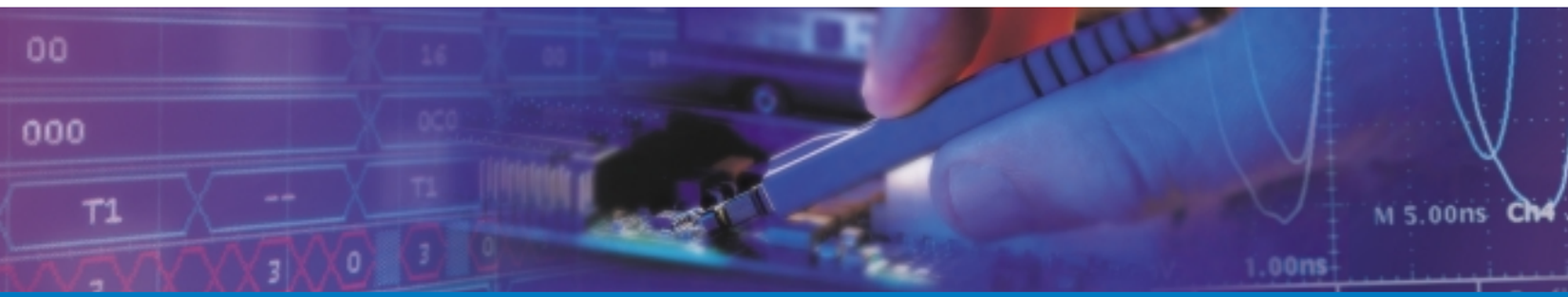
Tektronix Logic Analyzers

Breakthrough Real-time Digital Systems Analysis



Tektronix®

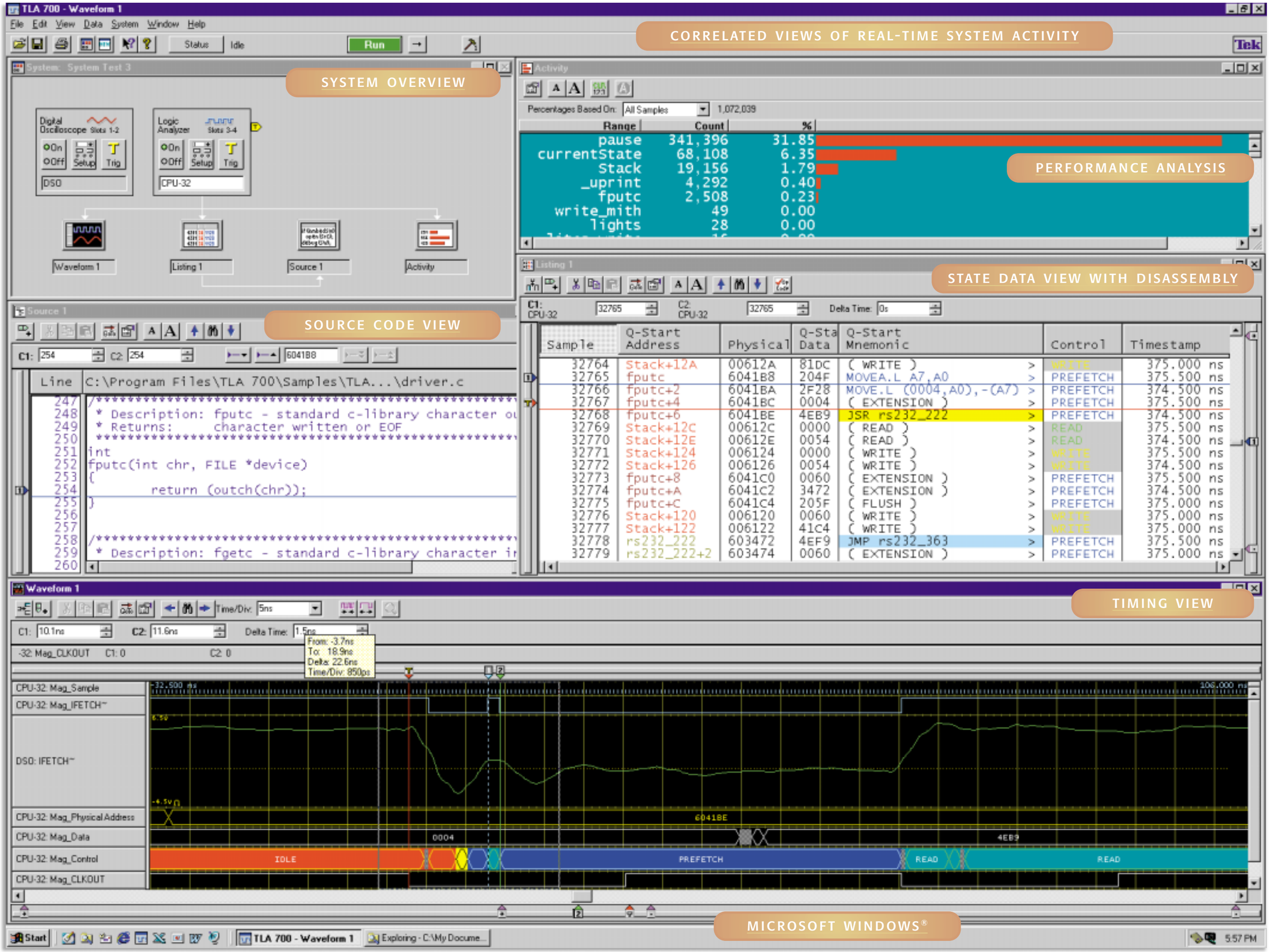
It's simple: Tektronix logic analyzers let design engineers see problems so they can solve them.

