

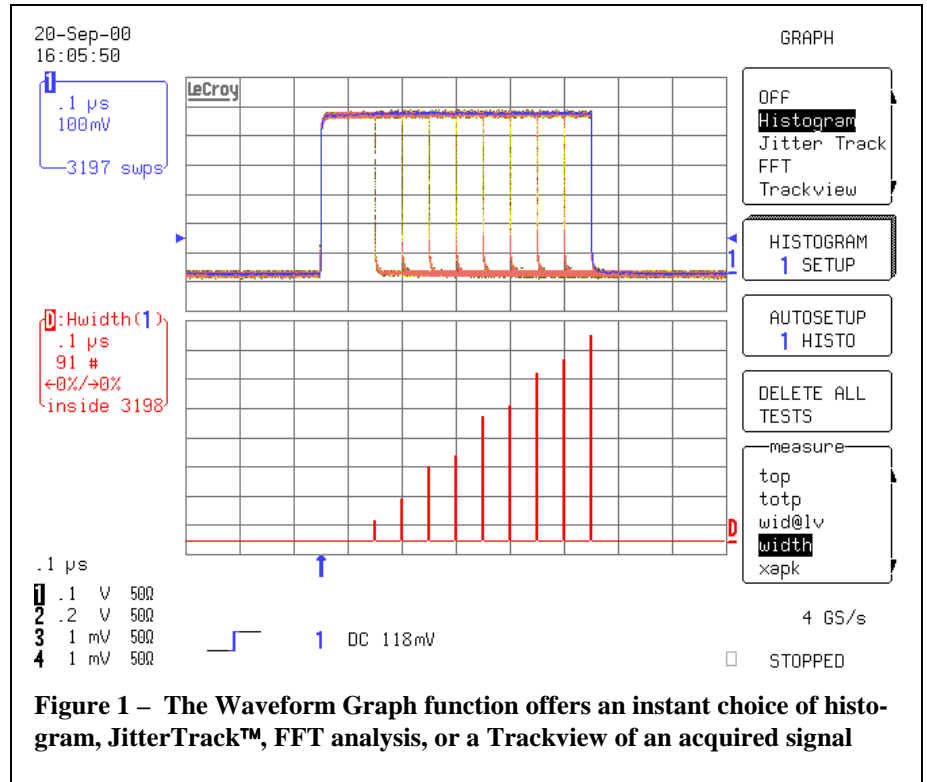
# Using Wavepilot Graph

## Quick Graph Feature Helps Analyze Waveform Variations

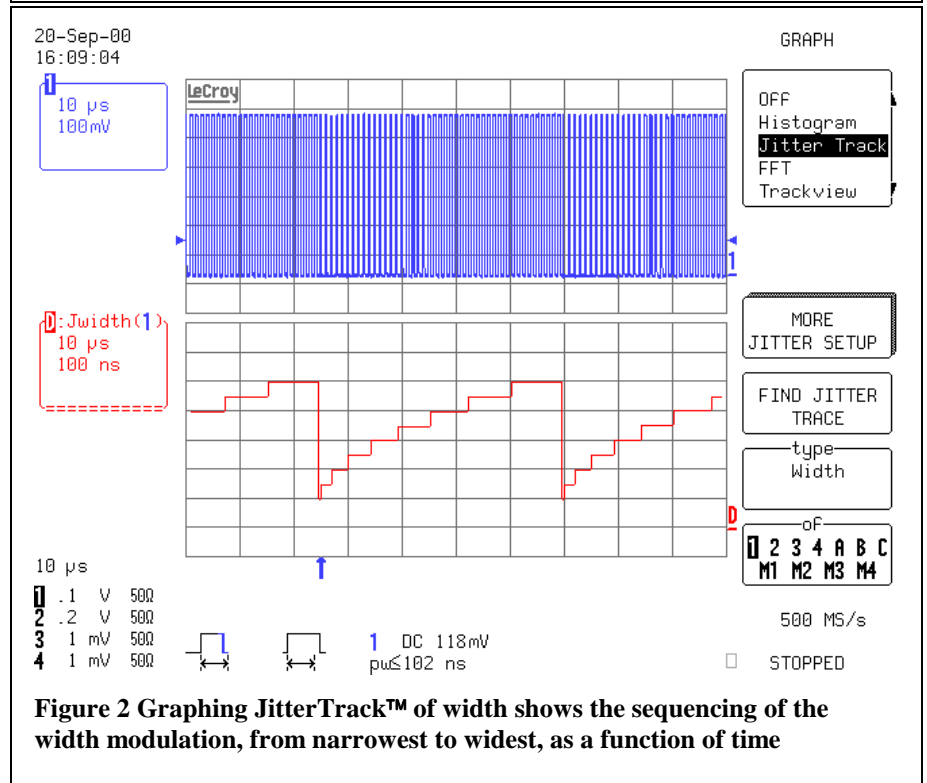
Waveform analysis can be thought of as a multidimensional view of a signal. Oscilloscopes have always been used to view signals in the time domain, a plot of signal amplitude versus time. More recently frequency domain analysis, using the fast Fourier transform (FFT) has been added to digital oscilloscopes. The FFT provides a graphical display of signal amplitude as a function of frequency. LeCroy offers two new views statistical analysis, using histograms, and timing analysis using the unique JitterTrack™ function. JitterTrack plots variations in timing parameters, such as period, width, frequency, and duty cycle, as a function of time.

