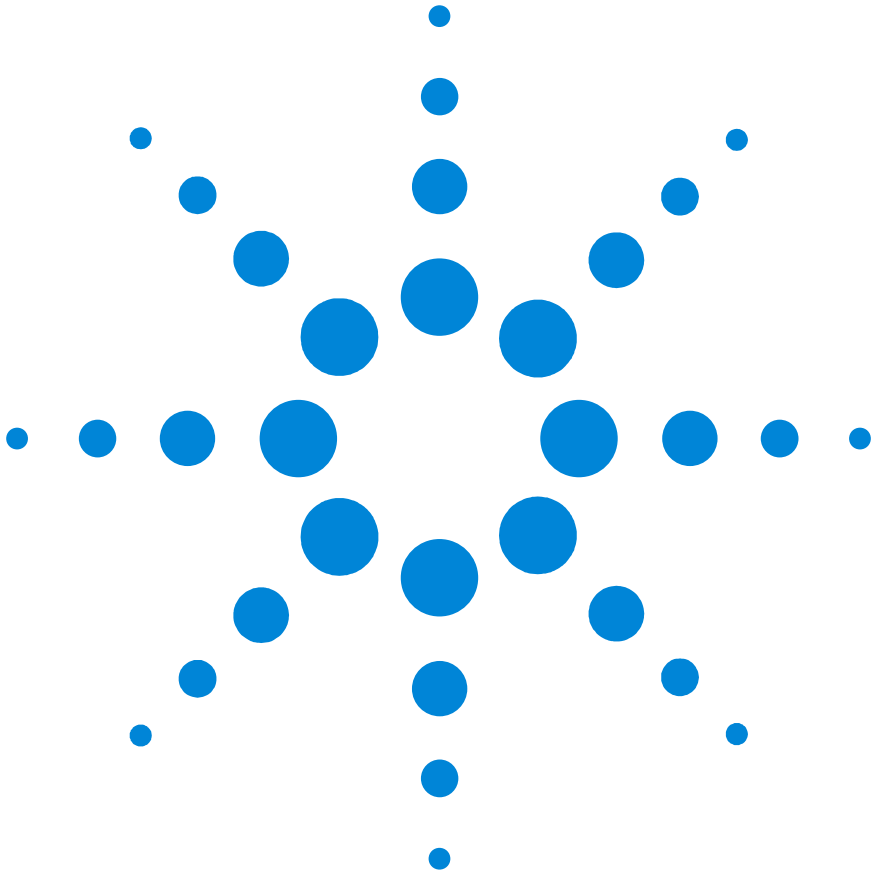

Agilent Parallel Bit Error Ratio Tester

81250 ParBERT

Installation Guide

Agilent Technologies

Important Notice

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Indicates invisible and potentially hazardous laser radiation.

Contents

1 About this Manual

ParBERT is the term for Agilent Technologies' family of Parallel Bit Error Ratio Testers.

Agilent 81250 ParBERT is a modular parallel electrical and optical bit error rate (BER) test platform that operates at up to 45 Gbit/s. The ParBERT 81250 platform comprises modules that operate at 675 Mbit/s, 1.65 Gbit/s, 2.7 Gbit/s, 3.35 Gbit/s, 7 Gbit/s, 10.8 Gbit/s, 13.5 Gbit/s, and 45 Gbit/s.

The system generates pseudo random word sequences (PRWS), standard pseudo random binary sequences (PRBS) and user-defined patterns on parallel lines. You can analyze bit error ratios with user defined patterns, PRBS/PRWS, or mixed data (a combination of user-defined patterns and PRBS).

This installation guide leads you through the steps to identify, install, and configure the Agilent 81250 ParBERT or any component of this system.

Welcome to the ParBERT Installation Guide

This manual is not only the guide for the first-time installation. It contains also the necessary instructions if you wish to change or upgrade an existing ParBERT configuration.

General Structure of the Installation Guide

Basics The chapters two to five provide all the information you need for setting up a standard, multi-purpose ParBERT system. This is a system consisting of a controller PC and one to three VXI mainframes that contain clock modules and electrical data generator/analyzer modules.

Hardware changes Chapter six explains how you can change the hardware configuration of an existing ParBERT system.

Special systems Chapter seven deals with special ParBERT systems. These are systems containing special components or modules for special purposes. Such modules are, for example, the MUX/DEMUX modules of 43/45 Gbit/s systems, optical modules, the 10.8 Gbit/s Booster Module, or the embedded ParBERT controller (a PC built up as a 2-slot VXI module).

Troubleshooting Chapter eight provides assistance if you have changed the hardware and the system does not react as expected.

Remote control The last chapter gives some advice about how to set up ParBERT for remote control.

How to Use this Guide

This manual is not meant to be read through from its beginning to its end. It depends on your situation which information you need.

If ...	... refer to Chapter	Chapter contents
... you install ParBERT for the first time	*"2 Introduction" on page 2-1*	This chapter provides an overview of the standard system components and the prerequisites for the installation.
... you have received a new ParBERT system	*"3 Setting Up the ParBERT Controller PC" on page 3-1*	ParBERT requires a controller PC. This chapter provides information on: • How to start a preconfigured ParBERT controller PC • How to install the ParBERT hard- and software on a custom PC •
... you wish to connect one or several ParBERT mainframes	*"4 Connecting Mainframes to the Controller PC" on page 4-1*	This chapter provides instructions on how to connect a single or multiple ParBERT mainframes through IEEE 1394 PC link to VXI interfaces. If you wish to add mainframes to a ParBERT system with embedded controller PC (a special VXI module), refer to chapter *"Expanding Systems with Embedded Controller" on page 7-23*.
... you are starting ParBERT for the first time, or if you have changed the hardware configuration	*"5 Putting ParBERT into Operation" on page 5-1*	This chapter explains how to check the hardware identification and how to use the ParBERT Configuration tool.
... you wish to add, exchange, or remove modules or frontends	*"6 Changing the ParBERT Hardware" on page 6-1*	This chapter contains all the necessary information.

If ...	... refer to Chapter	Chapter contents
... your system includes special modules	*"7 Special ParBERT Systems" on page 7-1*	In this chapter, you find the supplementary • installation instructions for 43/45 Gbit/s systems • installation instructions for optical modules • installation instructions for the 10.8 Gbit/s Booster Module • upgrade instructions for ParBERT systems with embedded controller PC
... your installation was not successful	*"8 Troubleshooting the ParBERT Installation" on page 8-1*	This chapter provides information on frequent problems, possible causes, and solutions.
... you wish to control ParBERT from a remote computer	*"9 Controlling ParBERT Remotely" on page 9-1*	Though remote control via GPIB is possible, the preferred method is via LAN. This chapter explains how to set up ParBERT for remote control.

NOTE Several optional as well as standard system components are delivered with their own dedicated installation and user manuals. Such components are for example:

- E8403A/E8404A VXI mainframe
- E9850A embedded VXI controller
- E8491B IEEE 1394 PC link to VXI
- VXI bus extenders

Before you start with the installation, it is therefore recommended that you inspect the shipment for additional documentation that may be required for a successful setup and installation.

Internet For latest information, answers on frequently asked questions, and related documentation, please check the following URL:
`http://www.agilent.com/find/parbert`

To contact the ParBERT support via e-mail, use the following address:
`bvs-pdga_parbert_support@agilent.com`

Document History

All editions and updates of this manual and their creation date are listed below. The first edition of the manual is edition 1. The edition number increments by 1 whenever the manual is revised. New editions are complete revisions of the guide reflecting alterations in the functionality of the instrument. Updates are occasionally made to the guide between editions.

- Edition 1, July 2000, related to Agilent E4875A Software Release 1.0 and higher.
- Edition 1.1, March 2001. Update to cope with added functionality, related to Agilent E4875A Software Release 3.0 and higher.
- Edition 1.2, April 2001. Update with special focus on clockgroups and their implementation.
- Edition 2, October 2001. Installation of ParBERT 43G systems added. Enhanced Agilent 81250 Configuration Tool and user interface configuration. Related to Agilent E4875A Software Release 4.0 and higher.
- Edition 2.1, February 2002. Update with special focus on replacement instructions of 3.35 Gbit/s. frontends. Updated software start procedure (Agilent 81250 Configuration Tool). Related to Agilent E4875A Software Release 4.2 and higher.
- Edition 3, May 2004. Complete revision with special focus on ease of use and new ParBERT components. Related to Agilent E4875A Software Release 5.6 and higher.

2 Introduction

This chapter familiarizes you with the ParBERT components, systems, and specific terms. It provides additionally an overview of the conditions that must be met before installing ParBERT.

ParBERT Components Overview

ParBERT consists of hardware and software components. This section presents the components and explains the basic terms that are used in the ParBERT documentation and in this installation guide.

NOTE The ParBERT components are described here, not the installation procedures.

An Agilent 81250 Parallel Bit Error Ratio Tester consists of a controller PC, one to three mainframes, and modules plugged into the mainframes.

Figure 1 Basic ParBERT Configuration

The ParBERT Controller PC

The ParBERT 81250 software suite runs on an external PC or a laptop which is connected to the system via an IEEE 1394 PC link to VXI.

ParBERT controller is the computer on which the ParBERT firmware server runs. The ParBERT firmware server is the software that forms the interface between the graphical user desktop or any user-written application and the ParBERT hardware.

The ParBERT controller can be any state-of-the-art PC running under Windows 2000 or Windows XP (see also *"ParBERT Software Components" on page 2-14*).

The hardware interface between the controller and the mainframes is an IEEE 1394 PC link to VXI. This interface (also called FireWire) needs a one-slot module in the leftmost slot of the ParBERT mainframe and generally requires a free PCI slot in the PC. Both VXI-module and PCI-card are included in the E8491B option.

If you order ParBERT with a controller PC, all required hardware and software is factory-installed, and the tester is ready for use. If you have ordered ParBERT without a controller PC, you have to install the interface and software on your PC.

Older ParBERT versions were shipped with an *embedded controller*. This is a special VXI module that communicates directly with the VXI bus. It occupies the two leftmost slots of the first mainframe and does not use the IEEE 1394 PC link to VXI.

If you wish to add mainframes to a ParBERT with embedded controller, please refer to *"Expanding Systems with Embedded Controller" on page 7-23*.

The ParBERT Mainframes

ParBERT mainframe is the E8403A or E8404A VXI mainframe with 13 VXI slots.

Figure 2 E4803A Mainframe with Modules

The mainframe that is connected to the controller PC is called *master mainframe*.

You can connect one or two *expander mainframes* to the master mainframe. An expander mainframe needs an interface module (usually an IEEE 1394 PC link to VXI module) and at least one clock module.

The ParBERT Modules

The ParBERT modules are divided into:

- Clock modules
- Data generator/analyzer modules
- Special modules

Clock Modules

A clock module generates the system master clock and distributes it to all the data modules of the system. If expander mainframes are used, the clock modules of the expander mainframes are connected as slaves to the master clock module.

NOTE Only clock modules of the same type can be connected in master-slave configuration.

A clock module can generate the master clock from its built-in oscillator or from an external clock source.

The following clock modules are supported:

- E4805B clock module
- E4808A high performance clock module
- E4809A 13.5 GHz clock module

E4805B / E4808A clock modules

The E4805B and E4808A clock modules have the same front panel layout.

The E4805B clock module can be used in ParBERT systems that do not exceed data rates of 2.7 Gbit/s.

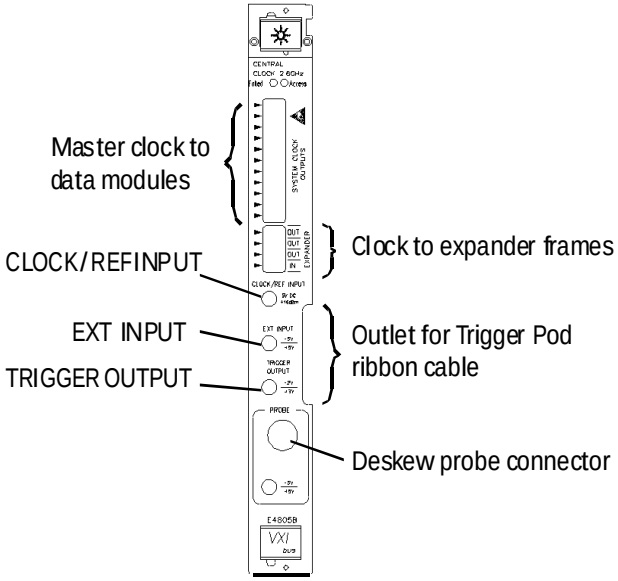

Figure 3 E4805B / E4808A Clock Modules

The E4808A high performance clock module has the same properties as the E4805B clock module, but superior jitter and noise characteristics. It can be used for all data modules except the 7 Gbit/s and 13.5 Gbit/s data modules.

Both modules provide the master clock to up to 11 data modules.

E4809A clock module

The E4809A clock module is required for systems that contain 7 Gbit/s and/or 13.5 Gbit/s data modules. It generates not only the system master clock but also an additional 13 GHz giga clock for these modules.

The E4809A clock module needs two VXI slots and provides both clocks to up to 10 data modules.

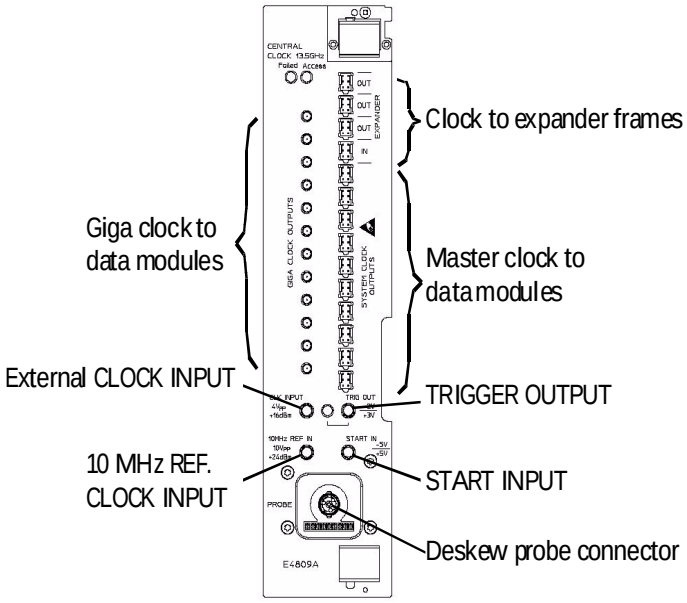

Figure 4 E4809A Clock Module

NOTE The E4809A clock module uses power splitters for the giga clock outputs. The output connectors are paired as follows: [1,2] [3,4] [5,6] [7,8] [9,10] [11,12]. Output #1 is at the top, output #12 is at the bottom.

If only one connector of a pair is used, the unused connector must be terminated with 50 Ohm to RF ground.

For example:

- Only one module is in the system and the corresponding giga clock cable connected to output #1. Output #2 has to be terminated with 50 Ohm to GND.
- Two modules are in the system and the corresponding giga clock cables are connected to output #5 and output #6. No other output needs to be terminated with 50 Ohm to GND.

Tools for the E4809A clock module

The E4809A clock module is shipped with two special tools for removing or inserting the giga clock cable connectors.

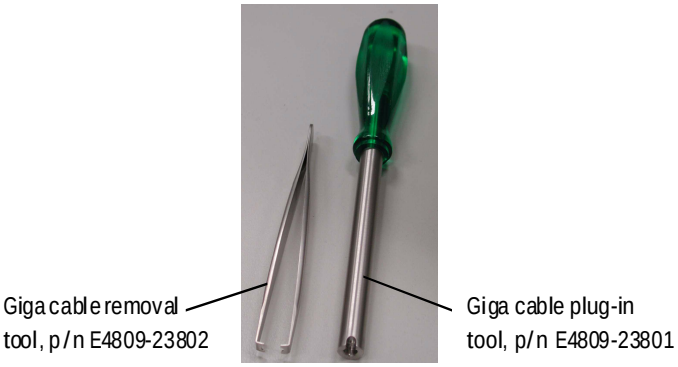

Figure 5 Giga Cable Tools

CAUTION

Never attempt to plug or unplug the giga clock distribution cables with your fingers. The giga clock connectors do not tolerate any oblique insertion or removal. Use the tools.

Trigger Input Pod

The trigger input pod is an option to the clock modules. It is used to detect and react on external signals.

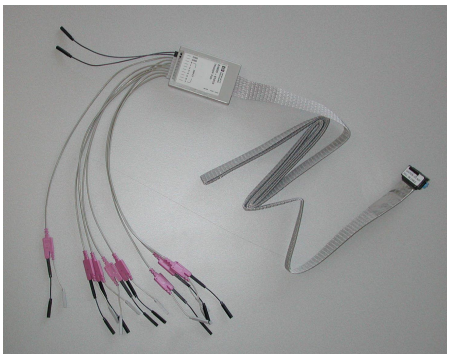

Figure 6 Trigger Input Pod

The trigger pod has eight TTL-compatible input connectors. An external voltage applied to one of these lines can change or even terminate a

running test. The flat ribbon output cable of the trigger pod is to be plugged into the master clock module of the system.

Data Generator / Analyzer Modules

To simplify the reading, the data generator/analyzer modules are called *data modules* in this manual.

The data modules generate the stimulus signals and analyze the response signals in real time.

Data modules with frontend slots

There are data modules that have slots for two or four replaceable frontends. Generator and/or analyzer frontends can be plugged into these slots. Such modules provide two or four tester channels, respectively.

The following figure shows two examples.

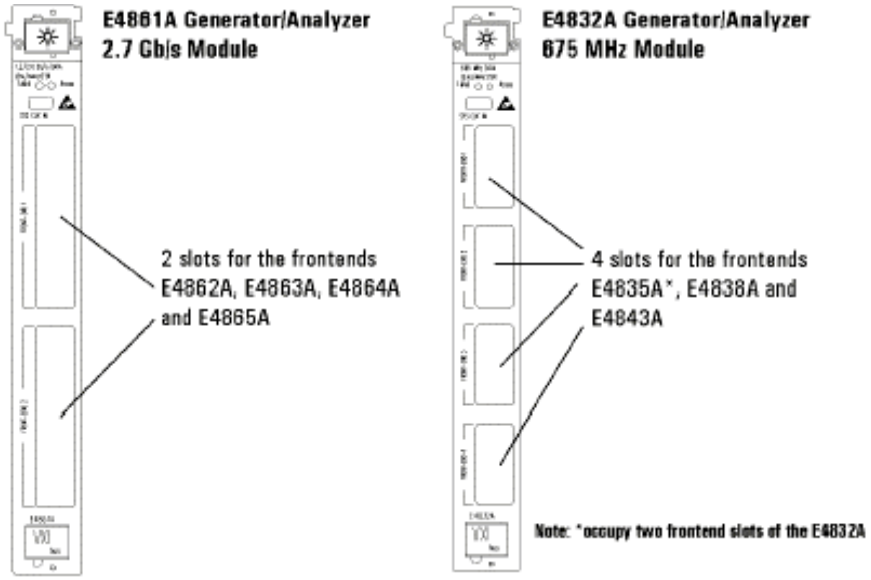

Figure 7 Data Modules with Frontend Slots

Frontends

There are generator and analyzer frontends. If necessary, both kinds can be mixed in one data module.

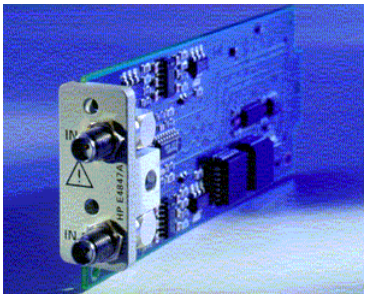

Figure 8 Generator Frontend for up to 675 Mbit/s

The software numbers the connectors of a data module from top to bottom. Differential outputs or inputs are counted as one connector. Depending on the type of module and the number of frontends installed, this leads to connector numbers from 1 to 4.

Data modules without frontend slots

There are also data modules that have no frontends. These are particularly the high-speed modules. Here, one module means one generator or analyzer channel.

Special Modules

Modules for special purposes are:

- the 10.8 Gbit/s booster module N4868A
- the 3.35 Gbit/s electrical/optical data modules E4810A/E4811A
- the 45 Gbit/s E4868B MUX or E4869B DEMUX modules
- the 45 Gbit/s E/O and O/E converter modules
- the embedded ParBERT controller module E9850A

If your system contains one of these modules, please refer to chapter *"7 Special ParBERT Systems" on page 7-1* for additional information.

Module Summary

The following table summarizes the presently supported hardware components and system configurations. The table is sorted according to frequency requirements.

Note that some configurations require a specific clock module.

