

**Getting Started**  
with the  
**Agilent N4916B**  
**De-Emphasis Signal Converter**

You only need a few minutes to get started with the N4916B.

This Getting Started Brochure helps you to quickly install and check the instrument.

If you need more detailed information on the N4916B, refer to the Online Help of your High-Performance Serial BERT N4903B. For more information, visit [www.agilent.com/find/jbert](http://www.agilent.com/find/jbert)

The Help also offers printable versions of the User Guide and the Programming Guide.



**Agilent Technologies**

## Copyright

© Agilent Technologies, Inc. 2011

## Revision

Revision 4.0, April 2011  
Manual Part Number  
N4916B-91011  
Printed in Germany  
Agilent Technologies, Deutschland GmbH  
Herrenberger Str. 130  
71034 Boeblingen, Germany

## Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with terms of such license.

## Warranty

The material contained in this document is provided "as is," and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Agilent disclaims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Agilent shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use or performance of this document or of any information contained herein. Should Agilent and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

## Restricted Rights Legend

U.S. Government Restricted Rights.  
Software and technical data rights granted to the federal government include only those rights customarily provided to end user customers. Agilent provides this customary commercial license in Software and technical data pursuant to FAR 12.211 (Technical Data) and 12.212 (Computer Software) and, for the Department of Defense, DFARS 252.227-7015 (Technical Data - Commercial Items) and DFARS 227.7202-3 (Rights in Commercial Computer Software or Computer Software Documentation).

## General Safety Precautions

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument.

Agilent Technologies Inc. assumes no liability for the customer's failure to comply with these requirements.

Before operation, review the instrument and manual for safety markings and instructions. You must follow these to ensure safe operation and to maintain the instrument in safe condition.

## General

This product is a Safety Class 1 instrument (provided with a protective earth terminal). The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

All Light Emitting Diodes (LEDs) used in this product are Class 1 LEDs as per IEC 60825-1.

## Instrument Markings

This product is marked with a warning symbol when it is necessary for the user to refer the instructions in the manual.



## Environmental Conditions

This instrument is intended for indoor use in an installation category II, pollution degree 2 environment. It is designed to operate within a temperature range of 5 – 40 °C (40 – 105 °F) at a maximum relative humidity of 95% and at altitudes of up to 2000 meters.

Refer to the specifications tables for the ac mains voltage requirements and ambient operating temperature range.

## Before Applying Power

Verify that all safety precautions are taken. The power cable inlet of the instrument serves as a device to disconnect from the mains in case of hazard. The instrument must be positioned so that the operator can easily access the power cable inlet. When the instrument is rack-mounted the rack must be provided with an easily accessible mains switch.

## Ground the Instrument

To minimize shock hazard, the instrument chassis and cover must be connected to an electrical protective earth ground. The instrument must be connected to the ac power mains through a grounded power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

## Do Not Operate in an Explosive Atmosphere

Do not operate the instrument in the presence of flammable gases or fumes.

## Do Not Remove the Instrument Cover

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made only by qualified personnel. Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

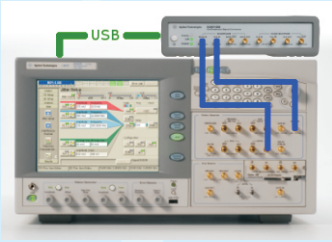
## Services and Support

Any adjustment, maintenance, or repair of this product must be performed by qualified personnel. Contact your customer engineer through your local Agilent Technologies Service Center. You can find a list of local service representatives on the Web at: <http://www.agilent.com/find/techsupport>

# Installing the Agilent N4916B

## Inspect Shipment

Check if the Agilent N4916B shipping container contains the following standard deliverables:



Agilent N4916B  
De-Emphasis Signal Converter  
connected to  
N4903B Serial BERT

If the contents are incomplete, if there is mechanical damage, or if the instrument does not work within its specifications, notify the nearest Agilent office. The Agilent office will arrange for repair or replacement without awaiting settlement.

For the complete content of your delivery please refer to the [Box Contents List](#).

In addition, the box will contain the USB flash drive, 4 x 50 Ohm termination resistors, Certification of Calibration (UK6 report) RoHS.



