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I/O Function Guide

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Interface Modules for Agilent 54600-Series Instruments

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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 GPIB addresses 17
Instrument address 17
Printer Address 17
To set RS-232 baud rate and handshake 18
Baud rate 18
Handshake 18

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Introduction

These modules provide the means for remote communication with Agilent 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.

Agilent 54650A GPIB Interface Module

- Full programmability
- Hardcopy output

Agilent 54651A RS-232-C Interface Module

- Full programmability
- Hardcopy output

Agilent 54652A Parallel Interface Module

- Hardcopy output

Agilent 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.

Agilent 54655A Test Automation Module (GPIB) and Agilent 54656A Test Automation Module (RS-232-C)

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

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

The Agilent 54656A has the following additional features:

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

Agilent 54657A Measurement/Storage Module (GPIB),
Agilent 54658A Measurement/Storage Module (RS-232-C), and
Agilent 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 Agilent 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.

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Interface I/O functions

Agilent Interface module	Interface connection	I/O Function
54650A	GPIB	GPIB controller or GPIB output to printer/plotter
54651A	RS-232-C	RS-232-C controller or RS-232-C output to printer/plotter
54652A	Parallel	Parallel output to printer
54652B[2]	RS-232-C and parallel	RS-232-C controller and parallel output to printer, or RS-232-C output to printer/plotter
54655A[1,3]	GPIB	GPIB controller or GPIB output to printer/plotter
54656A[1,3]	RS-232-C	RS-232-C controller or RS-232-C output to printer/plotter
54657A[1]	GPIB	GPIB controller or GPIB output to printer/plotter
54658A[1]	RS-232-C	RS-232-C controller or RS-232-C output to printer/plotter
54659B[1,2]	RS-232-C and parallel	RS-232-C controller and parallel output to printer, or RS-232-C output to printer/plotter

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

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

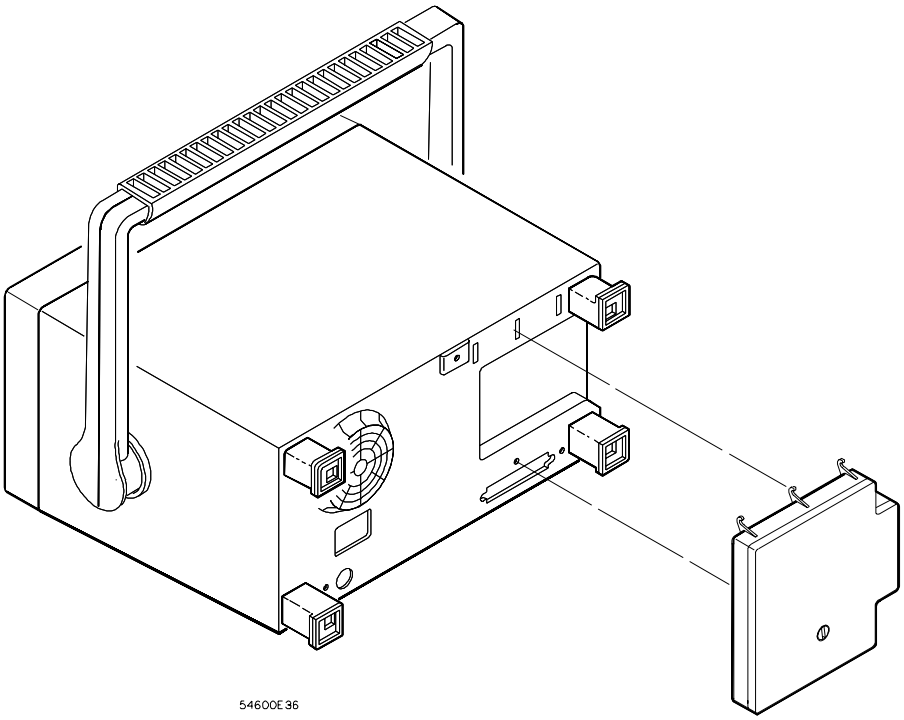
[3] The 54655A and 54656A are not compatible with the 54615B, 54615B, 54645A, and 54645D.

