

Analog Persistence

Analog-like Intensity Or Color Graded Persistence In A DSO

Analog persistence, a new feature available in the LeCroy LC Series oscilloscopes, produces displays that duplicate the intensity variations commonly achieved only in an analog scope. In a typical analog scope application, such as “eye” diagram analysis, the intensity variations are proportional to the amount of time a waveform falls on a particular point on the display. Highly repetitive elements of a signal are brighter than rarely occurring signal events. In figure 1, the narrowest pulse width occurs 10% of the time, wider pulses occur from 20 - 90% of the time, respectively. Note that the trace intensity varies in direct proportion to the frequency of occurrence of each pulse width.

Figure 2 shows the same data using color graded persistence to show the rate of occurrence. The accompanying histogram of pulse width provides an exact count of pulses with each width.

Analog persistence provides 16 levels of brightness or colors to differentiate the probability of occurrence of various waveform events. The frequency information is obtained by using a histogram of

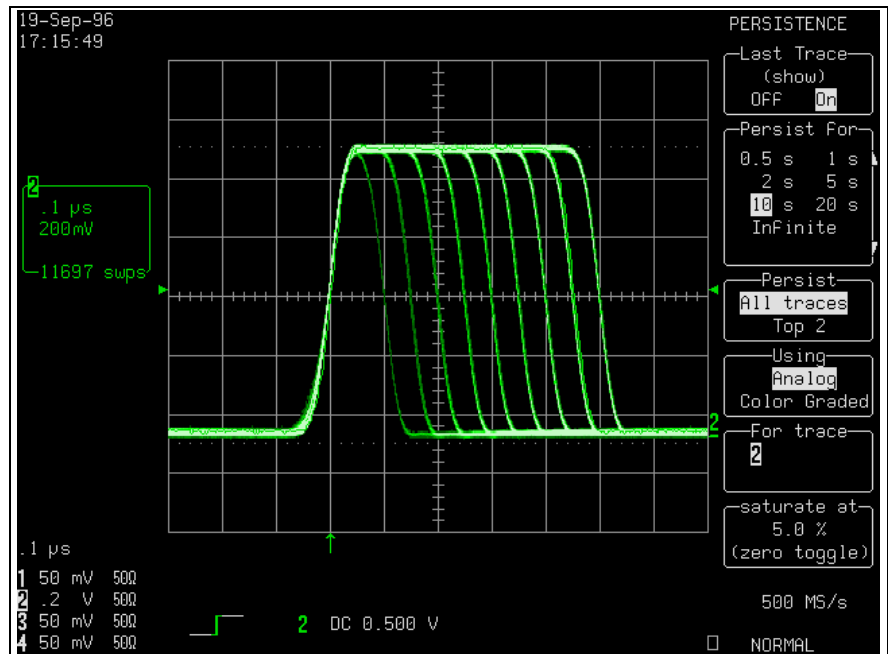


Figure 1 - Analog persistence display of a signal with elements having a variable frequency of occurrence