With today's microprocessor speeds, problems are more elusive than ever. And only the TLA's breakthrough technology delivers the sampling and acquisition speeds for accurate logic design.

Just When Digital Design Challenges Are Most Elusive . . .

Tektronix Helps You See Them Clearly, in Real-Time.

Whether you're a hardware developer, hardware/software integrator or embedded software developer, Tektronix logic analyzers give you valuable insights into your system's real-time behavior from every angle. With today's tight time-to-market and competitive pressures, Tektronix provides you with the solutions you need, when you need them.


TLA 700 - Waveform 1
File Edit View Data System Window Help
Status Idle
Run
Tek
CORRELATED VIEWS OF REAL-TIME SYSTEM ACTIVITY
System: System Test 3
SYSTEM OVERVIEW
Digital Oscilloscope Slots 1-2
Logic Analyzer Slots 3-4
On Off Setup Trig
DSO
CPU-32
Waveform 1
Listing 1
Source 1
Activity
Activity
Percentages Based On: All Samples 1,072,039
Range Count %
pause 341,396 31.85
currentState 68,108 6.35
Stack 19,156 1.79
_uprint 4,292 0.40
fputc 2,508 0.23
write_mith 49 0.00
lights 28 0.00
PERFORMANCE ANALYSIS
Source 1
SOURCE CODE VIEW
C1: 254 C2: 254 604188
Line C:\Program Files\TLA 700\Samples\TLA...\driver.c
247 /*
248 * Description: fputc - standard c-library character ou
249 * Returns: character written or EOF
250 */
251 int
252 fputc(int chr, FILE *device)
253 {
254 return (outch(chr));
255 }
256
257
258 /*
259 * Description: fgetc - standard c-library character in
260
Listing 1
STATE DATA VIEW WITH DISASSEMBLY
C1: CPU-32 32765 C2: CPU-32 32765 Delta Time: 0s
Sample Q-Start Address Physical Q-Sta Data Q-Start Mnemonic Control Timestamp
32764 Stack+12A 00612A 81DC (WRITE) > WRITE 375.000 ns
32765 fputc 6041B8 204F MOVEA.L A7,A0 > PREFETCH 375.500 ns
32766 fputc+2 6041BA 2F28 MOVE.L (0004,A0),-(A7) > PREFETCH 374.500 ns
32767 fputc+4 6041BC 0004 (EXTENSION) > PREFETCH 375.500 ns
32768 fputc+6 6041BE 4EB9 JSR rs232_222 > PREFETCH 374.500 ns
32769 Stack+12C 00612C 0000 (READ) > READ 375.500 ns
32770 Stack+12E 00612E 0054 (READ) > READ 374.500 ns
32771 Stack+124 006124 0000 (WRITE) > WRITE 375.500 ns
32772 Stack+126 006126 0054 (WRITE) > WRITE 374.500 ns
32773 fputc+8 6041C0 0060 (EXTENSION) > PREFETCH 375.500 ns
32774 fputc+A 6041C2 3472 (EXTENSION) > PREFETCH 374.500 ns
32775 fputc+C 6041C4 205F (FLUSH) > PREFETCH 375.000 ns
32776 Stack+120 006120 0060 (WRITE) > WRITE 375.000 ns
32777 Stack+122 006122 41C4 (WRITE) > WRITE 375.000 ns
32778 rs232_222 603472 4EF9 JMP rs232_363 > PREFETCH 375.500 ns
32779 rs232_222+2 603474 0060 (EXTENSION) > PREFETCH 375.000 ns
Waveform 1
TIMING VIEW
Time/Div: 5ns
C1: 10.1ns C2: 11.6ns Delta Time: 1.5ns
From: -3.7ns
To: 18.9ns
Delta: 22.6ns
Time/Div: 850ps
-32 Mag_CLKOUT C1: 0 C2: 0
CPU-32 Mag_Sample
CPU-32 Mag_IFETCH~
DSO: IFETCH~
CPU-32 Mag_Physical Address
CPU-32 Mag_Data
CPU-32 Mag_Control
CPU-32 Mag_CLKOUT
-32.500 ns
106.000 ns
6041BE
0004
4EB9
IDLE
PREFETCH
READ
READ
MICROSOFT WINDOWS®
Start
TLA 700 - Waveform 1
Exploring - C:\My Docume...
5:57 PM

