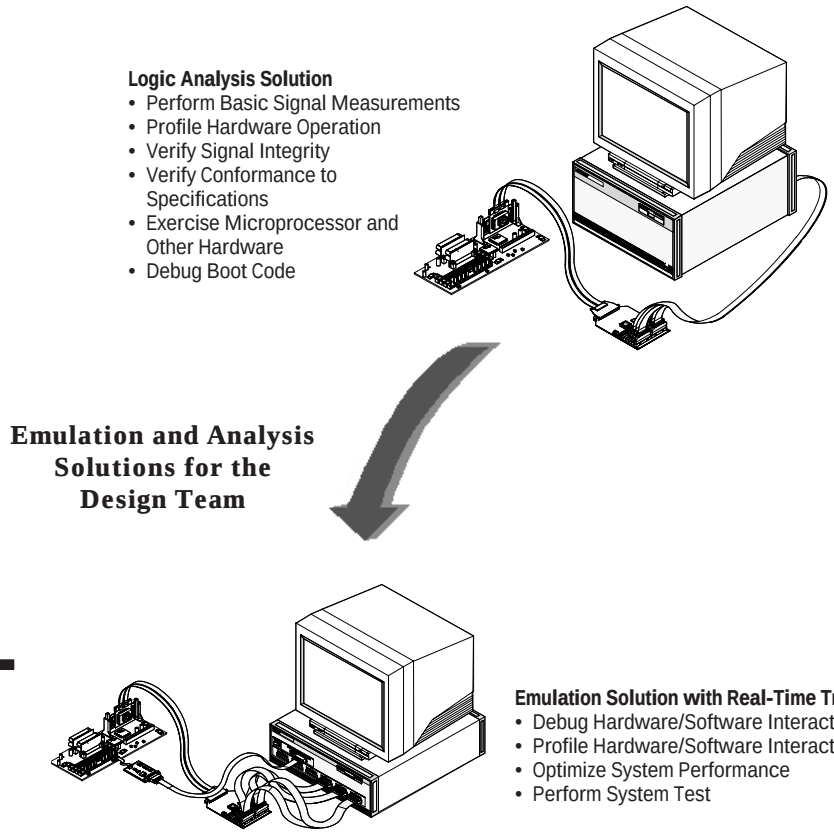
Emulation and Analysis Solutions for Intel Pentium II® Processors with MMX™ Technology

Product Overview



Quickly and accurately determine the root cause of your team's most difficult hardware and system integration problems with Hewlett-Packard's powerful emulation and logic analysis solutions.

HP's emulation and analysis solutions for the Intel Pentium II processor with MMX Technology combine the powerful tools of run control, code download, and logic analysis for a complete, scalable system development environment.

Debug and Integrate Computer Systems

With a scalable solution from HP, design team members can customize HP's product offering to meet their unique requirements. Solutions range from logic analysis to emulation with real-time trace to solve today's most complex Pentium II processor system design problems. HP's solutions are designed to meet your needs today and protect your investment as your needs change in the future.

With logic analysis providing the timing and state analysis of the system, you can monitor microprocessor activity in relation to other important system signals such as a PCI bus, other microprocessors, or I/O devices. Traditional emulation systems don't allow you to time-correlate events across your entire system using timing, analog, and state analysis for your most difficult integration problems.

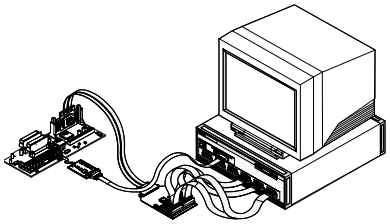
The logic analyzer is nonintrusive, allowing you to run your target system at full speed. The logic analyzer passively monitors the signals in the system. A system trace, up to 2 M deep, can be combined with complex triggering to find the toughest problems.

HP Scalable Solutions

HP emulation and logic analysis solutions are scalable for each member of the digital design team. The following are two typical configurations for firmware/software debug, hardware debug, and system integration.

Components of these solutions include logic analyzer, emulation module, analysis probe, inverse assembler, and system performance analysis tool set.

Information on each of these components is included in this document.



