



TECHNICAL DATA

TEKTRONIX
T321P

Revision B

11/9/62

T 3210

The Tektronix Type T321P is a 3-inch flat-faced cathode ray tube with electrostatic focus and deflection. It features a low-power cathode, deflection blanking and a helical post-accelerator. It was designed for use in the Tektronix Type 321 Transistorized Oscilloscope.

MECHANICAL SPECIFICATIONS:

Overall length	13 $\frac{5}{8}$ $\pm \frac{1}{8}$ inches
Greatest diameter of bulb	3 $\frac{1}{16}$ inches
Bulb contact	J1-21
Neck pin diameter	0.040 $\pm .002$ inch
Base	JEDEC NO. B12-43 (modified)
Bulb and base alignment	See outline drawing
Weight (typical)	18 ounces

ELECTRICAL DATA:

Heater voltage	6.3 volts RMS
Heater current	0.3 $\pm 10\%$ ampere RMS
Helix resistance	100 megohms Min.*
Capacitance, interelectrode (typical values)	
Grid No. 1 to all other electrodes	5.1 $\mu\mu f$
Cathode to all other electrodes	4.1 $\mu\mu f$
DJ ₁ to DJ ₂	2.6 $\mu\mu f$
DJ ₁ to all other electrodes except DJ ₂	2.7 $\mu\mu f$
DJ ₂ to all other electrodes except DJ ₁	2.8 $\mu\mu f$
DJ ₃ to DJ ₄	0.9 $\mu\mu f$
DJ ₃ to all other electrodes except DJ ₄	2.5 $\mu\mu f$
DJ ₄ to all other electrodes except DJ ₃	2.5 $\mu\mu f$
BJ ₁ to all other electrodes	7.4 $\mu\mu f$

Deflection polarity

Positive voltage on DJ₁ deflects beam toward pin No. 10

Positive voltage on DJ₃ deflects beam toward pin No. 1

Geometry (measured under typical operating conditions)

Minimum useful scan DJ ₁ -DJ ₂	6 div ¹
Minimum useful scan DJ ₃ -DJ ₄	10 div ¹
Minimum quality screen area	2 $\frac{3}{4}$ inch circle
Trace orthogonality	90° $\pm 1^\circ$
Centering of undeflected spot with respect to geometric center (deflection electrodes connected to grid No. 6)	0.125 inch Max.
Raster distortion	1.7% Max.

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

Post-accelerator voltage 5000 volts Max.

Accelerator and deflection system

(1st anode, blanking plates, 2nd anode, deflection plates, deflection plate shields, isolation shield, lower helix) 850 volts Max.

Focus electrode

Voltage range 0 to 850 volts

Maximum current to focus electrode $\pm 5 \mu\text{a}$

Peak voltage between electrodes

Plate to plate 500 volts Max.

Plate to all other electrodes in the accelerator and deflection system 500 volts Max.

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

Grid No. 1 voltage

Negative bias value 75 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 and blanking plates 1 watt Max.

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

Electrode designation	Symbol
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Post-accelerator voltage Epa 4000 volts DC

Lower helix voltage Elh
Isolation shield voltage Eg6 } 625 to 715 volts DC²

Average of deflection plates Edp
DJ₃-DJ₄ deflection shield voltage Es1 } 660 volts DC

Accelerator voltage

Grid No. 5 (astigmatism) Eg5 625 to 715 volts DC³

Grid No. 2 and 3 (1st anode) Eg2,3
Blanking plate BJ1 } 680 volts DC

Grid No. 4 voltage (focus) Eg4 0 to 270 volts DC³

Grid No. 1 voltage (control) Eg1 —15 to —25 volts
(cutoff)

Deflection factors (nominal)	
DJ ₁ -DJ ₂	7.8 volts/div ^{1*}
DJ ₃ -DJ ₄	5.6 volts/div ^{1*}

Useful scan

DJ ₁ -DJ ₂	6 div ¹
DJ ₃ -DJ ₄	10 div ¹

Deflection blanking voltage (BJ₁ to BJ₂)

For visual cutoff at Eg₁ = 0 volts

± 25 volts

DESIGN RANGES:

Minimum scan (PDA ratio of 6)

DJ ₁ -DJ ₂	6 div ¹
DJ ₃ -DJ ₄	10 div ¹

Deflection factors (PDA ratio of 6)

DJ ₁ -DJ ₂	10.6 to 12.9 v/div/kv of Edp ^{1*}
DJ ₃ -DJ ₄	7.6 to 9.4 v/div/kv of Edp ^{1*}

Grid No. 1 voltage for extinction of undeflected focused spot

3.8% of Edp

Focus electrode voltage (recommended range)

