
I/O Function Guide

Publication number 54652-97002

July 1996 (pdf version Dec 1998)

© Copyright Hewlett-Packard Company 1991-1996
All rights reserved

Interface Modules for HP 54600-Series Instruments

Contents

To install the interface module	6
Print/Utility Menu	8
To select your printer or plotter	9
To setup your printer or plotter	11
To set formfeed	12
To print or plot gray scale	13
Gray scale printing	13
Gray scale plotting	14
To print or plot scale factors	15
To set HP-IB addresses	17
Instrument address	17
Printer Address	17
To set RS-232 baud rate and handshake	18
Baud rate	18
Handshake	18

Introduction

These modules provide the means for remote communication with HP 54600-series instruments. For programming specifics, refer to the Programmer's Guide or Programmer's Reference shipped with your oscilloscope or logic analyzer. The hardcopy process does not interrupt front-panel operation of the instrument. While any of the interfaces are connected to the rear panel of the instrument, the instruments trace memories become nonvolatile and are saved when the power is removed from the instrument.

HP 54650A HP-IB Interface Module

- Full programmability
- Hardcopy output

HP 54651A RS-232-C Interface Module

- Full programmability
- Hardcopy output

HP 54652A Parallel Interface Module

- Hardcopy output

HP 54652B Parallel/RS-232-C Interface Module

- Full programmability
- Hardcopy output
- Connection to both an RS-232-C controller and a parallel printer at the same time.

HP 54655A Test Automation Module (HP-IB) and HP 54656A Test Automation Module (RS-232-C)

- Full programmability.
- Hardcopy output.
- 100 nonvolatile sequence steps.
- 40 nonvolatile mask templates.

- 2 nonvolatile trace memories.
- Built-in automatic mask generation and mask editing capabilities.
- Protection of test sequence and mask template setup through software.

The HP 54656A has the following additional features:

- External input lines for Next, Previous and Reset control.
- 5 user-definable output lines.
- Recessed protection switch.

**HP 54657A Measurement/Storage Module (HP-IB),
HP 54658A Measurement/Storage Module (RS-232-C), and
HP 54659B Measurement/Storage Module (RS-232-C/Parallel)**

- Full programmability.
- Hardcopy output.
- Three additional automatic voltage measurements (amplitude, preshoot, and overshoot).
- Two additional automatic time measurements (delay and phase angle).
- User defined measurement thresholds of 10%/90%, 20%/80%, or selected voltage values.
- Two additional cursor measurements (voltage in percent and time in degrees).
- Two additional cursor measurement sources (math function 1 and 2).
- Waveform math functions (addition, subtraction, multiplication, differentiation, integration, and FFT).
- Time and date tagging of hardcopy and nonvolatile memories.
- Three nonvolatile trace memories.
- Additional 64K of nonvolatile trace memory (with data compression).

The HP 54659B has an additional parallel output connector which allows the module to be connected to both an RS-232-C controller and a parallel printer at the same time.

Interface I/O functions

Interface module	Interface connection	I/O Function
HP 54650A	HP-IB	HP-IB controller <u>or</u> HP-IB output to printer/plotter
HP 54651A	RS-232-C	RS-232-C controller <u>or</u> RS-232-C output to printer/plotter
HP 54652A	Parallel	Parallel output to printer
HP 54652B²	RS-232-C and parallel	RS-232-C controller <u>and</u> parallel output to printer, or RS-232-C output to printer/plotter
HP 54655A^{1,3}	HP-IB	HP-IB controller <u>or</u> HP-IB output to printer/plotter
HP 54656A^{1,3}	RS-232-C	RS-232-C controller <u>or</u> RS-232-C output to printer/plotter
HP 54657A¹	HP-IB	HP-IB controller <u>or</u> HP-IB output to printer/plotter
HP 54658A¹	RS-232-C	RS-232-C controller <u>or</u> RS-232-C output to printer/plotter
HP 54659B^{1,2}	RS-232-C and parallel	RS-232-C controller <u>and</u> parallel output to printer, or RS-232-C output to printer/plotter

¹ The enhanced features of the HP 54655A/56A/57A/58A/59B are not available to the HP 54620A/C Logic Analyzer. These modules supply enhanced oscilloscope programming functions. The I/O functions of these modules will function when used with the HP 54620A/C Logic Analyzer.

