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Expanding Possibilities

HP 16600A and 16700A Series Logic Analysis System Mainframes

Product Overview

Solutions for Digital System Debug

The Advantage of Insight

Debugging today's digital systems is tougher than ever. Increased product requirements, complex software, and innovative hardware technologies make it difficult to meet your time-to-market goals.

As a digital designer, you need test equipment that quickly provides reliable insight into your toughest problems. That is why HP has combined logic analysis, emulation and software tools into one integrated system — to give you a complete view of your prototype, from signals to source code.

HP has a solution to help you completely outfit your team while providing budgetary flexibility. With HP's scalable systems, you won't waste money on features you'll never use. And you won't be faced with scrapping recently bought tools just because you changed microprocessors.



Figure 1. (left to right) The HP 16700A, 16702A and 16600A logic analysis systems.

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Key Features Overview



Figure 2.
Acquire state data at 333 MHz and timing data at up to 2 GHz through the same connection.



Figure 3.
Configure your HP 16700A Series system for your specific application with modular mainframes.

Features	Benefits
Scalable System • State/timing analyzers • Oscilloscopes • High-speed timing • Pattern generator • Emulation module	• Room to grow • Select the optimum combination of performance, features, and price that you need for your specific application today, with the flexibility to add to your system as your measurement needs change. • View system activity from signals to source code.
Timing Zoom Technology	• Simultaneously acquire data at up to 2 GHz timing and 333 MHz state through the same connection. Timing Zoom is available across all channels, all the time. (See pg 9)
Visi Trigger Technology	• Use graphical views and sentence-like structure to help you define a trace event . • Select trigger functions as individual trigger conditions or as building blocks to easily customize a trigger for your specific task.
Processor and Bus Support	• Get control over your microprocessor's internal and external data. • Quickly and reliably connect to the device under test. (See pg 10-11)
Post-Processing Analysis Tools	• Rapidly consolidate large amounts of data into displays that provide insight into your system's behavior. (See pg 10)
Setup Assistant	• Quickly configure the logic analysis system for your target microprocessor. (See pg 5).
Tabbed Interface	• Groups like tasks together so you can quickly find and complete the task you want to perform. • Spend your time solving problems, not setting up a measurement.
Multi-Windowed View of Target System Activity	• View your cross-domain measurements, time-correlated on the same screen. (See pg 5) • Debug faster because you can view system activity at a glance.
Global Markers	• Track a symptom in one domain (timing) to its cause in another domain (analog).

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Key Features Overview (cont.)

Features	Benefits
Resizable Windows and Data Views	• Magnify your view or zoom in on a boxed area of interest. • Resize waveforms and data or quickly change colors to highlight areas of interest.
Web-Enabled System	• Directly access the instrument's web page from your web browser. (See pgs. 6 & 7) • Remotely check the instrument's measurement status without disturbing the acquisition. • Remotely access, monitor and control your logic analysis system.
Direct Link to Microsoft® Excel via HP BenchLink XL 16700	• Automatically move your data from the logic analyzer into Microsoft Excel with just a click of the mouse. (See pg 7) • Use Microsoft Excel's powerful functions to post-process captured trace data to get the insight you need.
Direct Links to Industry Standard Debuggers and High-Level Language Tools	• Debuggers provide visibility into software execution for systems running software written in C and C++ as well as active microprocessor execution control (run control). (See pg. 11) • Import symbol files created by your language tools. Symbols allow you to set up trigger conditions and review waveform and state listings in easily recognized terms that relate directly to the names used for signals on your target and the functions and variables in your code.
Direct Links to EDA Tools	• Use captured logic analysis waveforms to generate simulation test vectors. • Easily find problems by comparing captured waveforms with simulated waveforms.
Transfer Data for Offline Analysis – Data Export	• Fast binary (compressed binary) from the FileOut tool provides highest performance transfer rate. • ASCII format provides same format as listing display, including inverse-assembled data.
Transparent File System Access	• Access, transfer, and archive files. • Stay synchronized with your source code by mapping shared directories and file systems from your Windows 95/98/NT-based PC directly onto the logic analyzer and vice versa. • Move data files to and from the logic analyzer for archive or use elsewhere.
Documentation Capability	• Save graphics in standard TIFF, PCX, and EPS formats. • Print screen shots and trace listings to a local or networked printer. • Save your lab notes and trace data in the same file by entering relevant information in the Comments tab of the display.
Remote Programming with Microsoft's COM Using Microsoft Visual Basic or Visual C++	• Perform pass/fail analysis, stimulus response tests, data acquisition for offline analysis, and system verification and characterization tests. • Powerful-yet-efficient command set focuses on your programming tasks, resulting in a shorter learning curve while maintaining necessary functionality. (See pg. 14 for more information)
Network Security	• Protect your networked assets and comply with your company's security requirements with individual user logins that provide system integrity.

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Key Features

Modularity is the key to the HP 16600A and 16700A Series logic analysis systems' long term value. You purchase only the capability you need now, then expand as your needs evolve. All modules are tightly integrated to provide time-correlated, cross-domain measurements.

Module Choices

State/Timing

HP offers a wide variety of state/timing modules to help you match your debug tools to your specific measurement needs. These modules include high-speed acquisition to capture glitches, wide channel counts to monitor all of the signals from a high-end processor system, and deep memory to capture elusive system crashes. See page 9.

Oscilloscope

Identify signal integrity issues and characterize signals quickly with automatic measurements of rise time, voltage, pulse width, and frequency.

High-Speed Timing

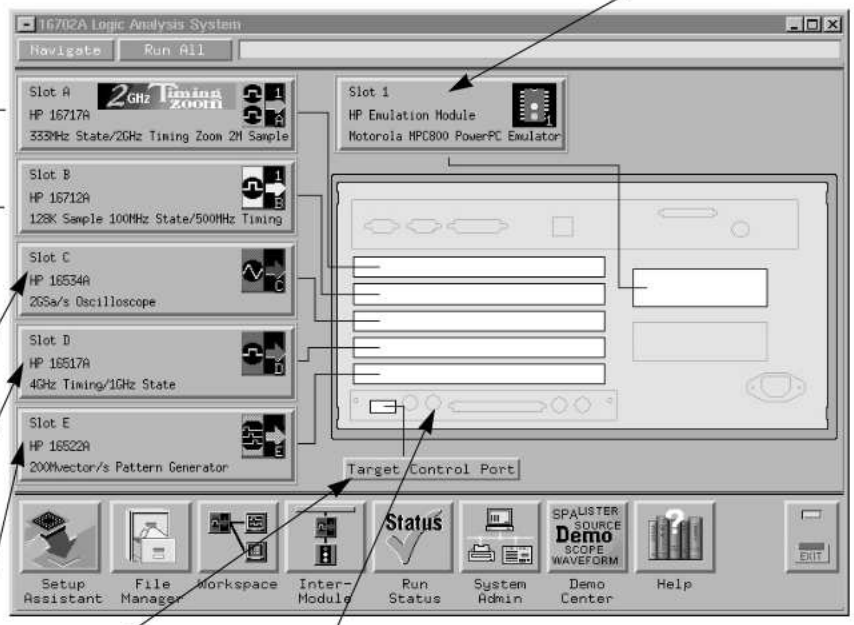
Precisely characterize setup/hold times over a wide channel count. Capture data over many clock cycles while retaining the highest multi-channel accuracy.

Pattern Generation

Use stimulus to substitute for missing system components or provide a stimulus-response test environment.

Emulation

The emulation module connects to the debug port (BDM or JTAG) on your target. You have full access to processor execution control features of the module through the built-in emulation control interface or a third-party debugger.



Use the target control port to activate your target's reset or interrupt lines, making it convenient to control the target remotely.

