LeCroy

WaveScan™ and WaveStream™ The 1- 2 Punch (LAB _WRX449)

WaveStream™ is a fast update acquisition mode and WaveScan™ is a new advanced search and analysis capability that allows the user to find waveform conditions rapidly. Both are available in LeCroy's WaveRunner Xi series and WaveSurfer Xs oscilloscopes.

WaveScan™ provides the ability to use ~20 search modes different from hardware triggers to do a simple search and find for an event on a single acquisition. It also allows a user to perform a continuous "scan" for data in many acquisitions, with the scope set to stop, save data, save images, etc. when the condition is found. In addition, "found" events can be overlaid or histogrammed with advanced tools.

WaveStream provides a vibrant, intensity graded (256 levels) display with a fast update to closely simulate the look and feel of an analog oscilloscope. WaveStream is most helpful in viewing signals that have signal jitter or signal anomalies. Since the sample rate in WaveStream mode can be as high as 10 GS/s (up to 5X that of other oscilloscopes), it is an excellent runt or glitch finder. Timing jitter is often visually assessed to understand approximate behavior. WaveStream makes it easy to understand jitter on edges or in eye diagrams. WaveStream also excels in allowing you to relate composite (WaveStream) to single-event (real-time sampled) behaviors. This last function is even more powerfully evident when used with WaveScan™ a waveform search function that offers 20 different search criteria.

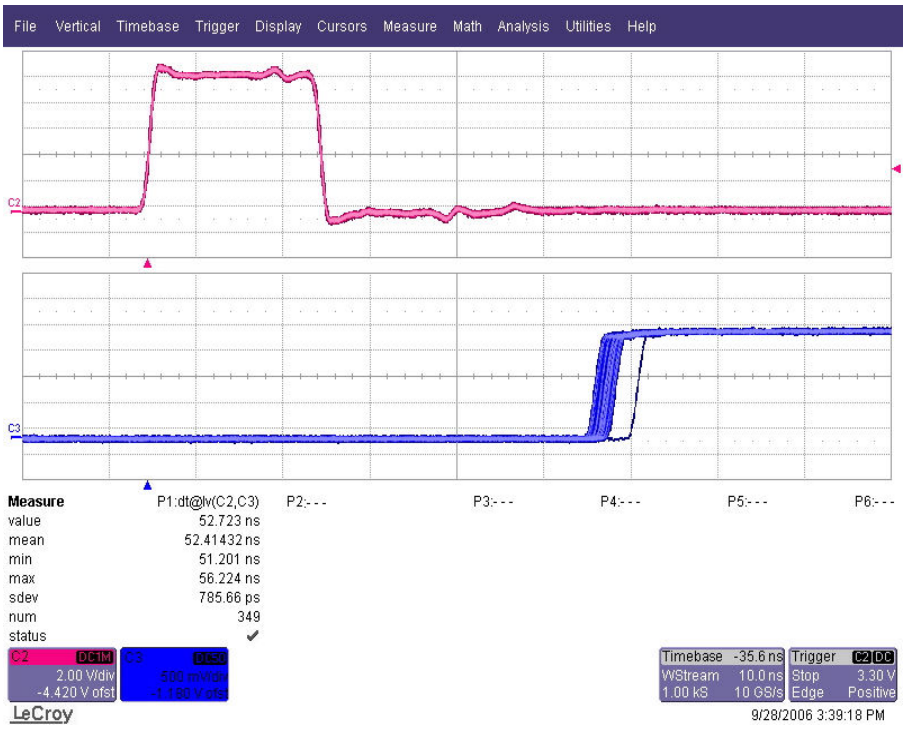

Figure 1 A WaveStream history showing a timing anomaly in a timing synchronizer

Consider the example shown in Figure 1. This is a WaveStream history of a timing synchronizer. The top trace (C2) is the input signal. The lower trace (C3) is the output of the synchronizer. The synchronizer uses a 400 MHz clock and it is expected that the edge of the output signal would have a timing uncertainty of 2.5 ns which is uniformly distributed. The WaveStream history shows multiple acquisitions overlaid in a persistence display. Most of the output signals are clearly within the expected 2.5 ns range. WaveStream has caught a single output waveform that is late by at least a full clock period.

The Delta Time at Level (dt@lv) parameter has been used to quantify the measurement. It shows a range of delay values between the input and output that spans a range of 5 ns or 2 clock periods. This measurement was made over 349 acquisitions and we since the WaveStream history shows only a single event we can estimate that this event occurs at least once in 350 measurements.

