CRT DATA

T5640

10-14-64

DESCRIPTION

The Tektronix Type T5640 is a 4 x 5 inch rectangular flat-faced, direct-viewing storage cathode-ray tube with electrostatic focus and deflection. The T5640 is designed primarily for use in the Tektronix 564 Storage Oscilloscope.

MECHANICAL SPECIFICATIONS

Overall length	16-1/2 ±1/8 inches
Greatest width of bulb	5-5/16 inches
Greatest height of bulb	4-5/16 inches
Bulb contacts	See outline drawing
Base	JEDEC no. B14-38
Bulb-to-gun alignment	±3°
Bulb-to-base alignment	See outline drawing

ELECTRICAL DATA

Writing gun	
Heater voltage	6.3 volts rms
Heater current	0.6 ±10% amps rms
Capacitance, interelectrode (typical value)	
Grid no. 1 to all other electrodes	7.3 pf
Cathode to all other electrodes	4.7 pf
D1 to D2	2.8 pf
D1 to all other electrodes except D2	2.7 pf
D2 to all other electrodes except D1	2.5 pf
D3 to D4	1.2 pf
D3 to all other electrodes except D4	2.3 pf
D4 to all other electrodes except D3	2.9 pf
B2 to all other electrodes	8.3 pf
Deflection polarity	
Positive voltage on D1 deflects beam toward pin no. 1.	
Positive voltage on D3 deflects beam toward pin no. 4.	
Geometry (measured under typical operating conditions)	
Minimum useful scan D1-D2	8 cm
Minimum useful scan D3-D4	10 cm
Minimum quality screen area	8 x 10 cm
Trace orthogonality	90° ±1°

Centering of undeflected spot with respect to geometric center: (deflection electrodes connected to astigmatism electrode)	
Horizontal	5 mm
Vertical	See note 1
Raster distortion	1.3% max[2]
Flood gun	
Heater voltage	12.6 volts dc
Heater current (total)	0.3 ±10% amps dc
Capacitance, interelectrode (typical values)	
A grid no. 1 to all other electrodes	16.4 pf
B grid no. 1 to all other electrodes	17.4 pf
Anode and CE 1 to all other electrodes	75.6 pf
CE 2 to all other electrodes	100 pf
CE 3 to all other electrodes	150 pf
CE 4 to all other electrodes	125 pf
CE 5 to all other electrodes	240 pf
STB 1 to all other electrodes	162 pf
STB 2 to all other electrodes	165 pf
STB 1 to STB 2	19 pf
STB 2 to STB 1	19 pf

RATINGS (Absolute maximum values)

Writing gun (all measurements taken with respect to the writing gun cathode)	
Accelerator and deflection system (Screen, 1st anode, blanking plates, 2nd anode, deflection plates, isolation shield)	4000 volts max
Focus electrode	
Voltage range	0 to 4000 volts
Current	±10 μa max
Peak voltage between astigmatism and/or any deflection electrode	500 volts max
Grid no. 1 voltage	
Negative bias value	150 volts max
Positive bias value	0 volts max
Positive peak value	2 volts max
Peak heater-cathode voltage	±125 volts max
Electrode power dissipation, 1st anode and blanking plate	3 watts max
Flood gun (all measurements taken with respect to the viewing gun cathode)	
STB 1 and STB 2 voltage	
Bias value	500 volts max
Peak value	1000 volts max
Accelerator and collimation system (anode, grid no. 1 and CE 1, CE 2, CE 3, and CE 4)	500 volts max
Peak voltage between any two electrodes in the acceleration and collimation systems	500 volts max

Collimation electrode current to CE 1, CE 2, CE 3, CE 4, and CE 5:		
To any electrode		±5 ma max
To all electrodes		±10 ma max
Grid no. 1 voltage		
Negative bias value		300 volts max
Positive bias value		0 volts max
Positive peak value		2 volts max
Peak heater-cathode voltage		±125 volts max
Electrode power dissipation		
CE 1, CE 2, CE 3, CE 4, and CE 5		2 watts max
STB 1, STB 2		7.5 watts max
Flood gun cathodes positive with respect to writing gun cathode		4000 volts max