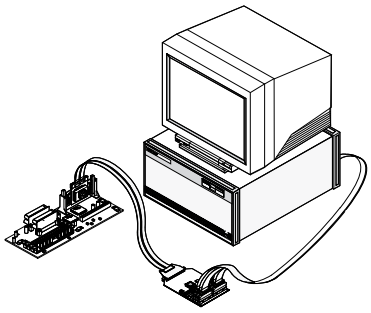
System Features

Emulation Solution with Real-Time Trace

- Microprocessors run control on your target system
- Real-time logic analysis trace solution:
  - Assembly level trace
- Pentium II processor probing

System Components and Functionality

- HP 16600A or 16700A Series Logic Analysis System:
  - Capture and analyze code flow and data flow without halting the target system
  - Time-correlate analog, timing, and state events across your entire system
  - Monitor microprocessor activity in relation to system buses, other microprocessors, or I/O devices
- Inverse Assembler: (see p. 6)
  - Use with Slot 1 compatible packages
  - Disassemble trace listing into Pentium II processor mnemonics
- Emulation Module: (see p. 3)
  - Download code, view and modify memory, and view registers from debugger interface on your target system or evaluation board



Logic Analysis Solution

- Real-time logic analysis trace solution:
  - Assembly level trace
- Slot 1 probing solution

- HP 16600A or 16700A Series Logic Analysis System:
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  - Time-correlate analog, timing, and state events across your entire system
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- Inverse Assembler: (see p. 6)
  - Use with Slot 1 compatible packages
  - Disassemble trace listing into Pentium processor mnemonics

Microprocessor	Package Type	Microprocessor Clock Speed	Emulation Solution	Emulation Solution with Real-Time Trace	Logic Analysis Solution
Pentium Processor with MMX Technology	Slot 1	Up to 300 MHz	X	X	X

Table 1: Emulation and Analysis Solutions for Intel Pentium II Processor with MMX Technology

Emulation Module

The emulation module is an integrated plug-in for the HP 16600A and 16700A Series logic analysis systems.

The emulation module helps you debug your code by providing run control, code download, and memory/register display and modification. You can control program execution through single stepping, start/stop, run/break, and set/modify breakpoints, or run code at full speed in the target.

The emulation module can be controlled by the emulation control interface provided with the logic analyzer. The emulation control interface is described on page 4.

The HP emulation module is controlled over your local area network (LAN) and connects to your target through the 30-pin Pentium II processor debug port connector.

Unlike traditional emulators, the modules provide more stable operation by accessing only the debug pins of the microprocessor and they do not affect other signals. With these solutions, you don't need a serial port on your target system to download code. These solutions don't require user memory, unlike ROM monitors.

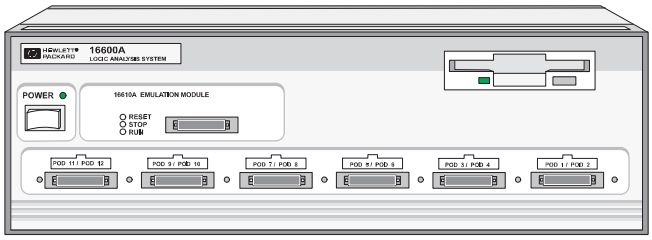


Figure 1: HP 16600A Logic Analysis System with Integrated Emulation Module

Emulation Control Interface

The emulation module integrated into the logic analysis system can be controlled directly by the emulation control interface. With the emulation control interface, you can easily display and modify contents of microprocessor registers, system memory, and I/O. You can also view memory code segments disassembled into familiar Intel Pentium II processor MMX Technology assembly instructions.

From the run control window you can instruct the microprocessor to run, break, reset, or single-step. You can also choose whether the memory, I/O, and register displays are updated for breaks and single steps.

Writing command files that set up registers, memory, and I/O in your system is easy with the command language. Once the command file is written, save it on the logic analyzer hard disk. When you want to initialize your hardware system to a particular state, simply recall and execute the command file.