At this point we can use a new LeCroy tool, WaveScan, to record a long acquisition with a large number of events and search for the anomaly. WaveScan lets the user search for non-monotonic edges, specific measurement conditions and common trigger related conditions like

runts and glitches. WaveScan finds events that triggers alone can't find. Also, it searches in a single acquisition, or scans multiple acquisitions until an event is found. It is standard in most LeCroy XStream™ oscilloscopes and in the WaveRunner Xi, WavePro, and WaveMaster scopes it offers additional advanced analysis features.

Figure 2 The WaveScan Setup using a dual channel measurement parameter

In this case, we will search a long acquisition using a measurement. The ability to search on a measurement is unique in the test and measurement industry. In our example we will search based on a dual input parameter Delta Period at Level which we have just used. The WaveScan setup is shown in Figure 2. It is searching for delay measurements greater than 55 ns, a value we have learned from the WaveStream measurement. Filter methods include greater than, less than, within limits, outside of limits, and rarest events.

The scope is setup to acquire 1 ms of data. This is shown in Figure 3. The edge parameter indicates that almost 2000 events are contained in the acquisition. WaveScan automatically indicates all instances of the measurement meeting the search criteria. These can be seen as light blue lines extending under the upper traces. The lower trace (Z2 and Z3) are a zoom expansion of a user selected anomaly. In this case we have shown both the input and out put trace. Thes traces are time locked using LeCroy's Multi-Zoom feature so that timing information is maintained. The center traces shown the scan overlay of all 7 detected anomalies, and a histogram of the measured parameter values of the selected events. In this case the histogram includes 7 events. This at listed in a table in the upper left hand corner of the figure. ScanHistogram accumulates over multiple acquisitions (it will have more information over time than just the table will). ScanOverlay and Table are always 100% correlated – they are both on a single shot of data.

As you can see these two great features of Lecroy oscilloscopes complement each other providing the ability to detect and analyze timing and other problems in great detail.

The WaveScan search feature is available on all LeCroy XStream oscilloscopes but the scan overlay and histogram analysis functions are only found in the WaveRunner Xi, WavePro, and WaveMaster product lines. WaveSurfer Xs only incorporates the search function. does not contain this advanced analysis capability.

The WaveStream fast update display is contained in the WaveRunner Xi and WaveSurfer Xs oscilloscopes. WavePro and WaveMaster do not contain WaveStream.

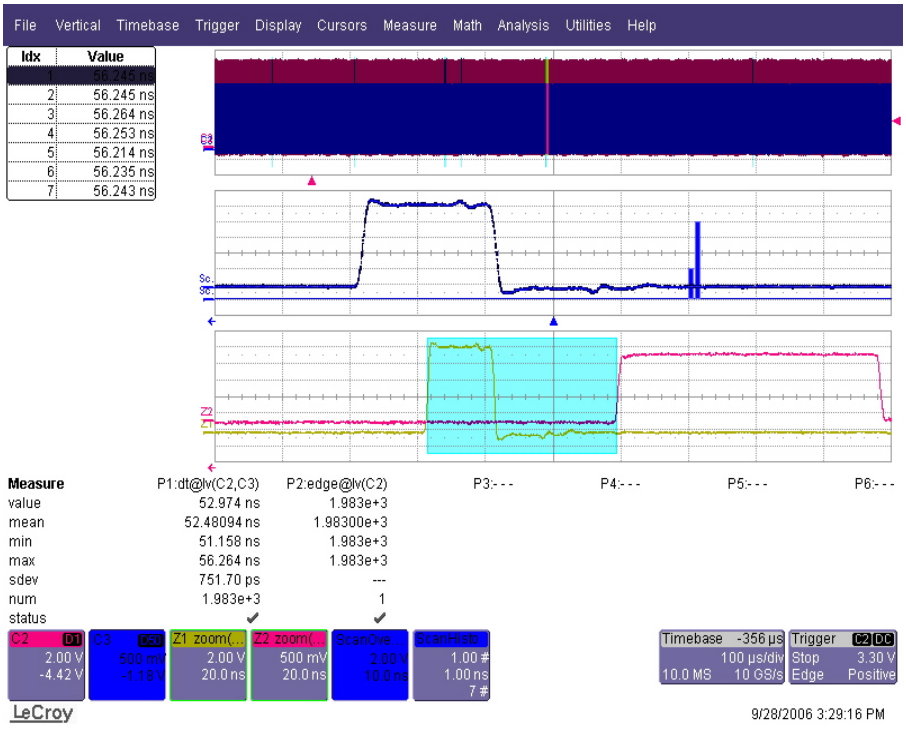

Figure 3 – The WaveScan overlay, histogram, and zoom displays