Locating Clock Jitter Anomalies

Jitter Functions Locate Period And Width Violations

Jitter functions included in the new jitter and timing analysis option are ideal for locating timing anomalies in large blocks of acquired clock signals. The jitter functions measure cycle to cycle period, width, duty cycle, and interval error. The number of waveform cycles measured using these functions is limited only by the memory within the oscilloscope.

The upper trace in figure 1 contains 10,000 cycles of a 10 MHz clock waveform. Jitter period and jitter width functions are shown in Trace B and Trace C. Trace B, the third trace from the top, shows a flat trend with the exception of several spikes. Each spike represents a variation in the period of a single cycle of the clock waveform. The deviation can be read using the vertical axis scaling of 1 ns/div. The horizontal axis of the jitter function plot has a one to one correspondence with the time scale in the acquired trace. By using a zoom expansion of the acquired trace centered around the region corresponding to a spike in the trend plot, we can view the period anomaly. This is shown in Trace A where the long period (102.5 ns instead of the nominal 100 ns) is marked by the relative time cursors arrows. Similarly, the bottom trace (Trace C) shows the location of each cycle

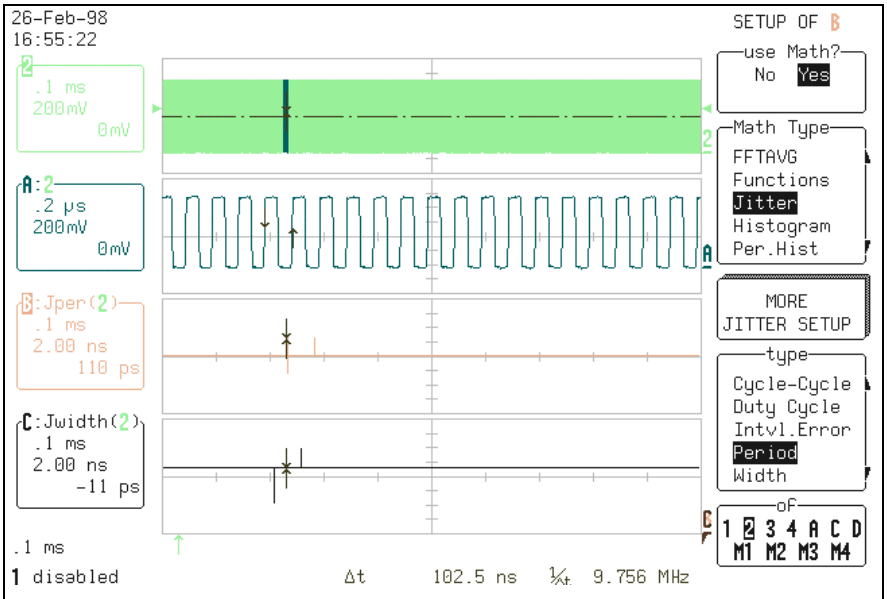

Figure 1 Jitter functions, jitter period and jitter width locate variations in clock signal timing .

