The HP B4620A Software Analyzer Tool Set

For the HP 16505A Prototype Analyzer

Software Analysis for the Entire Design Team

Use the Power of a Logic Analyzer to Solve Your Embedded Software Problems

As a software developer, you are responsible for the flawless execution of your software in its real-time environment. You must ensure that both input and output data-flow processing and system time constraints are tested to design specifications. Valid measurements can only be performed on the actual hardware prototype. This often requires close collaboration with your hardware design team members.

Standard software debug methods are commonly based on two concepts. The first concept uses debugger breakpoints to stop system execution. This gives you complete visibility of program status and variable content, but since one part of the software is halted, the system may not be able to manage data flow or to respond to some external stimuli. This can result in data loss.

Another debug concept provides an audit trail of code execution without halting the system. This method, called code instrumentation, involves adding instructions to the code to generate a "trace" of its execution. However, too much instrumentation can also become intrusive, altering your software's behavior and its real-time characteristics.

The HP B4620A completes your software development environment by providing multiple views of code execution and variable content under severe real-time constraints.

Figure 1.
The HP B4620A tool set is an optional software package for the HP 16505A prototype analyzer.

Based on the HP 16500C logic analysis system, the HP B4620A software analyzer tool set's main advantage for software designers is its ability to observe software execution by a microprocessor without halting the system or adding instructions to the code.

Because the HP B4620A works with the same system used by your hardware design team, the HP B4620A software analyzer tool set eliminates unnecessary equipment and setup duplication, and provides consistency between hardware and software debug tools. This powerful tool provides an easy path to tightly-correlated test data from both the hardware and software development disciplines, throughout the hardware-software integration phase of product development.

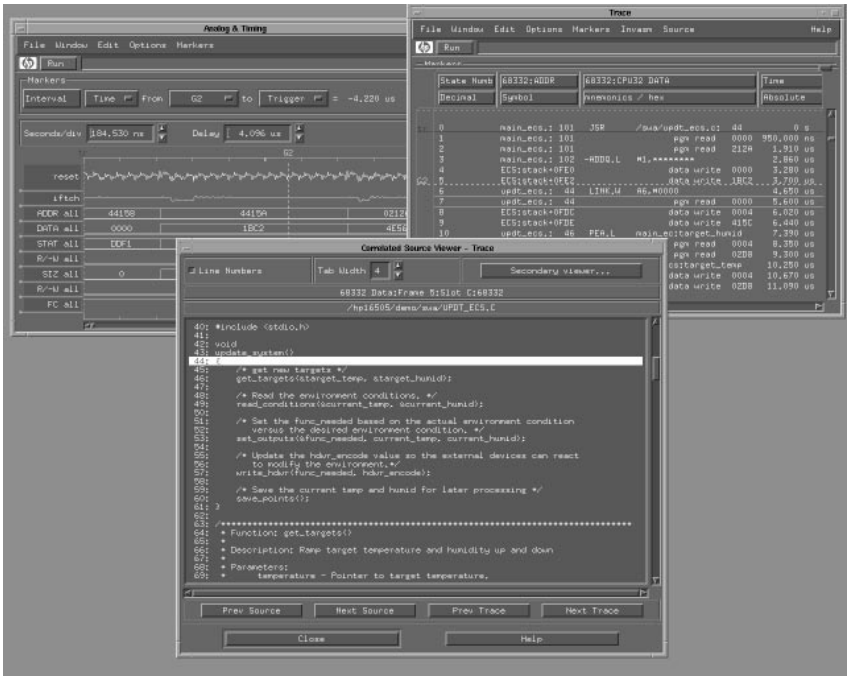

Figure 2.
Get a real-time window into system behavior with source code level viewing of executed code.

The HP B4620A software analyzer and the HP 16505A prototype analyzer can help you answer the following questions:

Code Execution

- What happened just before the system crashed?
- What source code was executed at a specific point in time?
- What is the exact time (not computed time) between two user-defined system events?
- What is the execution history leading up to or occurring after an area of interest?

Data Tracking

- What is the exact history of a variable's value over time?
- Which routine(s) corrupted my data?

Software-Hardware Integration

- What is the root cause of this system failure–hardware or software?
- Are timing anomalies found by the hardware engineer the cause of my software problems?
- Are the hardware engineer and I working on the same problem?
- What portion of my source code correlates to the problem the hardware engineer reported?

Product Description

The HP B4620A software analyzer is an optional software package for the HP 16505A prototype analyzer. It postprocesses real-time microprocessor traces acquired by HP 16550-series logic analysis modules coupled with preprocessors.

The HP B4620A provides correlation between a microprocessor execution trace window and the corresponding high-level source code window. The HP B4620A software analyzer works by using the information provided in your object file to build a database of source files, line numbers and symbol information.