Breakthrough Real-time Digital Systems Analysis

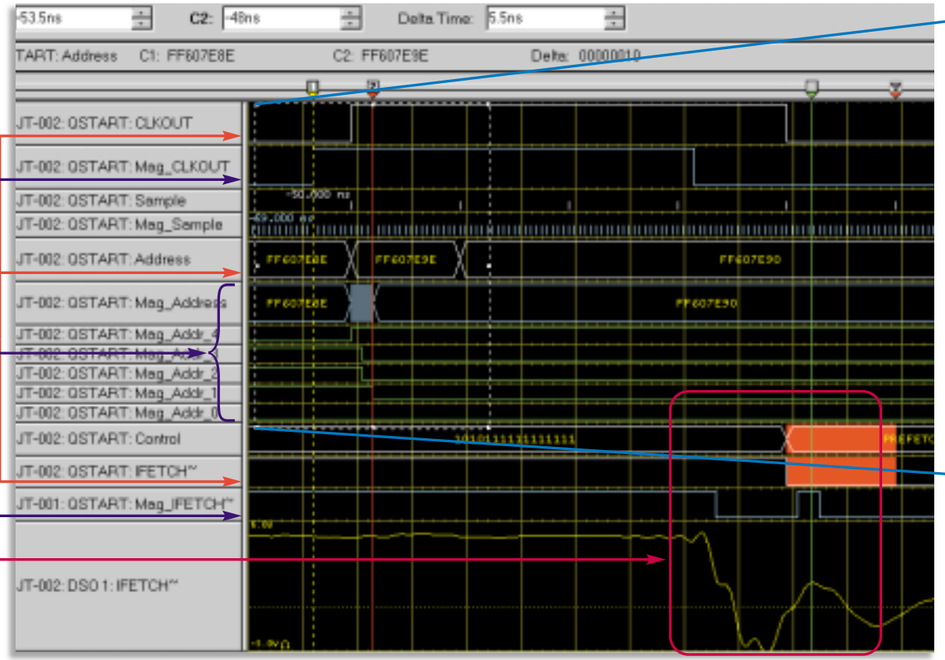
Whether you're an engineer debugging discrete digital logic or a large team debugging a complex system of multiple processors and buses, the Tektronix TLA family of logic analyzers is the solution for your every task.

Since its inception, Tektronix has enhanced and expanded the TLA family to maintain our leadership in helping you capture elusive hardware and software faults, regardless of the size of your design project. These breakthrough logic analyzers feature powerful state-based triggering plus the ability to simultaneously acquire 2 GHz timing data and 200 MHz state data through the same probe. This means you can debug complex code sequences and analyze the code's interaction with the hardware components.

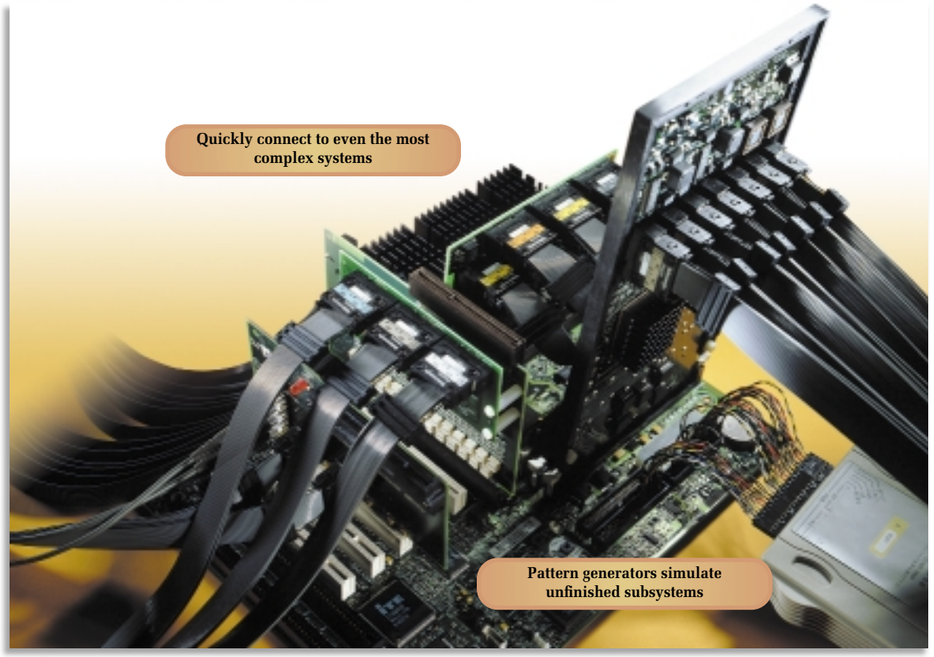
TLA instruments maintain the integrity of the system you're analyzing with low 2 pF probing. As Microsoft® Windows®-based platforms, TLA logic analyzers increase your productivity with a quick learning curve, off-the-shelf network connectivity and a readily available array of design and productivity tools to greatly shorten your time-to-market requirements.

