Keysight N4877A
Clock Data Recovery and Demultiplexer 1:2

Getting
Started

KEYSIGHT
TECHNOLOGIES

Getting Started
with the
**Keysight N4877A
Clock Data Recovery and
Demultiplexer 1:2**

You only need a few minutes to get started
with the N4877A.

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

If you need more detailed information on
the N4877A, refer to the Help of your N4877A.
For more information, visit
www.keysight.com/find/N4877

The Help also offers printable versions of the
User Guide.

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Notice

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ESD Sensitive Device

All front-panel connectors of N4877A are very sensitive to Electrostatic Discharge (ESD).
We urgently recommend to operate the instrument in an electrostatic safe environment.
There is a high risk of instrument damage causing expensive repairs when connecting a not fully discharged device or cable to a front-panel connector or when touching a connector.
Please follow these instructions:
Before connecting any coaxial cable to the connectors, short the center and outer conductor with ground.
Before touching the front-panel connectors, discharge yourself by touching the properly grounded frame of the instrument.

Safety Summary

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.

Keysight Technologies 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 10 – 40 °C (50 – 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.
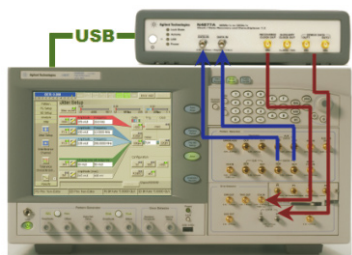
Services and Support

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

Installing the Keysight N4877A

Inspect Shipment

Check if the Keysight N4877A shipping container contains the following standard deliverables:

If the contents are incomplete, if there is mechanical damage, or if the instrument does not work within its specifications, notify the nearest Keysight office. The Keysight 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 an installation media, 4 x 50 Ohm termination resistors, 2 x 3.5mm/2.4mm adapter and Certification of Calibration (Uk6 report) RoHS.

Keysight N4877A
Clock Data Recovery and Multiplexer connected to
N4903B Serial BERT

Box Contents List

Installation Media

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

The mains plug may 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.

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

Connections of the N4877A

The N4877A is controlled via USB or LAN. When controlling the N4877A interactively with the N4877A remote GUI, then the preferred interface is USB. The N4877A Remote GUI can be installed on any Windows PC that fulfills the system requirements.

This document assumes that the N4877A remote GUI is to be installed on a N4903B Serial BERT and that the N4877A is being controlled interactively using the USB interface.

In a regular test setup the *Data In* connectors of the N4877A will be connected to the device under test and the *Recovered Clock Out* connector will be connected to the Error Detector's *Clock Input* connector.

In some applications, when the serial data rate is above the Error Detector's maximum data rate, the Error Detector's *Data Input* will be connected to the *Demux Data Out* connector of the N4877A.

For bringing up the N4877A together with the N4903B, connect the Pattern Generator's *Data Out* to the N4877A *Data In*.

Allow a warm-up phase of 30 minutes prior to performing any measurements.

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 Keysight N4877A

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 *Utility* menu and click *Minimize GUI*.

4 Inspect the *Keysight IO Control* icon in the Windows task bar.

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

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

Installing the Keysight N4877A

Establish the USB Connection

1 Keep the user interface of the Serial BERT N4903B minimized.

2 Connect the N4877A to mains and switch it on.

3 Connect the USB cable between the USB port of the N4877A and one of the rear USB ports of your N4903B.

Rear panel view of N4903B
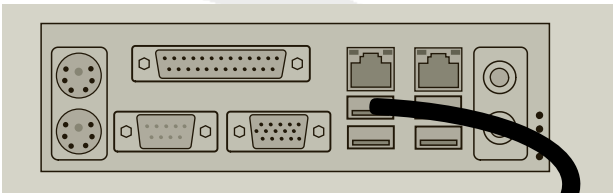
4 When you connect the N4877A for the first time, the Windows *Found New Hardware Wizard* appears and asks whether it should connect to *Windows Update*.

Answer *No*.

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

Rear panel view of N4877A

5 Click *Next* until the wizard finishes.

Windows will automatically identify the N4877A as a *USB Test and Measurement Device*.

Found New Hardware Wizard

Completing the Found New Hardware Wizard

The wizard has finished installing the software for:

USB Test and Measurement Device

Click Finish to close the wizard.