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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 Agilent 54600-Series instrument

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Interface Cables

Agilent Interface module	Cable function (Instrument to ..)	Module connector	Printer/plotter/ controller connector	Agilent part number	Cable Length
54650A, 54655A[1,3], 54657A[1] (GPIB)	Printer/plotter/ controller	GPIB	GPIB	10833A 10833B 10833C 0833D	1 m (3.3 ft) 2 m (6.6 ft) 4 m (13.2 ft) 0.5 m (1.6 ft)
54651A, 54656A[1,3], 54658A[1] (RS-232-C)	Printer/plotter/ controller	25-pin F	25-pin F	13242G 17255M	5 m (16.7 ft) 1.5 m (4.9 ft)
	Controller	25-pin F	25-pin M	92219J 17255D	5 m (16.7 ft) 1.5 m (4.9 ft)
	Controller	25-pin F	9-pin M	24542G	3 m (9.9 ft)
54652A (parallel output only)	Parallel printer	parallel	parallel	C2950A C2951A	2 m (6.6 ft) 3 m (9.9 ft)
54652B[2], 54659B[1,2] (RS-232-C and parallel output)	RS-232-C controller	9-pin M	25-pin M	34398A	2.5 m (8.2 ft)
	RS-232-C controller	9-pin M	9-pin M	34398A	2.5 m (8.2 ft)
	RS-232-C printer/ plotter/controller	9-pin M	25-pin F	34398A + 34399A adapter kit	2.5 m (8.2 ft)
	Parallel printer	parallel	parallel	C2950A C2951A	2 m (6.6 ft) 3 m (9.9 ft)

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

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

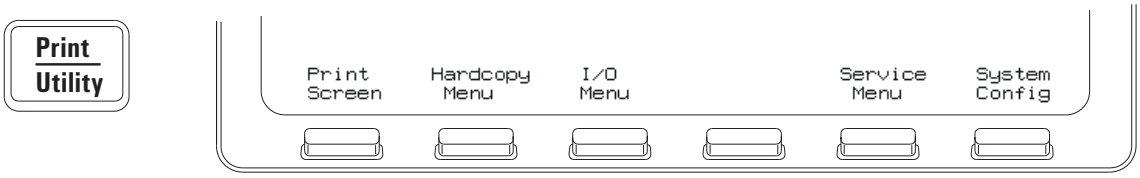
[3] The 54655A and 54656A are not compatible with the 54615B , 54615B, 54645A and 54645D.

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Print/Utility Menu

The Print/Utility menu of your Agilent 54600-series instrument allows you to select I/O functions for the module you have connected to your instrument. The module can have an GPIB, 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 GPIB module, refer to "To set GPIB 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.

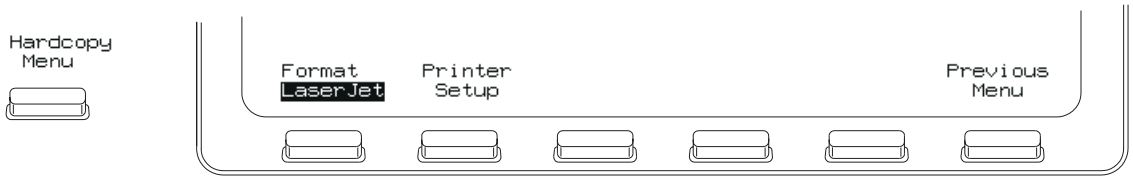
I/O Menu this softkey allows you to set up parameters for your RS-232-C or GPIB interface for printer or controller operation.

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.

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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 Agilent 54600-series instruments only)