Once the real-time trace is acquired by the logic analyzer, you can navigate the trace in assembly level or source-code level, with standard debugging commands such as source level 'step' or assembly level 'step'.

"Step Backward" from Problem to Cause

You can easily locate the cause of a problem by "stepping backward" from the point where you see a problem to its root cause.

Simultaneously View High-Level Source Code and Microprocessor Mnemonics

The HP B4620A software analyzer is tightly coupled with the inverse assembly listing. For popular processors, the HP filtering scheme allows you to control the operation of the inverse assembler to show only the information of interest to you. For example, you may want to filter out unexecuted code fetches.

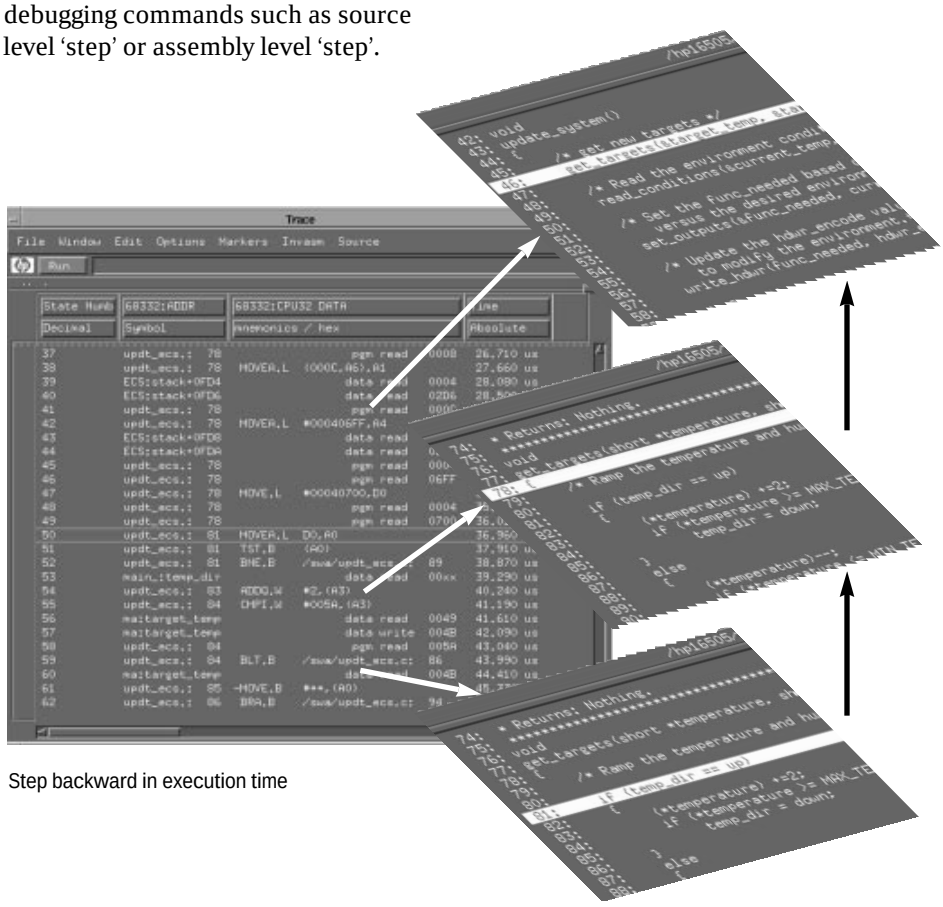

Figure 3.
Easily locate the cause of a problem by "stepping backward" from the point where you see a problem.

Triggering and Storage Capabilities

Since a microprocessor executes millions of instructions per second, it is important to be able to control the starting or ending point of trace acquisition. All HP 16500-series state and timing analysis modules supported by the HP B4620A provide powerful triggering capabilities to control exactly where and when you acquire information.

Trigger points can be selected by a mouse click on any source line of interest. You can view any source file in the source browser, then simply choose the source line about which you want to capture data.

Many software defects are due to data corruption. Use the HP B4620A to set the trigger point at a specific static variable access or modification by the embedded software and see why and where the corruption occurred.

The analyzer filtering capabilities allow you to focus on a specific part of the executed software. This feature lets you analyze a function's behavior without viewing calls to subroutines or interrupts.

To define the events you want to analyze or filter, a symbol navigation utility enables you to quickly select function or variable names from very large symbol files created by large software projects.

Figure 4. Easily find your symbols using the browser window.

Hardware-Software Integration

In the hardware-software integration phase, communication problems may arise when team members try to compare results obtained from different analysis tools.

Since the HP B4620A tool set works with a standard HP logic analyzer, both hardware and software designers can work on the same real time data. Moreover, this tool can set the trigger from a hardware event, and look at the software behavior around this event.

