

Using Waveform History

Fast Acquisition And Display Of Signal Changes Over Time

Analog Persistence™ and sequence acquisition mode are tools used to acquire and display a history of changes in a waveform. These features work in a highly integrated fashion to produce screen displays that show the range and frequency of occurrence of variations in the signal.

The LeCroy WavePro™ series of oscilloscopes place both these features at your fingertips. Both features can be evoked by simply pressing the “History” button on the front panel. Figure 1 shows the history display on a LeCroy WavePro 960. It shows an intensity graded Analog Persistence display containing 100 overlaid waveform acquisitions of the leading edge of a pulse waveform. The intensity grading indicates frequency of occurrence of each edge rate. Additionally, it includes the time stamps for each acquisition.

Sequence mode breaks the long acquisition memory of the oscilloscope into up to 8000 smaller segments. Each of these segments is stored in the memory and is available after the acquisition for individual viewing, parameter measurements, or waveform math. Each segment is individually time stamped with an absolute real time stamp, time since first trigger, and time between segments. The relative time stamps have a resolution of 1 ns.

Sequence mode also maximizes the acquisition rate increasing it to over

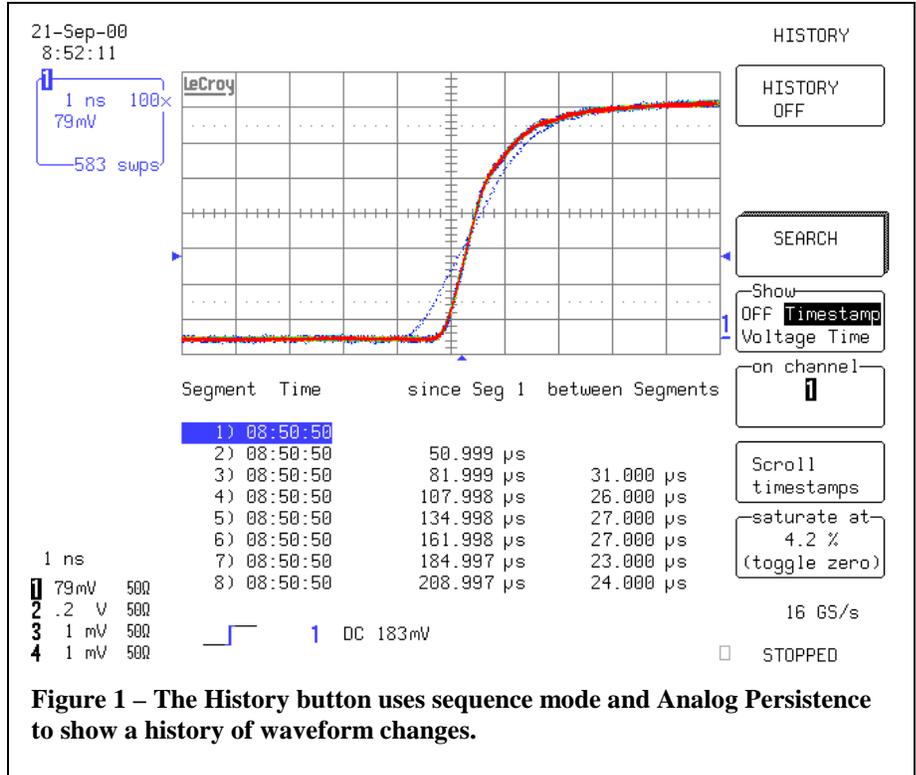


Figure 1 – The History button uses sequence mode and Analog Persistence to show a history of waveform changes.