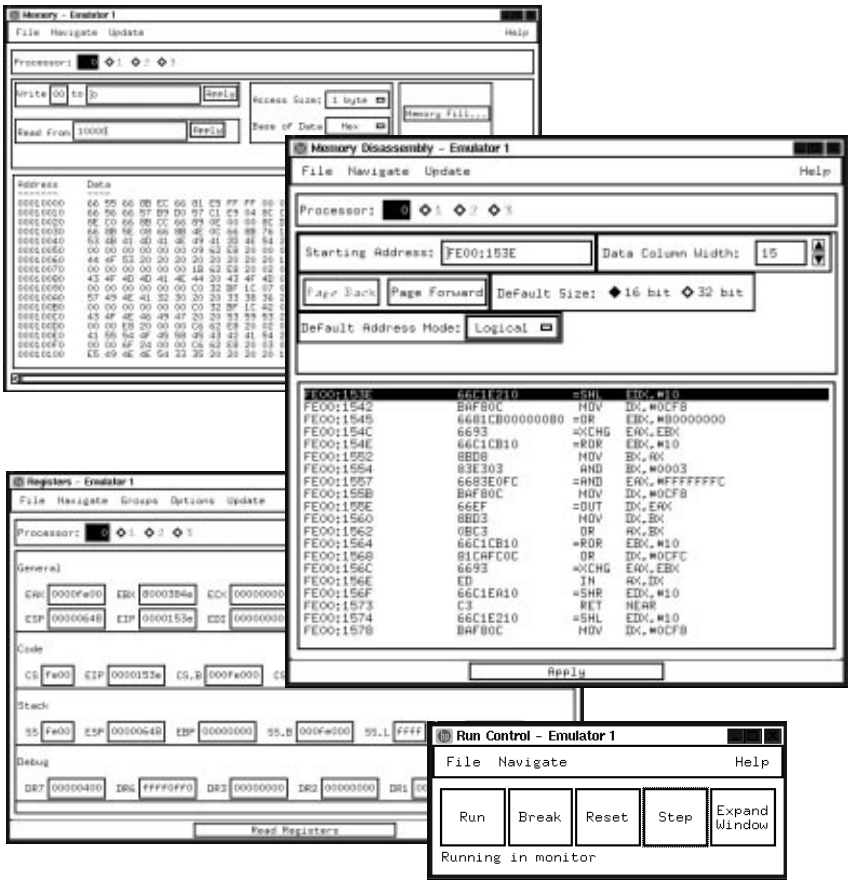


Figure 2: Emulation Control Interface

Emulation Module Triggering Integration with Logic Analyzer

With the emulation module, you can use the powerful triggering of the HP 16600A and 16700A Series logic analysis systems to halt the processor on events on the microprocessor, system buses, or other external events. The emulation module will also trigger the logic analyzer when a breakpoint is hit. This provides powerful correlation between the emulation interface environment and logic analysis.

Emulation Module Target Connection Information

Simply connect the control port of the module to the Pentium II processor debug port on your board. The emulation module supports the 30-pin Pentium II processor debug port connector. For more details regarding the Pentium II processor debug port refer to the *Intel Pentium II Family User's Manual, Data Book.*

Real-Time Trace Analysis

Real-time trace analysis consists of a physical connection to signals on the Intel Pentium II processor, acquisition of relevant data, and analysis of the real-time captured bus information.

Physical connection to the Pentium II processor bus is made through an HP analysis probe.

The real-time trace solutions available for the Intel Pentium II processor include inverse assembly and system performance analysis.

For information on the data acquisition modules for the HP 16600A and 16700A Series logic analysis systems, please refer to related HP literature on page 10.

Pentium Processor	Supported Speeds	Probing Solution	Real-Time Trace Solutions
Pentium II Processor with MMX Technology	Up to 300 MHz	Analysis Probe • Slot 1 compatible • Inverse Assembler included	Inverse Assembly • Disassembly of bus information into Pentium II processor mnemonics • Pentium II processor configuration files for logic analyzer System Performance Analysis: • Statistical performance measurements on trace data • State overview, state interval, and time overview measurements