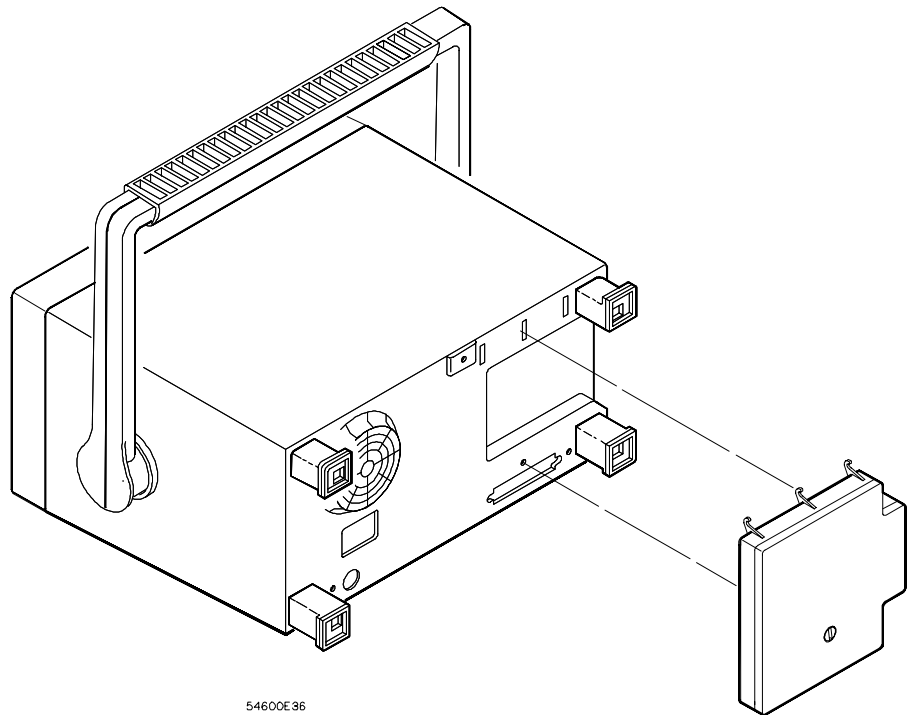
² The 54652B and HP 54659B are not compatible with the HP 54600A, HP 54601A, HP 54602A, and HP 54610A.

³ The 54655A and HP 54656A are not compatible with the HP 54615B, HP 54615B, HP 54645A and HP 54645D.

To install the interface module

- 1 Turn off the instrument.
- 2 Install the module as shown below.

The instrument is reset after installation. The installed interface module is shown in the message displayed when your turn on the instrument. The I/O functions (controller and hardcopy) are available by pressing the instrument front-panel **Print/Utility** key.