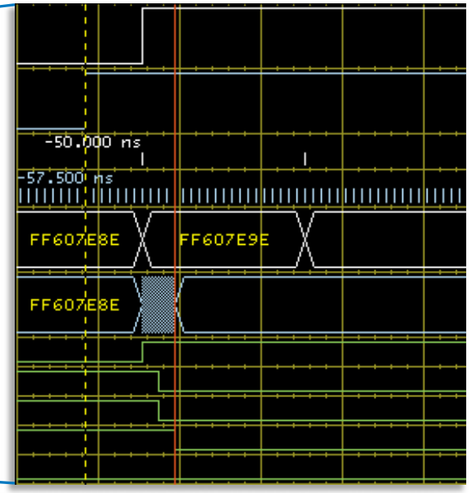
Tektronix

See Clearly What Your Hardware Design is Actually Doing



- 4 ns timing resolution
- 500 ps timing resolution
- Easily identify glitches and their causes





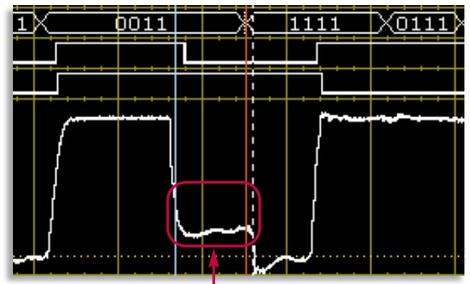
Timing Resolution

Whether you are debugging a high-performance computer or part of an embedded system, the timing parameters of your design demand sub-nanosecond resolution to make useful timing measurements. Logic analyzers that only offer 4 ns timing resolution are simply not adequate to capture the problem. Nobody wants to trade off channels for resolution, buy separate timing modules or trade up to more expensive hardware to get the resolution today's designs require. The TLA family with MagniVu™ acquisition provides 500 ps timing resolution on every channel of every model.

Find Digital Signal-Quality Problems

Faster edge speeds and tighter timing margin are creating more signal-quality issues than ever before. Overshoot, ringing, crosstalk, reflections and ground bounce can cause glitches and intermittently alter the timing of otherwise stable signals.

Adding a digitizing oscilloscope module to your TLA system provides up to 1 GHz analog signal bandwidth, along with the hundreds of logic signals you are already monitoring. Since data acquired by all modules is automatically correlated, you can easily observe the quality of critical signals along side the original behavior they affect.



- Reveal bus contentions

Probing Solutions

If you are building high-density test connectors into your verification platform, using a configured probe adapter for popular microprocessors or buses or just hooking up signals as you need more visibility, Tektronix has the probing solution. With three probe configurations fully compatible and interchangeable on all TLA models, you can easily choose the optimum combination for your application.

Stimulus for Functional Verification

System verification often requires you to stimulate your designs with ideal or faulty digital patterns. The TLA pattern generator controls your circuit at full speed or steps through individual states. With the combination of logic analyzer and pattern generator modules, you can control and monitor system real-time operation.

CONNECT/SETUP

- 2 pf or less loading for all logic and scope probes
- High-density 34-channel probes for quick setup
- Individual probe leads for difficult connections
- Adapters for popular processors and buses

CAPTURE

- 500 ps timing resolution on every logic channel
- 200 MHz state clock rate and 400 MHz data rate
- Simultaneous state and timing analysis on all channels of every model
- Trigger on setup and hold violations and on glitches
- 1 GHz, 5 GS/s digitizing oscilloscope modules

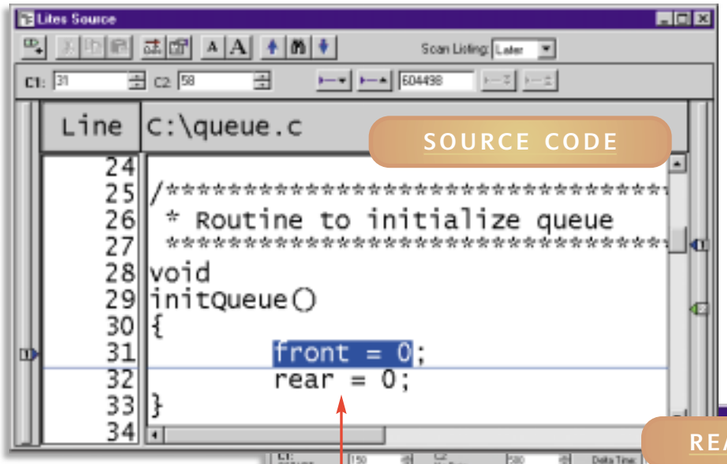
ANALYZE

- Data from all modules is automatically correlated
- All data is timestamped
- No skew between state and timing data
- Highlight comparison differences
- Pattern Generator modules provide stimulus

