

Analyze Data Faster with Dual Display Support



► Introduction

Whether troubleshooting digital circuits for timing problems, or verifying products under development, examining today's high-speed circuits can be a daunting task. A dual display system makes the job easier.

It is important that designers have access to the best debugging tools and that they use them to capture and analyze problems in the most effective way possible. A logic analyzer is a key debugging tool. When choosing a logic analyzer, it is common to consider factors such as channel width and memory depth, sampling rate, and probe capacitance. Less commonly considered, but also important, is the usability of the user interface. Ultimately the designer is part of the verification and debugging system so the user interface should be flexible and easy to use. Dual display support is one way that Tektronix Logic Analyzers (TLA) help to provide breakthrough real-time digital systems analysis. With enhanced display capabilities, it becomes easier to capture and display elusive faults, and to literally "see" more data. Once a problem has been identified and qualified, the design engineer can pursue a solution. For design teams who need to debug and verify their product designs, TLAs provide breakthrough features that control, capture, analyze, and display the real-time behavior of digital systems operation.

Advantages of dual display system

A dual display system offers greater display area with greater flexibility than the standard single display approach. Dual display enables you to find the cause of elusive problems quickly. Simply put, you can't solve what you can't see.

The amount of additional screen space generated by a second monitor is surprising; for example, two 15" monitors have more display area than a single 21" monitor. More display area means more computer desktop workspace, allowing more data to be viewed at once. Also, it allows the use of multiple tools to be more effective. You can open more windows, or view a single window as a larger display. The extra display area is flexible and can be used however is most useful for the engineer.

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Dual Display Applications

- Multiple Channel Viewing: You can display more than 150 waveform channels simultaneously, a single screen can span multiple monitors.
- View output from multiple TLA modules independently such as data from a logic analyzer and an oscilloscope.
- Multiple Data Set Comparison: This can be useful at beginning and end of memory, or to have two listing windows. Use the logic analyzer with a debugger, and view both simultaneously.
- Source Code Debug: View software source code on one display and view the real-time software execution listing on the other.
- View output from the TLAPG2 Pattern Generator in one window and operate the TLA in another.
- Self Instruction: View TLA help on one display and TLA data on the other.

In addition to the increased display area, the workspace of a dual display system is more efficient. In the Windows environment, many software applications are designed to work best when in full screen mode. That implies maintaining a 4-to-3 size ratio for the window. When trying to work with multiple windows open at the same time, keeping the windows sized to the appropriate ratio produces dead areas of unutilized space, decreasing the displays' effective area. A dual display system

avoids this problem by allowing two applications to be open at full screen, one on each display. This makes multitasking easier and enables utilization of the full display area without any wasted space.