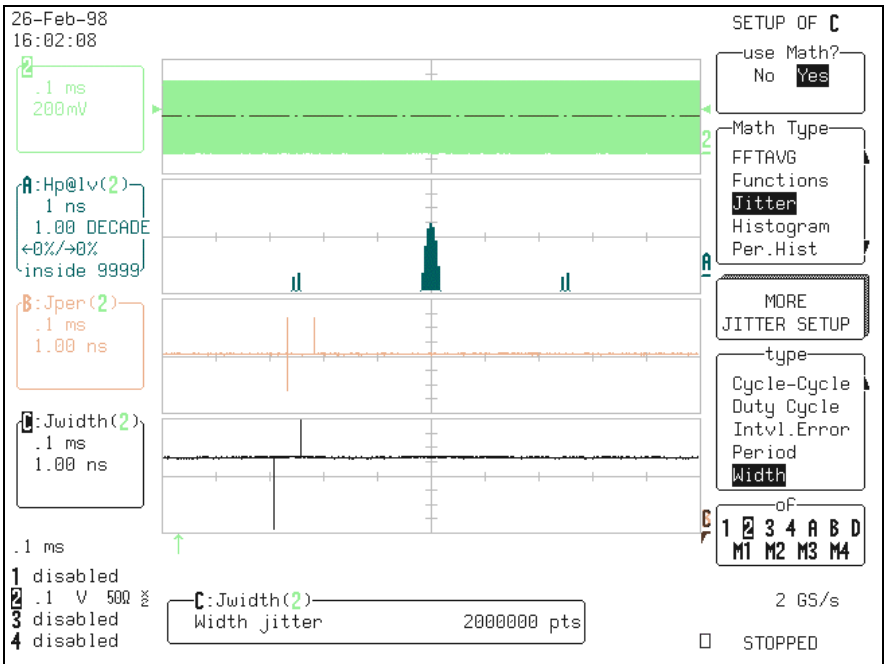

Figure 2 - Histogram of period at level shows the distribution of cycle by cycle period measurements

which has a width which differs form the nominal value.

In figure 2, Trace A has been re-defined as the histogram of period at level (p@lv). Period at level is one of 6 specialized timing parameters available in the jitter and timing analysis option. The histogram displays the distribution of up to 2,000,000,000 measured parameter values. In this example it is showing the distribution of cycle to cycle period measurements. The vertical scale is a logarithmic display of the number of measurements of each value. The center of the horizontal axis represents a period of 100 ns. The horizontal scaling is 1 ns/div. The small distribution to the right occurs about 102.5 ns.

The histogram and the jitter displays are complementary. Histogram shows the number and distribution while the jitter function shows its location in the acquired data.

The interpretation of waveforms and histograms is aided by the use of measurement parameters. In figure 3 the parameter readouts show five of the six new timing parameters. They include period at level, width at level, Δperiod at level, duty cycle at level, and edge at level. These parameters operate on a cycle by cycle basis. Like all LeCroy parameters they can be histogrammed and trended to study variations in their value for every cycle within a waveform.

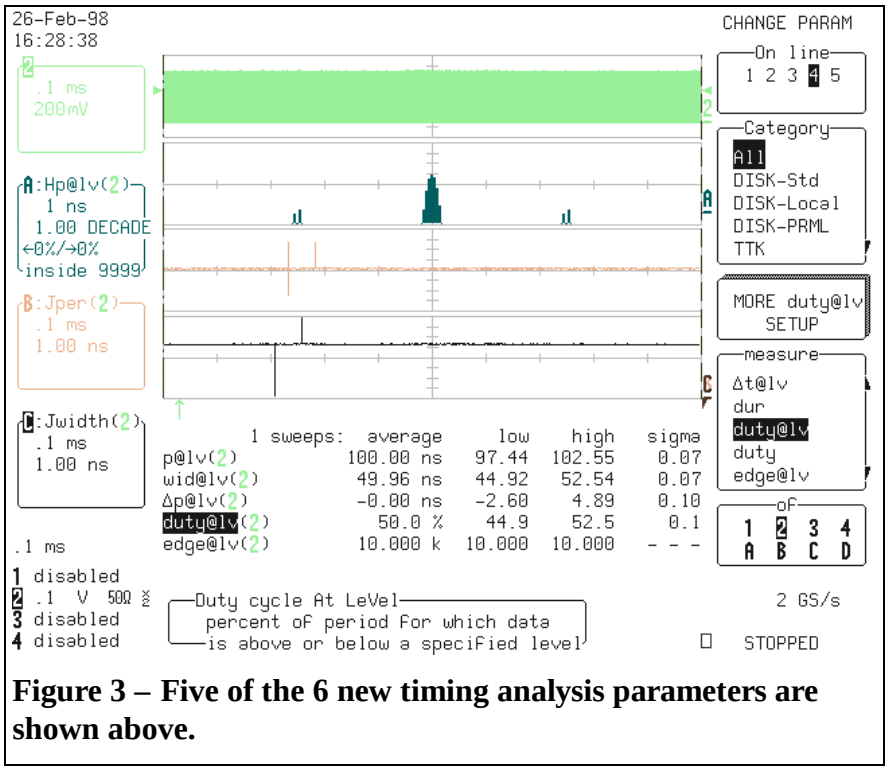

Figure 3 – Five of the 6 new timing analysis parameters are shown above.

Jitter functions along with trends and histogramming analysis of timing parameters make leCroy oscilloscopes ideal for jitter and timing analysis