0% to 41% of Edp

Deflection blanking voltage (BJ₁ to BJ₂)

3.8% of Edp

(Eg₁ = 0 volts)

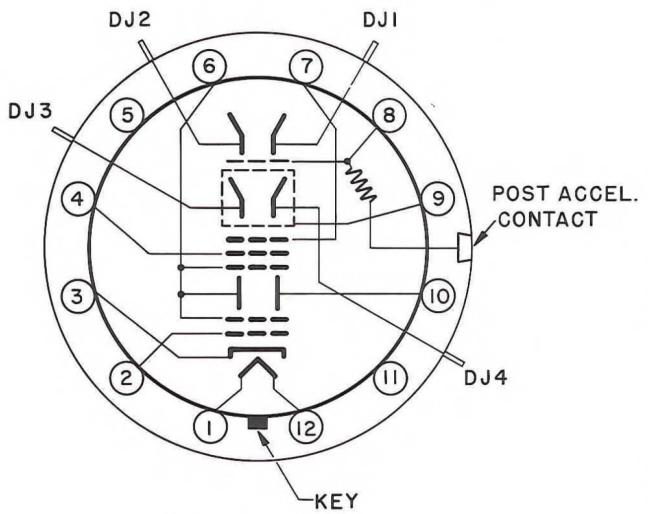
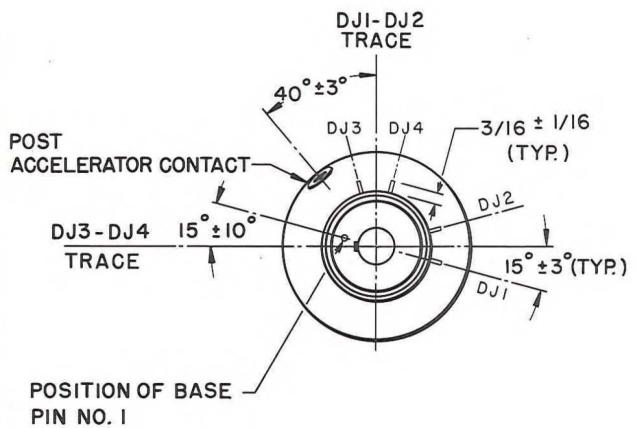
NOTES:

* Asterisk denotes change.

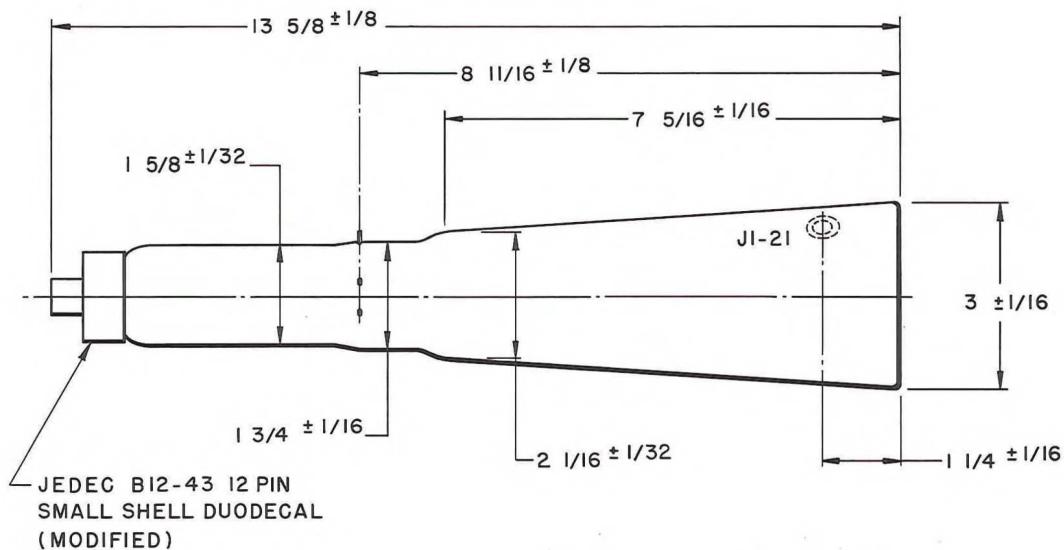
- Major graticule divisions are 0.25 inch.
- Lower helix and isolation shield are connected internally. Pattern distortion minimal with proper potential.
- Recommended range. Adjust for optimum focus.

