LeCroy

wavepro

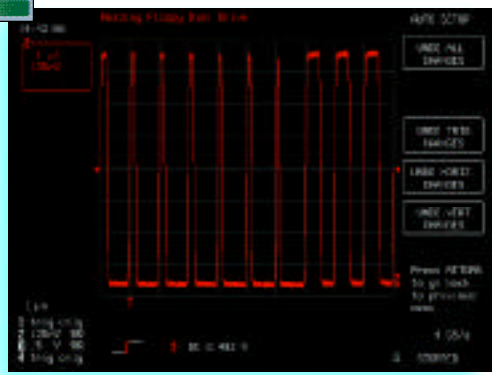
Digital Oscilloscopes

QUICK REFERENCE GUIDE

LeCroy

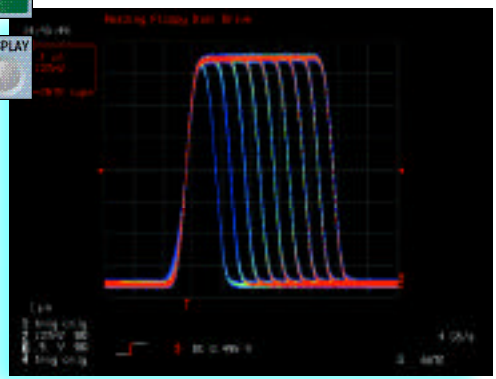
Quickstart to Signal Viewing

Quickly Display Signals



1. Connect your signal. When using a probe, ProBus® automatically sets the vertical scale factor and HFP probes automatically light-up with the trace color.
2. Press *Auto Setup* and view.
3. Press "Undo" to revert back to a previous setting.

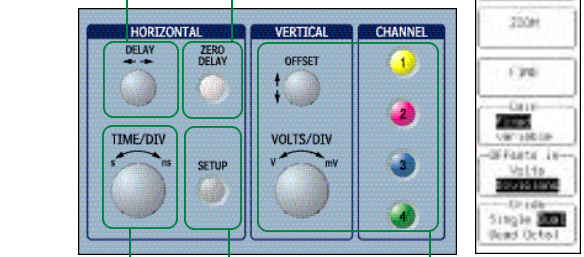
Analog Persistence™



Press *Analog Persist* to access the power of Analog Persistence. The three-dimensional view shows variations in a waveform as intensity or color-graded variations. Press *Display* to customize the display.

Quick Zoom

Press *Zoom* for a close-up view of signal details. Use the zoom controls to magnify and inspect the signal, the softkeys to change the zoom view, lock the zoom traces with multi-zoom, and to automatically scan the waveform.



Selects a pre- or post-trigger delay. Use to view the signal events prior to the trigger point.

Presets the trigger delay to zero.

Press a *Channel* button to view the menu.

Adjust the *Time/Div*, and SMARTMemory automatically assures the maximum resolution for each time-base setting.

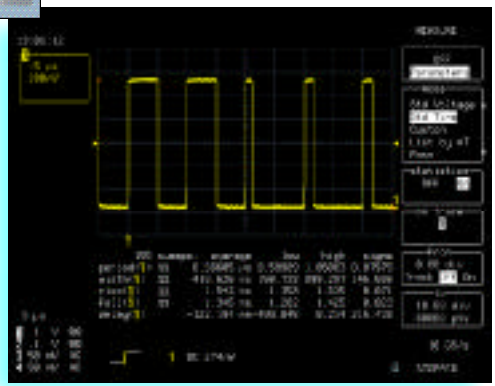
Press *Setup* and *Timebase* to set up the scope's timebase and acquisition system.

Press a *Channel* button, and use the control knobs to select and adjust that channel's Volts/Div and offset settings. Press twice to toggle the channel between On and Off.

Wavepilot™ for Quick Measurements and Analysis with Insight

Wavepilot provides a simple menu system that makes it easy to quickly explore the signal with powerful tools that help identify signal problems, characterize them,and track them to the source.

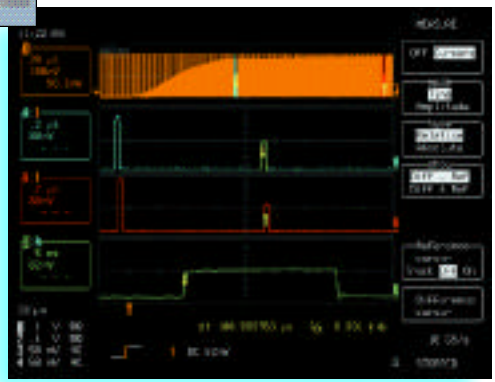
Statistical Measurements



Press *Measure* to select automatic parameter measurements with statistics for multiple acquisitions.

