# How Do You Get The Most Out Of Your Tektronix Performance Oscilloscope?

Whether you are designing a serial data communications system with several high speed links and transceivers or a DDR2 memory interface or a digital video system, you need to build your confidence and confirm that you have done your tasks correctly.

The only way to do this is by visualizing some of the key signals and their relative time relationship, and also by making sure these signals are clean and don't carry crosstalk interferences or any other kind of imperfections. You also would like waveform visualization, validation or debugging tasks to be fairly straight forward so that your work is not impaired and you can meet your schedule commitment. Your oscilloscope is your best companion to build this confidence.

The DPO7000 and DPO/DSA70000B series oscilloscopes offer a number of features that help you address the challenges of signal integrity and accelerate your day to day work. This application note will demonstrate important usability advantages looking at three key themes:

- Effective operation leveraging efficient controls and shortcuts
- Choices in operating the instrument control
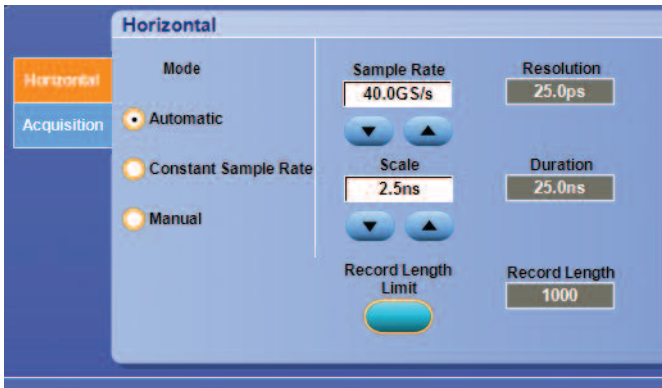- Achieving quicker results

**Tektronix**®

Enabling Innovation

**Figure 1.** The different timebase modes in the Horizontal Control Window.
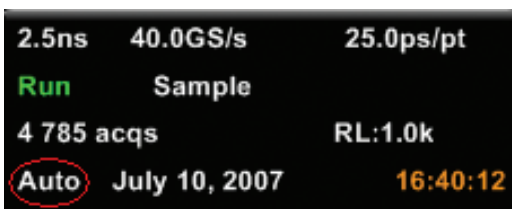


**Figure 3.** The timebase mode readout shows "Auto" for Automatic.



**Figure 2.** Directly selecting the timebase mode of interest in the drop-down menu.

This application note will also address waveform visualization, validation or debugging tasks that areperformed with an oscilloscope on your workbench. Actual applications include, but are not restricted, to serial data communication (high-speed or low-speed), embedded digital design, data acquisition and digital video design.

In order to get the best acquisition of your signal, you have learned to drive the horizontal timebase and the vertical amplitude controls. The horizontal timebase gives you access to your signal acquisition duration and precision in time, parameters that also derive the display of your signal representation over 10 divisions. The vertical control allows you to tailor the individual oscilloscope channel's inherent low-pass filter performance to your signal characteristics, not only in amplitude (gain) but also in frequency content (bandwidth and roll-off).
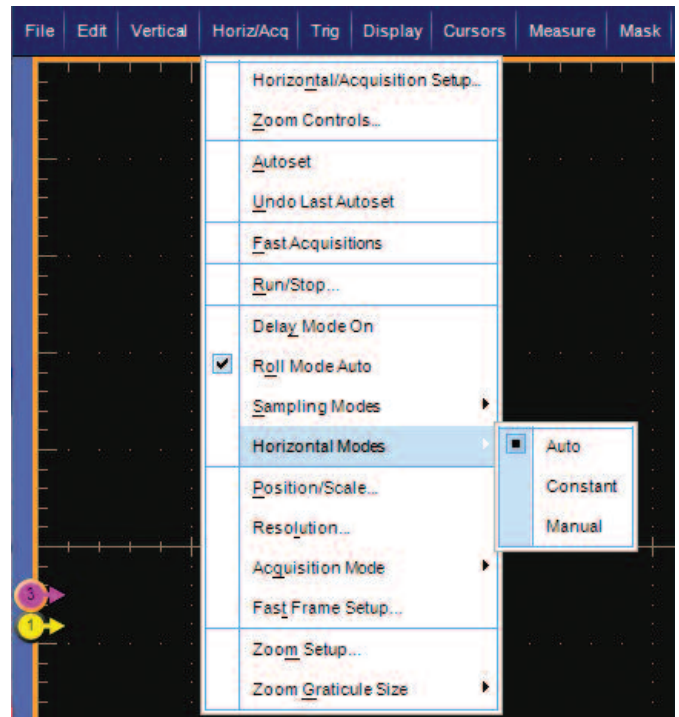
## Getting the Most of the Oscilloscope Timebase

The horizontal timebase implementation, with firmware version 4.0 or higher, gives DPO7000 and DPO/DSA70000B users better control over the acquisition of their signals. It can be tuned to suit the variety of your applications. It will address rapid acquisition and display rate for signal exploring and fault detection, or it can be optimized to provide precision acquisition for detailed analysis. It can also provide granular, independent control for data acquisition focus. To meet these applications, three distinct modes of operations are included: Automatic, Constant Sample Rate, and Manual.

They can be enabled via the **Horiz/Acq** button or pull down menu item on the toolbar and selecting **Horizontal/Acquisition setup** (Figure 1 shows the different modes in the Horizontal control window) or individual modes can be activated directly by highlighting **Horizontal Modes** (Figure 2 shows how to directly select the mode of interest). A specific readout shown on Figure 3 is also provided on the display at the right hand bottom corner. "Auto" stands for Automatic, "Cons" for Constant Sample Rate and "Man" for Manual.
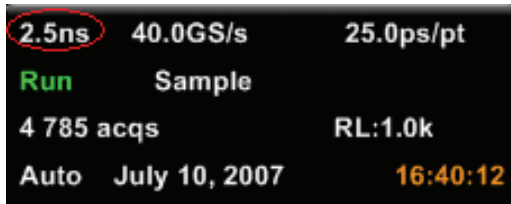
**Figure 4.** Time per division readout.

