# LOGIC ANALYZERS
HP 1660 Series Portable Logic Analyzers
### HP 1660AS, 1661AS, 1662AS, 1663AS, 1660A, 1661A, 1662A, 1663A, and 1664A

Full-Featured Portable Logic Analyzers:
- Flexible channel count and measurement capabilities
- Over 160 microprocessor and bus interface solutions
- Graphical interface on gray-scale display
- Mouse ships as standard equipment with all models

- Built-in DOS format 3½-inch floppy disk
- Standard HP-IB and RS-232 ports with most models
- Lightweight, flexible passive probing
- Compatible with HP 16550A logic analyzer module
- Compatible with HP 16532A oscilloscope module

DESIGNED FOR HP-IB SYSTEMS
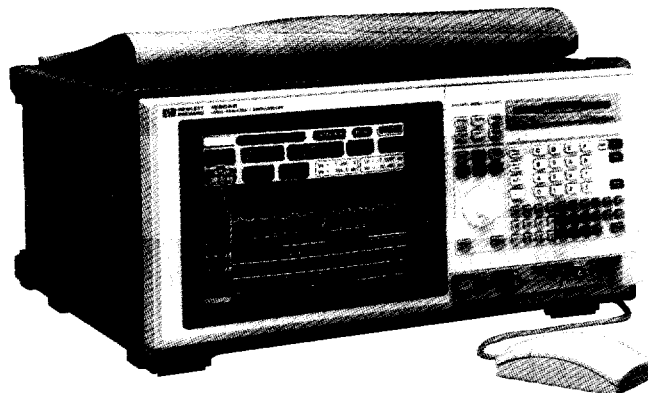
Move quickly through logically organized, graphical menus using front panel keys or the mouse, which ships standard with all models.
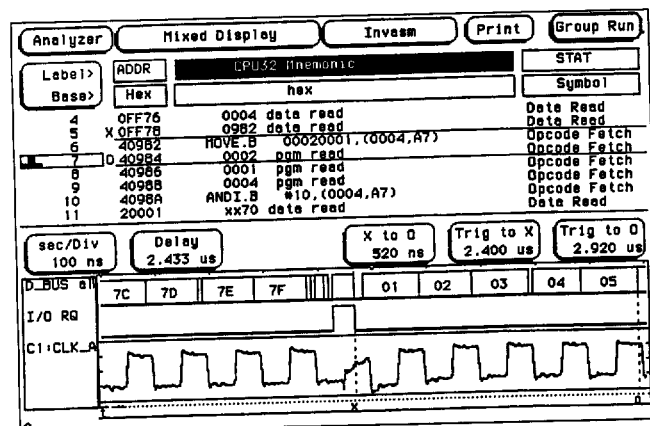
Debug efficiently with time-correlated state, timing, and scope measurements on a single screen.

HP 1660 Series Logic Analyzers

Confidently Deliver Products to Market Faster
You can feel confident about getting to the root-cause of digital design problems quickly and with certainty if you use an HP 1660 series logic analyzer. As a result, your new product will probably get to market faster and work the way it was designed to work. HP 1660 series logic analyzers have the right combination of performance, flexibility, and ease-of-use. The HP 1660 series analyzers provide the needed power to solve your tough digital design problems.

Application Flexibility
The HP 1660 series covers the embedded designer's testing spectrum—from the isolation of elusive hardware problems to the debugging of real-time software.

Because your application determines the number of needed channels, Hewlett-Packard offers 34-, 68-, 102-, and 136-channel models in the HP 1660 series.

Five modes of timing analysis let hardware designers adapt the analyzer to the speed and type of data they need to capture. And, with an optional 2-channel oscilloscope available with most models, you can open an analog window to digital events.

For software developers, we offer over 160 microprocessor and bus interface solutions. Powerful triggering lets you trace intricate software algorithms. For popular microprocessors, our new disassemblers enable you to focus on the specific code events you wish to view.

And for fast debugging during hardware/software integration, simultaneously capture state, timing, and oscilloscope data. The logic analyzer lets you view it all together in a mixed display so you can pinpoint design errors and show their effects.

One Common Interface
The human interface is identical for all nine HP 1660 series models and is consistent with the HP 16500 system interface. A mouse comes standard with all models so you can move quickly through logically organized, graphical menus. Front panel keys provide direct access to commonly used menus. HP 1660 series logic analyzers can also be operated by an optional keyboard. A training kit ships standard with most models and helps new users feel comfortable in a short amount of time. The training kit includes its own target system so you can take real measurements.

Performance Comfort Zone
Don't worry about having enough performance for your new embedded design. The HP 1660 series provides timing resolution up to 2 ns, oscilloscope sampling at 1 GSa/s, and state analysis that can keep up with system clocks as fast as 100 MHz.

Key Literature
The HP 1660-Series Portable Logic Analyzers Brochure, p/n 5091-7554E.
The HP 1660-Series Portable Logic Analyzers Technical Data, p/n 5091-6147E.