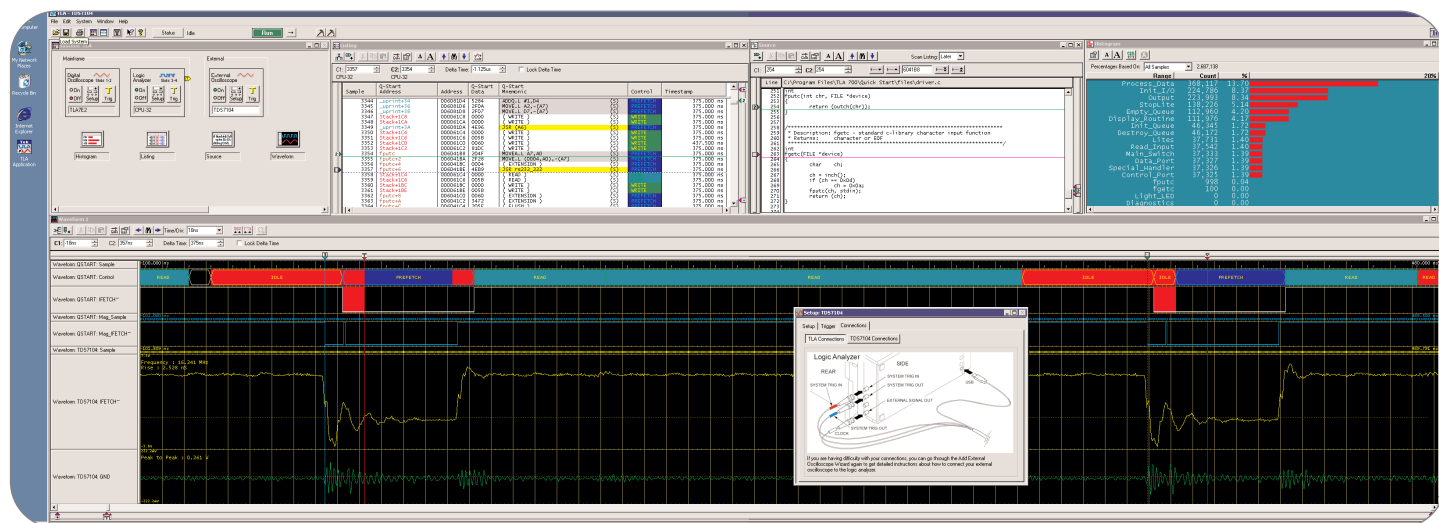
The display adapter(s) used in the TLA715/721 Logic Analyzers allow up to 1600x1200 resolution on both the primary and the secondary display. Support of such a high resolution permits full utilization of the power of dual display. The TLA715/721 optional 21" flat-panel monitors can pivot, rotating 90° to make the long axis vertical rather than horizontal. This facilitates the display of long vertical windows such as a listing and source code windows, or large numbers of waveforms.

Also, a dual display system is financially feasible. Small monitors cost less than large ones, and many organizations have surplus smaller monitors that can be put into useful service as a secondary monitor. For example, two 15" monitors have slightly more display area than a single 21" monitor but cost about half as much together.

TLA715/721 Setup and Configuration Instructions

Setting up dual displays is simple and uses Windows 2000 Professional standard display controls.

First, connect the monitor(s) to the TLA715/721. The logic analyzer has two places to plug in a monitor, labeled "Primary Video" and "Secondary Video". They can be found on the rear panel of the



► Figure 1: TLA715/721 Dual display screenshot (3200 x 1200). Screen captures of dual displays are a single, unbroken graphic.

TLA715 Portable Mainframe system, and on the front of the TLA721 Benchtop Mainframe. As suggested by its name, the Primary Video is utilized by Windows first. If you have not yet configured the system for dual display operation, the Primary Video will be the only one that functions on power up.

After the system power-on, go to the Display Properties menu. It can be found through Start -> Control Panel -> Display. Alternatively, you can right-click on the desktop and choose properties to get to this menu. This menu allows you to control many aspects of your display. Go to the "Settings" tab, and you will see two rectangles with numbers in them representing the two displays. You can choose which display you are adjusting the settings for by clicking on it so that it is highlighted by the blue border. Any changes you make on this menu will affect only the highlighted display.

Due to the unique architecture of the TLA715/721, the way in which Windows recognizes the display adapters is not typical to most Windows systems. Although it seems counterintuitive, the Primary Video is labeled as Monitor #2 in the display properties, while the Secondary Video is Monitor #1. If there is ever any doubt about which one is which, clicking the Identify button on the Display Properties Menu will display a large number on each screen corresponding to its display number.

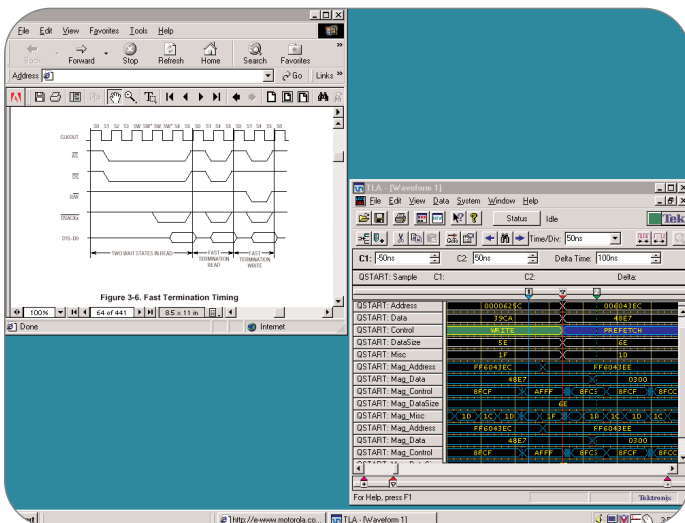
Enabling the secondary display is the next step. Click on the monitor icon labeled 1 and select the checkbox "Extend my Windows desktop

onto this monitor." That will enable the secondary display adapter, and your monitor will activate. The Identify button should now show the appropriate display number on both monitors.