Table 2: Real-Time Trace and Probing Alternatives

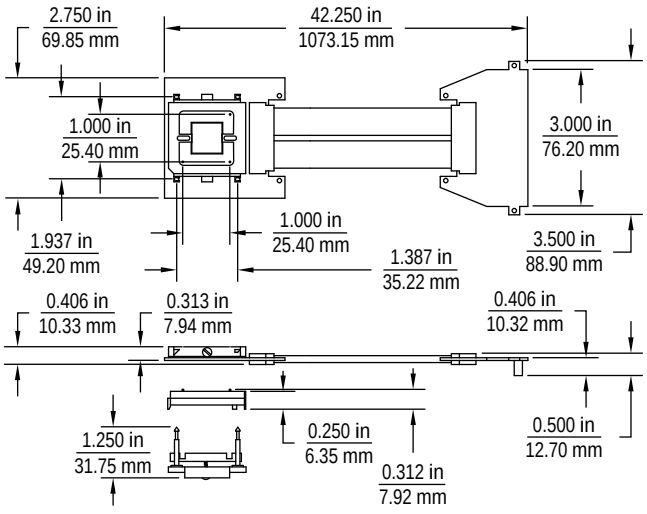


Figure 3: HP Analysis Probe Cable, Mechanical Dimensions

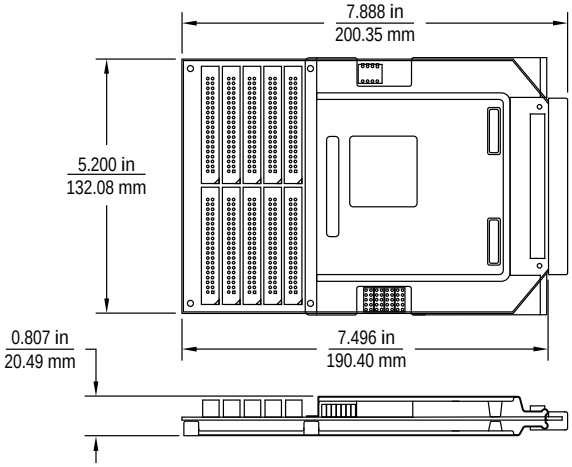


Figure 4: HP Analysis Probe Board, Mechanical Dimensions

Inverse Assembler

The inverse assembler quickly configures the logic analyzer by labeling address, data, and status signals for the Pentium II processor. Additionally, the inverse assembler gives you Pentium II processor mnemonics in the trace listing for easy correlation between captured data and target code.

The inverse assembler provides filters and color coding to show and/or suppress different types of instructions such as data reads, data writes, and I/O reads and writes.

The inverse assembler has several modes of operation, depending on your processor configuration. The inverse assembler provides Pentium II processor mnemonics when the cache is disabled and branch trace messages (BTM) are enabled.

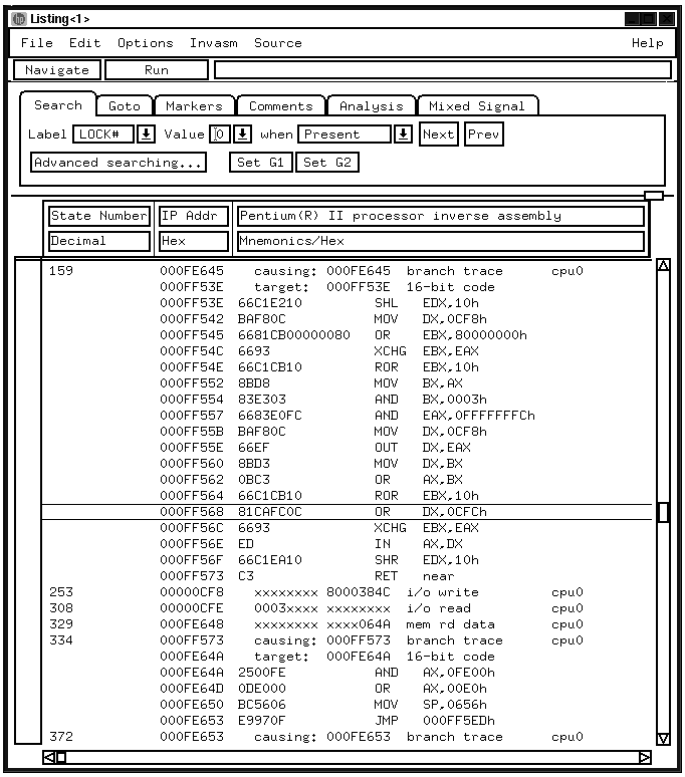


Figure 5: Inverse Assembly Listing

System Correlation

With the HP logic analysis systems, you can time-correlate bus information from other microprocessors or bus interfaces in your target, such as PCI, with the Pentium II processor. Analysis probes are available for other microprocessors in your system. (Contact your local HP Test and Measurement sales office or visit our web site at, http://www.hp.com/go/las-data for more information).

