



CRT DATA

T4220

Revision A

3-7-66

DESCRIPTION

The T4220 is an aluminized, 3-3/8 x 3-7/8-inch, rectangular flat-faced cathode-ray tube designed for oscilloscope use. The T4220 has electrostatic focus and deflection, a mesh shielded helical post accelerator, and a low power cathode. It is available either with or without a lighted internal graticule.

ELECTRICAL DATA

Focusing method	Electrostatic
Deflecting method	Electrostatic
Heater voltage	6.3 ±0.3 volts RMS
Heater current at 6.6 volts	103 ±5ma
Direct interelectrode capacitance, approximate:	
Cathode to all other electrodes	3.4 pF
Grid no. 1 to all other electrodes	12.9 pF
D1 to D2	1.7 pF
D3 to D4	1.0 pF
D1 to all other electrodes	5.4 pF
D2 to all other electrodes	5.5 pF
D3 to all other electrodes	3.3 pF
D4 to all other electrodes	3.7 pF
B2 to all other electrodes	5.3 pF
Post-accelerator helix resistance	200 MΩ min

MECHANICAL DATA

Overall length	12 ±1/8 inches
Greatest bulb dimensions ¹	
Width	3.840 ±0.060 inches
Height	3.340 ±0.060 inches
Minimum useful screen dimensions	
Width	3-3/16 inches
Height	2-9/16 inches
Bulb number	Special
Bulb contact	J1-22
Base ²	Special
Basing	Special
Bulb contact alignment:	
J1-22 contact aligns 45° clockwise from D3-D4 trace	±5°
J1-22 contact on same side as pin no. 2	
Base alignment:	
Pin no. 14 aligns with D3-D4 trace	±5°
Positive voltage on D1 deflects beam approximately toward pin no. 3	
Positive voltage on D3 deflects beam approximately toward pin no. 14.	
Angle between D1-D2 and D3-D4 trace	90° ±1°
Gun to graticule alignment	±3°

RATINGS (design maximum values)³

Post-accelerator voltage	10000 volts DC max
Post-accelerator grid voltage	2000 volts DC max
Lower helix and isolation shield voltage	2000 volts DC max
D1-D2 shield voltage	2000 volts DC max
D3-D4 shield voltage	2000 volts DC max
Average deflection plate voltage	2000 volts DC max
Ratio of post-accelerator voltage to average voltage of deflection plates ⁴	4.3 max
Astigmatism electrode voltage	2000 volts DC max
Focusing electrode voltage	800 volts DC max
Accelerator voltage	2000 volts DC max
B2 blanking plate voltage	2000 volts DC max
Accelerator input	6 watts max
Grid no. 1 voltage:	
Negative-bias value	200 volts DC max
Positive-bias value	0 volts DC max
Positive-peak value	2 volts DC max
Peak heater-cathode voltage:	
Heater negative to cathode:	
During warm-up period not to exceed 15 seconds ..	180 volts DC max
After equipment warm-up period	125 volts DC max
Heater positive to cathode	125 volts DC max
Peak voltage between astigmatism and/or any deflection electrode	500 volts DC max