Beam Current : .3 MA @ 680 V

≈ .6 MA @ 1000 V



BASE SCHEMATIC



BASE CONNECTIONS

- 1, 12 HEATER
- 2 GRID NO. 1 (CONTROL)
- 3 CATHODE
- 4 GRID NO. 4 (FOCUS)
- 5, 11 N.C.
- 6 GRID NO. 2 & 3 (1ST. ANODE)
BJ1 (BLANKING PLATE RETURN)
- 7 GRID NO. 5 (ASTIGMATISM)
- 8 ISOLATION SHIELD
- 9 DJ3-DJ4 SHIELD
- 10 BJ2 (BLANKING PLATE)

MARK	DATE	DESCRIPTION	BY	APPR
		CATHODE-RAY TUBE DIVISION TEKTRONIX, INC. PORTLAND, OREGON, U.S.A.		
TUBE TYPE:		T 321	DATE: 6-13-60	MOD. B

TECHNICAL DATA



PERFORMANCE
CURVES
T3210

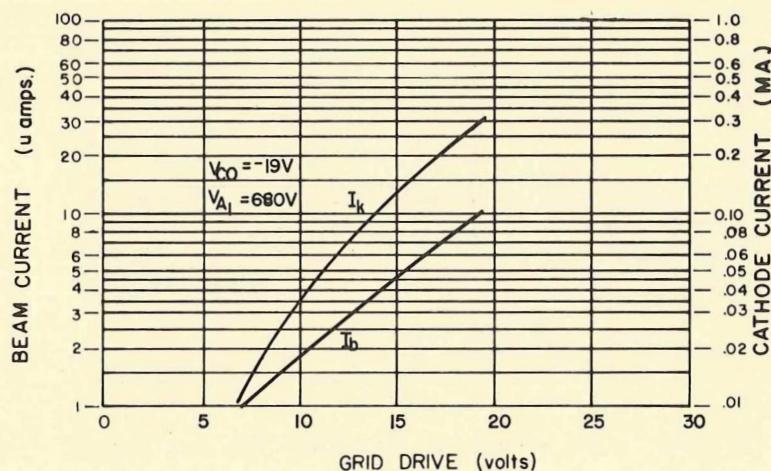
LIMITED DISTRIBUTION

7/3/63

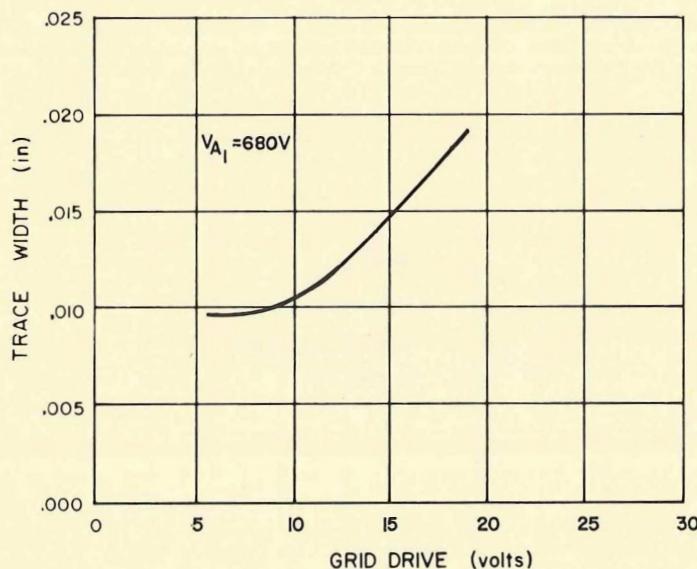
All measurements taken with voltages specified under Typical Operating Conditions on the T3210 Technical Data Sheet. This data is representative of the CRT alone dissociated from any operating circuitry.

AVERAGE GRID-DRIVE CHARACTERISTICS:

Grid drive measured as volts above cutoff.

