Annotate oscilloscope displays for better documentation

Arthur Pini - February 12, 2015

Has anyone ever shown you an oscilloscope screen image that left you wondering what the waveform represented? Without proper documentation, the waveform itself may be meaningless. By adding annotations to an oscilloscope screen, you can not only display relevant information, you can keep that documentation stored on the screen and it will be visible if you make a screen capture.

Consider the screen image from a late-model analog oscilloscope in **Figure 1**. This late model analog scope provides some annotation describing the setup such as the vertical and horizontal scale factors and offsets as well as the channel name and coupling. It also provides a measurement of the input signal frequency.

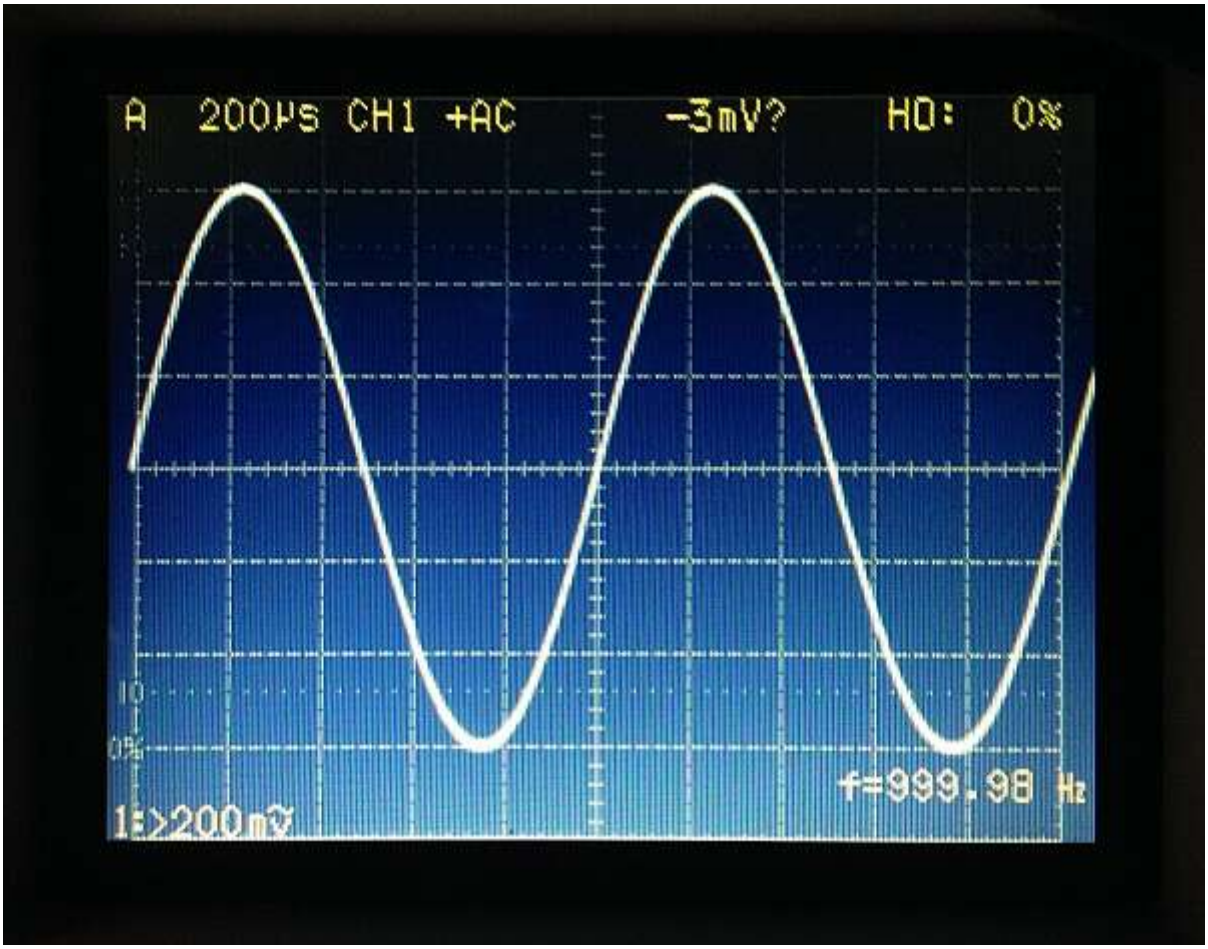

Figure 1 The screen on an analog oscilloscope includes minimal annotation, making the meaning is cryptic to those who aren't familiar with the instrument.