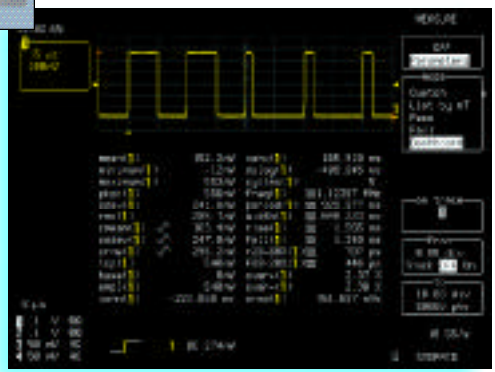
1. Select Standard Time or Voltage measurements. Turn parameter statistics On or Off.
2. Select *Custom* to establish your own set of measurements.
3. Setup pass/fail testing on parameters.

Measurements



Press *Cursors* for access to a variety of measurement cursors. Read the measurement results on the scope display.

Parameter Measurements

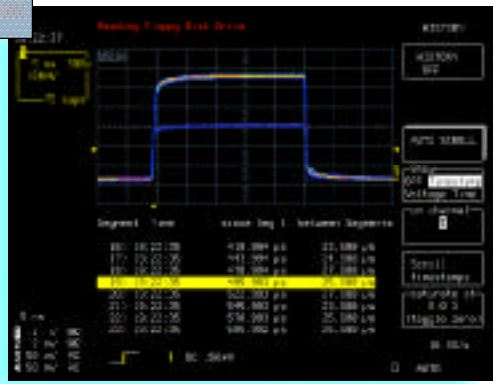


Press *Measure* for a quick view of up to 26 standard parameters, to set up a custom parameter, or a pass/fail test. Select parameter measurements with statistics for multiple sweeps.

1. Select "Dashboard" for an extensive parameter set, or select standard Time or Voltage measurements.
2. The "Dashboard" view is context sensitive so when you view a signal, histogram, or TrackView the measurements are relevant.
3. *Custom* turns parameter statistics On or Off and allows you to define your own set of measurements.

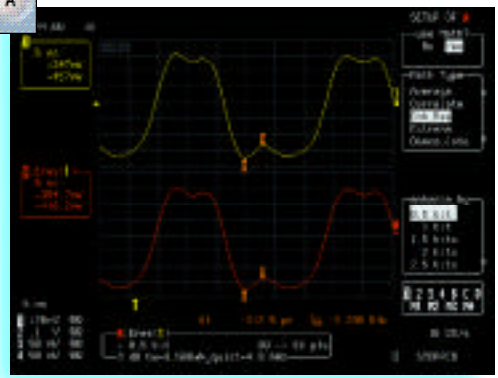
Measure and Analyze Waveforms

History



Press *History* to maximize the update rate and to display a signal – in Analog Persistence – in sequence mode. Trigger time stamps for up to 8 000 acquisitions are displayed. For further analysis of an acquisition segment , Histogram the full History, then use *Play* and *Reverse* to scan it in sequence.

Waveform Math



For math processing, Press button A, B, C, or D to set up a zoom trace.

1. Press *Setup*
2. Select "Use Math" and choose a function.
   Math and analysis can be performed on any trace.
   View the result for trace A, B, C, or D.

Standard Measurements

ampl	Amplitude	dur	Time between triggers in segment/history mode
area	Integral of waveform data	base	Lower of two most probable states cycles
cycles	Number of cycles of a periodic waveform	t@level	Time from trigger (t=0) to crossing at a level
cmean	Cyclic mean: The average of waveform data	crms	Cyclic root mean square
delay	Time from trigger to transition	Δdly	Time between 50% level of two sources
duty	Duty cycle: Width as percentage of period	f80-20%	Fall time from 80% to 20%
fall	Fall time from 90% to 10%	freq	Frequency
maximum	The highest point in a waveform	mean	The average of data for time-domain waveform
minimum	The lowest point in a waveform	over-	Overshoot negative
over+	Overshoot positive	period	Period of a cyclic signal
pkpk	Peak-to-peak	phase	Phase difference between signal analyzed and signal used as a reference
r20-80%	Rise time from 20% to 80%		
rise	Rise time from 10% to 90%	rms	Root mean square of data between the cursors
sdev	Standard deviation of data between the cursors.	top	Higher of two most probable states
width	Width of cyclic signal: All waveform pulses are averaged then displayed	csdev	Cyclic standard deviation
		Δc2d±	Δ clock to data ± (setup and hold time)
cmedian	Cyclic median: The average of base and top values over an integral number of cycles	Δt@lv	The transition time between selected levels on a single trace or between two traces
first	Indicates value of horizontal axis at left cursor	median	The average of base and top values
last	Time from trigger to last (rightmost) cursor	Points	Number of points between the cursors
r@level	Rise time between selected voltage levels	f@level	Fall time between selected voltage levels