## Automatic Operation

The default mode, Automatic, generates the liveliest update rate and is targeted for signal exploration when you need to interact with an animated signal (fast update rate). The acquisition record will fit to screen and provide the complete 10-division display.

The horizontal scale or time per divisions will match a user-friendly 1-2-5 sequence so that rapid simple time measurement can be made by counting number of divisions. It is directly controllable via the **Scale** knob on the front panel or **Scale** selection in the horizontal control window. A time per division readout is also displayed at the right hand bottom corner as shown in Figure 4.

The liveliness of the instrument is achieved via an arbitrary limitation of the record length used to acquire the data (called record length limit). This limit is set by default at 100 k. However, you can adjust this limit in the horizontal control window if 100 k does not fit your application. Figure 5 shows the overlay window in which the limit can be changed.

When you change the time per division, the oscilloscope tries to maintain sample rate, then it needs to change the record length it acquires. The sample rate (samples per second) gives the time resolution of the acquisition. In most cases, the oscilloscope tries to maintain the best real-time resolution, to ensure the least chance of aliasing, and provide the most filter-friendly settings.
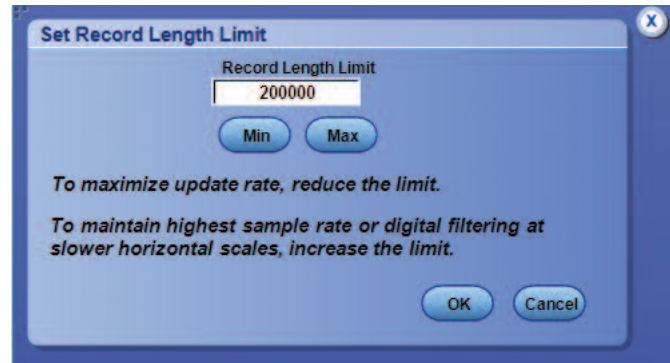


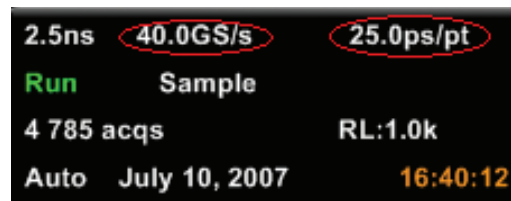**Figure 5.** Record length limit overlay window.



**Figure 6.** Sample rate and time resolution readouts.

One record length boundary is the minimum of 1 k record length necessary to display enough data points. When you decrease the time per division and reach the 1 k limit, the oscilloscope will automatically increase the sample rate (to get more samples points) up to non-real time sample rates. When you increase the time per division and reach the other boundary in record length (the record length limit), the oscilloscope then automatically decreases the sample rate.

Note the boundary limits we are discussing here are not the Min and Max values showing in the overlay window in Figure 5. The Min and Max values are actual minimum and maximum values allowed mathematically by the timebase.

You can adjust the sample rate and temporarily go over the record length limit either by using the Resolution knob on the front panel or directly in the Horizontal control window. A sample rate and a time resolution (time between sampled points) number are also displayed as readouts shown in Figure 6.

| | 2.5 ns | 5 ns | 10 ns | 20 ns | 50 ns | 100 ns | 200 ns | 500 ns | 1 us | 2 us | 5 us | 10 us | 20 us | 50 us | 100 us | 200 us | 500 us | 1 ms |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40 GS/s | 1 k | 2 k | 4 k | 8 k | 20 k | 40 k | 80 k | 200 k | 400 k | 800 k | 2 M | 4 M | 8 M | 20 M | 40 M | 80 M | 200 M | 400 M |
| 20 GS/s | | 1 k | 2 k | 4 k | 10 k | 20 k | 40 k | 100 k | 200 k | 400 k | 1 M | 2 M | 4 M | 10 M | 20 M | 40 M | 100 M | 200 M |
| 10 GS/s | | | 1 k | 2 k | 5 k | 10 k | 20 k | 50 k | 100 k | 200 k | 500 k | 1 M | 2 M | 5 M | 10 M | 20 M | 50 M | 100 M |
| 5 GS/s | | | | 1 k | 2.5 k | 5 k | 10 k | 25 k | 50 k | 100 k | 250 k | 500 k | 1 M | 2.5 M | 5 M | 10 M | 25 M | 50 M |
| 2.5 GS/s | | | | | 1.25 k | 2.5 k | 5 k | 12.5 k | 25 k | 50 k | 125 k | 250 k | 500 k | 1.25 M | 2.5 M | 5 M | 12.5 M | 25 M |
| 1 GS/s | | | | | | 1 k | 2 k | 5 k | 10k | 20 k | 50 k | 100 k | 200 k | 500 k | 1 M | 2 M | 5 M | 10 M |
| 500 MS/s | | | | | | | 1 k | 2.5 k | 5 k | 10 k | 25 k | 50 k | 100 k | 250 k | 500 k | 1 M | 2.5 M | 5 M |
| 200 MS/s | | | | | | | | 1 k | 2 k | 4 k | 10 k | 20 k | 40 k | 100 k | 200 k | 400 k | 1 M | 2 M |
| 100 MS/s | | | | | | | | | 1 k | 2 k | 5 k | 10 k | 20 k | 50 k | 100 k | 200 k | 500 k | 1 M |
| 50 MS/s | | | | | | | | | | 1 k | 2.5 k | 5 k | 10 k | 25 k | 50 k | 100 k | 250 k | 500 k |
| 20 MS/s | | | | | | | | | | | 1 k | 2 k | 4 k | 10 k | 20 k | 40 k | 100 k | 200 k |
| 10 MS/s | | | | | | | | | | | | 1 k | 2 k | 5 k | 10 k | 20 k | 50 k | 100 k |
| 5 MS/s | | | | | | | | | | | | | 1 k | 2.5 k | 5 k | 10 k | 25 k | 50 k |
| 2 MS/s | | | | | | | | | | | | | | 1 k | 2 k | 4 k | 10 k | 20 k |