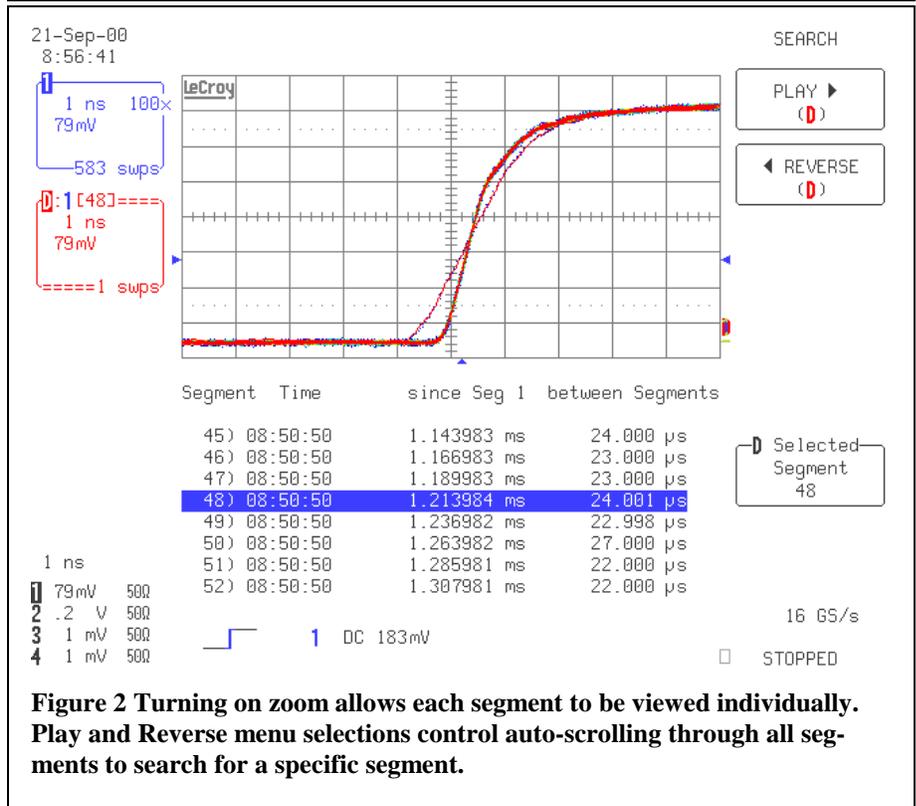


Figure 2 Turning on zoom allows each segment to be viewed individually. Play and Reverse menu selections control auto-scrolling through all segments to search for a specific segment.

33 kHz in the WavePro 960 as evidenced by the time stamps in figure 1.

In this example we can see a single edge which has a slow transition time. Each of the acquired segments can be viewed individually by using the oscilloscope's zoom feature. With Analog Persistence turned on the scope displays all the segments overlapped as shown in figure 1. The zoom display shows each segment individually as shown in figure 2. An auto-scrolling feature, in the Search menu, allows the user to automatically scan through all the segments using "Play" and "Reverse". This allows any segment, located using the Analog Persistence display, to be recovered for detailed analysis.

Once such an anomaly is observed it is easy to measure the risetime, using cursors or measurement parameters, then select a trigger to catch only events with slow risetimes. This type of event can be isolated using the slew rate trigger, whose setup is shown in figure 3.

Once the special slew rate trigger has been enabled running the acquisition again measures the precise time of occurrence of each of the slow transition events. This is illustrated in figure 4.

Users of older LeCroy LC and Waverunner™ series oscilloscopes can still use these features by setting them up individually. Analog Persistence is accessible using the Analog Persist button and sequence mode can be accessed via the Timebase menu. The History button consolidates the existing Analog Persistence and sequence mode features and makes both easily ac-

