

Waveform parameters at the touch of a key.

Dc to 400 MHz Bandwidth at 10 mV/div.

Calibrated sweep rates to 500 ps/div.

Stores repetitive waveforms up to 400 MHz (up to 14 GHz with 7S11/7S12 plug-ins).

Single-shot events and pretrigger up to 50 μ s/div (with 7B87 Time Base).

7854 WAVEFORM PROCESSING OSCILLOSCOPE

SPECIFICATIONS ORDERING INFORMATION

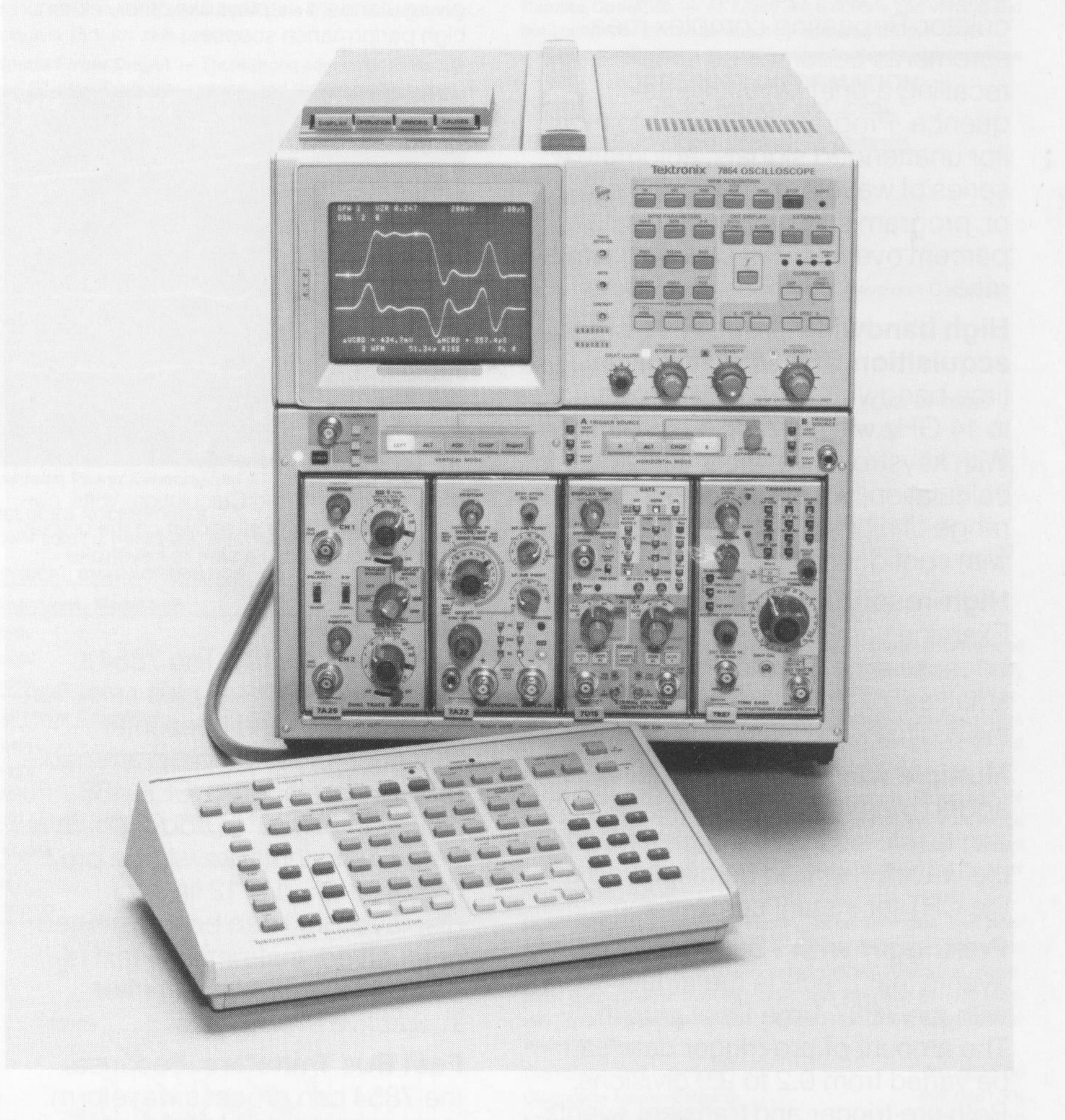
Signal averaging.

