

Tektronix®
COMMITTED TO EXCELLENCE

314
STORAGE
OSCILLOSCOPE

SERVICE

INSTRUCTION MANUAL

TABLE OF CONTENTS

SECTION 1	SPECIFICATION	Page
	Electrical Characteristics	1-1
	Vertical	1-1
	Horizontal System	1-2
	Triggering System	1-3
	Calibrator	1-3
	External Horizontal Input	1-4
	External Blanking	1-4
	CRT Display System	1-4
	Storage System	1-4
	Power Sources	1-5
	Environmental Characteristics	1-5
	Physical Characteristics	1-6
SECTION 2	OPERATING INFORMATION	
	Preliminary Information	2-1
	Safety Information	2-1
	Operating Voltage	2-1
	Controls and Connectors	2-1
	Front Panel	2-1
	Side Panel	2-4
	Rear Panel	2-4
SECTION 3	THEORY OF OPERATION	
	Block Diagram	3-1
	Description	3-1
	Vertical Amplifier	3-1
	Triggering	3-1
	Sweep Generator	3-1
	CRT and Power Supply	3-3
	Calibrator	3-3
	Circuit Operation	3-3
	CH 1 Preamp and Calibrator	3-3
	General	3-3
	Input Coupling	3-3
	Input Attenuator	3-4
	5 Division Calibrator	3-4
	Input Stage	3-4
	Preamp Stage	3-4
	CH 2 Preamp	3-4
	General	3-4
	Preamp Stage	3-4
	Channel Switch	3-4
	General	3-4
	Diode Gates	3-5
	Switching Multivibrator	3-6
	Current Limiter	3-8
	Delay-Line Driver	3-8
	Vertical Output Amplifier	3-8
	General	3-8
	Delay Line	3-8
	Output Amplifier	3-8

TABLE OF CONTENTS (cont)

SECTION 3	THEORY OF OPERATION (cont)	Page
	Trigger Source	3-9
	Internal	3-9
	Source and Coupling	3-9
	Trigger Preamp and Sweep Generator	3-10
	Trigger Preamplifier	3-10
	Sweep Generator	3-10
	Normal Triggered Mode	3-13
	Auto-Triggered Mode	3-13
	Single Sweep Mode	3-13
	Sweep Magnification and Positioning	3-14
	Ext Horiz	3-14
	General	3-14
	Input Stage	3-14
	Output Stage	3-14
	Horizontal Amplifier	3-14
	General	3-14
	Emitter-Follower Amplifier	3-14
	Common-Base Amplifier	3-14
	Output Amplifier and Output Inverter Amplifier	3-14
	Storage	3-15
	General	3-15
	Storage Tube	3-15
	Flood Guns and Collimation Electrodes	3-17
	Target-Control Amplifier	3-17
	Erase Generator	3-17
	Enhance Generator	3-18
	Auto Erase	3-18
	Auto-Erase Generator	3-18
	Sweep Reset Delay Multivibrator	3-18
	Integrate	3-19
	Power Supply	3-19
	General	3-19
	AC Power Input	3-19
	Power Source Selector	3-20
	Series Regulator	3-20
	DC-to-DC Converter	3-20
	Regulator Protection	3-20
	Auto Turn Off	3-20
	Low-Line Indicator	3-20
	+6 V and -6 V Regulator	3-20
	H V and Unblanking	3-20
	General	3-20
	High Voltage and CRT	3-20
	Blanking and Unblanking	3-22
SECTION 4	MAINTENANCE	
	Preventive Maintenance	4-1
	Cleaning	4-1
	Visual Inspection	4-1
	Semiconductor Checks	4-1
	Recalibration	4-1

TABLE OF CONTENTS (cont)

SECTION 4	MAINTENANCE (cont)	Page
	Troubleshooting	4-1
	Troubleshooting Chart	4-1
	Troubleshooting Techniques	4-4
	Corrective Maintenance	4-5
	Obtaining Replacement Parts	4-5
	Component Removal and Replacement	4-6
	Instrument Cabinet	4-6
	Storage-Time/Div Module	4-6
	CRT (with power supply section of instrument in place)	4-6
	Power Supply-High Voltage Section	4-7
	Interface Circuit Board (Assembly A8)	4-8
	Power Supply Circuit Board (Assembly A7)	4-8
	H V and Unblank Circuit Board (Assembly A6)	4-9
	Storage Circuit Board (Assembly A5)	4-9
	Horizontal Circuit Board (Assembly A4)	4-10
	Attenuator Circuit Board (Assembly A1)	4-10
	Vertical Circuit Board (Assembly A2)	4-11
	Trigger Switch Circuit Board (Assembly A3)	4-12
	Circuit Board Pins	4-12
	Circuit Board Pin Sockets	4-12
	Lead-End Pin Connectors	4-13
	Recalibration After Repairs	4-13
	Instrument Repackaging	4-13
SECTION 5	PERFORMANCE CHECK/CALIBRATION	
	Performance Check	5-1
	Introduction	5-1
	Using the Procedure	5-1
	Index	5-1
	Partial Procedure	5-1
	Control Settings	5-1
	Test Equipment Required	5-1
	Special Calibration Fixtures	5-1
	Calibration Equipment Alternatives	5-1
	Index to Performance Check	5-4
	Power Supply and Display	5-5
	Vertical System	5-6
	Horizontal System	5-9
	Triggering System	5-11
	Storage System	5-13
	Miscellaneous	5-16
	Calibration Procedure	5-17
	Calibration Interval	5-17
	Tektronix Field Services	5-17
	Using the Procedure	5-17
	Index	5-17
	Calibration Procedure	5-17
	Partial Procedure	5-17
	Index to Adjustment Procedure	5-17