Box Contents List



USB Flash Drive



Power Cable



USB Cable

## Power Requirements

The instrument can operate from any single-phase AC power source supplying 100 – 240 V in the frequency range from 50 – 60 Hz.

The maximum allowed voltage fluctuation is 10%.

The maximum power consumption is 170 VA.

The power supply automatically adapts to the applied AC power (Auto Selection) and monitors the AC power range.

The mains plug can only be inserted in a socket outlet that provides protective earth contact. Any interruption of the protective earth contact inside or outside the instrument makes any operation of the instrument dangerous. Intentional interruption is prohibited.

**All data and clock input and output connectors of the PG that are not used in your test setup must be terminated with 50 Ohm.**

The respective ports are at the front side of the instruments.

Use a 3.5mm/2.4mm adapter to connect ParBERT 81250 or N4903A.

## Connections of the N4916B

The N4916B is controlled by the J-BERT N4903B via USB. The respective port is at the rear side of the instrument.

If the N4916B is used with other instruments like ParBERT 81250 or N4903A, see the readme contained in the *N4916B.x.x.x.x.zip* file located on the USB flash drive.

The N4916B is a 4-tap De-emphasis signal converter with optional clock multiplier which converts the signal produced by the Pattern Generator (PG).

For De-emphasis, its *DATA IN* has to be connected to the *DATA OUT* of the PG and the *CLK IN* has to be connected to the *AUX CLK OUT* of the PG using the matched cable pair with the part number N4915A-010. Its Data Output has to be connected to the device under test.

For Clock Multiplier, its Clock Input has to be connected to the Clock Out of the PG. Its Clock Output has to be connected to the Clock In of ED.

The N4916B is also supported for *Aux Data Out* channel of the PG as well in the second channel mode.

## Ventilation Requirements

Make sure that there is adequate clearance of 50 mm (2 in) at the rear and right side of the instrument to ensure adequate air flow. If the air flow is restricted, the internal operating temperature will be higher, reducing the instrument's reliability.

Do not cover the ventilation holes.

# Installing the Agilent N4916B

## Check the Software Status of your Serial BERT N4903B

**1** You may wish to connect a keyboard and mouse to your Serial BERT N4903B. This is not mandatory but convenient and should be done when the instrument is switched off.

**2** Switch on the Serial BERT N4903B.

**3** Open the *Help* menu and click *About*.

The software revision must be 7.0 or later. If it is lower, you need to update the software. For details refer to the User Guide.

[www.agilent.com/find/n4903](http://www.agilent.com/find/n4903)

**4** Open the *Utility* menu and click *Minimize GUI*.

**5** Inspect the *Agilent IO Control* icon in the Windows task bar.

If you see this icon, the revision of the Agilent IO Libraries Suite is 15.5 or later.



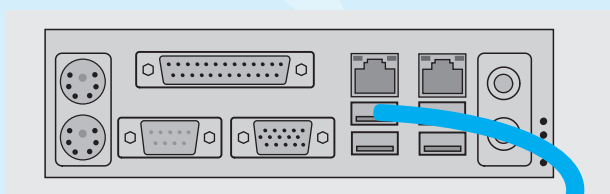
You can use the *Agilent Connection Expert* which makes it easy to configure USB instruments.

# Installing the Agilent N4916B

## Establish the USB Connection

- 1 Keep the user interface of the Serial BERT N4903B minimized.
- 2 Connect the N4916B to mains and switch it on.
- 3 Connect the USB cable between the USB port of the N4916B and one of the rear USB ports of your N4903B.

Rear panel view of N4903B



- 4 When you connect the N4916B for the first time, the Windows *Found New Hardware Wizard* appears and asks whether it should connect to *Windows Update*.

Answer *No*.

The necessary USB driver is part of the Agilent IO Libraries Suite.



Rear panel view of N4916B

- 5 Click *Next* until the wizard finishes.

Windows will automatically identify the N4916B as a *USB Test and Measurement Device*.



# Installing the Agilent N4916B

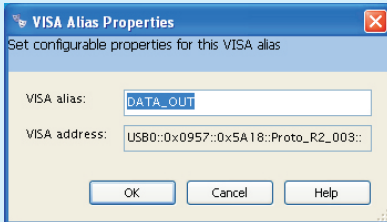
## Assign a VISA Alias Name to the N4916B

A VISA alias name is required by the software to access the N4916B.