TYPICAL OPERATING CONDITIONS³

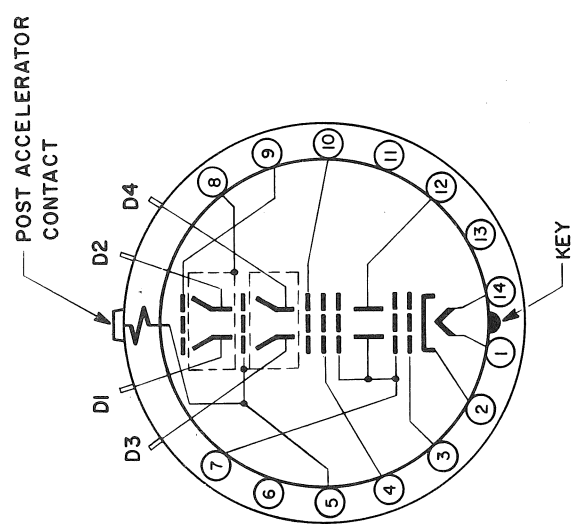
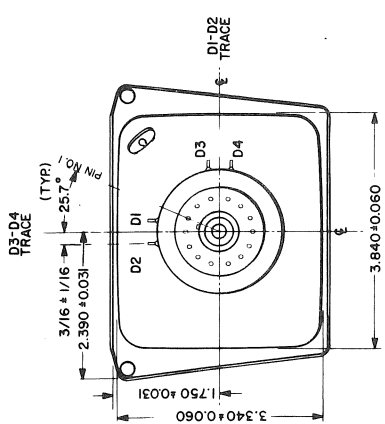
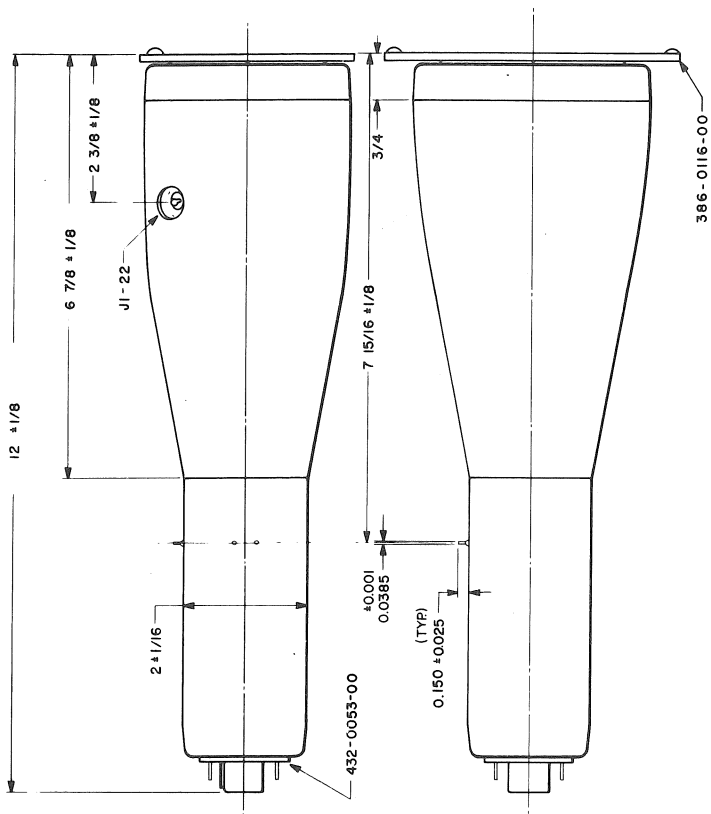
Post-accelerator voltage	6000 volts DC
Post-accelerator grid voltage	1361 volts DC
Lower helix, isolation shield, and D3-D4 shield voltage	1400 volts DC
D1-D2 shield voltage ⁵	1388 to 1495 volts DC
Average deflection plate voltage	1400 volts DC
Astigmatism electrode voltage ⁶	1388 to 1455 volts DC
Focusing electrode voltage ⁶	320 to 520 volts DC
Accelerator and B1 blanking plate voltage	1373 volts DC
Grid no. 1 voltage ⁷	-55 to -75 volts DC
Deflection factors:	
D1 and D2 ⁸	9.8 to 11.4 volts DC/div.
D3 and D4 ⁸	5.3 to 6.3 volts DC/div.
Useful scan D1-D2 ⁹	10 div.
Useful scan D3-D4 ⁹	8 div.
Blanking plate voltage (B1-B2)	
For visual cut-off at $I_k = 750 \mu\text{a}$	± 15 volts DC max
Focusing electrode current for any operating condition	-10 μa to +10 μa
Spot position (undeflected) ¹⁰	within ± 0.5 major div. from geometric center
Pattern distortion at 100% useful scan ¹¹	1.5% max

MAXIMUM CIRCUIT VALUES

Grid no. 1 circuit resistance 1.5 M Ω max

NOTES

1. Not including graticule lighting hardware. See outline drawing.
2. See outline drawing. The socket for this tube should not be rigidly mounted. It should have flexible leads and be allowed to move freely so that it cannot impress lateral strains through the socket contacts onto the base pins.
3. All voltages taken with respect to cathode.
4. This tube is designed for optimum performance when operating at a ratio of 4.3. Operation at other ratios may result in changes in deflection uniformity, pattern distortion, and/or useful scan.
5. Pattern distortion is minimized by proper adjustment of this potential.
6. Recommended range. Adjust for best overall focus.
7. Visual extinction of undeflected spot.
8. Major graticule divisions are 8 mm.
9. The deflection plates intercept part of the electron beam near the edge of scan; therefore, a low-impedance deflection drive is desirable.
10. Connect free deflection electrodes to accelerator.
11. With a 8 x 10 div. rectangular raster centered on the face of the tube, the raster edges will not deviate from straight parallel lines by more than 0.5 minor div. total on the left and right edges, nor by more than 0.5 minor div. total at the top and bottom.