Table 1 Supported Modules and Frontends

Max. data rate		Generator	Analyzer	Clock module	Comment
45 Gbit/s	Modules:	E4868B MUX	E4869B DEMUX	E4808A	ParBERT 43/45G special— comes with 8 data generator/analyzer modules
13.5 Gbit/s	Modules:	N4872A	N4873A	E4809A	No frontends—one channel per module
10.8 Gbit/s	Modules:	E4866A	E4867A	E4808A	No frontends—one channel per module
		N4868A			Optional 10.8 GHz booster module; one channel standard, 2nd channel optional
7 Gbit/s	Modules:	N4874A	N4875A	E4809A	No frontends—one channel per module
3.35 Gbit/s optical/electrical	Modules:	E4810A	E4811A	E4808A, E4809A	One channel per module Both modules can be used for generating/analyzing optical or electrical signals
3.35 Gbit/s electrical	Modules: Frontends:	E4861B E4862B	E4861B E4863B	E4808A, E4809A	Two frontends (channels) per module
2.7 Gbit/s	Modules: Frontends:	E4861A E4862A	E4861A E4863A	E4808A, E4805B	Two frontends per module
1.65 Gbit/s	Modules: Frontends:	E4861A E4864A	E4861A E4865A	E4808A, E4805B	Two frontends per module
675 Mbit/s	Modules: Frontends:	E4832A E4838A, E4843A	E4832A E4835A	E4808A, E4805B, E4809A	Four frontends per module E4835A means 2 frontends

For details please refer to the *Agilent 81250 ParBERT Technical Specifications*.

About ParBERT Systems

An Agilent 81250 Parallel Bit Error Ratio Tester setup can comprise more than one *ParBERT system*. The number of mainframes is no indicator whether you encounter one or several ParBERT systems. Moreover, you can control and operate multiple ParBERT systems from one ParBERT controller PC, even simultaneously.

What Constitutes a ParBERT System

Apart from the controller PC and its interface to the VXI frame, a ParBERT system consists of a master clock module and at least one data module.

Depending on its type, the master clock module can provide its clock through front panel cables to 10 or 11 data modules. The data modules have to have unique VXI addresses and must be plugged into adjacent slots. Ten or eleven data modules fill one mainframe.

Master-Slave Configurations

If you need more data modules, you can add one or two expander frames and connect their clock modules as slaves to the master clock module. Every expander frame requires a module for connecting it to the controller PC, and a clock module.

Remember that only clock modules of the same type can be connected in master-slave configuration.

Clockgroups

This master-slave setup is still one ParBERT system. Up to 33 data modules listen to one clock. The master clock module and its associated data modules are automatically identified as *clockgroup 1*. Clockgroup 1 exists in every ParBERT system. Slave clock modules and their data modules are identified as clockgroup 2 or 3, respectively.

Each clockgroup includes all data modules that are located directly to the right of the clock module, up to the next clock module or empty slot.

Channel identification

A generator or analyzer channel of a system is identified by **C**lockgroupNumber – **M**oduleNumber – **C**onnectorNumber, for example, C1 M3 C4.

Multiple ParBERT Systems

Separate systems are widely used for testing multiplexers or demultiplexers. Such devices generally require different clock frequencies at the generator and analyzer sides. Multiplexer/demultiplexer tests can be performed by one system, if the ratio of these frequencies is 2^n, such as 2, 4, 8, 16, and so on. If it is not, separate data generating and data analyzing systems will do the job.

If you need systems with different timing requirements, you will install independent clock modules, not connected in master-slave configuration.

Each clock module and its associated data modules are then automatically treated as a separate ParBERT system (each starting with clockgroup 1).

System naming conventions

The first system (leftmost in the master mainframe) is automatically called *DSRA* (DSR = Digital Stimulus and Response, system A).

If the hardware comprises several independent clock modules, the 81250 ParBERT Configuration tool creates additional systems. By default, they get ascending names, such as DSRB, DSRC, and so on. You can change these names by editing the configuration file `dvtsys.txt`.

Mainframes present no system boundaries. You can install multiple systems in one mainframe or distribute them over several mainframes. The following figure shows an example of three ParBERT systems in one mainframe.

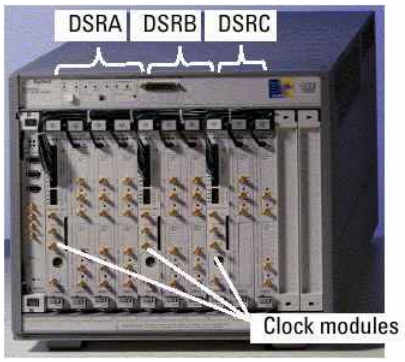

Figure 9 Three ParBERT Systems in One Mainframe

Operating multiple systems

The ParBERT user interface and remote control commands enable you to load and operate any of the configured systems.

You can even operate several systems in parallel by starting the user software more than once. Every user interface indicates the chosen system in the bottom line of its main window.

The ParBERT user software also provides utilities for starting multiple systems automatically.

NOTE You have to configure the mainframe for multiple systems for tests of the following types:

- Multi-frequency tests

  If the ratios of the test frequencies are not 2^n, you have to set up a different system for each clock frequency.

- Tests using Automatic Bit Synchronization with memory-based data

  In this case, separate systems are needed for the data generators and for the data analyzers.

ParBERT Software Components

The complete software is distributed on three CD-ROMs.

User software

The software necessary for operating ParBERT is supplied on the *User Software CD* (Agilent E4875-10001) with the following::

- ParBERT User Software

  The ParBERT user software (Agilent E4875A) provides an easy-to-use, intuitive graphical user interface for setting up, running and analyzing tests.

- ParBERT Measurement Software

  The measurement software gives you a fast and easy-to-use graphical access for running and evaluating complex bit error measurements, for example, DUT output timing measurements or eye opening measurements. For further information, please refer to *ParBERT Measurement Software* in the online help.

- Plug and play drivers
- Microsoft Internet Explorer
- Adobe Acrobat Reader

ParBERT Tutorial

You can use the *ParBERT Tutorial CD* to learn the basic steps of using ParBERT.

Agilent I/O libraries

The *Agilent Technologies I/O Libraries for Instrument Control CD* is part of the Agilent E8491B IEEE 1394 PC link to VXI package. This package includes two PCI cards for FireWire and GPIB. The I/O libraries provide the drivers for the I/O interfaces.

Prerequisites

ParBERT conforms to European and international standards. For details see the *"Declaration of Conformity" on page 10-2*.

Before you install a ParBERT system, ensure that the following prerequisites are met.

Power Supply

Mains 90-264 Vac ±10%, 47-66 Hz

Power consumption per mainframe 18 A @ 100 V

15 A @ 120 V

12 A @ 200 V to 240 V

Environment

Operating temperature 10 °C to 40 °C

Humidity max. 80 % relative humidity at 40 °C

Site attenuation A ParBERT system can generate electromagnetic radiation. Consider the Site Attenuation Requirements (see *"Site Attenuation Requirements" on page 10-5*).

Controller PC Requirements

The ParBERT 81250 software runs on an external PC which is connected to the system via an IEEE 1394 PC link to VXI.

You can order ParBERT with a state-of-the-art PC in your preferred format (desktop, laptop, rack-mounted, etc. You receive this PC preconfigured, that means, with all necessary hard- and software installed.

If you wish to use your own PC for controlling ParBERT:

- Choose a PC with Pentium-class processor
- The processor clock frequency should not remain under 2 GHz
- Minimum RAM is 256 MB
- 500 MByte of disk space should be reserved for installing the complete software
- Although Microsoft Windows NT is still supported (rev. 4.0, SP 6), the operating system should be Microsoft Windows 2000 or Windows XP, both professional editions with updated Service Packs

As computer technology evolves, these general requirements are subject to change, of course.

Tools

Tools Required

The following tools are required to install ParBERT:

- 2-mm flathead screwdriver
- Size 1 Pozidrive screwdriver
- Torx T-10 screwdriver (delivered with the system)

Unpacking ParBERT

When you receive ParBERT, it is recommended that you inspect the container and its contents.

NOTE If the contents are incomplete, if there is mechanical damage, or if any of the instruments does not pass the selftest, notify your nearest Agilent Technologies office. Keep the shipping materials for inspection by the carrier. The Agilent office will arrange for repair or replacement without awaiting settlement.

- Inspect the shipping container and its contents for damage.

  If the container or cushioning material is damaged, keep it until the contents of shipment have been checked for completeness and the instrument has been verified both mechanically and electrically.

WARNING To avoid the hazard of electric shock, do not perform electrical tests when there are signs of shipping damage to any of the instrument's outer covers or panels.

- Check the contents of shipment.

  See the packing list for exact details.

3 Setting Up the ParBERT Controller PC

Since you cannot use ParBERT without a controller—which means a PC with display, keyboard, and mouse—your first step should be to ensure that this PC is operational.

If you have received your ParBERT with a controller PC, this is preconfigured and ready for use. If not, you have to install hardware and software on your own PC.

Setting up a Preconfigured Controller PC

The shipment of a preconfigured controller PC contains:

- Two recovery CDs for Windows 2000
- Mains cable
- Keyboard and mouse
- Manual – Starting up
- Manual – Win 2000 Professional

A preconfigured ParBERT controller PC contains Agilent IEEE 1394 and GPIB interface cards. All required software is readily installed.

Quick Check

To verify that the controller PC is operational:

1 Connect monitor, keyboard, and mouse to the PC.

2 Connect the PC and the monitor to mains.

3 Switch the PC and the monitor on.

The PC is alright, when

- it boots automatically
- the Windows desktop appears
- the ParBERT icons are displayed

Figure 10 ParBERT Icons

By default, the Windows task bar is hidden. It appears when you move the cursor to the bottom of the desktop.

To shut down the computer:

1 In the Windows task bar, click *Start*.

2 Select *Shut down*.

Configuration of the Operating System

A factory-configured PC is configured as follows:

- The system name is A-SN-xxxxxxxx, where xxxxxxxx is the serial number of the PC.

- The name of the system administrator is **Administrator** (not case sensitive). His password is **DVTADM** (in capitals).

  An administrator has universal access rights. For example, you must log on as administrator if you wish to add users, change user permisssions, or update the ParBERT software.

- There is one user installed. His name is **dvt** (not case sensitive), and his password is **DVT** (in capitals).

  The user *dvt* is defined as a “Power User”.

- The administrator and user passwords are set to “never expire”. For security reasons, it is recommended to change these passwords occasionally.

- The Windows automatic log-on script is enabled. After power on, you are automatically registered as the user *dvt*.

  The auto log-on feature makes it possible to start the computer without manual intervention.

- The GPIB interface is set to address 11 and configured as a listener.

Setting Up a Custom Controller PC

The recommended operating system is Microsoft Windows 2000 or Windows XP with updated service packs installed.

TIP If you wish to start ParBERT automatically after power-on, consider setting up a ParBERT user and enabling the auto log-on feature for this user.

NOTE If you are using Windows NT (service pack 6 is required), a TCP/IP network must be set up, even if the controller is not connected to the LAN. TCP/IP support is required by the Agilent 81250 firmware server.

If the controller is not connected to the LAN, you can use the “MS Loopback” adapter and specify a “private LAN” IP address, such as 192.168.0.1 (no DNS or WINS).

Installing the Agilent I/O Libraries

The CD *Agilent IO Libraries for Instrument Control* contains the Agilent VISA and SICL libraries and some configuration utilities.

Agilent Virtual Instrument Software Architecture (*VISA*) is an IO library that can be used to develop I/O applications and instrument drivers that comply with the VXI plug&play standards.

Agilent Standard Instrument Control Library (*SICL*) is an IO library developed by Agilent that is portable across many I/O interfaces.

1 Log on as the system administrator.

2 Insert the CD into the CD-ROM drive.

The installer starts automatically.

NOTE The installer will check whether there is a non-Agilent VISA library already installed. If so, it will ask you how to treat the two libraries.

If you have installed a non-Agilent VISA library, we suggest that you cancel the installation for now and first pay attention to the `readme.txt` on the CD for known incompatibilities. You may also inspect the `install.pdf` to get information about the options you have.

After that, you can re-start the installer by running `setup.exe` from the CD.

3 Follow the instructions on the screen.

It is recommended to keep the proposed defaults. This helps troubleshooting and support in case of problems.

4 Choose *Full installation*.

This installs also the documentation files.

5 If you are using Windows NT: Answer **Yes** to the question “Do you want to install the drivers for the Agilent E4891 IEEE 1394 to VXI product”.

6 Do not request `IO Config` by now. Finish the installer.

When you click the Windows *Start* button and select *All Programs*, you will find the new program group *Agilent IO Libraries*. You can also right-click the new *IO Control* icon in the windows task bar. Both ways provide an access to the available library documents and functions.

7 Remove the CD. Shut down and switch off the computer.

8 Disconnect the mains cable.

Installing the Interface Cards

The Agilent product E8491B IEEE 1394 PC link to VXI includes:

- An E8491B#001 IEEE 1394 (FireWire) interface board to be installed in the controller PC
- An 82350A GPIB interface board to be installed in the controller PC
- A 1-slot VXI module to be installed in the ParBERT master mainframe
- Accessories
- Installation instruction sheet

NOTE It is recommended to install both interface boards in the PC. This provides the full ParBERT flexibility. You can then use the ParBERT controller as a GPIB listener or controller.

It is also recommended to install the Agilent E8491B#001 IEEE 1394 interface board. This board has been tested in conjunction with the Agilent I/O library functions that are used for communicating with the ParBERT mainframes.

Problems can arise, if you use a non-Agilent IEEE 1394 interface card, particularly in conjunction with Windows NT. You may need a device driver for your card.

For the hardware installation, follow the instructions coming with the E8491B product.

Enabling the Interfaces

You must inform the operating system about the new devices.

1 Power on the PC and log on as the system administrator.

Windows 2000 and XP detect new hardware automatically.

2 Wait a few seconds. The Found New Hardware Wizard will prompt you for choosing a suitable driver.

3 Click *Next*.

4 Make sure that Windows reports the successful installation of the device drivers.

You can also use the Windows Device Manager for verifying that the new devices are ready for use.

To open the Device Manager, click the Windows *Start* button. Choose *My Computer* – (right-click) *Properties* – *Hardware* – *Device Manager*.

When the interfaces are operational, you are ready for connecting your ParBERT mainframe(s) to the controller PC.

4 Connecting Mainframes to the Controller PC

When the controller PC is ready for use, it is time to

- check the proper fixing and connections of the clock distribution cables
- set up the mainframe(s)
- connect the mainframe(s)

These steps are explained in this chapter.

This chapter explains how to connect a master mainframe to the IEEE 1394 interface and how to add additional mainframes.

NOTE ParBERT systems with embedded controller do not use the IEEE 1394 PC link to VXI. If you wish to add mainframes to a. system with embedded controller, please refer to chapter *"Expanding Systems with Embedded Controller" on page 7-23*.

Once you have connected your Mainframe(s), you are ready to put ParBERT into operation (see *"5 Putting ParBERT into Operation" on page 5-1*).

Checking the Mainframe Clock Distribution

After unpacking a mainframe, make sure that the clock distribution cables have not loosened during transportation.

The *master clock distribution cables* connect the SYSTEM CLOCK OUTPUTS of the clock module with the SYS CLK IN ports of the data modules. They distribute the system master clock from the clock module to the other modules of the clockgroup.

E4805B / E4808A clock distribution

The figure below shows the cable installation of a system with an E4805B/E4808A clock module. Black cables are used.

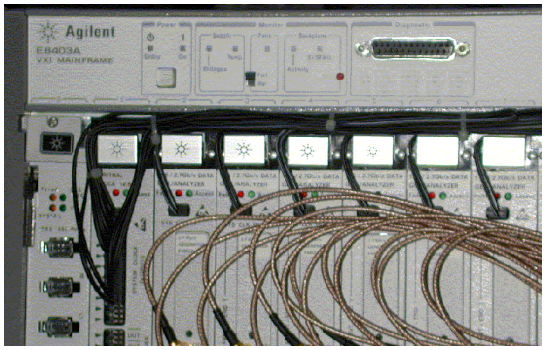

Figure 11 Arrangement of the Clock Distribution Cables (E4808A / E4805B Clock Modules)

E4809A clock distribution

The data modules for 7 and 13.5 Gbit/s require two clocks—the system master clock and the *giga clock*. Both are provided by the E4809A clock module.

The clock cables of a system with E4809A clock module are arranged as shown in the following figure. Blue cables are used for the master clock, light blue cables for the giga clock.

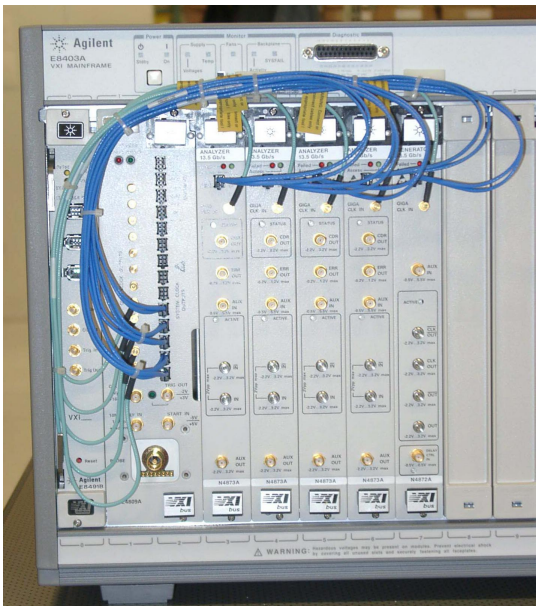

Figure 12 Arrangement of the Clock Distribution Cables (E4809A Clock Module)

Make sure that all connectors are firmly in place. If any clock distribution cables are missing, contact Agilent Technologies for replacement.

NOTE In order to reduce crosstalk and radiation to a minimum, the clock distribution cables have to be bundled, tied together, and installed as shown in the figures above.

Please keep this in mind if you are changing the hardware of an existing system.

CAUTION Never attempt to plug or unplug the giga clock distribution cables with your fingers. The giga clock connectors do not tolerate any oblique insertion or removal. See also *"How to Connect the Module" on page 6-8*.

Connecting the Master Mainframe

Use the IEEE 1394 interface cable to connect the master mainframe to the controller PC.

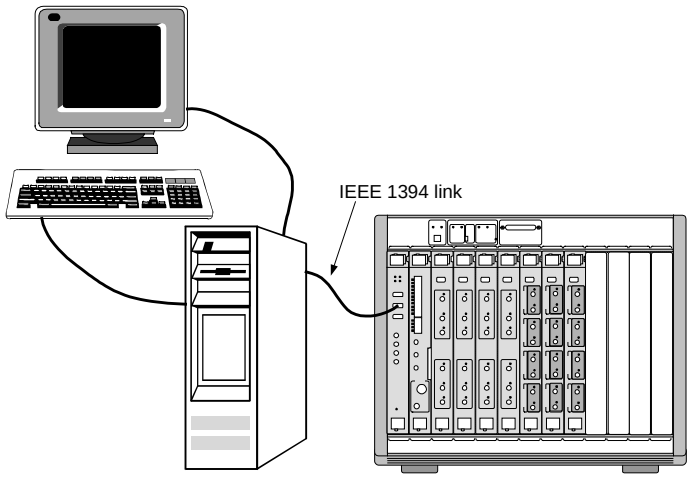

Figure 13 Connection of the Master Mainframe

Connecting Expander Mainframes

You may wish to connect several ParBERT mainframes to one controller PC. These mainframes can contain independent ParBERT systems or one ParBERT system in master-slave configuration.

The following figure shows the connection of three independent ParBERT systems to the controller.

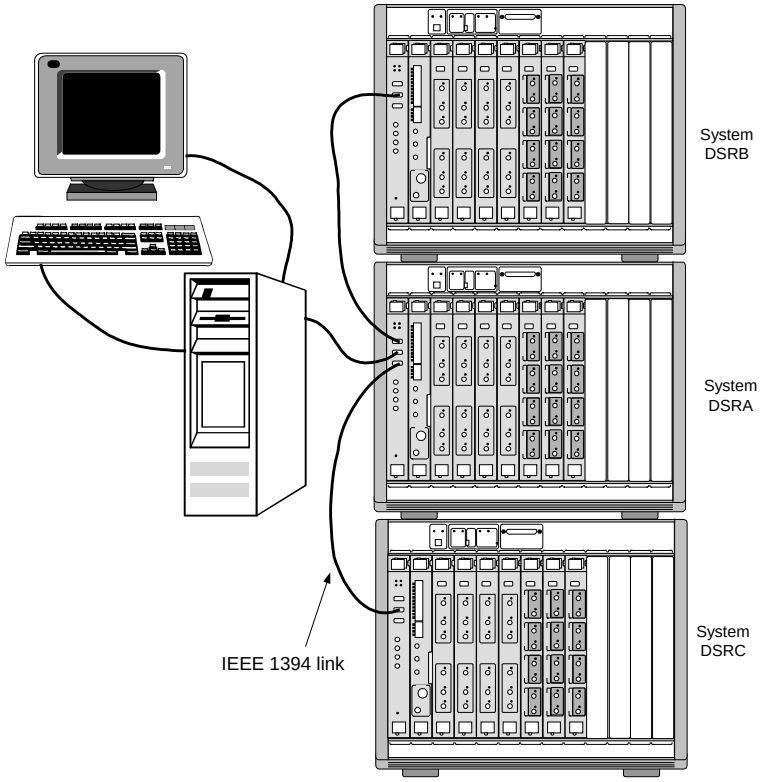

Figure 14 Connection of Multiple Mainframes

Master-slave configurations require additional connections.

Interconnecting Slave Mainframes

You need a first slave mainframe, if you wish to set up one ParBERT system with more than 10 or 11 data modules (depending on the type of clock module). You need a second slave mainframe, if that ParBERT system requires more than 20 or 22 data modules.