Modern digital oscilloscopes offer many tools to help you annotate the screen and store vital information in plain view. Those annotation tools include trace descriptors, screen axis labels, trace labels, and messages available in the oscilloscope. Annotation lets you create complete documentation of the screen images, which is then permanently attached to the graphic. Oscilloscopes from all major suppliers offer some form of trace and display annotation.

Now look at the oscilloscope screen in **Figure 2**. The screen image shows a source waveform, channel 1, a derived math waveform F1, and horizontal zoom expansions of both traces showing them with more timing detail. The trace F1 contains a track of the pulse widths of each pulse in the source trace C1. The track shows the instantaneous variation in width on a cycle by cycle basis. The vertical axis, documented in the F1 trace descriptor box, shows that the vertical axis is scaled at 1 µs per division while the horizontal axis is 100µs per division. While the trace descriptor boxes provide the scale factors for each trace, they don't document the limits of each axis.

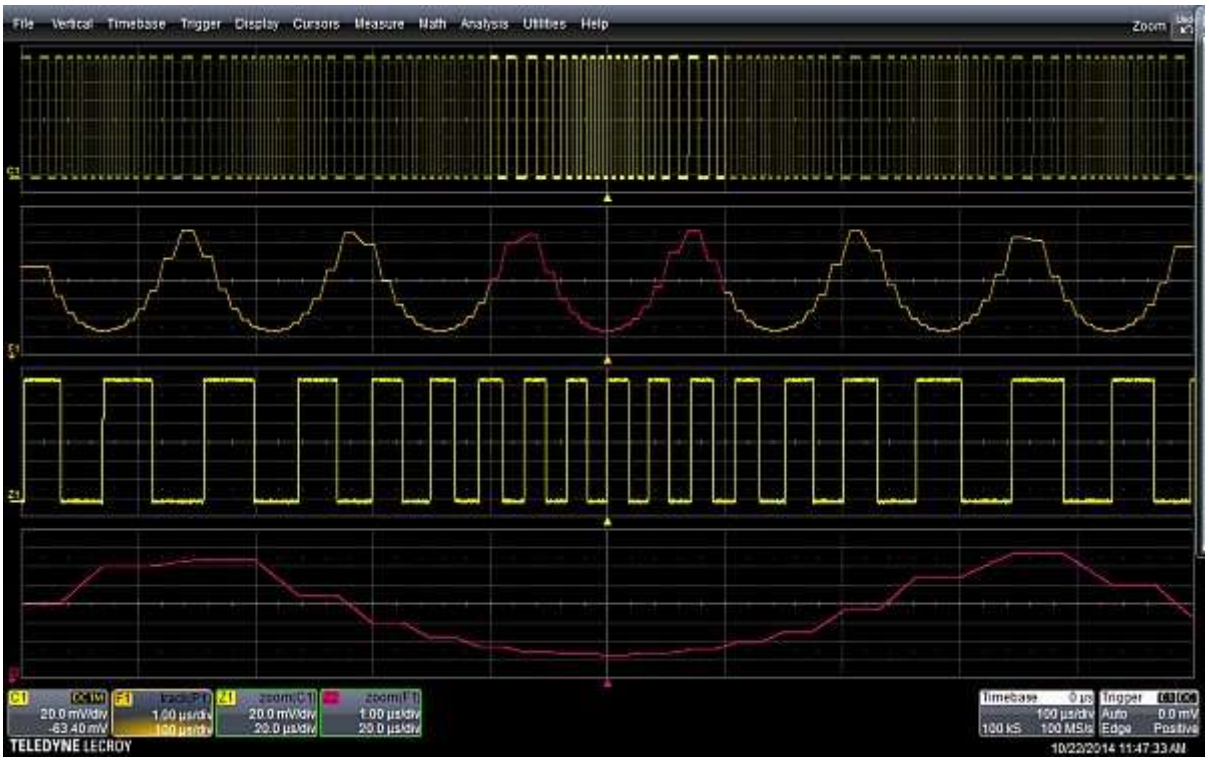

Figure 2 A basic digital oscilloscope screen image documents the vertical and horizontal axis scaling and offset but doesn’t tell the recipient anything about the source of the waveforms or the ranges of the axes.