Port-in/Port-out BNC connectors allow you to trigger or arm external devices or receive signals that can be used to arm acquisition modules within the logic analysis system.

Figure 4. The power-up screen lets you identify and access the measurement capability available in your logic analysis system.

Table 1. HP 16600A and 16700A Series Supported Measurement Modules

Measurement Module Category	HP Model Number	Description
State and Timing	16717A [1]	333 MHz state, 667 MHz timing, 2 GHz Timing Zoom, 2/4 M memory depth
	16716A [1]	167 MHz state, 667 MHz timing, 2 GHz Timing Zoom, 512K/1M memory depth
	16715A [1]	167 MHz state, 667 MHz timing, 2/4 M memory depth
	16710A/16711A/16712A	100 MHz state, 500 MHz timing, 8K/32K/128K deep memory depth
	16557D	140 MHz state, 500 MHz timing, 2/4 M memory depth
	16556A/D	100 MHz state, 400 MHz timing, 2/4 M memory depth
	16555A/D	110 MHz state, 500 MHz timing, 2/4 M memory depth
	16554A	100 MHz state, 250 MHz timing, 512 K/1M memory depth
	16550A	100 MHz state, 500 MHz timing, 4/8K memory depth
Oscilloscopes	16534A	2 channel, 500 MHz bandwidth
	16533A	2 channel, 250 MHz bandwidth
High-Speed Timing	16517A/16518A	4 GHz timing, 1 GHz synchronous state, 64K memory depth (master/expander)
Pattern Generator	16522A	200 M vector/second pattern generator
Emulation	E5901A	Processor-specific device provides code download, register/memory modification, and processor control (including break, run, reset, single step)

[1] Currently only supported in the HP 16700A Series.

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Key Features (Cont.)

System Setup Is As Easy As a Mouse Click

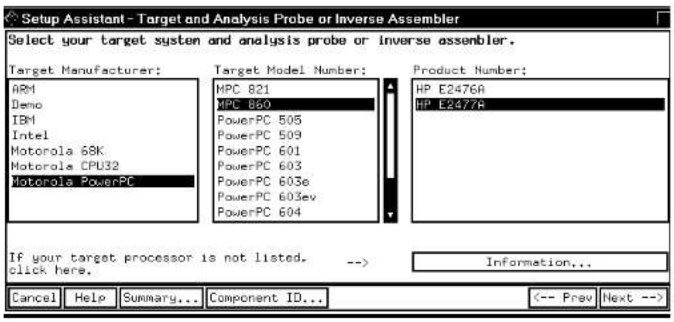


Figure 5. Setup Assistant gets you up and running quickly.



Figure 6. Icons in the power-up screen give you quick access to common tasks

Setup Assistant is a guided menu system that helps you configure the logic analysis system for your target microprocessor or bus. Online information guides you through the setup. (See Figure 5)

System Admin allows you to set up the instrument on your network, establish printers, set up user accounts for security, or update software quickly.

Demo Center provides simple demos of the most commonly-used features.

Help enables you to access the online User's Guide and measurement examples. The Help system includes full search and hypertext link capabilities.

See the Big Picture of Your Prototype System's Behavior

The large display with multiple, resizable windows on the HP 16600A and 16700A allows you to see at a glance more of your target system's operation. A built-in, flat-panel display in the HP 16702A fits in environments with limited space. Color lets you highlight critical information so you can find it quickly.

Use one tool to examine target operation from different perspectives. Multiple time-correlated views of data let you confirm both signal integrity and software execution flow. This is invaluable in solving cross-domain problems.

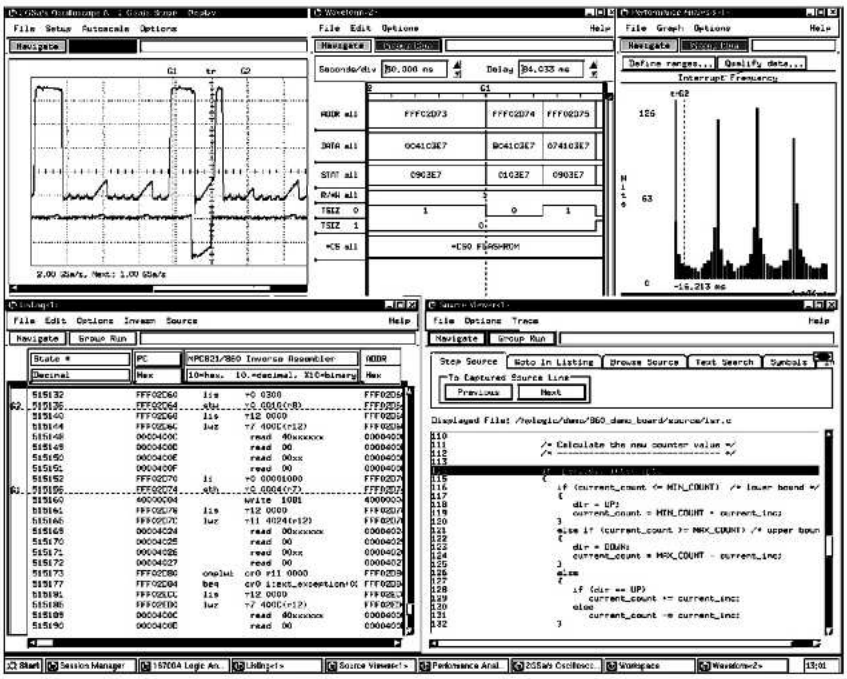


Figure 7. You can quickly isolate the root cause of system problems by examining target operation across a wide analysis domain, from signals to source code.

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Key Features (cont.)

Expanding Possibilities with Network Connectivity

View and analyze the data anywhere, anyplace, anytime
Web-enabled instrumentation gives you the freedom to access the system—anywhere, anytime. Have you ever needed to check on a measurement's status while you were in a remote location? Now you can!

When your logic analysis system is connected to your company's Intranet, you can directly access its web page from your web browser, whether you're in the office, at home, or at another site. Working from multiple locations has never been this convenient.

With a Web Enabled Logic Analysis System You Can...

...access the logic analysis system's web page from your browser by typing in the logic analysis system's URL (hostname or IP address).

...access HP's web site for the latest online manuals and technical information.

...quickly check instrument status to determine if the analyzer is available for use.

...remotely check current measurement status to find out if the system has triggered.

...access the analyzer's user interface directly from within your browser, giving you full control of all analyzer functions.

...install HP Benchlink XL 16700 to seamlessly transfer data from the analyzer to the PC.