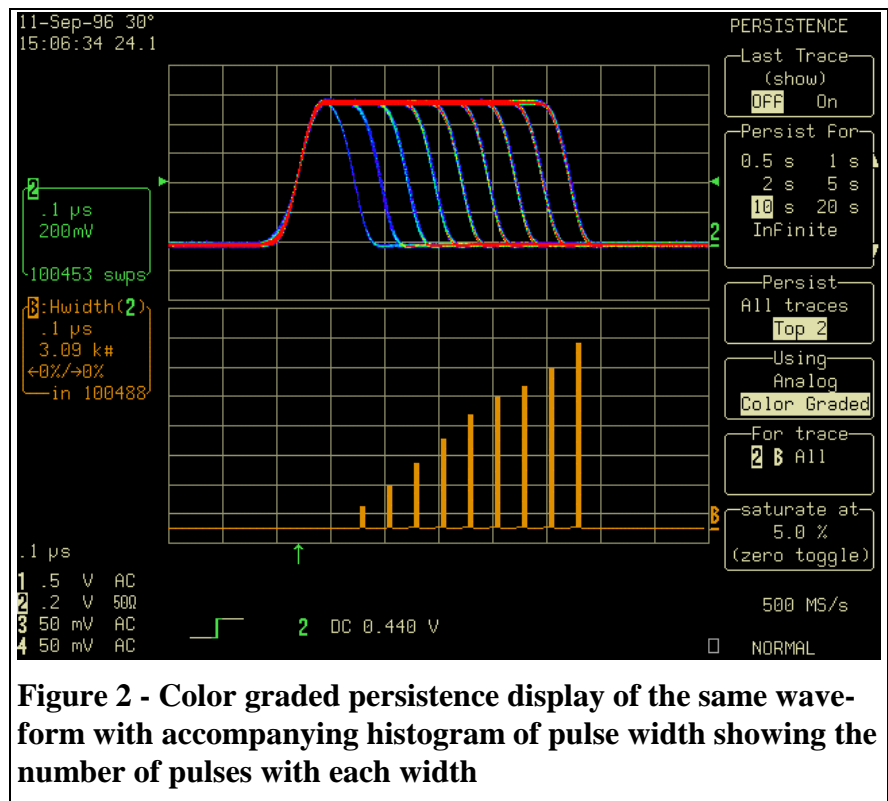


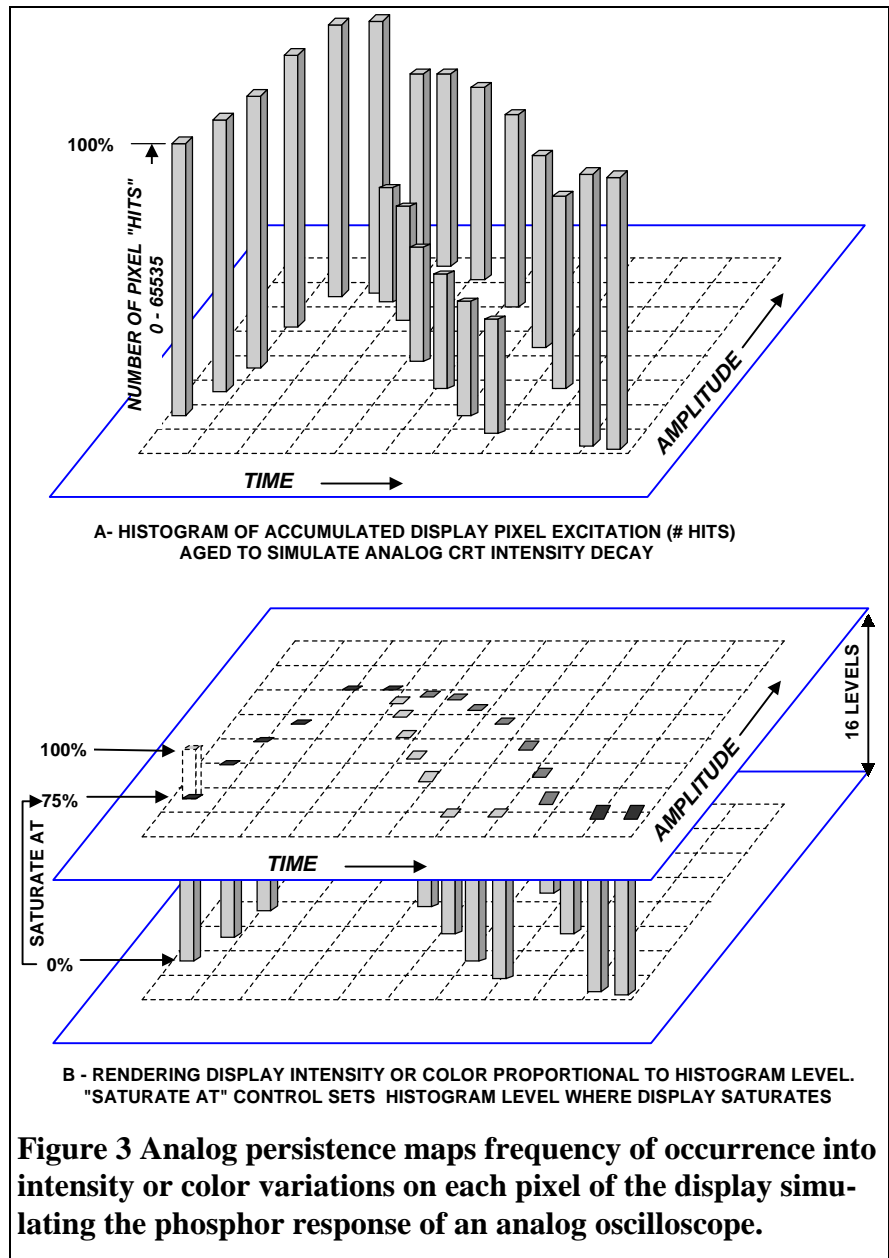
Figure 2 - Color graded persistence display of the same waveform with accompanying histogram of pulse width showing the number of pulses with each width

display pixel activity. Each time a point is written to the display it increments a histogram cell. The cells are also subject to “aging” like the decay of an analog CRT phosphor.