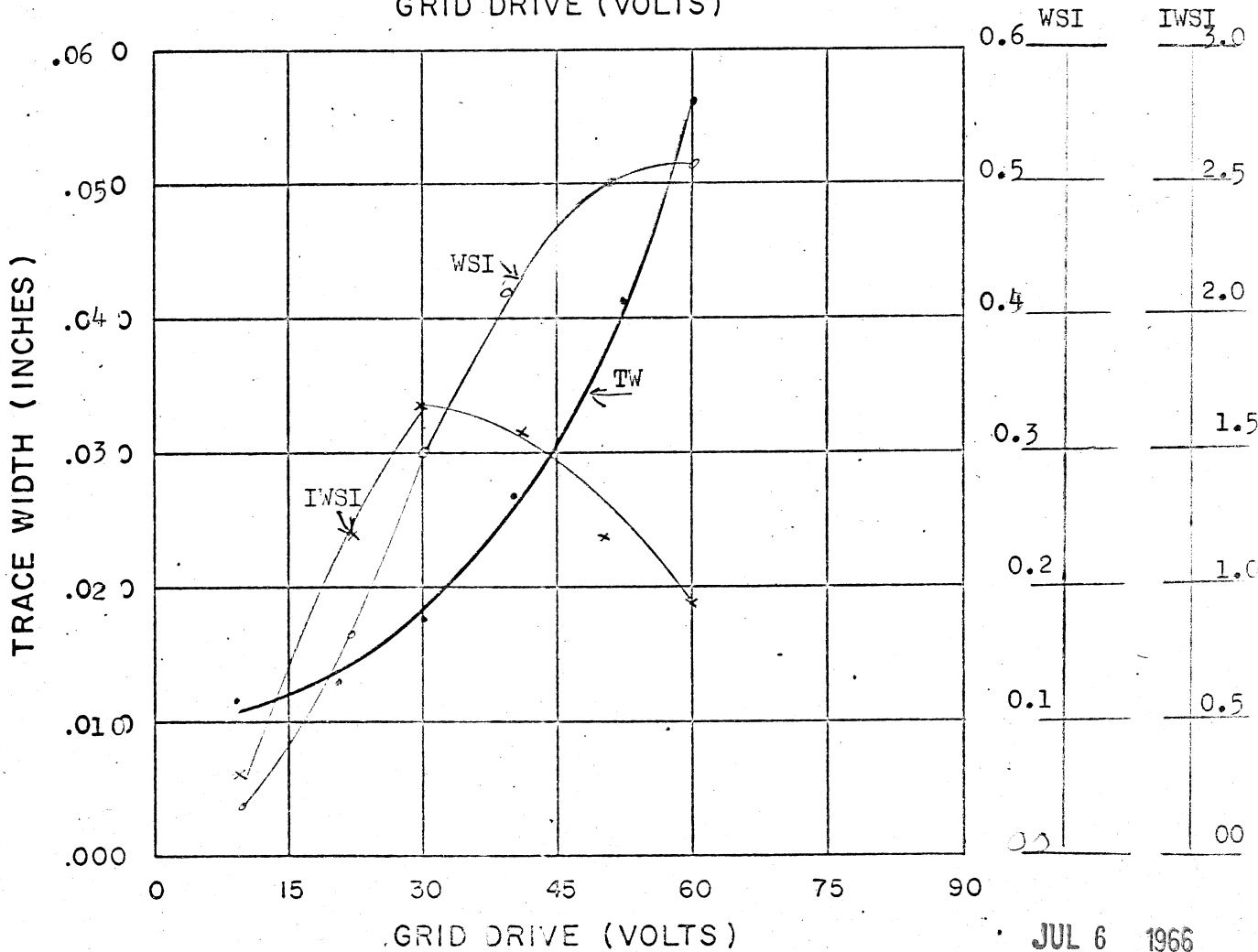
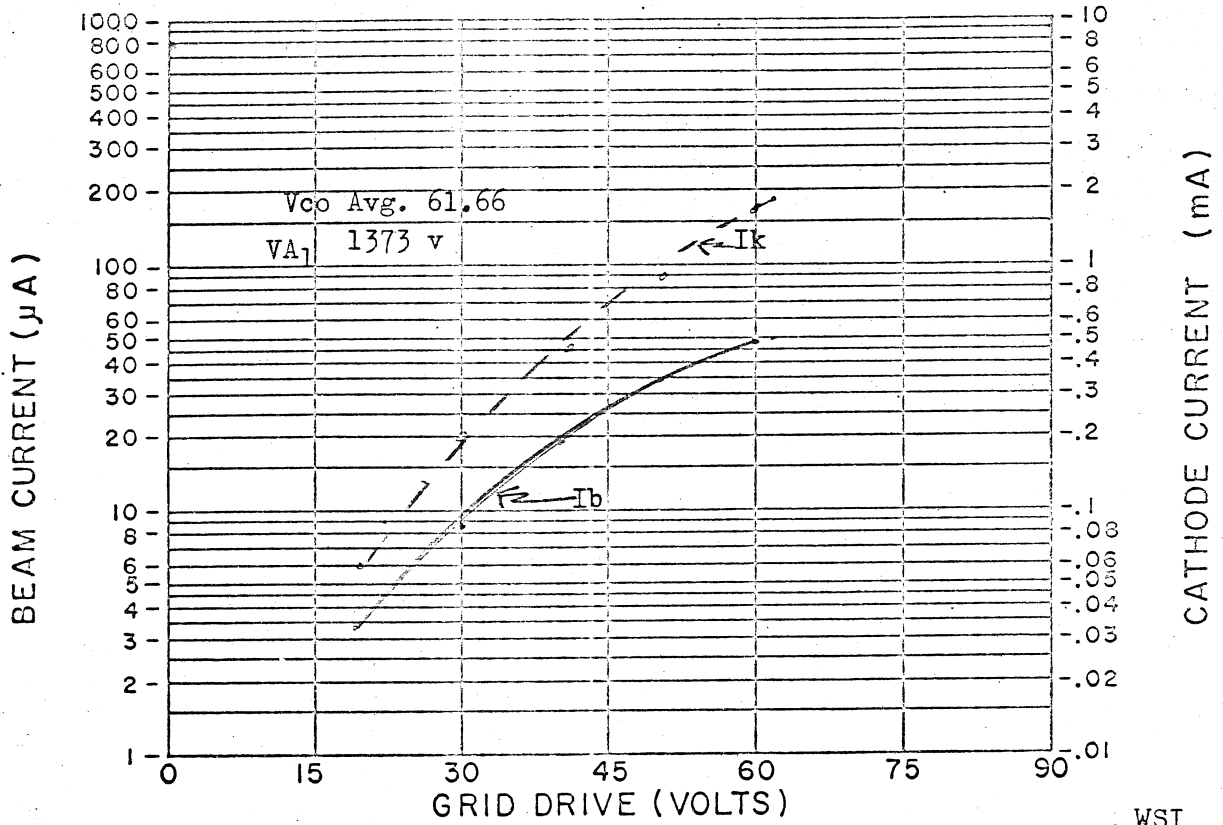


BASE CONNECTIONS

- 1,14 HEATER
- 2. CATHODE
- 3. GRID NO.1
- 4. FOCUSING ELECTRODE
- 5. ISOLATION SHIELD & LOWER HELIX
- 6,11,13 I.C. (GRID NO.1 INTERNAL CONNECTION)
- 7. ACCELERATOR, BI BLANKING PLATE RETURN
- 8. DI-D2 SHIELD
- 9. POST ACCELERATOR GRID
- 10. ASTIGMATISM ELECTRODE
- 12. B2 BLANKING PLATE

TUBE SCHEMATIC

MARK	DATE	DESCRIPTION	BY	APPR
		CATHODE-RAY TUBE DIVISION TEKTRONIX, INC. PORTLAND, OREGON, U.S.A.		
		TUBE TYPE: T4220		
		DATE:		
		MOD.		



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