Installation of interface module to HP 54600-Series instrument

Interface Cables

Interface module	Cable function (Instrument to ..)	Module connector	Printer/plotter/ controller connector	HP part number	Cable Length
HP 54650A, HP 54655A^{1,3}, HP 54657A¹ (HP-IB)	Printer/plotter/ controller	HP-IB	HP-IB	HP 10833A	1 m (3.3 ft)
				HP 10833B	2 m (6.6 ft)
				HP 10833C	4 m (13.2 ft)
				HP 10833D	0.5 m (1.6 ft)
HP 54651A, HP 54656A^{1,3}, HP 54658A¹ (RS-232-C)	Printer/plotter/ controller	25-pin F	25-pin F	HP 13242G	5 m (16.7 ft)
				HP 17255M	1.5 m (4.9 ft)
				Controller	25-pin F
	Controller			HP 17255D	1.5 m (4.9 ft)
	Controller	25-pin F	9-pin M	HP 24542G	3 m (9.9 ft)
HP 54652A (parallel output only)	Parallel printer	parallel	parallel	C2950A	2 m (6.6 ft)
				C2951A	3 m (9.9 ft)
HP 54652B², HP 54659B^{1,2} (RS-232-C and parallel output)	RS-232-C controller	9-pin M	25-pin M	HP 34398A	2.5 m (8.2 ft)
	RS-232-C controller	9-pin M	9-pin M	HP 34398A	2.5 m (8.2 ft)
	RS-232-C printer/ plotter/controller	9-pin M	25-pin F	HP 34398A + HP 34399A adapter kit	2.5 m (8.2 ft)
	Parallel printer	parallel	parallel	C2950A	2 m (6.6 ft)
				C2951A	3 m (9.9 ft)

¹ The enhanced features of the HP 54655A/56A/57A/58A/59B are not available to the HP 54620A/C Logic Analyzer. These modules supply enhanced oscilloscope programming functions. The I/O functions of these modules will function when used with the HP 54620A/C Logic Analyzer.

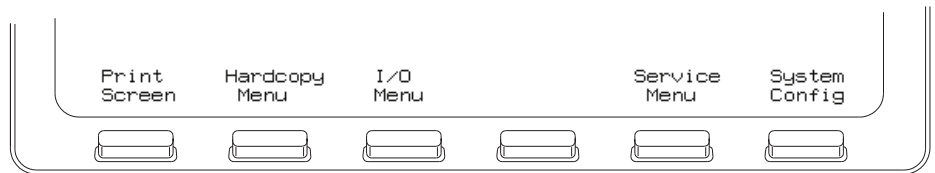
² The 54652B and HP 54659B are not compatible with the HP 54600A, HP 54601A, HP 54602A, and HP 54610A.

³ The 54655A and HP 54656A are not compatible with the HP 54615B , HP 54615B, HP 54645A and HP 54645D.

Print/Utility Menu

The Print/Utility menu of your HP 54600-series instrument allows you to select I/O functions for the module you have connected to your instrument. The module can have an HP-IB, RS-232-C, parallel, or combination RS-232-C/parallel interface.

- To display this menu, press **Print/Utility** .



Print/Utility Menu

Print Screen pressing this softkey sends the screen image to your printer or plotter.

Interface setup

In many cases, the interface will need to be configured before attempting to print. If you are setting up an HP-IB module, refer to "To set HP-IB addresses" on page 17. If you are setting up an RS-232-C module, refer to "To set RS-232 baud rate and handshake" on page 18.

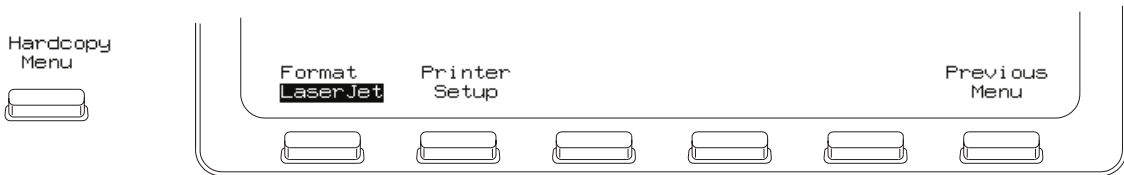
Hardcopy Menu this softkey allows you to select your printer or plotter type and to set parameters for that printer or plotter.

I/O Menu this softkey allows you to set up parameters for your RS-232-C or HP-IB interface for printer or controller operation.

Service Menu and **System Config** these softkeys control instrument and enhanced module functions such as service self-test, service self-calibration and system configuration. Refer to your instrument *User and Service Guide* or enhanced module *User's Guide* for use of these softkeys.

To select your printer or plotter.