TABLE OF CONTENTS (cont)

SECTION 5	PERFORMANCE CHECK/CALIBRATION (cont)	Page
	Power Supply and Calibrator	5-18
	Display	5-20
	Storage	5-22
	Vertical System	5-24
	Horizontal System	5-28
SECTION 6	ELECTRICAL PARTS LIST	
SECTION 7	DIAGRAMS	
SECTION 8	MECHANICAL PARTS LIST AND ILLUSTRATIONS	
CHANGE INFORMATION		

LIST OF ILLUSTRATIONS

Figure No.		Page
1-1	Sony-Tektronix 314 Storage Oscilloscope	
1-2	Dimensions	1-7
2-1	Locations of controls and connectors Front Panel	2-2
2-2	Locations of controls and connectors Side Panel	2-4
2-3	Locations of controls and connectors Rear Panel	2-4
3-1	Basic Block Diagram	3-2
3-2	CH 1 Preamp Circuit Block Diagram	3-3
3-3	CH 2 Preamp Circuit Block Diagram	3-5
3-4	Channel Switching Block Diagram	3-5
3-5	Signal Path, CH 1	3-6
3-6	Signal Path, CH 2	3-7
3-7	Vertical Output Amplifier Block Diagram	3-9
3-8	Trigger Source Block Diagram	3-10
3-9	Sweep Generator and External Horizontal Block Diagram	3-11
3-10	Horizontal Amplifier Block Diagram	3-15
3-11	Storage Block Diagram	3-16
3-12	Power Supply Block Diagram	3-19
3-13	CRT & H V Block Diagram	3-21
4-1	Troubleshooting Chart	4-2
4-2	Location of Power Supply Test Points	4-5
4-3	Location of Connectors	4-7
4-4	Location of Screws Holding Power Supply Section to Main Chassis	4-7
4-5	Location of 8-Pin Connector in Power Supply	4-8
4-6	Location of Hexagonal Spacers on Interface Board	4-8
4-7	Location of Screws Holding Heat-Sink Bracket	4-8
4-8	Location of Screws Near Focus and Intensity Controls	4-9

LIST OF ILLUSTRATIONS (cont)

4-9	Location of Screws on Power Supply Section	4-9
4-10	Location of Screws Holding Storage Circuit Board to Module	4-9
4-11	Location of Screws Holding Horizontal Circuit Board to Module Assembly	4-10
4-12	Location of Interconnecting and Ground Leads Between Attenuator and Vertical Circuit Boards	4-11
4-13	Location of Screws Holding Attenuator Circuit Board to Chassis	4-11
4-14	Location of Delay Line Leads	4-11
4-15	Location of Screws and Spacers Holding Trigger Circuit Board	4-12
5-1	Idealized Display of Risettime	5-8
5-2	Calibration Shield in place on 314	5-26
5-3	Typical display of correct adjustment of C1 or C11	5-26
5-4	Display of correct high-frequency compensation (idealized)	5-27
5-5	Typical display of external X10 attenuator compensation (idealized)	5-29
7-1	Semiconductor Lead Configurations	
7-2	Circuit Board Locations	
7-3	Adjustment Locations	
7-4	Adjustment Locations	
7-5	Adjustment Locations	
7-6	Adjustment Locations	
7-7	A1-Attenuator Board	
7-8	A2-Vertical Amplifier Circuit Board	
7-9	A3-Trigger Switch Circuit Board	
7-10	A4-Horizontal Circuit Board	
7-11	A5-Storage Circuit Board	
7-12	A7-Power Supply Circuit Board	
7-13	A8-Interface Circuit Board	
7-14	A6-H V and Unblanking Circuit Board	
7-15	A9-Intensity Limit Circuit Board	

LIST OF TABLES

Table No.		Page
1-1	Characteristics	1-1
2-1	Power Cord color codes	2-1
3-1	Sweep Generator IC Input-Output	3-11
4-1	Voltage and Ripple Tolerances	4-4
5-1	Test Equipment	5-1
5-2	Volts/Div Accuracy	5-7
5-3	Time/Div Accuracy (unmagnified)	5-9
5-4	Time/Div Accuracy (magnified)	5-10
5-5	Trigger Levels	5-11
5-6	Volts/Div Compensation	5-27