**Table 1.** Relationship between sample rate, time per division and record length.

To change the sample rate value that the oscilloscope tries to maintain constant, you need to do this in such a way that the record length stays within the allowed limits. For example, if you want to change the constant sample rate from 2.5 GS/s to 10 GS/s and the record length limit is 200 K, this change needs to occur when the time per division is between 50 ns/div and 2 μs/div.

Table 1 describes how the sample rate, time per division, and record length are linked together on a DPO7000. Please note that the record length boundaries are not exactly even and vary in number of points, taking into account the evenness of the time per division number. This table is subject to change.
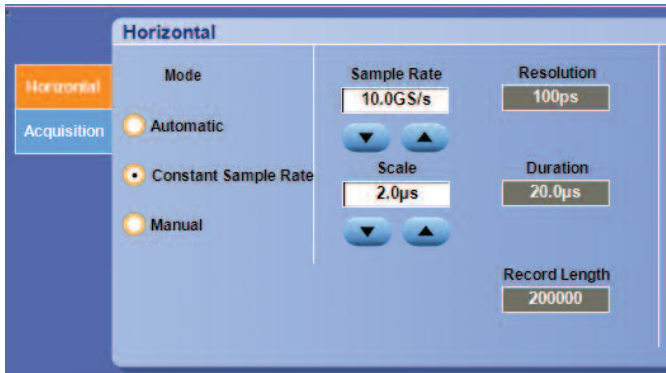
**Figure 7.** Constant Sample Rate mode of operation GUI.

## Constant Sample Rate Operation

The Constant Sample Rate mode will maintain the highest real-time acquisition resolution regardless of the acquisition duration. It is targeted to maximize the precision of the acquisition and the least chance of aliasing. Since it provides the largest amount of sample points, it is also best suited for the most accurate measurement, advanced analysis and digital filtering. This mode of operation is not optimized to maintain a high display update rate though, and the displayed trace may become thick due to the large amount of points that are being acquired.

When you change the time per division, the oscilloscope will maintain the selected sample rate constant and change the record length it acquires until it reaches its minimum or maximum boundary. The 1 K record length still exists since it is the minimum record length necessary to display enough data points. When you decrease the time per division and reach the 1 K limit, the oscilloscope will automatically increase the sample rate (to get more samples point) up to non-real time sample rates. The maximum boundary is affected by the record length option configuration that was purchased on the oscilloscope. When you increase the time per division, if the oscilloscope reaches the maximum record length boundary, then it automatically decreases the sample rate.

You can adjust the sample rate at any time, either by using the Resolution knob on the front panel or directly in the Horizontal control window. Please note in Figure 7, the Horizontal control window does not display a record length limit control any more.

## Manual Operation

There are some applications like digitizer, ATE and data acquisition that want to optimize the resolution of the signal acquisition, and at the same time, the time window of the acquisition. These users want control over a full range of sample rates and record lengths. They are willing to compromise the user-friendly 1-2-5 sequence of time per division values. Since the trace fits to the 10 division display, the time per division can very well be an uneven number.
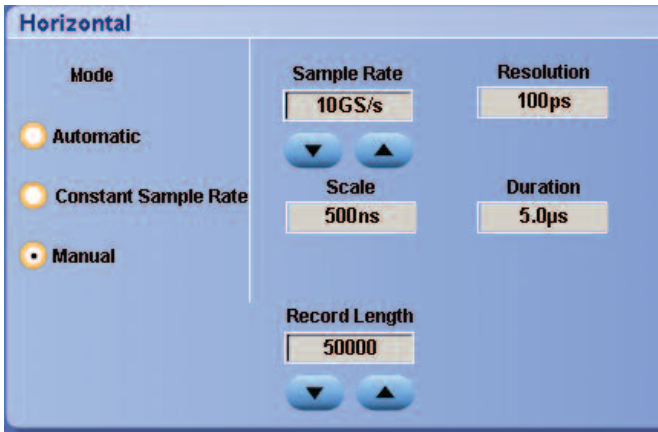
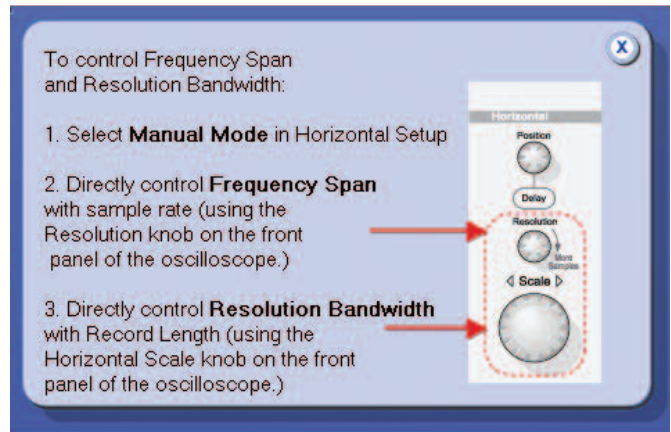**Figure 8.** The GUI control for the manual mode.