Positioning the Mainframes

Overview The mainframes are designed to be mounted in a rack, with the master mainframe in the middle, as shown in the figure below.

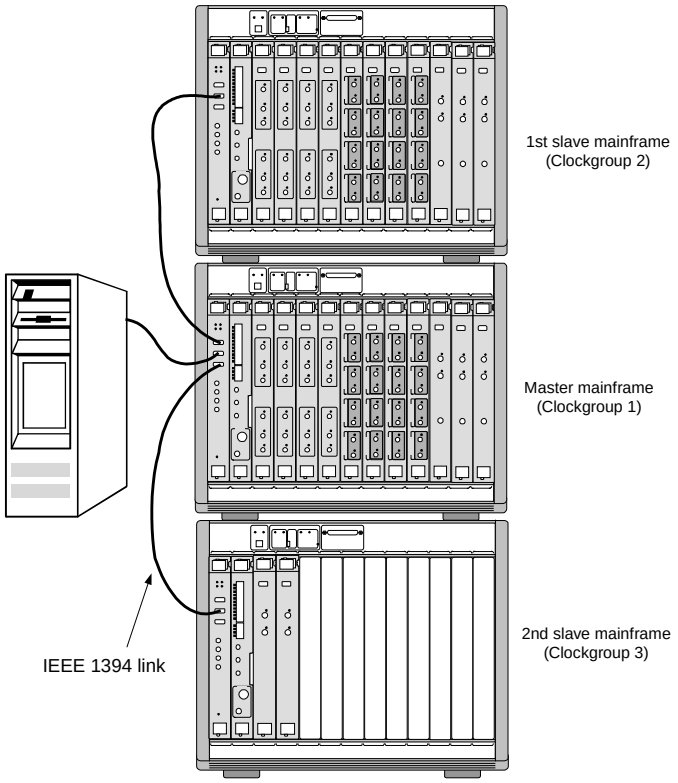

Figure 15 One Single ParBERT System With Three Mainframes

In addition to connecting the mainframes to the controller PC, you must synchronize the mainframes and slave clock modules to the master clock module. To interconnect the clock modules, you have to install

- *Synchronization cables* (first in the slave mainframes, then in the master mainframe)
- *Clock reference cables* (between the EXPANDER ports of the clock modules)
- *Giga clock cables*, if E4809A 13 GHz clock modules are used

Remember that all clock modules in a master-slave combination must be of the same type.

Details Refer to the following sections.

Installing the Synchronization Cable in a Slave

The synchronization cable is a flat ribbon cable that has to be plugged into the clock modules.

If you wish to use a mainframe without synchronization cable (this is the bus cable that comes out at the front of the clock module) as an expander frame, you need to install the synchronization cable.

To add the synchronization cable to an expander frame:

1 Remove the clock module from the expander mainframe. Follow the instructions given in *"Removing a Module" on page 6-2*.

2 Open the clock module, as described in *"How to Open a Module" on page 6-12*.

3 Plug the synchronization cable into one of the corresponding connectors in the clock module, as shown in the following figure. It does not matter which connector you use.

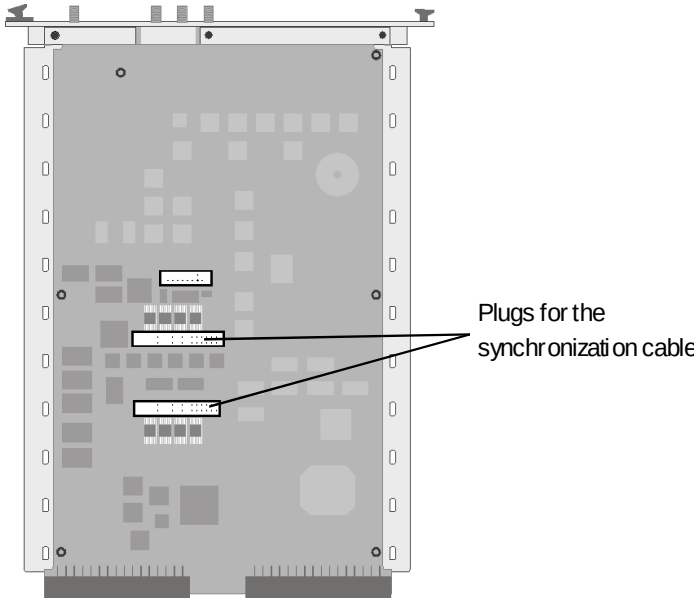

Figure 16 Plugging the Synchronization Cable into the Slave Clock Module

4 Close the clock module and re-insert it into the mainframe. Follow the instructions given in *"Installing a Module" on page 6-4*.

Connecting the Synchronization Cables to the Master

The synchronization cables from the expander frames have to be connected to the master clock module of the master mainframe.

1 Remove the master clock module from the master mainframe (see *"Removing a Module" on page 6-2*).

2 Open the clock module (see *"How to Open a Module" on page 6-12*).

3 Connect the synchronization cables from the expander frames to the master clock module, as shown in the figure below.

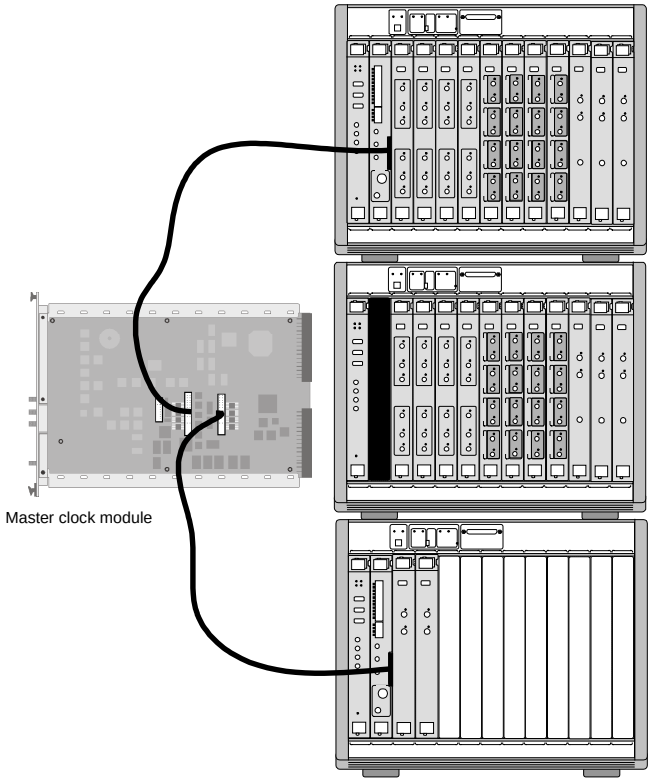

Figure 17 Connecting the Sync Cables to the Master Clock Module

4 Close the clock module and re-install it in the mainframe (see *"Installing a Module" on page 6-4*).

Connecting the Clock Reference Cables

Every clock module has one IN and three OUT connectors for master-slave connections. They are grouped together and labeled EXPANDER.

To connect the clock reference cables:

1 At the master clock module, connect one of the EXPANDER OUT ports to the EXPANDER IN port, as shown in the following figure.

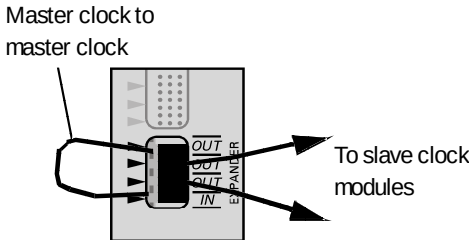

Figure 18 Master Clock Setup for Controlling Slave Clock Modules

2 Connect the remaining EXPANDER OUT ports of the master clock module to the EXPANDER IN ports of the slave clock modules.

The following figure illustrates the complete wiring of a system with two expander frames.

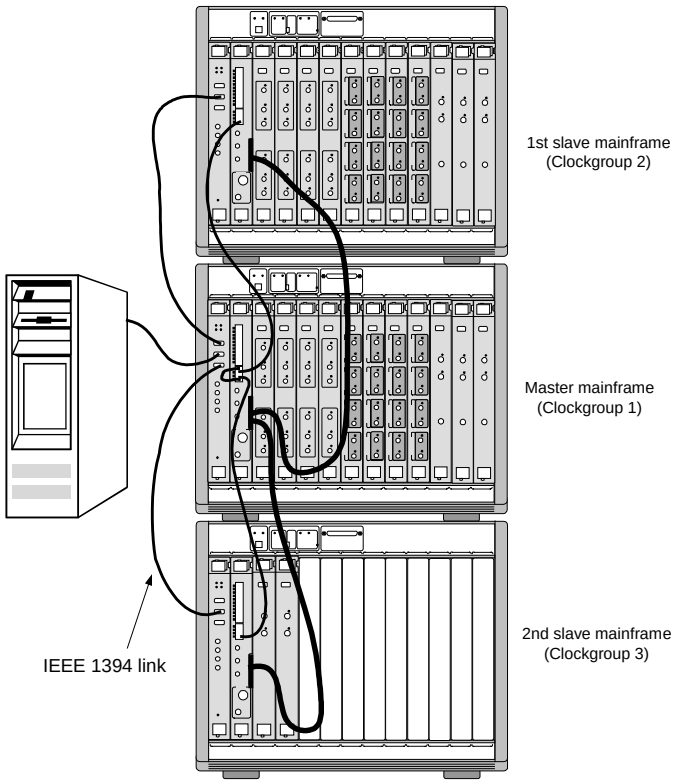

Figure 19 Connections of a Three-Mainframe System

If you do not interconnect the clock modules with clock reference cables, then you set up an Agilent 81250 Parallel Bit Error Ratio Tester that comprises three independent ParBERT systems.

TIP Independent ParBERT systems can be frequency-synchronized by connecting the TRIGGER OUT port of one system to the CLOCK/REF INPUT or CLOCK INPUT port of the second system. This requires that the parameters of the clock modules are set accordingly with the ParBERT user software.

Frequency-synchronization does not mean phase-synchronization.

Connecting the Giga Clock

NOTE Additional giga clock cable connections are required, if E4809A 13 GHz clock modules are used.

The E4809A 13 GHz clock module has 12 GIGA CLOCK OUTPUTS and one CLOCK INPUT.

All output connectors provide the same clock signal. Ten of the outputs are meant for 7/13.5 Gbit/s data modules, two for connecting the giga clock to the external CLOCK INPUT of two slave clock modules.

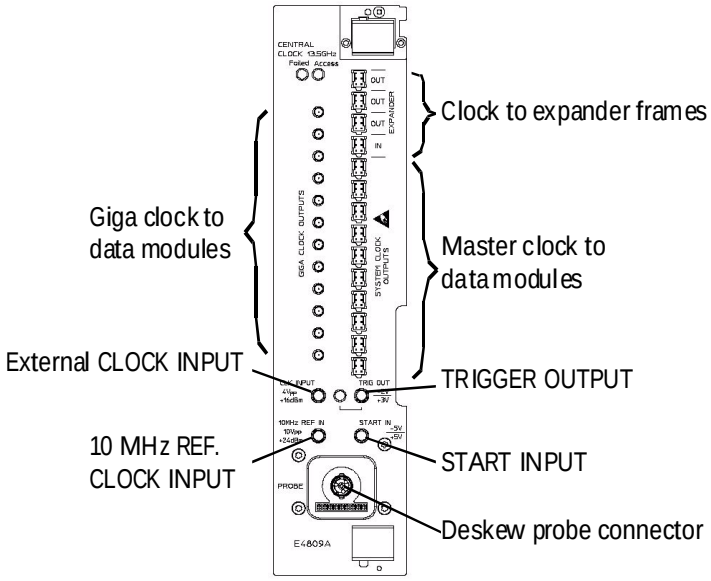

Figure 20 E4809A Clock Module

NOTE The GIGA CLOCK OUTPUTS have SMP connectors whereas the CLOCK INPUT has an SMA connector. If necessary, contact Agilent Technologies for a special cable or adapter.

CAUTION At the clock module, do not plug in the giga cables with your fingers. There is a risk that you damage the cable. Use the cable insertion tool

supplied with the module. See also *"How to Connect the Module" on page 6-8*.

NOTE Remember that the GIGA CLOCK OUTPUTS are internally grouped in pairs. You may need a 50 Ohm terminator. See *"E4809A clock module" on page 2-5*.

5 Putting ParBERT into Operation

Now that you have connected your mainframes to the controller PC, switch the PC and the mainframe(s) on.

NOTE You cannot put ParBERT into operation, if the mainframes are disconnected or switched off.

A preconfigured controller PC requires only two actions. More actions are necessary, if you have set up your own PC.

Using a Preconfigured Controller PC

If you have received ParBERT with a preconfigured controller PC:

1 Start the Agilent 81250 Configuration tool. Run the *Build Systems* function. Make sure that the mainframes and modules were correctly identified. For details see *"How to Use the Agilent 81250 Config Tool" on page 5-7*.

2 Start the ParBERT user software (see *"Starting the ParBERT User Software" on page 5-18*).

Using a Custom Controller PC

If you have set up your own controller PC:

1 Log on as the system administrator.

2 Configure the IEEE 1394 and GPIB interfaces (see *"How to Configure the IEEE 1394 and GPIB Interfaces" on page 5-2*).

3 Install the ParBERT user software (see *"How to Install the ParBERT User Software" on page 5-6*).

When the installation is complete, the Agilent 81250 Configuration tool starts automatically.

4 Set the VXI port and run the *Build Systems* function. Make sure that the mainframes and modules were correctly identified. For details see *"How to Use the Agilent 81250 Config Tool" on page 5-7*).

5 Start the ParBERT user software (see *"Starting the ParBERT User Software" on page 5-18*).

How to Configure the IEEE 1394 and GPIB Interfaces

Skip this section if you have received ParBERT with a preconfigured controller PC.

The interface configuration is required to connect the devices to the Agilent IO library functions.

1 Right-click the blue *IO Control* icon in the Windows task bar.

2 Select *Run IO Config*.

The lefthand window shows you the interfaces you can configure. To configure the IEEE 1394 interface, highlight it.

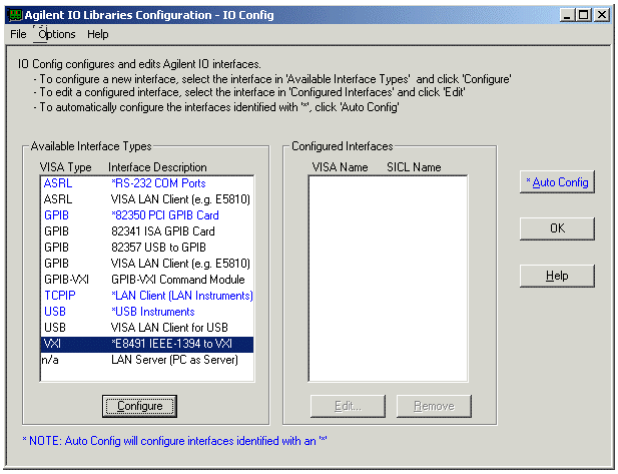

Figure 21 Agilent Libraries' IO Config Tool

3 Click *Configure*.

The configuration options are displayed.

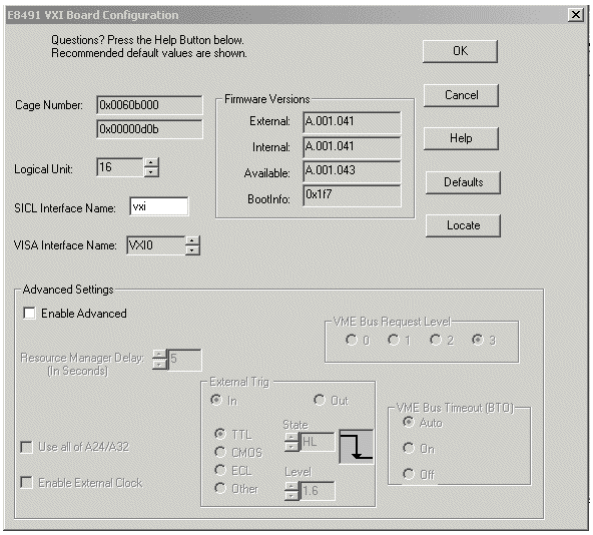

Figure 22 VXI Interface Configuration Options

4 It is recommended to keep the defaults. Click *OK*.

This adds the IEEE 1394 interface to the *Configured Interfaces*.

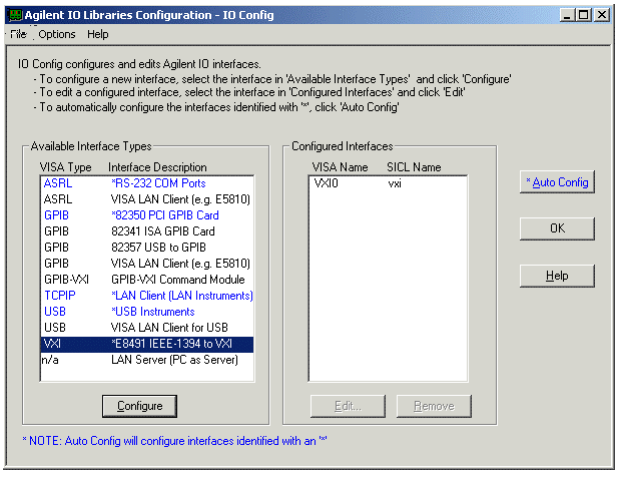

Figure 23 IEEE 1394 Interface Configured

Note that the default VISA name for the first PC-to-VXI interface is *VXI0*.

5 If you have installed the 82350 PCI GPIB card, configure this as well.

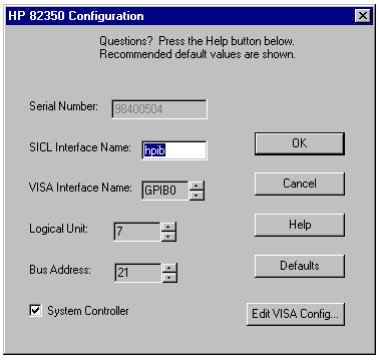

Figure 24 GPIB Interface Configuration Options

You can use ParBERT as a GPIB controller. If you wish to connect ParBERT as a listener to the GPIB, disable the *System Controller* checkbox.

When you terminate IO Config, the software will update the firmware of the E8491 PC-to-VXI interface modules installed in the VXI mainframes. Please wait until the update process has finished.

After that, you are ready to install the ParBERT user software.

How to Install the ParBERT User Software

Skip this section if you have received ParBERT with a preconfigured controller PC.

To install the ParBERT user software:

1 Insert the *E4875-10001 Agilent 81250 Parallel Bit Error Ratio Tester Software Installation* CD into your drive.

The installer starts automatically.

2 It is recommended that you choose the *Typical Installation*. This ensures full ParBERT functionality.

If you later-on need additional software, you can repeat and update the installation at any time.

3 It is also recommended that you keep the default directories. This helps the technical support in case of problems.

When you have installed the ParBERT user software for the first time, the Agilent 81250 Configuration tool is automatically started. It comes up with the page *I/O Interfaces and Systems*. For instructions, please refer to the following section.

NOTE After installing the ParBERT user software, you have access to a whole library of documents in pdf-format. By default, they are located under `C:Program Files\Agilent\Agilent81200\doc`.

TIP You can install the ParBERT user software also on a PC that has no Agilent I/O libraries and no connection to any ParBERT mainframe. This can be useful for training purposes. The software provides some offline and demo systems that can be operated without ParBERT hardware.

How to Use the Agilent 81250 Config Tool

You need the Agilent 81250 ParBERT Configuration tool for:

- Addressing a ParBERT VXI interface
- Verifying the correct identifaction of the modules and frontends in the connected mainframes
- Detecting and saving the module configurations of one or several ParBERT systems
- Detecting and saving the frontend configurations of the systems' modules
- Setting start conditions for the ParBERT software
- Setting start conditions for the GPIB interface
- Specifying LAN connections for remote programming

When you have installed the ParBERT user software for the first time, the Agilent 81250 Configuration tool is automatically started. It comes up with the page *I/O Interfaces and Systems*.

NOTE You *can* run the Agilent 81250 Configuration tool at any time.

You *must* run the Agilent 81250 Configuration tool, if:

- You are setting up a new ParBERT
- You have changed the ParBERT hardware (mainframes, modules, or frontends)

You don't have to run the Agilent 81250 Configuration tool if you have updated the ParBERT user software.

To start the configuration tool, double-click the *Agilent 81250 Config* icon on the Windows desktop.

Figure 25 Agilent 81250 Config Icon

The Agilent 81250 Configuration tool has four pages:

- I/O Interfaces and Systems
- Serial Numbers
- Startup Settings
- Configuring SICL/LAN Interfaces

How to Configure I/O Interfaces and Systems

This page allows you to connect to VXI interfaces and to build or re-build ParBERT Systems.