In this example, we use the *Agilent Connection Expert*. If your N4903B uses revision IO-Lib 15.5 of the Agilent IO Libraries Suite, you can run *IO Config* for the same purpose.

1 If the *Agilent Connection Expert* does not pop up automatically, click the *Agilent IO Control* icon in the Windows task bar and start it from the menu.

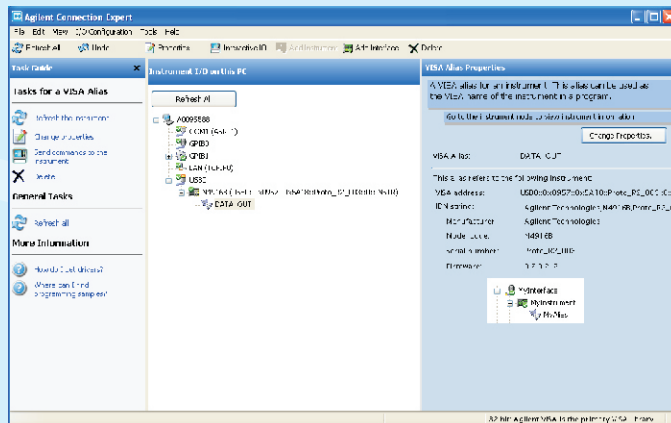
2 In the *Instrument I/O* panel, click *UsbInstrument1*. “UsbInstrument1” is the default alias name.



3 Click *Change Properties* and change the alias name to *DATA\_OUT/AUXDATA\_OUT* depending on the channel (Data Out and Aux Data Out) used. This is the alias used by the software.

The alias name *DATA\_OUT/AUXDATA\_OUT* is mandatory. You should not use any other alias name.

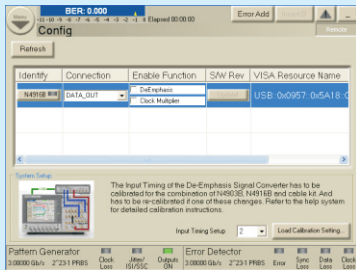
4 After clicking OK, the *Agilent Connection Expert* shows a window like the following:



# Checking the Agilent N4916B

## Connect the N4916B to the Pattern Generator

- 1 Disable the outputs of the J-BERT and use a 2.4 mm cable (m-m) and connect the pattern generator's Data Out port to the Input port of the N4916B.
- 2 Mount the SMA 50 Ohm termination on the unused Data Out port of the pattern generator using the SMA to 2.4 mm adapter.
- 3 Restore the N4903B user interface from the Windows taskbar.
- 4 From the Navigation Menu, select *External Instrument(s)* and then click *Config* to access *Config* window.



The *Config* window displays a list of instruments externally connected to the Serial BERT N4903B along with the functions associated with them.

If the setup is used for the first time, perform the calibrated settings. Refer to the help system for detailed calibration instructions.

Let's follow the next steps to enable these functions.

## Enabling De-Emphasis

- 5 Select the *De-Emphasis* function to open the *De-Emphasis Connection* dialog.
- 6 Press *Enable* to activate the connection between the N4903B and the N4916B and also enables the output of the J-BERT.

A selected checkbox corresponding to the function indicates that the connection is established between the N4903B and N4916B.

Enable

## Enabling Clock Multiplier

- 5 Select the *Clock Multiplier* function to open the *Clock Multiplier Connection* dialog.

If you select the *Clock Multiplier* function, a new menu entry is added to the *External Instrument(s)* submenu.

- 7 From the *Navigation Menu*, select *PG Setup* and click *Data Output* to access *Data Output* window.

- 8 Set the values as following:
  - Pre-Cursor : 0 dB to 12.04 dB
  - Post-Cursor1 : -12.04 dB to 0 dB
  - Post-Cursor2 : -8 dB to 0 dB

Pre-Cur	Post-Cur1	Post-Cur2	Unit
12.00 dB	-6.00 dB	-3.00 dB	dB

- 7 From the *Navigation Menu*, select *External Instrument(s)* and then click *Clock Multiplier-DATAOUT* to access *Clock Multiplier-DATAOUT* window.