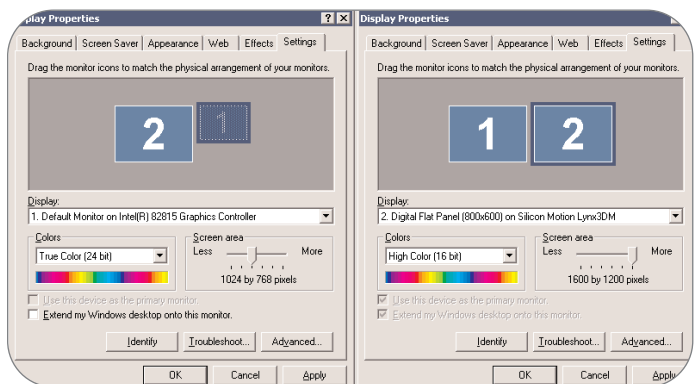
If Windows does not recognize your specific make and model of monitor, you may want to configure the display adapter. Click on one of the display icons to select that particular display. Then click Advanced -> Monitor -> Properties -> Driver -> Update Driver. This will initiate the "Upgrade Device Driver Wizard." Follow the instructions and specify the details about your monitor.



► **Figure 3:** TLA715 with internal display and TLA721/7XM with optional dual 21" flat-panel monitors.



► **Figure 2:** 4 x 3 Size ratio maintenance fails to fully utilize desktop workspace when two software applications are used at the same time.



► **Figure 4:** Display Properties Menu in the TLA715/721: In the left screenshot, the Secondary Display (#1) is selected but inactive. Secondary Display is set at lower resolution than Primary so it is shown smaller. In the right screenshot, the Primary Display (#2) is selected and is now physically to the right of the Secondary Display which is operating in the same resolution as the Primary.

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You can also control the display resolution and color rendering from this menu. In general, you want to use the highest resolution and most colors possible for your display without degrading the image quality. Usually this is determined by trial and error. The display will revert to the previous mode in 15 seconds if you do not accept the changes, so there is no risk with experimenting. Notice how the monitor icon changes size to reflect its screen resolution.

Now that you have both displays configured and working, you need to duplicate the physical arrangement of the monitors in this menu so that when you move your mouse off the side of one monitor it shows up in the expected location on the other monitor. This is done by left clicking on a monitor and dragging it to the appropriate location. Notice how the monitor icon moves to reflect its new relationship to the other monitor.

The Lynx3DM primary display adapter used in the TLA715 Logic Analyzer was initially designed for laptop computers, and contains special features that are independent of standard Win2000 display controls. These features are accessed through their own menu, which can be found at Display Properties -> Settings -> Advanced -> Lynx3DM. This choice will not be visible if you have the secondary display adapter selected. These special modes are also unavailable to users of the TLA721 Benchtop Mainframe, which has no internal LCD display.