DISPLAY

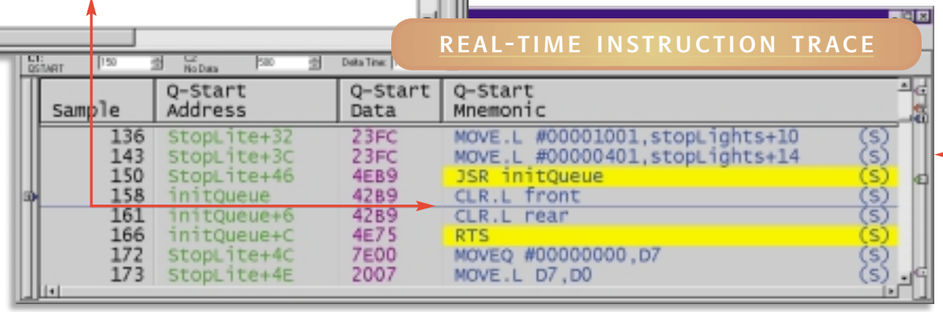
- Entire bus values shown as bus forms with symbols
- Drag-n-click zoom
- Copy and paste images of displayed data directly into your favorite word processor

Find and Analyze Your Elusive Real-time Software Problems



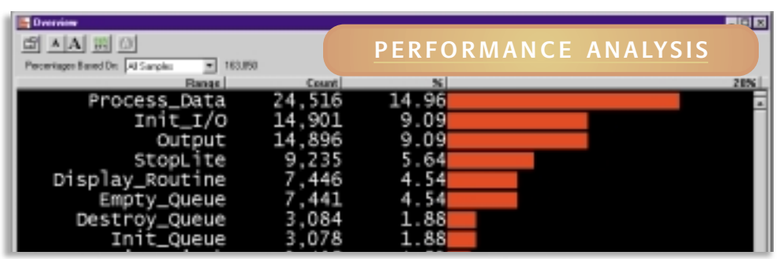
Source Code Debugging

Tektronix logic analyzers provide real-time debug visibility by capturing non-intrusive instruction execution and system signals. This maximizes source code debugging productivity by linking the source code to instruction trace history, which is also correlated to system hardware signals.



Real-time Instruction Trace

TLA software includes disassembly capability for analyzing every bus transaction and determining what instructions were read across the bus, then places the assembly mnemonic in the display with the associated address. This disassembly display enables you to view the data at different levels of abstraction. The state display provides a view of raw hex data. The hardware display shows every bus cycle type with instructions. The software display filters out the non-instruction cycles. The flow control shows only instructions that cause a change in the program flow, and the subroutine display shows only the entry and exit points to subroutines.

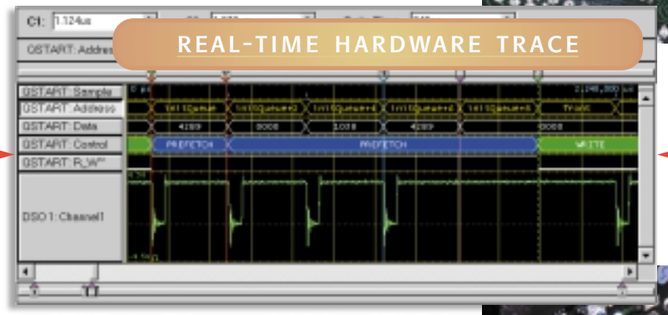


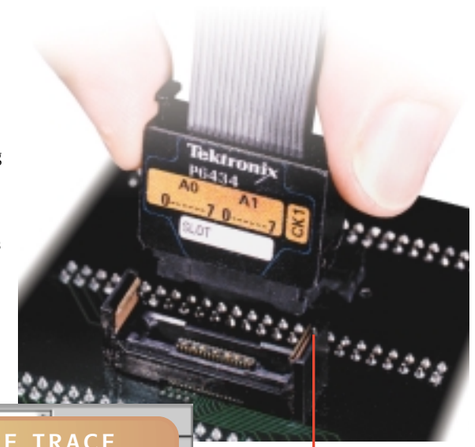
System Performance Analysis

Non-intrusively monitor, capture and analyze the system's real-time software and hardware performance. Using the performance analysis tool, you can quickly identify software and hardware areas to be optimized.

Processor Support

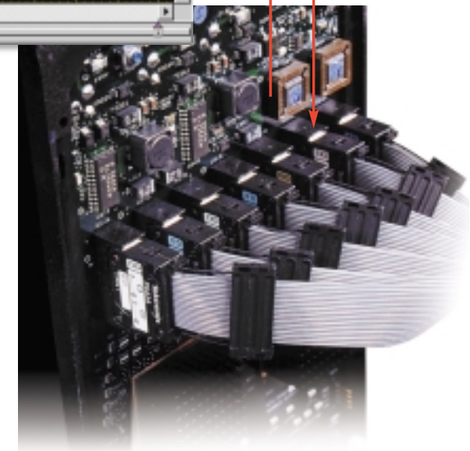
TLA processor support provides you with an easy-to-use acquisition and analysis package. The software automatically sets up the TLA, including assigning channels and programming the clocking state machine for your particular processor. This allows the TLA to acquire every bus cycle in real-time without interfering with full-speed operation of the processor bus. Many of the support packages provide a probe adapter using the Tektronix P6434 high-density probe to connect to the processor or bus being analyzed. The P6434 provides quick connection to 34 channels and eliminates human error when connecting to many individual channels.