**Figure 9a.** When you invoke the question mark symbol on the GUI, the behavior of spectral in manual mode is explained.
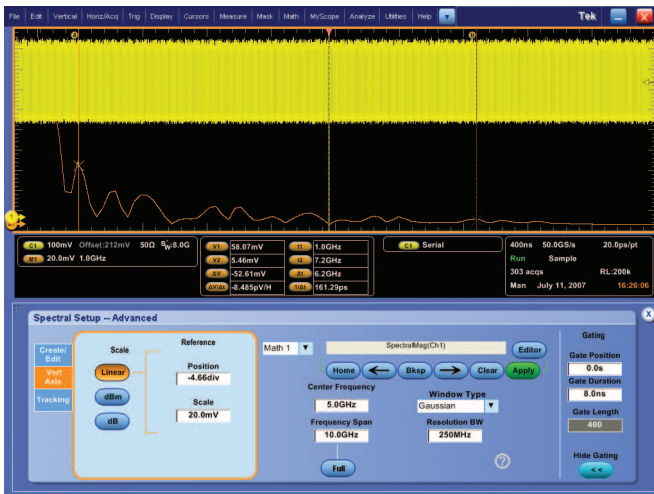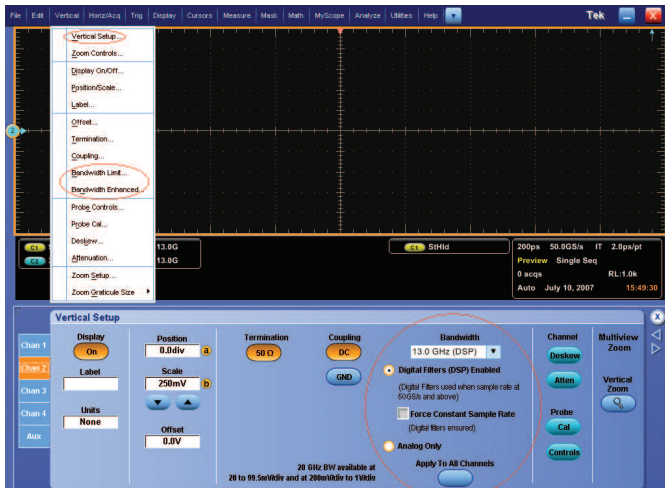


**Figure 9b.**

Manual mode offers direct and independent control of the sample rate and record length. You can directly control the record length via the Scale knob on the front panel or Record Length selection in the horizontal control window. You can also adjust the sample rate by using the **Resolution** knob on the front panel or use **Sample Rate** in the Horizontal control window, as shown on Figure 8.

In addition to digitizer, ATE and data acquisition applications, manual mode is recommended when you need to perform an FFT on the acquired signal for any applications. For example, in order to look at the frequency content of a 2.5 Gb/s serial data stream, you will perform an FFT of the acquired data stream. You can select **Basic Spectral** under the **Math** menu

and can generate a magnitude FFT of the acquired waveform by selecting **Magnitude**. The Math1 waveform gets SpectralMag(Ch1) once **Apply** is pushed. When the horizontal timebase is in manual mode, and when the FFT is using the full frequency span offered by the acquiring sample rate (which is the case in Basic Spectral or in Advanced Spectral with the frequency span set to full), then the frequency span is a direct translation of the sample rate and the resolution bandwidth is a translation of the record length, as explained in Figure 9a.

However, when you can operate the FFT with Advanced Spectral, reduce the span of the analysis and use-time domain gates, then you can adjust both resolution bandwidth and frequency span directly in the UI and independently of the timebase settings. Figure 9b shows the resulting FFT with a 2.5 Gb/s signal with 1.3 V offset. Sample rate is set at maximum real-time sample rate to enable the bandwidth limit filter at 8 GHz. Note that the gating is in effect and very short.

► **Figure 10.** *Bandwidth limit selection GUI.*

## Bandwidth Limit Selection

The bandwidth limit selection feature in the DPO7000 and DPO/DSA70000B series, introduced with firmware version 4.0, gives you better control over the acquisition of your signals. It can be tuned to suit a variety of applications. You can purchase one instrument for the highest bandwidth need and easily optimize it to handle lower-frequency measurements equally as well. You can tailor an individual scope channel's performance to the needed input signal characteristics and reduce the effects of out-of-band noise. This feature can be enabled via the **Vertical** button, pull down menu item on the toolbar or right clicking on the vertical readout and selecting **Vertical Setup** or **Bandwidth Enhanced** or **Bandwidth Limit**. Figure 10 shows the bandwidth limit selection in the Vertical control window.

## Control Over the Oscilloscope Input Channel Performance

To debug and validate the signal integrity of your signals, you need to tune the bandwidth of the acquisition system to the speed of your signal. Signal fidelity involves not only vertical noise, but accurate rise time, fall time, overshoot, and undershoot measurements. In general, selecting a bandwidth of 3 to 5 times the fundamental frequency of the digital waveform of interest is a good compromise between capturing important harmonic content and minimizing noise. For debugging, validating or testing a 6 Gb/s SATA data stream, you would need at least a 9 GHz or 15 GHz bandwidth oscilloscope. For a 2.5 Gb/s PCI Express device you would only need 4 GHz or 7 GHz bandwidth, and ideally you would be able to achieve these bandwidths reliably with one oscilloscope. If you want to see the smallest transition on your signal, you also need to control the gain of the acquisition system, and minimize unwanted noise or other interfering effects introduced by the oscilloscope or probe.
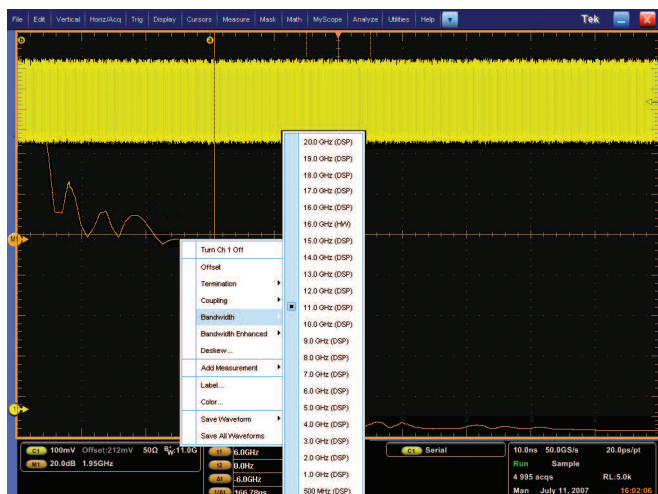
**Figure 11.** Bandwidth limit choices on a DPO/DSA72004B.