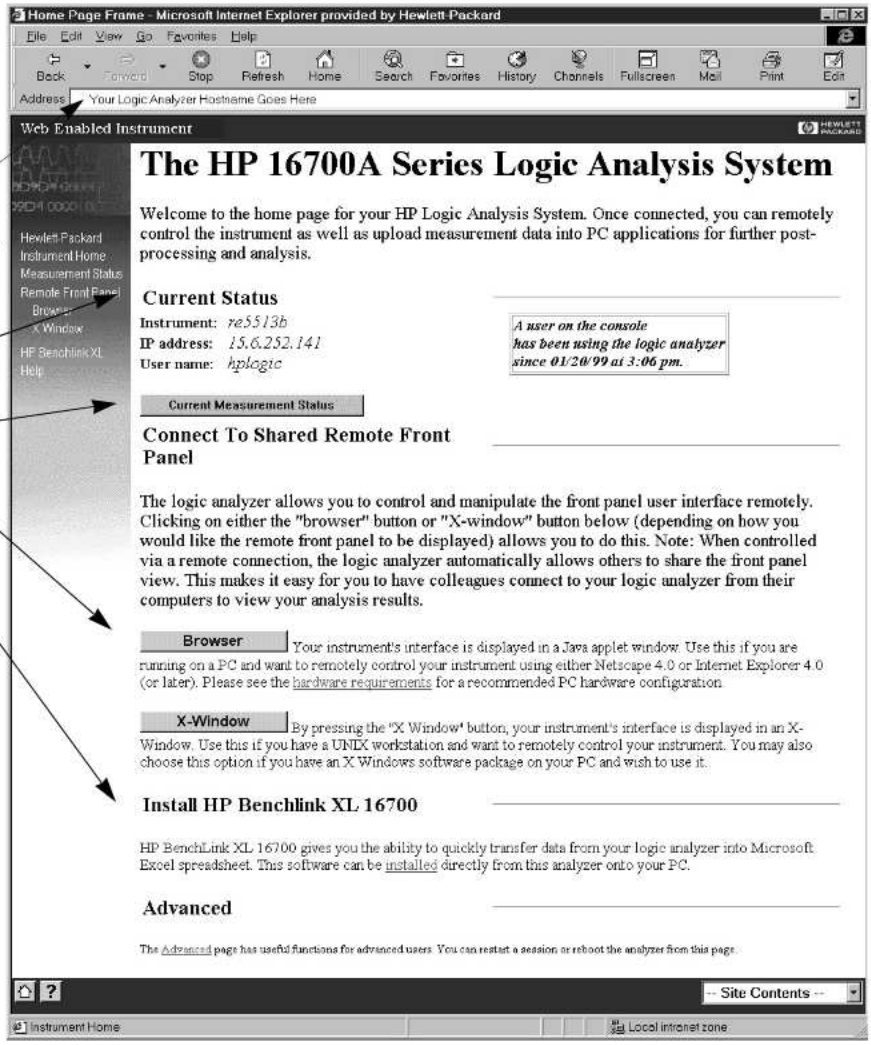


Figure 8.
Your logic analyzer is its own web site. From the Home Page you can perform multiple remote functions.

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Key Features (cont.)

Remote Control Helps to Improve the Efficiency of Your Debug Efforts.

Check up on long duration measurements to determine if you need to change a trigger specification or save captured data to a file.

Simultaneously share your measurement results with other team members in different locations. Work concurrently to make real-time decisions and solve problems.

Remotely access the target control port to reset the target, then set up a different measurement and start another acquisition.

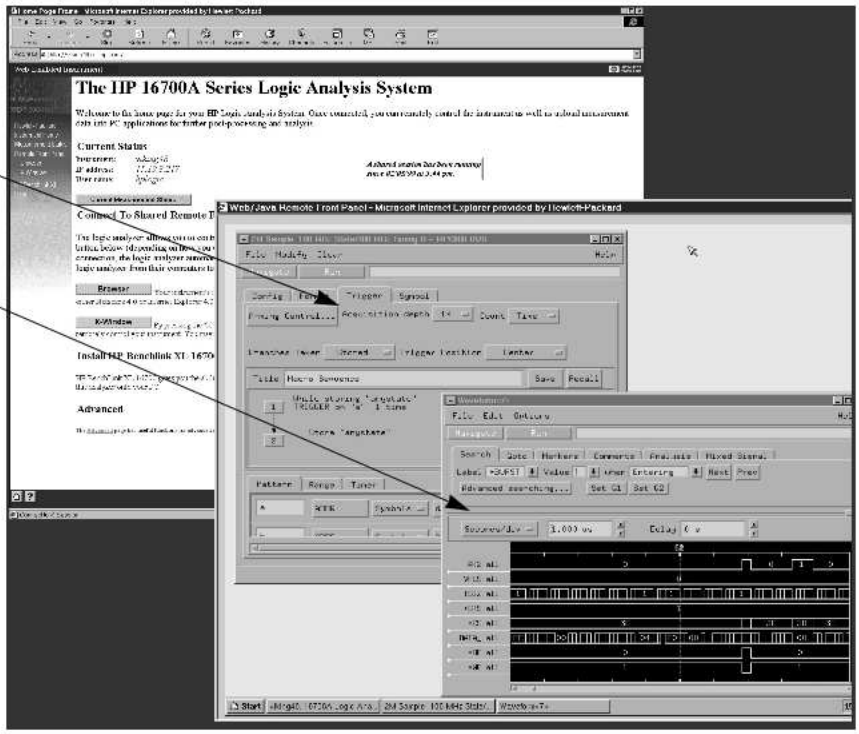


Figure 9. From your web browser, you have full remote control of all logic analyzer functions.

HP BenchLink XL 16700 Moves Your Data Automatically into Microsoft Excel for Advanced Offline Analysis

Use the HP BenchLink XL 16700 tool bar to connect to an HP logic analysis system. Select from the available labels and specify the destination cell location in Excel.

Import data from the current acquisition or data previously saved to a file via the File Out tool.

Use Microsoft Excel's powerful functions to post-process captured trace data for the insight you need.

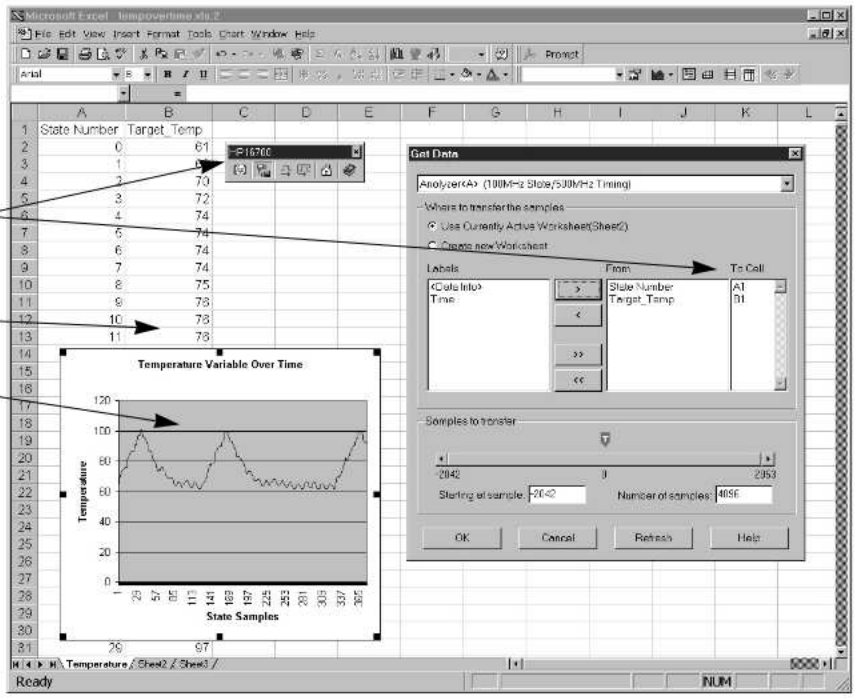


Figure 10. Transfer data into Excel with just a click of the mouse.

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Selecting a System that's Right for You

The following pages describe the components available to configure a system that meets your digital debug needs. For a list of all supported measurement modules for the HP 16600A and 16700A Series mainframes, refer to page 4.

Your mainframe and measurement module selection depends on:

- Desired mainframe form factor
- Availability of extra slots for future measurement capabilities
- Number of state/timing analysis channels needed
- Additional measurement/analysis capabilities: oscilloscope, pattern generator, high-speed timing, emulation, microprocessor and bus support, and post-processing analysis software
- Accessories
- Service and support
- Budget

Available Mainframes

The HP 16700A Series platform is a modular system that can change as your needs grow. You decide which state and timing analysis module(s) you want, then you add other measurement modules to meet your debug needs.

The HP 16600A Series logic analysis system offers built-in state and timing capabilities from 68 to 204 channels. These channel configurations are fixed. However, each frame contains one expansion slot for additional measurement capability, such as an oscilloscope, pattern generator, or analysis module.