TYPICAL OPERATING CONDITIONS

Writing gun (all measurements taken with respect to the writing gun cathode)		
Storage target backplate no. 1 voltage	$E_{STB\ 1}$	3350 to 3700 volts dc[3]
Storage target backplate no. 2 voltage	$E_{STB\ 2}$	
Isolation shield voltage	E_{is}	3460 to 3550 volts dc[4]
Average of deflection plates	E_{dp}	3500 volts dc
Accelerator voltage		
Astigmatism electrode	E_{as}	3300 to 3600 volts dc[5]
Accelerator and B1 blanking plate	E_a, E_{B1}	3425 volts dc
Focusing electrode	E_f	460 to 820 volts dc[5]
Grid no. 1 voltage (control)	E_{g1}	-53 to -88 volts dc (cutoff)
Deflection factors (nominal)		
D1-D2		19.5 volts/cm
D3-D4		18.4 volts/cm
Useful scan[6]		
D1-D2		8 cm
D3-D4		10 cm
Deflection blanking voltage (B1 to B2)		
For visual cut-off at I_k = 200 μa		±88 volts max
Flood gun (all measurements taken with respect to the flood gun cathode)		
Storage target backplate no. 1 voltage	$E_{STB\ 1}$	50 to 400 volts[3]
Storage target backplate no. 2 voltage	$E_{STB\ 2}$	
Collimator voltage		
CE 5	$E_{CE\ 5}$	10 to 75 volts[4]
CE 4	$E_{CE\ 4}$	70 to 125 volts[4]
CE 3	$E_{CE\ 3}$	125 to 240 volts[4]
CE 2	$E_{CE\ 2}$	245 volts

CE1 Fq Acc

, 50 -250

CE 1	$E_{CE\ 1}$	150 to 250 volts[4]
Flood gun accelerator	E_{fa}	
Grid no. 1 voltage (control)	E_{fg1}	0 to -100 volts[7]
Useful coverage		8 x 10 cm
Flood-gun cathode to writing-gun cathode (flood-gun positive)		3300 volts

DESIGN RANGES

Deflection factors	
D1-D2	5.3 to 5.8 v/cm/kv of E_{dp}
D3-D4	5.0 to 5.5 v/cm/kv of E_{dp}
Grid no. 1 voltage for extinction of undeflected focused spot	3% of E_{dp}
Focus electrode voltage (recommended range)	13% to 23% of E_{dp}
Deflection blanking voltage (B1-B2) For visual cutoff at I_k = 200 μa	2.5% of E_{dp}

NOTES

1. Ranges from ±3.0 mm with a vertical deflection factor of 20.5 v/cm to ±5.0 mm with a vertical deflection factor of 19.5 v/cm.

2. With a 8 x 10 cm rectangular raster centered on the face of the tube, the raster edges will not deviate from straight parallel lines by more than 1 mm total on the left and right edges nor by more than 1 mm total top and bottom.

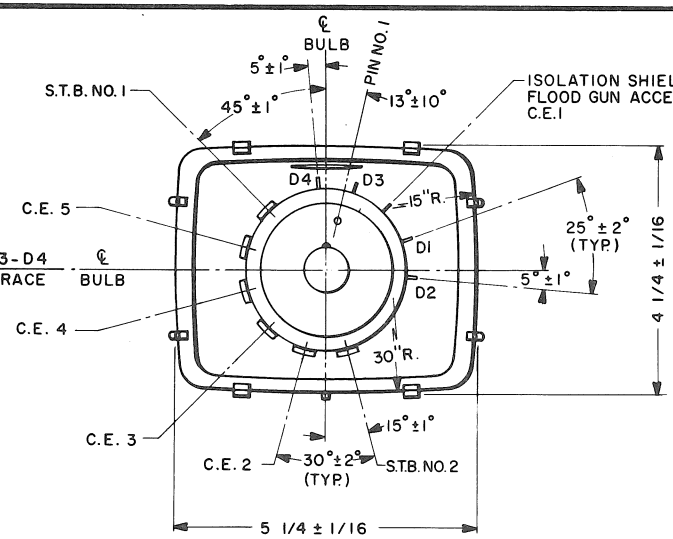
3. Adjust to operating level for stored mode.