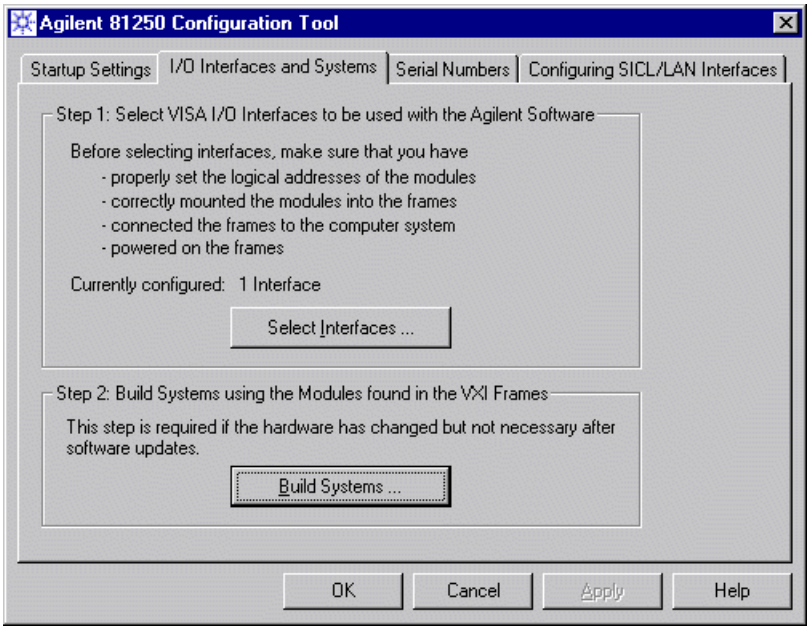

Figure 26 Configuring I/O Interfaces and Systems

- *Select Interfaces*: When you are setting up a new ParBERT, you have to select the VISA I/O interface to be used by the ParBERT software.

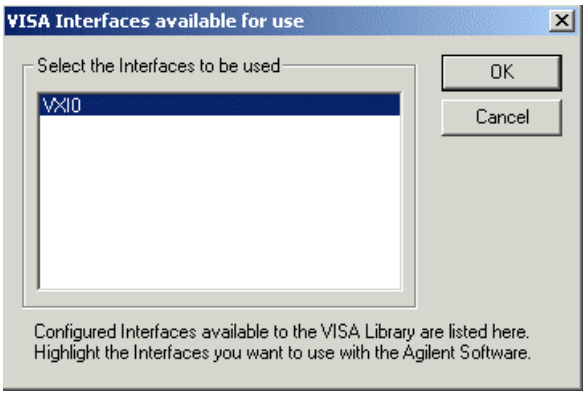

Figure 27 Selecting I/O Interfaces

The default interface is VXI0. If your controller PC is connected to more than one IEEE 1394 PC to VXI module, you have to select the interfaces you wish to use.

- *Build Systems*: You must click this button if you have changed the ParBERT hardware. You do not need to run *Build Systems* if you have updated the user software without changing the hardware.

  Wait for the following message:

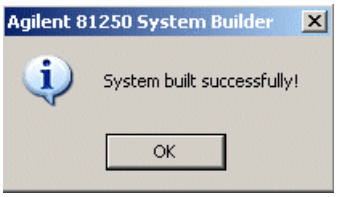

Figure 28 New Systems have been Built

The System Builder checks the available modules and creates new configuration files `dvtsys.txt` and `dvtits.txt`. The old files are saved as `dvtsys.bak` and `dvtits.bak`. The files are located in the `\cfg` subdirectory of the Agilent 81200 database.

The base system is called DSRA. If the mainframe contains more than one master clock module, additional systems (DSRB, DSRC, ...) are automatically set up, as shown in the figure below.

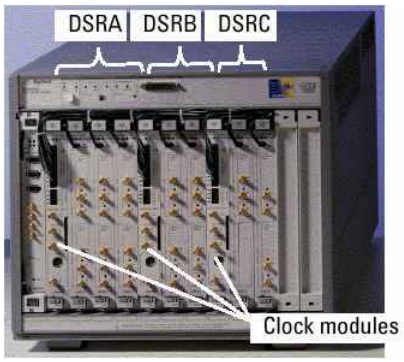

Figure 29 Automatic Assignment of System Names

You can change these names by editing the file `dvtsys.txt` in the Agilent 81200 database.

TIP If you run *Build Systems* twice, the `.bak` files are overwritten. If you wish to save your previous system configuration for re-use, rename or copy these files before clicking *Build Systems* once more.

The System Builder also creates for each real system an offline system and additionally some demo systems.

An offline system reflects the actual system configuration. As it does not access the hardware, it can be operated on any PC and used for training purposes.

The demo systems provide additional offline system configurations that can be used for demonstrating ParBERT features to newcomers.

NOTE After any changes of the system configuration you have to adjust the frontend and module connectors. For instructions, refer to the ParBERT online Help, "*How to Adjust the Instrument Connectors*".

Now that you have run *Build Systems*, you can inspect the result immediately by clicking the *Serial Numbers* tab.

How to Check the Configuration and Serial Numbers

The *Serial Numbers* page of the Agilent 81250 Configuration tool shows the hardware components found by the System Builder. It shows the mainframes and modules.

NOTE If this configuration differs from your hardware setup, you have to check your mainframes and their connections.

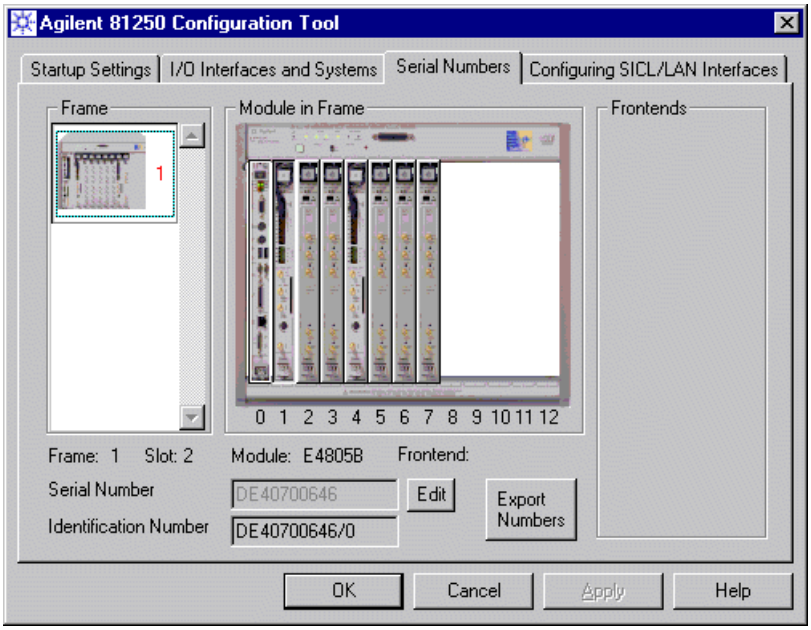

Figure 30 Serial Numbers Page

The *Serial Numbers* page can be used to query and archive the serial numbers of the installed modules and frontends. By default, the numbers of the first clock module in mainframe #1 are displayed.

The *Identification Number* is the hardware manufacturing number.

The *Serial Number* can be edited. This may support your asset administration. If you have received a module from repair which has a new ID number, you can assign the old serial number to that module.

- To view the modules of a different mainframe, click on that mainframe.
- To view the type and numbers of a different module, click on that module.

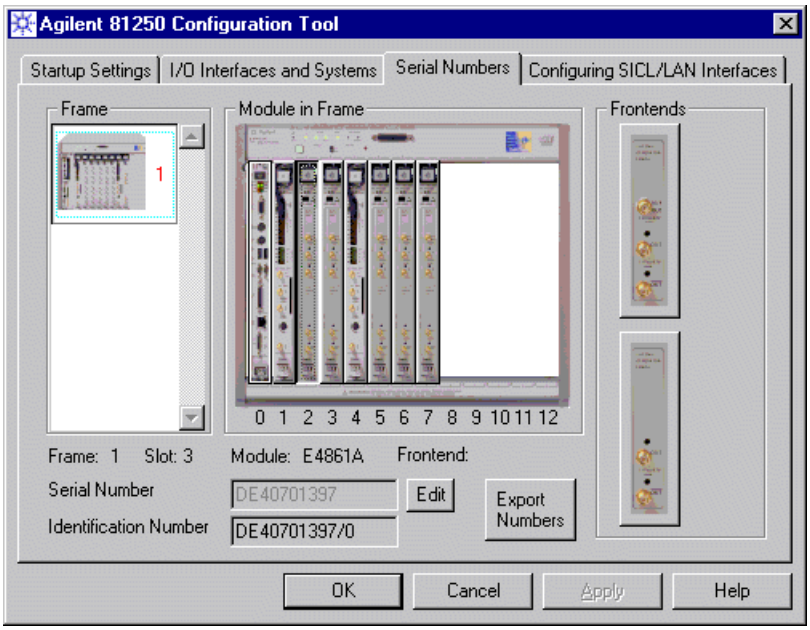

Figure 31 Serial and ID Numbers of a Data Generator / Analyzer Module

- To view the type and numbers of a frontend plugged into a data module, click the frontend.
- To archive the present system configuration in an ASCII file, click the *Export Numbers* button.

Now that you are sure that the ParBERT hardware was correctly identified, you may wish to inspect the *Startup Settings*.

How to Specify Startup Settings

The *Startup Settings* define how the ParBERT user software is started.

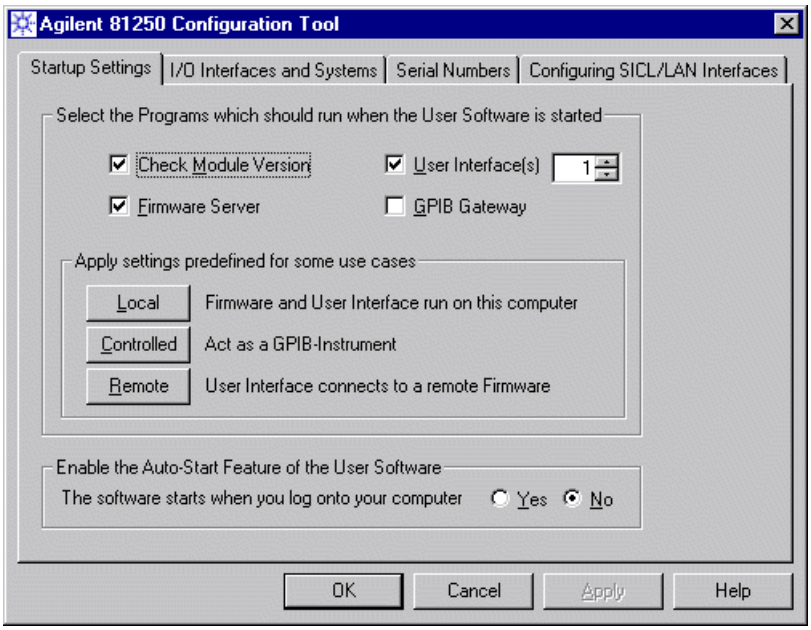

Figure 32 Startup Settings Page

NOTE When you are setting up a new ParBERT and its controller PC, it is recommended that you keep the defaults.

Operating Modes

Local mode Local mode is used, if the system is operated from the ParBERT controller PC. Local mode starts both the Agilent 81250 firmware server and the user interface.

Controlled mode Controlled mode is used, if the ParBERT controller PC shall be operated through GPIB or LAN. It starts the Agilent 81250 firmware server and the GPIB Gateway, not the user interface. If you do not use the GPIB Gateway, you can disable it.

Remote mode

This mode starts the Agilent 81250 user interface only. It is used on a remote computer that is used to operate a ParBERT system which is in controlled mode.

For remote operation, you have to establish a LAN connection to the ParBERT firmware server running on the controller PC.

Auto-Start

The *Auto-Start feature* defines whether the ParBERT software automatically starts after logon.

If **Yes** is selected, the user software starts automatically after logon.

You can select **No** if you use the PC for other work. Then you can start the user software from the Windows desktop or the *Start* menu.

By default, the setting takes effect as soon as the DVT user logs on.

User Interfaces

In the *User Interface(s)* box, you can specify that more than one user interface is started. This is useful if you are operating two or more independent ParBERT systems.

Your setting applies to both manual and automatic start.

Note that each user interface has to be configured: You will have to specify the system to be operated and more.

Individual Settings

NOTE

It is recommended that only experienced users change the automatic settings.

You can define which of the following programs are started automatically when ParBERT starts:

- *Check Module Version*

  When this option is activated, the ParBERT software on the PC checks the firmware of the ParBERT modules for consistency with the current

revision of the user software whenever ParBERT is started. In case of inconsistency, a BIOS update program is activated to guide you through the procedure.

This option should always be active on the ParBERT controller PC.

- *Firmware Server*

  This option must be activated on the ParBERT controller PC, because it builds the connection between the hardware modules and the interfaces.

- *User Interface(s)*

  This checkbox enables the user interface on the PC. It has to be activated for the PC that is going to be used for operating the system via the user interface. In the *User Interface(s)* box, you can specify that more than one user interface is started.

- *GPIB Gateway*

  This option defines whether the ParBERT controller PC is operated as a GPIB instrument from a remote PC.

  In this case, the firmware server communicates with the modules through the IEEE 1394 PC link to VXI and with the user's program through the GPIB interface card.

How to Configure SICL/LAN Interfaces

This page of the Configuration tool allows you to specify LAN connections for remote programming.

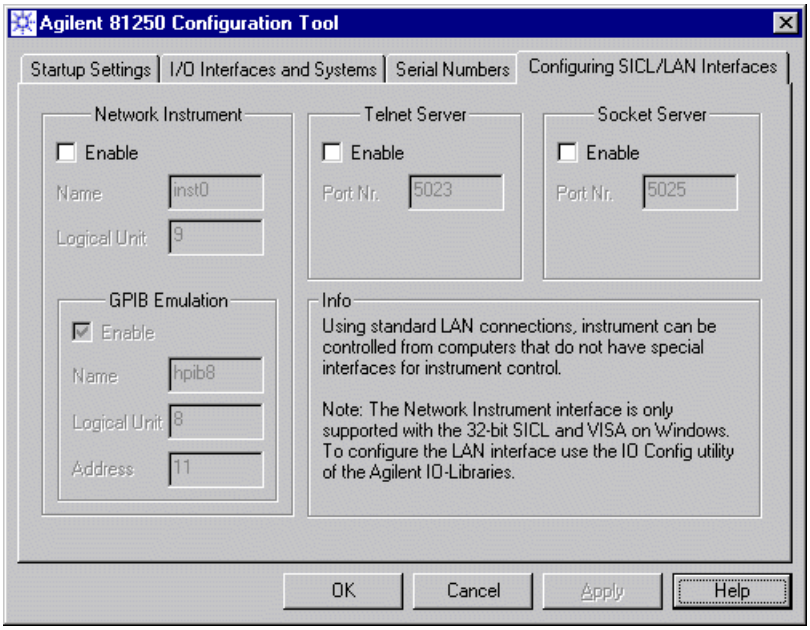

Figure 33 Configuring SICL/LAN Interfaces Page

You can enable and specify Network, Telnet, and Socket connections. Enabling such connections can be quite useful, if a non-Windows computer (for example, UNIX) is used for remote programming. For details please refer to the *Agilent 81250 ParBERT LAN Programming Guide*.

Starting the ParBERT User Software

To start the user software manually, double-click the *Agilent 81250 User Software* icon on the Windows desktop.

Figure 34 Agilent 81250 User Software icon

When you start the user software for the first time or if you have updated the ParBERT user software, the firmware inside the ParBERT modules needs to be updated.

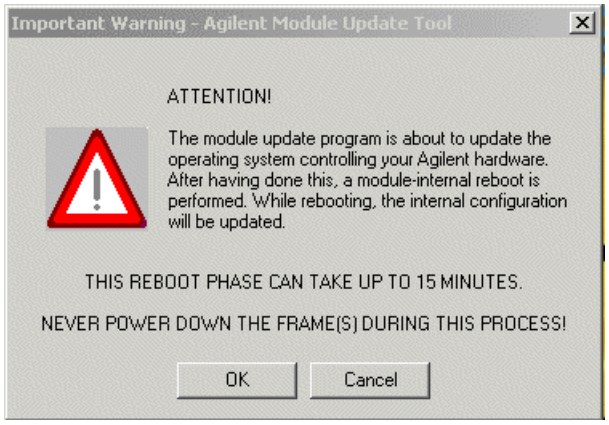

Figure 35 Module Firmware Update Required

Click *OK* and wait until the process has finished.

NOTE The BIOS update process can take up to 15 minutes. Do not power down the ParBERT mainframe(s) during that time.

After that, you have to configure the user interface.

For a new system, the interface configuration window looks as shown below:

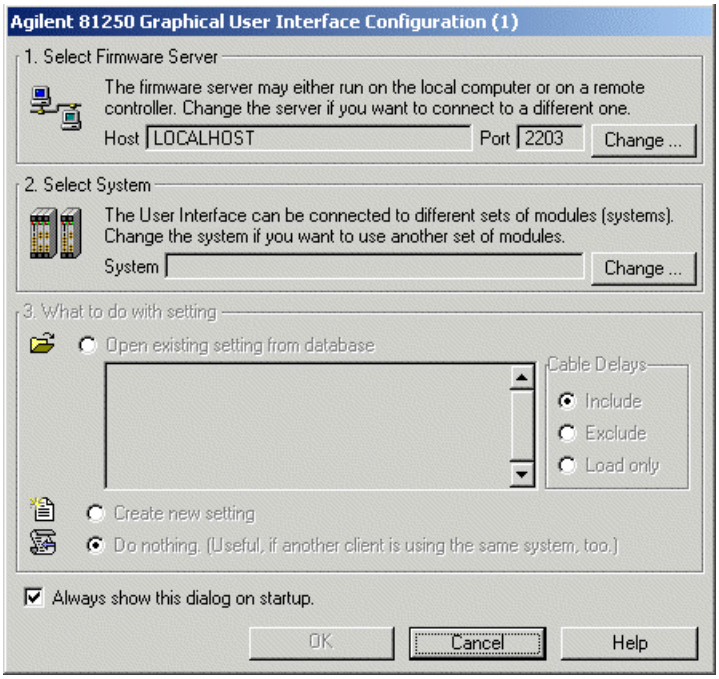

Figure 36 Agilent 81250 User Interface Configuration Window

NOTE You can start the user software more than once—either manually or automatically after logon. In this case you get several user interfaces, and each of them has to be configured.

For example, using two user interfaces, you can operate two independent systems through one firmware server running on one ParBERT controller PC. You can also communicate with different firmware servers of different systems which are connected to the LAN.

The present user interface is indicated in the window title (number 1 in the figure above).

Note also: By default, this configuration dialog appears each time when you start the ParBERT user software. You can change this behavior—see *"How to Disable the UI Configuration Dialog" on page 5-23*.

How to Select the Firmware Server

If you are running the ParBERT user software in local mode, the firmware server is found on your PC which is called LOCALHOST.

If you are running the ParBERT user software in remote mode, LOCALHOST is not available. You have to specify the network node on which the firmware server is running. This requires that the ParBERT controller PC has been connected to the LAN.

The selection is made by clicking the corresponding *Change* button.

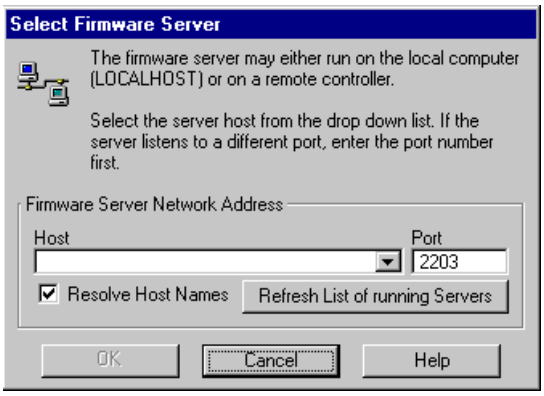

Figure 37 Selecting a PC on which the Firmware Server is Running

In this window, you can enter the computer name or the IP address and the associated port of the ParBERT controller you wish to connect to.

You can update the list of hosts by clicking *Refresh List of running Servers*. Depending on the checkbox, the list shows names or IP addresses. Note that only hosts running in the same subnet as the computer running the ParBERT user interface are recognized.

How to Select the System

When you start the user software for the first time or if you have updated the ParBERT user software, you must choose the ParBERT system you wish to operate.

The basic online system is automatically called DSRA.

You may wish to operate a different ParBERT system from this user interface.

If you start the user interface more than once, you have to choose a different ParBERT system for each user interface.

To select the system:

1 Click the associated *Change* button.

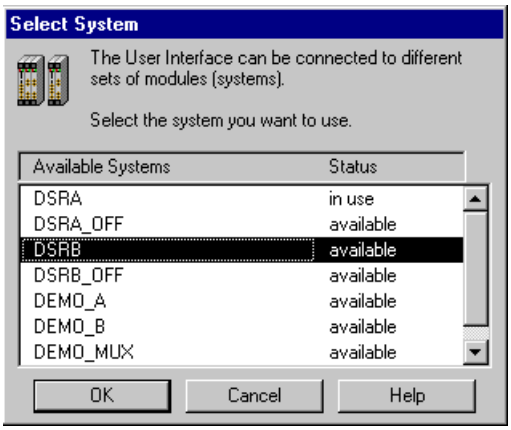

Figure 38 Choosing a System

2 Choose from the list of available systems.

The list includes also offline (e. g. DSRA_OFF) and demo systems (e. g. DEMO_A). For more information see *"How to Configure I/O Interfaces and Systems" on page 5-9*.

Systems already in use by an active user interface cannot be chosen.

3 Confirm.

How to Specify a Start Setting

This section of the Agilent 81250 User Interface Configuration window applies only to systems that have already been in use.