- Press the **Hardcopy Menu** softkey to view printer/plotter options. Your module can be configured to print in several formats.
- To select the format of your printer/plotter, press the **Format** softkey until the desired format is displayed.



Hardcopy Menu with RS-232-C or parallel module attached

Format Your module can be configured to print in the following formats:

LaserJet HP LaserJet format

DJ mono monochrome HP DeskJet format

DJ color color HP DeskJet format (color HP 54600-series instruments only)

Epson Epson format

ThinkJet HP ThinkJet format (HP-IB and RS-232-C modules only)

Plotter HP plotter (HP-GL) format. This format is available on HP-IB and RS-232-C modules only and is not an option on color HP 54600 instruments.

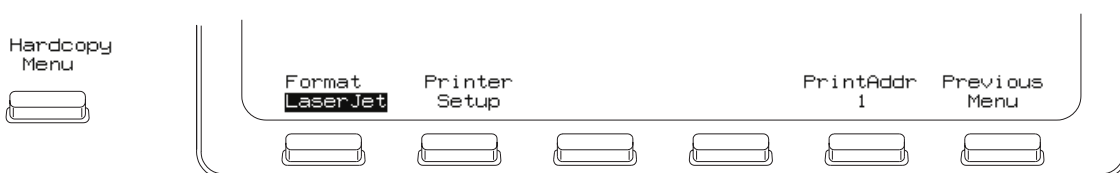
I/O Function Guide
To select your printer or plotter.

Destination If you have an RS-232-C/parallel dual interface module, press the **Destination** softkey to select the hardcopy output destination of the module to be **RS-232** or **Parallel**.



Hardcopy Menu with RS-232-C/parallel dual interface module attached

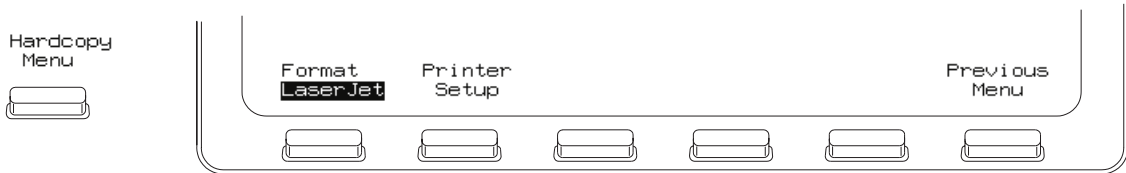
Printer address If you have an HP-IB interface module, press the **PrintAddr** softkey until the correct address is displayed. The address can also be incremented or decremented by turning the knob closest to the **Cursors** key. The default printer/plotter address is 1.



Hardcopy Menu with HP-IB module attached

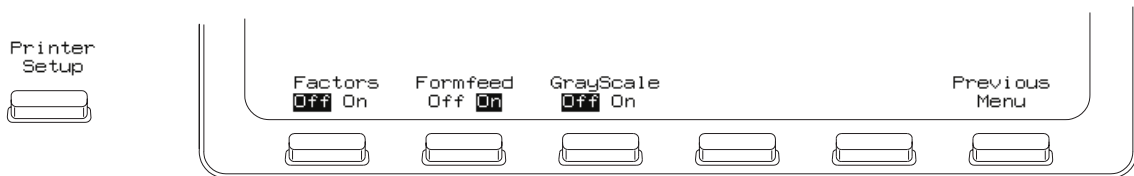
To setup your printer or plotter

- From the **Hardcopy Menu**, press the **Printer Setup** softkey.



Selecting Printer Setup from the Hardcopy Menu

Printer/plotter options are displayed for formfeed, scale factors, and gray scale printing.