Standard Math Tools (Signal Processing)

Arithmetic	Sum (add), Difference (subtract), Product (multiply), Ratio (divide)
Averaging	Summed average of up to 1000 sweeps; Continuous average from 1:1 to 1:1024 weighting
Extrema	Envelope, floor, and roof
FFT	Fast Fourier Transform to 50,000 points:
FFT Types	Power Spectrum, Phase, Magnitude, Windows, Flat Top, Rectangular, Blackman Harris, Von Hann, Hamming
Other Functions	Identity, Negation (Invert), Sine x/x
Resample	To deskew as well as resample signals
Rescale	Assign physical units and rescale
ERES	Enhanced Resolution for up to 11 bits of vertical resolution
Other functions	Absolute Value, Reciprocal (1/x), Square, Square Root, Derivative, Integral, Exp (base e), Exp (base 10), Log (base e), Log (base 10)

WAVAPRO OPTION:

WAVA–WaveAnalyzer

All standard math, measurement, and signal processing tools plus:

Extended Averaging Summed. Average of up to one million waveforms.
Continuous average from 1:1 to 1:1024 weighting

Extended FFT — Fast Fourier Transform to one million points
FFT Average, Power Averaging, Real, Power Density, Real + Imaginary

Histograms — Graphical analysis with Histograms and Histogram Analysis Parameters

Histogram Parameters

avg	average of data values in histogram
fwhm	full width (of largest peak) at half the maximum bin
fwxx	full width (of largest peak) at xx% the maximum bin
hampl	histogram amplitude between two largest peaks
hbase	histogram base or leftmost of two largest peaks
high	highest data value in histogram
hmedian	median data value of histogram
hrms	rms value of data in histogram
htop	histogram top or rightmost of two largest peaks
low	lowest data value in histogram
maxp	population of most populated bin in histogram
mode	data value of most populated bin in histogram
pctl	data value in histogram for which specified x% of population is smaller
pks	number of peaks in histogram
range	difference between highest and lowest data values
sigma	standard deviation of the data values in histogram
totp	total population in histogram
xapk	x-axis position of specified largest peak

Trending — Plot a parameter versus time or versus another parameter

DFP–Digital Filter Package

Linear-phase Finite Impulse Response (FIR) filters:
Low Pass, High Pass, Band Pass, Band Stop, Raised Cosine, Raised Root Cosine, Gaussian
Up to 4 filters can be cascaded.

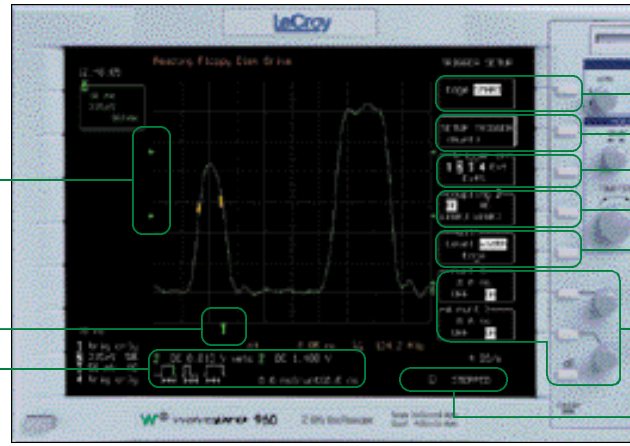
Design a custom filter then download the filter coefficients into the WavePro scope with DSOFilter utility.

JTA–Jitter and Timing Analysis

JitterTrack for a time correlated graphical view of cycle to cycle parameter variation.