The complete setup for a system and a device to be tested including all parameters as well as references to the data to be sent or expected is called *setting*.

This section allows to load one of the stored settings of the chosen system automatically with the user interface.

That means, you need only start the user software and all systems of the Agilent 81250 Parallel Bit Error Ratio Tester are ready for testing a particular device.

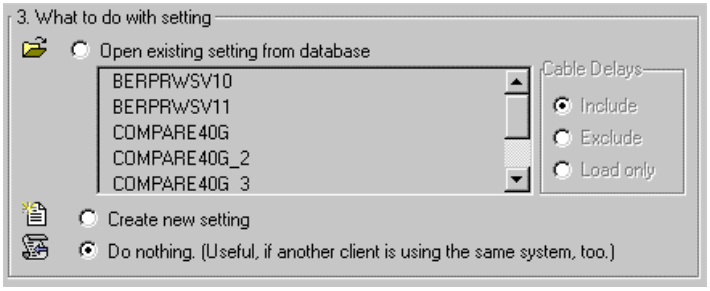

Figure 39 Selecting a Setting

To load one of the stored settings automatically:

1 Enable the checkbox.

2 Choose from the list.

3 Decide on loading also the cable delays.

How to Disable the UI Configuration Dialog

The user interface (UI) configurations are automatically stored. They are identified by numbers, starting from one.

Once the Agilent 81250 Parallel Bit Error Ratio Tester has been set up, you may wish to disable the User Interface Configuration dialog. This is done by disabling the *Always show this dialog on startup* checkbox.

When the user interface is active, the User Interface Configuration dialog can be started from the *File* menu, item *Configuration*.

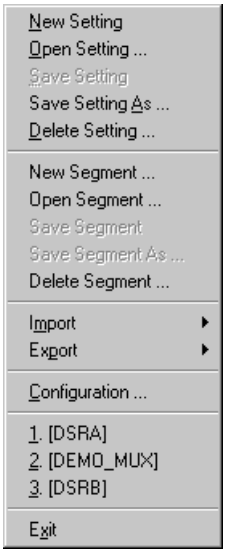

Figure 40 ParBERT File Menu

The File menu shows also a list of the systems for which user interfaces have been configured. If you wish to keep the present user interface but operate a different system, you can choose from this list.

The list tracks up to four entries. The following actions lead to a new entry:

- Closing the Agilent 81250 Graphical User Interface Configuration dialog with OK
- New Setting
- Open Setting
- Save Setting
- Save Setting As

The new entry is put in position 1. The numbers of the other entries are incremented by 1. If the entry is identical to another entry in the list, this entry is removed.

The list of the recently used startup configurations is shared among all user interfaces, independent of the startup parameter set they use.

How to Get Help

For context-sensitive help press F1, the Help button in the dialog boxes or the button shown here in the margin column.

The Help menu is self-explanatory. You can also start with the table of contents or search from the alphabetical index.

Testing ParBERT's Integrity

The main menu of the ParBERT user interface offers functions for testing the system's integrity. These selftests can be performed at any time, as long as no test is running. It is highly recommended to execute these tests after changing the hardware components or after software updates.

NOTE Note that these tests refer to the presently operated system. If you have multiple ParBERT systems installed, repeat the tests for each of these systems.

The tests are located in the *System* pull-down menu, as shown in the following figure.

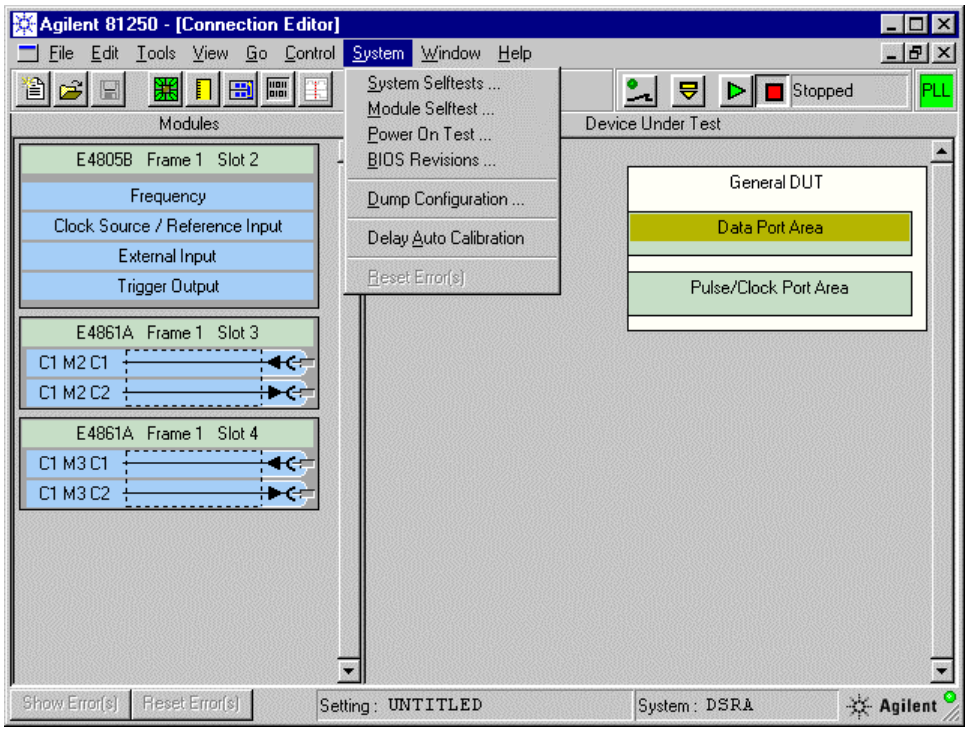

Figure 41 System Menu

In this example, the presently operated system is DSRA, as indicated in the status bar at the bottom.

When you click one of the upper four menu items, the *Instrument Diagnostic / Selftest* window opens. You can choose between the available tests.

System Selftest

The *System Selftest* is automatically performed when the ParBERT user software is started.

It checks the connections between the modules. It detects:

- Missing master clock distribution cables
- Empty mainframe slots
- Interrupted VXI backplane connections
- Wrong master-slave cable connections

The System Selftest returns the current firmware revisions of the modules and the types of installed frontends.

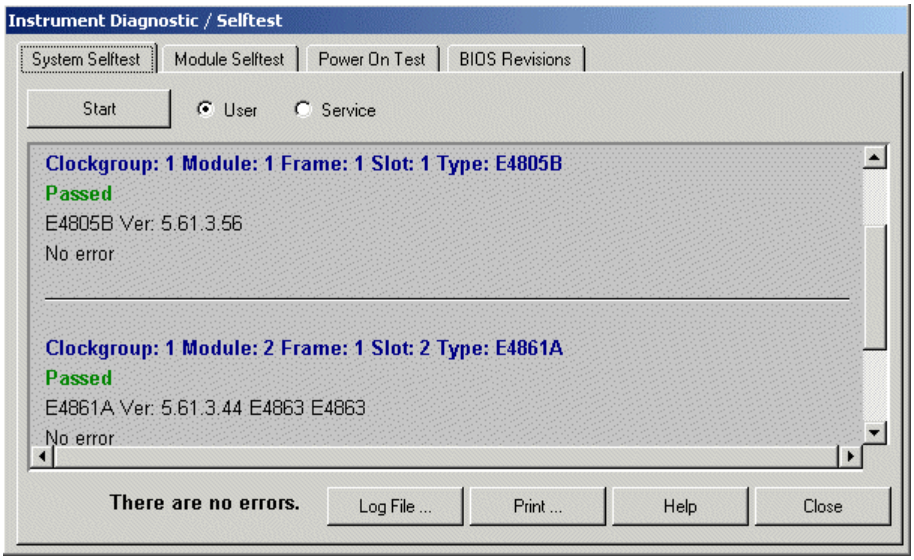

Figure 42 System Selftest Results

Module Selftest The *Module Selftest* allows you to select a single or all modules. It performs a thorough check of the modules and frontends. This test can take some minutes.

Power On Test This selftest is automatically performed at power on. It ensures that the system can be operated. You can view the results of the last *Power On Test* by clicking *View Results*. You can then save these results to a log file for documentation.

BIOS Revisions This function returns the current firmware revisions of the modules. It informs you if the BIOS of a module needs to be updated. You can use this function, if you have disabled the *Check Module Version* checkbox in the Agilent 81250 Configuration tool. Note that *Check Module Version* should always be enabled on the ParBERT controller PC.

6 Changing the ParBERT Hardware

This chapter explains how to remove or add ParBERT modules and frontends.

NOTE ParBERT 45G systems and systems with optical components require special attention. If you wish to modify one of these systems, please refer to *"7 Special ParBERT Systems" on page 7-1* .

To support upgrade, downgrade, replacement, and repair, it is highly recommended that you keep track of the modules in each mainframe using a table like the one shown below. This table then has to be updated whenever the ParBERT configuration is changed.

Table 2 Mainframe Configuration Table

Slot	Module ID	Module name	Logical address	Serial number
0	E8491B	IEEE 1394 PC to VXI	0	12345678
1	E4805B	Clock	24	23456789
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Removing a Module

Overview

To remove a module from the mainframe:

1 Switch off the ParBERT mainframe.

CAUTION

Some modules, particularly the E4861B modules, can reach a front panel temperature of more than 50 °C. This is not unusual, because the complete housing is used as a huge heat sink.

It may be wise to let the mainframe cool down before continuing.

2 Disconnect all cables from the module.

3 Pull out the module.

Details

Refer to the following sections.

How to Disconnect the Module Cables

To disconnect a module:

1 Unplug the signal cables.

2 At a data module: Unplug the master clock distribution cable. At a clock module: Unplug all master clock distribution cables.

3 At a 7 or 13.5 Gbit/s data module: Unplug also the giga clock distribution cable. At an E4809A 13 GHz clock module: Unplug all giga clock distribution cables.

CAUTION

Do not pull off the giga clock cables with your fingers. In particular: *Do not pull at the rubber coating!* There is a risk that you inadvertently damage the connector of the module or cable.

The giga clock connectors do not tolerate any oblique insertion or removal.

If you need to disconnect one of these cables, use the giga cable removal tool provided with the system and follow the instructions given below.

Not following these instructions can result in severe damage of the clock or data module. It can also result in unobtrusive damage of the cable connector which may then destroy another clock or data module when it is plugged in.

Grab the cable connector with the tweezers and pull it off, perpendicular to the module front panel.

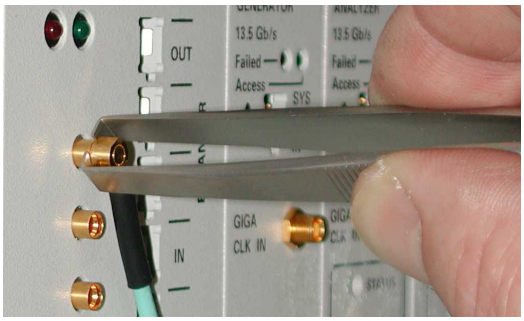

Figure 43 Using the Giga Cable Removal Tool

How to Plug Out the Module

To remove the module from the mainframe:

1 Using a 2-mm pozidrive or flathead screwdriver, unscrew the two screws at the top and bottom of the front panel that hold the module in place.

2 Flip the module handles until the module moves.

3 Pull the module out of the mainframe.

If you want to replace the module, insert the new module now, as described under *"Installing a Module" on page 6-4*. If not, remember that a clockgroup does not tolerate empty slots. Data modules following an empty slot will be ignored by the system.

Installing a Module

Overview To install a module:

1 Switch off the ParBERT mainframe.

2 Choose an empty mainframe slot.

NOTE A single ParBERT system does not tolerate empty slots.

All data modules of a system have to be in adjacent slots at the right-hand side of the ckock module. Data modules following an empty slot are ignored.

If you wish to use multiple independent ParBERT systems, you can install more than one clock module in one mainframe, each followed by its data modules. In this case, you may leave empty slots before the additional clock modules.

3 Set the module's logical address.

4 Plug the module into the mainframe.

5 Connect the module.

Details Refer to the following sections.

How to Set the Logical Address

NOTE Each time you rearrange the modules of a mainframe, you also have to make sure that they have the correct logical addresses.

Consult your own mainframe configuration table. Problems will arise, if a new module is set to an existing or illegal address.

TIP If you cannot find the mainframe configuration table, you can run the VISA Resource Manager. This requires that the mainframe is connected and switched on. Right-click the blue *IO* icon in the Windows task bar. Choose *Edit VXI Resource Manager*, highlight the VXI interface, click *Run*, and finally click *RM Output*. The VISA Resource Manager checks the mainframe configuration and reports for each module:

- Current VXI logical address (LADD)
- Slot number
- Manufacturer
- Module identification

When you are setting the logical address, ignore the numbers and ON/OFF information on the DIP switch—refer to the information printed on the module's side cover.

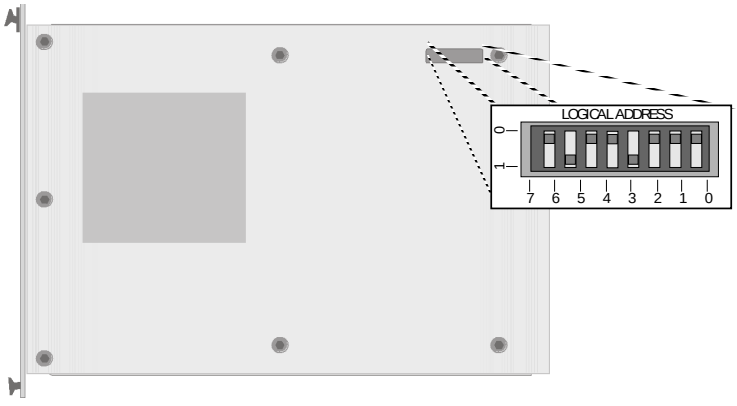

Figure 44 Module Address Switches

The coding is 8-bit binary. The example above refers to an address of 72, which means $2^6 + 2^3$ or 01001000 in binary notation.

The following table shows the logical addresses to be used.

Table 3 Recommended Logical Addresses

Slot	Master Mainframe	Expander Mainframe 1	Expander Mainframe 2
0	0	128	192
1	24	132	196
2	32	136	200
3	40	140	204
4	48	144	208
5	56	148	212
6	64	152	216
7	72	156	220
8	80	160	224
9	88	164	228
10	96	168	232
11	104	172	236
12	112	176	240

It is strongly recommended that you use the addresses listed in the table above.

NOTE An embedded controller PC has a logical address of “0”.

For master mainframes with VXI bus extender, the Agilent E1482B module or National Instruments VXI-MXI-2 module has a logical address of “2”. See also *“Expanding Systems with Embedded Controller” on page 7-23*.

The supported address ranges are:

Table 4 Logical Address Ranges

Master	Expander 1	Expander 2
0 – 127	128 – 191	192 – 254

Only if you are using the IEEE 1394 PC link to VXI and are setting up independent systems in the master and the expander frames (no master-slave configurations), you may use the master's address range also for the expander frames.

NOTE After you have set the logical address, record it in your mainframe configuration table.

How to Plug In the Module

To install the module:

1 Insert the module into the mainframe.

Make sure that the clock module is at the leftmost position and that all data modules are installed next to each other.

2 Using a 2-mm pozidrive or flathead screwdriver, secure the module to the mainframe with the two retaining screws on the top and bottom of the module front panel.

How to Connect the Module

A data module has to be connected to a clock module. A clock module has to be connected to its data modules.

To make the connections:

1 If you have changed or replaced a data module, plug in its master clock distribution cable.
If you have replaced a clock module, reconnect all master clock distribution cables.

2 If you have added a data module:

- Remove the binders from the clock distribution cables.
- Connect the additional master clock distribution cable.

3 If you have a system with the E4809A 13 GHz clock module, connect also the giga clock distribution cables.

The following figure illustrates the connections between the E4809A clock module and its data modules.

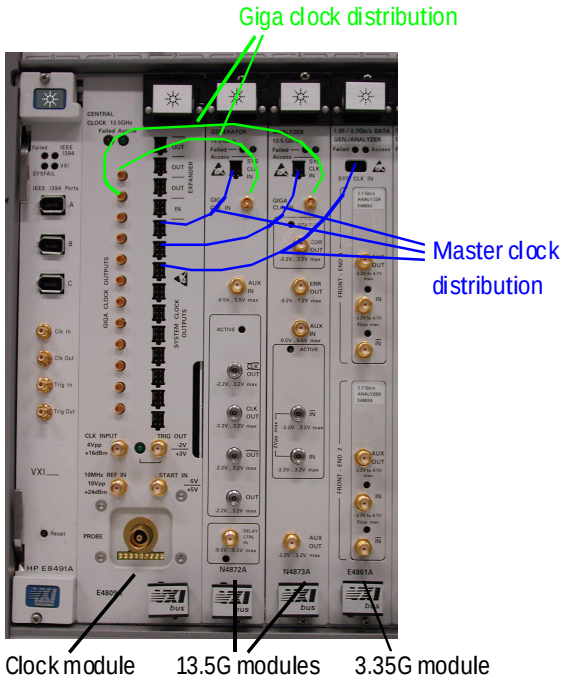

Figure 45 Connections of a 13 GHz Clock Module

CAUTION

Do not plug in a giga clock cable with your fingers.

The giga clock connectors do not tolerate any oblique insertion or removal.

If you need to connect one of these cables, use the giga cable plug-in tool provided with the system and follow the instructions given below.

Not following these instructions can result in severe damage of the clock or data module. It can also result in unobtrusive damage of the cable connector which may then destroy another clock or data module when it is plugged in.

To connect a giga clock cable:

- Hold the cable at the rubber coating and insert the cable connector into the giga cable plug-in tool. Do not touch the contact side of the connector.

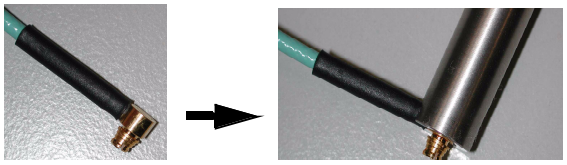

Figure 46 Insert the Cable Connector into the Plug-In Tool

- Line up the tool perpendicular to the module front panel. Using the tool, plug the cable carefully into the module connector.

Figure 47 Use the Plug-In Tool to Insert the Cable Connector

- Push the tool straight forward until the connector clicks into place. Then press your finger on the rubber coating of the cable to hold the connector in place and withdraw the tool.
- Plug the cables into consecutive connectors of the clock module. If the number of cables is odd, you have to add a 50 Ohm terminator (see *"E4809A clock module" on page 2-5*.

4 Make sure that the clock distribution cables are properly bundled and tied together, as shown in *"Checking the Mainframe Clock Distribution" on page 4-2*.

If you are refurbishing an existing system with 7 Gbits/s or 13.5 Gbits/s modules, it is recommended to arrange and secure the clock distribution cables as shown in the following pictures. This ensures optimum access to the connectors and protects the cables from stress and damage.

Attach adhesive clamp holders to the clock module and the mainframe to secure the cable assembly.

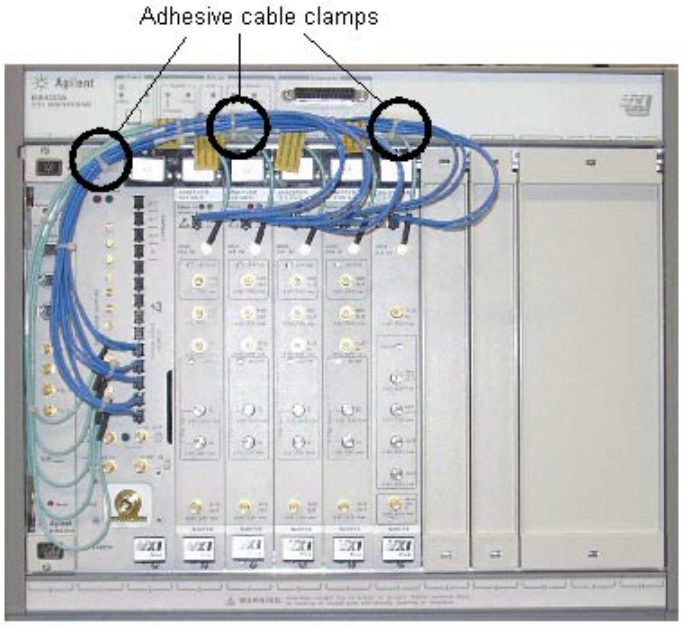

Figure 48 Clock Distribution of a 7G/13.5G System

For small systems, one clamp holder at the clock module may suffice, as illustrated below.

Figure 49 Clock Distribution of two 7G/13.5G Systems in one Mainframe

5 Finish up the changes as described under *"How to Proceed After Changing the Hardware" on page 6-22*.

How to Open a Module

When you are connecting synchronization cables or the trigger input pod to a clock module or changing frontends of a data module, you have to open the module.

CAUTION

Do *not* open any of the following modules:

- Optical modules
- N4874A/N4875A 7 Gbit/s data generator/analyzer modules
- E4866A/E4867A 10.8 Gbit/s data generator/analyzer modules
- N4872A/N4873A 13.5 Gbit/s data generator/analyzer modules
- E4868B/E4869B 45 Gbit/s MUX/DEMUX modules

These modules contain neither frontends nor other field-replaceable parts.