Table 2. Top-Level Comparison of the HP 16700A and 16600A Series Mainframes

Mainframe–HP Model	16700A	16702A	16600A/16601A/16602A/16603A
Slots for measurement modules	5 (10 total with HP 16701A expansion frame)		1
Built in state/timing channels	None	None	204, 136, 102, 68
Number of emulation module slots	2 (4 total with HP 16701A expansion frame)		1
HP 16701A expansion frame support	Yes	Yes	No
Built-in display	No	800 × 600, 10.3"	No
External monitor supported	1280 × 1024 std., 1600 × 1200 opt. 003, or remote via web browser or X-windows		

Table 3. Built-in Logic Analysis Capability of the HP 16600A Series Analyzers

HP Models	16600A	16601A	16602A	16603A
Maximum state clock	100 MHz	100 MHz	100 MHz	100 MHz
Maximum timing sampling rate (full/half channels)	125/250 MHz	125/250 MHz	125/250 MHz	125/250 MHz
Memory depth (full/half channels)	64/128 K[1]	64/128 K[1]	64/128 K[1]	64/128 K[1]
Channels supported	204	136	102	68
Supports context store	Yes	Yes	Yes	Yes
Setup/hold time	0/4.5 ns to 4.5/0 ns adjustable in 500 ps increments			

[1] Increased memory depth in half channel timing mode only.

With Context Store, Capture Infrequent Problems Every Time They Occur

The HP 16600A Series mainframes and the HP 16710A, 16711A, and 16712A measurement modules support advanced state and timing acquisition technology, including context store.

Using context store, you can store the events that occur before and after a specific trigger condition in a time window centered approximately around an event. Trace memory is filled only with data that is specific to the measurement you want to make.

Hardware engineers can use context store when searching for the cause of events that occur infrequently or randomly in time, but that seem to be correlated to specific conditions, such as interrupts or writes to certain address ranges.

When you are debugging software or trying to determine if the cause of a problem is in the hardware or software, context store makes it easy to identify the cause of memory and pointer corruption problems without having to sort through large amounts of trace data.

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Selecting a System that's Right for You (cont.)

Available State and Timing Analysis Measurement Modules

HP offers logic analysis modules that vary in channel count, acquisition speed, and memory depth so that you can select the capability that meets your needs as well as your budget.

The Speed and Triggering You Need for Tomorrow, Available Today

HP Timing Zoom Technology (HP 16716A and 16717A) Enables You To:

- Simultaneously acquire up to 2 GHz timing and 333 MHz state data across all channels, all the time, through the same connection
- Vary the Timing Zoom sample rate from 250 MHz to 2 GHz
- Capture 16K memory depth
- Vary the placement of Timing Zoom data around the trigger point
- Efficiently characterize hardware with 500 ps resolution

HP VisiTrigger Technology (HP 16715A, 16716A and 16717A) Lets You:

- Use graphical views and sentence-like structure to help you define a trace event.
- Select trigger functions as individual trigger conditions or as building blocks to easily customize a trigger for your specific task.
- Set global counters to count events such as the number of times a function executes, or the number of accesses to an I/O port.
- Set, clear or evaluate flags by any module in the frame. Flags allow you to set up a trigger that is dependent on activity from more than one bus in the system.
- Specify four-way arbitrary IF/THEN/ELSE branching.

Table 4. New State and Timing Modules

NEW HP Models	16715A	16716A	17A
Maximum state clock	167 MHz	167 MHz	333 MHz
Maximum timing sample rate (full/half channels)	333/667 MHz	333/667 MHz 2 GHz Timing Zoom	333/667 MHz 2 GHz Timing Zoom
Memory depth full/half channels)	2/4 M[1]	512 K/1 M[1]	2/4 M[1]
Channels/module	68	68	68
Maximum channels on a single time base	340	340	340
Maximum channels in an HP 16700 Series system with an HP 16701A	680	680	680
Setup/hold time	4.5/–2.0 ns to –2.0/4.5 ns in 100 ps increments [2]	4.5/–2.0 ns to –2.0/4.5 ns in 100 ps increments [2]	4.5/–2.0 ns to –2.0/4.5 ns in 100 ps increments [2]

Table 5. State and Timing Modules for the HP 16600A and 16700A Series Mainframes

HP Model	16550A	16557D 1-4 Modules	16557D 5 Modules	16517A, 16518A	16710A, 16711A, 16712A
Maximum state clock	100 MHz	140 MHz	100 MHz	1 GHz	100 MHz
Maximum timing sampling rate	500 MHz	500 MHz		4 GHz	500 MHz
Memory depth (full/half channels)	4/8 K	2/4 M[1]		64/128 K[1]	8/16K[1], 32/64K[1], 128/256K[1]
Channels/module	102	68		16	102
Maximum channels (on a single time base and trigger)	204	272	304	80	204
Maximum channels in an HP 16700 series system (w/ HP 16701A expansion mainframe)	1020	680		160	1020
Setup/hold time	3.5/0 ns to 0/3.5 ns, adjustable in 500 ps increments	3.0/0 ns to –0.5/3.5 ns adjustable in 500 ps increments		350 ps/ 350 ps	4.5/0 ns to 0/4.5 ns adjustable in 500 ps increments [3]

[1] Increased memory depth in half channel timing mode only.
[2] Minimum setup/hold time specified for single edge, single clock acquisition. Multi-clock, multi-edge add 0.5 ns.
[3] Minimum setup/hold time specified for single edge, single clock acquisition. Single clock, multi-edge setup/hold window is 5.0 ns. Multi-clock, multi-edge setup hold window is 5.5 ns.

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Post-Processing Tool Sets Provide Rapid Insight Into Your Toughest Debug Problems

When you want to really understand what your target is doing and why, you need to be able to view acquisition results in a format that quickly guides you to problem identification.

Each tool set described in Table 6 is an optional post-processing software package for the HP 16600A and 16700A Series logic analysis systems. The tool sets offer you a variety of views of the same real-time data to give you insight into your specific application.

Speed Problem Solving with Off-the-Shelf Solutions for Many Common Microprocessors

To help you design and debug your microprocessor-based target systems, HP offers different microprocessor specific products that let you get control and visibility over your microprocessor's internal and external data.

An analysis probe allows you to quickly connect an HP logic analyzer to your target system. The analysis probe provides non-intrusive capture and disassembly of microprocessor and bus activity.

Analysis probes are available for over 200 microprocessors and microcontrollers. Bus probes allow probing of popular bus architectures such as PCI, AGP, USB, VXI, SCSI, and many others.

Flexible physical probing schemes give quick and reliable connections to almost any device on your prototype.

Table 6. Optional Software Tool Sets for the HP 16600A and 16700A Series Mainframes.