This feature limits the maximum oscilloscope bandwidth in increments of 1 GHz and down to 500 MHz as shown in Figure 11.

These limited bandwidths, designed with DSP bandwidth filters, are operational at samples rates on or above the maximum real-time sample rate and are selectable independently on all 4 channels. The usage of these filters can be turned off if "**Analog only**" is checked. The users will then get pure, pristine hardware analog response of the oscilloscope. Otherwise, all three horizontal modes of operations (automatic, constant sample rate and manual) will enable these DSP bandwidth filters, whenever the sample rate is appropriate. Furthermore, in order to ensure the DSP bandwidth filtering occurs at all time per division selected, an entry called "**Force Constant Sample Rate**" has been added. When it is checked, it will enable the constant sample rate mode of operation of the timebase, but will not affect the selected sample rate. You will have to ensure the oscilloscope is sampling on or above the maximum real-time sample rate. You control sample rate with the **Resolution** knob on the front panel or go to the horizontal set up control window.



**Figure 12a.** Bandwidth readout.

A bandwidth readout associated with each active channel is displayed at the left hand bottom corner. Take a look at Figure 12a. The bandwidth number displayed is the best estimate of the acquisition bandwidth achieved by the channel, taking into account the elements that are recognized on the path, like probe, probe tips or other hardware bandwidth limiting accessories. The BW symbol with the prime (  ) indicates that the bandwidth is the result of a DSP filtering operation. Otherwise, if the prime is not there, then the bandwidth is purely analog. A mouse rollover of the readout gives further explanation about what elements are taken into account to determine the bandwidth number.

The series of user-selectable bandwidth limit filters is designed to preserve the instrument's basic roll-off characteristics, flatness, and phase linearity within the new frequency range and thereby reducing the effects of out-of-band noise on measurements.

Figure 12b.

## Enhanced Bandwidth to the Probe Tip

If you are concerned about signal integrity, you also care about vertical noise and aberrations when attaching a probe. The DPO/DSA70000B scopes offer compensation for the response characteristics of probes and attached tips. This maintains the best signal fidelity for all connections to your signals. This user-selectable bandwidth enhancement to the probe tip is achieved via DSP filtering and supports the Tektronix P7500 TriMode™ probes, as well as some of the popular Z-active probes (P7380A, P7380SMA, P7313, P7313SMA, P7360A) and their probe tips. It maintains the superior step response performance and reduces vertical noise – the key to better signal integrity. Like other DSP filtering features, it

is operational at samples rates on or above the maximum real-time sample rate and is selectable independently on all 4 channels. You need to select the type of probe tip attached so that the proper filter is applied. The type of probe tip is selected in the probe setup control window (Figure 12b). This control window is selected via the **Vertical** button, pull down menu item on the toolbar or right clicking on the vertical readout and selecting **Probe Cal**.

To learn more about reliable timing and amplitude resolution, accuracy down to the probe tip, and optimizing the performance of the complete acquisition system, please read the application note "Utilizing Digital Signal Processing to Optimize Real-time Oscilloscope Probe System Performance" (55W-20957-X) on www.tek.com.
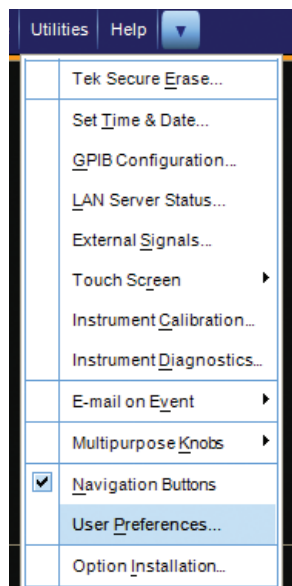
**Figure 13a.** The user preference selection in the Utilities pull down menu.
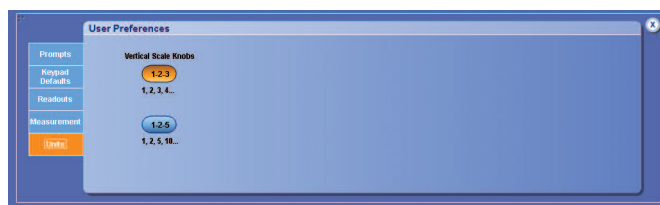