To eliminate the risk of damaging the product accidentally, it is strongly recommended that you do *not* open any module of a ParBERT 43/45G system.

To open a module:

1 Take electrostatic precautions (e. g. wear a grounded wriststrap).

2 Using a T-10 size Torx screwdriver, remove the seven screws from the side panel of the module. The locations of the screws are shown in the figure below.

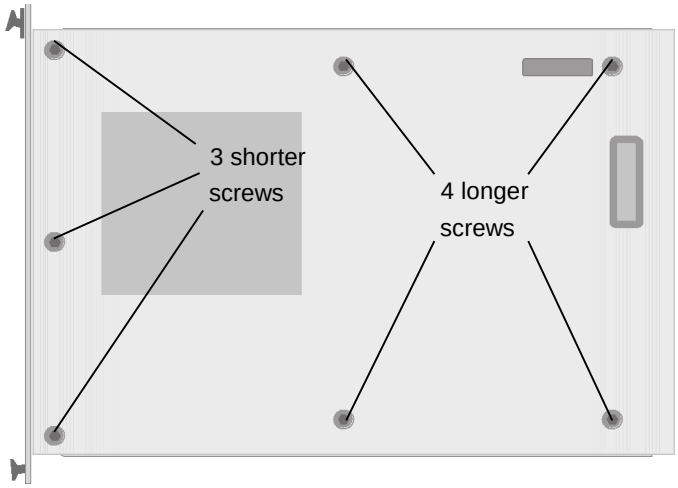

Figure 50 Side Cover Screws of a ParBERT Module

3 Set the cover and screws to the side.

Adding or Changing Frontends

Overview

The frontends for E4832A (675 Mbit/s), E4861A (2.7 Gbit/s), and E4861B (3.35 Gbit/s) data modules differ in size and shape.

In addition, generator frontends consist of one PC board whereas analyzer frontends require an additional receiver board. A special case are the E4835A 675 Mbit/s analyzer frontends which are always installed in pairs. Here, two frontends share one receiver board.

The following figures show four examples of 2.7 Gbit/s and 3.35 Gbit/s frontends.

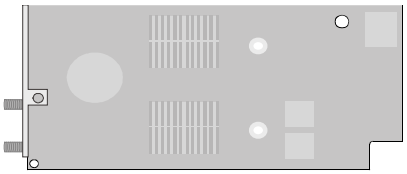

Figure 51 Generator Frontend of an E4861A Module

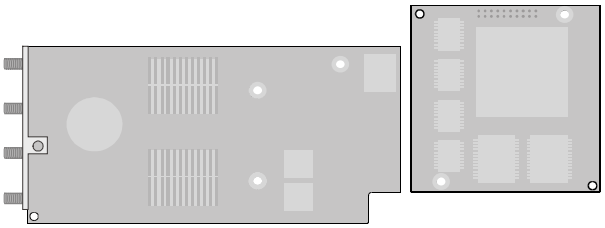

Figure 52 Analyzer Frontend of an E4861A Module

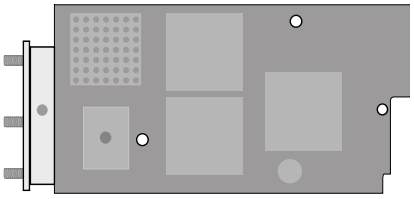

Figure 53 Generator Frontend of an E4861B Module

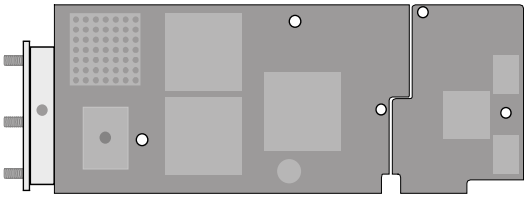

Figure 54 Analyzer Frontend of an E4861B Module

Details Refer to the following sections.

How to Remove a Frontend

To remove a frontend:

1 Shut down the mainframe and remove the ParBERT module, as described in *"Removing a Module" on page 6-2* .

2 Open the module as described in *"How to Open a Module" on page 6-12*.

3 Locate the srews that hold the frontend in place.

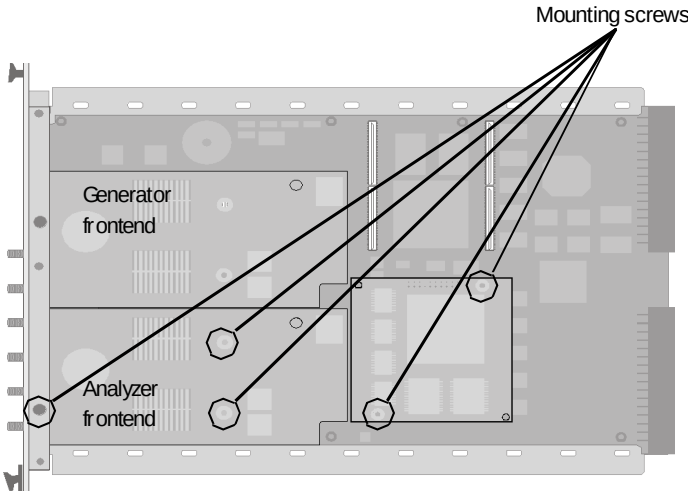

Figure 55 Frontends in an E4861A Module

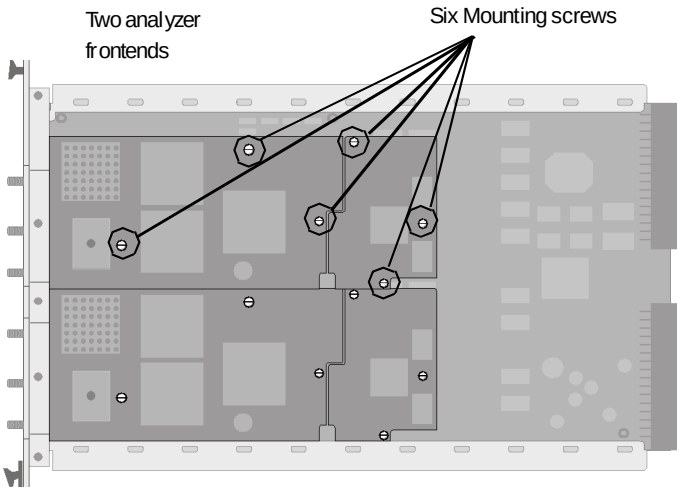

Figure 56 Frontends in an E4861B Module

2 Using the Torx T-10 size screwdriver, remove the mounting screws. There are three screws for the frontend, and two or three screws for the receiver board (analyzer frontends only).

3 Lift off the frontend from the module, as shown in the figure below.

If you are removing an analyzer frontend, make sure that you also remove its receiver board.

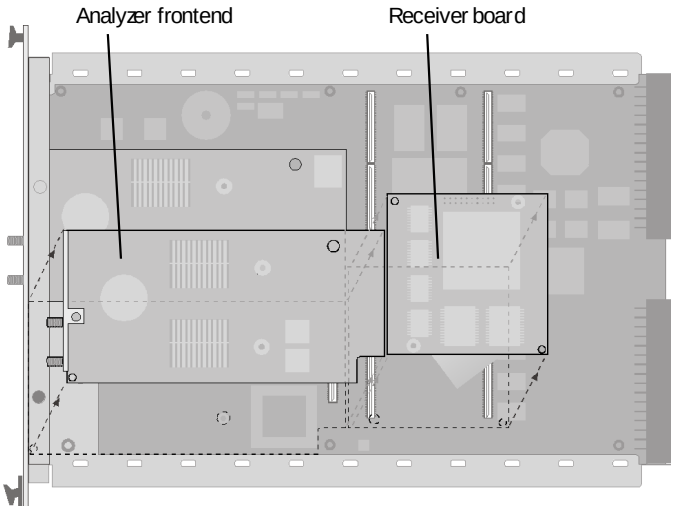

Figure 57 Removing a 2.7 Gbit/s Analyzer Frontend

How to Install a Frontend

To install a frontend:

1 Carefully insert the new frontend into place.

Its front panel has to be aligned with the front panel of the module, and it has to be aligned with the contacts on the main board.

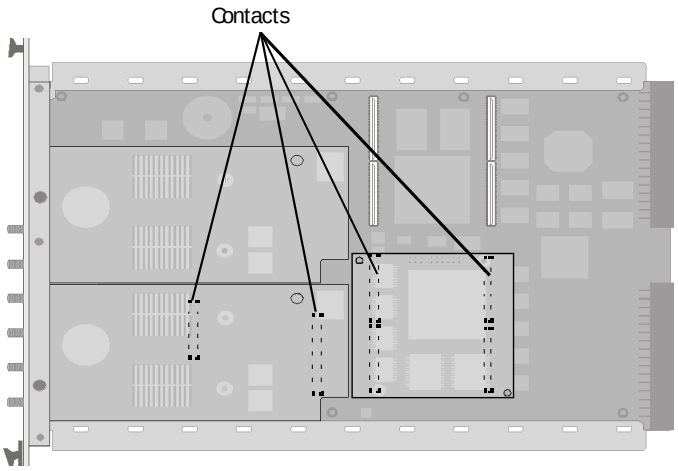

Figure 58 Frontend Contacts of an E4861A Module

E4861B modules have special multi-pole connectors, as shown below:

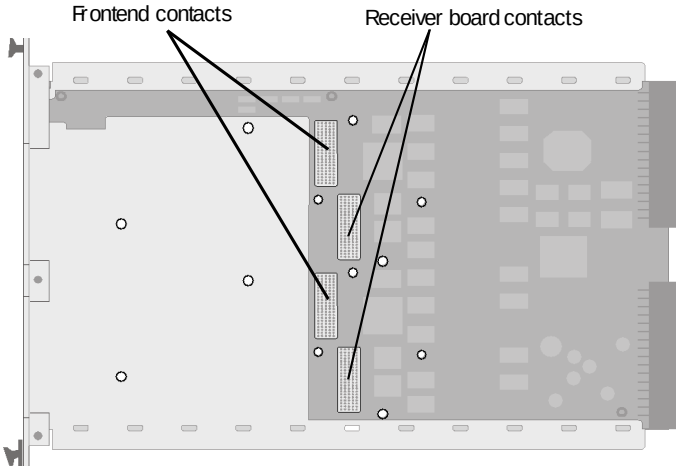

Figure 59 Frontend Contacts of an E4861B Module

CAUTION

When you insert the new frontend, make sure that you press it firmly into place. Mind the position of the connectors and press on them—it is important that these contacts are made. As the boards are flexible, tightening the mounting screws does not guarantee good contact.

2 Secure the frontend to the main board using the screws that were delivered with the frontend.

3 If you are installing an analyzer frontend, plug in the receiver board and secure it with its screws.

4 Close the module.

5 Attach the label that was delivered with the frontend at the side of the module.

6 Re-install the module, as described in *"Installing a Module" on page 6-4* .

7 Finish the configuration according to *"How to Proceed After Changing the Hardware" on page 6-22*.

Installing the Trigger Input Pod

The trigger input pod has eight sense lines which allow to control test execution by applying external signals.

If you ordered the trigger input pod separately, you need to connect it to the system's master clock module.

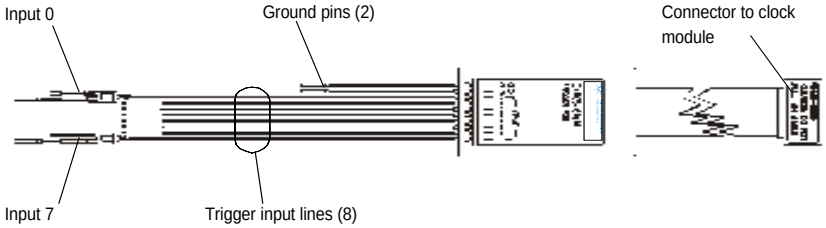

Figure 60 Trigger Input Pod

To connect the trigger input pod:

1 Shut down and unplug the mainframe.

2 Remove the clock module from the mainframe as described under *"Removing a Module" on page 6-2*.

3 Open the clock module, as described under *"How to Open a Module" on page 6-12*.

4 Plug the trigger input pod into the appropriate 16-pin socket on the clock board, as shown in the following figure.

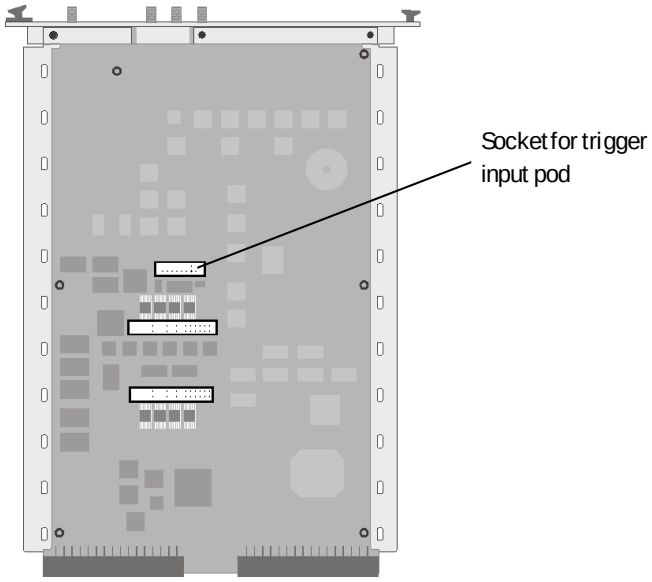

Figure 61 Clock Module Connector for the Trigger Input Pod

5 Close the clock module.

6 Re-install the clock module in the mainframe as described in *"Installing a Module" on page 6-4*.

Contact the Agilent support if you need additional probe leads for the trigger pod. The required part number is 16520-62102. You need to remove the leads from the probe adapter header before plugging them into the pod housing.

How to Proceed After Changing the Hardware

NOTE Whenever you change the hardware configuration, a selftest is run when you turn ParBERT on (the green Access LEDs flash). This is normal, and you have to wait until the selftest is complete.

After the selftest has finished, the following must be done:

1 The systems must be rebuilt (new configuration files generated). See *"How to Configure I/O Interfaces and Systems" on page 5-9* for more information.

2 Exchanging or adding an E4862A, E4863A, E4864A, E4865A, E4862B, or E4863B frontend requires an auto calibration after a 30-minute warm-up period. Auto calibration can be invoked from the *System* menu of the ParBERT user interface.

3 The outputs and inputs have to be deskewed.

   This means adjusting the instrument connectors and compensating for internal and external delays.

   See *How to Adjust the Instrument Connectors* and *How to Compensate for Internal and External Delays* in the *ParBERT System User Guide* or in the online Help.

7 Special ParBERT Systems

Special ParBERT systems are systems that contain special components or modules for special purposes.

Such modules are, for example, the MUX/DEMUX modules of 43/45 Gbit/s systems, optical modules, the 10.8 Gbit/s Booster module, or the embedded ParBERT controller (a PC built up as a 2-slot VXI module).

Installing ParBERT 43/45G Systems

The Agilent 81250 ParBERT 43G is a special solution for stimulating and analyzing electrical 16:1 OC-768 multiplexers and 1:16 demultiplexers at data rates of 2.7 Gbit/s and 43.2 Gbit/s.

ParBERT 45G has the same architecture but covers a frequency range up to 45 Gbit/s.

For data generation, sixteen 2.7 Gbit/s (ParBERT 43G) or 3.35 Gbit/s (ParBERT 45G) data generators are multiplexed to create a 43/45 Gbit/s data stream.

For data analysis, a 43/45 Gbit/s data stream is demultiplexed and fed into sixteen 2.7 or 3.35 Gbit/s data analyzers.

For best jitter/phase noise performance, it is recommended that a signal generator like Agilent E8244A is used as an external clock source.

Components of ParBERT 43/45G Systems

ParBERT 43/45G systems are offered as preconfigured bundles that are ready for use.

Pattern generator bundles

A pattern generator bundle multiplexes sixteen 2.7 or 3.35 Gbit/s data generators to create a serial data stream. The bundles include:

- One 13-slot VXI mainframe
- One IEEE 1394 PC link to VXI
- One E4808A high performance clock module
- *43G bundle E4894B*: Sixteen 2.7 Gbit/s generator frontends E4862A built into eight E4861A 2.7 Gbit/s data modules

  45G bundle E4896A: Sixteen 3.35 Gbit/s generator frontends E4862B built into eight E4861B 3.35 Gbit/s data modules
- One 45 Gbit/s multiplexer module E4868B, including 32 cables to connect to the generator channels (SMA to MCX), and a cable pair to connect to the DUT (1.85 mm to 1.85 mm)
- One 15446A 8-line trigger input pod
- E4875A ParBERT software

A 43/45G pattern generator system looks as illustrated in the figure below.

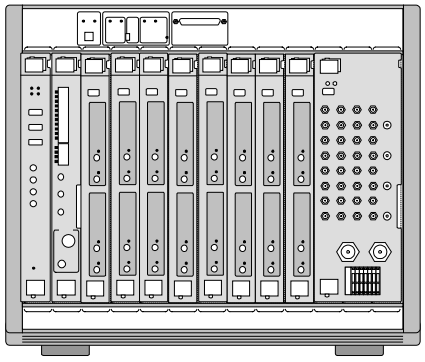

Figure 62 ParBERT 43/45G Pattern Generator Bundle

Error detector bundles

An error detector bundle demultiplexes a serial data stream and provides the data to sixteen 2.7 or 3.35 Gbit/s data analyzers. The bundles include:

- One 13-slot VXI mainframe
- One IEEE 1394 PC link to VXI
- One E4808A high performance clock module
- *43G bundle E4865B:* Sixteen 2.7 Gbit/s analyzer frontends E4863A built into eight E4861A 2.7 Gbit/s data modules

  45G bundle E4867A: Sixteen 3.35 Gbit/s analyzer frontends E4863B built into eight E4861B 3.35 Gbit/s data modules
- One 45 Gbit/s demultiplexer module E4869B, including 32 cables to connect to the analyzer channels (SMA to MCX), and a cable pair to connect to the DUT (1.85 mm to 1.85 mm)
- E4875A ParBERT software

A 43/45G error detector system appears as illustrated in the figure below.

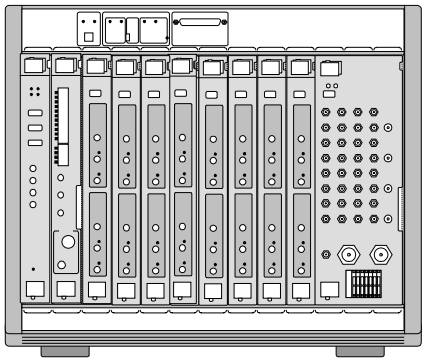

Figure 63 ParBERT 43/45G Error Detector Bundle

Setting up ParBERT 43/45G Systems

When you have received a ParBERT 43/45 bundle, proceed as follows:

1 Inspect the shipment (see *"Unpacking ParBERT" on page 2-17*).

2 Check the clock distribution cables (see *"Checking the Mainframe Clock Distribution" on page 4-2*).

3 If you have received two mainframes, a pattern generator and an error detector, interconnect their IEEE 1394 PC to VXI modules. Then both mainframes can be controlled by one PC. Do not interconnect their clock modules. Note that these are independent ParBERT systems, not master-slve configrations.

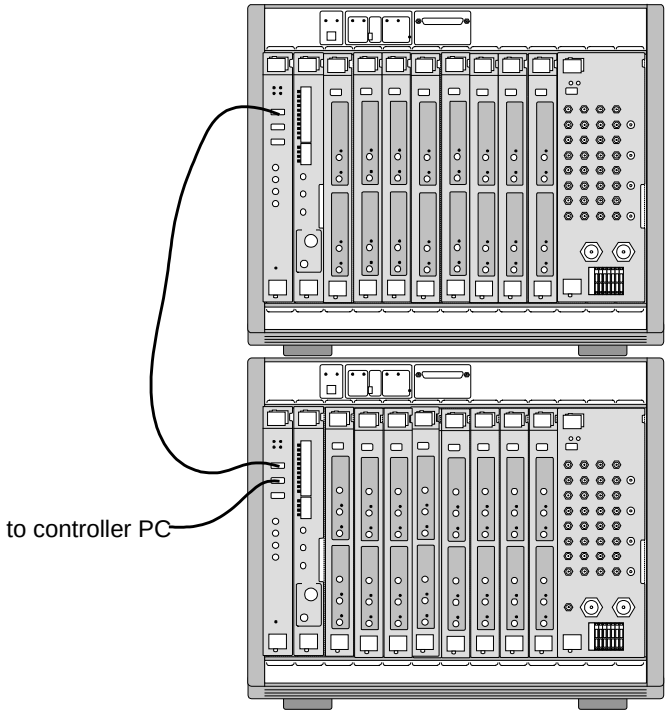

Figure 64 Configuration for Testing Multiplexers and Demultiplexers

4 Prepare the controller PC (see *"3 Setting Up the ParBERT Controller PC" on page 3-1*).

5 Connect the mainframe(s) to the PC (see *"4 Connecting Mainframes to the Controller PC" on page 4-1*).

6 Connect the PC and the mainframe(s) to mains and switch them on.

7 Put the system(s) into operation (see *"5 Putting ParBERT into Operation" on page 5-1*).

Note that you can operate a pattern generating and an error detecting system in parallel from one PC by starting the user interface twice. This can be done manually or automatically (specified with the ParBERT Configuration tool, see *"How to Specify Startup Settings" on page 5-14*).