Application	Product Name	HP Model Number
Debug your real-time code at the source level. Correlate the logic analyzer trace with the high-level source code that produced it. Set up the logic analyzer trace by simply pointing and clicking on a line of source code.	Source Correlation Tool Set	B4620B
Customize your trace for greater insight. Create custom tools using the C programming language. Custom tools can analyze captured data and present it in a form that makes sense to you. Analysis systems do not require the Tool Development Kit to run generated tools.	Tool Development Kit	B4605B
Optimize your system's performance. Profile your system's performance to identify system bottlenecks and to identify areas needing optimization.	System Performance Analysis Tool Set	B4600B
Solve your serial communication problems. Convert serial bit streams to parallel format for easy viewing and analysis. Supports serial data with or without an external clock reference and protocols that use bit stuffing to maintain clock synchronization. Works at speeds up to 1 GHz.	Serial Analysis Tool Set	B4601B

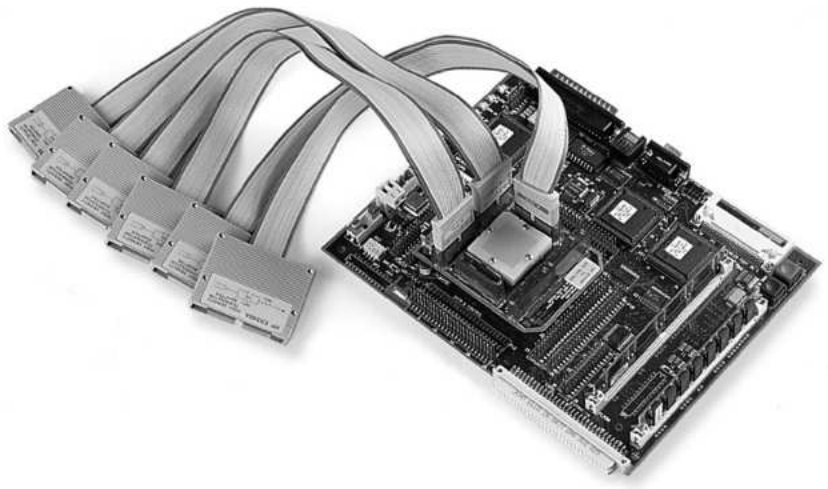


Figure 11. HP analysis probes (formerly known as preprocessors) make it easy to connect a logic analyzer to your target system.

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On-Chip Emulation Tools Make Fixing Bugs Easier

For specific microprocessor families that feature on-chip emulation, you can add an emulation module to your system to connect the on-board debugging resources of the microprocessor to the logic analysis system.

The microprocessor's BDM or JTAG technology provides control over processor operation even if there is no software monitor on the target system. This feature is particularly helpful during the development of your target system's boot code.

Emulation Control Interface
The emulation control interface is accessed from the power up screen of the HP 16600A or 16700A Series system. The interface is included standard for those microprocessors supported with the HP E5901A emulation module.

Designed for hardware engineers, this generic graphical user interface provides the following features:

- Control over processor execution: run/break/reset/step
- Register display/modification
- Memory display/modification in various formats including disassembly for code visualization. Memory modification or memory bloc fill can be done to check processor memory access or to reinitialize memory areas.
- Multiple breakpoint configuration: hardware, software, and processor internal breakpoint registers.
- Code download to the target
- Command scripts to reproduce test sequences.
- The ability to trigger a measurement module on a processor break or receive a trigger from the logic analysis system's measurement modules.

Integrated Debugger Support
When the hardware turn-on phase is completed, the same HP emulation module can be connected to high-level debuggers for C or C++ software development.

You can achieve the functionality of a full-featured emulator by using a third-party debugger to drive the installed HP emulation module. This gives you active and complete microprocessor execution control (run control).

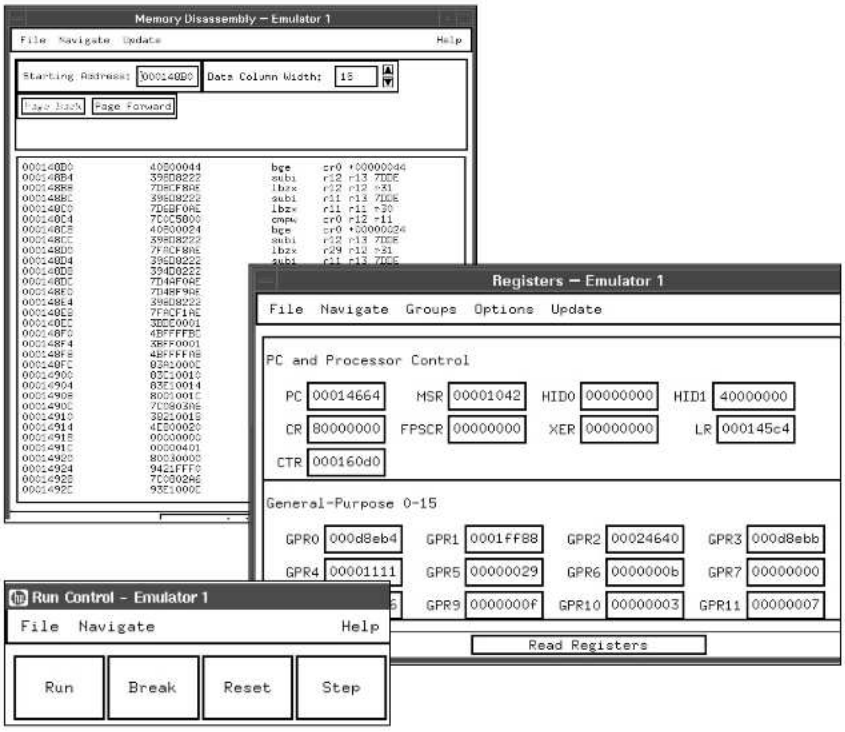


Figure 12. Emulation Control Interface

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Figure 13. HP 1184A testmobile cart

HP 1184A Testmobile

The HP 1184A testmobile gives you a convenient means of organizing your HP logic analysis system mainframes and accessories.

The testmobile includes the following:

- Drawer for accessories (probes, cables, power cords)
- Keyboard tray with adjustable tilt and height
- Mouse extension on keyboard tray accommodates either right or left hand operation
- Locking casters for safety on uneven surfaces
- Strap provided to stabilize the monitor
- Load limits:
  Top tray: 68.2 kg (150.0 lb.)
  Lower tray: 68.2 kg (150.0 lb.)
  Total: 136.4 kg (300.0 lb.)

Weight

	Max Net	Max. Shipping
HP 1184A	48.0 kg (106.0 lb)	59.0 kg (130.0 lb)

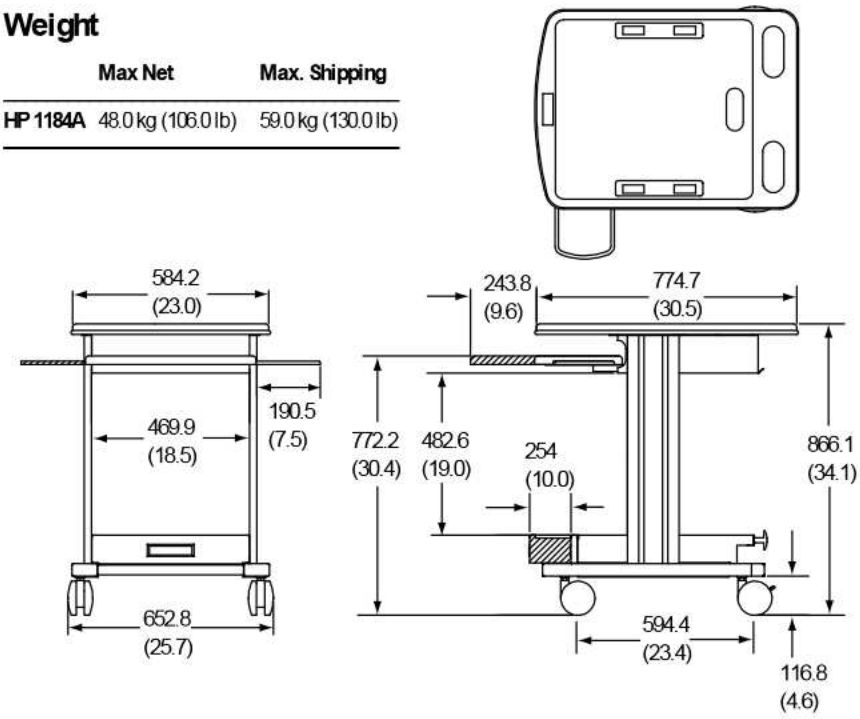


Figure 14. HP 1184A testmobile cart dimensions. Dimensions: mm (inches).