These powerful analysis tools easily accessible from the Wavepilot toolbar available in the LeCroy WavePro™ series oscilloscopes. Simply pressing the Graph button in Wavepilot evokes a special graph menu, shown in figure 1, offering an instant selection of histograms, JitterTrack, FFT or Trackview.

Figure 1 shows the statistical analysis of a pulse width modulated signal displayed with Analog Persistence™ for a view of the signal's history. The histogram shows that there are nine widths and that the frequency of occurrence of each pulse width



**Figure 1 – The Waveform Graph function offers an instant choice of histogram, JitterTrack™, FFT analysis, or a Trackview of an acquired signal**



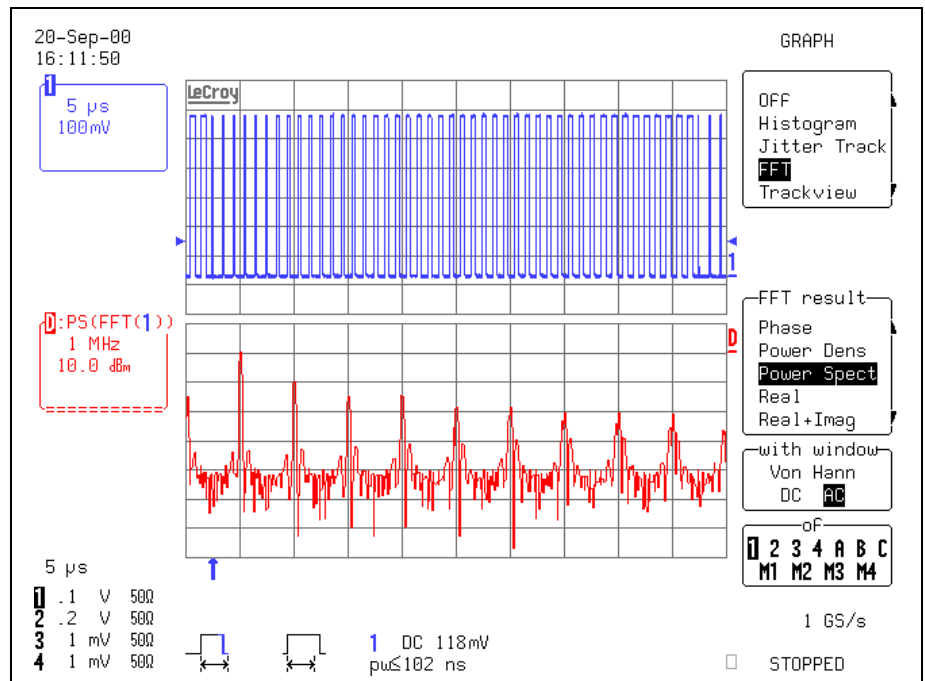
**Figure 2 Graphing JitterTrack™ of width shows the sequencing of the width modulation, from narrowest to widest, as a function of time**

varies proportional to the width. The next question that someone might ask is, "What is the ordering of the pulse widths?" That question is easily answered by selecting the JitterTrack View. Figure 2 shows an analysis of pulse width as a function of time. The JitterTrack display shows that the pulse widths increase sequentially, from narrowest to widest, with the duration of the signal at each width increasing proportionally to the width.

