

Cathode Ray Tubes:

Getting Down to Basics

FORWARD

This book was written to serve three major purposes:

1. To understand the interaction and interdependence between the CRT and electronic circuitry in measurement devices having CRTs. The cathode-ray tube (CRT), as the output or display section of oscilloscopes, graphics terminals and other measurement devices, requires understanding in isolating a malfunctioning electronic circuit, the design of circuitry that interfaces with the CRT is dependent upon the requirements of the CRT and before these circuits can be fully analyzed the requirements of the CRT must be known. The proper operation of the various controls and adjustments directly associated with the display requires an understanding of the probable effect upon the CRT.
2. To understand the basic theory or principles of CRT design and operation. In today's world of solid-state devices the principles of operation of vacuum devices is relatively unknown. This book is an attempt to give the engineer, technician or other reader a basic understanding of CRT operation.
3. To consolidate previous CRT-technical documents under one cover. Over the past 30 years there have been a number of CRT theory booklets and technical reports written by Tektronix covering CRT design and theory of operation; some were published and now are out-of-date and no longer in print, others were never published.

I wish to acknowledge those whose publications have been used in this book and whose efforts continue to advance the performance of cathode-ray tubes.

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APPENDIX A

Format EIA Phosphor Designation	Fluorescence	Phosphorescence	CIE Coordinates		Persistence (20%)	Comparable WTDS Designations
			X	Y		
P1	Yellowish Green	Yellowish Green	0.218	0.712	Medium	GJ
P2	Yellowish Green	Yellowish Green	0.279	0.534	Medium Short	GL
P3	Orange Yellow	Orange Yellow	0.523	0.469	Medium	YB
P4	White Screen for Monochrome TV and Data Display Tubes (11,000°K)					WW
P5	Blue	Blue	0.169	0.132	Medium Short	BJ
P6	White Screen for Monochrome Data Display Tubes (11,000°K)					WW
P7	Purplish Blue	Yellowish Green	0.151	0.032	Medium Short	GM
P8	(Reservation Cancelled)	0.357	0.537	Long		
P9	(Reservation Cancelled)					
P10	Dark Trace Screen (KCl)	Normally White				
P11	Blue	Blue	0.139	0.148	Medium Short	BE
P12	Orange	Orange	0.557	0.442	Long	LB
P13	Reddish Orange	Reddish Orange	0.670	0.329	Medium	RC
P14	Blue	Orange Yellow	0.150	0.093	Blue-Med Short	YC
			0.504	0.443	Orange-Medium	
P15	Green	Green	0.246	0.439	Short	GG
P16	Violet (UV)	Violet (UV)	0.199	0.016	Very Short	AA
P17	White	Yellow	0.302	0.390	Blue-Short	WF
					Yellow-Long	
P18	White Screen for Monochrome TV and Data Display Tubes (11,000°K)					WW
P19	Orange	Orange	0.572	0.422	Long	LF
P20	Yellow Green	Yellow Green	0.426	0.546	Medium Short	KA
					To Medium	
P21	Reddish Orange	Reddish Orange	0.539	0.373	Long	RD
P22	Tricolor Screen for Color TV and Display Tubes (R,G,B)					X
P23	White	White	0.364	0.377	Medium Short	WG
P24	Green	Green	0.245	0.441	Short	GE
P25	Orange	Orange	0.569	0.429	Medium	LJ
P26	Orange	Orange	0.513	0.426	Very Long	LC
P27	Reddish Orange	Reddish Orange	0.674	0.326	Medium	RE
P28	Yellow Green	Yellow Green	0.370	0.540	Long	KE
P29	Yellowish Green	Yellowish Green	0.279	0.534	Medium Short	SA
	Orange	Orange	0.569	0.429	Medium	
P30	(Reservation Cancelled)					
P31	Green	Green	0.226	0.528	Medium Short	GH
P32	Purplish Blue	Yellowish Green	0.340	0.515	Long	GB
P33	Orange	Orange	0.559	0.440	Very Long	LD
P34	Bluish Green	Yellowish Green	0.235	0.364	Very Long	ZB
P35	Yellowish Green	Greenish Blue	0.200	0.245	Medium Short	BG
P36	Yellow Green	Yellow Green	0.400	0.543	Very Short	KF
P37	Greenish Blue	Greenish Blue	0.143	0.208	Very Short	LK
P38	Orange	Orange	0.591	0.407	Very Long	LK
P39	Yellowish Green	Yellowish Green	0.223	0.698	Long	GR
P40	White	Yellowish Green	0.276	0.312	Blue-Med. Short	GA
					Yellow Green-Long	
P41	Orange Yellow	Orange Yellow	0.541	0.456	Long	YD
P42	Yellowish Green	Yellowish Green	0.238	0.568	Medium	GW
P43	Yellowish Green	Yellowish Green	0.333	0.556	Medium	GY
P44	Yellowish Green	Yellowish Green	0.300	0.596	Medium	GX
P45	White	White	0.253	0.312	Medium	WB
P46	Yellow Green	Yellow Green	0.365	0.595	Very Short	KG
P47	Purplish Blue	Purplish Blue	0.166	0.101	Very Short	BH
P48	Yellow Green	Yellow Green	0.365	0.615	Medium	KH
P49	Yellowish Green	Reddish Orange				VA
		Yellowish Green	0.315	0.615	Medium	
		Reddish Orange	0.672	0.327	Medium	
P50	Reddish Orange	Yellowish Green				VB
		Reddish Orange (8 KV)	0.655	0.340	Medium	VB
		Yellowish Green (15KV)	0.398	0.546	Medium Short	
P51	Reddish Orange	Yellow Green				VC
		Reddish Orange (6KV)	0.675	0.325	Medium	
		Yellowish Green (12 KV)	0.414	0.514	Medium Short	
P52	Purplish Blue	Purplish Blue	0.157	0.075	Medium Short	BL
P53	Yellow Green	Yellow Green	0.368	0.539	Medium	KJ
	Tri-Color Screen for Display (R,G, white)					B
P55	Blue	Blue	0.150	0.070	Medium Short	BM
P56	Red	Red	0.640	0.335	Medium	RF
P57	Yellowish Green	Yellowish Green	0.218	0.712	Medium	LL
		Orange	0.573	0.426	Very Long	