HP Support and Services

HP's family of support services complements your logic analysis system to provide a complete solution. HP's expertise allows you to concentrate on your particular design projects and applications, rather than your debug tools, resulting in increased productivity.

HP can provide consulting to assist in making specific measurements, applying debug techniques, and understanding the issues related to specific processors. On-site assistance can be provided for initial turn-on of your target system. Contact your local HP representative for more information on HP consulting services available in your area.

HP training courses include extensive hands-on and are designed to pay off immediately in real-world situations. HP training can be delivered through scheduled classes, on-site classes, or one-on-one consulting. For training offered in your geography and language, consult the HP test and measurement education web site:
http://www.hp.com/go/tmeducation

HP on-line support professionals can help you better use digital system debug tools to maximize your investment and minimize your debug time. Operational verification and standard measurement assistance can be provided via various methods including phone, fax, e-mail, or web.

The standard warranty for your system may be enhanced via a return-to-HP warranty extension, a conversion to on-site warranty, installation services, and calibration services.

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System Software

All features and functionality described in this document are available with system software version A.01.40.00

Mass Storage

Hard Disk Drive	4 GB formatted disk drive
Floppy Disk Drive	
Capacity	1.44 MB formatted
Media	3.5 inch floppy
Formats	MS-DOS (Read, write, format), LIF (Read only)

Internal System RAM

Standard	64 MB
Option 003 (Must be ordered at time of frame purchase)	160 MB total

Supported Monitor Resolutions

Standard	640 x 480 through 1280 x 1024 (The HP 16702A has a built-in 800 x 600, 10.3" (26.2mm) diagonal monitor.)
Option 003 (Must be ordered at time of frame purchase)	Adds support for up to 1600 x 1200

LAN, IEEE 802.3

Physical Connectors	10BaseT (Ethertwist): RJ-45 10Base2 (Thinlan): BNC
Protocols Supported	TCP/IP NFS CIFS (Windows® 95/98/NT)[1] FTP NTP PCNFS
X-Window Support	X Window system version 11, release 6, as a client and server

Web Server

Supported from Instrument Web Page	Measurement status check, remote display, installation of PC application software, link to HP's Test and Measurement site
PC Requirements	Pentium® (family) PC (200 MHz, 32 MB RAM) running Windows 95, Windows 98, or Windows NT 4.0 w/service pack 3 or higher
Supported Web Browsers (on Your PC or Workstation)	Internet Explorer 4.0 or higher, Netscape 4.0 or higher

HP BenchLink XL 16700 Support

Installation of PC Application Software	Directly from instrument web page
Microsoft Excel 97	Version 7.0 or higher Excel limits maximum trace depth to 64K per sheet.

Available Data Formats

Fast Binary (Compressed Binary Format)	High performance transfer rate. Includes source code to parse data. Available via File Out.
Uncompressed Binary	Includes utility routines. Available via RPI.
ASCII	Provides same format as listing display, including inverse-assembled data. Available via RPI and File Out.

Intermodule Bus (IMB)

Time Correlation Resolution	2 ns (HP 16700A and 16702A only)

Port In/Out

Connectors	BNC

Port In

Levels	TTL, ECL, or user defined
Input Resistance	4 KΩ
Input Voltage	–6V at –1.5 mA to +6V at 1.6 mA

Port Out

Levels	3V TTL compatible into 50 Ω
Functions	Latched (latch operation is module dependent) Pulsed, width from 66 ns to 143 ns

Target Control Port

Number of signals	8
Levels	3V TTL compatible
Connector	2 rows of 5 pins, 0.1-inch centers

Operating Environment

Temperature	
Instrument	0 °C to 50 °C (32 °F to 122 °F)
Disk Media	10 °C to 40 °C (50 °F to 104 °F)
Probes/cables	0 °C to 65 °C (32 °F to 149 °F)
Altitude	To 3000m (10,000 ft)
Humidity	8 to 80% relative humidity at 40 °C (104 °F)

Printing

Printer Interface	Parallel interface for Centronics compatible printers
Printers Supported	PostScript® printers and printers that support the HP Printer Control Language (PCL)
Graphics	Graphics can be printed directly to the printer or to a file. Graphic files can be created in black-and-white or color TIFF format, PostScript, PCX, or XWD formats.

1 User and share level control supported for Windows NT 4.0. Share level control only supported for Windows 95/98.

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HP Remote Programming Interface (RPI)

HP RPI Overview

Typical Applications	Manufacturing Test Data Acquisition for Offline Analysis System Verification and Characterization Pass/Fail Analysis Stimulus Response Tests
Remote Programming Steps	1. Set up the logic analyzer and save the test configuration. 2. Create a program that remotely enables you to: • Load a test configuration • Start the acquisition process • Check measurement status (verify completion) • Act on the results of the data acquisition • Save configuration and captured data • Export data • Execute a compare • Modify the trigger setup or trigger value for the next acquisition • Access oscilloscope's automatic measurements
Physical Connection	Remote programming is done via the LAN connection

Requirements

HP 16600A and 16700A Series analysis systems	HP RPI is standard with HP16600X-/700X system software version A.01.30.00 or higher
PC	Programming is done via Microsoft® ActiveX/COM automation Pentium (family) PC with one of the following: Windows 95 Windows 98 Windows NT 4.0 w/ Service Pack 3 or higher Visual Basic or Visual C++ (Version 5.0 or higher)
Unix	Programming is done via procedural commands

Command Set Overview

System	System Configuration Query, Load/Save Configuration and Data, Start/Stop Measurement, Current Run Status
Logic Analysis Modules	Load/Save Configuration and Data, Trigger Setup, Acquisition Data and Parameters
Oscilloscope Modules	Load/Save Configuration and Data, Trigger Setup, Acquisition Data and Parameters, Query Automatic Measurements
Pattern Generator	Load/Save Configuration and Data, Load ASCII file (vectors), Modify Vector
Emulation Module	Reset Processor, Run Processor, Break Processor, Single Step
Listing Tool	Status, Acquisition Data and Parameters, Transfer Data (includes inverse assembled information)
Compare Tool	Execute Compare, Set Compare Mask, Query Compare Result
File Out Tool	Transfer Data to File

Additional Information

Instrument Online Help	Programming Information in instrument online help
Web Sites	Full remote programming documentation (pdf) available on the hard drive. Sample programs are provided.

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Supplemental Characteristics for the HP 16600A, 16601A, 16602A, and 16603A

Probes

Minimum voltage swing	500 mV peak-to-peak
Threshold range	±6.0 V, adjustable in 50 mV increments

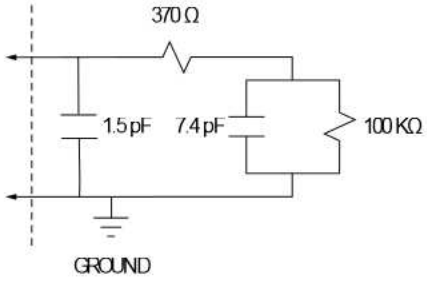


Figure 15. Equivalent probe load for the general-purpose lead set.

State Analysis

Setup/hold time [1]	4.5/0 ns through 0/4.5 ns adjustable in 500 ps increments
Minimum state clock width	3.5 ns
State clock/qualifiers	6/6 (HP 16600A/16601A/16602A) 4/4 (HP 16603A)
Time tag resolution	8 ns
Maximum time count between states	39 hours
Number of machines available	2 state or 1 state/1 timing (HP 16600A, 16601A, 16602A) 1 state or 1 timing (HP 16603A)
Context Store block sizes	16/32/64 states

Timing Analysis

Sample period accuracy	0.01% of sample period
Channel-to-channel skew	2 ns typical
Time interval accuracy	± (sample period + channel-to-channel skew + 0.01% of time interval reading)

Triggering

Maximum sequencer speed	100 MHz
State sequence levels	12
Timing sequence levels	10
Maximum occurrence counter value	1,048,575
Pattern recognizers	10
Range recognizers	2
Range width	32 bits each
Timers	2
Timer value range	400 ns to 500 seconds

[1] Minimum setup/hold time specified for single-edge, single clock acquisition. Single-clock multi-edge setup/hold window is 5 ns. Multi-clock, multi-edge setup/hold window is 5.5 ns. All setup/hold windows are adjustable in 500 ps increments.