After the accumulation and aging process the resulting histogram, shown in figure 3A, is mapped to the output display. The histogram can have up to 65,535 counts. To utilize this resolution on the CRT display a user adjustable saturation control sets the upper end of the display intensity and distributes the 16 levels of intensity or colors over the remaining range as shown in figure 3 B. This operation is similar to using the intensity control on an analog scope to maximize the display’s intensity range.

Analog persistence allows engineers, used to viewing analog displays, to obtain the advantages of a digital scope while retaining the familiar feel and information content of an analog display.

Figures 4 and 5 provides some examples of how analog and color graded persistence can



be used in analyzing data dependent variations in vector diagrams of data communications signals.



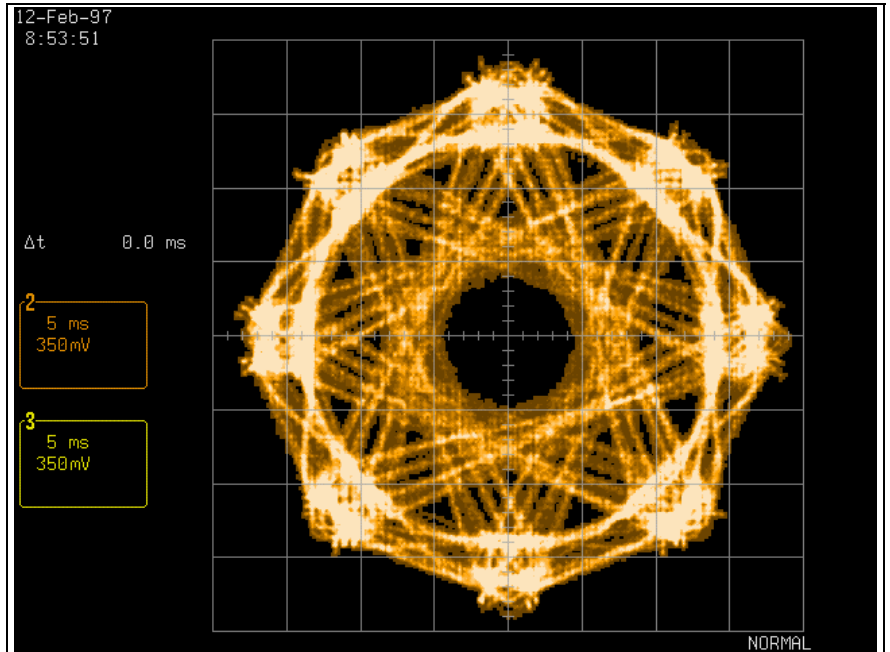


Figure 4 Vector diagram of a PHP wireless phone signal using analog persistence

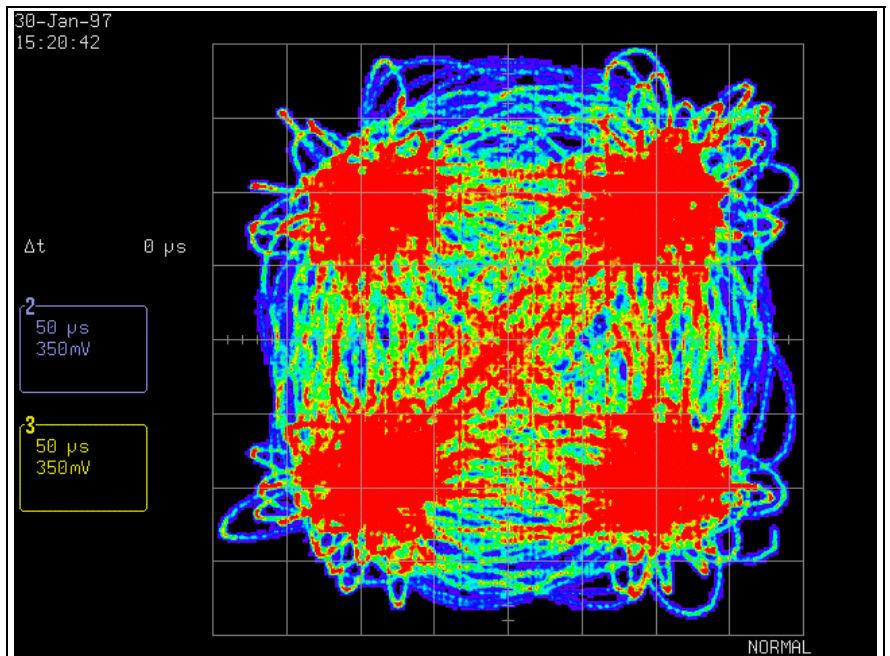


Figure 5 Color graded persistence display of a vector diagram for a CDMA pilot channel. Red indicates the most often occurring data states and transition paths.