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HP 1660 Series Portable Logic Analyzers (cont'd.)
HP 1660AS, 1661AS, 1662AS, 1663AS, 1660A, 1661A, 1662A, 1663A, and 1664A

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Key Specifications and Characteristics

	HP 1660A, HP 1660AS	HP 1661A, HP 1661AS	HP 1662A, HP 1662AS	HP 1663A, HP 1663AS	HP 1664A
State and timing channels	136	102	68	34	34
Timing analysis	Conventional: 250 MHz all channels, 500 MHz half channels Transitional: 125 MHz all channels, 250 MHz half channels Glitch: 125 MHz half channels				
State analysis	100 MHz in all modes				50 MHz in all modes
State timing memory depth	4K/channel, 8K in half-channel modes				
Setup/hold time	3.5/0 ns to 0/3.5 ns adjustable in 500 ps increments				
Min. detectable glitch	3.5 ns				
Probe input R & C	100 kΩ and ~8 pF				
Trigger terms	Patterns: 10 Ranges: 2 Edge and glitch: 2 Timers: 2				
Trigger sequence terms	12 in state and 10 in timing				
Labels	126				
Symbols	1000				

Additional Information for HP 1660AS, HP 1661AS, HP 1662AS, and HP 1663AS

	HP 1660AS	HP 1661AS	HP 1662AS	HP 1663AS
Logic analysis capabilities	Identical to HP 1660A	Identical to HP 1661A	Identical to HP 1662A	Identical to HP 1663A
Scope channels	2			
Scope sample rate, bandwidth	1 GSa/s, 250 MHz			
Scope vertical resolution	8 bits			
Scope memory depth	8K			
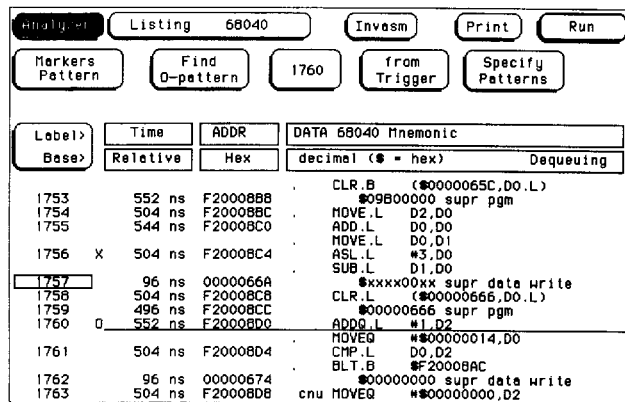
View your system's behavior with processor-specific mnemonics, using HP preprocessors and inverse assemblers.
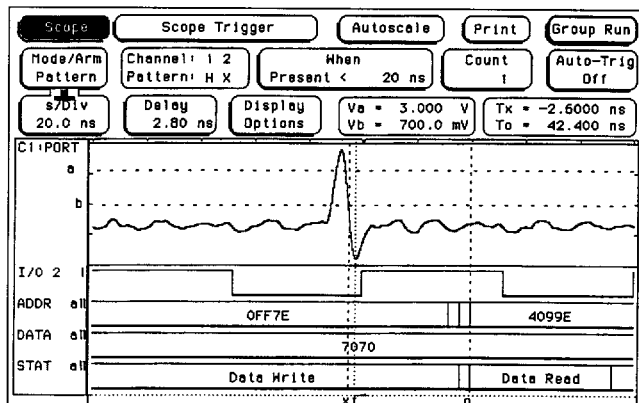
Pinpoint design errors and show their effects with time-correlated scope and timing waveforms.

Debug a Wide Range of Microprocessor-Based Systems Ranging from 8-Bit Controllers Up to 32-Bit Microprocessors

Select from over 200 solutions to connect to your design (see pages 430 to 432). The HP 1660 series analyzers let you debug real-time software. State data can be displayed in processor-specific mnemonics to make debugging system problems easier. For popular microprocessors, new disassembler technology allows you to independently activate up to 10 unique filters, so software is easier to analyze. For example, you can focus on code flow by exclusively viewing calls, jumps, and returns.

View Analog Behavior of Digital Signals with Built-In Scope

The HP 1660AS, 1661AS, 1662AS, and 1663AS add two 1-GSa/s digitizing scope channels for viewing the analog behavior of your signals. Both channels capture non-repeating events simultaneously with 8K samples per channel. Characterize critical timing parameters with time interval measurements of better than 150 ps accuracy, or examine glitches in your system to determine if noise or loading is a problem.

All 1660AS models offer independent time and voltage markers, channel labeling, automatic pulse parameters, as well as edge, voltage level, and pattern duration triggering.

Enhance Troubleshooting with Full Analysis Features

As with all HP logic analyzers, the HP 1660 series packs in numerous features designed to make debugging your system easier. You can view timing measurements in either waveform or listing formats. State measurements can be viewed in listing, compare listing, waveform, and X-Y chart displays. In state mode, use storage qualification to capture only the data you need to see, thereby using acquisition memory more efficiently.