Printer setup options for HP LaserJet and HP DeskJet formats

To set formfeed

- To set formfeed, press the **Hardcopy Menu** softkey, then the **Printer Setup** softkey. **Formfeed** can be selected as **On** or **Off**

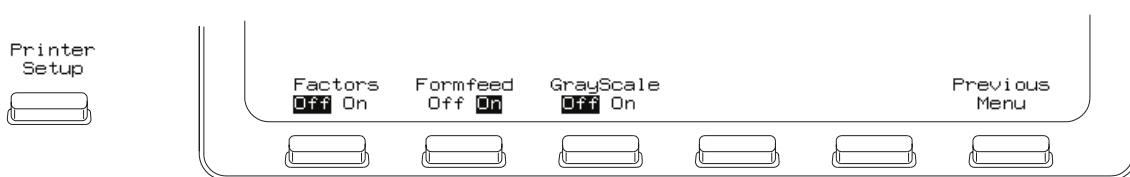
The instrument will send a formfeed command after printing when **Formfeed** is set to **On**.

Formfeed is not an option when **Format** is set to **Plotter**.

To print or plot gray scale

Gray scale printing

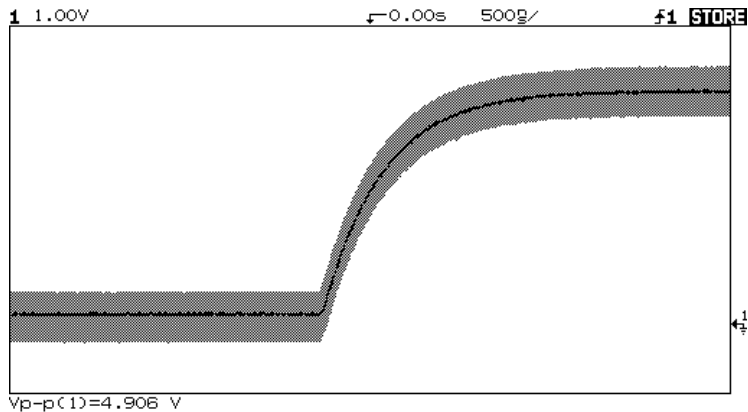
- To print in gray scale, press the **Hardcopy Menu** softkey, then the **Printer Setup** softkey. **GrayScale** can be selected as **On** or **Off**



Selecting GrayScale from the Printer Setup menu

When gray scale printing is selected, the full-bright and half-bright traces on the instrument screen are printed on the hardcopy.

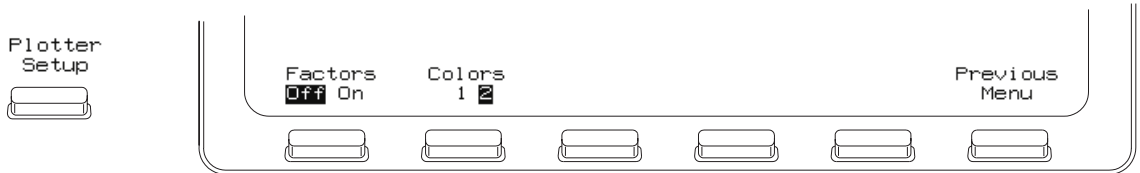
Gray scale printing requires an HP-PCL printer capable of at least 300 dpi (dots-per-inch), such as an HP LaserJet or HP DeskJet series printer. Grayscale printing is not available with **ThinkJet** and **Epson** formats. If you have a color HP 54600-series instrument, **DJ Color** format will print in 2 different colors.



Gray scale print

Gray scale plotting

- 1 Press the **Hardcopy Menu** softkey, then press the **Format** softkey until **Plotter** is displayed.