Parameter	Description
Δp@lvl	Difference between adjacent cycle period above or below a selected level
Δwid@lvl	Difference between adjacent cycle widths above or below a selected level
duty@lvl	Percent of period signal is above or below a selected level
edge@lvl	Number of edges with a selected slope and level
freq@lvl	Frequency of a full cycle at selected slope and level
p@lvl	Duration of a full cycle at specified slope and level
skew	Time from one signal edge to closed edge of second signal edge
tie@lvl	Fractional interval time error
wid@lvl	duration of signal excursion above or below a selected level

Triggering



Level indicators

Horizontal delay (trigger) position indicator

Icons indicate the type and characteristics of the trigger in use.

Select SMART Trigger

Select trigger type

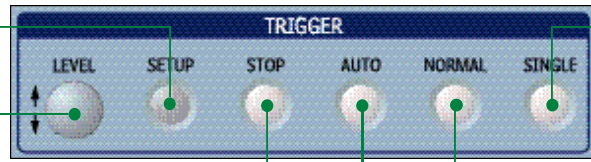
Select trigger source

Select coupling

Select pulse type

Setup signal conditions

Flashes when a trigger occurs. The text indicates status.



Accesses the trigger setup menu.

Sets the trigger level.

Prevents the scope from triggering.

Triggers even if a signal is not present.

Triggers whenever the trigger conditions are met.

Arms the trigger. The scope triggers once when the trigger conditions are met and then displays the signal.

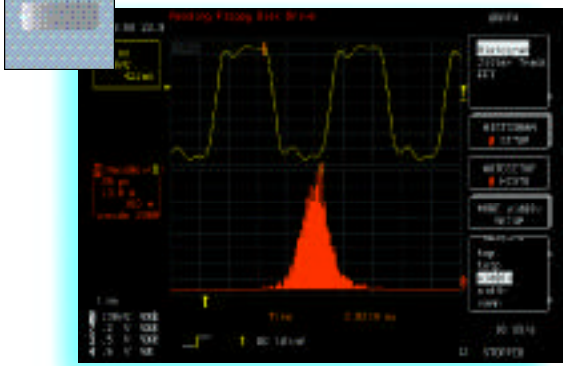
WavePro Basic Triggers

Name	Descr iption
Edge	Select positive or negative slope and holdoff by time or events.
Window	Set a window around the trigger level. Trigger whenever the signal crosses outside the window in either direction.

WavePro SMART Triggers®

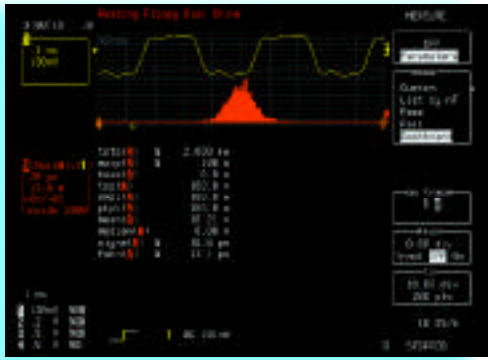
Name	Descr iption
Glitch	Triggers at end of positive or negative pulses down to 2 ns. Trigger when pulse is > or < or within a range (< and >) or outside a range.
Interval	Triggers on intervals between positive or negative edges. Trigger when interval is > or < or within a range (< and >) or outside a range.
Qualified	Qualify by edge or state. Triggers on a selected input after a defined state or edge has occurred on another channel (or a pattern is present or absent). Set a time condition that the second must occur within to trigger, or a wait time or number events before triggering.
Qual First	A single pulse qualifies a sequence of triggers.
Dropout	Triggers if the input signal drops out for longer than selected time.
Runt	Define runt conditions including the range of pulse levels, widths, and select the edge.
Slew Rate	Define slew conditions including dV, dT, and slope.
Pattern (logic)	Trigger on the logical combination of up to 5 inputs. When used in combination with Qualified it is possible to trigger on a selected input when the pattern is present or absent.

Graph Parameter Distributions



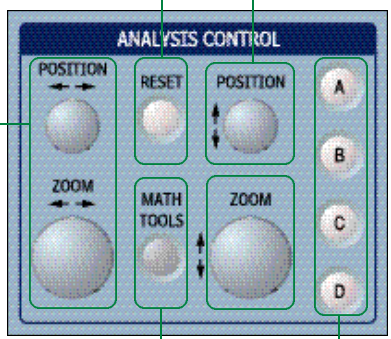
Histograms are fast and simple to set up. Press *GRAPH*, dial in the measure parameter, select the Histogram Setup conditions, then press *AUTOSETUP* histogram.