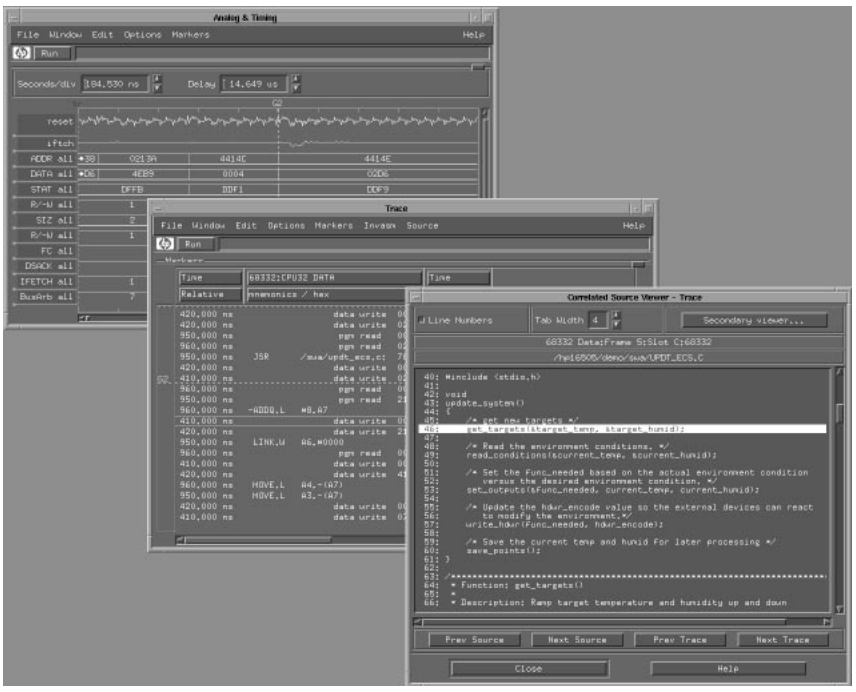

Figure 5. Time-correlated waveform and source code windows enable you to isolate the root cause of your system integration problems.

Time Measurements

Since every trace is non-intrusive, and every event captured in the trace is time-stamped, software designers can easily measure time duration between two points of their software, or between any hardware event (such as an interrupt), and any source line.

Easy Integration with Your Software Environment

Connection to Microprocessors

The HP B4620A supports multiple processors with non-intrusive preprocessors that provide reliable, fast and convenient connections to your target system. See page 7 for the list of supported processors.

Object Files and Symbols

To provide source line referencing, the HP B4620A software analyzer tool set reads many object file formats. See the Product Characteristics section on page 6 for the complete list of supported formats.

The HP B4620A software analyzer tool set supports multiple loaded files as well as address offsets, to offer source code level view of dynamically-loaded software execution or code moved from ROM to RAM during a boot-up sequence.

You can also specify alignment conditions for processors that don't include lower address bits on the bus. This is necessary if your processor uses bursting or byte enables when fetching instructions.

Figure 6. Easily connect to your target system with an HP preprocessor for your specific microprocessor or bus.

Platforms and Networks

- Remotely access the HP B4620A software analyzer tool set from workstations, X-Terminals or PCs running X11 emulation software, or use an SVGA monitor to locally control and view the measurements at your lab bench.
- Access the source files via the standard network capabilities of the HP 16505A prototype analyzer such as FTP or NFS.
- Access your software development environment (compiler, debugger) from your HP 16505A prototype analyzer via Telnet and X-Windows client/server protocols.

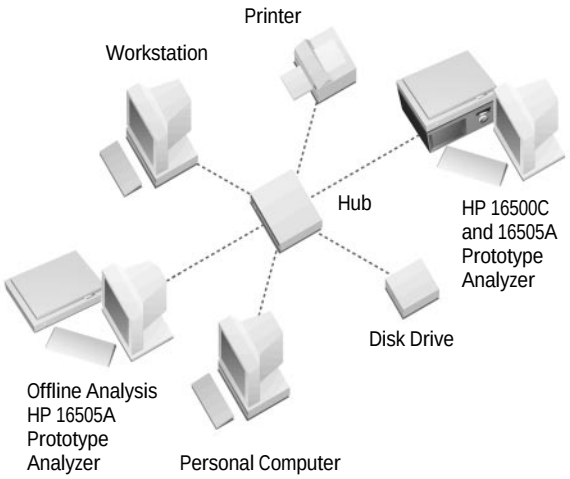

Figure 7. Networked measurement tools enable design team members to view data from the same target system.

Installation

The HP B4620A software analyzer tool set software and documentation are pre-installed and locked in the HP 16505A. By placing an order for the HP B4620A, you can obtain a password that allows you immediate use of the HP B4620A. A free 21-day trial period allows you to evaluate the HP B4620A or any tool set as your work schedule permits. To enable this demo period, start the HP 16505A prototype analyzer, then click on the License Management button in the Session Manager window. Type “demo” in the HP B4620A product password field and select “Verify Passwords.”