Resolution up to 0.01 div (10 bits).

Choice of 128, 256, 512, 1024 points/waveform.

Keystroke programming (up to 2000 keystrokes with Option 2D).

IEEE-488 interface (standard). Over 30 compatible plug-ins.



The Tektronix 7854 Oscilloscope

gives you pushbutton solutions to common measurement problems that occupy your valuable time. Digital storage, waveform processing, and programmability combine with a superior analog instrument for powerful new capabilities. A member of the high performance 7000 Series of oscilloscopes, the 7854 can take advantage of over 30 specialized plug-ins, so you can tailor a test and measurement system to your specific needs.

Parameters at the touch of a key.

No more counting divisions and multiplying figures while adjusting the display. For you it means saved time, increased accuracy, consistent measurements, and simple operation. **Accurate measurements.** With the 7854's single and dual cursor measurement capability, you can select a portion of a waveform for parameter calculation or obtain the amplitude and time for single point or point-to-point measurements. **Noise Reduction.** Averaging enables you to uncover signals buried in noise, improving measurement accuracy. The procedure is simple and flexible: average with a single keystroke, or select a specific averaging sequence with a combination of keystrokes.

The 7854 has advanced measurement technology and is a solid investment today that can expand to meet tomorrow's needs.



Waveform processing. Powerful 7854 arithmetic functions enable you to process waveforms for the answers you need. For instance, perform simple multiplication of a voltage waveform by a current waveform to yield the instantaneous power waveform. The time savings is considerable, leaving you more time to draw creative conclusions from your data.

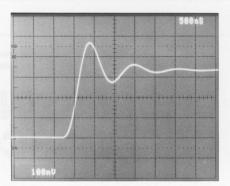
Keystroke programming. Create your own measurement routines using the 7854 Waveform Calculator. Repeating complex measurements becomes as simple as recalling a brief keystroke sequence. Program the scope to monitor unattended signals; automate a series of waveform measurements; or, program specific functions, like percent overshoot or standing wave ratio.

High bandwidth, repetitive signal acquisition. The 7854 has a realtime bandwidth of 400 MHz and up to 14 GHz with sampling plug-ins. With keystroke waveform parameter calculation, you can tackle a wide range of high-speed applications with confidence.

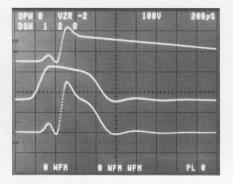
High-resolution measurements. Examine your signals with precision, because amplitude differences as small as .01 division are recorded in the digitizing process.

Multiple waveform storage. With added memory, up to 40 waveforms can be stored for later recall. Multiple waveforms can be displayed on the CRT for instant comparison.

Pre-trigger with 7B87. Capture events that precede the trigger with the 7B87 Time Base plug-in. The amount of pre-trigger data can be varied from 0.2 to 9.9 divisions. Both pre-trigger and transient events can be stored at speeds of up to $50 \mu s/div$ or up to $2 \mu s/pt$ using an external clock.



Conventional Scope: In the SCOPE mode, the 7854 provides a complete plug-in scope giving standard displays like other Tektronix high performance scopes.

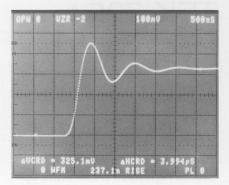


Multiple Storage and Calculation: Volts, current, and power are all shown on the display. Power calculation is a simple keystroke operation.