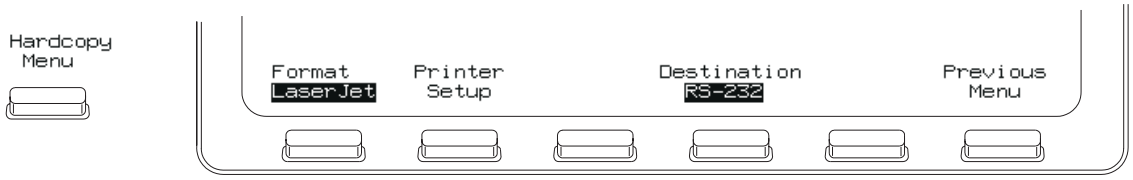
Epson Epson format

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

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

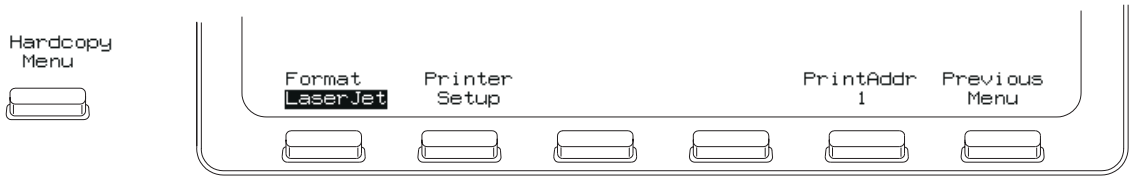
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Destination If you have an RS-232-C/parallel dual interface module, press the **Destination** softkey to select the hardcopy output destination of the module to be **RS-232** or **Parallel**.



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

Printer address If you have an GPIB 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.

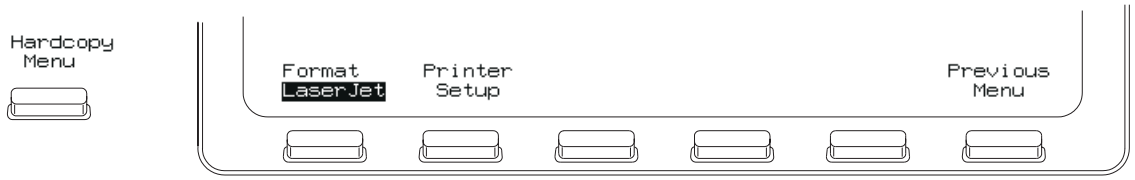


Hardcopy Menu with GPIB module attached

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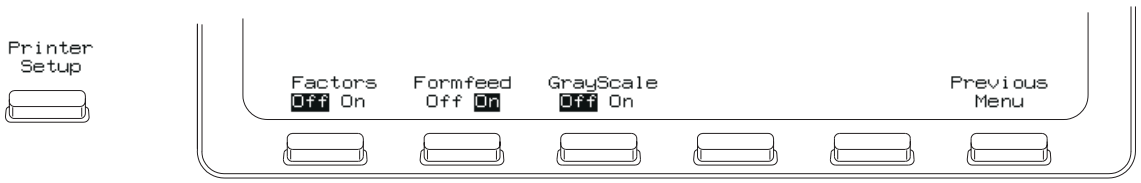
To setup your printer or plotter

- 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 Agilent LaserJet and Agilent DeskJet formats

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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**.

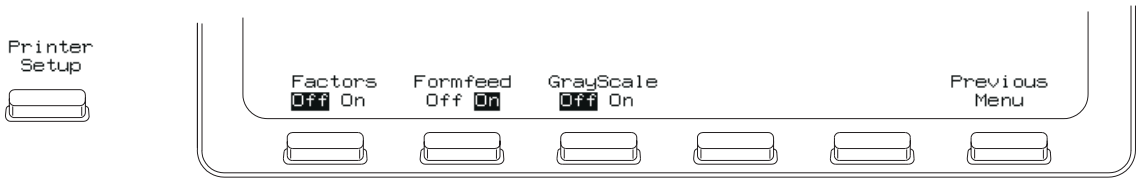
> Formfeed is not an option when **Format** is set to **Plotter**.

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To print or plot gray scale

Gray scale printing

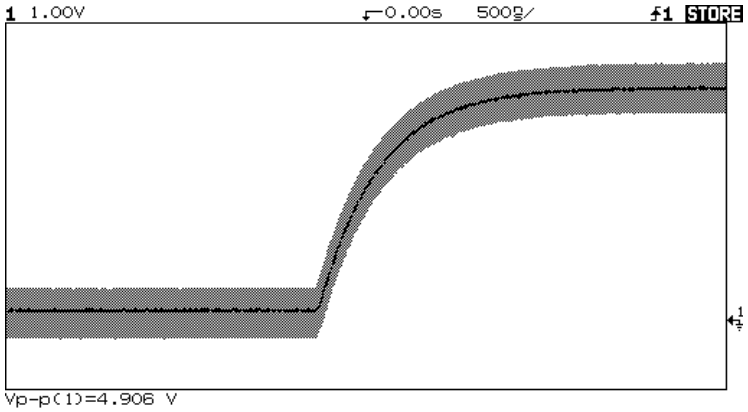
- To print in gray scale, press the **Hardcopy Menu** softkey, then the **Printer Setup** softkey. **GrayScale** can be selected as **On** or **Off**



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 Agilent 54600-series instrument, **DJ Color** format will print in 2 different colors.