Modularity

Once installed in the HP 16505A prototype analyzer, the HP B4620A software analyzer can support any new processor by changing preprocessors and verifying object file compatibility. Multiple-processor systems are also supported.

Product Characteristics

Source Display

- Two source windows per trace display.
- First source window correlated with trace disassembly listing.
- Second source window used for source browsing.
- Triggering configuration can be set from both source windows.
- For multiple-processor systems, each trace window can be correlated to a source window.

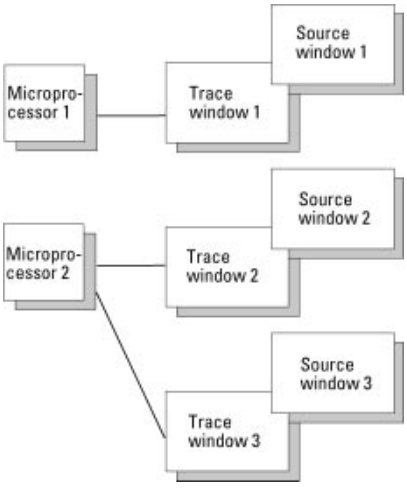

Figure 8. For multiple-processor systems, each trace window can be correlated to a source window.

Object File Format Compatibility

- HP/MRI IEEE695, Intel OMF86, Intel OMF286, Intel OMF386 (which supports Intel80486 and Pentium® Language Systems), Intel OMF96, ELF/DWARF, TI_COFF, Cygnus a. out.

Source File Access

- The HP B4620A software analyzer tool set must be able to access source files to provide source line referencing.
- Source files can reside in multiple directories on both the HP 16505A internal disk or on NFS-mounted disks. To display the source file, the HP B4620A first looks for the source path name in the object file, follows the path to access the source file, and if not found, looks for the source file in alternate user-defined directories.

Ordering Information

Required System Components

- HP 16505A prototype analyzer with system code version R1.20 (or greater)
- HP 16500C logic analysis system mainframe
- Any HP 16550A, 16554A, 16555A/D, or 16556A/D measurement module.

Processor Support

The HP B4620A software analyzer tool set supports many of the most popular embedded microprocessors. For the most current information about supported processors, please call your HP sales representative.

Ordering and Shipment

When the HP B4620A tool set is ordered simultaneously with the HP 16505A, the HP B4620A is shipped installed and ready to run.

HP Model Number	Description
HP B4620A	Software analyzer tool set software Proof-of-receipt is provided by the SW Entitlement Certificate.
Option 0D4	Do not install tool set on an HP 16505A. (Instructs factory to ship product separate from any HP 16505A system on the order.)

HP B4620A Software Analyzer Tool Set Licensing Information

License Policy

The HP 16505A prototype analyzer tool set software is licensed for single-unit use only. Licenses are valid for the life of the tool set. Software updates do not affect the license.

Nodelock Mode

Tool set licenses are shipped or first installed in nodelock mode. Nodelock mode allows use of the tool set license only on the node (HP 16505A prototype analyzer) on which it is installed. Tool sets ordered with an HP 16505A prototype analyzer will be installed with a permanent password and are ready to run. For tool sets purchased as upgrades to existing prototype analyzers, you must contact the HP Password Center via e-mail, fax or phone to obtain a password. Password turn-around time is generally the next business day.

Temporary Licenses

A single temporary license is available for any tool set type not previously licensed on a node. The temporary license is valid for 21 calendar days from first entry of the password in the License Management window of the HP 16505A. The temporary password for any node on any tool set is “demo”.

License Management

Licenses are managed from the License Management window under the Session Manager. License management does not require Unix® expertise. Licenses are reserved at the start of a measurement session. They remain in use until the measurement session is terminated.

Password Backup

Passwords can be backed up to a floppy disk or network file.

For more information on Hewlett-Packard Test & Measurement products, applications or services please call your local Hewlett-Packard sales offices. A current listing is available via Web through Access HP at http://www.hp.com. If you do not have access to the internet, please contact one of the HP centers listed below and they will direct you to your nearest HP representative.

United States:
Hewlett-Packard Company
Test and Measurement Organization
5301 Stevens Creek Blvd.
Bldg. 51L-SC
Santa Clara, CA 95052-8059
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 9858

Japan:
Hewlett-Packard Japan Ltd.
Measurement Assistance Center
9-1, Takakura-Cho, Hachioji-Shi,
Tokyo 192, Japan
Tel: (81-426) 48-0722
Fax: (81-426) 48-1073

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

Australia/New Zealand:
Hewlett-Packard Australia Ltd.
31-41 Joseph Street
Blackburn, Victoria 3130
Australia
1 800 629 485

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

Technical information in this document is subject to change without notice.

Printed in U.S.A. 10/1/96
5964-9333E