**Figure 14.** Multi-purpose knobs.



**Figure 13b.** The selection for the vertical scale knob behavior.



**Figure 15.**

## Optimize the Waveform Vertical Position

Signals with large offset tend to be more challenging to optimally display even on a large display screen. Some front panel user-interface features havebeen added in the DPO7000 and DPO/DSA70000B Series firmware version 4.0 in order to accelerate the vertical adjustment of the waveforms. You need to remember that more vertical gain or scale also means more vertical noise. The front panel vertical Scale knob controls the vertical scale with a new finer vertical resolution in sequence of 1-2-3 that replaces the 1-2-5 sequence. This is actually a user preference. User preferences can be enabled via the Utilities pull down menu item on the toolbar and by selecting User Preferences and then the Units tab as shown in Figures 13a and 13b.
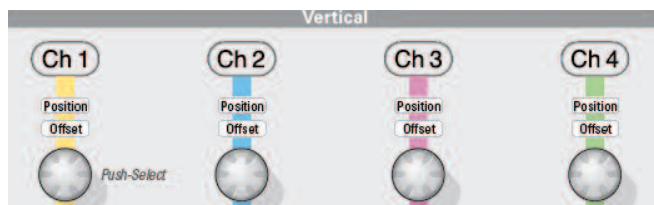
For even finer resolution control, you can either touch or left-click the mouse on the label handle of the channel of interest. Then vertical position and scale controls get assigned to the **Multi-purpose** knobs; the "a" knob for position and "b" knob for scale. By pushing on the Multi-purpose knob, you can then get the finest control.

You can also directly control the position of the waveform from the front panel with the **offset/position** knob. Please refer to Figure 15. To select vertical offset versus vertical position, you need to press the knob and either position or offset will be lit on the front panel. This knob provides the same fine control as the Multi-purpose knob. While adjusting the voltage offset and volts per division remember to fit the signal in eight vertical divisions or more if possible. Optimizing the dynamic range in this manner will produce the most accurate, repeatable measurements.
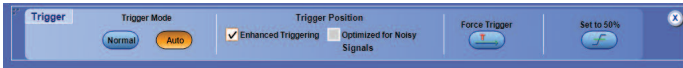
▶ **Figure 16.** *How to select Enhanced Triggering.*



**Figure 17.** Trigger readout.

## Control Over Triggering

In order to get the most relevant display of your signal for your applications, you have learned to master the triggering of your oscilloscope. Oscilloscope users expect their instruments to trigger reliably and with stability on a wide variety of signals. DPO7000, as well as DSA/DPO70000B oscilloscopes, have the most advanced and highest performing trigger hardware system available, with the most trigger types. But no matter how high performance the trigger circuitry data path is, the acquisition path is different, which results in delays and amplitude variances that appear as trigger position changes on the scope screen. This is true for all performance oscilloscopes even those from the competition. For additional information on the trigger system, please refer to the application note "Trigger at a New Level with Pinpoint™ Triggering" (55W-17291-X) on www.tek.com.

## Enhanced Triggering Mode

DPO7000 and DPO/DSA70000B, oscilloscopes with firmware version 4.0 or higher, have an enhanced trigger mode to adjust the trigger position and compensate for the difference of delay there is between the trigger path and the data acquisition path. This will eliminate virtually any trigger jitter at thetrigger point. Latest measurements show pk-pk jitter at < 30 fs, with RMS jitter much smaller than that.

In this mode, the trigger point can be used as a measurement reference. This feature is enabled by default, however you can disable it whenever it makes best sense for your application.

The enhanced triggering mode can be enabled via the Trig pull down menu item or the Trigger button on the toolbar and by selecting Mode or in the Trigger control window by selecting the Mode tab as shown in Figure 16.

The trigger readout at the bottom of the graticule indicates when the enhanced mode is active. As shown in Figure 17, a prime (') is added to the A and B symbols (these symbols represent the A and B events). A mouse roll over of the readout provides the explicit notifier.
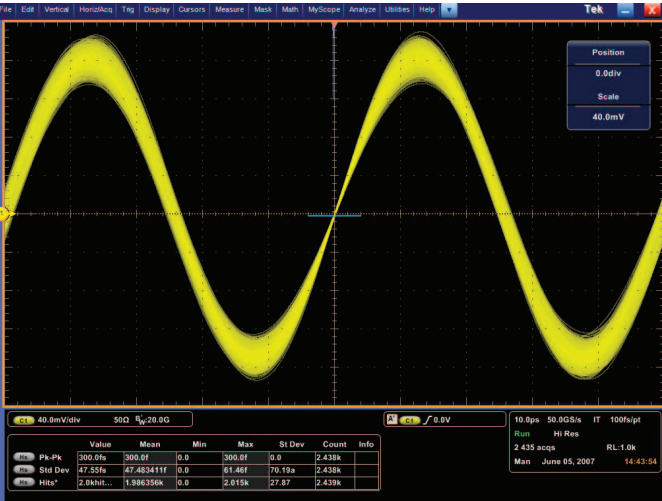
**Figure 18.** Trigger enhancement applied to a 20 GHz sinwave.

This enhanced trigger mode not only corrects the triggered waveform, and aligns it to the selected horizontal reference position, but also it adjusts the other channels relative to the triggered channel. It removes the trigger jitter of all signal edges and not just the triggered edge, leaving the uncorrelated noise among the channels. It positions the trigger event accurately in the waveform and on the display, relative to trigger level, vertical position/offset, horizontal position and manual deskew whenever the deskew amount combined with the horizontal position is within the record. It increases the sensitivity of the edge trigger up to the oscilloscope's maximum bandwidth, as high as 20 GHz on the DPO/DSA72004B oscilloscopes series for Positive/Negative/Either Slope Edge Trigger as shown on Figure 18. It works with almost all Pinpoint® trigger types except for Pattern or State triggers, i.e., it works for Edge, Glitch, Width, Timeout, Runt, State, Setup and Hold, Transition, Window Triggers. It also works when the these trigger types are selected in any combination for the A-Only (with or without Logic Qualification) or A- and B-Events (which means you can use **Trig After Time** and/or **Trig on nth Event)**. In addition to stabilizing noisy signals, you have the option to apply a low-pass filter to the trigger level crossing, by selecting the **Optimized for**

**Noisy Signals** checkbox. This feature is fully compatible with the following acquisition modes: sample, high Res, envelope, average, and FastFrame.