HP B4600B System Performance Analysis Tool Set

The system performance analyzer (SPA) is an optional software package for the HP 16600A and 16700A Series logic analysis systems. The SPA tool set provides statistical performance measurements on your system such as state overview, state interval, time interval, and time overview. The same symbols used in the inverse assembler provide support for the state interval measurements, as shown in figure 6.

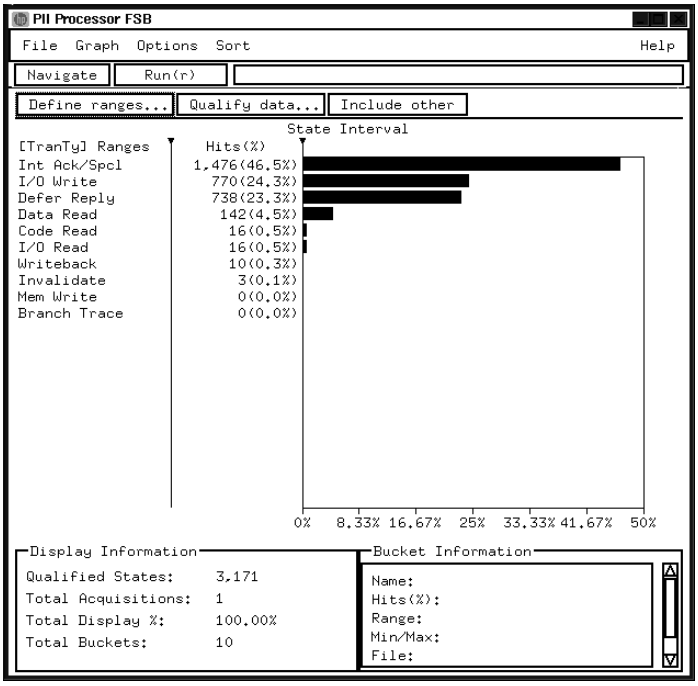


Figure 6: State Interval Measurement from the HP System Performance Analysis Tool Set

Analysis Probe Modes of Operation

State Mode

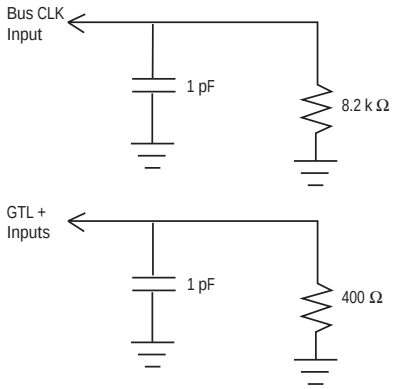
In state-per-clock mode, address, data, and status are captured on each bus clock.

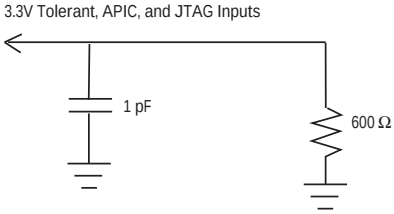
Timing Mode

Timing analysis is supported. All processor signals are buffered and passed on to the logic analyzer pods.

Analysis Probe Technical Specifications

Processor Package	Pentium II processor Slot 1 Single Edge Connector (S.E.C.) Cartridge
Signal Line Loading	

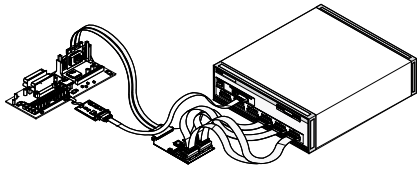


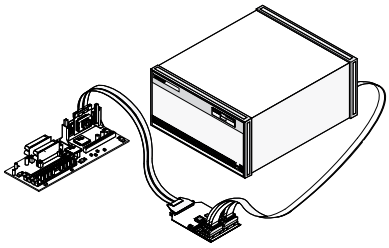


Clock Frequency	66 MHz maximum for external BCLK
Target Signal Amplitude	800 mV p-p minimum for GTL + signals
Timing Analysis	3 ns channel-to-channel skew (typical)
Power Requirements	Supplied by the logic analyzer
Environmental	
Temperature	
Operating:	0 to 55°C (+32 to +131°F)
Nonoperating:	-40 to 75°C (-40 to +167°F)
Altitude	
Operating:	4,600m (15,000 ft)
Nonoperating:	15,300m (50,000 ft)
Humidity	Up to 90% noncondensing. Avoid sudden temperature changes that could cause condensation within the instrument.