Real-time Correlation to Hardware

With the TLA's time stamp always running, every acquisition and every bus cycle has a unique 500 ps time stamp associated with it. Because of this capability, the TLA 700 Series provides precision time correlation across ALL the modules in the TLA 700 system, even across expansion mainframes. This allows you to see how the event on one bus affects the operation of another bus in the system.



Tektronix Embedded Systems Tools Partners

Over 20 industry leading Embedded Systems Tools Partners deliver a wide range of development and debug solutions that work with Tektronix logic analyzers. Software development tools such as software debuggers and emulators running on the TLA logic analyzer provide you with complete system control and insight critical to verifying, debugging and optimizing your system.

CONNECT/SETUP

- Low 2 pF probe loading
- Processor/bus setups
- Custom probe adapters
- Network access to source files

CAPTURE

- 16 M deep real-time instruction trace
- Multiple processor/ bus acquisition
- Powerful triggering
- Data storage qualification

ANALYZE

- Real-time instruction operation linked to source code
- Assembly code as executed in real time
- Code execution correlated to real-time events
- Correlated multiple processor and data buses
- Intelligent disassembler listing
- Error-pattern search
- Real-time performance analysis

DISPLAY

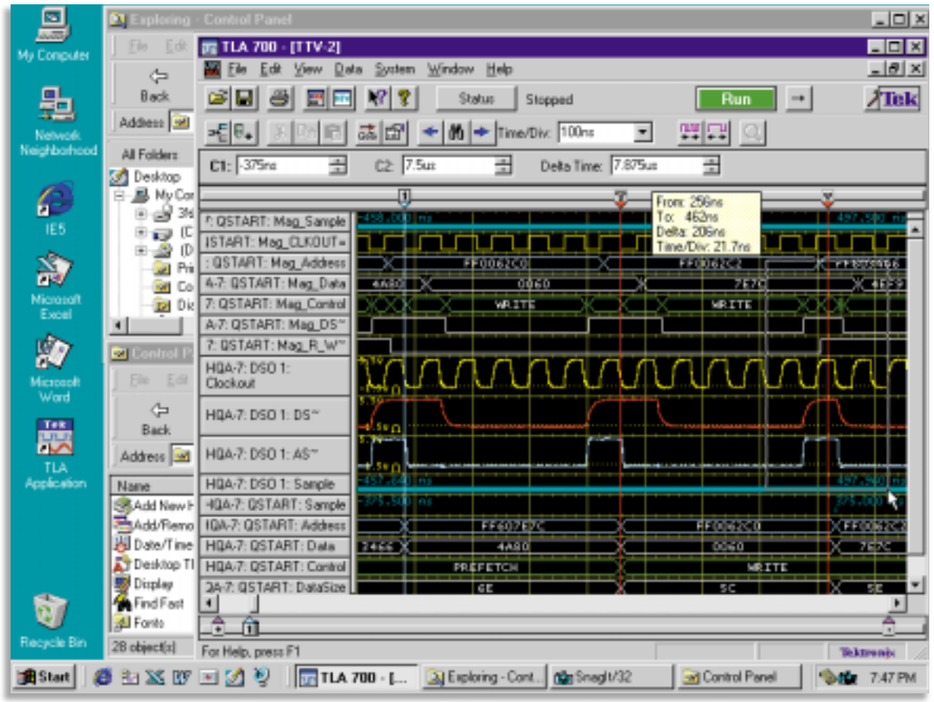
- Waveform, listing, source, magnitude, histogram windows
- Multiple correlated windows
- Symbolic notation support from compilers
- Disassembler color highlighting

Enhance Productivity Through Familiarity, Connectivity and Modularity

Familiarity

Work in a familiar, open and connected environment with the Microsoft Windows® operating system, the platform upon which the entire TLA family is based.

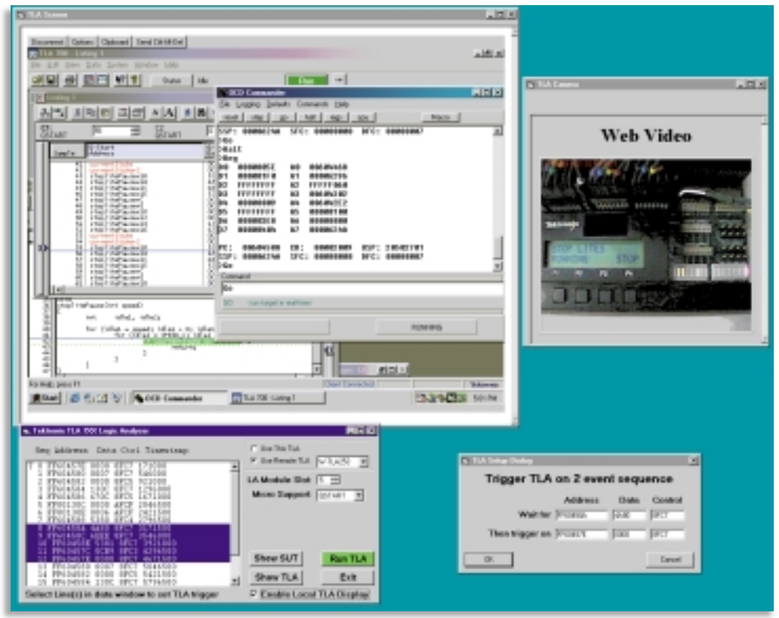
- TLA applications operate like any other PC application
- Zoom box cursor readouts provide you with precision measurements
- Familiar Microsoft Windows toolbar and desktop



