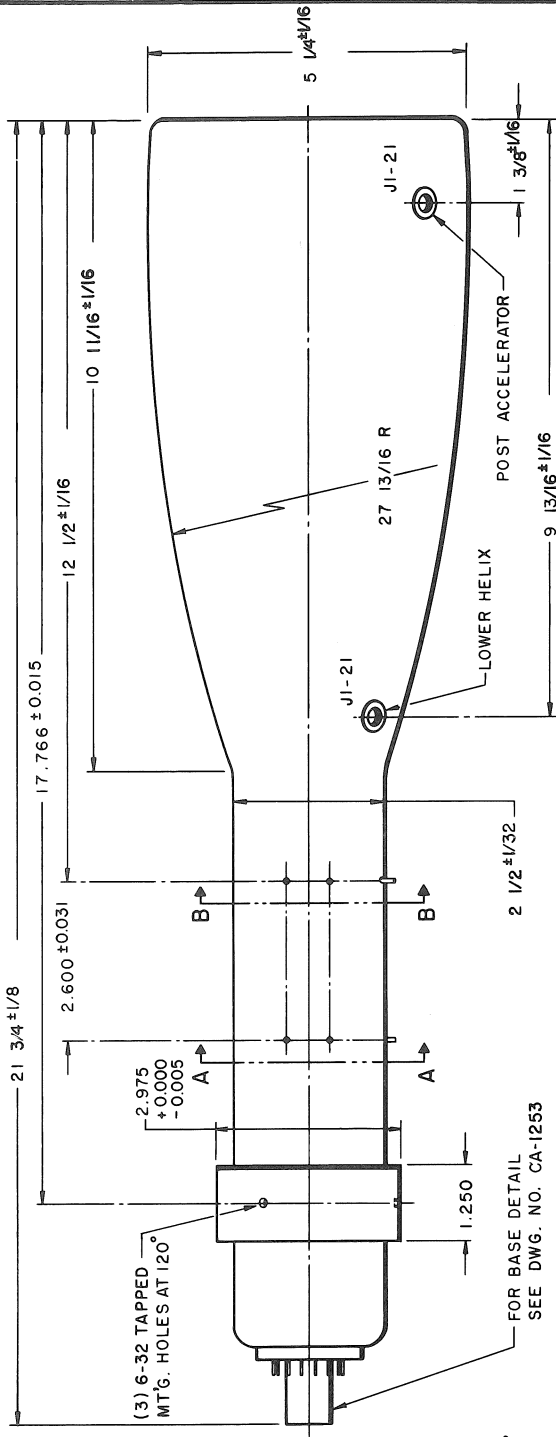
Electrode designation	Symbol	
Post-accelerator voltage .....	Epa	24,000 volts DC <sup>3</sup>
Lower helix voltage .....	Elh	3885 to 4335 volts DC <sup>3</sup>
Isolation shield voltage .....	Eg5	4060 to 4160 volts DC <sup>3</sup>
Average of deflection plates .....	Edp	4110 volts DC <sup>1,5</sup>
Accelerator voltage		
Grid No. 4 (astigmatism) .....	Eg4	3885 to 4335 volts DC <sup>3</sup>
Grid No. 2 (1st anode) .....	Eg2	4110 volts DC
Grid No. 3 voltage (focus) .....	Eg3	500 to 1900 volts DC <sup>4</sup>
Grid No. 1 voltage (control) .....	Eg1	-80 to -120 volts (cutoff)
Deflection factors (nominal)		
DJ <sub>1</sub> -DJ <sub>2</sub> .....		35 volts/cm
DJ <sub>3</sub> -DJ <sub>4</sub> .....		9 volts/cm
Useful scan		
DJ <sub>1</sub> -DJ <sub>2</sub> .....		6 cm
DJ <sub>3</sub> -DJ <sub>4</sub> .....		2 cm

DESIGN RANGES:

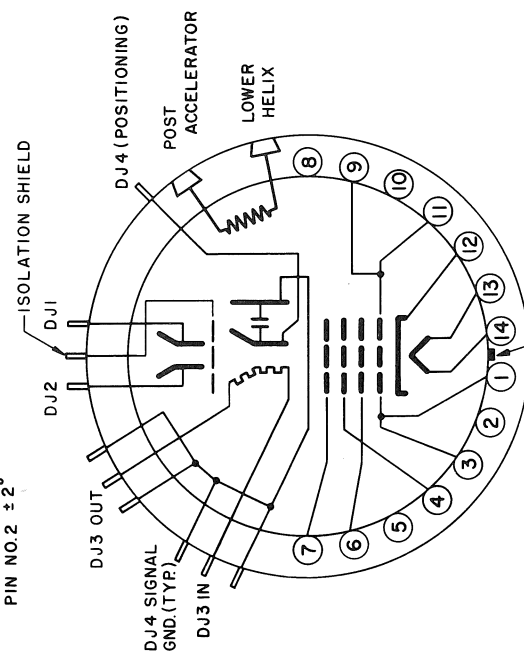
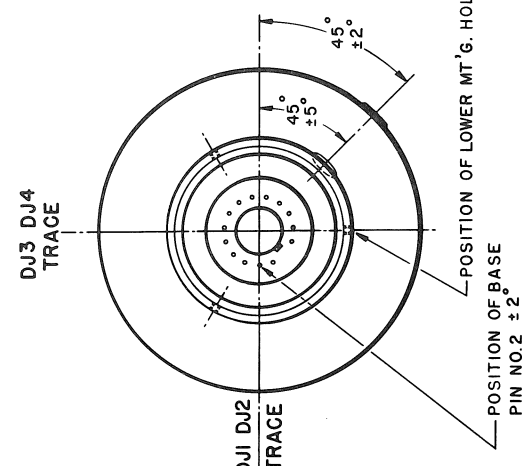
Deflection factors (measured under typical operating conditions)		
DJ <sub>1</sub> -DJ <sub>2</sub> .....		32 to 38 volts/cm
DJ <sub>3</sub> -DJ <sub>4</sub> .....		8 to 10 volts/cm

NOTES:

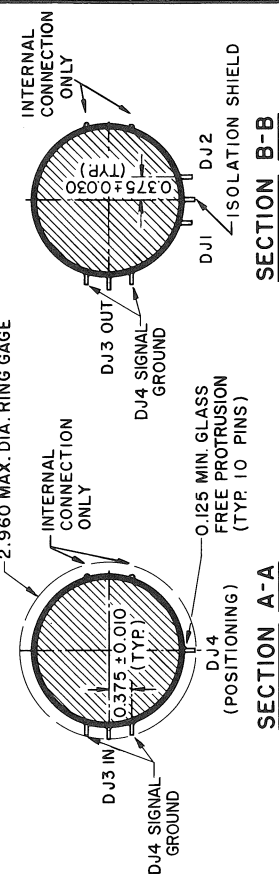
1. Optimum high-speed response is obtained with 4110 volts on the vertical deflector. Under this condition the transient response is optimum.
2. Usable scan is that at which the beam current is not less than 50% of the value at electrical center. In normal operation, some current is collected on deflection plates.
3. Recommended range. Adjust for optimum geometry and overall focus.
4. Recommended range.
5. It is recommended that the average potential of the DJ<sub>3</sub>-DJ<sub>4</sub> plates be equal to the average potential of the DJ<sub>1</sub>-DJ<sub>2</sub> plates. Spot size and deflection linearity may be impaired otherwise.



FOR BASE DETAIL  
SEE DWG. NO. CA-1253



BASE SCHEMATIC



BASE CONNECTIONS

1, 3, 9, 11	GRID NO. 1
2, 5, 8, 10	N. C.
4	GRID NO. 3 ( FOCUS )
6	GRID NO. 2 ( 1ST. ANODE )
7	GRID NO. 4 ( ASTIGMATISM )
12	CATHODE
13, 14	HEATER

MARK	DATE	DESCRIPTION	BY	APPR
		CATHODE-RAY TUBE DIVISION <b>TEKTRONIX, INC.</b> PORTLAND, OREGON, U.S.A.		
		TUBE TYPE: <b>T519</b>		
		DATE: 10-14-60		
		MOD. <b>D</b>		