Powerful Triggering

Triggering features help you capture elusive events. Start, center, end, and user-defined settings let you quickly specify the trigger position in memory. Use timers to trigger when a time-out or a data overrun condition occurs. Cross trigger the timing analyzer with the state analyzer to view the activity of control signals between states. Or trigger the scope using the logic analyzer's powerful triggering capabilities. Display the resulting time-correlated state, timing, and scope measurements on a single screen.

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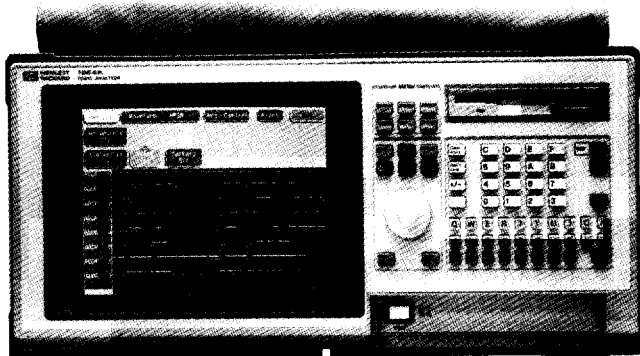## HP 1660 Series Portable Logic Analyzers (cont'd)
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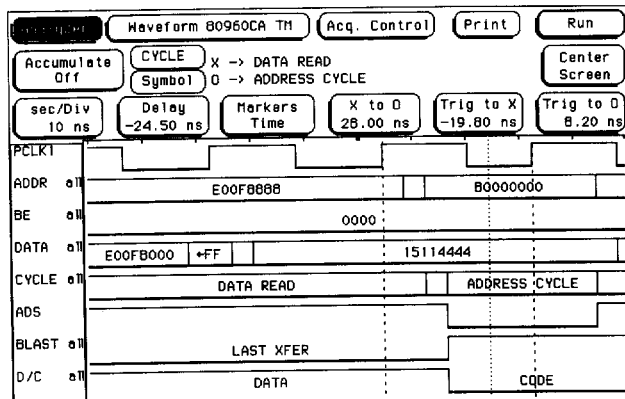
Make timing measurements with up to 2-ns resolution. Display bus values inside the waveforms, using any base (including symbols).

Compact size lets you debug problems away from the bench.

The HP 1664A is value-priced to help you solve tough measurement and budget problems.

Move Screen Images and Measurement Data to Your Computer

The built-in 3½-in DOS disk makes it easy to transfer measurement data into your computer. All 1660 series models allow you to save screen images as industry-standard PCX, TIFF, or PostScript files. Import these images into documentation packages or store data listings to the DOS floppy disk in an ASCII format.

Full programmability lets you control all logic analyzer functions from a computer. Data and setup commands let you upload or download instrument configurations and measurement data.

Invest Wisely

HP 1660 series logic analyzers (except for the HP 1664A) are upgradable as your needs change. Begin with the HP 1660 series model with the right number of channels for your application. You can later add an integrated scope with the E2460AS upgrade kit. Or conveniently increase the number of logic analyzer channels for wider applications with another upgrade kit.

Compatibility with previous HP logic analyzers lets you start using your HP 1660 series logic analyzer without having to spend time refixturing, reconfiguring, or relearning a new analyzer. HP 1660 series logic analyzers use the same probe connectors, preprocessors, and inverse assemblers as most other current HP logic analyzers.

Troubleshoot Without Traveling

The HP E2446L remote troubleshooting software allows you to control and collect data from a distant logic analyzer without leaving the office. The software, which runs on a PC under Windows, lets you control and collect data from a location which may even be in another country. You get remote access to all of the capabilities of an HP 1660 series or HP 16500 series analyzer via modem.

Transfer Configurations or Measurements Made with One Instrument to Another

Make measurements in the field with confidence that setups and data can be reproduced later in the lab. Use the built-in 3½-inch disk to transfer data from a HP 1660 series analyzer. You can insert the disk and view the measurement data on another HP 1660 series analyzer or on an HP 16550A.

HP 1664A 34-Channel Logic Analyzer

Exceptional Price Performance

The HP 1664A is a general-purpose logic analyzer that offers broad functionality at a price that will fit into tight budgets. Like other HP 1660 series models, the HP 1664A offers both timing and state analysis, including the half-channel, 500-MHz, conventional timing mode. Preprocessor interfaces, inverse assemblers and symbol tables are also supported with the HP 1664A to help you debug the real-time execution of software.

HP 1663A and HP 1664A Comparison

	HP 1663A	HP 1664A
US list price	$6,020	$4,500
State speed	100 MHz	50 MHz
Boot mode	Flash ROM	Flexible disk
I/O ports and programmability	RS-232, HP-IB and programmability are standard features	Centronics is standard; RS-232, HP-IB, and programmability are optional
Training kit	Standard	Optional
Upgrade paths	Add an oscilloscope or more logic channels	None