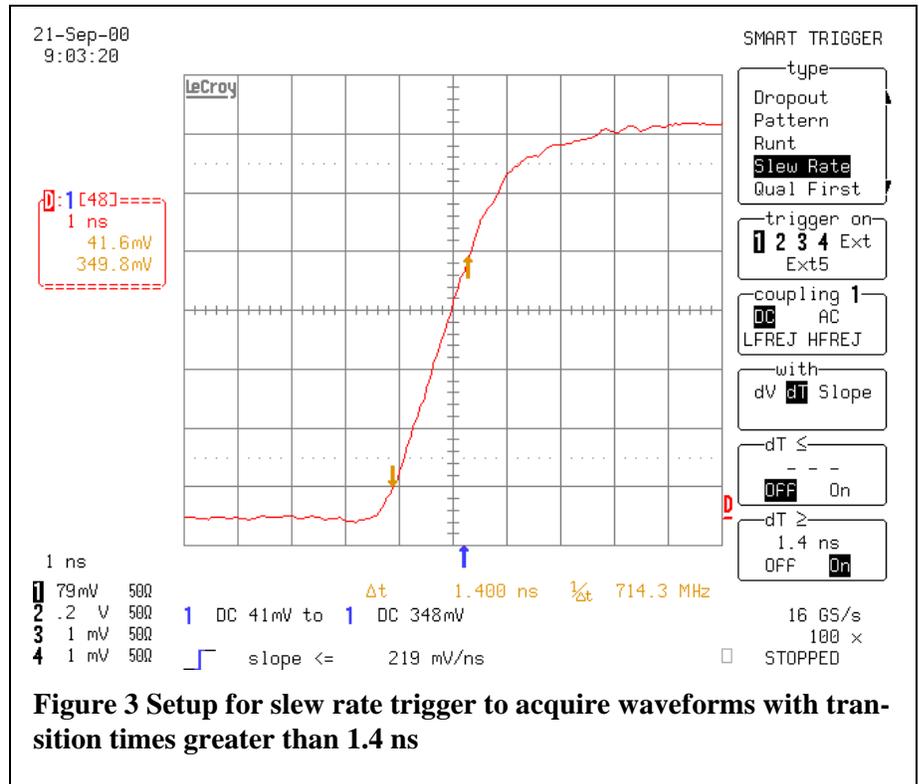


Figure 3 Setup for slew rate trigger to acquire waveforms with transition times greater than 1.4 ns

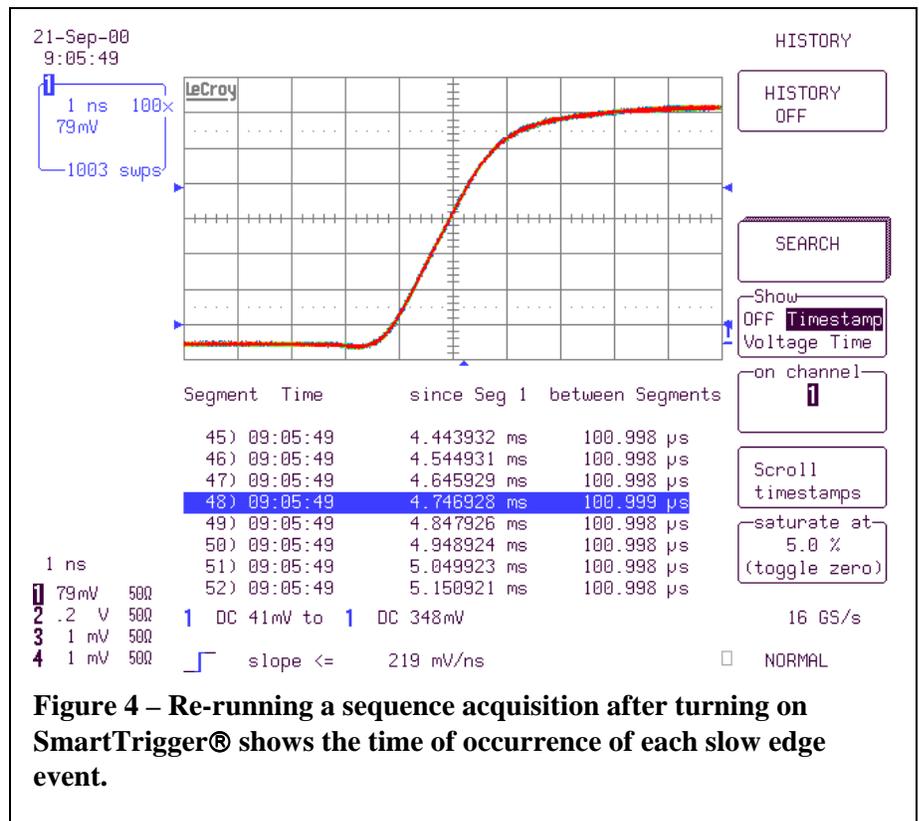


Figure 4 – Re-running a sequence acquisition after turning on SmartTrigger® shows the time of occurrence of each slow edge event.

cessible via a direct front panel control.