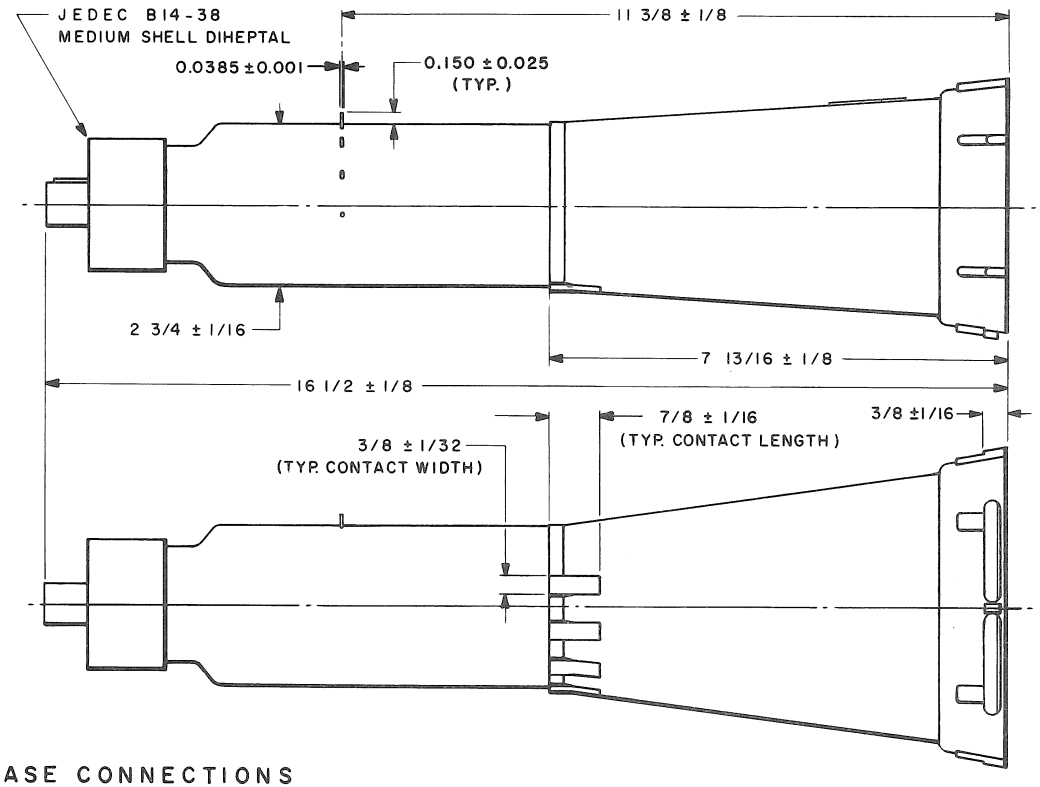
4. The writing gun isolation shield, flood gun anode, and CE 1 are internally connected. This potential is adjusted to optimize writing-gun geometry, and collimation is adjusted with CE 2, 3, 4, and 5 with respect to this geometry adjustment.

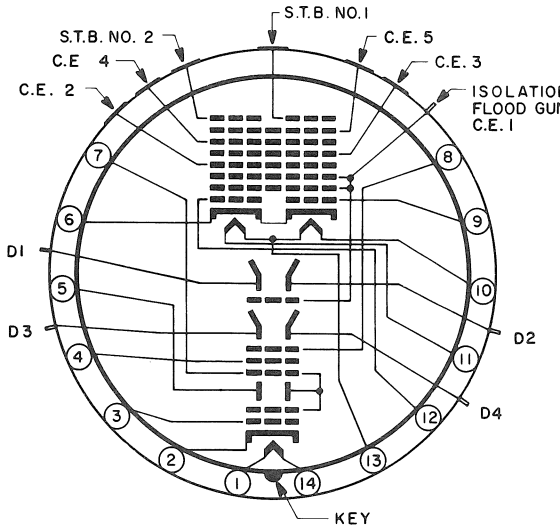
5. Recommended range. Adjust for best overall focus.

6. The deflection plates intercept part of the electron beam near the edge of the scan; therefore, a low-impedance deflection drive is desirable.

7. Flood gun grid no. 1 bias is adjusted to get precise coverage of the tube faceplate.







TUBE SCHEMATIC

BASE CONNECTIONS

1,14	HEATER
2	CATHODE
3	GRID NO. 1
4	FOCUSING ELECTRODE
5	(B2) BLANKING PLATE
6	COMMON CATHODE - FLOOD GUNS "A" & "B"
7	ACCELERATOR, (B1) BLANKING PLATE RETURN
8	ASTIGMATISM ELECTRODE
9	GRID NO. 1 - FLOOD GUN "B"
10,11	COMMON HEATER - FLOOD GUNS "A" & "B"
12	GRID NO. 1 - FLOOD GUN "A"
13	INTERNAL CONNECTION - DO NOT USE

MARK	DATE	DESCRIPTION	BY	APPR

CATHODE-RAY TUBE DIVISION
TEKTRONIX, INC.
PORTLAND, OREGON, U.S.A.

TUBE TYPE: T 5640

DATE: 11/12/64

MOD. D

1-15-65