Axis labels

By turning in on Axis labels, you can achieve more documentation on the axis limits for each trace. Axis labels are controlled in the display setup. You can choose to add them or not based upon need. **Figure 3** shows the same waveforms in **Figure 2** but with axis labels activated. The axis labels complement the scaling information provided in the trace descriptor boxes, showing the horizontal and vertical range of every display grid axis.

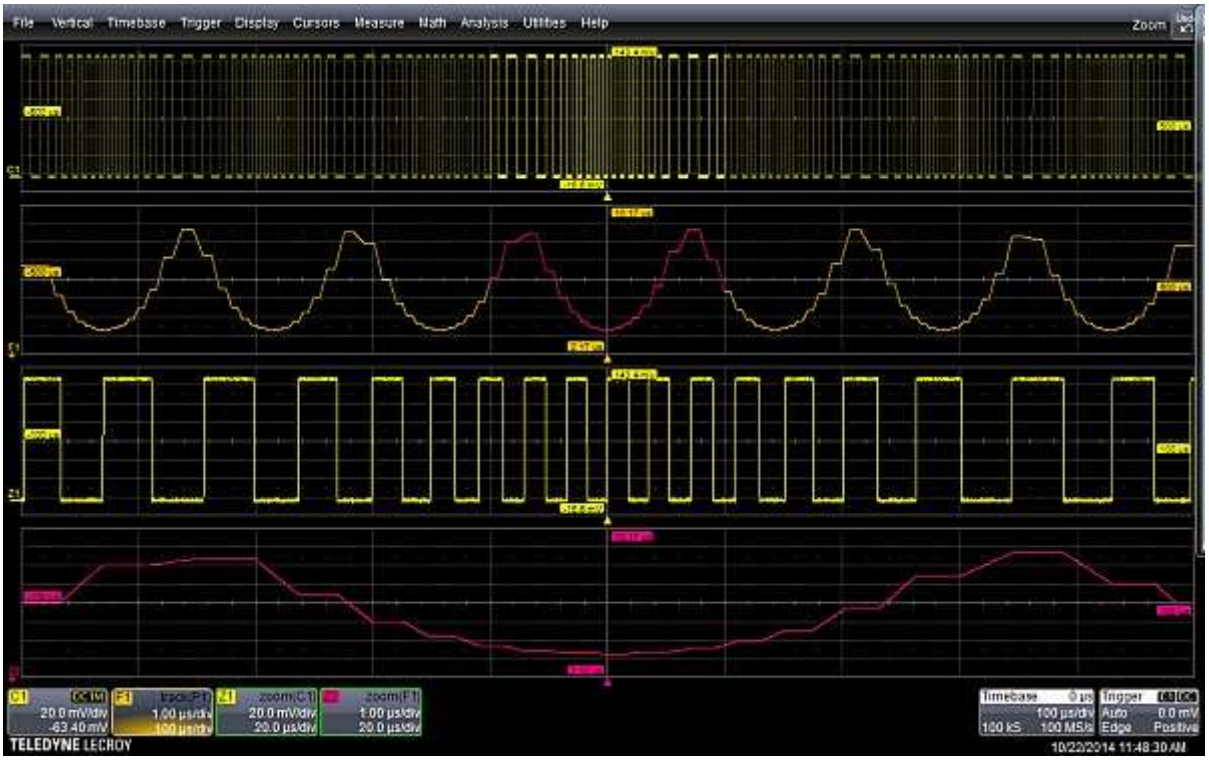

Figure 3 Axis labels, available under the Display setup, show the limits of each of the displayed grids complementing to scale information provided by the trace descriptors.