Gray scale print

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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.

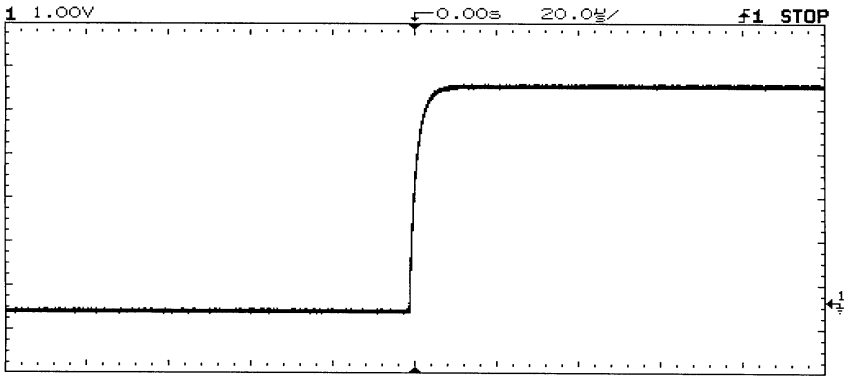
Gray scale plot uses two pens for the hardcopy. Half-bright traces are plotted with plotter pen 1 and full-bright traces are plotted with plotter pen 2.

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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.



	State	Volts/Div	Position	Couplg	BW Lim	Invert	Probe
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

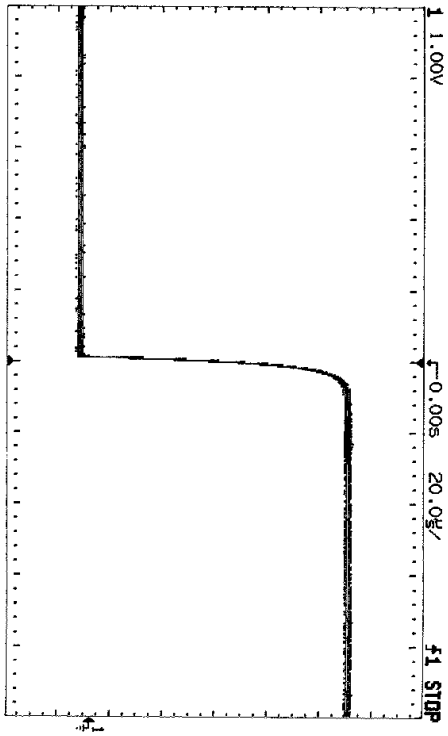
	Mode	Main Time/Div	Main Delay	Time Ref	Delayed Time/Div	Delayed Delay
Horizontal	Normal	20.00us/	0.000 s	Cntr	--------	-----

	Mode	Source	Level	Holdoff	Slope	Couplg	Reject	NoiseRej
Trigger	AutoLvl	Ch 1	2.366 V	200.0ns	Pos	DC	Off	Off

Display Mode: Normal

Print or Plot with Factors On (portrait mode)

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Plot with Factors Off (landscape mode)

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To set GPIB addresses

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



Setting GPIB addresses

This menu allows you to set the instrument and printer/plotter address. Each device on an GPIB bus must have a unique instrument adresss 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 GPIB 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 GPIB parameters, refer to the Programmer's Guide that came with your Agilent 54600-Series instrument.

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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 Agilent 54600-Series instrument.

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DECLARATION OF CONFORMITY

according to ISO/IEC Guide 22 and EN 45014

Manufacturer's Name: Agilent Technologies

Manufacturer's Address: 1900 Garden of the Gods Road
Colorado Springs , CO 80901 USA

Declares, That the product

Product Name: Digitizing Oscilloscope Module

Model Number(s): 54652B and 54659B

Product Options: All

Conforms to the following Product Specifications:

Safety: IEC 1010-1:1990 +A1 / EN 61010-1:1993
UL 3111
CSA-C22.2 No. 1010.1:1993

EMC: CISPR 11:1990 /EN 55011 (1991): Group 1 Class A
IEC 555-2:1982 + A1:1985 / EN 60555-2:1987
IEC 555-3:1982 + A1:1990 / EN 60555-3:1983 + A1:1991
IEC 801-2:1991/EN 50082-1 (1992):4 kV CD, 8 kV AD
IEC 801-3:1984/EN 50082-1 (1992):3 V/m, {1kHz 80% AM,27-1000MHz}
IEC 801-4:1988/EN 50082-1 (1992): 0.5 kV Sig. Lines, 1kV Power Lines

Supplementary Information:
The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC, and carries the CE-marking accordingly.