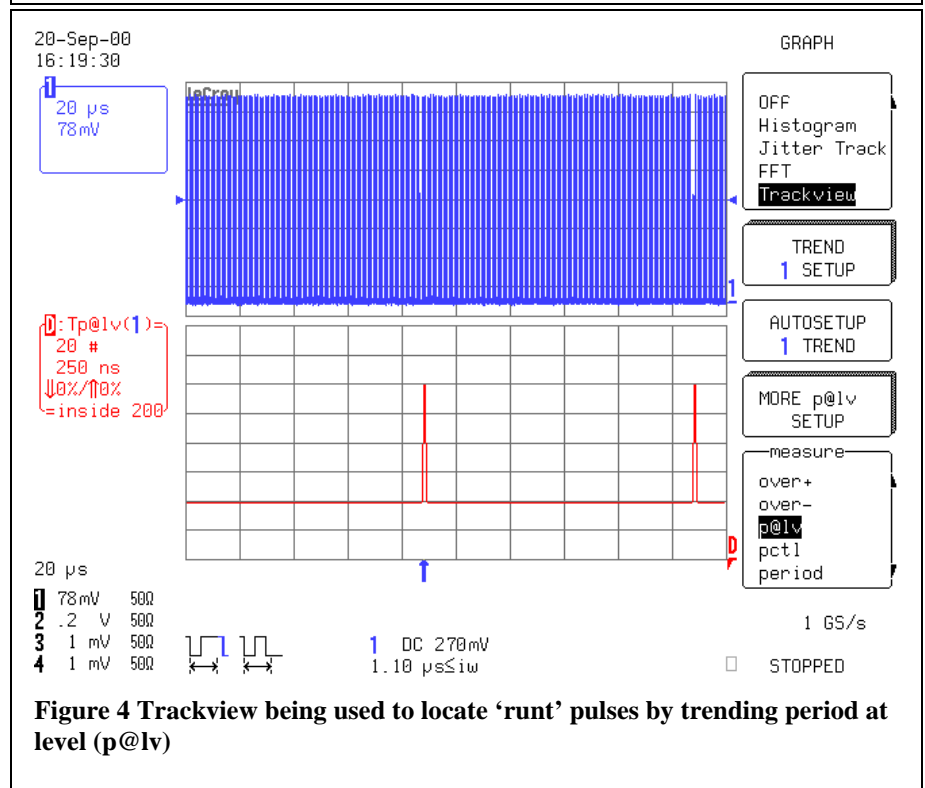
The third view, shown in figure 3, is the FFT of the pulse modulated waveform. The FFT shows the frequency spectrum of the waveform consists of the 1 MHz fundamental frequency along with a series of harmonics. The modulation affects are obvious in the sidebands shown about each of the principal spectral lines.

The final view, available under the Graph menu, is Trackview. Trackview plots the measured parameter values in the order in which they are made. This is called a trend plot and is shown in figure 4. The example in figure 4 is a trend plot of period at level (p@lv) and shows how to locate a runt pulse in a clock train.

The Wavepilot toolbar makes it easy to access and switch between each of these analysis tools. The choice of histograms, JitterTrack, FFT, or Trackview from a single menu access the key controls for optimizing the analysis. Use Math Tools or



**Figure 3** The FFT of the pulse width modulated signal taken over one cycle of the modulation.



**Figure 4** Trackview being used to locate 'runt' pulses by trending period at level (p@lv)

Math Setup for access to additional analysis controls or for manual setup of the LC or Wa-verunner series scopes.