## Pattern Lock Triggering

The DPO7000 and DPO/DSA70000B oscilloscopes offer the choice of specialized triggering for serial data streams to help you identify particular events in real-time. Up to now, triggering on serial pattern is limited to 40 bit pattern and on serial streams of up to 5 Gb/s on 8b/10b encoded high speed serial data. With pattern lock triggering, high speed digital serial communication engineers can now analyze a serial digital pattern up to PRBS31-1 long on either NRZ or 8b/10b encoded serial data up to 6.25 Gb/s.

The table below shows the common test pattern lengths. Please note that only Tektronix can handle the gigabit long patterns that are the most challenging. Since these patterns are very long, post acquisition search with short record length will never find them no matter how long you wait.

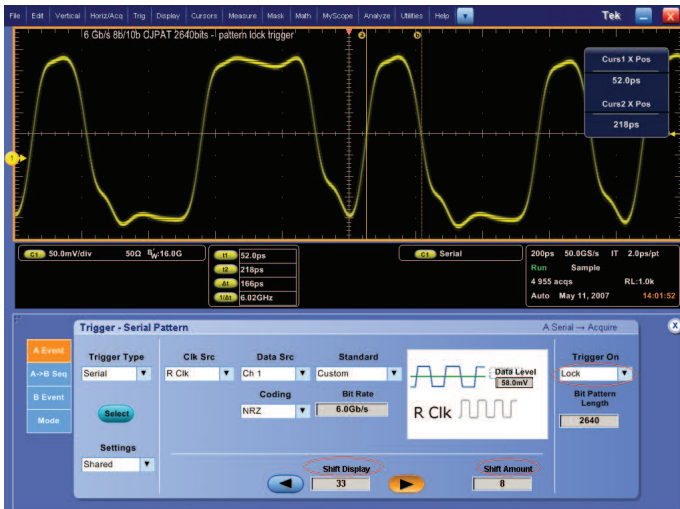| | |
|---|---|
| CJTpat | 2640 bits |
| PRBS7-1 | 127 bits |
| PRBS15-1 | 32,767 bits |
| PRBS23-1 | 8,388,607 bits |
| PRRBS31-1 | 2,147,483,647 bits |

**Figure 19.** Pattern lock may lock to any point in a SATA CJpat.

(shown in Figure 19) can also be invoked via right-clicking the mouse on the trigger readout at the bottom center of the display and selecting Trigger Type> Serial.

The Pattern Lock triggering feature allows you to analyze the captured pattern, by shifting the trigger position by increments of the Unit Interval. The **Shift Amount** field gives the increment value whereas the **Shift Display** field provides the total amount of shifts the trigger position has to be moved. The arrows on both sides of the Shift Display field perform the shift operation. This feature is standard on DSA70000B models, and is included as part of the extra-cost Option PTM on the DPO7000 Series and Option PTH on the DPO70000B Series.

Combining this triggering and the averaging acquisition mode, you can isolate the particular bit sequences that cause mask violations. You can also remove random noise and correlated jitter, and more clearly identify and evaluate deterministic effects such as dependent jitter and inter symbol interference. Averaging is not possible with conventional eye diagram analysis and it may be also too time consuming on long patterns if the sample rate is low. Tektronix' Pattern Lock can trigger on an event anywhere in a repeating pattern as long as 2,147,483,647 bits (PRBS31-1). It uses the recovered data clock edges or the external clock edges; however it cannot use data transition like the Serial Pattern triggering feature can, or cannot decode a specific serial pattern. This feature can be found via the **Trigger** pull down menu item by selecting **Serial Pattern Setup** or via the **Trig** button on the toolbar and selecting the **Trigger Type > Serial** on the left side of the control window. To enable the feature, you need to select **Lock** under **Trigger On > Lock**. This control window
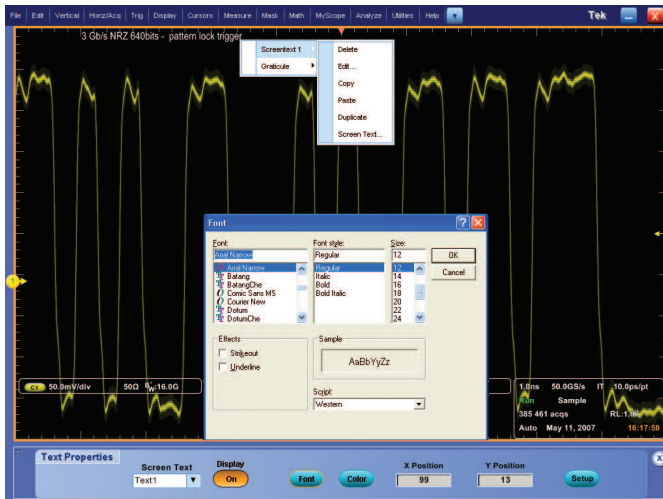
**Figure 20.** The right click for screen text that includes edit,
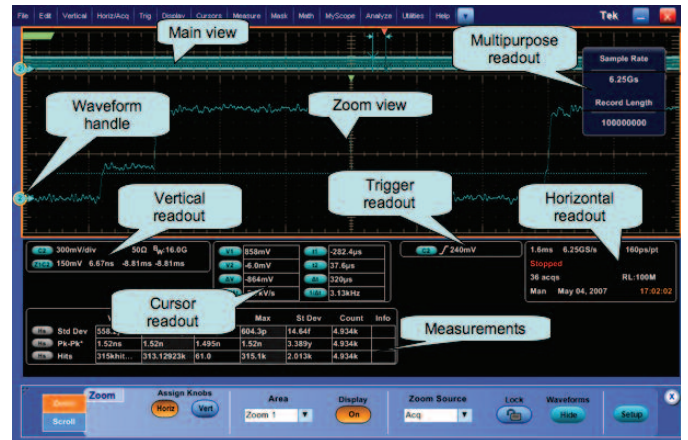duplicate, font type, size or color.