Plotting GrayScale from the Plotter Setup menu

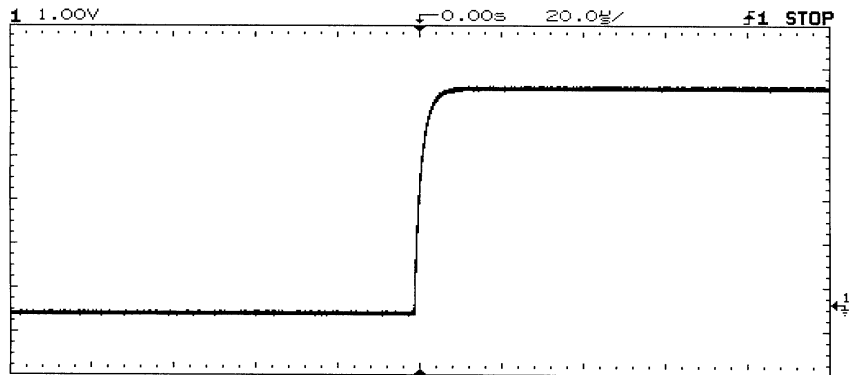
Gray scale plotting requires an HP-GL plotter capable of plotting with at least 2 pens.

- 2 Press the **Plotter Setup** softkey, then press the **Colors** softkey until **2** is displayed.
Gray scale plot uses two pens for the hardcopy. Half-bright traces are plotted with plotter pen 1 and full-bright traces are plotted with plotter pen 2.

To print or plot scale factors

Instrument scale factors may be turned on or off for hardcopy prints and plots. All factors are printed on the hardcopy when on is selected. When factors is selected for a hardcopy plot, the plot is in portrait mode. When factors is not selected for hardcopy plot, the plot is in landscape mode.

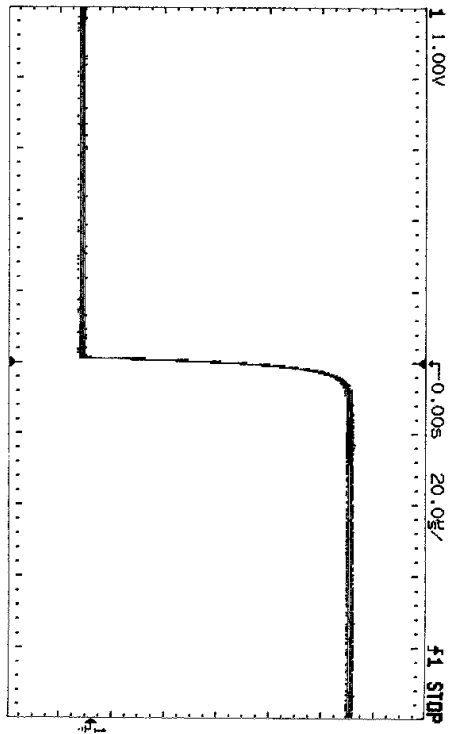
- 1 Press the **Hardcopy Menu** softkey, then press the **Printer Setup** softkey.
- 2 Press the **Factors** softkey until **On** is displayed.



Chan 1	On	1.000 V	-2.366 V	DC	Off	Off	1:1
Chan 2	Off	100.0mV	0.000 V	DC	Off	Off	1:1
Chan 3	Off	100.0mV	0.000 V	DC	---	---	1:1
Chan 4	Off	100.0mV	0.000 V	DC	---	---	1:1
Horizontal	Mode	Main	Main	Time	Delayed	Delayed	
	Normal	Time/Div	Delay	Ref	Time/Div	Delay	
		20.00us/	0.000 s	Cntr	-----	-----	
Trigger	Mode	Source	Level	Holdoff	Slope	Couplg	Reject
	AutoLvl	Ch 1	2.366 V	200.0ns	Pos	DC	Off
							NoiseRej
							Off
Display Mode: Normal							

Print or Plot with Factors On (portrait mode)

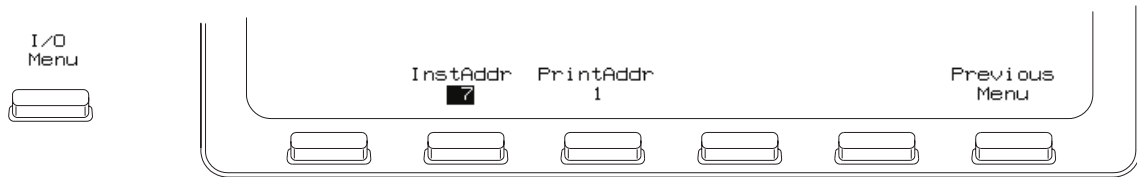
I/O Function Guide
To print or plot scale factors



Plot with Factors Off (landscape mode)

To set HP-IB addresses

- To set addresses on HP-IB modules, press **Print/Utility** , then press the **I/O Menu** softkey.