Programmability. The 7854's keystroke functions, plus selection of the vertical and horizontal compartments, are programmable through its standard IEEE-488 (GPIB) interface. In addition, waveforms, constants, keystroke programs, and up to 12 lines of displayed text can be transmitted or received. Instructional text is especially useful for operator-interactive procedures.

Fast Bus Transfers. Because the 7854 can process waveform data, you can send answers over the GPIB instead of raw data. This saves transfer time, your controller's processing time, and your programming time.

Plug into a solid investment. The 7000 Series' plug-in design means that your scope will serve you as well tomorrow as it does today. Configure your scope to fit changing test requirements, choosing from a



Storage Scope: Risetime is calculated by pushing a single key. Time and voltage differences between cursors are shown on the line above risetime.

80	L22 SHL				
001	APR				
2002 2003	4 WFN IFY>X 2	LBL G	CTO		H.
884	IFY>X 2		OTO		
006	SHH STO		I.		

Waveform Processing: Keystroke Programming enables the user to design measurement routines tailored to individual tests or experiments.

wide range of amplifiers, counter/ timers, sampling devices and other special-purpose modules. At any time, you can add new performance at a fraction of the cost of a monolithic instrument.

Instruction. Tek offers a 7854based Waveform Processing Workshop that covers all 94 commands and operators available both locally and over the GPIB. You can explore the 7854 capabilities in this fastpaced, two-day course.

Application program library.

7854 users may take advantage of the Tektronix Instrumentation Software Library, a collection of utility software that assists users in designing measurement programs to fit their specific application needs.

SPECIFICATIONS

VERTICAL REAL TIME SYSTEM

Input - Two plug-in compartments; compatible with 7000 Series plug-ins.

Modes of Operation - LEFT, ALT, ADD, CHOP, RIGHT.

Mainframe Bandwidth — 400 MHz with 7A29 or 7A19 Amplifier plug-in.

Mainframe Step Response - 0.9 ns or less with 7A29 or 7A19 Amplifier plug-in

Chopped Mode — Chop rate is ≈ 1 MHz.

Delay Line - Permits viewing leading edge of displayed waveform (7B50 Series time bases not recommended for 7854 except 7B50A).

Trace Separation Range - In dual-sweep modes, B trace can be positioned four div above or below the A trace.

CRT AND DISPLAY FEATURES

CRT Display Modes

SCOPE (Conventional display.) STORED (Digital data display.) BOTH (Stored display plus real time waveforms.) PROGRAM ENTRY (User program text display.)

HORIZONTAL REAL TIME SYSTEM

Input - Two plug-in compartments; compatible with 7000 Series plug-ins. 7000 Series vertical amplifiers and specialized plug-ins may also be used.*

Modes of Operation - A, ALT, CHOP, B.

Fastest Calibrated Sweep Rate - 0.5 ns/div.

Chopped Mode — Rep rate is \approx 200 kHz.

X-Y Mode — Phase shift between vertical and horizontal channels is within 2° from dc to 35 kHz without phase correction, (dc to 1 MHz with phase correction, B horizontal only, Option 02).

*Note: See plug-in compatibility for exceptions for digital storage.

PROGRAM STORAGE

Keystroke programming allows the mainframe to remember a sequence of keystrokes (with remote calculator keyboard or GPIB.*)

Editing — Line by line editing capability.

*Note: Mainframe vertical and horizontal modes and all other keys except edit commands are programmable.

DIGITAL STORAGE

Equivalent Time Bandwidth - 400 MHz. See 7000 Series system bandwidth specifications

Accuracy - Refer to plug-in specifications. Acquisition Channels - One or two simultaneous channels

(Plug-in CHOP mode not valid).

Acquisition Window — ± 5 divisions from center screen both vertical and horizontal.

Resolution

Vertical - 0.01 div.