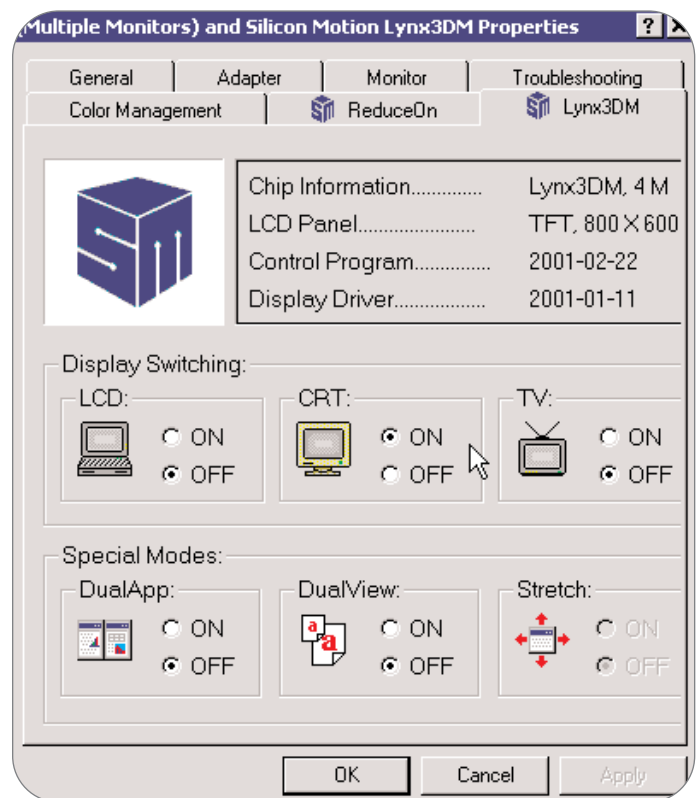
The Lynx3DM Display Switching function allows you to control which monitors are driven by the primary display adapter. The LCD refers to the TLA715's internal LCD monitor, the CRT refers to the external monitor, and the TV function is not supported. If the internal LCD is selected, the resolution displayed on the screen(s) will be limited to 800 x 600. If you set your display to higher resolution, you will see a 800 x 600 "window" into the large virtual display. You can scroll the screen around the larger scale display by trying to move the mouse off the edge of the screen.

The special modes section is only functional at 800 x 600 or lower resolution and will otherwise be grayed out and inaccessible. Make sure your resolution is properly configured, then examine some of the features offered by special modes.

Under normal conditions, both displays attached to the primary display adapter will have the same display. The Lynx 3DM's DualApp feature is a mode that allows you to have different applications open on the

internal LCD and external monitor. To enable DualApp, you will first need to open up two different applications at once. Then click the "on" button under DualApp and a dialog box will appear. It allows you to choose the physical orientation of the monitors and which application to display on which monitor. These applications are fixed in each display so are not as flexible as the standard Windows system. However, Dual App allows you to have three separate displays functioning at once (internal LCD and 2 external monitors).

Another useful feature is DualView. This allows you to display a subsection of the main display at full screen on the second display. This works like a magnification function, allowing you to see a particular area of detail in very large display. To enable DualView, click the button to "on" and follow the instructions. You will be prompted to designate the area of the screen for magnification, and also which display will show the magnified view.



► **Figure 5:** Lynx3DM Menu: Allows control of special features on the TLA715's primary display adapter.

Stretch mode is only functional at resolutions below 800 x 600. It allows you to stretch the smaller display to fill the full size of the screen. This is primarily useful when dealing with older software that has a fixed display size of 640 x 480.

The TLA715/721 also supports Simulscan technology which allows the primary display adapter to power both the internal LCD display and external display immediately on boot. Normally, the default is to an external display if one is detected, otherwise to the internal display. Simulscan is enabled in the BIOS, which can be accessed during boot by pressing F-2 when prompted. Using the arrow keys to navigate, and the +/- keys to change values, select Advanced -> Silicon Motion Simulscan -> change to Enable. After making any changes to the BIOS, press F-10 to save and exit changes. The system will reboot and power both primary displays.

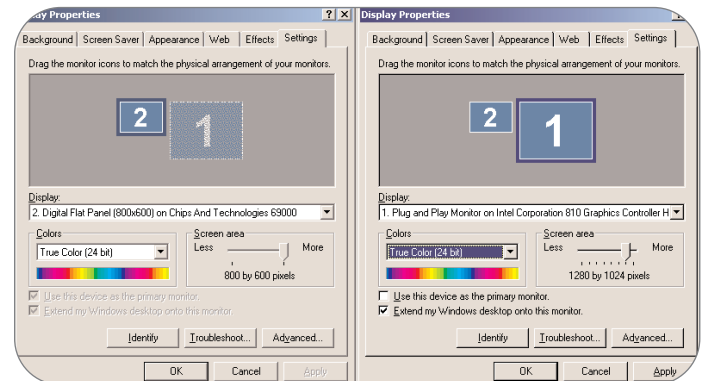


► **Figure 6:** TLA612 with optional 18" 1280 x 1024 flat-panel monitor and internal 800 x 600 display.