Setting HP-IB addresses

This menu allows you to set the instrument and printer/plotter address. Each device on an HP-IB bus must have a unique instrument address between 0 and 30.

Instrument address

To set the instrument address, press the **InstAddr** softkey until the correct address is displayed. The address can also be incremented or decremented by turning the knob closest to the **Cursors** key. The default instrument address is 7.

Printer Address

To set the printer or plotter address on the HP-IB bus, press the **PrintAddr** softkey until the correct address is displayed. The address can also be incremented or decremented by turning the knob closest to the **Cursors** key. The default printer/plotter address is 1.

See also

For more information on HP-IB parameters, refer to the Programmer's Guide that came with your HP 54600-Series instrument.

To set RS-232 baud rate and handshake

- To set the baud rate and handshake parameters on a module with an RS-232 interface, press **Print/Utility** , then press the **I/O Menu** softkey.



Setting RS-232-C baud rate and handshake

Baud rate

To set the RS-232 baud rate, press the **Baud Rate** softkey until the correct value is displayed. The baud rate can also be incremented or decremented by turning the knob closest to the **Cursors** key. The baud rate can be selected as 1200, 2400, 9600, or 19200. The default baud rate is 9600.

Handshake

To set the RS-232 handshake protocol, press the **Handshake** softkey until the correct protocol is displayed.

Handshake can be set to **DTR** (data terminal ready) or **XON** (XON-transmit on /XOFF-transmit off.)

See also

For more information on RS-232 parameters, refer to the Programmer's Guide that came with your HP 54600-Series instrument.

© Copyright Hewlett-Packard Company 1991-1996
All Rights Reserved.

Reproduction, adaptation, or translation without prior written permission is prohibited, except as allowed under the copyright laws.

Publication number
54652-97002

Printed in USA.

Edition dates are as follows:

First edition, July 1996

Printed in USA.

Warranty

The information contained in this document is subject to change without notice.

Hewlett-Packard makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties or merchantability and fitness for a particular purpose.

Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

This Hewlett-Packard product has a warranty against defects in material and workmanship for a period of three years from date of shipment. During the warranty period, Hewlett-Packard Company will, at its option, either repair or replace products that prove to be defective.

For warranty service or repair, this product must be returned to a service facility designated by Hewlett-Packard.

For products returned to Hewlett-Packard for warranty service, the Buyer shall prepay shipping charges to Hewlett-Packard and Hewlett-Packard shall pay shipping charges to return the product to the Buyer. However, the Buyer shall pay all shipping charges, duties, and taxes for products returned to Hewlett-Packard from another country.

Hewlett-Packard warrants that its software and firmware designated by Hewlett-Packard for use with an instrument will execute its programming instructions when properly installed on that instrument.

Hewlett-Packard does not warrant that the operation of the instrument software, or firmware will be uninterrupted or error free.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the Buyer, Buyer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

No other warranty is expressed or implied. Hewlett-Packard specifically disclaims the implied warranties or merchantability and fitness for a particular purpose.

Exclusive Remedies

The remedies provided herein are the buyer's sole and exclusive remedies. Hewlett-Packard shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Assistance

Product maintenance agreements and other customer assistance agreements are available for Hewlett-Packard products.

For any assistance, contact your nearest Hewlett-Packard Sales Office.

Certification

Hewlett-Packard Company certifies that this product met its published specifications at the time of shipment from the factory. Hewlett-Packard further certifies that its calibration measurements are traceable to the United States National Institute of Standards and Technology, to the extent allowed by the Institute's calibration facility, and to the calibration facilities of other International Standards Organization members.