Graph and Measurements



Get measurements that make sense! Press *GRAPH*, then *MEASURE*, for a quick, context-sensitive parameter assessment of the characteristics of TrackViews.

Analysis Controls



Reset the *ZOOM* magnification to 1:1. Also used to reset math and analysis functions.

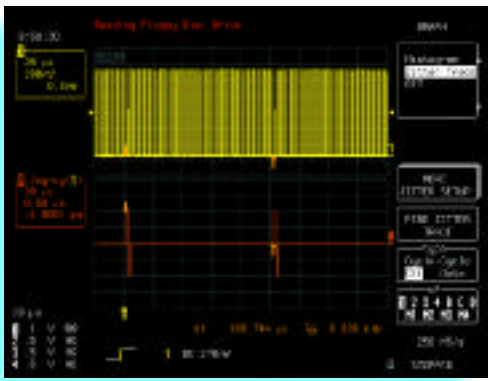
Rotary controls adjust the vertical position and magnification of the selected zoom trace.

Rotary controls adjust the horizontal position and magnification of the selected zoom trace.

Provides direct access to mathamatical signal processing.

Select a zoom trace for setup of signal processing. The analysis controls affect the selected trace (A,B,C,D). Press twice to toggle between On and Off.

Graph Views



Press *GRAPH* for quick access powerful problem solving features. Quickly identify the problem with special views:Histograms, FFT, TrackView, and JitterTrack.

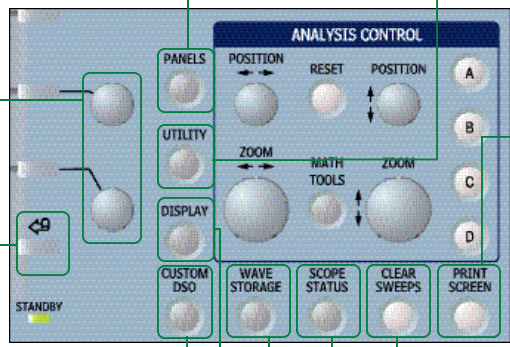
1. Select the type of view and the parameter or function.
2. Setup the view.
3. Select Graph and TrackView or JitterTrack for a time-correlated view of measurements and you can visually track down signal errors and anomalies.

General Controls

Store and recall the settings of front panel controls and scope setup conditions.

Setup hard copy printing, Cal Out signal, GPIB, Network, and I/O interfaces, as well as other functions.

Use the rotary controls for menu selection, cursor movement, and memory length setting.



Print to the hard copy device set up in the utilities menu (hard copy selection).

Return to the previous menu level. It clears the menu when a top level menu is displayed.

Clears data acquired in persistence displays, sweep averaging, and measurement statistics.

Access customized scope menus and applications that you can create offline with any text editor, and then import and store in the scope in a non-volatile virtual disk.

Check the status of the scope's systems, setup conditions, add software options, and free-up memory.

Setup display characteristics and functions, including color schemes, and persistence conditions. Toggling *Analog Persistence* shows a second menu.

Store and recall waveforms to/from internal scope memory, floppy disk, or PC cards.

Rear Panel

Centronics compatible Printer Port

VGA Monitor Port

PC Card Slot (optional) Supports SRAM, ATA Flash, and Hard Drive PC Cards.

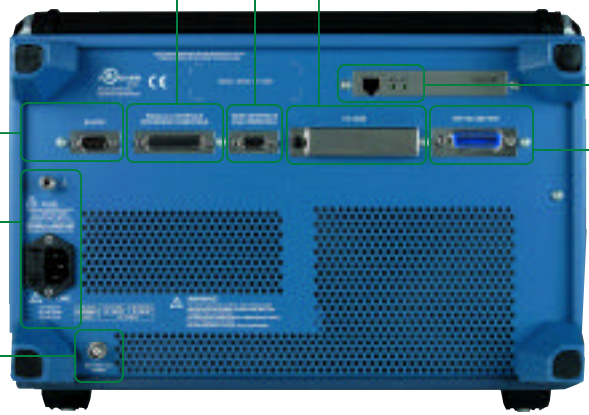
RS-232-C

10 Base T Ethernet Port (optional)

AC Line Input: Automatically senses and configures line voltage and frequency.

GPIB Port

50 Ω BNC Input for a 10 MHz Reference Clock



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