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Using Controlled Run to Increase Measurement Speed

TECHNICAL BRIEF

DPOJET Measurement Methods

There are multiple ways to run oscilloscopes to get the measurement data you need. The manual method, where you look at the captured waveform and count graticules, works for quick measurements where you do not need much information. Oscilloscopes have automated measurements that work well, but still may require manual setup and data collection. Fully automated testing scripts set up and control the oscilloscope, capturing the data and formatting it in a useful way. How that automation is done can affect the speed, precision, and accuracy of that data.

This technical brief describes a new method to significantly shorten time when capturing data using Tektronix tools such as DPOJET (Digital Phosphor Oscilloscope Jitter and Eye Test) software for Tektronix DPO/MSO70000DX and DPO70000SX oscilloscopes. One way it does this is by controlling the trigger of the oscilloscope directly in order to minimize the amount of time spent initializing the trigger machine and starting the oscilloscope acquisition system to begin acquiring.

Traditional Method

The traditional method follows this basic outline:

1. Command the oscilloscope to set up vertical, horizontal, and trigger event so that you capture enough data to ensure you meet your statistical needs. Set trigger to a single event: risetime edge of the waveform.
2. Program oscilloscope software to set up the measurement in DPOJET, including type of measurement and reference values.
3. Set up Device Under Test (DUT) to transmit the pattern needed for the test.
4. Command the oscilloscope to start a single sequence in which it will look for the trigger event, capture the waveform, and calculate the measurement values.
5. Transfer measurement data to a measurement table or system.
6. Set up the DUT for the next pattern and command the oscilloscope to trigger, capture and analyze again.

During this cyclic method, much time is taken on each cycle for the oscilloscope to initialize the trigger machine and start the acquisition engine before any actual measurement takes place. This can account for a majority of the time it takes to perform the full cycle.

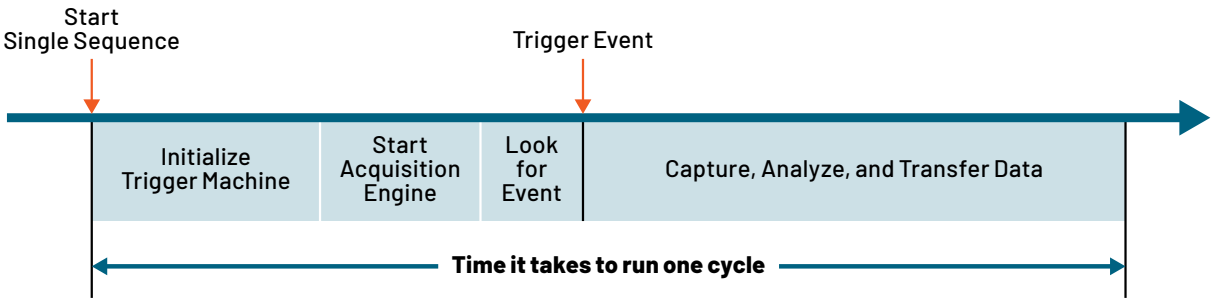

Figure 1. With the cyclic method for capturing data, trigger initialization and acquisition engine startup is a significant portion of the cycle time.

New Controlled Run Method

If you could successfully reduce or eliminate the initialization and other setup times during the capture loops, you could successfully capture much more data. Tektronix has developed a method to reduce the time it takes to capture the data that we can call "Free Run" or "Controlled Run."

Figure 2. Capturing loops using the Controlled Run method.

We set up the oscilloscope Voltage Scale and Horizontal Scale to capture the waveform data we want to measure. We also set up the trigger for command control. This means that instead of configuring the trigger machine to look for an edge, we use a command to force a trigger, which allows us to directly control when the trigger occurs. We also program the system to continuously run, rather than in a single sequence, so that trigger and acquisition engine startup time is not an issue.

The process looks something like this:

1. Program the oscilloscope horizontal and vertical scales to capture waveforms of the proper timing and scaling.
2. Configure the oscilloscope trigger system so that it will trigger upon a trigger command.
3. Program oscilloscope software to setup the measurement in DPOJET, including type of measurement and reference values.
4. Initialize the oscilloscope trigger and acquisition system into a continuous run state and capture a waveform using the command trigger to ensure it is running.
5. Set up DUT to transmit the pattern needed for the test.
6. Send a command to trigger the oscilloscope. The oscilloscope will capture the waveform and calculate the measurement values.
7. Transfer measurement data to a measurement table or system.
8. Set up the DUT for the next pattern and repeat steps 6 and 7 until testing is complete.

Using this method, the time needed to initialize the trigger machine and acquisition occurs only once at the start of testing. No additional time is taken during each succeeding cycle (see below). The result is 60% less time taken to complete testing.

Conclusion

There are many ways to get data from an oscilloscope. Tektronix has developed this faster method to improve automated measurements. Taking less time to make a measurement can lead to getting a product to market faster. Contact your local Tektronix Application Engineer for more information on how to take advantage of capabilities like the one described here to achieve better testing.

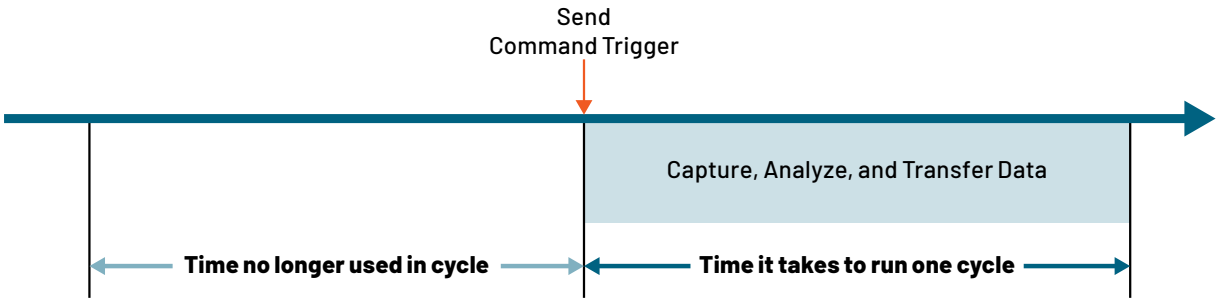

Figure 3. In the Controlled Run method the trigger is forced and the system continuously runs so that trigger and acquisition engine startup is no longer part of the cycle time.

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