Remote Operation

You can remotely operate the TLA user interface from another Windows or UNIX workstation, and customize the TLA user interface to fit your working style.

- Control your TLA remotely using a Web browser.
- Develop your own custom tools that access TLA data using the TLA Programmatic Interface (TPI) based upon Microsoft COM/DCOM.
- Remotely view your target system operation across the network using a Webcam from the comfort of your office.



Connectivity and Modularity

All models of the TLA family come standard with an internal CD-ROM, hard disk and PC card slots for expansion, such as for a LAN connection. Other industry-standard PC connections include SVGA, printer, serial, USB, mouse and keyboard. Trigger in/out connections provide an interface to other external instrumentation for coordinating measurement results.

The replaceable hard-disk is standard on the TLA 700 Series, ideal for security or enabling individual team members to store personal setups and data.

The TLA 700 Series is card-modular so you can configure the number and type of logic analyzer, pattern generator or digitizing oscilloscope modules to meet your requirements.

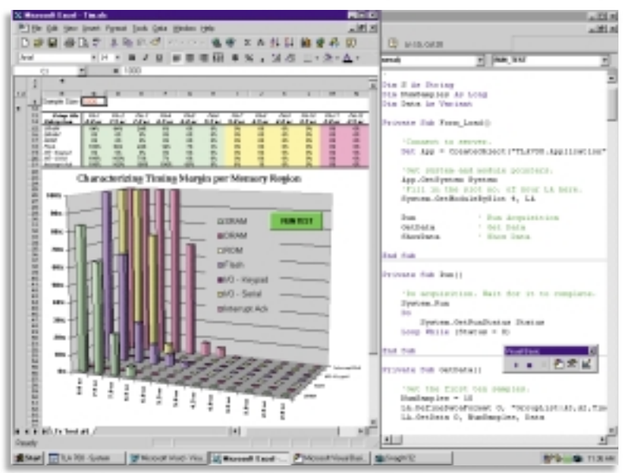
TLA 7QS QuickStart training package shows you how to quickly become productive with your TLA logic analyzer.

Expandable to Meet Future Needs

A variety of flexible methods, such as new products, field upgrade kits and special programs are available to enhance the measurement capabilities of your TLA.

Advanced Data Analysis

The TLA family's remote control command set, based on Microsoft COM/DCOM technology, interfaces seamlessly with advanced Windows® applications — such as Excel®, as shown at right — to provide powerful advanced data analysis and graphical presentation of results either directly on the TLA or remotely over a network.



CONNECT/SETUP

- Wide selection of logic analyzer modules
- Combine with pattern generator and digitizing oscilloscope modules for a more powerful measurement system
- Customize the user interface to match your preferences
- Share setups and data between all of your TLA logic analyzers

CAPTURE

- Repetitive acquisition modes automate data collection so you can focus on difficult problems

ANALYZE

- Memory comparison uses the processing power of the TLA to give you immediate answers
- Quickly search through deep memory to find elusive problems

DISPLAY

- Show data in a variety of display formats, including waveform, listing, source and histogram
- High resolution displays show you more data so you can find your problems faster