System Configuration and Ordering Information

HP makes it easier and more economical to order your emulation or analysis solution by providing solution product numbers. The table below shows the system components you need to order and what is included in each one. The product numbers do not include logic analysis. The HP 16600A and 16700A Series logic analysis systems need to be ordered separately. If you want to configure or upgrade your system with individual products, see page 9 for individual product number information.





Solution	Products to Order	Included Components
Emulation Solution with Real-Time Trace		
• HP 16600A or 16700A Series Logic Analysis System	• Refer to HP publication number 5966-3148E for logic analyzer configuration • Supported logic analyzers: - HP 16600A - Two HP 16650A or three HP 16555/556 A/D cards	
• Emulation Solution - Pentium II Processor with MMX Technology	• HP E5901A #510 • HP E2466C	• Emulation Module • Analysis Probe • Inverse Assembler
• Optional System Performance Analysis Tool Set	• HP B4600B	
Logic Analysis Solution		
• HP 16600A or 16700A Series Logic Analysis System	• Refer to HP publication number 5966-3148E for logic analyzer configuration • Supported logic analyzers: - HP 16600A - Two HP 16650A or three HP 16555/556 A/D cards	
• Analysis Probe Solution - Pentium II Processor with MMX Technology	• HP E2466C	• Analysis Probe • Inverse Assembler
• Optional System Performance Analysis Tool Set	• HP B4600B	
• Optional Emulation Module	• HP E5901A #510	

Individual Components and Ordering Information

Description	HP Product
Analysis Probe	HP E2466C
Emulation Probe	HP E5900A #510
Emulation Module	HP E5901A #510
System Performance Analyzer	HP B4600B

Training and Consulting

Digital Systems Consultants can help you maximize your emulation and analysis system through training and consulting. Digital Systems Consultants are experienced in debugging complex digital hardware/software problems and hardware/software integration.

HP training may be delivered through scheduled courses, on-site classes, or one-on-one consulting. HP has courses for the beginner as well as advanced users migrating from the HP 16500 Series system. Call 1-800-593-6632 in the U.S. for information about training schedules and location or to register. For training offered in other geographies and languages, consult the HP Test and Measurement education web site: http://www.hp.com/go/tmeducation.

For consulting services, contact your local HP Test and Measurement sales office. An HP Digital Systems Consultant can help you solve tough digital debug problems by showing you how to apply HP tools and debug best practices. Topics covered can include:

- System Installation
- Complex Triggering
- Multiple Bus Analysis
- Source-Line Referencing
- System Performance Analysis
- Instrumenting Code to Solve Specific Issues
- Bus Signal Timing Analysis
- Signal Integrity Analysis
- HP 16700A/HP 16600A Networking

Topics related to debug of Pentium II processor-based targets can include:

- Triggering Techniques to Handle Transaction Tracking and Cache Related Issues
- Effective Use of Branch Trace Messaging

Related HP Literature	Pub. Number
HP 16600A and 16700A Series Logic Analysis System Mainframes, Product Overview	5966-3107E
HP Logic Analysis Systems Upgrade, Product Overview	5966-3059E
System Configuration for the HP 16600A and 16700A Series Logic Analysis Systems, Configuration Guide	5966-3148E
State and Timing Analyzers for the HP 16500C Logic Analysis System, Product Overview	5962-7245E

Warranty Information

These Hewlett-Packard products have a warranty against defects in material and workmanship for a period of one year from date of shipment. During this warranty period, Hewlett-Packard Company will, at its option, either repair or replace products that prove to be defective.

Pentium® is a registered trademark of Intel Corporation.
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For more information about the HP 16600A and 16700A Series logic analysis systems visit our web site, 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, 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)
Tel: 0 800 738 378 (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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Printed in U.S.A. 04/98
5966-3880E