Horizontal - Selectable points/waveform on remote keyboard. Fixed at 512 points with Option 0D.

Horizontal Resolution (divs)	Points/Waveform
0.01	1024
0.02	512
0.04	256
0.08	128

PLUG-IN COMPATIBILITY

All 7000 Series plug-ins are compatible in the standard oscilloscope display mode. The 7L5 and 7L18 Spectrum Analyzers require factory modification for optimum use with digital storage operation. The 7D01, 7D02 and 7T11 are not compatible in STORED mode

The 7B87 provides pretrigger for the 7854. Pretrigger allows you to view what has occurred before the trigger event in single shot applications. The amount of pre-trigger time is determined by the Acquire-Stop delay time setting. The total amount of pretrigger is 0.2 to 9.9 times the time/div setting.

Single Shot Performance - Using 7B87 with 7854 Internal clock.

Fastest Sweep (Time/Div)	Points/Waveform	
50 µs	128	
100 µs	256	
200 µs	512	
500 µs	1024	

Ext Clock - 2 µs/point maximum

OUTPUTS/INPUTS

+Sawtooth — Positive-going with baseline at 0 V \pm 1 V into 1 M Ω . Voltage is 1 V/div (±10%) into 1 M Ω , 50 mV/div (±15%) into 50 Ω . Output R is \approx 950 Ω .

+Gate - Positive pulse of the same duration and coincident with sweep. Output voltage is 10 V (\pm 10%) into 1 M Ω , 0.5 V (±10%) into 50 Ω.

Output R is \approx 950 Ω . Source is selectable from A gate, B gate, or DELAYED gate.

Vertical Signal Out - Selected by A TRIGGER SOURCE switch. Output voltage is 0.5 V/div into 1 M\Omega, 25 mV/div into 50 $\Omega.$ Output R is \approx 950 $\Omega.$ Bandwidth depends upon vertical plua-in.

Remote Single Sweep Reset - Rear panel BNC, ground closure activated.

TTL Output - Rear panel BNC, TTL output under remote keyboard control (SWH and SWL).

External Z-Axis Input - 2 V p-p for full intensity range from dc to 1 MHz. Positive signal blanks the trace. Maximum input voltage is 15 V (dc plus peak ac).

Camera Power Output - Three-prong connector to the left of the CRT provides power, ground, and remote single-sweep reset access for the C-50 Series cameras

Memory Back-Up Power Input - 6.0 V to 6.5 V at 0.7 amp to preserve stored data if mainframe's power is interrupted.

CALIBRATOR

Voltage Output -- Squarewave, positive-going from ground. Ranges are 40 mV, 0.4 V, and 4 V into 100 k_Ω; 4 mV, 40 mV, and 0.4 V into 50 Ω . Amplitude accuracy is within 1%; rep rate is 1 kHz within 0.25%.

Current Output - 40 mA available through Calibrator output with optional BNC to current loop adaptor.

POWER REQUIREMENTS

Line Voltage Ranges - 90 V-132 V. 180 V-250 V

Line Frequency — 48-440 Hz.

Maximum Power Consumption - 230 W.

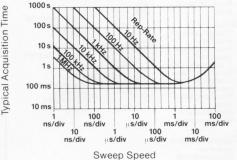
INCLUDED ACCESSORIES

Power cord (161-0066-00); BNC-to-BNC cable (012-0208-00).

PHYSICAL CHARACTERISTICS

Dimensions, Mainframe	mm	in		
Width	305	12.0		
Height	348	13.7		
Depth	627	24.7		
Waveform Calculator	mm	in		
Width	277	10.9		
Height	69	2.7		
Depth	165	6.5		
Cord Length (within 76 mm)	1420	56.0		
Weights	kg	lb		
Net	20.4	45.0		
Shipping	28.2	62.0		

Acquisition Time Using Equivalent Time Sampling



Note: 512 horizontal points, 7B87 at minimum holdoff.