Flexible Configurations to Meet Your Measurement Needs

TLA 60X/61X/62X

TLA 714

TLA 720

APPLICATIONS				
	Timing and State Analysis	✓	✓	✓
	Single-Processor/Bus Analysis	✓	✓	✓
	Real-time Instruction Trace	✓	✓	✓
	Source Code Debug	✓	✓	✓
	Performance Analysis	✓	✓	✓
	Multi-Processor/Bus Analysis		✓	✓
	Digital Stimulus and Control		✓	✓
	Digital Signal Quality Analysis		✓	✓
	System Validation			✓
FEATURES				
Logic Analyzer	Channels	34, 68, 102, 136	34, 68, 102, 136 per module	34, 68, 102, 136 per module
	Max Channels per Bus (merged)	136	272	408
	Max Channels per Mainframe	136	272	680
	Max Channels per System	136	1768 (with two TLA 7XMs)	2176 (with two TLA 7XMs)
	Max Independent Buses per System	1	13 (with two TLA 7XMs)	16 (with two TLA 7XMs)
	Timing	2 GHz MagniVu™ Acquisition	2 GHz MagniVu™ Acquisition	2 GHz MagniVu™ Acquisition
	State	100 MHz Std/200 MHz Opt	100 MHz Std/200 MHz Opt	100 MHz Std/200 MHz Opt
	Max State Data Rate (half channels requires 200 MHz state option)	400 MHz	400 MHz	400 MHz
	Simultaneous State and Timing Through Same Probe	✓	✓	✓
	Memory Depth Per Channel	64 Kb, 256 Kb, 1Mb	64 Kb, 256 Kb, 1 Mb, 4 Mb, 16 Mb	64 Kb, 256 Kb, 1 Mb, 4 Mb, 16 Mb
Pattern Generator	Channels		64	64
	Max Channels per Bus (merged)		128	320
	Max Channels per Mainframe		128	320
	Max Channels per System		832 (with two TLA 7XMs)	1024 (with two TLA 7XMs)
	Pattern Speed		134 MHz (full channel) 268 MHz (half channel)	134 MHz (full channel) 268 MHz (half channel
	Memory Depth		256K (512K half channel) Std 1M (2M half channel) Opt	256K (512K half channel) Std 1M (2M half channel) Opt
Digitizing Oscilloscope	Channels		2 and 4	2 and 4
	Max Channels per Mainframe		8	20
	Max Channels per System		52 (with two TLA 7XMs)	64 (with two TLA 7XMs)
	Bandwidth		500 MHz and 1 GHz	500 MHz and 1 GHz
	Sample Rate		2.5 GS/s and 5 GS/s	2.5 GS/s and 5 GS/s
	Vertical Resolution		8 bits	8 bits
	Memory Depth per Channel		15K	15K
Data Analysis Tools	Standard Data Window Types	Waveform, Listing, Histogram (Performance Analysis), Source Code	Waveform, Listing, Histogram (Performance Analysis), Source Code	Waveform, Listing, Histogram (Performance Analysis), Source Code
	Remote Control with Microsoft COM/DCOM	✓	✓	✓
	Symbols Extracted From Variety of Object File Formats	✓	✓	✓
User Interface	Operating System	Microsoft Windows®	Microsoft Windows®	Microsoft Windows®
	Internal display resolution	800x600 (TLA 61x/62x only; TLA 60x requires external display)	800x600	Requires external display
	External display resolution	1280x1024	1600x1200	1600x1200

TLA 700 Series:

Performance and Modular Flexibility for Your Toughest Design Challenges

Benchtop Modular Mainframe

TLA 720 with logic analyzer, pattern generator and digitizing oscilloscope modules

Portable Modular Mainframe

TLA 714 with logic analyzer, pattern generator and digitizing oscilloscope modules

TLA 600 Series:

Affordable Timing and State Logic Analyzers for Your Mainstream Design Needs

Logic Analyzer with Internal Display

TLA 61x and TLA 62x

Logic Analyzer with External Display

TLA 60x

www.tektronix.com/LA

Your greatest information source for Tektronix logic analyzers is at the Tektronix website. These popular logic analyzer web pages are updated frequently to provide the most current and extensive information about the entire TLA family, including:

- Product specifications
- Manuals
- Application Notes
- Online demonstrations
- Product upgrades
- Application and software drivers
- Most recent microprocessor/bus support information
- Tektronix embedded systems tools partners
- Other digital design tools

www.tektronix.com/LA

Business card

Measure Circuit Board Impedance

The TDS8000 Digital Sampling Scope with the 80E04 TDR/Sampling module is an outstanding solution for circuit board impedance measurements, featuring a reflected rise time of <35 ps and 20 GHz bandwidth.

Characterize High-speed Digital Signals

Measuring high-speed signal characteristics requires tools with uncompromised performance. The TDS694C Digital Storage Oscilloscope (DSO) has 3 GHz bandwidth and 10 GS/s sample rate across four channels simultaneously to ensure the most accurate single-shot rise-time and timing measurements available. A special cross-triggering capability enables correlation with TLA logic analyzers.

Analyze Complex Signals

An affordable solution for many applications is the TDS3000 Digital Phosphor Oscilloscope (DPO). This highly portable scope delivers up to 500 MHz bandwidth and sample rates up to 5 GS/s. Its intensity graded color display helps you locate and characterize anomalies that are often elusive on traditional Digital Storage Oscilloscopes.

Generate High-speed Data

Tektronix DG and HFS Series Data Generators offer high-speed clock and data simulations with the ability to control edge placement on an edge-by-edge basis or to inject jitter or wander onto the data stream. The AWG Series simulates high-speed digital signals in the analog domain. The AWG610 — truly a mixed-signal device — generates serial digital signals up to 1.3 GHz.

The Integrated Tool Set for Superior Measurement and Analysis

The Tektronix logic analyzer family is a key component of the powerful Tektronix instrument ensemble for testing the most challenging digital-design applications.

This integrated tool set includes the TLA family along with sampling oscilloscopes, digital storage oscilloscopes, digital phosphor oscilloscopes, data generators and a host of complementary connection devices.

For further information, contact Tektronix:

Worldwide Web: for the most up-to-date product information visit our web site at: www.tektronix.com

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