Converting ParBERT 43/45G to a Basic ParBERT

The sixteen channels of a ParBERT 43G system—installed in eight data modules—generate or expect differential signals.

A multiplexer module has therefore 16 pairs of input connectors which are connected to the generator frontends. A demultiplexer module has 16 pairs of output connectors which are connected to the analyzers.

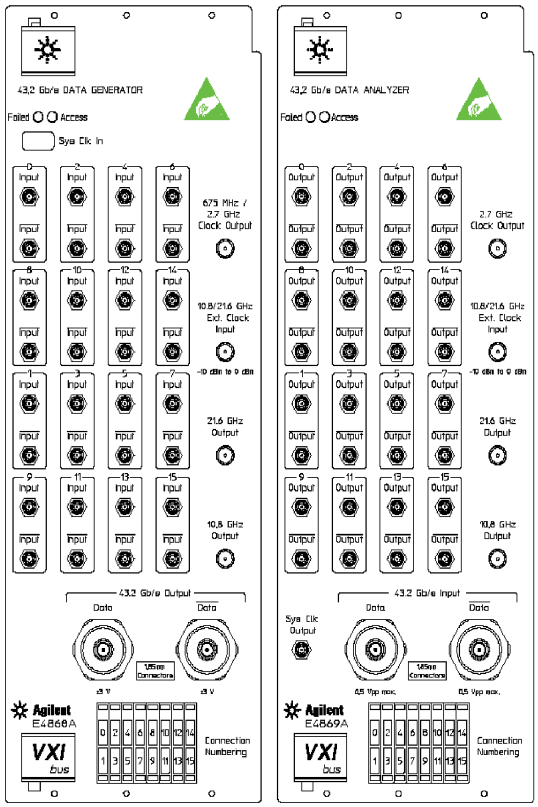

Figure 65 ParBERT 43/45G MUX and DEMUX Modules

The generators and analyzers can be disconnected from the MUX or DEMUX module. When this is done, they can be used for generating or

analyzing digital signals as with any Agilent 81250 Parallel Bit Error Ratio Tester.

For example, if you wish to stimulate a multipler device, you will have to disconnect the generators from the MUX module.

ParBERT 45G to ParBERT conversion

To use a ParBERT 43/45G pattern generator or error detector system for general purposes:

1 Disconnect all signal cables from the frontends.

It is strongly recommended to unscrew the cables from the generator/analyzer modules and to leave the connectors at the MUX/DEMUX module in place, because the cables have been calibrated. If you disconnect both sides, you should label the cables so that they can be re-installed for the same connections.

2 Remove the MUX/DEMUX module from the mainframe.

As long as the MUX/DEMUX module is installed, the software will not allow you to access the channel parameters.

CAUTION

Take ESD precautions, e. g. wear a grounded wrist strap. These modules are susceptible to electrostatic discharge.

3 After power on, run the Agilent 81250 Configuration tool and activate the "*Build Systems*" function.

After that, you have a normal, general-purpose ParBERT system with 16 generator or analyzer channels that can be used for stimulating a multiplexer or measuring the output of a demultiplexer device. You can align the connectors, attach your test cables, and compensate for cable and propagation delays.

ParBERT to ParBERT 45G conversion

To reconfigure the system to a ParBERT 43/45G:

1 Re-install the MUX or DEMUX module into the mainframe.

2 Connect the frontends to the MUX or DEMUX module.

The connection scheme is printed on the front panel of every MUX/DEMUX module. The graphic shows eight consecutive data modules with two frontends each.

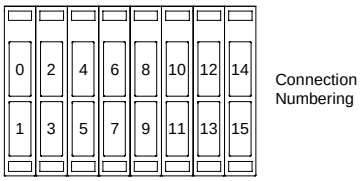

Figure 66 Numbering of Connections

As the ports of the MUX/DEMUX modules are numbered, this drawing makes it very simple to establish the connections correctly:

- Connect the two cables of port #0 of the MUX/DEMUX module to the upper frontend of the leftmost data generator/analyzer module. Connect “normal” to “normal” and “inverted” to “inverted”.
- Connect port #1 of the MUX/DEMUX module to the lower frontend of the leftmost data generator/analyzer module.
- Connect port #2 of the MUX/DEMUX module to the upper frontend of the next data generator/analyzer module.
- Follow that scheme until all ports of the MUX/DEMUX module are connected.

4 After power on, run the Agilent 81250 Configuration tool and activate the “*Build Systems*” function.

CAUTION

Never attempt to operate an E4868B MUX or E4869B DEMUX module in a general-purpose ParBERT system! These modules are highly susceptible to overvoltage and electrostatic discharge.

If you have re-installed a MUX or DEMUX module, make sure that you perform the *Build Systems* operation of the Agilent 81250 Configuration tool *before* starting the Agilent 81250 user software.

Build Systems reverts the system to a ParBERT 43/45G with all its built-in protection mechanisms.

ParBERT 43/45G Extensions

You may need an extra generator for sourcing a clock pulse to the device under test. Or, if you are testing a demultiplexer device with built-in clock recovery circuit, you may need an extra analyzer for conditioning the recovered clock signal. Testing SFI-5 multiplexer and demultiplexer devices generally requires more than 16 generator/analyzer channels.

In such cases it is recommended to add a third frame in the middle between the pattern generators and the analyzers. This frame should house the MUX and DEMUX modules.

Such a configuration is depicted in the following figure.

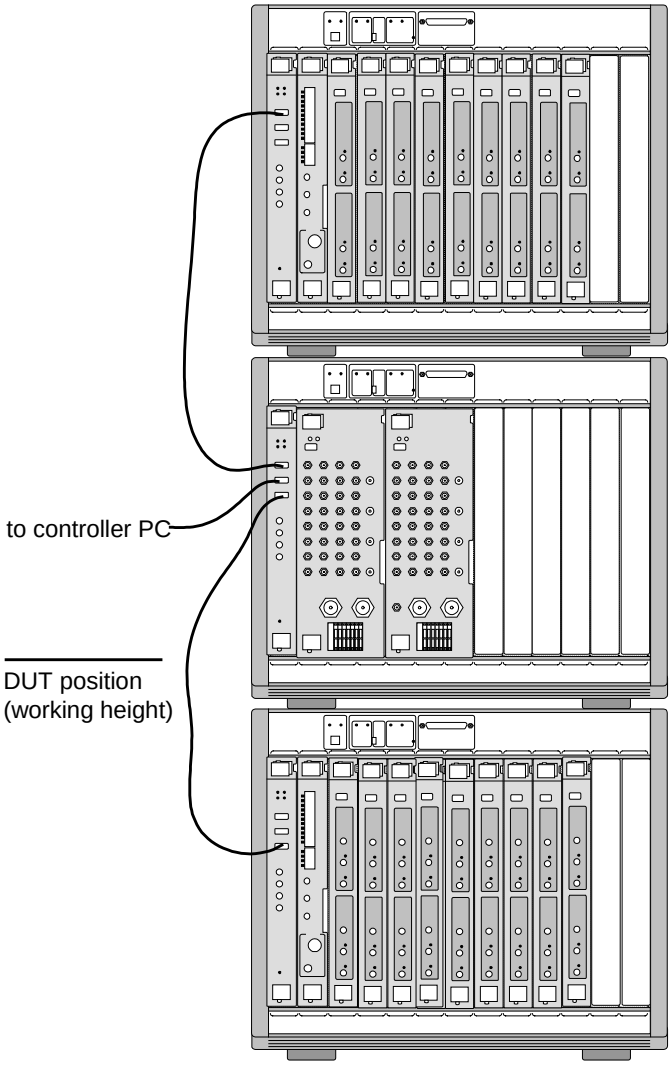

Figure 67 Setup Using More than 16 Data Modules

A setup like this can hold a total of up to 22 data generator/analyzer modules.

To keep the high-frequency cables as short as possible, the working height for placing the DUT should be established between the middle and the bottom frame.

Making Clock Connections

The MUX module requires a clock signal. It has to be synchronized with the generator frontends.

The DEMUX module has a built-in clock data recovery (CDR) circuit that allows to recover the clock from the incoming data. But the DEMUX module can also be controlled by an external clock.

Both modules have clock input and output connectors. With ParBERT 43/45G, there are many ways for generating and connecting clock pulses.

Using the Built-in Clock Module

The simplest clock source is the E4808A clock module. Its use is illustrated in the figure below.

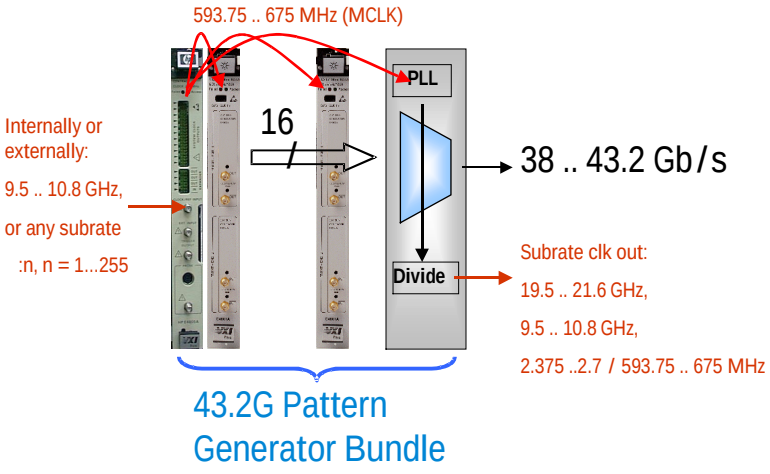

Figure 68 Using the Built-in Clock Module

The clock module can use its own oscillator, or it can lock to an external clock source. It has a clock multiplier and a clock divider that allow it to use a variety of source frequencies. Its output is connected all to the data modules and can also be connected to the MUX module. Its output clock rate is limited to 675 MHz.

The MUX module has four clock output connectors that can provide four subrates of the generated serial-line frequency: 1/2, 1/4, 1/16th, and 1/64th. If the serial-line frequency is set to 43.2 GHz, you can get clock rates of 21.6 GHz, 10.8 GHz, 2.7 GHz, and 675 MHz.

NOTE 43 Gbit/s devices generally require clock frequencies of 2.7 GHz or a multiple thereof. If the ParBERT shall source such a clock pulse, an additional generator frontend is needed. This in turn requires an additional data module and results in a configuration as shown in *"ParBERT 43/45G Extensions" on page 7-9*.

Using a Clock Provided by the DUT

The device under test may have its own clock generator. The figure below shows a setup example.

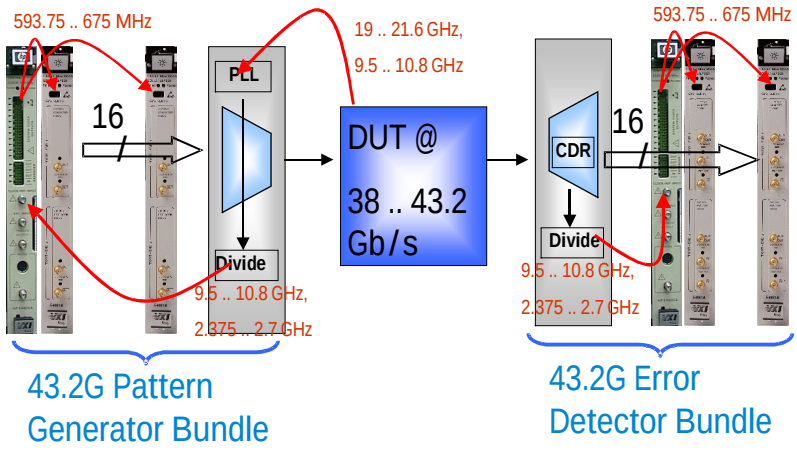

Figure 69 Using the DUT Clock for the Generator and Clock Data Recovery (CDR)

Here, the clock from the DUT is fed into the MUX module. The clock output of the MUX module is connected to the CLOCK/REF INPUT of the clock module.

On the receiver side, the DEMUX module recovers the DUT clock pulse and uses this as an external clock source for the analyzer system's clock module (CLOCK/REF INPUT).

Using an External Clock Generator

For precision measurements, it is recommended to use an external precision clock generator. The following example assumes that the DUT needs also a 2.7 GHz clock.

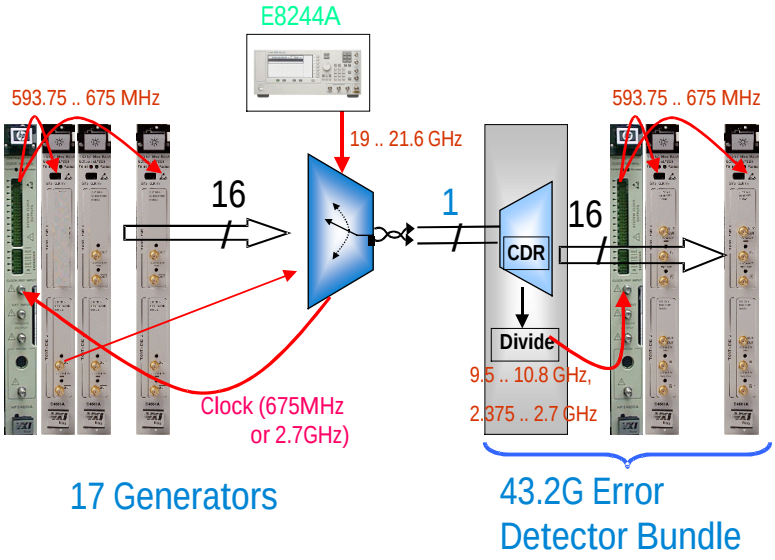

Figure 70 Using an External Clock Generator

The connection of the pulse generator to the DUT and from there to the CLOCK/REF INPUT of the clock module helps to eliminate undesired signal delays.

NOTE It is possible to connect the pulse generator also to the DEMUX module in order to create a fully synchronized setup. In this case, a pulse delay unit has to be inserted between the pulse generator and the DEMUX module.

Installing Optical Modules

Optical ParBERT modules are:

- E4810A 3.35 Gbit/s electrical-optical data generator module
- E4811A 3.35 Gbit/s optical-electrical data analyzer module
- E4883A 45 Gbit/s lightwave transmitter (E/O converter)
- E4882A 45 Gbit/s lightwave rerceiver (O/E converter)

The transmitters generate invisible infrared radiation. Please pay attention to the following safety information.

Laser Safety Information

The laser sources specified in this guide are classified according to IEC 60825-1 (2001).

The laser sources comply with 21 CFR 1040.10 except for deviations pursuant to Laser Notice No. 50, dated 2001-July-26.

	E4810A	E4883A
Laser type	VSCEL 8585-3060	DFB
Wavelength	850 nm	1550 nm
Max. CW output power *	<2 mW	<40 mW
Beam waist diameter	50 µm	9 µm

	E4810A	E4883A
Numerical aperture	0.2	0.1
Laser class according to IEC 60825-1 (2001)	Class 1M	Class 1M
Max. permissible CW output power **	5.3 mW	163 mW

* Max. CW output power means the highest possible optical CW power that the laser source can produce at its output.

** Max. permissible CW output power is the highest optical power that is permitted within the appropriate IEC laser class.

Laser Safety Labels

A sheet of laser safety labels is shipped with the laser module. In order to meet the requirements of IEC 60825-1, we recommend that you attach the laser safety labels, in your language, at a suitable location on the outside of the instrument where they are clearly visible to anyone using the instrument.

The following labels are attached to the module:

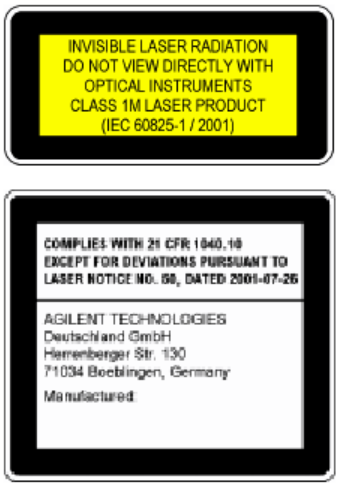

Figure 71 Labels on Laser Modules

WARNING

Please pay attention to the following laser safety warnings:

- Under no circumstances look into the end of an optical cable attached to the optical output when the device is operational. The laser radiation can seriously damage your eyesight.
- Do not enable the laser when there is no fiber attached to the optical output connector.
- The laser is on when the green LED on the front panel is lit.
- The use of optical instruments with this product will increase eye hazard.
- Refer servicing only to qualified and authorized personnel.

Installing E4810A / E4811A Electrical-Optical Modules

These modules are capable of generating or analyzing electrical or optical data streams at 21 Mbit/s up to 3.35 Gbit/s.

They cannot be used in conjunction with an E4805B clock module. They have no replaceable frontends. For these modules, one channel means one module.

The ParBERT user software allows you to switch between optical and electrical operation. For optical operation, cable connections have to be made at the front panels.

Connections of an E4810A Electrical-Optical Module

This data generator module consists of an electrical signal generator and an electrical-to-optical (E/O) converter. The electrical signal generator can provide a differential signal.

For optical operation, a short cable (p/n E4811-61604) is used to connect the OUT connector of the signal generator to the E/O converter. Once it is enabled by software, the E/O converter produces the optical signal.

When the laser is active, the green LED below the laser symbol is lit.

Figure 72 External Connection of an E4810A Module

WARNING

Do not look directly into the optical connector or the open end of a connected fiber when the laser is active.

Connections of an E4811A Optical-Electrical Module

The E4811A analyzer module consists of an optical-to-electrical (O/E) converter and an electrical data analyzer. The electrical data analyzer has a differential input.

For optical operation, two short cables (p/n E4811-61601) are used to connect the OUT connectors of the O/E converter to the IN connectors of the data analyzer.

In addition, the O/E converter has an external cable connection between the optical sensor and the comparator. This makes it possible to inspect

the converted signal and, if necessary, to insert an external electrical filter between the two components.

Figure 73 External Connections of an E4811A Module

If you wish to use an external electrical signal filter, insert it between F-OUT and F-IN.

Installing E4882A O/E and E4883A E/O Converter Modules

These modules are options of the ParBERT 43/45G systems. They are used to interface these systems to optical devices.

The following figure shows a setup for testing optical multiplexers/demultiplexers with serial data rates between 38 and 45 Gbit/s.

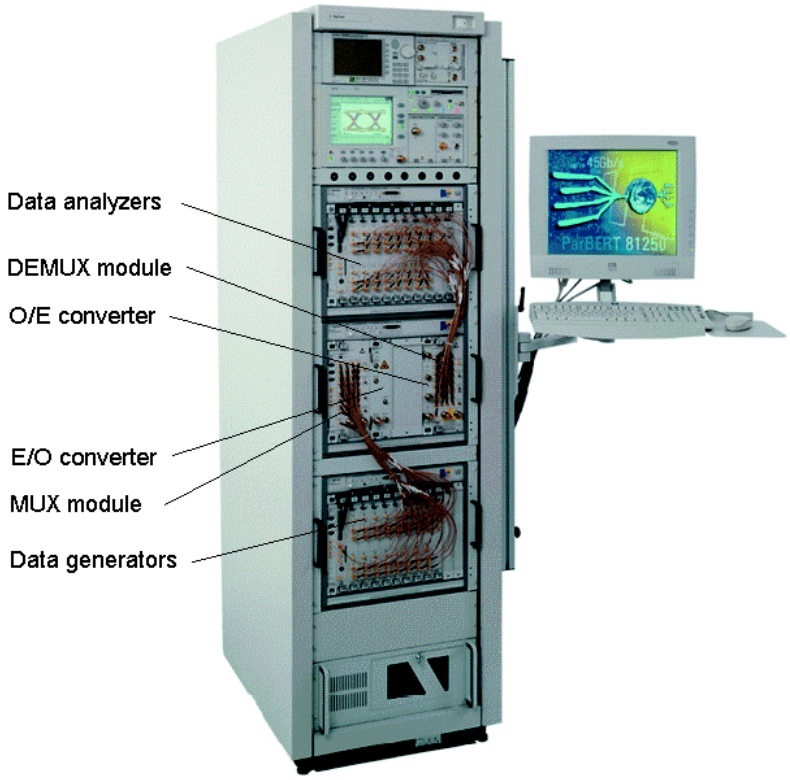

Figure 74 Optical ParBERT 45G System Setup

NOTE Optical ParBERT 43/45G systems are shipped with special E488X software and an additional user manual. Consult this manual when you are setting up an optical ParBERT 43/45G system. For example, the converter modules require special VXI addresses.

The E4882A lightwave receiver consists of a one-slot module which has one optical input and one electrical output connector. The latter is to be connected to the input of the 45G DEMUX module.

Figure 75 E4883A Transmitter (E/O Converter) and E4882A Receiver (O/E Converter)

The E4883A lightwave transmitter is a two-slot module. Its electrical DATA INPUT is to be connected to the output of the 45G MUX module.

To install the E4883A transmitter:

1 If you wish to use the built-in DFB laser, use a PMF cable and connect the INTERNAL LASER OUTPUT to the LASER INPUT.

   To use an external light source, connect this to the LASER INPUT.

   The transmitter modulates the laser light it receives at LASER INPUT.