MEMORY FORMAT

Time

		STAN	DARD			OPTIC	ON 2D		OPTION OD
Points Per Waveform*	128	256	512	1024	128	256	512	1024	512
Maximum No of Waveforms	16	8	4	2	40	20	10	5	1
Maximum No of Constant Registers	50			100			0		
Maximum No of Prog Commands plus lines	920		20			20	00		0

*Unless otherwise selected, default value is 512 at power-up.

IEEE STANDARD 488 INTERFACE

Standard — Conforms to IEEE Standard 488-1978. Interface Functions Subset Implemented:

SH1	Complete Source Handshake	
AH1	Complete Acceptor Handshake	
Т5	Talker Function	
L3	Listener Function	
SR1	Complete Service Request Capability	
RL1	Complete Remote/Local Capability	
DC1	Complete Device Clear Capability	
DT1	Complete Device Trigger Capability	

I/O Records - Waveforms, constants, program text, and display text

End of Message Terminator (Selectable in TALK/LISTEN mode for EOI or LF/EOI). - Compatible with Tektronix and other popular controllers

Device Address - Selectable via rear panel switch

Remote Operation — All keystroke functions and vertical and horizontal modes can be remotely operated via the GPIB.

ORDERING INFORMATION (PLUG-INS NOT INCLUDED)

7854 Oscilloscope (including remote

Waveform Calculator)

Option 02 — X-Y Phase Correction

Option 03 - EMC Modification

Ontion 78 - P11 Phosphor

Option 0D — Delete GPIB and remote Waveform Calculator one waveform storage

Option 2D — 4 k Expanded Memory,

040-0941-00

INTERNATIONAL POWER CORDS & PLUG OPTIONS Option A1 - Universal Euro 220 V/16A.50 Hz

Option A2 - UK 240 V/13A,50 Hz

Option A3 - Australian 240 V/10A, 50 Hz

Option A4 - North American 240 V/15A, 60 Hz

Option A5 - Switzerland 220 V/10A, 50 Hz

7B87 Time Base required only for

pretrigger and single shot digitizing

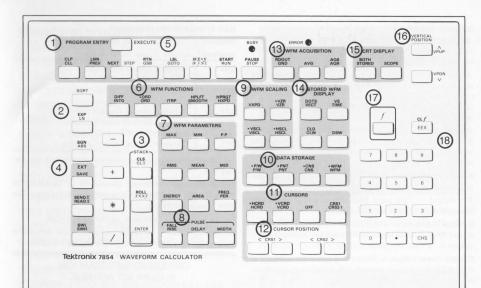
7854-based Waveform Processing Workshop — Covers all 94 commands and operators, which are available both locally and over the IEEE-488-1978 interface (GPIB). Through interactive lectures and labs, this fast-paced two-day course covers manipulation of data, keystroke mathematical operations and programming. (Availability subject to scheduling.)

7854 Service Technician Class - Tektronix offers service training classes that provide service personnel the knowledge and skills to support the 7854 to a component level. Contact your local Tektronix Sales Representative for further information.

Qualified service personnel electing to perform their own troubleshooting of the digital section of the 7854 will require the specific Tektronix equipment listed below. Additional equipment is specified in the Diagnostic Test Interface Service Manual. This equipment is not required for 7854 operation or understanding.

Diagnostic Test Interface	067-0911-00
Diagnostic Memory Board	067-0961-XX
Microlab I Mainframe	067-0892-00
Signature Tables	070-2972-00

The 7854 is also available as a WP1310 Signal Processing System. This system is a combination of the Tektronix 7854 Oscilloscope and 4052A Graphic Computer. Together, these two instruments automate the waveform test and measurement process, from acquisition and calculation to storage and display formatting.