**Figure 21.** Context sensitive right click menus.

# Other Productivity Enhancement Tips

## More About Right Clicks

Crowded lab benches, carts and floor-standing oscilloscope locations can make it difficult to use a mouse. DPO7000 and DPO/DSA70000B embrace a touch screen operation as an efficient way to access all instrument features when a mouse is not available or not preferred.

Large, comfortable, precise Multi-purpose knobs merge the direct access of dedicated front-panel controls with the flexibility of the on-screen menus. It is easy to assign a value to a knob, hang your hand on top of the instrument and use your thumb to scroll through values while watching the display.

However, did you know you can access right click menu directly by touch screen too? Press lightly on the screen and a circle will be drawn around the location where the screen was touched and the right click menu associated with that location will appear.

How do you get the most out of your Tektronix performance oscilloscope?

Application Note

Figure 22. The arrows allow navigation between control windows.



**Figure 23.**
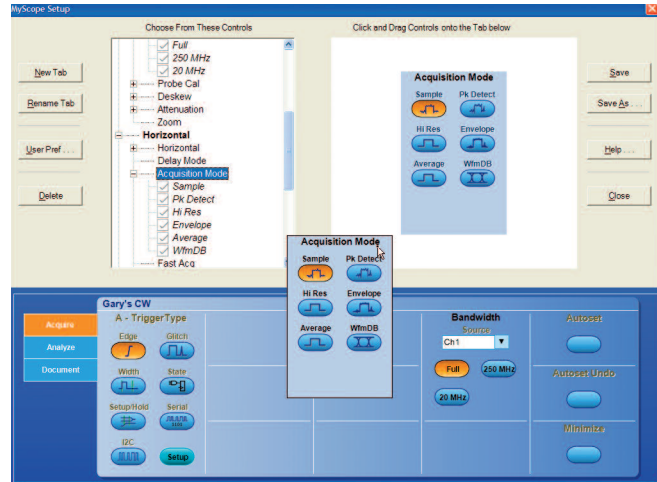The control window handle.



Figure 24. MyScope customized window.

you to put together all the necessary menu items you need

## More About Control Window Navigation

Some users may prefer web browser-style navigation. You can move through recently used control windows with one click. For Window-to-window navigation, click on the forward or back buttons (arrow icons) shown at the right-hand side of the control window, as shown in Figure 22.

## More About Moveable GUI Items

Both the control windows and the Multi-purpose knob readouts now have a handle on the top left corner that you can grab to move the windows in the display - even to an external display monitor. This handle is shown in Figure 23. When you double click on the handle, the window goes back to its default position.

## MyScope Customizable User Interface

MyScope® is a feature which allows you to very quickly create your own control window and save it outside of the scope applications. This control window can be used on all DPO7000 and DSA/DPO70000B models. MyScope allows

to perform your job efficiently. "MyScope Functionality Makes it Your Oscilloscope" (55W-17152-X) is a brochure which extensively describes this feature, which can be found on www.tek.com.

## Conclusion

This application note demonstrated some important signal acquisition and usability features that you can take advantage of to achieve quicker results and be more effective, whether you design serial data communication (high-speed or low-speed) systems, or work on embedded digital, or digital video designs.

Using the DPO7000 or the DPO/DSA70000B oscilloscope series, you can build your confidence and confirm you've done your tasks correctly by visualizing the key signals of your design and their relative time relationship, and also by making sure these signals are clean and don't carry crosstalk interferences or any other kind of imperfections. Now tasks like waveform visualization, validation or debugging will become fairly straightforward. Overall you will become more accurate in your schedule prediction and commitment.

## Contact Tektronix:

ASEAN / Australasia  (65) 6356 3900

Austria  +41 52 675 3777

Balkans, Israel, South Africa and other ISE Countries  +41 52 675 3777

Belgium  07 81 60166

Brazil  +55 (11)  40669400

Canada  1 (800) 661-5625

Central East Europe, Ukraine and the Baltics  +41 52 675 3777

Central Europe & Greece  +41 52 675 3777

Denmark  +45 80 88 1401

Finland  +41 52 675 3777

France  +33 (0) 1 69 86 81 81

Germany  +49 (221) 94 77 400

Hong Kong  (852) 2585-6688

India  (91) 80-42922600

Italy  +39 (02) 25086 1

Japan  81 (3) 6714-3010

Luxembourg  +44 (0) 1344 392400

Mexico, Central/South America & Caribbean  52 (55) 54247900

Middle East, Asia and North Africa  +41 52 675 3777

The Netherlands  090 02 021797

Norway  800 16098

People's Republic of China  86 (10) 6235 1230

Poland  +41 52 675 3777

Portugal  80 08 12370

Republic of Korea  82 (2) 6917-5000

Russia & CIS  +7 (495) 7484900

South Africa  +27 11 206 8360

Spain  (+34) 901 988 054

Sweden  020 08 80371

Switzerland  +41 52 675 3777

Taiwan  886 (2) 2722-9622

United Kingdom & Ireland  +44 (0) 1344 392400

USA  1 (800) 426-2200

For other areas contact Tektronix, Inc. at: 1 (503) 627-7111

Updated 30 October 2008

**For Further Information**
Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit www.tektronix.com

**Tektronix**®

Enabling Innovation