TLA61X/62X Setup and Configuration Instructions

The TLA61X/62X Logic Analyzers are similar to the setup and configuration of the TLA715/721 but with a few exceptions. The TLA61X/62X can only support one external monitor at up to 1280 x 1024 resolution in addition to the internal 800 x 600 flat-panel display. Each display has its own independent display adapter and it is not possible to have both monitors display the same information.

There is also no support for the special features associated with the Lynx3DM which is only used in the TLA715/721. There is a similar menu to the Lynx3DM called CHIPS on the TLA61X/62X. Although it indicates that it is possible to use both monitors from the primary display adapter, that functionality is not supported by the hardware. The only logical choice for Display Device button is LCD. Choosing CRT will cause the screen to go blank, as the display adapter tries to send its signal to a device that does not exist.



► **Figure 7:** Display Properties Menu in the TLA61X/62X: In the left screenshot, the Primary Display (#2) is selected. The Primary Display is set at lower resolution than Secondary, hence it is shown smaller. In the right screenshot, the Secondary Display (#1) is selected, active, and is operating at a higher resolution.

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Comparison of Features between TLA715/721 and TLA61X/62X

TLA715/721

	Display Adapter	Display Properties Designation	Display Hardware	Maximum Resolution
Primary Display	Silicon Motion Lynx3DM	Monitor #2	Internal Flatscreen (if present) and External Monitor	800 x 600 with Internal LCD Display, 1600x1200 with external monitor
Secondary Display	Intel® 815	Monitor #1	External Monitor	1600 x 1200

TLA61X/62X

	Display Adapter	Display Properties Designation	Display Hardware	Maximum Resolution
Primary Display	Chips and Technologies 69000	Monitor #2	Internal Flatscreen LCD Display (if present)	800 x 600 with Internal LCD Display
Secondary Display	Intel® 810	Monitor #1	External Monitor	1280 x 1024

Advanced Tricks

Once you've got your system set up with dual displays, you will probably find many uses for the enhanced arrangement. There are a few tips.

1: Create a second taskbar for your second display which is useful for storing shortcuts to frequently used programs.

The toolbar requires a location to reference, so create a new folder on your hard drive. Then right-click on the taskbar and choose Toolbars -> New Toolbar and when prompted for a location point to the folder that you created. After you've created the toolbar, it will appear by default as a new section on your existing taskbar. Drag-click it out of the taskbar and onto the desktop, then drag it over to the secondary display. If you move it close to the edge of the screen it will snap to a edge-hugging form like the main taskbar.

2: Set your displays in different screen resolutions for different purposes.

Normally, if you have two displays that are the same size, you would have them operating in the same screen resolution so that the icons and scale would be the same size. However, if you want to see a particular window in larger scale, you can lower the resolution on one of

the displays and place the window of interest into it. It's easy to do and undo; just go to your display properties menu and adjust the resolution of the displays.

3: Use more than two displays, use as many as five!

Although we have been discussing the advantages of dual displays, it is possible to use up to five displays. You can do this by placing video cards in the two PCMCIA slots of the TLA715/721. This has been tested with the "Display-to-Go™ 4MB" card from Margi (www.margi.com). The results are amazing, showing a wall of monitors all part of one large composite display.

Conclusion

Dual displays are one way that Tektronix logic analyzers provide enhanced usability in real-time digital systems analysis. With enhanced display capabilities, it becomes easier to capture and display elusive faults. Once a problem has been identified and qualified, a solution to it can be pursued. For design teams who need to debug and verify their product designs, the Tektronix Logic Analyzers provide breakthrough features that control, capture, analyze, and display the real-time behavior of digital systems operation.

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