- 8 Set the values as following:
  - Input Frequency: 1 to 7.6 GHz
  - Termination Voltage: -2.0 V to 2.0 V

<input type="checkbox"/> Track PG Clock Frequency	
Input Frequency	3 GHz
Multiplier	2
<input checked="" type="checkbox"/> Termination	0 mV

# Checking the Agilent N4916B

## Check the Output Signal (De-Emphasis Function of N4916B)

The general approach shown here is using an oscilloscope. If you have connected the N4916B to a High-Performance Serial BERT N4903B, you can also use the error detector. For details see the Help and the User Guide.

1 Preset Instrument state.

2 In the *PG-Bit Rate Setup* window, set Datarate to 3 Gb/s.

3 In the *PG Output Setup* window, set the Data Offset to 0 V and the Amplitude to 400 mV.

4 Enable De-Emphasis from the *Config* window.

6 Connect the Outputs of the N4916B to an oscilloscope.

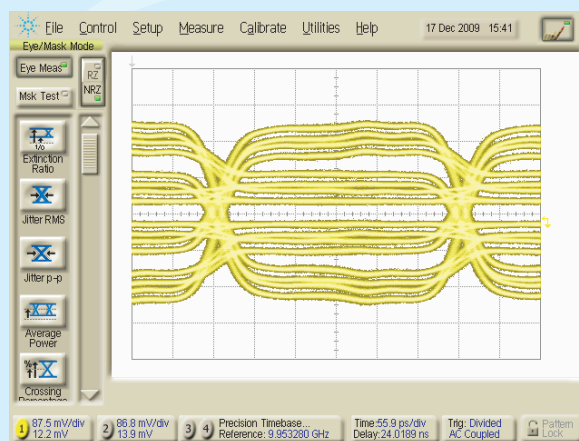
5 In the *PG Output Setup* window, set the values as following:  
- Pre Cursor: +12 dB  
- Post Cursor 1: -6 dB  
- Post Cursor 2: -3 dB

7 Connect the Trigger Output of the pattern generator to the trigger input of the oscilloscope.

8 Set the Trigger Out to Pattern Trigger.

9 Choose a suitable pattern (e.g. PRBS) and start the pattern generator.

10 After some adjustments of the scope, you will see a display like the following:





# Checking the Agilent N4916B

## Check the Output Signal (Clock Multiplier Function of N4916B)

The general approach shown here is using an oscilloscope. If you have connected the N4916B to a High-Performance Serial BERT N4903B, you can also use the error detector. For details see the Help and the User Guide.

**1** Preset the instrument state.

**2** In the *PG-Bit Rate Setup* window, set Datarate to 3 Gb/s.

**3** In the *PG-Clock/Trigger Output* window, set the Clock Offset to 0 V, Clock Out Amplitude to 400 mV and Trigger Out Offset to 0 V.

**4** Enable Clock Multiplier from *Config* window.

**5** In the *Clock Multiplier DATAOUT* window, set the values as following:

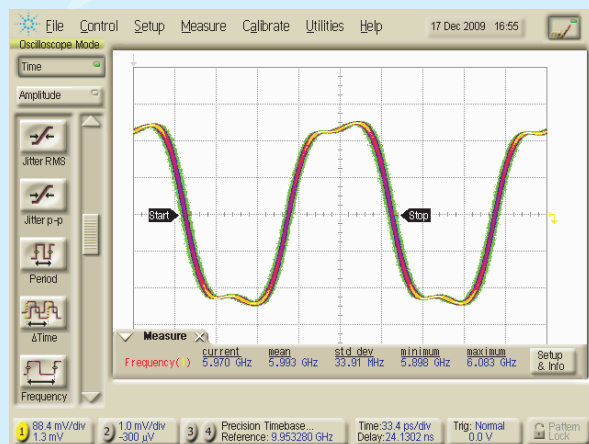
- Input frequency to 3 GHz
- Multiplier to 2
- Termination ON at 0 V

**6** Connect the Clock Out of PG to the Clock In of Clock Multiplier.

**7** Connect the Clock Out of Clock Multiplier to an oscilloscope.

**8** Choose a suitable pattern (e.g. PRBS) and start the pattern generator.

**9** After some adjustments of an oscilloscope, you will see a display like the following:



In case of problems, please refer to the section "Problems with the N4916B" of the Help and the User Guide of your N4903B.