2 In addition, the E4883A lightwave transmitter requires a clock signal. Connect its RZ CLOCK IN to the 10.8 GHz OUTPUT of the MUX module.

WARNING

Do not look directly into the optical connector or the open end of a connected fiber when the laser is active.

Installing the 10.8 Gbit/s Booster Module

The N4868A 10.8 Gbit/s Booster Module is an add-on to the E4866A 10.8 Gbit/s data generator module. It contains high speed amplifiers and is used to increase the slew rate of the generated signal.

This yields a signal that is less prone to transmission errors.

The booster module can be plugged into any free adjacent slot of the system. It is to be connected through cables between the E4866A data generator and the DUT.

NOTE Remember that a ParBERT system, controlled by a master clock module (this is clockgroup one), ignores all modules following an empty slot.

The standard booster module has one frontend holding two amplifiers, and you can specify their operation mode in the ParBERT user interface: differential (this is the default) or single-ended.

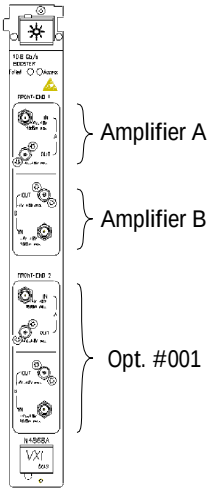

Figure 76 10.8 Gbit/s Booster Module

In *differential mode*, you need two matched cables to connect the N4868A booster module to the two differential output connectors of an E4866A 10.8 Gbit/s data generator module.

“Matched” means, the cables have to have precisely the same delay. Because the signal has a period in the range of 100 ps, even a small difference would cause performance degradation.

In *single-ended mode*, you can operate each amplifier separately. For example, you can connect two 10.8 Gbit/s generators—both set to single-ended operation—and amplify two separate signals.

The figure above shows an N4868A module with option #001. It has two frontends and can thus be connected in differential mode to two E4866A 10.8 Gbit/s data generator modules.

Expanding Systems with Embedded Controller

The embedded ParBERT controller is a 2-slot VXI module that houses an industry-standard PC. Besides connectors for monitor, keyboard, and mouse, it has GPIB and LAN interfaces and a SCSI interface for connecting an external CD-ROM drive. It occupies the slots 0 and 1 of the ParBERT master mainframe.

This controller communicates directly with the VXI bus of the mainframe. It does not use the IEEE 1394 PC to VXI interface.

If you wish to add one or two expander frames to a system with embedded controller, you need a VXI bus extender module for the master mainframe and another one for each of the expander frames. Bus extender modules are interconnected by two cables. They extend the VXI bus of the master mainframe to the expander frames.

A VXI bus extender module requires one mainframe slot.

You can use the Agilent E1482B bus extender option or the National Instruments VXI-MXI-2 bus extender modules. The Agilent E1482B bus extender option includes all necessary cables.

To add expander frames to a system with embedded controller:

1 Set the logical address of the first VXI bus extender module to “2” and install it in slot 2 of the master mainframe (adjacent to the controller). See *“How to Set the Logical Address” on page 6-5* for instructions.

2 Set the logical addresses of the additional VXI bus extender modules to “128” (expander frame 1) or “192” (expander frame 2) and install them in slot 0 of the expander frames.

3 Set up the mainframes as shown in the following figure.

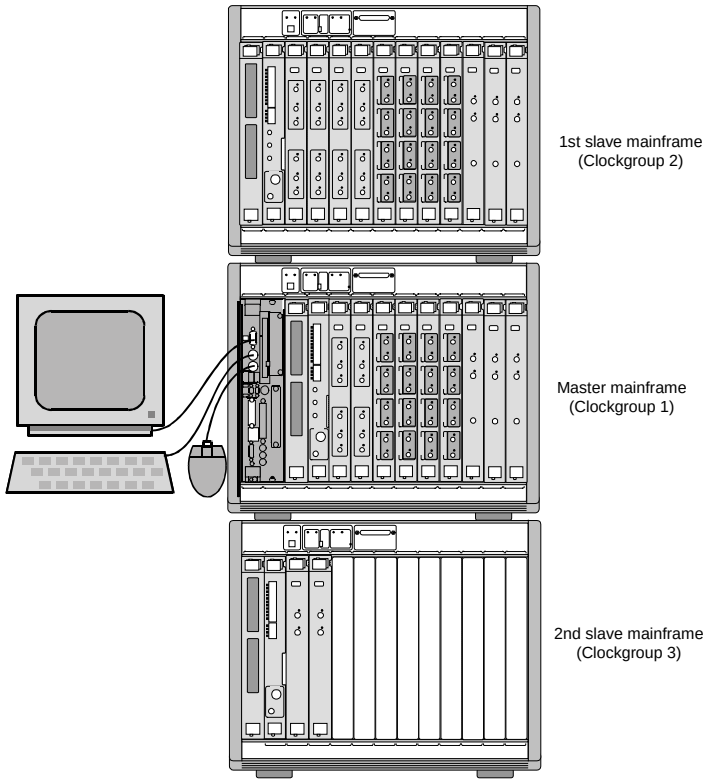

Figure 77 Mainframes with Embedded Controller and VXI Bus Extender Modules

4 Use cable set one: Connect the upper connector of the master mainframe's VXI extender module to the upper connector of the module in the first expander frame. Connect the lower connector of the master mainframe's VXI extender module to the lower connector of the module in the first expander frame.

5 If you wish to add a second expander frame: Use cable set two.

This is a piggy-pack connection between expander frame 1 and expander frame 2. Plug the cables onto the connectors of the first expander frame. Connect one cable between the upper connector of the VXI extender module and the other one between the lower.

6 For a master-slave configuration: Install the synchronization cables and clock distribution cables as described in *"Interconnecting Slave Mainframes" on page 4-6*.

8 Troubleshooting the ParBERT Installation

This chapter describes some possible problems you could run when you are installing ParBERT, and provides some basic tips for correcting them.

NOTE This chapter provides only tips for troubleshooting the ParBERT components from Agilent Technologies. If there are problems from any external equipment, you have to check the user documentation of this equipment.

You can also check the ParBERT website for answeres on frequently asked questions at the following URL:

http://www.agilent.com/find/parbert/

Problems at the Power-On Selftest

ParBERT runs a power-on selftest when the user software is started (see *"Testing ParBERT's Integrity" on page 5-25* for more information).

If any conflicts are found during the power-on selftest, ParBERT notifies you. Depending on the problem found, it is recommended that you run the complete set of selftests to specifically identify the problem. You can start the selftests from the *System* menu in the ParBERT user software. See *"Testing ParBERT's Integrity" on page 5-25*.

Problems after Changing the Hardware

Check the following points if you have modified the hardware and are experiencing problems:

Problem:

LED

The green Access LED of a module lights up, apparently without any reaction.

Solution:

This is due to an internal update of the reconfigurable logic circuitry. Do not power down unless all green LEDs are off. Wait at least 12 minutes before switching the mainframe off.

Problem:

Unrecognized modules

ParBERT does not recognize newly inserted modules, or the modules are not in any easy-to-follow order.

Solution:

Have you rebuilt the systems?

Check the detected configuration with the Agilent 81250 Configuration tool.

Any time you change the system configuration, you have to make sure that the correct logical addresses are used. See *"How to Set the Logical Address" on page 6-5*.

Ensure also that the modules are correctly plugged into the VXI frame. The front panels of all modules together must form a plane, uniform surface. Tighten the arresting screws.

You may also check the ASCII file `dvtsys.txt`. This file informs you about the systems that have been built and their module configuration. `Dvtsys.txt` is located in the subdirectory `\cfg` of the Agilent 81200 database.

In addition, you can run the VISA Resource Manager. Right-click the blue *IO* icon in the Windows task bar. Choose *Edit VXI Resource Manager*, highlight the VXI interface, click *Run*, and finally click *RM Output*. The VISA Resource Manager checks the mainframe configuration and reports for each module:

- Current VXI logical address (LADD)
- Slot number
- Manufacturer
- Module identification

NOTE Most problems are caused by incorrect logical addresses. See *"How to Set the Logical Address" on page 6-5*.

Problem:

Unrecognized frontends ParBERT does not recognize newly inserted frontends.

Solution:

Have you rebuilt the systems?

Check the detected configuration with the Agilent 81250 Configuration tool.

You may also check the file `dvtits.txt` in the database subdirectory `\cfg`. It is recommended to open both files, `dvtsys.txt` and `dvtits.txt`, and to inspect them in parallel. `Dvtsys.txt` defines the available systems, `dvtits.txt` provides the details.

Problem:

No synchronized tests

After adding modules or front-ends, the system can no longer run synchronized tests.

Solution:

After changing any hardware in the system, it is absolutely necessary that you deskew the system.

This consists of adjusting the instrument connectors and compensating for internal and external delays. See *How to Adjust the Instrument Connectors* and *How to Compensate for Internal and External Delays* in the *Agilent 81250 ParBERT System User Guide* or in the online Help.

Problems with Clockgroups

Check the following if you have problems setting up clockgroups:

Problem:

Master clockgroup not found

For a multi-mainframe configuration, the software does not recognize the master clockgroup.

Solution:

Have you rebuilt the systems?

When you change the configuration of the clock modules (for example, when you set up one master clock module and one or two slave clock modules), you have to reconfigure the systems in the software. See *"How to Configure I/O Interfaces and Systems" on page 5-9* for instructions.

Solution:

Are all the slave clock modules correctly connected to the master clock module?

When you set up a single system with several clock modules, it is important that there is only one clock source. You have to set up a module as a master clock generator. See *"Interconnecting Slave Mainframes" on page 4-6* for more information.

9 Controlling ParBERT Remotely

You may wish to control ParBERT from a remote computer.

- You can control ParBERT via GPIB.
- You can control ParBERT via LAN.

Both ways can be used for integrating ParBERT into an automated testfloor.

The preferred way is operation via LAN. This has the following advantages:

- You can use the VXI plug&play library functions. These functions provide the optimum tools for program development.
- You can use the ParBERT user interface on both the remote and the controller PC.
- The system performance is better than with GPIB.

Controlling ParBERT via GPIB

The E8491B PC link to VXI product includes an 82350A GPIB interface card. If you have installed this card in the controller PC, you can connect ParBERT to your General Purpose Instrument Bus (GPIB).

The Agilent I/O libraries provide the necessary device driver.

To operate ParBERT via GPIB:

1 Skip this step, if you have a preconfigured ParBERT controller PC.

Use the IO Config utility to configure the interface (see *"How to Configure the IEEE 1394 and GPIB Interfaces" on page 5-2* and the *Agilent IO Libraries Installation Guide*).

Make sure that you configure ParBERT as a listener. If necessary, change the default GPIB settings.

2 Use the Agilent 81250 Configuration tool and set the startup mode of ParBERT to "*controlled*" (see *"How to Specify Startup Settings" on page 5-14*). The default GPIB address is 11.

3 Start the ParBERT user software.

In controlled mode, this starts the firmware server and the GPIB gateway, not the graphical user interface.

If you wish to check or change GPIB parameters, please see the online Help and refer to the *Agilent 81250 ParBERT System User Guide*.

TIP For debugging purposes, it can be useful to enable the ParBERT user interface even in controlled mode. This slows down the system's performance, but you can immediately check the reaction on your commands.

Controlling ParBERT via LAN

To control ParBERT via LAN:

1 Make sure that the ParBERT controller PC is set up and accepted as a LAN client.

You may have to install hardware and software. Please contact your network administrator.

2 Use the Agilent 81250 Configuration tool and set the startup mode of the ParBERT controller to "*controlled*" (see *"How to Specify Startup Settings" on page 5-14*).

You can disable the *GPIB Gateway*.

3 Start the ParBERT user software on the controller PC. In controlled mode, the ParBERT user interface is not activated. But the ParBERT firmware server is started.

TIP For debugging purposes, it can be useful to enable the ParBERT user interface even in controlled mode. This slows down the system's performance, but you can immediately check the reaction on your commands.

4 Install the ParBERT user software on the remote PC (see *"How to Install the ParBERT User Software" on page 5-6*).

5 Start the ParBERT user software on the remote PC (see *"Starting the ParBERT User Software" on page 5-18*).

The *Graphical User Interface Configuration* window appears.

6 Connect to the ParBERT firmware server (see *"How to Select the Firmware Server" on page 5-20*).

Note that you can only connect to an *active* firmware server within your LAN node.

7 Select the system to be operated as explained in *"How to Select the System" on page 5-21*.

After that, you can operate the system from your computer. You can also use the VXI plug&play library functions. For plug&play, it is not necessary to configure the LAN interface with the IO Config utility.

For information on VXI plug&play, click *Start – Programs – vxipnp – Agilent 81200 Help*.

For remote programming, refer also to the *Agilent 81250 Programming Note* and the *Agilent 81250 LAN Programming Guide*.

Appendix

Please pay attention to the Declaration of Conformity and the Site Attenuation Requirements.

Declaration of Conformity

Agilent Technologies **DECLARATION OF CONFORMITY**
According to ISO/IEC Guide 22 and CEN/CENELEC EN 45014 CE

Manufacturer's Name: Agilent Technologies Deutschland GmbH
Manufacturer's Address: Digital Verifications Solutions (DVS)
Herrenberger Str. 130
D-71034 Boeblingen

Declares under sole responsibility that the product as originally delivered

Platform Name:	**81200**	**Data Generator / Analyzer Platform**
System Names:	**81250**	**Parallel Bit Error Rate Tester (ParBERT)**
Module Names:	E1401B+E4807A	C-Size VXI Hi-Power Mainframe, 13-Slot with Controller
	E4801A+E4806A	VXI Mainframe with embedded Controller
	E8403A	C-size VXI Mainframe, 13-slot
	E4805B	Central Clock Module, 2.67 GHz
	E4808A	Central Clock Module, 10.8 GHz
	E4809A	Central Clock Module, 13.5 Gb/s
	E4810A	850nm 3.35G Optical-Electrical Generator
	E4811A	750-1610nm 3.35G Optical-Electrical Analyzer
	E4832A	Generator/Analyzer Module 667 MHz
	E4835A	2 Differential Analyzer Front-End, 667 Msa/s
	E4838A	Generator front-end, 667 Mbit/s
	E4841A	Generator/Analyzer Base Module, 667 MHz
	E4846A	Dual Generator front-end, 200 Mbit/s
	E4847A	Dual Analyzer Front-End, 333 Msa/s
	E4861A / E4861B	Generator/Analyzer Base Module 2.67 Gb/s / 3.35 Gb/s
	E4862A / E4862B	Generator Front-End 2.67 Gb/s / 3.35 Gb/s
	E4863A / E4863B	Analyzer Front-End, 2.67 Gsa/s / 3.35 Gb/s
	E4864A	Generator Front-End 1.33 Gb/s
	E4865A	Analyzer Front-End, 1.33 Gsa/s
	E4866A	10.8G Generator Module
	E4867A	10.8G Analyzer Module
	N4868A	10.8G Booster Module
	E4868A / E4868B	43.2G Multiplexer Module
	E4869A / E4869B	43.2G DeMultiplexer Module
	N4872A	13.5 Gb/s Generator Module
	N4873A	13.5 Gb/s Analyzer Module
	N4874A	7 Gb/s Generator Module
	N4875A	7 Gb/s Analyzer Module

complies with the essential requirements of the following applicable European Directives, and carries the CE marking accordingly:

- The Low Voltage Directive 73/23/EEC, amended by 93/68/EEC
- The EMC Directive 89/336/EEC, amended by 93/68/EEC

Revision: I Issue Date: 2003-November-11

Agilent Technologies

DECLARATION OF CONFORMITY

According to ISO/IEC Guide 22 and CEN/CENELEC EN 45014

CE

and conforms with the following product standards:

***EMC** (Technical Construction File)*

The product herewith complies with the requirements of the EMC Directive 89/336/EEC (including 93/68/EEC) and carries the CE Marking accordingly (European Union).

Against: *EMC test specification EN 55011:1991 (Group 1, Class A)*
As detailed in *Electromagnetic Compatibility (EMC) Certificate of Compliance No. 01-075*
Assessed by: *CETECOM GmbH, D-45219 Essen*

	Standard	Limit
EMC	*IEC 61326:1997+A1/1998 / EN 61326:1997+A1/1998*	
	CISPR 11:1997 / EN 55011:1998	*Group 1 Class A*
	IEC 61000-4-2:2001 / EN 61000-4-2:2001	*4kV CD, 8kV AD*
	IEC 61000-4-3:2001 / EN 61000-4-3:2001	*3 V/m, 80-1000 MHz*
	IEC 61000-4-4:1995+A1:2000+A2:2001 / EN 61000-4-4:2002	*0.5kV signal lines, 1kV power lines*
	IEC 61000-4-5:2001 / EN 61000-4-5:2001	*0.5 kV line-line, 1 kV line-ground*
	IEC 61000-4-6:2001 / EN 61000-4-6:2001	*3V, 0.15-80 MHz*
	IEC 61000-4-8:2001 / EN 61000-4-8:2001	*30A/m*
	IEC 61000-4-11:2001 / EN 61000-4-11:2001	*1 cycle/100%*
	Canada: ICES-001:1998	
	Australia/New Zealand: AS/NZS 2064.1	
Safety	*IEC 61010-1:2001 / EN 61010-1:2001*	
	Canada: CSA C22.2 No. 1010.1:1992	
	USA:UL 3111-1:1994	

Supplemental Information:

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

This DoC applies to above-listed products placed on the EU market after:

2003-November-11
Date

Hans-Martin Fischer
Name

Product Regulations Representative
Title

For further information, please contact your local Agilent Technologies sales office, agent or distributor.
Authorized EU-representative: Agilent Technologies Deutschland GmbH, Herrenberger Strasse 130, D-71034 Boeblingen, Germany

Revision: I Issue Date: 2003-November-11

Site Attenuation Requirements

EMC Regulatory Instruction - Site Attenuation Requirement

Introduction

All EMC relevant products must comply with the local requirements, internationally with the CISPR 11, in the European Union with the EMC Directive 89/336/EEC including 93/68/EEC, in Canada with the ICES/NMB-001, in Australia with the AS/NZS 2064.1.
For the modules of the VXI platform, the derived standards as well as the classes are noted in the Declaration of Conformity in this Guide.

EU-Conformity from a Competent Body

For products that do not fulfill the requirements the EU EMC Directive (§ 10.2) requires a Technical Construction File (TCF) with a Declaration of Conformity or a Certificate issued by a Competent Body (CB). For the Site Attenuation Requirements and the methods stated herein a review by a CB is mandatory.

Technical Rational

The systems concerned meet all requirements with the exception of Radiated Emissions of CISPR11 class A or the corresponding local standard. The measurement environment with specified high-speed test data traffic through open connections causes radiated electromagnetic emission above the required limits.

In order to meet the requirements appropriate preventive measures for the site must be considered and established before the systems will be switched on for its intended application. The methods described herein are sufficient to keep the system within the required limits of the standard.

Site Attenuation:

This document describes the methods for a Site Attenuation to meet the requirements of Class A.

Product:	81200 Data Generator/Analyzer Platform
Required Target Site Attenuation:	**26 dB**

Installation Instruction

If your site received permission from a local (PTT) agency to exceed the levels of radiation, this exceeded level has to be considered. In case of e.g. +10 dB, subtract this ratio from the Required Target Site Attenuation.

Based on the location where the system is to be installed, obtain the Available Site Attenuation. The calculating method is described in the section *Calculating Method*. Preventive measures might be necessary by optimization of the equipment and/or additional walls to be installed.

Revision: F Issue Date: 2003-April-16

EMC Regulatory Instruction - Site Attenuation Requirement

Note: After installation of the preventive measures the Available Site Attenuation must be calculated .

The Available Site Attenuation must be higher than the Required Target Site Attenuation value!
If not, additional measures as a shielded Cabin with specified shielding performance must be considered. Other shielding methods as conductive wallpaper, metal walls etc. require an approval test ("in situ") by a local (PTT) agency. Appropriate arrangements have to be organized.
Install the system as described in the Installation Manual.

The product installation will then meet the requirements for radiation levels of Class A of CISPR 11 or the corresponding local standard.

Calculating Method

To obtain the **Required Target Site Attenuation** at the customer site:

1. Available Site Attenuation:

   $A = n * W + X$

   A = Available Site Attenuation in dB
   n = number of concrete walls within distance D
   W = 10 dB (attenuation of a concrete wall without openings)
   X = attenuation reached by distance between equipment and exterior Wall plus 30 m to estate border

2. Attenuation X

   $X = 20 * \log (D/30)$ D = real estate border distance in m

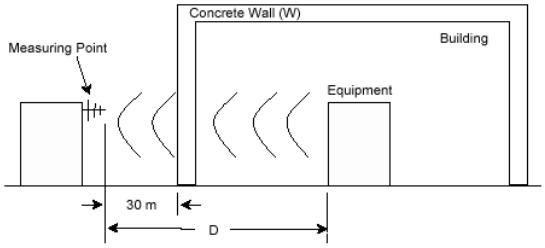

Figure 1: Site attenuation calculation

Calculation for this product:

Req. Target Site Attenuation in dB	Walls/n	X in dB	**D in m**
26	0	26	**599**
26	1	16	**189**
26	2	6	**60**
26	3	-4	**-**

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Index

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