Description of 7845 Waveform Calculator Keys

1 PROGRA	M ENTRY Switch to program entry mode	6	WAVEFOF DIFF INTG	M FUNCTIONS Differentiate	12	CURSOR CRS1<	Move first cursor
CLP	Deletes all program		>ORD	Integrate Change ordinate		CRS1>	left Move first cursor
CLL	lines Delete program		ORD ITRP	Recall ordinate Interpolate		CRS2<	right Move second
LNN	line Line label entry		HPLFT	Horizontally position left		CRS2>	cursor left Move second
PREV	Back up to previ- ous line		SMOOTH HPRGT	Smooth Horizontally	0		cursor right
NEXT	Advance to next line		HXPD	position right	(13)	WAVEFOF RDOUT	Acquire plug-in
EXEC	Return to execute		HAFD	Horizontally expand		GND	readout
	mode	(7)		M PARAMETERS			Acquire ground reference
SQRT	Square Root	-	MAX MIN	Maximum Minimum		AVG AQS	Signal average Acquire single-sho
EXP LN	Exponential Natural log		P-P RMS	Peak-to-peak Root mean square		AQR	signals Acquire repetitive
SGN	Signum, either +1, 0, or -1		MEAN MID	Average value Vertical midpoint	-	Alderi	signals
ABS	Absolute value		ENERGY	Energy	(14)	STORED	WAVEFORM
+	Subtract X from Y Add X to Y		AREA FREQ	Area under curve Frequency		DOTS	Discrete dot
*	Multiply X by Y Divide Y by X	0	PER	Period		VECT	display Continuous vec-
3) STACK CO		(8)	FALL	Fall time		VS	tored display Waveform versus
CLS	Clear all stack registers		RISE	Risetime Delay		TIME	waveform display
CLX	Clear X register by	15.161	WIDTH	Pulse width			Waveform versus time display
ROLL	popping stack Circulate stack	(9)		MSCALING		CLD	Clear display of waveforms
X<>Y	Interchange X and	-	VXPD >VZR	Vertically expand Change vertical		CLW	Clear one wave- form from display
ENTER	Push stack		VZR	zero Recall vertical zero		DSW	Display waveform
4 EXTERNA	AL COMMANDS Transmit keystroke		>VSCL	Change vertical scale	15	CRT DISP	
	program		VSCL	Recall vertical		BOTH	Stored display plus realtime waveform
SENDX	Transmit waveform or constant		>HSCL	scale Change horizontal		STORED SCOPE	Stored data display Conventional real-
READX	Receive Waveform or constant		HSCL	scale Recall horizontal	~		time display
SWL SWH	Set level to TTL low Set level to TTL	-		scale	(16)	VERTICAL VPUP	- POSITION Vertical position up
O	high	(10)	DATA STO >P/W	RAGE Change points per		VPDN	Vertical position down
(5) PROGRA	M EXECUTE Executes a single		P/W	waveform Recall points per	(17)	SHIFT CO	
RTN	line			waveform	0	f CLf	Select shift function Clear shift
	Return from subroutine		>PNT PNT	Change point value Recall point value	(18)	NUMERIC	
GSB LBL	Go to subroutine Line label		>CNS	Change constant value	0	EEX 0-9	Enter exponent
GOTO IFX=Y	Unconditional jump Test if X is equal to Y		CNS	Recall constant value			Digit keys Decimal point
IFY>X	Test if Y is greater		>WFM	Store waveform		CHS	Change sign
START	than X Begins execution		WFM CURSORS	Recall waveform			
RUN	at line 000 Begins execution	(11)	>HCRD	Move to horizontal			
PAUSE	at next command Wait about 0.7		HCRD	coordinate Recall horizontal			
	seconds		>VCRD	coordinate Move to vertical			
STOP	Stop execution, transfer, or			coordinate			
	acquisition		VCRD	Recall vertical coordinate			
			OFF CRS1	Turn off cursor(s) Turn on one cursor			
			CRS2-1	Turn on both cursors			

For further information, contact:

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