Trace labels and annotation video

Trace labels

Trace labels let you to annotate each trace with descriptive text. The Teledyne LeCroy oscilloscope used in this article supports multiple labels per trace providing ample annotation. Trace labels can be anchored to the trace or "floated" to any point on the display grid. You have complete control over the placement of the labels within each trace display grid. **Figure 4** shows an annotated screen display.

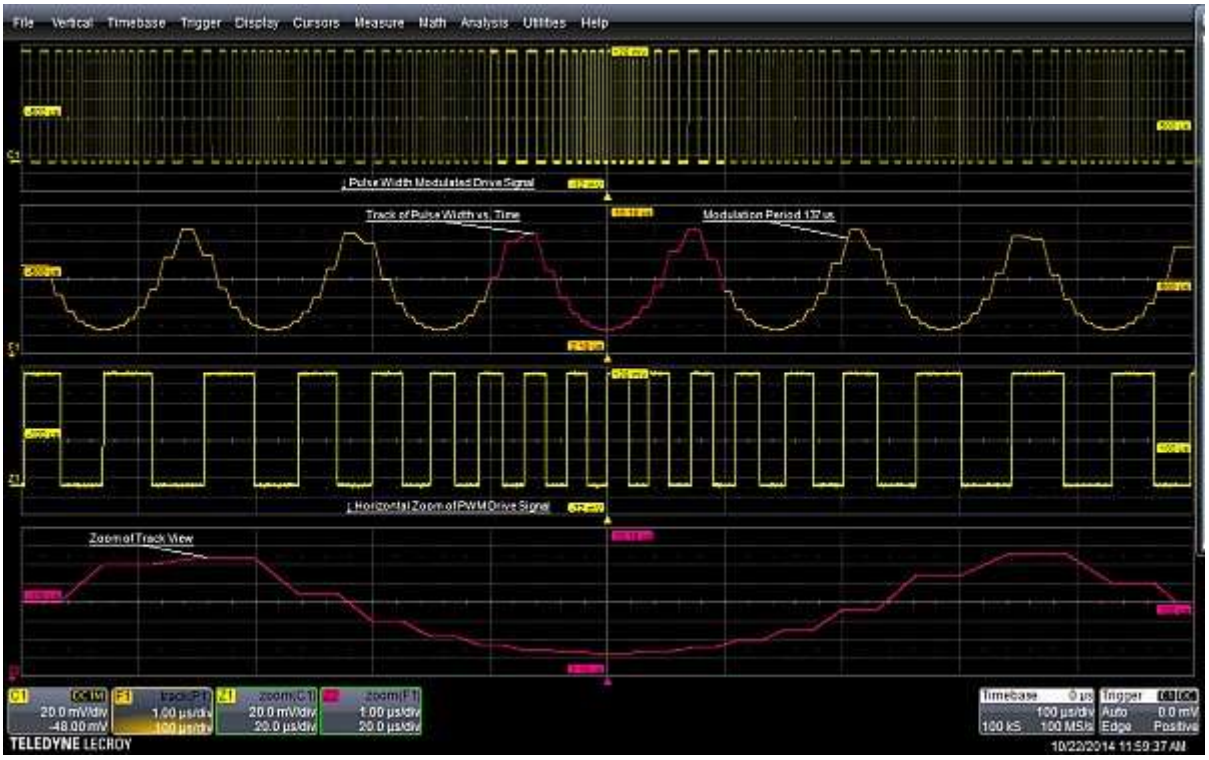

Figure 4 Trace labels provide detailed descriptions of the each trace. Labels may be placed in contact with the trace or may float anywhere within the grid. Each trace supports multiple labels.

Trace labels are associated with each trace and are added from the trace dialog box. For example, the label on the channel 1 trace (C1) is added from the C1 setup dialog box. Likewise, the labels associated with the math trace F1 are created and placed from the F1 math setup dialog. Labels can be placed by dragging them anywhere within the display grid using the oscilloscope's touch screen or a mouse.

The video below shows **figures 2 through 4** so you can see how the annotations build on the screen. The sequence repeats four times.