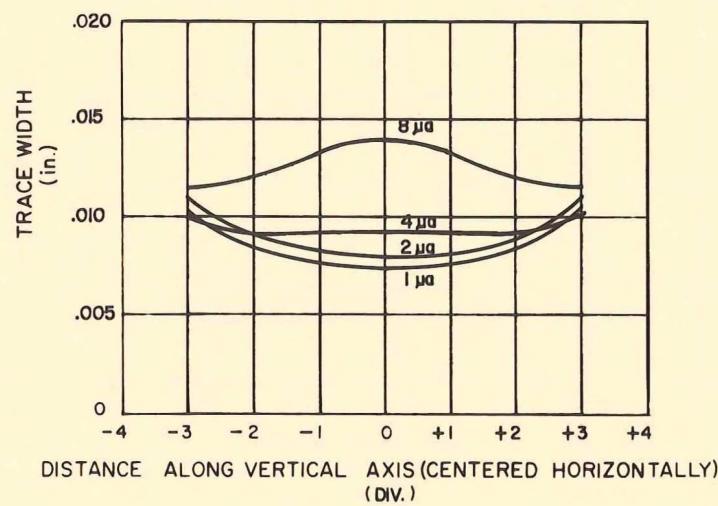
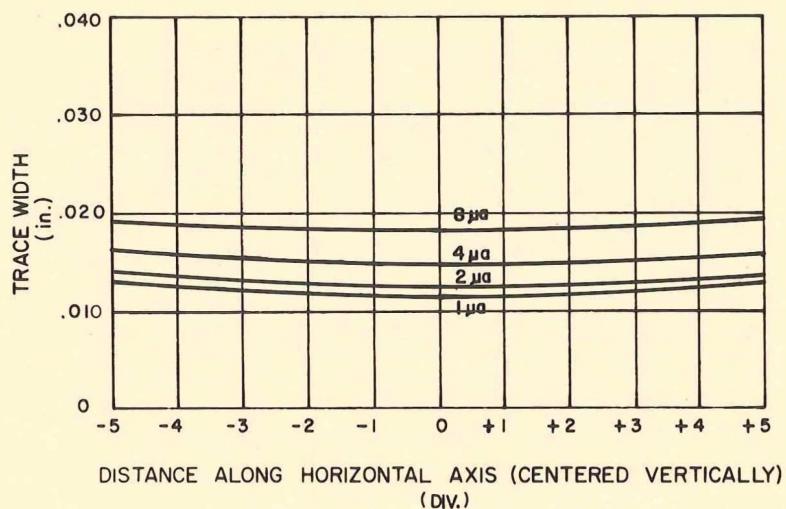


AVERAGE CENTER-SPOT-SIZE CHARACTERISTICS:



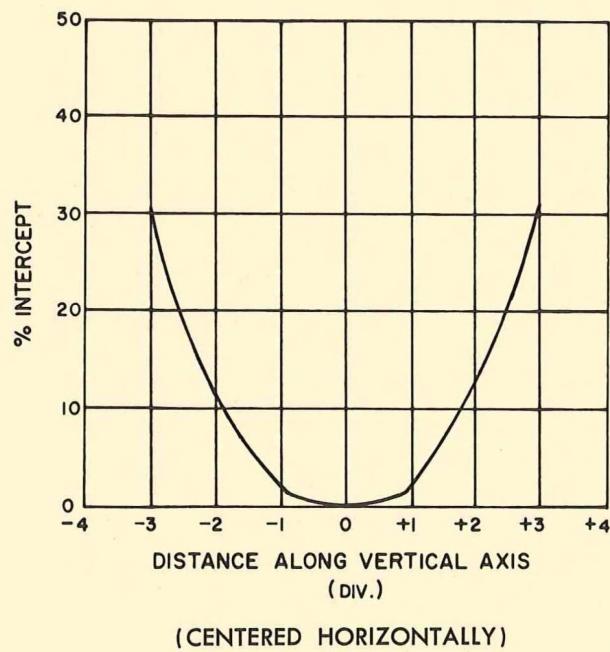
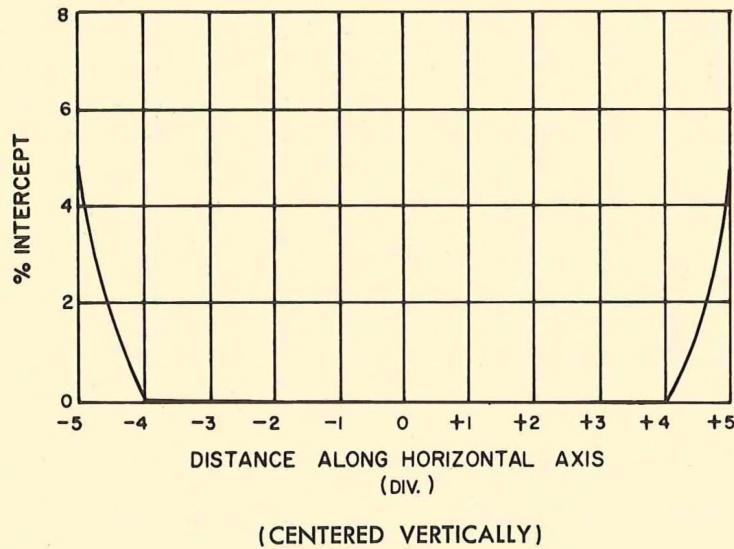
TRACE WIDTH VERSUS LOCATION ALONG AXIS:

All trace width measurements taken using shrinking raster method with 11-line raster at 2 kc rep-rate.



DEFLECTION PLATE I_b INTERCEPT:

Taken at normal viewing currents of $1\text{-}2 \mu\text{amps}$.



LINEARITY CHARACTERISTICS:

Percent departure from the deflection factor measured at the axis.