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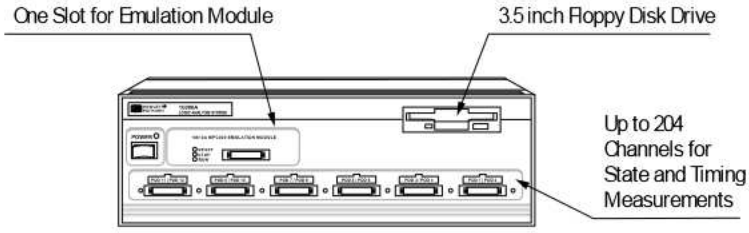


Figure 16. HP 16600A Series front panel

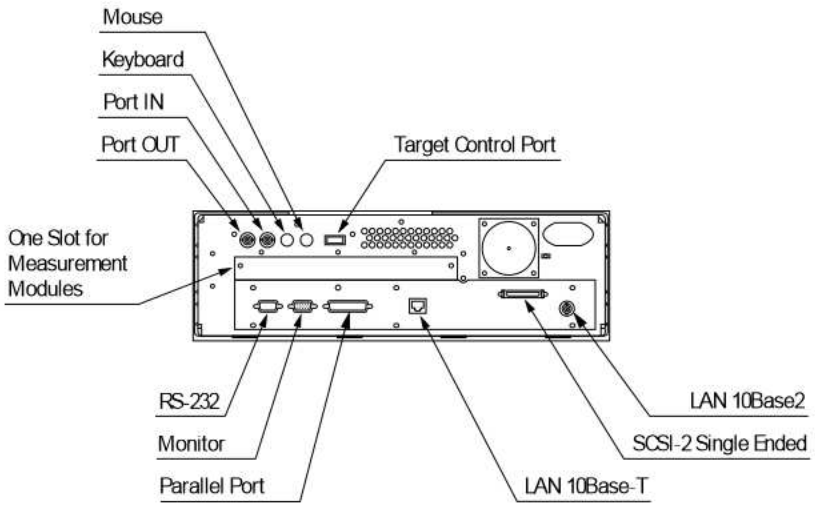


Figure 17. HP 16600A Series rear panel

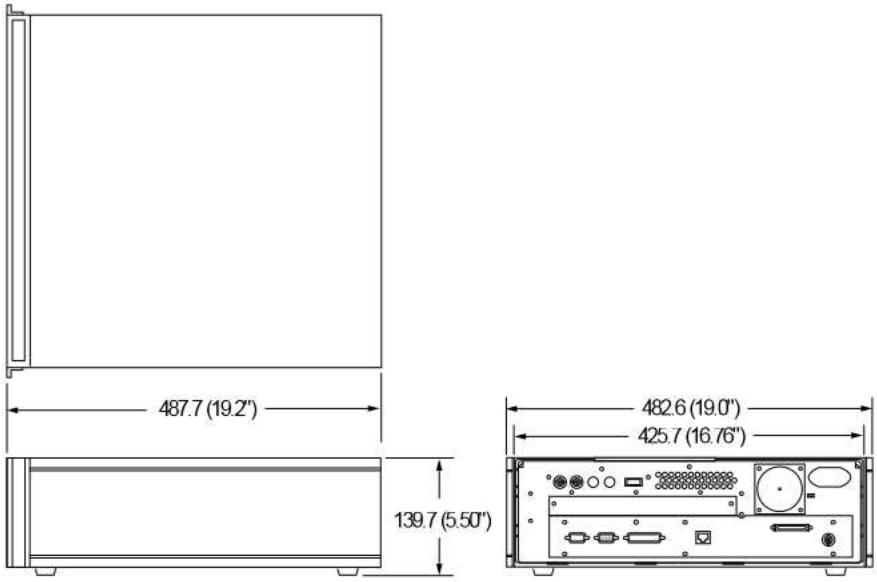


Figure 18. HP 16600A Series exterior dimensions. Dimensions: mm (inches).

Power

HP 16600A	115/230 V, 48 to 66 Hz, 285 W max
HP 16601A	115/230 V, 48 to 66 Hz, 285 W max
HP 16602A	115/230 V, 48 to 66 Hz, 285 W max
HP 16603A	115/230 V, 48 to 66 Hz, 285 W max

Weight*

	Max Net	Max Shipping
HP 16600A	10.0 kg (22.1 lb)	25.2 kg (55.6 lbs)
HP 16601A	10.0 kg (22.1 lb)	25.2 kg (55.6 lbs)
HP 16602A	10.0 kg (22.1 lb)	25.2 kg (55.6 lbs)
HP 16603A	10.0 kg (22.1 lb)	25.2 kg (55.6 lbs)

* Weight of module ordered with mainframes will add 0.9 kg (2.0 lb) per module.

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Power

HP 16700A	115/230 V, 48 to 66 Hz, 610 W max
HP 16701A	115/230 V, 48 to 66 Hz, 545 W max
HP 16702A	115/230 V, 48 to 66 Hz, 610 W max

Weight*

	Max Net	Max Shipping
HP 16700A	12.7 kg (27.0 lb)	34.2 kg (75.4 lbs)
HP 16701A	10.4 kg (23.0 lb)	32.0 kg (70.6 lbs)
HP 16702A	15.2 kg (32.4 lb)	36.7 kg (80.8 lbs)

* Weight of modules ordered with mainframes will add 0.9 kg (2.0 lb) per module.