< Back   Finish   Cancel
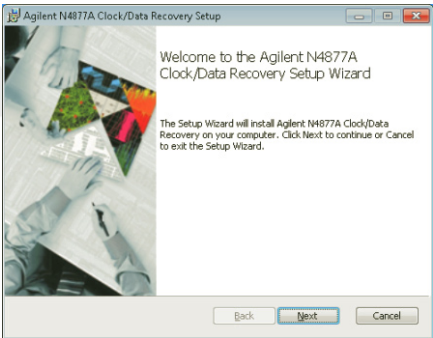
Installing the Keysight N4877A

Installing N4877A Remote GUI

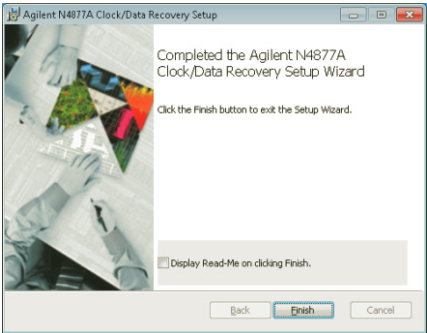Follow the given steps to install Keysight N4877A Remote GUI on N4903B.

1 Double-click the installer (AgtN4877A.msi). This installer file will be available either on CD, USB Flash drive or Web.

2 Follow the onscreen instructions to continue the installation process.

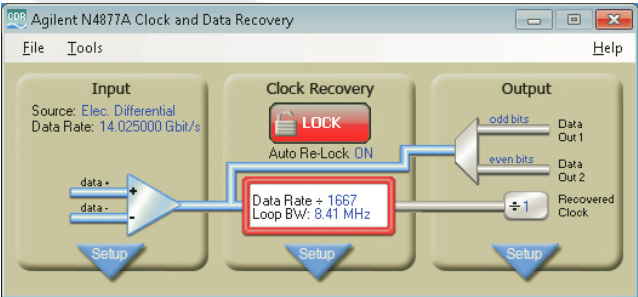**3** On the successful installation of N4877A Remote GUI, the following window will appear.

Launching N4877A Remote GUI

1 To launch the N4877A Remote GUI, go to *Start > Programs > N4877A - Clock and Data Recovery* and click on *N4877A - Clock and Data Recovery*.

The N4877A Remote GUI will be launched as shown below:.

Checking the Keysight N4877A

Connect the N4877A to the N4903B

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 N4877A.

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 Using a 3.5 mm SMA cable (m-m) and connect the Recovered Clock Out port of the N4877A with CLK IN port of the N4903B Error Detector.

4 Using a 3.5 mm/2.4 mm adapter to connect the Demux Data Out1 port to the Error Detector's Data Input port.

5 Launch the N4877A Remote GUI from the Windows Start Menu.

6 Configure The N4877A to
  – Input Source: Electrical Data Differential
  – Nominal Data Rate: 8 Gb/s
  – Loop Bandwidth: Rate Dependant
  – Data Rate Divider: 1667
  – Enable Auto Re-Lock: Checked
  – Clock Out Divide Ratio: Auto unchecked, Select 1÷2

7 Restore the N4903B user interface from the windows taskbar.

8 Set the N4903B PG to:
  – Bit rate: 8 Gb/s
  – Jitter Generation: Off
  – Data Out Levels:
    - 0.5 V Amplitude
    - 0 V Offset
  – Pattern: PRBS 2^15-1
  – Enable the outputs of the J-BERT.

9 Set the N4903B ED to:
  – Pattern: PRBS 2^15-1
  – Input Configuration: Single Ended Normal

10 Minimize the N4903B user interface and maximize the N4877A Remote GUI.

11 Check whether the N4877A is locked, if the CDR is not locked, then click the Re-Lock button.

12 After the N4877A entered locked state, maximize the N4903B user interface. The Error Detector should no longer report clock loss.

13 Perform Auto-Alignment on the Error Detector.

14 BER should be 0.0 after Auto Alignment on the PRBS bitstream.

Verify whether the N4877A is working properly. The indications are:
– **N4877A reports locked.**
– **N4903B displays the expected frequency at the Error Detector (Calculated from settings at the N4877A: Nominal Data Rate/Output Divider)**

For more details, refer to the Help and the User Guide of N4877A and N4903B.

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