Messages

The labels shown so far are fixed attributes either of the display grids or traces. There is also provision to show messages to the operator. This generally is required under remote control in an automated test system. There is a "Message" command which will display a message to the operator in the lower left corner of the display as shown in **Figure 5**.

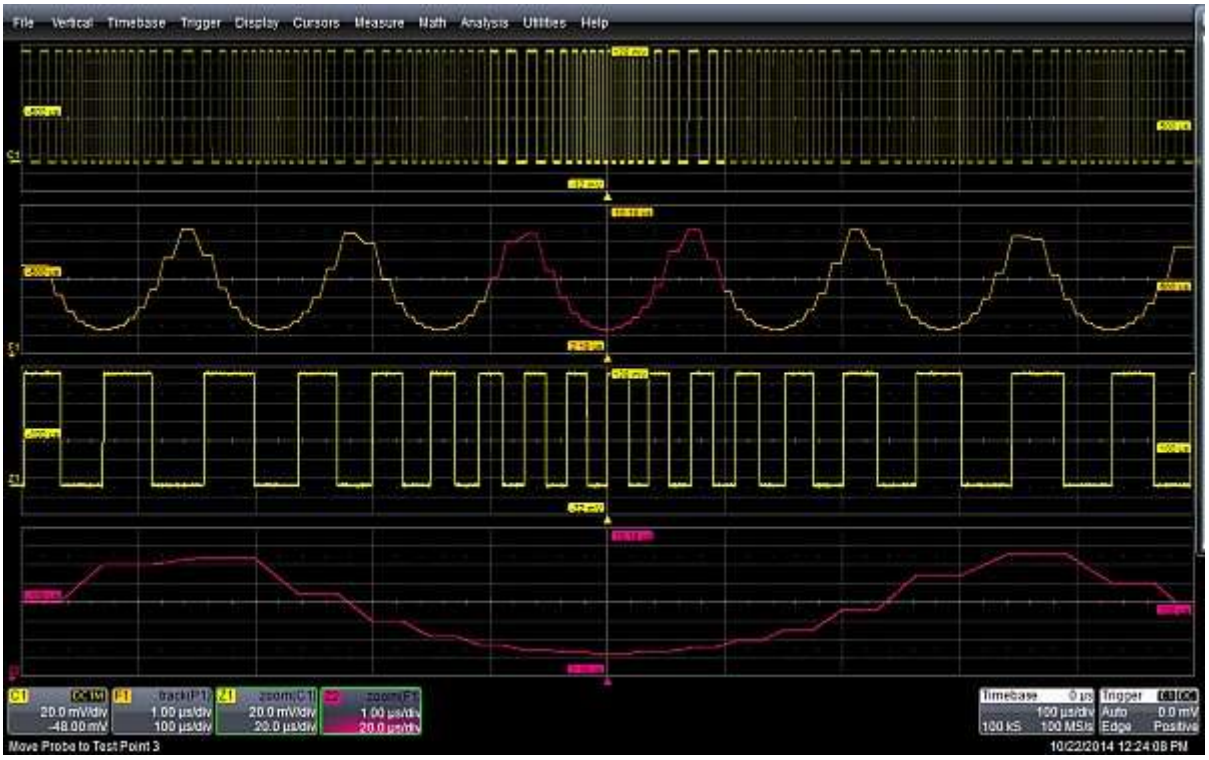

Figure 5 The message "Move Probe to Test Point 3" in the lower left corner of the display is an example of an operator prompt sent using the oscilloscope's remote control message command.

The message "Move Probe to Test Point 3" is an example of an operator prompt sent over remote control. The message command lets the test programmer prompt the operator for some action during the test. It can be combined with a "Beep" command to emit an audible beep to alert the operator to the message.

The message is independent of any of the screen elements and can be updated and changed as needed. It can also be used as part of the annotation. For instance, a test number might be posted before a hard copy of the screen is made.

Conclusion
Annotation tools help you document the measurements appearing on an oscilloscope screen. Take advantage of screen annotations when archiving test reports, especially when the state of the instrument is not recorded with the screen images.

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