This product was tested in a typical configuration with Agilent Technologies test systems.

Colorado Springs, 1/12/95

John Strathman, Quality Manager

European Contact: Your local Agilent Technologies Sales and Service Office or Agilent Technologies GmbH, Department ZQ / Standards Europe, Herrenberger Strasse 130, 71034 Böblingen Germany (FAX: +49-7031-143143)

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Colorado Springs , CO 80901 USA

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Product Name: Digitizing Oscilloscope Module

Model Number(s): 54655A and 54656A

Product Options: All

Conforms to the following Product Specifications:

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UL 3111
CSA-C22.2 No. 1010.1:1993

EMC: CISPR 11:1990 /EN 55011 (1991): Group 1 Class A
IEC 555-2:1982 + A1:1985 / EN 60555-2:1987
IEC 555-3:1982 + A1:1990 / EN 60555-3:1983 + A1:1991
IEC 801-2:1991/EN 50082-1 (1992):4 kV CD, 8 kV AD
IEC 801-3:1984/EN 50082-1 (1992):3 V/m, {1kHz 80% AM,27-1000MHz}
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UL 3111
CSA-C22.2 No. 1010.1:1993

EMC: CISPR 11:1990 /EN 55011 (1991): Group 1 Class A
IEC 555-2:1982 + A1:1985 / EN 60555-2:1987
IEC 555-3:1982 + A1:1990 / EN 60555-3:1983 + A1:1991
IEC 801-2:1991/EN 50082-1 (1992):4 kV CD, 8 kV AD
IEC 801-3:1984/EN 50082-1 (1992):3 V/m, {1kHz 80% AM,27-1000MHz}
IEC 801-4:1988/EN 50082-1 (1992): 0.5 kV Sig. Lines, 1kV Power Lines

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This product was tested in a typical configuration with Agilent Technologies test systems.

Colorado Springs, 4/24/97

John Strathman, Quality Manager

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Complete product warranty information is given at the end of this manual.

Safety

This apparatus has been designed and tested in accordance with IEC Publication 348, Safety Requirements for Measuring Apparatus, and has been supplied in a safe condition. This is a Safety Class I instrument (provided with terminal for protective earthing). Before applying power, verify that the correct safety precautions are taken (see the following warnings). In addition, note the external markings on the instrument that are described under "Safety Symbols."

Warning

- Before turning on the instrument, you must connect the protective earth terminal of the instrument to the protective conductor of the (mains) power cord. The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. You must not negate the protective action by using an extension cord (power cable) without a protective conductor (grounding). Grounding one conductor of a two-conductor outlet is not sufficient protection.
- Only fuses with the required rated current, voltage, and specified type (normal blow, time delay, etc.) should be used. Do not use repaired fuses or short-circuited fuseholders. To do so could cause a shock of fire hazard.
- Service instructions are for trained service personnel. To avoid dangerous electric shock, do not perform any service unless qualified to do so. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.
- If you energize this instrument by an auto transformer (for voltage reduction), make sure the common terminal is connected to the earth terminal of the power source.
- Whenever it is likely that the ground protection is impaired, you must make the instrument inoperative and secure it against any unintended operation.
- Do not operate the instrument in the presence of flammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.
- Do not install substitute parts or perform any unauthorized modification to the instrument.
- Capacitors inside the instrument may retain a charge even if the instrument is disconnected from its source of supply.
- Use caution when exposing or handling the CRT. Handling or replacing the CRT shall be done only by qualified maintenance personnel.

Safety Symbols



Instruction manual symbol: the product is marked with this symbol when it is necessary for you to refer to the instruction manual in order to protect against damage to the product.



Hazardous voltage symbol.



Earth terminal symbol: Used to indicate a circuit common connected to grounded chassis.

WARNING

The Warning sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a Warning sign until the indicated conditions are fully understood and met.

CAUTION

The Caution sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product. Do not proceed beyond a Caution symbol until the indicated conditions are fully understood or met.

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