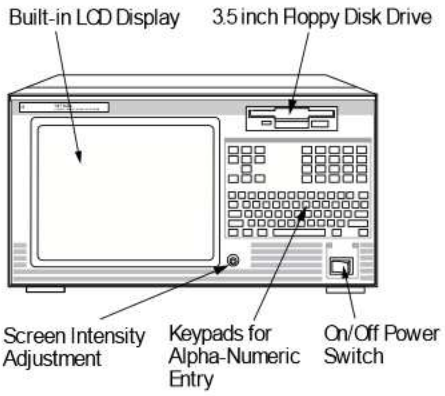


Figure 19. HP 16702A front panel

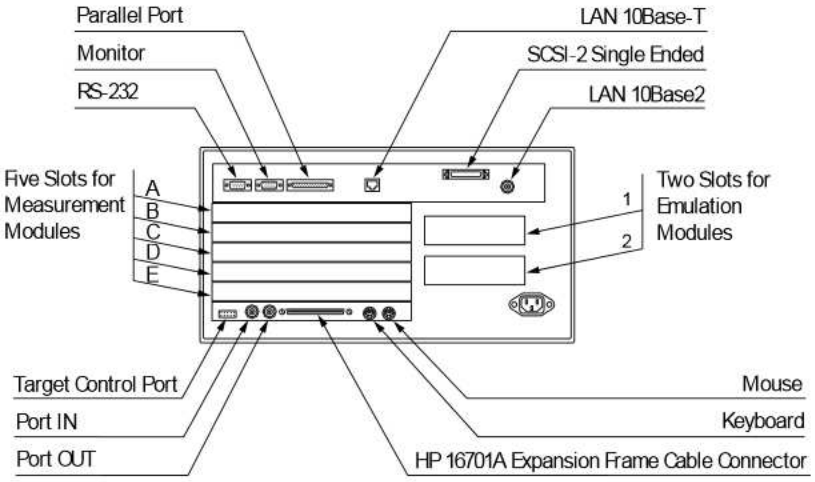


Figure 20. HP 16700A and 16702A rear panel

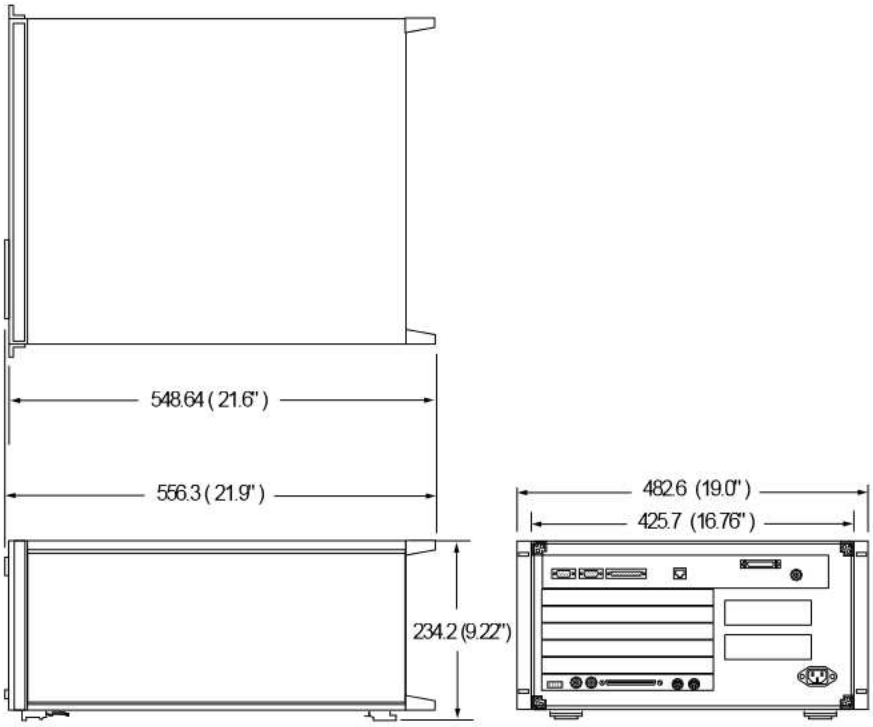


Figure 21. HP 16700A, 16701A and 16702A exterior dimensions. Dimensions: mm (inches).

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Ordering Information

Table 7. Mainframes and Testmobile

Product #	Description	Includes
HP 16700A [1]	Modular frame with five measurement module slots and two emulation module slots.	• One DIN keyboard • One three-button DIN mouse • One ten-conductor, flying-lead cable for target control port • Training kit • Two 17-conductor flying-lead probe cables (HP 16600A Series only)
HP 16702A [1]	Modular frame with built-in 800 X 600 LCD display, five measurement module slots and two emulation module slots.	
HP 16600A Series [1, 2]	Built-in logic analyzer 1 measurement module slot, 1 emulation module slot HP 16600A – 204 channels HP 16601A – 136 channels HP 16602A – 102 channels HP 16603A – 68 channels	
HP 16701A	Expansion frame with five measurement module slots and two emulation module slots. Requires HP 16700A or 16702A	1 ft. and 3 ft. interface cables
HP 1184A	Testmobile	Drawer, keyboard tray, mouse tray, strap for stabilizing monitor

RECOMMENDATIONS:
[1] For HP 16700A and all 16600A Series mainframes, order a monitor (option 001) and at least one CD-ROM drive (option 004). For the HP 16702A, order at least one CD-ROM drive (option 004). The CD-ROM drive is necessary to install future system software upgrades.
[2] Each HP 16600A Series mainframe includes two sets of 17-channel probe leads (34 channels total). If you require additional pairs of probe leads, order option 010.

Table 8. Mainframe Options

Option #	Description	HP 16700A or 16702A	HP 16701A	HP 16600A Series
001	Add 17-inch 1280 x 1024 monitor and cable	√		√
003	Performance system upgrade — 160 Mbyte total system RAM, 2 Mbyte total video RAM. (Must order at time of frame purchase)	√		√
004	Add CD-ROM Drive	√		√
010	Add two sets of 17-channel probe leads (34 channels)			√
0B3	Add service guide	√		√
1CM	Add rack-mount kit	√	√	√
ABJ	Japanese Localization	√		√
W17	Convert one year return-to-HP warranty to one year on-site warranty	√	√	√
W30	Extend standard warranty to three year return-to-HP warranty	√	√	√
W50	Extend standard warranty to five year return-to-HP warranty	√	√	√

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Table 9. Related HP Literature

Refer to the documents below for more information on HP logic analysis systems and accessories.

Publication Title	Publication Type	HP Publication Number
State and Timing Analyzers for HP Logic Analysis Systems	Product overview	5966-3367E
Oscilloscope Modules for HP Logic Analysis Systems	Product overview	5966-3150E
HP 16522A 200 MVector/sec Pattern Generator Module	Product overview	5964-2250E
Processor and Bus Support for HP Logic Analyzers	Configuration guide	5966-4365E
Post-processing Tool Sets	Product overview	5966-3147E
Probing Solutions for HP Logic Analysis Systems	Product overview	5968-4632E

Warranty

HP hardware products are warranted against defects in materials and workmanship for a period of one year from date of shipment. If you send us a notice of such defects during the warranty period, we will either repair or replace hardware products that prove to be defective. Some newly manufactured HP products may contain remanufactured parts, which are equivalent to new in performance.

HP software and firmware products that are designated by HP for use with a hardware product are warranted for a period of one year from date of shipment to execute their programming instructions when properly installed. If you send us notice of defects in materials workmanship during the warranty period, we will repair or replace these products, so long as the defect does not result from buyer-supplied hardware or interfacing. The warranty period is controlled by the warranty statement included with the product and begins on the date of shipment.

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For more information about the HP 16600A and 16700A Series logic analysis systems, visit our web site at:
http://www.hp.com/go/las-data
For more information about Hewlett-Packard Test & Measurement products, applications, services, and for a current sales office listing, visit our web site at:
http://www.hp.com/go/tmdir
You can also contact one of the following centers and ask for a test and measurement sales representative.

United States:
Hewlett-Packard Company
Test and Measurement Call Center
P.O. Box 4026
Englewood, CO 80155-4026
1 800 452 4844

Canada:
Hewlett-Packard Canada Ltd.
5150 Spectrum Way
Mississauga, Ontario
L4W 5G1
(905) 206 4725

Europe:
Hewlett-Packard
European Marketing Centre
P.O. Box 999
1180 AZ Amstelveen, The Netherlands
(31 20) 547 9900

Japan:
Hewlett-Packard Japan Ltd.
Measurement Assistance Center
9-1, Takakura-Cho, Hachioji-Shi,
Tokyo 192, Japan
Tel: (81) 426 56 7832
Fax: (81) 426 56 7840

Latin America:
Hewlett-Packard
Latin American Region Headquarters
5200 Blue Lagoon Drive
9th Floor
Miami, Florida 33126
U.S.A.
Tel: (305) 267-4245/4220
Fax: (305) 267-4288

Australia/New Zealand:
Hewlett-Packard Australia Ltd.
31-41 Joseph Street
Blackburn, Victoria 3130, Australia
Tel: 1 800 629 485 (Australia)
0800 738 378 (New Zealand)
Fax: (61 3) 9210 5489

Asia Pacific:
Hewlett-Packard Asia Pacific Ltd.
17-21/F Shell Tower, Times Square,
1 Matheson Street, Causeway Bay,
Hong Kong
Tel: (852) 2599 7777
Fax: (852) 2506 9285

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